Mammoth Pacific I Replacement Project Final EIR

Exhibit II

Comment Letters and Attachments on the

Second Revised Environmental Impact Report (RDEIR2)

Comment Letter 11



T 510.836.4200 F 510.836.4205 410 12th Street, Suite 250 Oakland, Ca 94607 www.lozeaudrury.com richard@lozeaudrury.com

BY ELECTRONIC MAIL AND US MAIL

August 6, 2012

Mono County Economic Development Dept. ATTN: Dan Lyster PO Box 2415 Mammoth Lakes, CA 93546 Email: <u>dlyster@mono.ca.gov</u>

RE: Mammoth Pacific I (%MP-I+) Replacement Project (State Clearinghouse No: 2011022020)

Dear Mr. Lyster:

I am writing on behalf of Laborers International Union of North America, Local 783, and its members living in Mono County (‰UNA+or ‰ommenters+) regarding the Second Revised Draft Environmental Impact for the Mammoth Pacific I (MP-1) Replacement Project (‰roject+or ‰ammoth Project+).

The proposed Mammoth Pacific Replacement Project proposes to replace the existing geothermal power plant (% P. I % with a new binary power plant (% J. 1+) capable of generating, on average, approximately 18.8 MW (net) of electricity. The existing MP-I plant is a commercial geothermal development project operated by Mammoth Pacific L.P. (% PLP+) and located near Casa Diablo Hot Springs in Mono County, California. The existing MP. I plant consists of a binary power plant with a design capacity of about 14 megawatts (% WW+), a geothermal wellfield, production and injection fluid pipelines, and ancillary facilities that have been operating since 1984. The new M-1 plant would maintain the existing geothermal wellfield, pipeline system and ancillary facilities of the existing MP-I plant. The existing MP-I geothermal power plant is located in unincorporated Mono County approximately 1,200 feet northeast of the intersection of U.S. Highway 395 and State Route 203 on 90 acres of private land owned by Ormat Nevada, Inc. (@rmat+), the parent company of MPLP. The project site is located on APN 037-050-002, with a Land Use Designation of Resource Extraction (%RE+), and is surrounded by lands under federal ownership and managed by the U.S. Forest Service as part of the Inyo National Forest and lands owned by the Los Angeles

Comments of LIUNA Mammoth Pacific I Second Revised Draft EIR August 6, 2012 Page 2 of 2

11-01

Department of Water and Power. The project site is located within the existing Casa Diablo geothermal complex.

LIUNA hereby requests and urges Mono County, as lead agency ("County"), to fully comply with the California Environmental Quality Act, Public Resources Code § 21000 et seq. ("CEQA"), in all aspects of the Project, including but not limited to, County preparation and consideration of any and all further CEQA documents prepared for the Project, County consultation with all other relevant and responsible agencies, County responses to any and all comments submitted on the Project, and County consideration of any and all applications for licenses, permits, variances, or any other notices or approvals sought for the Project.

LIUNA expressly reserves the right to submit additional comments on the Project in conjunction with the Final Environmental Impact Report ("Final EIR") for the Project or any other future actions taken with regard to the Project.

Please place this office on the notice list for any and all CEQA or other land use actions, notices, or hearings related to the Mammoth Project, as well as notices of any actions taken in conjunction with federal agencies pursuant to the National Environmental Policy Act ("NEPA"). Please also inform us of any meetings, hearings, comment periods, or other actions taken with regard to the Draft and Final EIRs for the Project.

Please send notices by electronic mail and U.S. Mail to:

Richard Drury Christina Caro Lozeau Drury LLP 410 12th Street, Suite 250 Oakland, CA 94607 richard@lozeaudrury.com; christina@lozeaudrury.com

Please call should you have any questions. Thank you for your attention to this matter.

Sincerely,

Richard T. Drury Christina M. Caro Counsel for LIUNA Local 783 and Mono County members

Comment Letter 12

ADAMS BROADWELL JOSEPH & CARDOZO

ATTORNEYS AT LAW

601 GATEWAY BOULEVARD, SUITE 1000 SOUTH SAN FRANCISCO, CA 94080-7037

> TEL: (650) 589-1660 FAX: (650) 589-5062 eklebaner@adamsbroadwell.com

> > August 6, 2012

SACRAMENTO OFFICE

520 CAPITOL MALL, SUITE 350 SACRAMENTO, CA 95814-4721 TEL: (916) 444-6201

FAX: (916) 444-6201

DANIEL L. CARDOZO THOMAS A. ENSLOW TANYA A. GULESSERIAN MARC D. JOSEPH ELIZABETH KLEBANER RACHAEL E. KOSS ROBYN C. PURCHIA ELLEN L. TRESCOTT

OF COUNSEL THOMAS R. ADAMS ANN BROADWELL

BY EMAIL AND OVERNIGHT MAIL

Mono County Economic Development Department ATTN: Dan Lyster P.O. Box 2415 Mammoth Lakes, CA 93546 <u>dlyster@mono.ca.gov</u>

Re: <u>Comments on the Second Revised Draft Environmental Impact</u> <u>Report for the Mammoth Pacific I Replacement Project, California</u> <u>Clearinghouse Number 2011022020</u>

Dear Mr. Lyster:

We are writing on behalf of California Unions for Reliable Energy ("CURE") to provide comments on the Second Revised Draft Environmental Impact Report ("RDEIR2") prepared by Mono County ("County"), pursuant to the California Environmental Quality Act ("CEQA"),¹ for the Mammoth Pacific I Replacement ("M-1") unit, a geothermal power plant facility with a net generating capacity of approximately 18.8 megawatts ("MW"), proposed by Ormat Nevada, Inc ("Applicant"). The Applicant seeks a Conditional Use Permit from the County to build, route, and reroute geothermal pipelines; construct a substation and transmission line; develop and operate, and eventually decommission, the M-1 unit; and to eventually demolish and decommission the existing Mammoth Pacific Unit I ("MP-I") power plant and ancillary facilities. The MP-I unit and the M-1 unit will operate simultaneously for approximately two years. The RDEIR2, and these comments, refer to the proposed M-1 unit, substation, transmission line, and ancillary pipeline facilities together with the eventual decommission line, and ancillary pipeline facilities together with the eventual decommission line, and ancillary pipeline facilities together with the eventual decommission line, and

 $^{^1}$ Pub. Resources Code, §§ 21000 et seq. 2620-019cv

The Project requires a conditional use permit from Mono County; variances from County land use regulations authorizing construction of an overhead transmission line and construction within 100 feet of the exterior property line; and an Authority to Construct and Permit to Operate from the Great Basin Unified Air Pollution Control District. The Project also requires the County to amend the Mono County General Plan to authorize the Applicant to develop geothermal facilities within 500 feet of a watercourse within the Hot Creek Buffer Area. The County for the first time addressed the required General Plan amendment in the RDEIR2. Our comments focus on this revision to the County's analysis.

We thoroughly reviewed the RDEIR2 and conclude that the County's analysis of the proposed General Plan Amendment fails to comply with the requirements of CEQA. In particular, the County failed to include the proposed General Plan Amendment in the Project description, evaluate alternatives to the proposed Plan Amendment, and identify the environmental impacts of the General Plan Amendment in the RDEIR2. In addition, the County has not complied with the applicable procedural requirements for amending a General Plan by failing to provide the public and other agencies with at least 45 days in which to review and comment on the proposed Plan Amendment. For these reasons, set forth fully in the following paragraphs, we urge the County to withdraw the RDEIR2 and recirculate a revised analysis consistent with these comments.

I. STATEMENT OF INTEREST

CURE has an interest in enforcing environmental laws that encourage sustainable development and ensure a safe working environment for its members. Environmentally detrimental projects can jeopardize future jobs by making it more difficult and more expensive for industry to expand in Mono County, and by making it less desirable for businesses to locate and people to live in the County, including the Project vicinity. Continued degradation can, and has, caused construction moratoriums and other restrictions on growth that, in turn, reduce future employment opportunities. CURE's members live, work, recreate and raise their families in Mono County, including in and around Mammoth Lakes. Accordingly, CURE's members would be directly affected by the Project's adverse environmental impacts. The members of CURE's member unions may also work on the Project itself. They will, therefore, be first in line to be exposed to any hazardous materials, air contaminants, and other health and safety hazards that exist onsite.

12-01

II. THE PROJECT DESCRIPTION IS INCOMPLETE AND INACCURATE

The RDEIR does not meet CEQA's requirements because it fails to include a complete and accurate Project description, rendering the entire analysis inadequate. Without a complete project description, the environmental analysis under CEQA is impermissibly narrow, thus minimizing the project's impacts and undercutting public review.² A complete project description, under CEQA, is one that includes a list of all project-related environmental review and consultation requirements mandated by federal, state, or local laws, regulations, or policies.³ The project description must also be accurate and consistent throughout an EIR.⁴

12-02

12-03

The RDEIR2 does not comply with CEQA's requirements because it does not include the proposed General Plan Amendment in the description of the Project. For the first time in the RDEIR2, the County proposes to amend the General Plan to authorize development of geothermal facilities within 500 feet of a watercourse within the Hot Creek Buffer Zone.⁵ However, the County did not include the proposed amendment in the Project description. Instead, the County buried the newly proposed General Plan Amendment in the Environmental Assessment section of the RDEIR2. Merely including this land use change in section 4.10 of the RDEIR2 violates CEQA's requirement to describe all aspects of the Project which may result in potentially significant environmental impacts.

III. THE RDEIR FAILS TO INCLUDE AN ADEQUATE PROJECT ALTERNATIVES ANALYSIS

An EIR "must produce information sufficient to permit a reasonable choice of alternatives so far as environmental impacts are concerned."⁶ "An EIR for any project subject to CEQA review must consider a reasonable range of alternatives to the project, or to the location of the project which (1) offer substantial environmental advantages over the project proposal . . . ; and (2) may be feasibly accomplished in a successful manner considering the economic, environmental,

 ² See, e.g., Laurel Heights Improvement Association v. Regents of the University of California (1988)
 47 Cal.3d 376.

³ Cal. Code Regs., tit. 14, § 15124 subd. (d)(1)(c) ("CEQA Guidelines").

⁴ See County of Inyo v. City of Los Angeles (1977) 71 Cal.App.3d 185, 193.

⁵ See, e.g., RDEIR2, p. 19.

⁶ San Bernardino Valley Audubon Society v. County of San Bernardino (1984) 155 Cal. App. 3d 738, 750-51. 2620-019cv

12-03

Cont.

social, and technological factors involved."⁷ This requirement for an EIR is intended to foster informed decisionmaking and public participation.⁸ The burden is on the lead agency to select a range of project alternatives for examination, and the agency's reasoning for selecting what the agency deems to be a reasonable range of alternatives must be publicly disclosed.⁹

The RDEIR2 provides that the Project now includes amendments to the Mono County General Plan.¹⁰ Specifically, the proposed Plan Amendment would allow geothermal development where it was previously prohibited in the County. The RDEIR2 fails to include an analysis of alternatives to the proposed action or to state why it was reasonable for the County to forego analyzing Project alternatives that do not require an amendment to the General Plan.¹¹ The County's failure to study alternatives to the proposed Plan Amendment in the RDEIR2 precludes informed decisionmaking and public participation and violates CEQA. Moreover, the County's failure to identify alternatives to its proposed action to remove restrictions on geothermal development within the Hot Creek Buffer Zone is manifestly unreasonable in light of the purpose served by the 500-foot setback requirement.

The Conservation/Open Space Element of the Mono County General Plan provides:

The principal issues faced by Mono County regulatory authorities during the administrative proceedings accompanying the applications for existing geothermal permits involved the question of whether geothermal operations would affect the fumaroles and geothermally included pools, streams, and springs in the Casa Diablo area, including Hot Creek Fish Hatchery.¹²

Energy Resources Goal 1, Objective D, Policy 1 of the Conservation/Open Space Element ("Policy 1") states "[g]eothermal exploration and development projects shall be sited, carried out and maintained by the permit holder in a manner that best protects hydrologic resources"¹³ To implement this policy, the General

¹³ Id. at p. V-41.

2620-019cv

⁷ Citizens of Goleta Valley v. Board of Supervisors (1990) 52 Cal.3d 553, 566.

⁸ See CEQA Guidelines, § 15126.6 subd. (a).

⁹ See ibid.

¹⁰ RDEIR2, at pp. 33-34.

¹¹ See RDEIR2, at p. 19.

¹² Mono County General Plan Conservation/Open Space Element, at p. V-6.

Plan prescribes that all geothermal development must comply with Action 1.13, i.e., "No geothermal development located within the Hot Creek Buffer Zone shall occur within 500 feet on either side of a surface watercourse."¹⁴ The County is required to analyze alternatives to removing this restriction on geothermal development from the Mono County General Plan.

12-03 Cont. Lastly, the contention in the RDEIR2 that the proposed amendment simply "clarify[ies]" the County's preexisting intent and interpretation of its General Plan is contradicted by the plain text of the General Plan.¹⁵ The Land Use Element of the Mono County General Plan provides that a variance from a development regulation may be granted if not in conflict with the "text of the general and specific plans policies of the County."¹⁶ Because the 500-foot setback requirement is identified in Policy 1, the Land Use Element clearly states that a variance from this requirement is not allowed. The County now proposes to amend Policy 1 to make the prohibition on geothermal development within the Hot Creek Buffer Zone subject to a variance.¹⁷ In this way, the proposed Plan Amendment would in fact reverse – rather than "clarify" – the County's prior legislation with respect to all future geothermal development in the County.¹⁸

IV. THE RDEIR2 FAILS TO IDENTIFY THE POTENTIALLY SIGNIFICANT EFFECTS OF THE PROPOSED PLAN AMENDMENT

12-04

"An EIR on a project such as the adoption or amendment of a comprehensive zoning ordinance or a local general plan should focus on the secondary effects that can be expected to follow from the adoption, or amendment "¹⁹ However, the RDEIR2 does not analyze the secondary effects of the proposed Plan Amendment. The County's failure to analyze the Project's potentially significant impacts violates the CEQA.

The RDEIR2 concludes, without conducting any environmental analysis, that there would be no change to any potential future geothermal development within the Hot Creek Buffer Zone as a result of the proposed General Plan Amendment.

¹⁴ Id. at p. V-43.

¹⁵ RDEIR2 at p. 34.

¹⁶ *Id.*, at Land Use Element, § 33.010(D), at p. II-315.

¹⁷ See RDEIR2, at p. 34.

¹⁸ See Families Unafraid to Uphold Rural El Dorado County v. Board of Supervisors of El Dorado County (1998) 62 Cal.App.4th 1334,1335 (describing the General Plan as a "constitution for all future development" in a city or county).
¹⁹ CEQA Guidelines, § 15146.

²⁶²⁰⁻⁰¹⁹cv

The rationale provided in the RDEIR2 is unsupported. The County provides three reasons why there would be no change to any potential future geothermal development. We discuss each one in turn.

First, the RDEIR2 states the proposed Plan Amendment will not result in any new impacts because no geothermal development may be approved, under the Mono County General Plan, unless the impacts of the proposed development have been reduced to less than significant.²⁰ As support for this contention, the County cites Energy Resource Goal 1, Objective B, Policy 1 of the Open Space Element of the General Plan.²¹ The County's reasoning is incorrect. The cited provision of the Mono County General Plan **does not apply** to "projects in the vicinity of Casa Diablo and associated monitoring or mitigation wells or other facilities."²² Thus, any geothermal development project proposed in the Casa Diablo geothermal complex – including the instant Project – may be approved even if the project would result in potentially significant impacts to the environment (such as development within the Hot Creek Buffer Zone), as long as the appropriate CEQA findings are made.

12-04 Cont.

Second, the RDEIR2 states:

[T]he Casa Diablo area referenced in the General Plan Conservation/Open Space Element consists of the 90 acres of land owned by Ormat and under geothermal lease to MPLP on which the project site would be located and an adjacent approximately 194-acre parcel owned by the Los Angeles Department of Water and Power (LADWP). As illustrated on Figure 39, the LADWP parcel contains areas sufficient to accommodate geothermal development and processing facilities outside of the 500-foot setback from the blue-line stream channel (and more than 100 feet from exterior property lines). Thus, a variance under Chapter 33 would not be required in order to approve a future geothermal development project on the LADWP parcel.²³

The County's conclusion that no future project would require a variance is invalid because it is unsupported. The County does not cite to any pending conditional use

²⁰ RDEIR2, at p. 35.

²¹ See ibid.

²² See Mono County Conservation/Open Space Element, at p. V-43.

²³ RDEIR, at p. 35.

²⁶²⁰⁻⁰¹⁹cv

permit applications. Thus, the County does not have any facts from which to conclude that a future project would not require a variance. Moreover, the County's conclusion is contradicted by information provided by Ormat. Although Ormat owns and leases a total of 90 acres of land in the Casa Diablo geothermal complex, Ormat maintains that due to the unique geothermal features of the area, there is only one economically feasible configuration for the proposed 5.7-acre M-1 Project.²⁴ Ormat's own experience demonstrates that the total acreage of a site (i.e., the 194 acres owned by LADWP) is not determinative. Many other factors, such as economic constraints and the location of the geothermal resource, will dictate any future proposal for geothermal development in the County and whether it may be sited within the Hot Creek Buffer Zone. The County simply cannot rule out the potential for a future proposal to construct a geothermal development project within the Hot Creek Buffer Zone.

12-04 Cont.

Third, the RDEIR2 states that because the granting of a variance is a discretionary act subject to CEQA, any future project seeking to develop within the Hot Creek Buffer Zone will be subject to environmental review.²⁵ The rationale provided in the RDEIR2 fails as a matter of law. The County may not defer Project environmental review to future project approvals. In *Laurel Heights Improvement Association v. Regents of the University of California*, the California Supreme Court held that CEQA requires an EIR to include "an analysis of the environmental effects of future expansion or other action if: (1) it is a reasonably foreseeable consequence of the initial project; and (2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its a reasonably foreseeable consequence of the proposed Plan Amendment because the Plan Amendment would remove the existing prohibition on such development. This conclusion is further supported by the fact that future geothermal development in the Casa Diablo geothermal area is highly likely.

The California legislature has mandated that one third of all retail sales of electricity come from renewable sources of energy.²⁷ Pursuant to law, the state's

²⁴ Applicant's Variance Application (undated), Attachment Amended April 25, 2012 (Attachment 1); cf. Mammoth Pacific I Replacement Project Revised Draft Environmental Impact Report, February 2012, at p. 2-4.

²⁵ RDEIR2, at p. 35.

²⁶ Laurel Heights Improvement Association v. Regents of the University of California (1988) 47 Cal.3d 376, 396.

²⁷ See Pub. Util. Code § 399.11 subd. (a). 2620-019cv

largest investor-owned utilities are required to obtain a third of their electricity from renewables by 2020.²⁸ Geothermal resources are, and will continue to be, exploited for this purpose.²⁹ There are a total of seven Known Geothermal Resource Areas in the State,³⁰ and the California Energy Commission has determined that the geothermal resource found in Mono County is likely to generate an additional 111 megawatts above existing capacity.³¹ However, the California Energy Commission has also concluded that the Long Valley Caldera of Mono County has the potential to provide thousands of megawatts in California.³² To say that future geothermal development in the Casa Diablo geothermal complex is reasonably foreseeable may be an understatement. Any additional geothermal development proposal will be significant because it will surely change the scope or nature of the current degree of resource exploitation and will cause other stresses on the environment through new construction and power production activities. The County is required to prepare a revised EIR that analyzes the secondary effects of the proposed Plan Amendment.

12-04 Cont.

V. PROCEDURAL VIOLATIONS

12-05

Pursuant to Government Code sections 65351 and 65352, during the preparation or amendment of the general plan, the County is required to provide notice and opportunities for involvement to citizens and local agencies.³³ Under Government Code section 65352(b), each entity receiving a proposal for a general plan amendment shall have 45 days to comment on the proposed amendment unless

²⁸ Ibid; see also California Public Utilities Commission, Order Instituting Rulemaking to Continue Implementation and Administration of California Renewable Portfolio Standard Program, May 10, 2011, available at <u>http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/134980.pdf</u>.

²⁹ See, generally, California Energy Commission, Integrated Energy Policy Report (2011), available at <u>http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf</u> (last visited August 6, 2012) (Attachment 2).

³⁰ California Renewable Resource Portal, Geothermal Resources

https://calrenewableresource.llnl.gov/geothermal/ (last visited August 6, 2012) (Attachment 3); see also California Energy Commission, Map of Known Geothermal Resources Areas,

http://www.energy.ca.gov/maps/renewable/geothermal_areas.html (last visited August 6, 2012) (Attachment 4).

 ³¹ Sison-Lebrilla & Tiangco, California Energy Commission, Staff Paper, California Geothermal Resources in Support of the 2005 Integrated Energy Policy Report (2005), at p. 8 (Attachment 5).
 ³² California Energy Commission, Background About Geothermal Energy in California, available at http://www.energy.ca.gov/geothermal/background.html (last visited August 6, 2012) (Attachment 6).

³³ Gov. Code §§ 65351, 65352. 2620-019cv

12-05 Cont. a longer period is specified by the lead agency.³⁴ The County has not complied with the aforementioned notice and comment requirements by limiting the review period for the proposed Plan Amendment to less than 45 days.

VI. CONCLUSION

We thank the County for this opportunity to comment on the RDEIR2 and further urge the County to prepare and circulate a revised EIR which adequately addresses the proposed Plan Amendment to the Mono County General Plan.

Sincerely, Elizabeth Klebaner

EK: clv Attachments 1-6

³⁴ Gov. Code §65352 subd. (b). 2620-019cv

ATTACHMENT 1

P.O. Box 347 Mammoth Lakes, CA 93546 (760) 924-1800, fax 924-1801 commdev@mono.ca.gov	Planning Division	P.O. Box 8 Bridgeport, CA 93517 (760) 932-5420, fax 932-543 www.monocounty.ca.gov
VARIANCE APPLICATION	DATE RECEIVED	FEE \$ RECEIVED BY ECK # (NO CASH)
APPLICANT/AGENT Ormat New	vada, Inc., on behalf of Mammoth I	Pacific, LP
ADDDDDDD 6005 Moil Dood	CITY/STATE/ZIP Reno,	NV 89703
ADDRESS 0225 Neil Road		
	E-MAILrleiken@c	
TELEPHONE (775) 336-0173		rmat.com
TELEPHONE (<u>775) 336-0173</u>	E-MAIL rleiken@c	rmat.com
TELEPHONE (<u>775) 336-0173</u> OWNER , if other than applicant ADDRESS <u>P.O. BOX 1584, MA</u>	E-MAIL rleiken@c	rmat.com
TELEPHONE (<u>775) 336-0173</u> OWNER , if other than applicant ADDRESS <u>P.O. BOX 1584, MA</u> TELEPHONE <u>(760) 934-4893</u> E-	E-MAIL <u>rleiken@c</u> <u>Mammoth Pacific, LP</u> <u>MMOTH LAKES, CA 93546</u>	rmat.com
TELEPHONE (<u>775) 336-0173</u> OWNER , if other than applicant _ ADDRESS <u>P.O. BOX 1584, MA</u> TELEPHONE <u>(760) 934-4893</u> E- PROPERTY DESCRIPTION :	E-MAIL <u>rleiken@c</u> <u>Mammoth Pacific, LP</u> <u>MMOTH LAKES, CA 93546</u>	rmat.com

Mono County

and the first first states

A STREET STREET, AND A STREET AND A STREET

·

See attached, next page

LINE CONTRACT OF SMALL ST

NOTE:	Variance applicants must clearly demonstrate that special circumstances - other than
	financial hardship - related to the property deprive the property owner of privileges
	enjoyed by others in the vicinity and in an identical land use district. Special
	circumstances are typically related to the property's physical characteristics such as its
	size, shape, topography or surroundings. Variances shall not: 1) constitute special
	privileges inconsistent with other properties in the vicinity or in the same land use
	district; 2) injure the public's welfare or be detrimental to property owners in the
	vicinity; or 3) conflict with the county's General Plan or Specific Plans.

I CERTIFY UNDER PENALTY OF PERJURY THAT I am: \Box legal owner(s) of the subject property (all individual owners must sign as their names appear on the deed to the land), \Box corporate officer(s) empowered to sign for the corporation, or \Box owner's legal agent having Power of Attorney for this action (a notarized "Power of Attorney" document must accompany the application form), AND THAT THE FOREGOING IS TRUE AND CORRECT.

Ohad Zimron State of the Contract Street	1	
Signature	Signature	Date

Planning / Building / Code Compliance / Environmental / Collaborative Planning Team (CPT) Local Agency Formation Commission (LAFCO) / Local Transportation Commission (LTC) / Regional Planning Advisory Committees (RPACs) Revised December 2003

Mono County Community Development Department

Planning Division

P.O. Box 347 Mammoth Lakes, CA 93546 (760) 924-1800, fax 924-1801 commdev@mono.ca.gov P.O. Box 8 Bridgeport, CA 93517 (760) 932-5420, fax 932-5431 www.monocounty.ca.gov

۰.

Version and the set of the set of

PROPOSED USE: Describe in detail the variance, using additional sheets if necessary.

Description of Proposed Use and Justification for Variance:

The MP-1 Replacement Project has been thoroughly described in a separate Use Permit application and in the Draft Environmental Impact Report (EIR) that is currently undergoing public review.

Applicable Mono County regulations (Development Standards, Chapter 15, Resource Extraction) call for a 100-foot setback from exterior property lines. As designed, the plant itself will comply with this requirement. However, the very front end of the plant will intrude up to approximately 12 feet into the setback area. This isn't the entire plant, it would be a section of the preheaters, a control and power shelter, and some piping (only a few feet into the setback area) – see the attached plant layout. In order to avoid this intrusion in the setback area, the entire plant would have to be moved further north into an area that has severe geologic, soil and geotechnical limitations and geothermal surface manifestations, as discussed in the environmental impact report. This would cause unwarranted environmental and other effects that can be avoided by a variance to allow this limited construction in the setback area.

Amended, April 25, 2012: In addition to the standard above, Development Standards Chapter 15 Resource Extraction also requires a variance to allow geothermal development to occur within 500 feet of a surface watercourse in the Hot Creek Buffer Zone. The entire MPLP property (along with the existing MPLP geothermal plants) is within the Hot Creek Buffer Zone. A "surface watercourse" is defined as a solid or broken blue line as shown on U.S. Geological Survey 7.5- or 15-minute series topographic maps As shown on the attached map, the distance to the streamcourse from the southwesterly corner of the M-1 site is about 275 feet, and therefore within that 500 foot distance. For the same reasons discussed above (geotechnical limitations, geothermal surface manifestations, and adverse environmental effects), the M-1 plant cannot be moved farther north or west out of the 500 foot distance.

The Conservation/Open Space Element of the Mono County General Plan, at page V-5, in its discussion of geothermal resources states that fumaroles and other geothermally influenced natural features are significant resources. At page V-45 it states that applications for geothermal permits (which would include variances) may take into account national needs for alternative energy development.

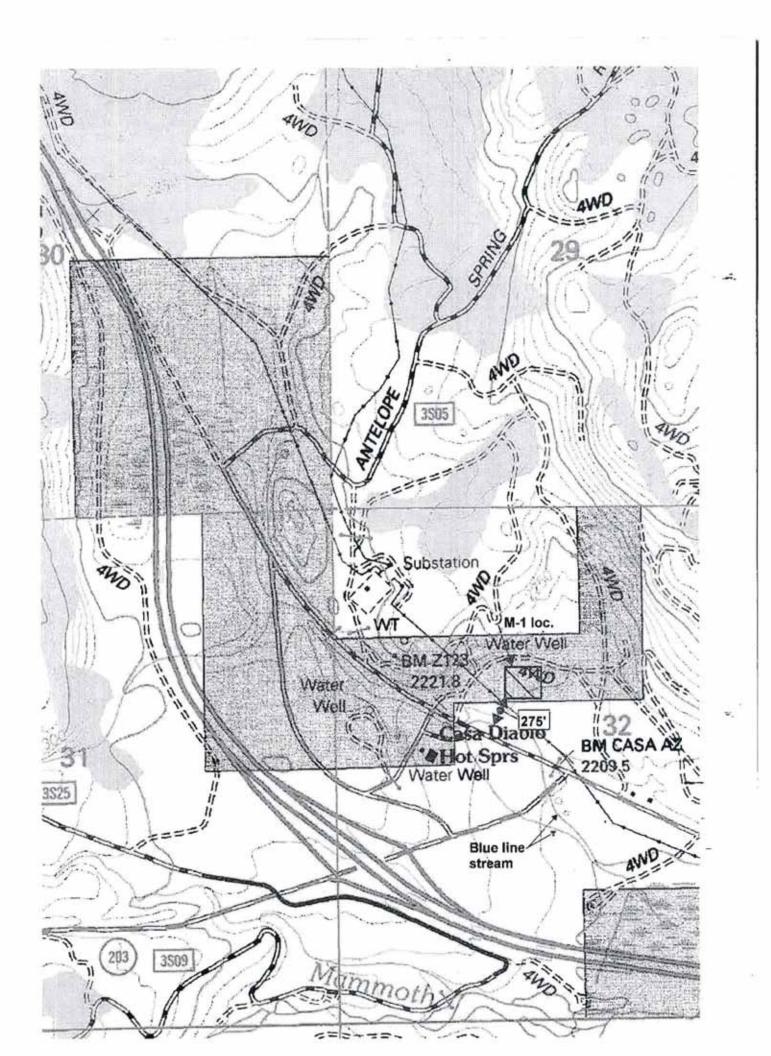
The environmental effects that can be avoided by the proposed variance include effects to and from fumaroles, mud pots and thermal grounds/soils. Excavation in the area north of the currently designed plant would affect the surface expression of these natural features. Construction in that area would be much more environmentally intrusive, and very complex and expensive. For example, in addition to the geothermal surface manifestations, the soils are very soft, compressible clay. Construction would require at least 15 feet of fill, add unnecessary ground disturbance, and raise the height of the plant (thereby adversely affecting visibility).

Decisions on applications for variances must take into account the nature of the proposed use of the land, the existing use of the land in the vicinity and the conditions in the vicinity. The proposed use is the same as the existing use of the project area and the surrounding area. It is a geothermal development area that has been in production for over 25 years.

Planning / Building / Code Compliance / Environmental / Collaborative Planning Team (CPT)

Local Agency Formation Commission (LAFCO) / Local Transportation Commission (LTC) / Regional Planning Advisory Committees (RPACs) Revised December 2003 There are unique circumstances affecting the project site; namely, extreme topography (the fumaroles, mud pots and geothermally influenced soils). The variance is necessary for the efficient production of geothermal energy and the further enjoyment of a substantial property right of the applicant. There are already geothermal pipelines within this setback area, along the property line in question. The property on the other side of this line is managed by the US Forest Service and is covered by a geothermal lease to MPLP. The proposed land use is therefore consistent and compatible with the lands to the south of this property line.

The granting of a the proposed variance (1) will further the public's interest in alternative energy sources, (2) will not affect or be injurious to other properties in the area, and (3) will not alter the character of the area.



ATTACHMENT 2

2011 IEPR



INTEGRATED ENERGY POLICY REPORT

CALIFORNIA ENERGY COMMISSION EDMUND G. EROWN JR., GOVERNOR CCC-100-3911 ATL CMP The 2011 integrabel livings Parks Report is Androdeed to

JAMES 8, 80YO Energy Commissioner Network 2002 – Sanuary 2002

With guidade for his 12 pians of dedicated public ser-ence and No sectating afforts to develop and implement state policies contributing to California's achievationity as a global over private

Acknewledgements

The Collarmic Large Communes would like to acknowledge the cardinations of the following Energy Communics shall in the proparation of the 2011 Wingshind Energy Palicy Popul.

OFFICES OF THE COMMISSIONERS

Eilers Man	Ellip Autobies	Sin Rathiter	Cathlenne Crists
Martona Elliot	Taul Games	Cathy Gratier	Sekity-Glast
Gales Lones	Kattilees McDuniati	Sarah Michael	investor Second
Tim Ohion			

Special Humic to Keyle Balleri in the Diver's 20ta for his efforts to quantify relevante antibulod generation capacity relative to state grant.

Card Roberton

Repr Infector

Wchael Wittan

Tory L'Bran

EXECUTIVE OFFICE Data Gybie Setue Ork

MEDIA OFFICE Second Carboli	Auto Chun
and share the second of the second	

DEPUTY DIRECTORS Parama Ratificiany Selvis Bandler Put Perst Louise for Man

STAFF CONTRIBUTIORS Jos Adaes Rousin Rides

THE PARTY PARTY INTO A	the second second		
Jan Adams	Ricards Nidas	lanetter Alben	Sarub Allend
At Alvarada	Gare Anderson	Anim Balevinian	Breeck Rachae
Artardining	Wartha Brook	Donly Browli	Satan Brown
Beth Dranbers.	Darcie Chaoman	Arata Cirea	Betty Christian
Matt Coldwell	Christine Callson	MM Dowell	Ave Drog
Panla David	Dooth Davis	Ins Davision	Rhetty DeMesa
Christopher Danny	Famila Doughman	Parre dukter	locat Eales
Devi Kdom	Ruis Laure	Satur Chining	Ravid Flores
Kallmen Farrett	Avato Evenue	Sandra Triomin	Jenne Gape
Clies Listerbeig Gallums	Padra Gamer	Avgets Could	Larraine Generality
Reynalds Danzalka	July Grav	MAx Gravely	Karee Dviller
Alaca Guerra	Cit Harland	Mark Hattens	Candace Hit
Adresse Randel	Mile Kate	Linda Keta	BUT WARKING
Ind Kine	fire maph	Andrea North	The Rendshine
Mark Keething	Planet Kukami	Liura Cavige	Expension Louis NAK
Mult Lartee	Mike Lopus	Wrgmin Low	Richel MatDonald
Aueria Maties	Pilar Magaña	Jonat Margolio.	Farni Martinezt
John Maltrias	Altan Malters	Init McErne	Michael McGoirt

CALIFORNIA ENERGY COMMISSION

Rokart B. Weisstendler, Ph.D. Chair	
Karen Divagilari, 1.D. Carla Perterman Andrew Middlester Commissioners	
Robert P. Oglesby Executive Director	
Primary Authors Jared Eabola Raitara Base	Jim Molinery Mile Manufact

Tartara Boron	Mike Monuterith
inister Campigna	Sarry () Seill
Nichslai Figale	Sim Page
Cavid Hungerboot	Heather Balth
Mike Jaska	Cettina Report
Delte Kavaltic	Datterie Sahen
Doug Riverier	Ruben Savares
Tacanné Karanar	Eabriel Taylor
Gat Carelli	David Vidaver
Cha McEurlas	
Auffic Green	Salaria Rasses
resident Manager	Program Manager
Inter Parton	Without Witton
Project Secondary	Braght; Benge

14

STAFF CONTRENIORS (CONTINUES)

Karlana McLeongtrue	Hour Weer	Philip Mildear	
Rata Matter	Phone Norvard	Sherill Neight	
And Wolfston	John Nuller	Multiari Jabrig	
Las Uttell	Jame Patteriot	All Personglare	
svia Rhone	Has Rider	Lars Killera	
Gardia Scheme	Phill Tethi	Margaret Sheridae	
Charles Solit	Robin Seturby Jones	Livela Spinger	
Sciat Devent.	Drik Shikes	Peter Shut	
See Stroker	Saruh Toheri	Angela Tanghotli	
Chris Tapier	History on der Werf	Tric Werkang	
Matach Wing-Galarity	Call Wiggstt	Arten Water	
Jone We	Rule York	Early Tolenth	
Secult Paper	Auto Incohetti		

Rata Mane Can-Gang Mynyne Jer O'Hagan Frinanisk 1944 Rathel Tafacar Davit Santan Manyine Tafaca Shariye Tafac Shariye Tafac Cany Misane Lina Woral Dasyn Dang

Pretace

Tanath Sol 1389 Houses Chapter 568 Digitales of 2005 m quires the California Lenge Commission is prepare a locatial artispisted avergy policy input that contains an assessment of major beargs literals and insues facing the state's electricity natural pat, and transportation has sectors and provides pility recommendations to concerns recovered, project the enveloped prior edublic secure, and there everyp supplies, ordance the state's account, and protect public health and safety Phylic Researces Code & 25,101(c). The Everyy Connection proposes these assessments and assossalled parky recommendations every two years as part of the Adapted Group Price Papert, Preparation at the integrative Kings Policy Report southes clear collaboration with Indexal state, and total agreezes and a wide namely of state/restors. is an extensive public process to identify prifical energy in tury and density strategies to address these mores.

Abstract

The 2221 Integrated Every Palicy Report answire, a sumstary of animal many instant anematic basis (California, Teogrant previse), training and animal setting the the effect of the setting set of the setting setting the setting setting the set the

ŝ,

KEYWORDS.

An Accurates Navel, knoleses, knownegs, tanfasis, harling and applices reflections of students, California Deerg Dammian, California Integenetaris Science Departule. California Malie Utilitere Communiane, California's Otzan Europy Fatane, chiane energy externing, studi Andi generativa, casthooli Must and generations, accurates disease, electric anticles, nicelujo men. Intella strategist, resmont Anopues, devest, distituituid generations, accurates disease. Deless Ampy Hols Paus, generativa, status and part delessantes. Deless Ampy Hols Paus, generativa part forte, per contacto, part del Statabate, subraté gen Annanti, subraté pas partellane, partellane Statabate, subraté gen Annanti, subraté pas partellane, partellane parter Honsgues, Patrice Honey Telessante, anderes and generativas, parter Honey Telessante, parter Malies, methoge and theorem Developer Telessantes and the passes. Internativa, Remerativa, Partitela Mandard, mentor subageant, internativa, Remerativa Fatabated, reservas Jahanes, Janes and Marteriane, Remerativa Fatabates, Patrite Mandard, et essantes Jahanes.

Points can the following pilation for this report: California Energy Constraints, 2011. 2011 Integrated Energy Policy Report, Publication Number CEC 200-2011 001 CM

Table of Contents

- 1 Locative Summary
- 19 Chapter 1. Introduction
- 27 Diagiter 7: Personalité Electricity Status aut Innaes 31 Diagiter 1: Activities Conf (Theline Energy Efficiency for
- California: Accordity Bill 2021 Propriot Report
- 60 Chapter & Achieving Energy Savings in California Buildings
- 72 Ouster's California's Oran Energy Falare
- 82 Ocapter & Pewer Plant Licensing Lessons Learned
- 85 Chapter 7: Natural Gas Approximent
- 101 Chapter & Electricity and Natural Gas Domand Forecast
- 13 Dayle & California's Districtly Infrastruction
- 137 Chapter 18: Insecuritation Energy Pericasts and Analysis
- 154 Chapter 11. Banelits Trans the Alternative and Revenable Fault and Vehicle Technology Program
- 169 Chapter 12 Bringing Energy monution to California Through the Public Internet Energy Research Program
- 188 Ouples 13: 2011 Bissing Action Plan
- 187 Chapter 14: Nuclear Issues and Status Report on Assembly Bill 1627 Report Recommendations
- 20 Accepts

List el Figures

- 3 Figure E.E. California's Danging Direct Rends
- 30 Figure 3: Reconsible Generative for Colifering and Resenables Particle Standard Generation
- 31 Figure 2: Nonewalde Distributed Generation Capacity Countral Xin and 32 2000 MM Goal
- 31 Figure 3: Desert Rowswalds Everys Conternation Plan Area
- 10 Figure & Henry Hub Daily Spot Market Natural Gas Prices
- 31 Figure Schemp Hub Annual Average Natural Gas Spot Market Priced.
- 11 Figure & Marginan East Sugary Curves for National Carars
- 31 Figure 7.116 Administ temp (Fullerk 2011, Ausual Auroper Home Hub Sout, Market Proces.
- 188 Figure & Statewise Annual Unchicity Consumption
- 224 Figure 3: Statewale Annual Noncompilated Peak Distant
- 317 Figure 33: Statewide Employment Projections
- 185 Figure G. Stateweds Final Impacts of East Generation
- 111 Figure 12: Statewide Committed Consumption Efficiency and Consumption Impacts
- 158 Figure 13. Annual Pytroloum Displacement From PEVs stations:
- 160 Figure 18 Annual Petroleum Reductions Biofunt Hoduction Projects Biofesei
- 182 Figure 15: Annual Petroleum Displacement from Natural Cas Tracks. (Carlors)
- 187 Figure 16: Estimated Number of John In Supply Chain Phase

4

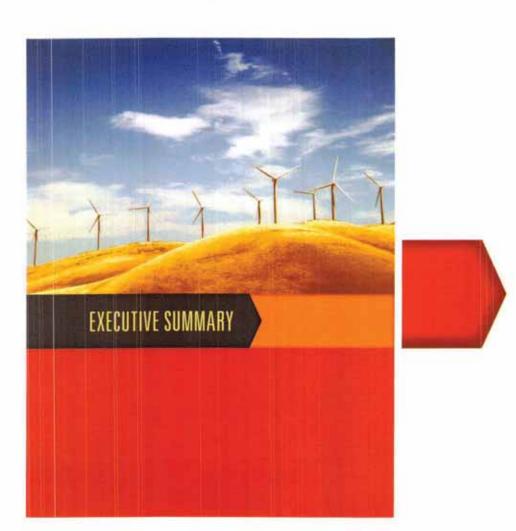
- 175 Figure 12-Integrated Gazzmann Lighting System
- 1/7 Figure 18. Cariconitating Photosoftaic System

List of Tables

- 29 Table 1: In-Style Research: Caracity and Greenings (2010)
- Table 2: Performing Regional Talgets for KOOD Megawothy of New Research Causeds by 2029
- 23 Jaile 3. Property Profession Propinst DG Taights to 252%
- 34 Table 4: California's Revisuable Cariza Potential
- 33 Fulle 5: KNIC and Publicly Denied Utilities: 2005 and 2010 Stinlegs and Expenditions
- 35 Table 5: Excitated Peterlate for Pyblick General Utilities Excluding SMLD and LADNPY
- 98 Table 7: PEAE High Denand Day Can Resementing and Teactors
- 183 Tuble & Stationide Electricity General Persons' Comparison
- 106 Edda & Stationial End Itter National East Pyrecost Designation
- 129 Table 10: Electricity Compression From Self-Generation (DWI)
- 127 Table 31. Generation Project Development Transien
- 127 Table 12: Compariso of Perscalds of California ISU 2018 Peril Stenand
- 129 Table 13, 572 Capacity With Compliance Deadlance in or Refere 2022
- 115 Table 34-Programs for Small GMF
- 348 Task IS PER Public Charging Inhastructure Deptement by California Region
- 256 Table 16. Program Investments by Fael Type
- 257 Table D. ARYVE Progress Fairding Impact.
- 164 Table JB. Annual Prinslesel, DHL and Driteria Emotion Reductions to 2029 - Law Date
- 165 Table 19: Kensall Priblinum, GHL, and Collera Emission Reductions by 2028 -High Case
- 366. Table 26: Projected July Creation by Tops, as Reported by Recipients

i.

- 184 Table 21. to State Biofuel Production (inflimit gpt)
- 186 Table 27: Rupper Groupher that to Meet California Load



Every two years, the California Energy Commission prepares an Integrated Energy Policy Report as directed by Senate

Bill DEP Univer, Chapter SAR, Statutes of 2002. The expert namnew samue aspects of energy semity remark, decidentian, and proc and, Rando Ja-Thera assessment, provide policy resonanticidates, to ensure system milatility and safety construer ensurema, patient the ensurement and antibility in a feastive ensurement.

This 2012 Integrated Energy Policy Report proveds an survive of policies that policy Collinaria I wanty system and summaries program resc is implementing three policies. The report is built on a survey of we degit analysis of levy apactics this feature is built on a survey of we degit analysis of levy apacts that the feature is one policy assess of tophilptis event that Collinnia must consider as it mores forward in moting its avery guals. These traces for not trate prevent collectores.

 Counting that the state has nullinesst, initiality, and take every indication to every aprend and follow everygrithment as well an the shale's clean energy grads. This will involve imposed free-acting of donard for electronic solution par, and transportitized learn, presenting awarg afficiency, situated exposure. Betholited presention, and constituent and and parsen for endour for and for additional constraint which a percentra and taxemicans industricities, endowning the electricity instantomics and 600mlations system, evolution for and for and developing none electricity, andraid put, and fur and developing particities to maintain somely reliability and top protections and processors and addressing particities that processors and addressing particities around processors and addressing protect plant learning processors and addressing processors plants.

- Addressing challenges to achieving policy plants for imargo efficiency researable searcy, dictributed groutsfiles, combined heat and proces, offernalise competition fort, and reduced greenhourst gas only tions, Gaux vehicle achieving all cost effective everys officiency reduces energy the in earling buildings. proceeding you set every buildings, increasing fatter is feature II of millionersy eligible in the state sales by 2020, necessing the pridaction and non of Insurance interactivet, achieving Governor Edmand G. Brown in's Clean Energy Juba Plan Largets of 12,006 egawatty (MR) of merecable instituted prevailer by 1020 and 6.500 MW of cambined heat and proof to 2025, increasing the ana of alternative and removable Interpretation fraits to 26 present of fuel contampton by 2022, and decreasing the carbon intensity of transportations fault, by all least 10 percent by 7028.

Science the accession involvance transits of the data arrange economy to involvance transits or particle holds preventions: the research participants resonable energy. He variet goal, alternative and development to resolution this and research address development to result alto and several different development to result alto and several different and the insequence of the constraints and in this 2012 Data of the Data parts. "California is lead by the values in containing with research and the integra and the leadys and unclocable and new effected."

ł

confeq would profer to represent News, seconding to explorementative plans scheduling in April 25(1), but we proves indicated wellingness to make the inversion inservision without a long twom power purchase approximated. Similarly, plant seems way they would need hind a long twom particulars approximate its forance wetting there spating plants with afternaling control plant power particulars approximate its forance wetting there spating plants with afternation control probasings. Informate all these plants well increases the need for new generating capacity is sufficiely power parts.

The Energy Commission also expects more than 2.500 West around final generating capacity to in distantial landsmark moves and 2020 as a world of Beaula tilt 1366 Strady, Chapter STR, Datates at 2006, which lands stag from softly meethemship in backshop generations to power places that wat are consistent by placewaise; standard. This distribute well react the share of Calibrary's electrolity week next by stand-benefit.

.It the tame time, an quality combaints are centremag the development of new head hard power plants that could regiace retains or directivit general ing capacity, particularly in the seathern part of the state. That region will likely need to replace some other generaling capacity with departments, mediate forcid faciled ansate plants when minding press from philling ing plasts retex to satisfy hisal capality requirements and hoto integrate cariable renovable prepration resources developed as a result of the state's Norrow ables Pertole Standard. To better orderstand the percential conflicts between the need for new capacity and the scarcity of emission attuats to develop that Lapacity, Rosanthy Bill 1318 /V. Manual Pinn, Chapter 295, Statutos of 2008 regards the California Air courses Board to Breekey a report, in computation with various agenties including the Energy Commision, to assess the read for one power plant capacity is the loath Gassi An Rasin and evaluate the send far artists compared to available amounts. The report will also examine whether rule charges and ath

California's Current and Future Energy Needs

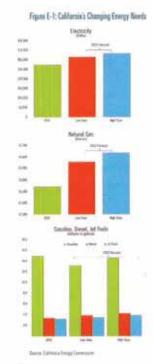
Fore is the segment downlaw. California's downlaw for interpretations to give in 2018. Californian transmoot advant 2013.2018 geparative threes (SWI) at electricity, network generative transmission (2014) million threes. Turing Cannersense at differentiation Maller threes. Turing Cannersense at differentiation will avain between 218.2013 (2004) and 122.544 (2004), at annual average powers where the seminative and avain between 218.2013 (2004) and 122.544 (2004), at annual average powers where any conservations on respective to results defined and the seminative million threes by 2027, an average annual growth turk of between 0.2 apercent and 55.4 properti-

De the transportation side, er 2013 Californium error 21.5 tillion galants of gassilon. Hereit and art fact, which represents a 7.2 percent decline fram 2006 levers. Data for the first sense manifes of 2011 indicate that gasative and densit comumption was Rown about 2 assessed from 2020 musit. This michael s dae to a combination of contained high hard courts. The occusionic growth. Macforer in the oping of real estate and equilies, and particuled high animplay mant, Likelpy Commission staff forecasts of future gatabae coexamption range from a doctore of 15.4 cant from 2009 levels to an increase of 3.5 percent by 7020. The layer range is haved on a low printtion fuel demand scenario that accurses increased officiation more filters using hybrids and detail, and the introduction of alternative hum. The higher range it based on a high principan Bonard science with

or permitting descharations pre-medial to allow photoplants to the developed which safeguarding an quality. The project has been understay since sprain 2018, and the Air Resources Reset anticipates prividing a head watch to the Lagotoluwin as the summer of 2012.

is addition to participating in the Assembly Bill 1118 shady the Energy Commission is an exising the electricity infrastrications movied to support California's transition to a low-carton future while maintaining resource advasary and reliability. This startaneet, began in the 2011 integrated freezy Policy Report proceeding and continuing as part of the 2012 Integrated Group Paricy Report (Butch present ing is realizable invitation that will affect the most for new generating and transmission mitpitructure. substing electricity demand growth, polarital orbit ment of large amounts of generating casacity due In Age or slark water policies, landed availability of ownested efforts for reglatement prevaling facilities. etronext, regisement, or directions of coal field generation serving California and achievennet of tate policy goals for increased use of energy eff ficiency revealed recovered detributed resolution combined heat and power, and enough through

Thore are also inhighly charlenges around ated with the statu's licensing process for large scale salunal gar, sular and allow thermal power plants. Easty 1998, the Feerily Conventions has been and mum than 18,000 MW of electricity grinerating capacity that is carrently spinuting and deliver energy to California cuctumers. In Depender 2010. office Repetiting more than 4,000 MW of solar thermal projects and 1,000 WW of spheral par plants, the Comp. Constitution began analyting its permitting process to identify that give to the patient and taxed up the process without compressing transparence. affective participation, or environmental automets During 2017, the Energy Commission's "Restarts isorned' proceeding will provide white papers and public workthout an a earliefs of incore, that will be ord to storolog incommondations. Depending on The native of these remainmentations, the Energy



Commission may person changes to the regulations. That gives and dylete the Denryy Commission's power plant lighting process.

The Energy Commission is after working through with federal, state, and regional approves to improve news plast and transmitting fail permitting project as through the Decart Revenuesia Everyy Conservation Play and the U.S. Harsay of Lond Management's Druft Salar Programmatic Environmental Impact Stationent The Depart Newwarkle Energy Contervalion Plan planning othert brings begether a large and alwerse scaledulater group to develop concerculies its alregist that identify and mag areas, for vinewable energy generation and transmitting deadhprowed and hat ong form natural residence conservation. The Draft Talar Programmatic Leastaneoutatal Inspart Statement is belowing to establish a solid foundation for longterm plassing for salar energy development on public lands in California and five other western states and will promote better, smarter licencing of willing-scale solar projects while publicity or minimizing conflicts with widdle, and tailway and Noterical researces

California's clean energy poats for everys Michaely restoubly respects, distributed ground tion spectreed heat and power, and energy charage will also affect the need for segraded and new every inhustrature. Using energy more efficiently reduces stichicly demand and therefore the need to new generation and transmission influstructure increased ancients of distributed principlan incutod rear electric leads can also reduce the need for new targe scale power plasts and transmission lines had will remain upgrades to the saiding slob-likeline as International Monting the state's Reconsulties Particles Standard target of 33 partent renewable electricity by 2020 will require new retenable power plants. transmission likes to bring power from those plants to the state's load contern, and other intractive: like natural gas, fixed power plaints, averyy through, and demand engineers is tapport adaptating high loors, alutiable resonables into the electricity system while maintaining worked operations and reliability. Specche

a recruiting eccentry and bases had peccel. Densel more angles is, there active it is non-active by bitment 97.2, percent and 16.4 percent compared to 1008 whet have and of an anythesi adult shade incoment, process have a set of an anythesi adult shade incoment for all anota and the moments of takeness direct anythesis whet have a set.

Consumption of adversaling spacing of solutions that a marked by time. Staff in allowates that a marked by the electric works space scale assession is 4.446,000 workshes in 2020 and as many as 1.4 million in 2020, athrough additional analysis to isolated to estimate the available of battery electric and plaques electricit workshes. Solution allowates the state of the electricity encourses the state of a solution of the electricity encourses the state of a solution of the electricity encourses the state of a solution of a solution to estimate the state of a solution of a solution to electricity encourses the solution of a battery of a solution of a solu

California's Energy Infrastructure Needs

Electricity Sector

By 2028. California zoual ton referensest, esplacement, we describer of even than 5.2024 WH of heaping generation and 2.2022 WH of cash of an equilipment of a set of 2.0022 WH of cash of an generation This study's policy to reduce some through cashing an gener platest—andro that is participed bros the acceas, explaining, merch, or failers through a statem feature machinese and then reference to its statem feature requirement than 12.2002 WH of exciting gas, then generation to ranging with that paties by 2028. Merch assesses of California's quarks that are less three features.

makes with California's clean energy policies are discussed laber in this summary

A final infrastructure score in the electricity set tar is the safety and reliability of the state's rache at power plasts, to 2016, marinar press from the Diplan Canana Pesser Plant and the San Droftle Committing Italian priorded 25.7 present of California's mutate electricity generates. These plants are located war main surfrequity faults and have significant investories of speet multiprile feel should an odd. Comment about mathias plant tably and establishtase increased because of recent large earthquakers ii Japan, particularly the 9.2 magnitude socile in March 2003 and the resulting #5-but framans that affected the Fukuching Dauchi plant, in suly 2013, the Every's Commission and the Catiliania Public Utilities. committee conducted a joint public workshop on The implications of the Foliastiana Dulichi accident for California's medium power plants and the etilities rights is carried will the reconnectations made in a 2008 Energy Commission assessment of simma hazard and notices plant subscubilities, which was remained by Astronaldy Hill 1417 (Blaketine, Chapter 772, Statutes of 2006. After that workshop, the Exeige Conversion. It consultation with the California Public Utilities Commusion, severaped a set of speofic recommendations in the 2012 integrated Energy Paley Report to address insues with California's netwar pawie plants, webuding completion of varia studies, improvements in spent fuil storage, income learned from the station thackeul at Pakechima: now generation or Doministics facilities needed to main-tain reliability in the event of a long form radiage, and moats of energency response planning

Natural Gas Sector

The primary effectively insert in the 2011 Adapted Design Policy Report Instance in the national gas sector in the calls and reliable operation of the scalar's network of extend gas paperises. On Signments 3, 2018, a Toph process rational gas transmission papeline investiby Pacetic Can and Electric Company regulated andre a supplementic of the term of the term of the term regular analysis and the barriers of the term of the regular analysis and the barriers of the term of the heating term procession. Such disabilities that have been mentigentions atomic the optimum, and the foregra-Commission around Patility Internet. The age Research Program facility to Internet gas and the interactive

The California Public Utables Commission Initially entered precision roburbanes and turburgentity ordered facific Gat and Electric Company to realise specaling ersoners on tions of similar similary and charachers. bcs at the failed tegment, in June 2011, the California hubb: Utilities Commonian streetest Papels: Call and Derive Company, Southern California Can. San Dept Gas & Circhin, and Southwest Gas to pressure liert or oplain all populies, which is expected in take several seart, Cold Not is complete, processer levels min be induced below minimum allocable spending periturn or the utilitiest mits impremied other missions infended to accure thate aperations. A fainful report an hydroleying offerts and periodicity results not the subject of an evidentially financing at the California Public Utilities Conversion on November 22, and an December 15 the California Public Utilities Dommission granted Pacific Can and Electric Company's squest is restore pipeline pressures on several key Bay Area loss other hydefecting was complete. Since that tone. the California Public Utilities Commiss has justed a competitivenie staff report detailing its

Indiago sed making recommendations for changes at facility Gas and Decisic Generation. The Every Commission has a closely evolved the tradege commission has a closely evolved to the tradege commission and aparticling producers for any regards as services for value of gas commences, including the natural gas. The Every Parks that Contention missions on the advect to present of the advectory. Parks

Gas and Electric Company has exported the sector month to contenters as a result of educing the spectrating processes. Two positive segments have fulled hydrostatic testing, but is such case, as long as

ust energy policies and programs have made California's sphered leader in energy efficiency. in Its last tree decades, California's policies, program and efficiency standards for buildings and appliances have contributed to keeping California's per capital electricity concentration vertations constant while one in the test of the Dellor States has recreated 45 prezent. This Energy Commution shaft estimates that chandrards have also saved cardomers \$16 billine in electricity and natural gas costs (in 2010 dollars) piece 1575. President Obama, noting in No 2017 light of the theor address that more efficient use of prorpy sover, money, asked Congress to send live a kell to "Hele manufacturers triminaly energy wath in their factories and give howinesters accention segrads ther buildings. Their energy hills will be \$205 billes lower aver the next decade, and Americany will tose less poluton, mer manufacturing, and mice into he conditection workers who eased than."

Caliference's energy efficiency policies include increasing at read-efficience energy efficiency, reducing energy size in exploring the energy efficiency reducing energy size in exploring the efficiency reducing energy and energy including to contractions in California analog at new reliabilitati contractions in California (con set) energy "is automotionic at parallel energy of California and a contractions energy productions in white huiding energy and is "wet area" to 2010, an 44 wes unstantiation analysis fails, and energy to 2010.

Achieving All Cast-Effective Energy Efficiency

In further California's goal of activity of 2016 efficiency energy efficiency, a funnity fill 2010 Enrow, Chapter 724. Statutes of 2006 research for Swapp Consequence, an activity softward public Utilities Conventions, foi investig softwards Public Utilities Conventions, foi investig softwards wergy efficiency patiential estimates and targets for California acts's neurons ower and publicly activities (attriburing of the three projects Associated Human Lengths III). His Composition Earling Publics Application 2016 (PUL), His Compt Convention 1481 Induced The Activity 2017. His testing accurs naturals Sigh-Romand persols, Papela, Can and Electric Caregary deadd have the adulty to remote wateral gas to coldene service to cardiniers, rectining gas first generating plants.

Everyp Connection startf also analyzes the offset of the reductions due to lower quarking protocols on Pacoloc Eas and Electric Company's interaction or Pacoloc Eas and Electric Company's interaction or Pacolocus and and a part transmission of pacing with the Tare are backfore capacity, cardialments should be able to be model by writing more capacity the age to angle to the model by writing more capacity the age of Electric and and provide a gain the area of Electric and and provide a short to make the pace of any and provide a short to make the pace of the term of backbare capacity on these show collectric and any backbare capacity on these show collectric the average confidence acces.

Transportation Sector

California mest also ensure setticised whiteheadure for most the stater a assessment and administrationepochicies and mests. Methodise, commential basimentes, househeadure, transitione and geneties, and ale sig and basequicables faults for exercised al groots and appropriate heats along product sensor for with and, industrial, agricultural product sensor for with east, industrial, agricultural subservation, without and reservations at anot. California of prediction has fullees AT2 proposed

Learning and Sange Commission shall estimate before encloses sanging from 7.2 to 1.3 percent per para. The stability 21 of enforcement, which percented mere than 1.2 willing another of matter of per day in 2013, continue the engl of cruels of any pert 1. An anatorie winast from Alexia and a sanity of beings sources. Taylit meetics in the anilog haven't per year to 7020 transport in 7020 levels.

Energy Conversions staff believes there is but found writing space input capability to small the low estimate for crude of argents and satisfy the

Electrics Earcy Electropy for Earthmap 2011 - AGM Nat myort, which tummaniatic shifting progenics and transmortanish approximation for packing some of all abbiered and the same an energy scaling is and 833 Mitt of pack an electric statistics are same and the calibrane Packing Diffusion Communities 2018 tanking packs of 2376 CPM and SG2 Mix Reported nutries (and transmopacing Communities) and 2378 tanking packs of 2376 CPM and SG2 Mix Reported nutries (and transmopacing Communities) and and the calibrane Packing Diffusion Communities Packade and the Calibrane Packing Diffusion Communities in the Calibrane Packing Diffusion Communities and pack tanking to the 2010 PLT Bit wilding the transmost and privates SU23 Diffusion to tacking coming stating and privates SU23 Diffusion to calibrane and SU34 Diffusion to calibrane and privates SU23 Diffusion to calibrane and SU34 Diffu

For fulger savings patiential, the Activery Gast Elliptic (Jany) (Bicancy de Calitions 2701-2004) report estantes 5.525 Gills of cast office/ve savings periodal to live patiety assent adults for 2017-2020. The funger however, only represents about 42 percent of net annual savings from all patiety seems delibers. The for largest patiety and a patient of a large sale.

Forecasted savings Next several individual uGBties must the AB 2521 goat of 10 percent savings over 10 years, but He combined publicly sensed stilly fargets achieve only 6.8 general savings have forecasted 2020 have every sta. For much shiften, market troingt potential was samulated using a 50 percent cathaner measure inpattine level. Energy Commission staff analysis indecates that when a 75 percent econ tive lever is used, nearly all utilities would must the 18 percent percemption reduction goal operations in AB 2021. This suggests that the publicly swinet utilities the next the thermorphics reduction goal but may repairs a higher level of program effort and budget thus was factored into their largers. However, the mise of met-effectivement is a key factor or setting incardise tools and Arbornising which officiency missions h include in programs, increasing incentive levels to 75 percent may not be cast effective for all utilities.

statics seed for torevolvant transportation back. There are too track of argent enhancement projects supported to Southows Caldersen that are at project support of Southynessis, and Reem Tritts at Pion R02 on the Pipt of Lina Argence, and Reem Tritts at Pion R02 on the Pipt of Lina Argence, and Reem Tritts at Pion R02 on the Pipt of Lina Argence, and Reem Tritts and Pion Calders an analysis, the Southers California market thread require constructions of only one of their evolution of anyoper, the Southers California market thread and anyoper, at the Name and Pionie evolution of anyoper to the Name and Pionie and an Orienter expanded candidity to receive extents all requires settlem Hor need have to here parts to assume to Microard supplex of canonechand leasapprefaries here.

For alternative transportation fuels, domains for behaviors is expected to grow as a result of the fadinal Renewable Facile Mandard 7 mandates and the state's Low Carlan Fair Dlandard, Certain Histor lettions in low-lovel bloods, buildenst, recovable dworf, and reaceable gradient will report only modest fucking initializations investment and Altik to or matheatans to make whereas to make prepter ater, California's scharbrachere he receives, Michillaria, and these of strains is report and advecate to accord endals a continued provits of othercal une over the ed several years. Although California's bediesel althoutputture is porerable inadequate to accomme date widespread blooding of biodiesel, with settioned lead time (17 to 74 woodbill would address insuld be completes that would enable expresses of insideral use. An initial \$100 million investment have the Energy Commission and private sources should an celerate the development of several biofiel production projects in California by 2017.

Other alterative transportation turks like encively, output gas, and kydrogen will require considerative unvestment aver the real second parts in the log inhomosphere and welfasts from all years in the log inhomosphere and welfasts from the ment) are doing make in California's whether the grant ment are doing make in California's whether the grant entrative second compares and second in the anticident with Comp Community angues from the and other privals and guilty, forth any previous the

Reducing Energy One in Existing Buildings

Easting haldings also provide a theoremistics experising to the cost arrays saming, indicest previousle gas memories, and gib senders. When half all California's 12 million environments that and mene than 42 perpend of summercial haldings seen that before implementations of the chart's halding strategists. Assessing bit 754 Okiemer, Oragine CIU, Stateley of 20050 wareful the Energy Community of Interlay adapt, and replement a comprehensive Mathematic program to robust seeing consumption in meching halding, and replement a comprehensive Mathematic program to robust seeing consumption in meching halding and mayor as that effect in the Interlay design Prior (Wynet.

Efforts by the Exergs Genomicases, the California Pathie Utilities Contensions in trial governments, and addition to contention repetiential and commercial building setsetty proposes where the Exergs Disprahe Contension¹⁴⁴ found are previding the functionates the two and TGB regimes. Real those we be incomplete worth activities previous the left residential and interstationated buildings, identify what mult be there in propulse contension areas. Declaring action plans, the two, plant pregnances, and directing action plans. Inter-

neuring tarward with AB 758 program involutions. The Gauge Commission will also welve with the Califormia Pelolis Utilities Commission to employate interface to a scheme imposed or compliances with testilating and appliance standards to sensure that sostryp officiency measures and supported an opporty instands and atticements assesses. The Gauge Commision will also devote impositions to introve complipance with appliance officiency Standards using 85 partnershy under Sonate Bill #34 (Punky, Chaples MH, Stadium et al Distante Bill #34 (Punky, Chaples A) Stadium et al Distante Bill #34 (Punky,

Activeying Zern Net Esergy Histors and Buildings

The Energy Commission, the California Public UNItest Commission, and the Air Research's Reard Agen. charging adhedvantive to support the singlepotent of plag in otherhie vehicity in California. The Everyp Commission kays are affected specific being particular sets it Auding adhed to the first of the support lister, 11 hydrogen informs, and 20 USI SB present effected theorem challens.

California's Clean Energy Goals

In the 2012 State at the Data solitory, Governme Remove shall all "Calification in Austing the nation in concluting plats in removable travery and the foreign and constructions of mean altitorist theological and two logicality of a mean altitorist theological and two logicality of their constrained to chear energy wate retrieved by Previolated Cherris in No. 2012 States of the Universe energies of the results of the set of a state of waters theological theoretical and and the international strength states of the memory and and the international

Cathenia's anticlease energy and environmental pericy paid, are impartual ticklappe to generative sensesy independents, minute energy independent tacks, induce statements generatives, and key unable than energy paids. The 2021 Julia pained integrities Report discussions anomic sentage statements and the senses energy efficiency, misessale intertwish, indefinished presentation, catheore and provides, and efficiencies energy efficiency, misessale intertwish, indefinished presentation, catheore and provides, and efficiency report Anocesion the imparture fails that antercapped anomicality catheore and an ensurement with presentation, and ensurement and dissolutions will place in activities parts.

Energy Efficiency

Compy officiency remains California's trap provely for multing new electricity sends and is a key situategy for increasing jubic and reducing generations gas amersions from the electricity sector. Part and connect

edupted a grad al activities preview every holding transform by 2020 for modernia thereing holding in zerometrack holdings, horizonia by the Catherine Public UDMex Commission, Catherina has more are not areny building that are public table. It modern the table is one of energy public in Scherbeite 2021 the Catherine Public UDMex Commission evidence of 2020 JULY 2019 Mrt (Hogg Action Film for the cammerical holding texts).

The Elvergy Datientscen is calculated in any net energy gash to regarine specification of the efficiency alonators in reflect two includings and advantages with the gast of advances 70 to 10 percent energy strengs in each thread advance of to epitaling auxiliaries standards to include electronics and after diversity stranger into include electronics and after diversity alonger into include electronics and after diversity alonger into include electronics and after diversity alonger into include a durity that represent an incruzing paction of Calibratic tensory and. In 2018, applaces officiency chaster that of theory events (3, 34) generation there of other that, representing study 2 percent of Calibratic to storage tout.

Downer House valued in his 2012 State of the Darke address. "Our state issues insueable, your offcised cars, walkers, and technic socies. We do that because new andientics and states on socies. We do that because new andientics and profits have notening and insert heads." In most the downship and and heads." To most the downship to an analy official adjusted states the downship to an adjust official adjusted states and heads on a state 2012 adjusted states and heads on a state adjust tory chargers will auch serie to Catilianus that, when implemention, will sure states when you adjusted to adjust a state trade states and heads and a state adjust on a state 2016 adjust and your state adjusted and adjust adjust to adjust the 2010 continuents and interching your ang of more the 2010 continuents.

Renewable Energy

California has more than 11.000 MW of reservation generating capacity as inter, with estimated techinc of patiential larkest data set officed technomy.

*

aniversential or manific conducies? of 10 welling MM of additional resources. The state is the toolog producer of sono-addition unlegs in the libring? Erster adds many 16 departed of institution? unapplies conting here removalize resources the wells. Solar, porthermal, biometric, and sonab Apditoritectics in 2010. Californess's kadentinis is and in sparse to 5 yelling. State presentation paties are not programs. That here emissional meansante libringhout and helped orders: the contor of means-the historic for contant, the contor of National Demonstratic Energy Libringhos: the pre-watt pack for solar mediates have foregoed from EC2 in 1388. It washes 51 biologies.

Renowables Portfolio Standard

California y Researchies Parthelis Standard response address to proceed 37 processor of their relativistics of electricity how revealable resources by 2010, bit 2010, instructure generative standards for the control of relativistics and proceeding to 2010 and 10 proceed of address that generative how colding functions conductes that generative how colding functions conductes that generative how colding functions ingread and geneting could define controls to september and generative whether working resource addresses, it is councilian whether working resource addresses, it is councilian whether working resource addresses of a councilian whether working resources addresses of a councilian whether working resources to include addresses september and theraugh 7202 and whether ad councils for more facilities with tools to function given solid generative solid.

To support the Resemular Perthals Deviced Lieget, General Rows S Data Lengy Mite Plan admit the adding 20.000 MM of here researched couport by 2020, recisiong 8,000 MM of large-scale wind, solar, and genhemic resource at well as 12,000 MM of liecalism revealed generation that the inservice truth and specification and publication force, Gaussian Revers Data Lengy Julié Plan Reschel Mit Gaugy Commonses to proport a plant to "repeating pointing of the highlight particip limits" presenting of the highlight particip limits (2006). Beneficient in transmission particips' To tapport and and the transmission energy that will reach one plan and beneficients.

4,000 MH of new purchased heat and power in 2023 to robust greatheast gas sensitives, and the (average) Chess Energy July: Plan includes a Larbert of 6300 WW by 2018. Combined head and power. which is often a pitchthad generation recourts. It as impertant part of California's energy-min. Cambined heat and power facilities can militan mergy son by califying work heat appoint with electricity productions and using it to power inductival functions amarticles, tossilars, and ether facilities. There is currently more than \$,520 MM of combined heat and ment installated in California, reaking the state's fixed of continued heat and power facilities he second largent is the tixeled States. These facilities impro the efficiency of the electric system to some tess that is protect energy and tax reduce as pullation and generihouse gas emissions since less hart is burned to pridate such and of avery evaluat.

California's busifying Facility and Constinent Inial and Power Program attitument, approved by the Poweral Energy Regulatory Commission in New 2016. Initiality, and a constance facility and a method ment restartion general adultion. The articlement restartion general adultion. The articlement restartion general adultion, and the Markow exclusion accords targets, incomposition that an exclusion general adultic particular that Magatanoetta adultication and the AM Resources. Based's generation and pair resources the process particular gain resources the process of the process particular gain resources pair resources the time process to sign one general particular segmements, and provent the Valor.

The Queenar's policy puts for distributed genregions and condense haid and press, along with the most qualitying facility estimated with their as hairs a distributed for the policy of the distributed theory of their distributes and the 2022 integrated Design Policy Append proceedings. Note Senger Commission Manual to address part and the 2022 integrated Design Policy Regard proceedings, that Design Commission Manual to address part and the 2022 integrated Design Policy Regard proceedings, and present in California and desempt proceedings extended and proceeding for according to recentling extended and proceeding controls to accord by laws and according to policital controls. public health, in Decountier 2011, the Everyp Committeen released the Research? Planer in California. Earths and Easter regard, which describes the status, of remensible development in California and identifies Childrenges to manifus remensible parts.

Mare of the challinges to meesakk dovriep ment tellste he energy infrachtschute seicht, including addressing land ove mount, and fragmented and switcoping pre-mitting processary associated with building new resewable utility scale and deskibuled ration facilities, building sufficient transmission souled hi internancel and believe instructive penics. ten, and approxing the distribution system to reliably and safely support kigh levels of resemable distribaled greenation, investiging topperting instandarachers the natural gas fired plants, every storage, and demand respirate measures to help indepents variable tenrivable reprinters, secaring the successary investert and Reporting to build new commutile facilities and conduction research and Americanovil In domina new inclumingers and situltegies in support ensemble electricity inhaidrochure miniti. To address these shallonges, the Lange Com-

mozzke will werk (basily with other lapencies and Usakilytety) in develop a reservation (bit upper) as 2022 as a part for 2012 departed foreign future August Experies (the NUE departed foreign future depart Experies (the invitinge plan include: CE) provides grappedic areas the development. (2) montant interpreter and the development, CE montant interpreter built cards for include constitution and complexity and fine. (El provide montant information) and for include property, CE montant interpreter built cards in which provides montants information for information provides montant programs for complexity in which provides montants and complexity and their information institution programs for information provides information institution programs for information provides information institution programs.

Biomergy Development

10

In addition to focad julity guits for increasing renew pile microschy size, California pile taggesta developerant of biosenergy fo help actives the statist developrenergy guits. Enopsee: and tenges will calculate develot the guid #12,000 MH of local absoluted

tion of distributed generation and combined heat and power to the statute energy rok.

Transportation Fuels

California's transportation policies include increasing the officingy of its transportation fluid, volceasing energy security through the development of after native transportation fonts and vehicles to reduce dependence on petroleum, and reducing generating gas emissions in the homportalism sector, which so counts for searly 45 percent of the state's prenchause gas emission, to 1987, the Energy Comand the As Neurosciet from a surroad the Stale Albertable Facts Plan which recommended adiating attemption and remewable fast use goats of 3 present by 2012, 13 precised by 2022, and 26 percent by 2022. The state also has a goal of producing a streetly receasing share of its biomets fighted transportshas fuels have is utata suprate between now and 2053. Other impartant transportation certainst paticipal cliefe California's Low Cartier Fairi Diardard regulation to indice the carbon intensity of transportation hastic wood in the state by of logist 10 percent by 2020. and the Air Residences Board's Zera Consider Vehicle regulations, which require planufacturers to produce ing numbers of zero emission vehicles and plus in hybrid electric vehicles in the 2018-2025 old years. Foderal policies like the revised Renew able Fast Mandards also incovings the development and one of renewalite and attenuation furth buand afting the valuences and types of renovable for that must be used nationally, with individual states regained to inset proportional-stars volumes.

California is making propers theorie actioning its class monity gapsa. The efficiency of the status is gate-days which there is supproving, web fault economy necessition by 2 percent devices 7004 and 2025. Nove 12-54 miles per patient to 70.56 miles per gabos. Percision argumentes in 2009 decland an enformation of 8 percent time 2020 keyes, nov its energy provision, and hishers and target will play impacted tasks in reducing castso emmission with hangapertaine neutrol missions: development of three resources has been taken to March 2011, the Energy Camericision adapted tha 2012 Aloneousy Action France, which sould that the bageware share at revenuable inclumba (powerlaw descauged them 20 percent in 2006 to 31 percent a 2010, and an other biologi apartedies in 2020 represented and 5.6 percent of California theorie dimension.

The 2017 Biomorphy Action Plan identifies a sumbar of MrBrupers to sugged Sinewarp, including manthematism of the Public Gaudy Change to provide analysis, to including and energing the through the subjects. Reveloping longus and kinestitute of the publim impedies and no data statis instatic throughtenin and expedible determinist, instatic throughtenin distributions and no data statis instatic throughtenin increase accuss to the interface providing membrase statism expected bars in the interface increase accuss to the interface (approximation and dipoliations goal and autority intermiscions and dipoliations goal and autority and memory functions statism participation approximation and interface participation approximation and transport of biomaxis memory.

The 2012 Discovery Action Plan was initiated to be applied and relevanted an resided to adopt to changing conditions. Parties are continuing to work on competing and applied processes, and the Energy Commission will report on applieds and processes in Main XPRs.

Distributed Generation and Combined Heat and Power

In the right cacanetacers, distributed generationunal scala power generation located class to instanby loads – can indices or similar the root for new generation, hypothesismic, and distributed instructivetans. Distributed generative can impose the efficancy of the interface roution by availing transmission and distribution to that each who performs and distribution to the can end perform the interface your power loss. These systems can also impose vehicably by provaing electricity to a sole regardlers, of what might scare on the power gold. Statisticated generation that tailows derive good derived persons rate from a shift generating capacity and your hieronizate shiftmeness and we capacity and your hier-

Is a recent just report by the Devisegs institution and the Honore Heldhalms. Assuming the Bark of Paththalm (Process Systems on the US-2 Prover Science Coopy Shult at the Honore Institutions instant that, Many everys analysis, have matter the potential for Sighthalm growthalm (In Borone a many part of any therkneys) what hardwarm. The Anton rapidly david coop bits. The previous growthal at this rapidly david coop bits. The previous growthal a first rapidly david coop bits. The previous growthal a first rapidly david potential and recently extends to be assumed before we gas detremine what with the Manifestion, integras from a detremine what with thisbuild marging somes.

For the portpeties of the 12 1000 MHz of reason akie dishrikalad geveration by 2025 gail, distributed prevention is defined as 121 have and fectivalization accepted an revewable for purposes of the Norrise ables Portfolio Standard, (2) sized up to 20 MHz and (3) located willing the tow writings distribution got or applying power directly to a consumer. California has abaut 1,000 MW of resources included prompton nicolod, with positive \$2700 MW that is possible at sufficient under socilizer their programs to support duicitated grownstan. Morting the Governm's target will require improvements in the presiding and intreconnection processes affecting distributed generation facilities. It will also require regardes to the state's aging distribution taxtion to address physical challenges and maintain safety and reductal ity when inforcommoling large amounts of stateshold greenation. These issues will be considered during the ortoponet al the Every Commission's convection stitutege; plan thering 2012.

In addition to California's distributed generation goals. He for Resources Reart's Chinate Charge Scaping Plan engendly called for development of

11

The messaged are of attained as granities. The wave of attenuation which is in increasing, with the number of regulatorial taplied without how in 2000 is 0.201 and California Spati-dayl without how is 2000 is 0.201 and California Spati-dayl without how is 2000 is 0.201 backs - which is that can use granitive campaing are consentations of Handia and the Spectral - increased how 8.42 percent is 1.54 percent, and the number of national gas governed backs visio how just another of national gas governed backs visio how just another 1.201 to new them 10.2000.

According to Energy Connection staff projection, containington of alternation between two and 2010. Used to recent in distances between two and 2010. Used the containing of the second staff of the containing of the containing of the containing of the containing of containing of the containing on typical electric which is, Similarly, constantiation alloction states statistical in investment and a traditional state of the containing on typical electric which is, Similarly, constantiation of safes at a state of the containing of the state at a containeed state of the state at a schedule gains for Homoportation is septical that at a conservation of 2010. Autoinum analysis is non-earth at is provide the state.

These per two programs in place that will support the development of alternative and reservable fuets and vehicles to much future domand and help attain California's presidence gas emission reduction guars. balls coupled by Assembly Hill 118 States. Chapter 758, Statutes of 2007). The Air Resisances Result's Air Guilty improvement Program, with an annual budget of \$20 million to \$40 million, supports development and dephysical of one-execution and reduced emission light duty orientes and tracks. The Emergy upon's Alternative and Rendscable Fail and teners behavings Program, will a bulget of about \$100 million annually livingh 2025, supports involve industries the estimate to transport the transport turn and advanced transportation technologies. This program invests in a wide variety of alternative and convertie here, including storing drive, blimetham desal tubetilules, siltunal, natural ges, prepare, and boltants, and heads workforce having. To gate the

Everys Communities has been the projects totaling \$754 million and approved plant for an additional \$152 million advection.

Index Assembly Ris 119 Nainz, Chapter 2(1), Statuter of 2000, the Every Community is distributed to evaluate the Insentity of the Adversaria and Rease and Social and Social Contrology Program and Espect or arrayment as part of the Integratude Energy Princy Report. The results at the Intel such evaluation are sented in the 2221 Interpreted Energy Princy

As a securit of the Attentions and Newsweller Fast and Velocite Tochnology Program, Californea revotang that feeding the deviae of interface coefficient campustypetones and high-specification and the coefficient campustypetones are program to 2009–2010 levels, the symparum has more thous divided the modules of LSD bankes statistics to the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added 20 existing gas tubions, the states and has added by the California the the program has also they bell to california threads there private homology and have addit to california process.

Other program benefits include superficant exh mated reductions in California's etc of principum fails. Program institution in electric situa tacheologies. production of birthing. Send substitutes, national parmediant- and heavy-duly williales, and hydrogen fasiing stations will cantribute toward estimated petrotrue regardiest of 180.4 million to 1.4 billion gathers per year in 2020. Expected reductions in generation gas arresident and tortheile pulled with late while significald, to 2008, total no read preprinted gas execsame were extinuited at 183.3 million tunnet of CO.e. Earlos Bands coulcident: Program investments are ectimated to reduce previous gas seenants to 2.7 william formers of CO.p to 9.7 and lice turnees of CO.p a 7928, and reduce emictance of criteria polylarity tack as very like to gave compareds, taches monarity strogen under, and particulate matter

These taxetifs will have a people impact in fulting Calibraticy transportation energy policy point. Development and commerculations of the B4 projects feeded to date have the periodial to implace up to 6 generated the exclusived pertonism hast destand in 1002 and endow such is precased with the probability hastness any essait preventions pain relations from transportations in this came peak to addison, common indications of homes of projects handwid by the program and transmission periodic handwid by the program and transmission periodic handwid by the program is produced bioaxial achievement of the shafe goal to produce an increasing share of Caldionnia's during common any increasing the shafe works by 2005.

Supporting California's Clean Energy Goals: Agency Coordination and Research and Development

Energy Agency Coordination

To achieve California's clean energy goats, state energy agreetes must coordinate thereby to monitor a local projective on every patchs, and to similar pring periage, conflicts, potential consequences. and amou of courses that must be addressed. New againing the proving interdispondencies interry the slate's energy and economical agreeces. In 2015 the Everys Committation, the Air Necources Board, the California Economical Protection Agency. He Calierror Public Uniders Commission, and the California tomound of factors figurate developed a sinior. implementation plan, and mindmap to achiever a chose everys toher to Collisia The Collimp's Oliver Deep false Desites whated a Stationar 2001. Interest an 2020 but also considers the state's geal to reduce greenhouse gas emissions to 70 percent of 1998 levels by 2018.

The disenses because an low revenues to applicating the interval 2010 induction of automatigate guids, reducing peak energy demand through efficiency, demond encourse, and enclutation of distituined generation recreasing the advanced of indudate energy in the statisty perificial is achieving the Dispersion by 2010 intervalues. The which is translated

14

serurang that sufficient learnerscore ped diskloption intractively will be available to meet execution grant and generature per versions reduction to persist and use sequencing generation. Available grant and have generating generation and advancements in value to generating enderstand and advancements in where generating end.

An part of the California's Dates Canego Estare partors, aground piontip program of policity available "https://cities/interpret/inter-endeding-like partcities/abs/lind as the Deserve Metrick are pathol to the California Oran Europy Future exploits and all be applied or posteriolity in which new bielensation. The approximation of the California Orange California applied provided in which new bielensation. The approximation of the California Orange California applied and absolute the other stars and the applied and absolute the other stars and the applied and absolute the other stars and the applied and the other stars and the other stars and the Davies of the applied in the stars and california of the Davies of the applied and the stars and the other targets biesseally following cach downad forecast applied provided by the Except California in the alignetic California Problem Bard.

Research and Development

The ansertions and approximate if new technologies are encounted, and approximate and an encounter development and encounter, development pairs. Finale society from and/encounter and technologies, the society and development and technologies, the society and development and technologies. A society gas a develoption of the society are used as society gas a develoption of the society and technologies. A society of the provided library, in the 2022 States of the society for an explaint society of a development, society of the formers plate society labors of the bestive that generated society is the bodies of the society of the society labors of the society of the for society of the society of the society of the for society of the for society of the society of the society of the society of the for society of the society of the society of the society of the for society of the society of the society of the society of the for society of the society of the society of the society of the for society of the society of Dues the last 14 years, the Exerge Connecttions 9 Audie Inferent Exerge Printiench Program Annbeded assays of which research that may and to market energy and supports the thefe's using string gamt. The program fault instants around a brind tarethness of energy auto, and data origing ethicities another intergy automated Austricate Activities among infinite anotherated apolishim. Transmission and attributions and transmission techniques.

To further the state's goat at achieving all past-effective sworpy efficiency savings, theory Committees haded research has supported technological girs and strategies now included in the 2008 Building Diversity (Candiells, such as residential card onto implorials that allochools reliect the sur's even pa how the not surface; to reduce air conditioning stal, requirements to unprove energy performance of an transfers and stud systems, and more officiant Afthen and anderground pige insulation. In odds fam, requirements in the 7007 and 2019 Analysis. Discoury Standards for external power supplies and ful-comen interviews resulted density from Energy Commission-Sauling Insearch, Diesell, Stera Huasame, will produce estimated annual energy taxings of incred Nam 12 killion for California electric and satural per rubparent when halo implemented.

The Public Meteod Serrey Research Program (Jose Kaskpant for Alazard Schemagnics and the manifelytics Segrent for Alazard Schemagnics and intellubility for the development of a Astrochemagn versions of the period. Another example is developed within lefting control network that or values energy to be menadore casing system developed by Reflexand Dathetics Low Viejland Schemal in right table series françabat Calimons (Incl Indicated Jones) conting to (35 to 70 percent and toband annual events in the 31 to 10 percent

Restarcts and development are also essential to support Cardonics's messagite sensy positi. Foregy Commitsions functed payorist tamin fulgod intervalia foctorilogies much material and achieve failton moleg presentation. Allowardly blocks for most intervalentially in the statu's decision/g particular. Date susreption In a low inscripturing plathourbac probes at oround by Construint, Junc, imposite plathout by the Platic Homourb ange Research Program. A model is the Platic Holl perdiction. Howe are no includinglass, so California and Annexe and several abilitational state under disaispond including a CA 1000 Nacify andre tourshockers a figures. California.

Trenty Committees research funding and hepports technologies to exprose management and oper ation of the electric gold. For example, spechrophase measurowest systems - which provide information to protoperature up in 30 times pol second - are being and by the California telependent Taxtee (tperahe to help former and provent power satingen. In Investry 7008, new yeek technik allotted and exercitors abort unusual grid ossillations that were causing prid instability, playing the shuldows of a power line in time to poold a major blackout. From to installation of this tectore. He California Independent Eatlant Descript weitable would not have deleved the migulatily. In the future, speckrophaser lectronic gain are expected to care electricity comumers \$210 million to \$170 million per year by availing segrets power solidges along with \$90 million per year in reduced which with parts

A major challings laces the Poblic Interest Lency Research Popular is Site expendion in Tancery 1. 2017, of the clark's Police Code: Charge Is regard many entited consorts and anothermal. There is keepert from the Charges and key lightsfore trades to zontow the Poblic Quark Charges, and in Ochber 2011 the Calinova Alder Online Economission extension the Poblic Quark Charges, and in Ochber 2011 the Calinova Alder Online Economission of public Interesting to evolution patiential californiation of public Interest, funding patiential californiation of public Interest, funding an entropy of the California Poblic Interest, and therestables programs. Poolshalter programs, Pools with a patiential in Alderson tables programs. Pools with a patiential interesttables programs. Pools with the patient of the Econogic account is not inclusion. (Phase 2 of the processing, which will adversarize an infrainties.

- 18

Economic Development and Job Creation

Concerns Dision's Dialet Ferry Ibbs Pion executations that investigg in energy HTD Sectory and chain execution is a perturbation of the biologing California's ecomopy. California's energy patient cardinate to be instrumented an estimating on order or galad insettments, at harding two tempores, and gravity are instalative and pilot by creating market domains for these energy technologers, projects, and previous Georgen Brown and contain is to 2022 Date of the Market adverse." In the longituding of the samplet industry, pilot were trantanda in the foreign target in the samples. The same technologies and the part of the same pilot."

Evergy efficiency sharkards periods investments in technique monotone to develop new products as and as jut creates for MM workfree needed to provide nergy adult, here every ratings, and building connectioned to develop if initialities and hereing ad analysis and topogent initialities and hereing additional to cossing even than LS million for here explorated to cossing even than LS million for here explorated pilot, including feest pilot contained in provides and politics consisted when participant programs and indirect pilot coreshold when partners solated adulars concept builts on the politics.

Dian range palizes to taggert network in surger sagart clean including investment in Calibreau, which thesis to gain with its task the landschara, and suppert industries like assortiu-clean. According is a secret (row it A Young, Life analysis, in the first aparter of 2001) some Calibra in control STAT million is worken sagitar investment for clean both companies, supersenting 56 period of aufational investments in the clean test in bandyer. A 2021 Benefits in testings to total

report statulated that, suffernally, the tition econ implices more people blair the firstal faets and betrick inductivity, with first of the first failtent processe thread tech segments between 2003 and 2010 in mesodolo story; which added about \$2,000 print in the solar Dermal, salar photosailast, wind power, biolach, fasi of production, and smart grid industries. In Califor wa, a 2000 sarery to the Conter for Energy (Mojesco and Renovable Technologies Roard that Hausands of workers will be proded between now and 2025 to baild renewable power plants being properted to Southern California, with humbeds of operations and maintenance yets sensing for the next 70-30 years, in addition. It activited that construction price to build 2,000 photovoltaic projects totaling 6,000 MM over a 35-year period would create a monthly average of 12,802 plot.

California's insectioneds in aforealise and renew dis transportation hait projects are also contributing to ad creation. While peoply through the Advancedore and Revenable Fart and Hubicle Technology Program ard Mill in the early shapes, awardses explicit to create more than 3,000 pills throughout the market spectrum schöre nandaturing contraction engineering and operations and maintanance. Duing economic length multipliant, program investments in 1,000 manufacturing arbs alone tright result from 3,000 is 1.000 indirect jobs in Insurce, transportation, supply chains, worthfulnes, and saturbal backnesses. Autochem ana estimate that more than 800 Celifornia turo nes will participate in their projects, more than tail of which are used batterizes. The propriate plus experiences with private beaucorg and other public funding searces, with estimates of everaged haves as trigh as \$184 million.

Research and determinent activities to support the tubics along sensing applicance and environmental on broaving additional venture capital associations to Exoformic and constitution to an environment Commission staff estimators that research feeded by the Public Internet Georgy Research Pargiane musicity more than 3388 development. 255 where Jubic

benalling how middes doing the work parchating gents and services), and 2.580 induced jobs (wh furnishe memory and aveployeest purchase possity and services). Funding from the Public Informal Energy flo search Program also loverages additional invest-For example, the Energy Instantions Small Grant Program has provided \$30 million in swardows who went as falleting more than \$1.4 belies in subsequent investment, Products developed through these grants are worth \$1.3 billion to the private sector - muse than All times the initial investment of program funds and creater jobs and other economic barrelits for the state in addition in 2018 the Public Interest Energy lessanck Program successfully inveraged more th \$100 estima is belong character betting under the American Recovery and Resourchment Act of 2005 and \$500 million in private investment using only \$28 million of program funding.

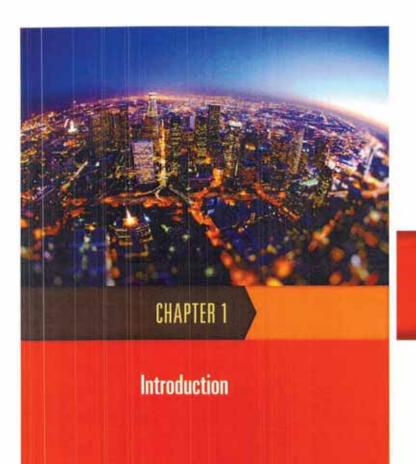
Conclusion

This AUT Integrated Europy Autor Report Identifies the wide saving of issues that California must abless to essare subcard initiality angles with attraction to next attracting energy needs, achieve the slade's Grain mengy parks, and provide estimation of exclusion and give transmit Princips a characterizy accounty.

Significant inflactiveshare montheasts are module to support the integration of learning and tensorial indidecreases the area of adversative and tensorials insisportation here, and provime reliable and safe supplies of every product and increases, intertheest in electricity by each state or workshift in production and the states 2.2 percent intervalues projects to ever the states 2.2 percent intervalues protototion and the states 2.2 percent intervalues to supath the shafest 2.2 percent intervalues protototion and the states 2.2 percent intervalues of the blandment pair. Additional meethems of advectively to accounting tensors of advectively appreciates the leafers, themael interprotect is worked in energy advectively. gas plants, and every strategi to help smooth the integration of investiga strategies and investigation formation for administration and increased to transport data mesons for administration and the particulation for the strategies of the particulation will require revertments and tradition for any and changing integration and tradition for any commontain response of a physicisms and the strategies commontain response of a physicisms and the strategies of the strategies with the strategies and related the states's nuclear plants and work strategies during the states's nuclear plants and work strategies the states.

California must alta address scars associated with weeking its store energy guits. The state wool performe As efforts a active energy children; sungs an entities and one to address, sponster the development of zero rel energy lashings, and eneuer compliance with existing and new standards. California alter models to address challenges to achieve the Revension Perfolia Califords they data alter memorable electricity guits, as well as challenges to achieve the state's plant, as well as challenges to achieve the state's plant, as well as challenges to achieve the state's plant, and well as challenges to achieve the state's plant, and well as challenges to achieve the state's plant statement their base eggs, and combined hour and power guits.

Taply Calibrata must continue its cases), went its secarcy the example, devicement of parcentries benefits of the chain energy systems through capitals institutions is emergy efficiency, consultionery, afternative and reasonable transportance hors: and measure and devicement administ that segarat the status cover energy cash.



As the United States recovers from the recent economic recession, it is more important than ever that California

confinent to particle planetary policies and development. Nat only dises chara energy profile momentation that benefits, it assurance energy reactify and tabulations transmiss growths. Browner chara courses from the bardy more on dimension energy moments, if is more assuranced and bardy more and provide service of the highs and here at glubal reasoners actively. Clean reactify protects also provimp algorithm to mail constrainties, cline in the one fits abarded by the measurement, altively and the barden and the measurement, altipage and a particular to be able to be the measurement, according to a 2011 report for barden to planet 2014 the energy parenality area (2014). 2014 the to cline a reasoner, clines a power service, colledge reachy 2014 by the clines reasoners.

 Nar St. Rev Daste of Sens Streng and Lemans of California Strength Str. January 2011 www.mailling.text[Signature]company_pine_pine_2011.text

11

employ more workers than the fersil facts and treffect instructions.¹

The Eakharing Energy Continuant confirmers for repeat policies and programs that menurage investments is reported and labeled energy inhibitestion and innavalise energy technologies that will county ants, build 21" confury backetors, increase energy stores, and project public hearth." Many of the state's energy policies, lockading appressive 3628 presidents per IGNIC ambision reduction hargets. increased manys efficiency standards for buildings and appliances, the 23 percent by 7579 Renewplites Portfolio Standard (RPS), and nel energy buildings. and the Law Carton Fari Mandard topport a harrol ion away from total fast dependency and loward class everys development, in addition, Generoor Jerry Brown's Clean Energy Jubs Plan subs: the wood to increase investments in clear energy and energy efficiency to hote reducite California's economy

The 2007 impainted George Proton Report 2007 2019 discussion is reasing in Research Storage Cardionaux electricitys studies gas, and thromaphatilises har sizetars. The regard peoplets are services of interes in the following practice semanated rearges renergy efficiency procession. Surgica and discussional and entry-based procession. Surgica and discussional and entry-based procession. Surgica and discussional and entry-based parametic procession and discussional and anti-based paratemport failed missionaux and anti-based parameters and discrimingment, renergy existent research and discrimingment, biosenergy gaint, and California reaction prover gaint Tatana.

 Merci, Meyn, Anadatan Natiwal, Devantinan Lung, Nei Huanniga teatrature Researcher Aries Program. Since you Dates Factories: A Andreas and Angement Dates. Anto Assessment: Ang-2011. Anno Estantiga yolu- Annotati Landing anal. Markov phany, manufug 2012, printing analysisphil.

1 and and the second second

Renewable Energy

Californics NPS target, originally established in 2007, was oppanded in 2016 in 12 percent by 2010. To support that target, for amount dissures to December 19, 2010, relation of a goal of acting 20,000 energies with the town-skille presentation generation of 22,000 MW of localized electricity generation of the metable presentation of the town of the intermediate-scale service systems close to estilling contained in these states with states and puller metables had to and these metables and puller energy systems. In addition, reservable energy is atteated by States and States and States and puller and a close state size states and puller and puller to the caliform at the Reservation of the addition of the caliform at the Reservation of the addition of the caliform at the Reservation of the addition of the caliform at the Reservation of the addition of the 21 of counter Charge Town of the table of Number States and Reservations. In the Reservation of Counter 2016 of the States and States and States and States addition of the 21 of counter Charge Town of the Charles 2016 of the 21 of counter Charge Town of the Charles 2016 of the States and Reservations. In the Reservation of Counter 2016 of the States and St

Commission is preparing a renewable plan to "expective permitting of the leghest priority press ton and transmission projects." In Geometer 2011. the Energy Committaius solvated the Restructed Power in California Joston and Issuer report, which identifies high lovel strategies to support removable development. These shatepes will be the basis for a comprehensive renewable strategic year that will be developed as part of the 2017 integrated Energy Pulsa Report Hydron The 2017 (EPH includes a summary of The Resonable Power or California Status and Issues inpurt, including insizes that must be addressed to ensure that California meets its renewable energy grafs, hitsen include promponental approxibuliary. planning, and promiting, francescous, revewo stepultan at both the golf and statebalize torota-

The Againtine Letter and acceleration of a state one engeneration for All persons of California's generational approximations and antidiations a price approximation. Even long term provide most in charge faults approximated in a state energy. mentioned and beauting cost recearch and development, recommendar justice, coordination with total generatority, and weithersa Development.

As additional challenge in the expensions of the Public Good, Charge PGG in sequent researching energy on bioscop 1. 2012/4 °B the PGG is not manbround or combined its same Taplans, shall increation program therearchics Program, and the Conting the secondary. Program will be subported, and advances funding will be ended by Tangz Connecsions start and advance in the Tangz Connecsions start and advance in the Tangz Connecsions start and advance in the Tangz Connecsions start and advances in the temperature temperature reserves transformations. A temperature temperature energy cardinglas forching and trajectory system.

There is suggert from the Diversion and key keystaines kaden to contrast the PCC for research energy proposed in a Sophisher VC, Thi Witter to California Poder USN'es Communities (PCU) Provident Michael Privaty Communities (PCU) Provident Michael Privaty Communities (PCU) the PCU to loss acids to 's vectors that programs to the PCU to loss acids to 's vector that programs to the pCU to loss acids to 's vector that programs to the pCU to loss acids to 's vector that the solar priteria also acids that 's we cannot allow to be appendix acids acids a vector acids acids to the appendix PCU to be acid and that 's acid the tot and the PCU to be acid and that acids acids the PCU to be acids and that acids Anisolation to the provide acids and the acids Anisolation, and animatchalin particular the solaring PCU funding 'A Table to the acid the solaring PCU funding '

He best phase of the proceeding is addressing appropriate funding levels for remeable and research programs and how funds should continue to be caltected. On December 15, 2011, the CPUC approved

- 7 The Public Samb Dispute a a sectory investment or all interacisates of instructing to find energy influence, another energy public good instruction, development and thermitation, and to support loss match another and thermitation, and the support loss match and provide a structure and thermitation interacting instruction is about a loss areas to an interact their even score project controls, and attributes.
- 8. goingstreeppinitest
- 7 Dathona Pope Mining Devenues, Bele Harmong Released by 218 2013 Spring 5, 2011, Increase of gain gathona Prog. Journal & Dist. Incredited, 2011.

Its Thank T decision instituting the Tinetric Thepson Investment Chapter (FPC) to rollect hasts on an intrive batts. In severability and research, Biveleppinel, and demonstrations programs. When and allocations for this (FPC will be at the issue keys) as the control FPC. Fronts will be plened in haloscore attematics and ind doctarrate will deferent the the CPUC's hand archives at this conclusion. Phase: 2 of the proceeding, when will address more health program mesop, newspit), and addentional two be bailed.

Energy Efficiency

California's service research "Rading order" guilles the state's every Accidant and requires mosting tow electricity demand first with energy efficiency. As part of this commitment. According 8:88 2021 (Cavine, Chapter 738. Statutes of 20062 established several important energy officiency policies, including a statewale conmitment to cost effective and locable energy officiency, AR 7021 requires the CPUC and the Energy Commission to stantify potentially action any cash effective electric and rational gas mongy efficiency payings and net goals for monthly owned. utilities 10000 and publicly duried address to achieve This periodial." As required by AB 2022, the JULY 674 provides an overview placealty beau the Energy Commission's multipliers of publicly remait elitibes' prigress locard monthly targets and 2020 review seerily efficiency polastical astimulas and Targets. In

1 PRODUCE PRODUCED AND ADDRESS ADDRESS

- The basis for energy efficiency "septer," and "gast," are used into comparing the two or an article and the section of the analow. This that the CVL and TOL is and the two "gast," Polytopy and allows that information for the "gast," section that a the two polytophility.
- B. Caritovia (https://answigue.ik/answig/lag/)/filter-existing (Phones to Caritovia 2022 2022 Files 2027 Report Tourn for 2022, and and an even strengt to give 2022 particulation (122-255-2022 INDEXC 2020 2020 2021 2021 2020)

Another statewills committeed to reduce electroly denued is to access every efficiency in California's new and existing buildings. The Everypt Commission recognizes that more efficient residential and commenced buildings will contribute separticantly to achieve a California's chose amongs and GHC emits san induction goals. State policies like According NO 32 chates, Chapter 486, Statutes of 2000 and Cathering's Clean Energy Fahare initialize support the state's efforts to achieve all cost effective averyefficiency is buildings, to addison, Arcoretic Bill 758 classes, Diapter 478. Statutes of 2008 descript its Energy Commission to develop, using Land implement a comprehensive program to experie mergy checkelopturn to mending buildings, techniling regulations, for energy callings and angenerateds as method buildings The 2017 dOW declaring the rate of building and appliance standards in increasing efficiency to new and mining buildings at well as progress lowerd inglomenting the All 754 program.

Improved Coordination and Planning Processes

Addressing challenges to follow choice isorggi development will beginn choice softwards among the style's weapy genetism. This obligation that an annually accurring timoggi an interlogency style Losson as calculates the Losson Jones genetism. This obligation and calculates the Losson Jones and CHUE, the Caltonics Indexpendent Systems Describe CHUE, the Caltonics Indexpendent Systems Describe Calculations 500. The Calculates the Descriptions Describes Calculations Expressions and Protections Special Calculations 500. The Calculations Definition Describes Calculations The Calculations Definitions Describes Calculations The Addressis Addressis Special Calculations Special the segments interacted the Calculations's Dison Energy Addres Descriptions Addressis Calculations and Special to work this calculates address Special Calculations and the Calculations and Special Addressis and Special Calculations Special to work the calculation address of the service process and the service stress and the Calculations's Dison Energy Profere Descriptions Special Calculations and Special Calculations and Special Special

servers in Separal of snewable resource integration, the companison of any gas fixed generation, and annularmost of contributed trad and genera. This and annularmost of contributed trad and genera. This electrolity planning by the three anisotralation ather electrolity planning by the three an interval and any the same based goots.

For the transportation sector. The Energy Common ton hat developed artilleonary king form principal of California transportation plengy domaed to support Its analysis of principam reduction and efficiency musicent, introduction and commercialization of attenuation turis, integration of energy are and tand use planning, and transportation fast inhustracture repainments. Projections describe what must be added to the state's existing intradiraction to support instanted principals imports and what must be of its name of the state of the second states and the second states and the second states and the second states and se hart domast. A key part of this analysis fatasory or California's progress and challenges in mosting state and federal mandates for reducing petroleum tenendings and appending climate change - specifi cally. The statu's Low Carloon Eyel Standard (LCPT) and the followal Renewable Fast Standard (RFS). The 2011 (0797 provides an patrolese of key findings on a yory the yight must address if it is to need mundated clicas transportation energy goals.

Alternative Fuel and Vehicle Development

The alteritispherical of sourcelline technologies is spaced for metrical California's biometry and other chain every grants. The Every Constitution's Alternation and Internative for and inferior technology Program, created by the Lagolistics in 75557 genuines bedrag to showing and paying alterative and reveauble bars and advanced transportations technologies to help al with the calify california technologies to help al points the say thread use workdowsky in sampy officiency, summand are streamed, the manusch, transmourse, and samp of adjustchess. The analog goal of EGF is to miner the approximation, private failback have paids after dependencies, private adjustches, and the cause constructional policies. Not adjust to some characteristic and concluration to some characteristic process and work relative constraints characteristic policies. Not offset consolided the approximation transmission fails to mannenthal size/private an intervent and review mannenthal size/private an intervent attack regard and CEF achieves.

In improve the Energy Commission's power plant Reporting process, in December 2018 the Longy Comestatus solicited as Deter Instituting International GHI Freibudeg Hgardeg "Instead Inanial" during the bicoming of solar thermal and national gas fixed power plants during 2009 and 2010. The ON Proceed ing began with a samping workshop in Docember 2008. at which statements provided focused comments an addressing challenges with power plant Revenue. The shaft usual this, herdback is analysies that constitute He tore of a "history marend" self-acceptional for impriving and threamlining the Energy Commission's shing process. The 2012 879 provides an merview of the initial lodings from that assessment. Staff will continue to examine traffic al loture, and will bett whites through 2022, with a tool staff report and Statings in follow. The Energy Committee is improving and shown

timing other plasming processes as well. In terms of startivity removes plasming. The Lendy Commission is never the release dates of its break Alcool Get Advectment and California Every Portand Amerski to impose conduction and timing with the OPECLass Free Processmint Pain. 13/PFC and the California DDT Transmission Plan. Tabiliturally, the Camprole DDT Transmission Plan. Tabiliturally, the Energy Commission Star (conducted to startisenet) and funcatin during acid-conducted plans to develop gold-

12

and every records policies. The 2017 ADM provides a logit level status repairs on funded policits and expected learning, with the lost in-status (Downton Report for the Administer and Research Tork and Hencie Technings Program to be released in 2012, Carly tolkings shows that program beefing two learns of panded hening industriations, and any readers. Each panded hening industriations, and any readers. Each estimates also field that these policity will lead to refused patients researching and domain and Drid estimates also field.

Energy-Related Research and Development

The Longs Connection's Public Internet Corryy Research (PER: Program has been togeneting research on and development of clean enougy factoreligies since 1996. " Through the PER Program. the Energy Commission has developed and Antonia bring to market intergy technologies, that provide exempted benefits, greater system solubility and knet rather costs. The 2011 42% practics as overview of the program's vital role in advancing statteicity and natural gas technologies to moried acceptance, and in funding projects that create who and althout investments to California. If also provides manufes of PER funder products and technologies that have greatly advanced Coldensia's clean energy policy and economic grain. A mape score facing the PER Program is the expension of authority to callent funding for public internet energy remarch on tonuary 1.7012 As discarded sarries the CPUC has sponed a proceeding to evaluate continuation of the PGC to fand retreach, devolupment, and demonstration

18 Nath Reserve Link Server Harts 1

cases for the APRC[®] Releasing the results in prior watbend parts with table altitle bits (Lange Commission to present pulses facilities that table approved prevention classingentity that with other approved prevension. Consequently, the 2011 APP warmaries the status of the Energy Contension's natural gas annexement and the interfection and analog parts for the circle of add to competenzione formula (gas annexement) and the interfection and analog parts to be included in the 2017 APR tradits.

Energy Assessments and Forecasts

Natural gas continues to play an esciential task in metal gas starts, every biotecting and the variaus end starts in the sequences, and madetical sectors. Kohned gas gaves plasts, with some method gaves, will also be requirtual to key integrate administration several endowers the task electricity system. The Living Commission this the electricity system. The Living Commission that the electricity system for Mathematical gas manys. In the site of the second system of a data of gas matrix and the studies's discussions of a data of gas matrix and an adultation developed in the Singletistical Zell Shale are patient included.¹⁰ The Living Commission studies' differences in the Singletistic Zell Shale many parales included.¹⁰

Cartonia Energy Donand Process 2017-2017, missand in August 2018, describes profesionary latecarts for electricity comunifies, peak, and natural

- A. Hyperick & Sender Kill (1997) Branes and Shar Digitar Soli. Bytem 17 (2007) and wave energy in gradient galaxy between metabolic 2009 percent and an anti-second solid metabolic 2009 percent and anti-second solid metabolic 2009 percent anti-sec
- 10 Carbons (Inequilibrium, 201) Ratest Sax Medel III, annual Station, Park Spill April Spilleredie (201) even among on generalization priori, CEC 2010 2010 INLEXIC (SIX-502) FDD 201 ptf.

11

affarts and in December 2023 approved the callection of heads on an interve basis for revewables and in search, downagement, and demonstration programs. If

Progress on Bioenergy Goals

The Large Commune published California's heat docump Active Tario in 2005 to promote and sequent the Bovchgement of alsopore, linger, and buffels to head publication of the 2005 Bowcryg Active Tario many multication of the 2005 Bowcryg Active Tario many and searce after facilities over interactive Alsonewer, by 2011, multi al Tario gains were soft after to Bowcry material and the Active active and the facilities in searce gainers, competitive with tario tario. March 2011, Biomedy Active Tario mains subsystem for accentrating arrays to a and many mains a search for accentrating arrays to a and many mains accented for searcement challenges in teaming 2016 biomy Active Tario and and and accenter of the 2020 Bowcry Active Tario and any Active of the 2020 Bowcry Active Tario and and accenter of the 2020 Bowcry Active Tario and accenter of the 2020 Bowcry Active Tario active accenter and accenter accenter accenter accenter accenter of the accenter ac

California's Nuclear Power Plants

In 2010, suchar power provided about 16 percent of California's in order electricity generation and 13.8 percent of the entire California power one. While California's her mechar plants are an important

25" And approve guiltum datasets and add to have see

 ZDD Hanning Action Plant, Gallwares Directs Generations, property for the Economy Working Design contractive process energy or pre-OE2 pathological COST 2012 (2012) 402 (2012) 2012 AUX 2012 (2012) gas domaid for Coldensu an a veloce and the each maps of My placing and write the state? The analysis characteristics for effects of occurrency and dismographic freedom, Annual Alabianis, memory forcenetation, rutur and Indeed patients, and California's distance clouder, and graphic tability and California's of Salaria and graphic states and California's of Salaria and graphic states and California's of Salaria and graphic states and California's of Salaria and Salaria's and California's of Salaria and Salaria's and California's of Salaria and Salaria's and California's of Salaria's and Salaria's and California's of Salaria's and Salaria's and Salaria's part and Salaria's and Salaria's and Salaria's Alaria's and And Salaria's and Anales and Alaria's and Anal Alaria's and Alaria and Salaria's and Analysis, and Analysis, and Analysis and Analysis, and Analys

In susperi every planning processes, the Europe Commendate provides expecting analysis on the elabory interbritty and related gas unbuildentices works and endated insuessmental source. The 2014 GPP authors the school and a solvergenerative and extraording to the send to indexes separate and main stated as insurant and as only approximate and extraording gallow technications in this proof plants and the difficulty in factoring new replacement generating support prior the school of maintee and the difficulty is becoming one replacement generating support prior the school of maintee and the difficulty is becoming one replacement generating support generating.

The 2007 EPM also devocative empty expandiously affecting systematics of the neshind pairs find generafind encoded to topport integration of exacutes encoder encoders and an encoder encoder encoders internatives include demand possible technolog bases adaptive, softet previousland, publication technoment of generation and a using EDC, researche encoge execution for execution generative for previous succession and for execution generative for previous succession

11 Kouse, Den Ver Dan, Ker Dower, Kenaar Juan, Kent Dacher, and Dar Dieg, Periodope Galiana Dergi Jarang Genaar 2017 2018, patients Dergi Darens, pers, 522 2018 2017 2018, and period. An even might in agent Handrick mension Co. 2018, DI 2018 2018 2018 1012 (2018).

Eacher in numhanning Galhtmas's eischrichty reikability und nierling chraite change guids. Bie Unter Nac spoklacer Common regulation pechtine wellte hantgert, Utrage, niet public sahrte soners reisting tei nietegenz straatien. The 2011 APP descriften wer scienze od literatieri common film value aff be March 2011 earthgeake and tameneri in Japan that musted the Teleschen Darich Racher Paul. It atte provides the strateur the values' propuls pe sahrty messenselabiliere schemet in Uter Paul. Biering and State Strateuri.

17 Cellins Lingu Commune and Well & Announce, Inc., In Announce of Collinear: Access Press Plans, M. 202 Report Namelie 2028, and original generality and and UTL ON FORM CONTERNATION ON FORM PAR.





energy - energy from natural resources like sunlight, wind, rain, and the Earth's heat -

California has used renewable

to help must its electricity south for wore than a century. Renov-able electricity provides many economic and environmental benefit including local into in clean facturalitys and construction inductions. massage from property and takes faset, energy independence from using local energy sparses and fuels rather than imported waterail gai, enduced fermi fael generation that has negative repacts on air and water quality, and reduced generators gas enteniors from the startraity wetter to hote mini state cheads charge graft. Califar on hat been a leader to expanding its consumption of resonance onings soun the late 1970s when, under General story Brawe's feet administration. The California Public Utilities Commission arbitrat elittee to establish standard affors for buying electricity from alternative suppliers ("qualifying facilities.") at pisst-based rates. with the price equal to the boyer's full antided tool. By 1981, these plantant contracts resulted in more than 12,000 energy and 1900 of puolitying facilities on live in California, about half of which used consulty resources.

Table 1: In-State Researchile Capacity and Generation (2010)

Retoration Resource	Unity Scan Cause to (MM)	When une Destricted Generation Cause for UNI	Drivitation Generation Galactic (MH)	tine Capacity (MM)	Total Generation Camp
Rones	1070	117	8	1,000	3,745
Germania -	1.01	11	1	2367	12748
Seal April	313	1040		1,890	(4,00)
3re-		141	1397	1477	616
ma	Ro data	90.0018	¥	1.029	6.00
Tetal	OH.	1982	00	8.00	

11

twin Committee Co

R. Disarray of the state making the Disago Convers part (Samon Fart) wir Heigt Haar Statem ert Hij Hill genoue, 2010 i 30 feiden fann spe Material Strength Strength and Drift and and the second lightly which it

E Saler Printers and St. (20) 1471 facility in any descention and antipation in whether and theory in the state and the partner property and control processing of the second se encoders to event his manual address langug fermanis ^kagant teon megara per menalita integra, menalita i

1. Wat furbal semant is the SAT Donnalis to happy because agrees partners ang period privates musical pagents and incomentage incoments and the later International Property name or Story and all other heads formers, manners,

I MAR THEFT AND AN ADDRESS thead provides with Lands's Tarbinis for any an actual property located to two Castleres (UL and the Samp Commerce (1974 Patrian), was performed ng parahak di telapitanik gabat baranani pende natawa den Canternen (M

A language with

monocitie presentation in 7000 " hi stute connectile presentatio represcolad about 75 present of latal renewablik generation from more than 10.000 MW of mnewality generating supporty (Table 11.7 For the 33 paraset by 2020 target. Energy Commission staff

silutates that the state will need renewable generalize in the range of 25.800 pippwalt hours (CRM) to \$7,000 balk in withflow to prestatus repicted from minting facilities. UNHty contracts signed and sending to date are separited to deliver arough unargy to reach the opper bound of this range if early or all of the combuched reservables are built and generalize in 2020 Figure 11.

This estimate includes a number of short-term contracts that may not be renewed, an well as evolving facilities that may refer the to age or moletacl supervises, which must restars for mobility

- 31 Topostig as the data source but research generates used in the set of and its barrows in proceeding source test intervention processing procession or 2005. For any end of the procession in barrow Tax Party Taxana Harmann Forqueer, Tayah Copyrights (Full Copy Continuous MS Source), and the long Contrastor's Tax (prior Free).
- 21. The element of the state is an installed an analysis of the state of actualid wild casterly game lack strailable data the total will therefore near furthe extension, game the reacted ability of any marks the Gravetsi's 12.2023 We got, he jumies all projects connected of the interpretation least and rectain electronic VV airob capacity.

Renewable Electricity Status and Issues

Non- Courses Street it palling forth new and supported targets. In his Clean Energy John Plan. The Coverses in complianizing the importance of monitong re renewable energy as a central element of rebuild ing California's economy. The Gaverney descried the Every Commission is prepare a plan in "repedite prenting of the lightest priority (insteading) generation and transmission ensects' its support searchmosts in minimulate energy that will prease path and butinesses, replace energy attependence, and protect public, he offs, its Decumber 2013, the Everyp Decemication released the Annowable Power in Califormine Status and Assocrations, which describes the parrent status of researchity deutsigment to California and classified challenges in maring the chale's remewable years. This chapter summarums that report and suffiams high-level situltagies to be included in a comprehensive strategic plan for venewable energy in California that will be dowinged as part of the 2007 Internated Courts Policy Report (Eduly)

California's **Renewable Electricity Targets and Status**

in 2007, the California Legislature autablished the Revenuables Harthele Standard (RPS) to diversity the electricity section and reduce growing dependence on national gas. At that time, the target was to surrane the annual of researching technologies the state's power mix to 20 percent by 2017, which was training any similar and the 2010 by Reputation parant in 2006. In 2011, the RPS was further revised and expanded to require that reconcible electricity should equal an average of 25 percent of the total electricity said to retail conformers in California during the compliance partial ending December 21, 2012, 25

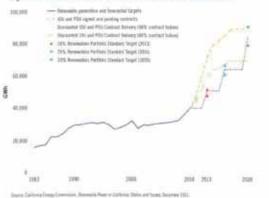
percent to Department 31, 7016, and 33 percent by ecomber 31, 7670 = Te support these WPS targets General Research Otrus Latergy Judy Plan cuts hat adding 20,000 MW of new revewable capacity in 7020, including 8,000 MHF of large scale wind, solar and gothermal as well as 12,000 MW of locationd generation close in camanar leads. According to a most propatation to Michael Petian Senior Advisor is the Governia for Revolution facilities, resources included in the 12,000 MW goal are defined as: (1) fants and lochneitegies accepted as renewable for purposes of the Rendwables Portfolio Standard, 171 sized up to 70 MHz and (2) incased within the law witige detribution god or supplying power dentify to a torouter.1+ have parties have suggested that this detection to repanded to include other low GHG endting resources, such as fast colls and high efficience combrind heat and power facilities. The Energy Commission will hald warkships during the 2012 30YH Control and 2012 2019 proceedings to discuss combined heat unit power insurs, and welcomes sugprofessi from parties on how to best annual that the tiple's dehibuled groupice and cambleod heat and power graits are complementary

California appoints to be on track to achieve the 20 eril average by 2013 IMS compliance period, with nearly 16 percent of statewide retail takes coming from

- - 18 The California Autor Distance Distances on services of The Califords Flow, 2014; Elementario complexite Maria proceeding constraints from the activi-LD annum 2016, LD annuel 2015; C. Tannon; 2014; LD annum 2016; per granner 2016; Branner, 1014; LD annum 2016; per granner 2016; Branner, 1014; LD annum 2016; Branner, Savetti Branner, Branner, Annu Savetti, Savetti Savetti Branner, Branner, 1014; LD annum 2016; Branner, Branner, Branner, Branner, 1014; LD annum 2016; Branner, Br
 - Notice Press, encentration of the Departure 5, 2011. Carlies one Neurobate on the Decomment and the Departure Printip Receptule Connect on Exchange Length Connection, www.chin. mit?. Seconds. Printip 20.

h





bailed enqui les pases, aqueles annotés previou due et et total princia gray tau leu estat, areas anches, armany taux appagnes, a una méri analitaria attau atta an esta pase le fil est due le VLA 2021, sensais provaise les taux artem aquertes espinent la cale et la gran estatum previon.

San Isan politing locities.¹⁷ Theor is also risk of cantract funder, spita free the Energy Connectance 600 constant durations indicates that univers the start of the IPS payson, should 10 proceed of tang-bear BPS contexts 100 process memory approach for the California Public Utilities Commission XPSCC have from concerned.

The landbact failure ratis increases to allocal 40 percent where also consistenting contracts that have breve delayed, and, at the September 14, 7011, waikining on the draft Altrosector Power in California

12 According to restrice an the Carlinnia Data Toniga Indust estants, contracts for ranging (2.302.106.27 secondate group time with approxime Total States and According Marks on physical second and compared. Barlow and haven report, five unliftent indicated that Thep terminity extenses a contract feature rate of 40 percently (17) This suggests it would be provided the utilities to contract for extensionality generation in the range of \$3,000 CPM between the first end of 17 percently \$5,000 CPM between tables in the 17 percently.

- 17 Teaming at the lagrange (L. Litz), language through thing that is statistical at the Del Assession Assession (Captionsy Direct and Teaming), and the Del Assession that the Del Assession and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession and Del Assession (Del Assession), and the Del Assession and Del Assession and Del Assession (Del Assession), and the Del Assession and Del Ass
- 24 The Deep Conversion advecting in the Autorian Letteral Street error are of preficted if Salar later, which used in Salar or Spin.

Table 2: Proliminary Regional Targets for 8,000 Mogwastis of New Renovable Capacity by 2020

attenting Tyrestissier (Jwe())	CHIZ Served	Canadotes Remeates Deliverability Potential with New Urgosold Loss (MRI)	2010 Pyrmited Growting Cauchy Associated with New Statistics (MR)	Antimus Teneroso Print Cape (1 1980)
Seems Passiva	imperial North and Starth, San Bright South		10	341
Relation overflamme Ridge Revolution Discontistion Primette	Reference. Electronic	5.98	- DOI	210
Calorest Reel, West of Deer's and Path AT Reports	Averant East, Francharings, Imperactions	4,016	105	194
Eldnahi-honyah. Pogat-kaga.ard Elaiwahi-topor-kaga	Monton Para, Prajak, Hamm	240	1.419	10
Autor Gray	- motional -		30	. 418
Same of Lonins Drifts	Ares	10.	-104-	
Carris Weins	Corrow South, Santa Barbara		80	(ca
The second se			-	And in case of the local division of the loc

ana California Temp Commune, Annual & Aver or California Direct and Society Print

Ex a starting paid for measuring program toward method the Conversion's 2000 MM paid, the Messer and the Conversion's 2000 MM paid, the Messer includes protowards regional targets for both utilitycare and tocalised resempting panetales localities, for the target of 1400 MM of utility occile menedates by 7025. Earogy Capennasian start identificat reages trajected targets laxed on one transitionistic largets application task how have identification with the old ward calibration's balancing authentifics and patientific interesates capacity in Campatition Removality Carport, benefits (2521), their little targets in 2007–2000 Removality Energy Transmission Initialise (AETR that would be served by Nexe Inex and opprairs (Table 72.11 It There sees lives and apprairs, and permitted

thail, and operating terms 2020, they could allow generatize free more than 16,202 MPI of consta-

71. NOT any initialized in 2022 to a point return principles (2021), We Tonyo (Stransvisce), the California (2021, Webbs), was show (2044)-bits, Notice (2021), and the california are served in the control of the California (2021), and the end of the California (2021), and the california are informed and any initial california (2021), and the end of point the control of the Vanit terms. And the point term (2021), and the california (2022), and the control of the California (2022), and the initial and point the california (2022), and point the initial and point the california (2022), and the initial and the California (2022), and the California (2022), and the california (2022), and the (2023), and the california (2022), and the california (2022), and (2023), and (2022).

Table 3: Proposed Preliminary Regional DG Targets by 2020

Right	Bahral the Meter Sek technologies (MBR)	-	Underfront (mis of Second the realist and second all (1997)	tine (artic
Certar Court	- 78	- 10		10
Circlui kulty	830	1298		7.675
End Ray	4(8	38	1	- 01
mperal	16	- 10		210
Hand Degree	180	1.435	i i	114
ton Angeles (info well county)	-119	941	1176	4,000
Bott Say	216	.4		771
Reth Yamp	-110	38	1	11
Carryment Wages	410	itt	28	
has longs	.84		5.686	1.10
of Pomoure 1	180		- 110	80
Servit		46		19
drange	429	18	10	41
we	1.00	140	1.50	- 12.880

14

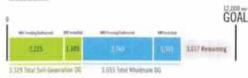
and failweighting Einstein. Anweight Pour a Carbona State and Joan Science (201

Peril-1723, additional insertionshi in remaction generations may be reached to replace generations respective to produce our The scares of the read interactitack as generations terms respective the thread setting terms for a swedier of there instructs, which scenarity represents small 13 periods of their generations were applied on the setting setting terms were applied and 2200 and 2200 and the scenarity for general beforem 2008 and 2200 and 2009 and and 110 periods beforem 2008 and 2200 and 2009 and at 10 month of the scenario beforemance Standards 11 month of the scenario beforemance Standards 10 month of the terms the scenario scenario scenario. maining cash tawhacha are ingercled to ingere between 1957 and 2018, which will repair implicational gainer from a net of transmitty and thereinal generation with choose to satisfy physically emoty while still moving generations (gai instance inductive gain).

When signing the DEI I MPS imposition, Generate Report establish that the D1 provided by 2022 MPS Larger thread be considered a first enter than a coloring. This is a transition of all the row-Cardine receives by recourses to meet the share's large from ODEI ODE entroises reaching parts. Rack of the revealing estimates by forego Consensation shaft indicate that if new meetings after gravital the reveal in the standard to meet an excluded the reveales.

Figure 2: Renewable Distributed Generation Capacity Counted Toward 12,000 MW Goal

1i



Santa Carlo mattering Communit.

The start provides the property approach while interpret programs performance while one programming interfaces. The start program is a start programming interfaces. The start programming interfaces are start provided interfaces and the start programming interfaces and the start programming interfaces. The start programming interfaces are start programming interfaces and programming interfaces are start programming interfaces. The start programming interfaces are start programming interfaces and programming interfaces are start programming interfaces and programming and the programming and the start programmin

tour researchic capacity to line acress Notes Sees. ¹⁴ in 2018, Using set local califies straid prenets for regardly 5200 MeV erver researching capacity, should 8.000 MeV at which a protectively with the rese base, and separates. This indicates that another 8.2018 MeV of screweight regardly should be sited in the ORE (an isociety with them.)

For the 12,000 MV distributed generation (IIC) farget, Energy Commission staff developed performancy regional targets for localized generation (Table 1).

14 Writter (antisynt is Nor-Darty and Dollas Part Service) and a statistical product of the Service Service and Service Ser

strived for purposes of the analysis at that time as reservable DC projects 20 MW and smaller inforcesexclud to the distribution or transmission grid. The analysis was becoming y noulital and included unlar. tionasti, performat, wind, fait colls using remeable het, and small hydrogener. The analysis also accounted that reconside DG capacity included would count teniard meeting the 12,058 MW goal. California has roughly 3,000 MW of renewable DG capacity instated and, if existing state programs to support remesable DC are fully successful, the state multi and about 6.700 MW of capacity in the unit for to eight years if igner 25. Mare information is needed to assess the legitomacy of the fargets and the targets should be periodically updated. Gives the trend of declining cools for balan photo-of-us; (PV) inclosing ers, No. Frongs Commission Seleves the facut straid be on diversiging the "low-hanging hus?" in the soul faw years. Meanwhile, the state should beat on relaxe ing perioding and altacomection processes to that subsequent development of renewable DC installations car take advantage of said reductions and improved regulation structures in later years.

^{1.} The Descent Institute of Descent problem California printing from their reception of a spring true contracts for transmisparameters for excent 1.100 for of optimal descine quantitation (Califor excent on 1000 for Astronom of contracts of the can parentize to their to the Astronom of contracts of the approximation of the Astronom of contracts of the parentized to their to the Astronom of contracts of the Descent of the approximation of the Astronom Distance of the approximation of the Astronom of the Astronom of the Astronom of the Astronom of Astronom of the A

Table 4: California's Renewable Energy Potential

Notrener	Increase Potential (MIR)
Rettast	100
Satterni	6.87
Seat lights	2.216
late - Descripting hits Press	LNLM
hay - PV	17404.000
Wood and Bills	12.713
Wed-Dates	36.000
Hed-Whitee	25.000
TREAS FREEMONDAL PREDMINE.	10,214,220

Hoter and Assoc December 12(1)

summable generation solid represent from 62 to 79 percent of total electricity sales in 2050.⁹ California's estimated reconstruction technical

petiential in 24 website ADM (Table 1), * Athengik Mei Riger date null reflect eccentric on environmental conctranets, constitution of peoper size facets of 1 percent of this petiential escale week file Generalizy 2018 DBP environmental peak Actioner (the Generalizy will Repeak on the petiely of project investigers to recare favored, prevents percentaires, websitementain field connectify acceptance, and power petitiana local connectify acceptance, and power petitiana

Semples these challenges, secant baseds indicate increasing sharkal interest in resonable biodisplants. The 2020 MS initiation by the new-low-new rad the last UDDC down biok have developers officing to say by released interesting and the second second and the UDDC down biok have developers officing to say by released interesting and the second second second biologic down bioks have a second second second biologic down biols. Second second second new signed constraints for receiptly \$4,000 MM at new reweating capacity. In 2010, study and lacid sections reweating capacity in 2010, study and lacid sections and parents to ALSD WH of measures capacity and parents with XLSD WH of measures capacity and parents with XLSD WH of measures capacity.

18. The UP percent adviture accurate that aductivity derived, In-

whether that prevention provides on of energy efficiency property works on the prevention of execution and another of electric services, and interface prevention of the carbo service services, measures and the determinant prevention of the carbo service associations, and the determinant prevention of the carbo service associations and the determinant prevention of the carbo service associations and the determinant prevention of the carbo service associations and the determinant prevention of a service pretability of the service of the carbo service of the carbo service and carbo prevention of the service of the carbo service associations are the service of the carbo service association of the service of the carbo service and prevention of the service of the carbo service and preventions. The service carbo service prevents are set of example the carbo service prevents.

14

projects in the desert - The DHEDP's with in to identify arrays in the Mission and Consolid Desert regions culture for resensable generation and transmission project development and a mark that will constrain to meanings. The DHEOP management is may be address, iteration, also DHEOP management in a starardine, iteration. Also, Koya, Liso Appiles, San Banagelone, Nierstein, San Daugs, and Happiles constrain of gase 31, it will promote development of state therresenable sensing as well as promoted in Machinetium (and a Hilp-scale using PA, well, and other forms of constraintion laters).

Other effects to improve permitting for addition scale and DC economics property include:

 The RLPI published the multiduciplinary Rest Management Practices and Costoner Monoid Depart Research Energy Practics in December 2000, which heigh ample Brotharti Antige amplets that meanic provisemental angusts. A

 The Energy Constrained's Public Internet Energy Research (PCR) Program in Studies research in features the energy Sachiller, including strategies in the studiest line environmental impacts of environment the strategies and an environment and energies in a sample species. The mass information about the spin of the species are mass information about the spin of the SRS Tragence, Species and Calabian 2020.

U. Sensating Daug Atten Yam, Net Mangmood Parton and Gellene Recail Dear Provested Dauge Priority Dearsting (201), new data profile among Priority. The farergy Convension initiative as from invitiative training informational Promoding in December 2018 to Another Invision Research from the Isoaning of Yough statistic reasonable hardware as 2018 bits to partial identifying instruction approaches to before planning and permitting Size Chapter R).

 The U.S. Department of Everycy IUE 2003 Strip America Crites Program provided handles for crites Usal promote safar power and streamlest interaction technology (powerload) and residents.

 The U.S. DOU's EardSept netrative previews hand ing the instance of the seal members by tributines and lightly primiting processors and to desetup resourtion advantation technology systems, local resing and Earding rades, and regulations.

California's Accountly 80 X1 12 (X Manual Heat, Waithing, and Samor, Chagine Hi, Salachia et 2011), perced in 2011, explores the Coorge Commission. Its constrained as possible for an explored and and admost including general plane strengths, ransing infrancess, and a subject (commission) conservations plant to growthe the development of eligibie reasoable energy reporters.

Rate periodictions are suggesting revealed DC to design group and the parent sectors, developing expedited percenters, straining online periodic to the solar VP system, and altering periodic periodic to the solar VP system, and altering periodic to the solar VP system and periodic to the constraining a multi-distribute affort to multi a exist aretholaring a multi-distribute affort to multi a exist aretholaring the effect. The California periodic targets are the solar arethold and the solarity of solarity of solarity and the solarity of the solarity of the solarity of the solarity of solarity and the solarity of the solarity.

 The Decay Protection Council recently parted a resolution recommanding fluit "the Energy Commisview should ideal an aircin mean-adul energy pelicy that publics the statisty guids for the development of permitting processes.¹⁴ The California ECO Intercess sector during includes along 57,500 BHE of converting Lightlift, and there are 200 action telesconsection research for GC systems on the Weslescole Disbetween Access Tarriel system Marking along 2000 BKK.

Issues Affecting Future Renewable Development in California

The Aliveredits Placer in Catherina Status and Alixes report therafilier a variety of lisees that will affect the aerosed of versionities capacity editoration distributed including revenentiation places, and permitting basenetscien, pick-and theraform, and permitting uncertaint and floquening and recent and downlow and HADCs revenentiation places, acting powerment candidations and watchers downlowed. The report will distribute the acting of the test of the second acting and and consel of the tits is address there challenges, which would be concerned in a downlow Cathering Status place acting to place and places.

Planning and Permitting Issues

For solids-scale towards plants, the pointry plansing and promitting challenges are reversioned.¹ ford sets intern and hosposoid and investigating pointfile processors. Revended a solid set in the a match of executional and land-area impacts depending on location and technology. Recards the implayed at one sensed to developed is processor the

 Darbeite Europ, Community, San Anna Henga, English Thail 2020 annual to research and protects Mail (Son annue, Yaning, Prosent, Naturnal). in the California descrit. You Accounting Power as California. Status and Essense report National on insurf minimum-fail inparts. There include impacts on transfers plant advanced spectra, some subjects and softwarper, and califord freements that proviated softwarper, and califord freements that provide attraction of the application spectra and the softwarper descrit backs in California are seend for the totaget generation, whithis hadder, for eaching parse, which ing securities, whithis hadder, for eaching parse, pars types space.

In horse of the personaling process, a scarely of fishing, status, and local appoints have topological adherity for different lyses of additional scalar program. This care load is inconstituted environmental request and standards, interpretations of results, and additional components. The second is that developers must have to autility one that and additions, submet displace influenzies, and local dispessions results displace influenzies, and local dispessions results displace influenzies, and local

For remeable DG balifiest, woldty surveying patient (familately, and free animal pacad parameters and/a paradiction non these projects are a chairings to adolesing the strain or the set of parameters in the adolesing the strain or the set of parameters in the another that a most of the parameters in the another that a most of the parameters in the another that the displanation and interferency in the parameters parameters in their gravers plane are parally parameters in the parameter barries and and have travers interest in their gravers plane are parally parameters in the parameter barries parameters in grave neuron setting and reviews processing in displanation.

The state's Renewable Europy Active Taum (REXT) is despitping the Decart Renewable Europy Genericative Prae GRECP1 to help aniomize coverane/stat empacts of economics generative and transmission

- 2

Figure 2: Depart Benewable Energy Conservation Plan Area



Daries, Earlieves (resp. Earlierister), Astantika (Swer's Earlieves, Astac and State December 2011.

1.1

³¹ Construct State 1.24 K. Anastrine 2008, Anastri preprint approved in control control control with a practice approximation and an approximation of a state of the state of the state of the state approximation of parts and a more thanks. The Lineag Canoma and the state of t

here research pump behaviour whit isolating framework with the protection and containtion of except connects for brain public location and to "consider adopting an outline downsider energy particular exclusion in the JAUP ADM (2000)."

Transmission Issues

The precise y transmission summer identified in the denormality leaves in California Tables and Asian traped are the next if examine thereasened leave of resolution green stars around the sent the caseful data and and attenuists funding. The word for caseful data had not and trapeomission technological and bother sent of the exercise greed.

These per 11 respir families products that are critical the interparameting and distributing the researoling parametizes and distributing the researting parametizes and distributing the research to 2020 speculate mandata. If Six projects are bcritical and and a start of the analysis of the research of these projects are could for information testing of these projects are could for information testing the down and testion y testing projects are be for a start of the analysis of the information for the operation testing the information for the forther and the start of the information of the down and testion y and testing-testing the start's research of the start of the information of the information of the start testing the start's research and testing the start testing the start's research in address bettermedy a start of the start is research at a start testing testi bases and control para testing testing testi bases and control para-

The second transmission issue is the need to checonology and underderfor Transmission gravening properties to build the most appropriate transmission projects to summed opposite strangers while engine

U www.go.cz.go.iwo.arte.Pp1.05/go.00_ https://disconferences.pp1.05.07.07_bio.ortho ineddisc.Rest.pdf

N. Far a lost of process and Addined Becomplex of procest system, one Carlon in Group Determinant, American Process in Carlon and Deter and Taspin. Improved 1921, some immigcipation of the process of taspin. Improved 1921, some immigcipation of the taspin of the system and tables theory.

14

In provide regulation and load belong " Demand response - Naving electronic continent inform that consumption at clinical these in a responsi to market provid - can also physical electronic and conducing unable based in provide regulation or ranging through asymmetry provide regulation or ranging through asymmetry contexts that here individual hauds of an dawn as model. Here, here its used to additional instances programs might be used to provide researche integration structure.

Utarts to address grid-level integration issues includio

 The California GD is noticing to improve its forecarding techniques to notice structure and the annual of standby capacity that will be method to competing to the vacultures between generalize and head.

 Farmal planning for adding and office loss interge chrough the two checking endown bagan with the damage of forgompty fait (3)444 Glainner, Chadred 498, Statistics of 2020, which interfer the CPUC and publicly award wildres to contain the send for and bisedba of condi-efficient, and subject energy through scheme, and detension accemptore largest to fordate 72121.

Exercand increases in being asked throughbead dise (basked Tubers for another universe, and the California IGO and the hand model increases provide that are laping the foundation for the role of demand response in monocole indepation efforts. The California IGO is also included the ingeliament a respontion emergy exolution in prints 25127 that will admin

F) yood halwang is a analysis practice of whitey statistical periods are not as soluble periods backets in parts in several is noment denoise the backshale spatial period is a period status presenter backwale spatial periods in a several is the statistic approximate periods of several is the statistical must may provide the statistical several is the must may provide present and provide several is the must may provide present and provide several is the must may provide present and provide several several several must may provide present and provide several several several must may provide the several several several several must may provide the several several several several must be approvide several several several several must be approvide several several several several must be approvide several several several several must be approvide several several several several several several must be approvide several severa ing protect land are and inversemental associations. Convertly, shall fractions of bactomerons repeting to serve and names and the server and the the "were" planning process is a sampler. This length has the hearmouteness development properties will not be developed fractioned development properties will not be developed fractioned and environmental instant. This hasheves a desidentified the task of it comparest and constantiat astionalities, and processes and the towards a deficitant in a participate deficitivity or planning processes a deficitant in a participate deficitivity or planning processes.

The black branching instant is how for make furthe and it the mining branchings guid. According preprinted resensable generations guid. Converting preprinted resensables generations guided have could be every beak weed. Adverse guided have a branching weeny beak weed. Adverse guided have a branching beaked with a membraning the view of these a tables and a branching black according transmittion meet/branch and associng black according transmittion meet/branch and associng black according segments. There is a sinweath for additional revenable development. There is a weed for additional revenable development.

ACT with a studewide land are glassing process showed to sequent transmittee plassing by dustforg transmission projects would at most be studey transmitten any gauge. The most hard SE CMC/A transmitten any gauge. The most hard SE CMC/A transmitten any gauge transmitten and memory and transmitten and transmitten and transmitten delt marting and transmitten and transmitten delt marting and transmitten and transmitten and are statisting transmitten with a DeltC/C, and senergy approcess are working trapshor to source along about all DEVC senergy to the SECCP with the Calibration SEC's senergy temperature planning preserve. Effect within to improve transmittane planning methods.

 Par main information plane that TVE 2022 ACT, Ann. annu. Homogen Appendix.

demand requests and everyy cheage to submit both for provide annihory services.

 The CPUC is evaluating integration costs as part of its long-form Procuranest Plan proceeding for various scenarios.

The Energy Commission's PER Program is funding a wirk army of project introduct is develop billers functanged prices for wirk and using sometanian, develop and doministrate princip the age technikpins, linkelity ways that domand segment can support removable integration, and develop the smart gold of the Marin.

Detritorion-Lovel Integration

There are also insure with integrating targe amounts of renewable DG lefs the distribution system, which trings power how solicialians to consumers. Mech of holes's stateducies system shill every designs. technologies, and stealegaes that were developed to ment the needs of end 20th century partomers and more electricity is only one direction. The doublication tertrot would to be made and and six bechavio girst that muchy allow for here-way flow of electricity as well to improved communication lockwologes. hetter systems updates, andare standards, cyber security measures, and investor standards. Better models and simulation tasks are also received to evalu-ate protection, control, and operational requirements of the grid with a high possicultion of distributed attenuation recognizer. There are also process that loges associated with the occasion methor of requests for intisconnection and the need to reduce the complexity, express, and length of time account alled with that process.

Etharts to improve distribution level integration which.

 In September 2001, the OPUC speech a processing an inforcemention wrights insure to receive value. The California Barcorectors Planning David, homed in 2008, is marking to anteress California's Systematician anexis in a combination quantity draws compared and planning transmission of part of all interfaces the executing stammatics on Architecture to order the status 32 percent by 2008 2015 gains.

 The California IIII has reveal its transmission planning process is social barenetwise signality, seeded to weet California's parky manufacts, with the 2010-2017 Remembers Plan Excepting as the RPS manufacts is identifying parky-drives transmission generation.

 The California Oil empirical a sec-bote scalare dram for Foldov & progit Regulating Connections by consult approaches associable on the second the removed returning fedatal trianulos functions planning proteins to advose generators to water the construction that data advose generators to water the construction that data of Dominitari 12, 2018.

Efforts to promote better soz of the existing transmission grid vectories.

 The DREEP has a goal to tesport consolidation of tenevalia development, including transmission infraction; suffer than scattered "leaghing" development.

The PER Program has handed a wide variety of property reduct to uppriving the performance of the orienting harmonics reducts. These relater research to someone the carrying capacity of motified lines, metal-involution to the reperturb the sounds all MM before maximum to pure capacity and the sounds of MM before maximum topically, and average harmonics caking that can be separated theoraph amonicsion caking that can be separate by higher temperatures and allow ensurements to large higher temperatures and allow ensure poses to be transmission to easing transmissions.

and regulations generating interconnecting generation and plucage resources to KNJ decimitation vertices.¹⁰

 Califyerou winters are unsafe modernizing their decisitation systems by replacing excepted at the shift of the works are spacement that affen has more adoptional communications of functional charpabilities. This modernization is Merky to instatus at a result of liseway that is 7 Faultia. Charges 207. Studies of 2020; which requires withing to diversity states of definition plans.

 The OFUC has established the Rymouth Distributed Everys Calabarative working group to help address lateramenthal scales.

 Fast track presses are available within each er fast state v intersonandam processes fast standame intersonmethan ei smaller sportst. An attallien are providing unbesufase on their websites to help deveryopert sherdy juscations on the intriduction prof where anyetts can be intersonanded note quarky and all lower cost.

 The Energy Extension and the California IKD funded a shuty on researching OE whap ratios in Germany report Spain to intentify strategies that pay be applied to Ealthonia's system.¹⁰

 Restauch hunded lineagib the PCR Program is Rescaled as perticiping the impacts of DC 4+ dividution streacts, and developing linear gold and Subtrary streage inchanging that can support integration at the distribution lines.

38 Camera Adri Shine Demosivi, ser ana spi as pel Pale bech taki, antidan la ana 444, 331

21 Carlin, Asm. J. Aprini, L. Panecher, M. Awara, Waggini, H. Doglar, J. Zhowe and S. Sannan, HDM, Grappin Romonian Berthands Generative Industriesk Data - Astanet Statent Anas Darching Bhanti, an Ganayay and Jano Nazahin. 2023. Entrana Tanag Cambridge Data - Nazahin 2023. Entrana Tanag Cambridge. Nazahing 2016 and 2024 Strength State Acad State perception. 2021;418: 2021. 423.

Integration Issues

Grid-Level Integration

Manifacing reliable specifies of the abolitis system with high lowing of alexistences instances will require a useful of bodynges rectingly, politic set lawing the regulation to follow real-time app and above in generation subject with the set of the set of the bodyness or generation that in comparing perception have able useful to follow political as or down recept a wind as subar generations, sploring a reprinting to provide thereing some an embalance and regulations proved to retrieve power as embalance and regulation proved to retrieve power as embalance and regulation proves the realizers. Explore specialize notice that accurs when here is non-specialize notice in that accurs when here is non-specialized neutroin that the set of the set of the provide them there is then the thermologies to they force here much nonabilities the theory of the set of the set of the set of and the thermologies to the play lower here acting of word and active them the two.

Complementary technologies like solarad paifind power plants, newsyrtologie, and domand wegeneu powiek urznus choise for blands and cough response powiek urznus choise for blands and cough response provide solar and resultar, respulsion, spinning resortars, and resultar viewer a challengt in manager and an available. However, a challengt in the weed to available viewer as challengt in the weed to available solar thear on the incommental cash of shifting the care of hear web incommental cash of shifting the care of hear web inpositing management anong productions in providing heading products, and web as patiential terementerial impacts and hear of machina the from casterging theas wets must frequently.

Energy stralage can prevails a speaky of integration territors, but additional markation in evoluti atout cost offschievens, appropriate largets, and speakle techniques to determine which can provide the regul response and specificial fluctuaty worked

 Second present 4 the air intermeters capacity that is applications to the goal spaces and wants to need strategy intermeters within 20 months of a logarity methods to the "pathwest 50, and new parts can be applied to the 100 months / 100 million 2011/11/01/2011/2011

-

Investment and Financing Issues

The interior flatanting challence identified in the Revewable Power or Catilonia: Status and Issues report was the send to ensure allequals trearcing at critical stages of research project descingment, he particular. Here are funding page of the H&D and early commercial stages. Private companies are often relactant to invest a R&D to accetecile clean energy merculate due to the tights price of pleas energy technologies, konalogie tpillowe risks, be beology and peticy securitainty. The scale and long time havings of many clean amongy projects, and tash of wedeturnal enabling chan everyy initialituchere. Although overall NUS investment in the United Status has prove an musity by & percent, invantment or everys withdod remunch is about \$1 billion less than a should ago, with the private metho's share of mergy #4.0 investment Rectining from nearly kall in the 1980s and 1990s to about 25 percent holes in the early commuted stage long have traditionally used private equily, debt, and tax equity markets to provide financing, but since the Intercial crisis. These splices are officer impractical given economic conditions, depiced we governm incretives to function well, or the net provide turblicated etans for overlars.

[Thirts In address financing itsses include:

 National government followateries are participing cutting-edge metalect or a variety of choice energy forcheoginges, and the follow Ancience's Regards Property Agency - Energy found togs must have recent forcheologies to bridge the gas between basic sendary regards and molecular application.

Other tokend government soggest mechanisms include his incredises such as the boviess energy revolutions has credit and the resource gendection has credit as well as activation dependent of resource and revolution and tood towards program. State eccentent include prepares in support research (b), including the Collimna lister inflation (20), the Longing Reinvalder Program, USP), the Shoc Date Henner Anthrecht (B), No Diff Conalises Incurs infrareding (B) (20), No Diff Conalises Incurs infrareding (B) (20), No Diff Conalises Incurs in three task Collimans, and well is safely and see the includence suffer Collimons, Advanced Taxagerialism and Attenuitie Towards.

 The FRI Program provide raughly \$175 million for menuclik energy research ladvens 1357 and 2010, including seed heating for technilogy-secolation that according to technology and development of million technilogies.

 Calderwa's inequalities fluid institutive investiges in stages paids, technology installators, whereafters, were todayed patienties to periode an investidies platform for starting companies, incoment, development allgane schem, hummers groups, and instane capitalists.

 The CPUC's Research Access Rectange characters for processed process for developers, whites, and regulates by adverag belates to set their own proc, perioding a sharehold control for each will do and adverage projects to be extended to the CPUC freque as equivalent organizer review process.

 Taste lise head in cardfu previde a relatively guaranteed revenue shows maked hyperatives costs, and their support lise card physical foregroups for hearing 2018, the SPMC made feed in tariffu available for the proclass of a pt 6405 MW of tensorithin generating capacity from straight facilities 12.5 MW or less: Sensori to 12 Mignitis Micro, Chapter 2023.

(1) Say was generally being private and an general private strategy of the second private

 Service opticipal "Charge Results for Results-April-Scheral free

respects, and determining arbother three may be a aligning through a first an executivar for income statures. However, E3 argumphine have piecare about the types of power plants that will be built to most increased electricity itemand and replace aging somer shalls and cluste that may teller as a sould of the State Water Resources Central Reads's police on the spie of areas through cooling in power plants particularly in the tauthent part of the state, which tot some of the warst air quality in the nutron. There are also manyous along the tunes of fires it prostation that may be hull to support renewable integration, in chading frontile natural gas furbines ("pisakers") that are trus efficient than baseload resources and have reased emplosis that may affect the constantiles a which they will be located.

() communities do tere file value of remenapel generating resources, performing the remenable OG took act resthup PA; so that communities. Routings PA' or unass senseneeths can generate the totage metal impacts of basel heads and events metal impacts of basel heads and events metal impacts of basel heads of the algorith path. However, repting table is not always metalous path. However, repting table is not always metalous to these systems and addition, may events to the assessment and the tegits apliest cord of base systems and addition, may evaluating of the menables for an authous resultation restelling where they are paying the the typitment and additional wing while insulation, representing in tobalisms where they are paying the the typitment and additional wing while insulations are then where they are paying the the typitment and additional actions.

Etheris is help which the costs of installeg and has PV in althought and low-income housing include:

 The Every Commission NOW offset affectable housing projects ligher incentives than standard market cuts tessing projects. Of the overall 400 Milling and for the online WSW program, 74 MW will be Statutes at 2018, increased eligible project too to 3 401, and South 10133 2 Constant, 42100, and 1500 long, Owarke 1. Statuters with 2010 to mak additional assessments, travelanding have the fixed on Lardt projewould be extravationed. CPUC Patientiating 11: 65-1025 at implementing Theory changes, with a racket projeate strange entry of the statute of the statuter of the instant result and the statuter of the statuter of the travel results and the list for particular with the CPUC Resistance with the Statuter of Resistance and the list for particular with the CPUC Resistance and the list for particular with the CPUC Resistance 321.27

Turning for programs, like the NGH? The USP, and the PER Program, which key contrasts transition challings, required at the end critical and white unbracked # the Pydele Quedt, Change or alternativ transver Handing is not transitionaries. On Disconstru-12, 2013, the CPDC approved it Phase 1 microsoaliditating the Chestro Programs have the resemables and transack, discributioned. Change arXiV: The callent basis on an interval later programs.¹ I and sum with a sum the resemables and transack, discributioned and disconstrution programs.¹ I and with a plancel in passion protects and endowed and automoush for the CPUC field theremay also and automoush for the CPUC field theremay also.

Cost Issues

N

Remeable technologies have a with range of cards depending on the technology. Historically, technologies like solar thread picetic and usine PV even Dought in lower levelship lawer. These there of conventional generation. Reviewer, means) contract toda, view that this is changing. According to the

42 Dartieres Parez Detrois Darmannes, and Assigned Darressonan's and Alternational Dar July 2019. Room Darma resolution of a Unity Banagar New Darman to the Darian 1931/V Anal - P. Juri Vingen, and A. D. 2012. Best Spin, 195 geosther/Bal, ROD (1973) and

 Saliseta Pallo Utilites Derivitian, New Assessment Jacob W. H. 2011, von Ann. Status proPath. Solid: MCML, NJ. (CATLINIALISIN).

made availables for new affindation beauting during the 10-year program.¹⁰ As includ, this program entires on funding from the straty's Public Goots Charge.

Under the Carlyrina Safar Instantes, the CPUC has been program, the Single Family Affectable. Safar Houses Program and the Mathematic Afforestable Safar Houses of Yougan. The grant of these programs include insprung energy size and the grantly of alltradiativ housing through use of Safar and Energy (10)commy feelonalizes and decremony to the commy feelonalizes and decremony and confit without increasing workfully feasibility argument for ensisters. Programs provide sofar increases for spatiallying affordable basing in the previous benchmarks of PGLL, 507, and 538. Deep Conf. & Election.¹⁰

The surgeoid Gold Attendatives Solar Attendation Hearing Plangton possible training to initial solar initial systems for two income formameners, "This pergram legars a 2004 and an of theorem 2002 Aniiosticable LSUT solar initial training and California Theory systems regression nearly 4.2 Mill of generating calification and are referring calific solarly velocities bills by about 75 generate. Gold Statewards surable based more than 8.2001 spotments surg able 120 percent. Gold Statewards state able based more than 8.2001 spotments surg able based more than 8.2001 spotments for all plit trainers on the theory and practices of solar electric installation.

 The "later for AN California" program, implemented by the Galifornia Department of Commanity Services and Development using funding truth the

- M. Lines forthers, entropy and protocolines angeo phononal-one protocoline forther protocoline in the second phonon and the phonon phonon of the second phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon and phonon phonon and phonon and phonon and phonon and phonon and phonon and phonon phonon and ph
- Constructions and a construction of a page strength formation from the strength fragment which is more equal to a give PCC-reservation of the strength of the strength of the strength fragment of the strength o
- Del Alterativos anterito, into nano geligificanzione prije regioni numbero.

Energy Committen's XXX contrast instations, the mapping of state thermal prever town incliningly comvoids is upper and providing an observe the 2018M Mandal. Write Referant 2019C, a prove the The location (cost of a new 500 -mogenetic nature) gas consistent (cost). If the utility scale revealed preparity, the Leverg Commission. Collinson REL and CPCC is mainting of worth togethere to include the presentation and revealed integration costs. While costs of the appear spacetist, these are inclusion of the appear spacetist. The scale costs of the state of the state of presents togethere to include the presentation and revealed integrations costs. While costs of the appear space-

Resewable DC projects were and cantidered more costly due to higher transaction costs and lack of accountry of scale New standardication of conhuch turns and the way PV is manufactured and sold are reducing toll. for DG systems, as shown by advers actors hind by Southern California Labor (SCI) with the GPUC stating that all contracts signed among them 2010 Resemptive Utandiand Chiefd and Deltwin No. 2003 MPR.** 8 is they that there will be reprinced charges in the market in the next the to les years as DG tablem havene more card-competitive. While distribution turther apgrades and residentiation study be significant drawning on the location of DC proents and the pace of which they are deployed. there ans a variety of efforts underway to identify optimiz incellines for such projects and develop the second pril inclosingies souled to ease inlegration into the distribution taxtee.

In any discussion of the const of reversable locknoingers, it is expected to exception that reversables provide important about to the trans a subgravity associated, such as the work of having a discusse printing of generating resources that reduces costs and risk to taloguests, prevides basisers and assames generating constrainty, whereas dependence to while all guested unless subfills, whereas dependence is unlessed as and unless subfills, whereas dependence is unless and unless subfills, whereas dependence is unless of guested unless subfills that dependence is unless of guested unless subfills that dependence is unlessed guested unless and induces (DEG entrainty).

www.empace.projection/orticle_militation
 www.empace.projection
 wwww

Research and Development Issues

Continued public sector investment in some contracted RED is an imperiant tool in help address many at the citatorges facing California's renewable enhating. The Energy Committant's PER Program has basined at write warwly of research to sitestify ways to address the concremental impacts of renewable energy factor fork develop technologies to improve the performance of the state's hanswitten and distribution systems. prompte salographics of reconnective preventions technomgue at both the Statementative and distribution toold migh the dividigment of smart gird, invergy share age, and dominal rangement inclusionses, and reduce resultie to heatingy costs while arguining efficiency With increasing levels of viewwalks repairings in California's alsoluting min, confinued twistarch will be required to each of these areas to provide the technoingit all advantaments medial to tapport the state's clean energy policy goals. Statutory collection of familing to support the PADI Program ended of the end of 2011 but funds are being safested on an interim. keen pending a linal decision by the CPUC.⁴⁴

Environmental Justice Issues

Environmentar police (E) is admined in Carlterina lan as "the fair brainwork of amptie of all score, typhenes, and respects with respect to the downlament, adoption, implementiation, and policies". The Damy Cammingson has concluded the Unsern with privar plant fairmout prevents sime. 1995, including stacking and to community monitors, shortfying areas adoptively affected by monitors in other environmental impacts. Adoptional prevents inplace plantes of monitory at the income.

45. Antophics and provide the state of the s

Low Income Home Except Accordance Program.¹⁰ Nata a goal of mitidating 2008 new PV applements singles and mathlanning low increasing home and and charlowers be property 2014. An of Neurontee 2015, the groupses task included 422 singles family systems and has approved an additional 2015 ongle family systems and inne property that will benefit 664 mathlanning with.

The Las Angeles Department of Nature and Power DADMP recently estimated its Salar interchol Pogram with significations accusted beginning Supfamble LSBI-An part of the program. LSBMP that has been called to investigate more options for making salar although to low-income callmans, with the goal of destingtion brand other program. Dar Roser income households.¹⁷

Local Government Coordination Issues

Reservable development of the local local will be an estimated component of the status velocity. Note when the general status gradient status will be an the generalized of the local local generalized to encode and provide the local local generalized encodes and providing to a wide using of neuroscillo property. Moreo trainal generalized to the economic and providing to a status of the economic data to describe a status devices and the economic general. Moreo trainal generalized and the economic generalized and a local status of the economic data to describe a local status to the general genes and a strendown that the data difference genes and anotheresistic. More trained and the features of generics for removable facilities, but many local and genesists. perificiters are plus theory strong leadership and encoders is plusting removale energy itselepment. The start work is main closely with local generators is a solutional three works and provide another where possible is help expedie the are within and underland three works and provide another an ensemble obley scalar pojects that are under local an ensemble obley.

There are several initialises and trouvalue and standardise predicting processes for revenuable DG preacts.

Transph da Salar Aneteza Cambandina aragran, the di S Gapriment di Anegi (DOC) na 2007 and 7000 microli 20 c. 5. mics. na si edich an a Califernia, pa "Sina Anesesa Calim."¹⁶ The areas Induced beal amber dag indultion and to identify harmen la grante adoption el sular technique and Review anditation to them America.

An part all the reveal intralegy in induce harmony to the adapteen of polar technologies and to stranable manual practic. DOE for theodel the Tales Anamia Manual the Costex and Etapethets to segment balling codes, while information processing and product taleactions, metabolity, and solves ¹1.

The SOX's 12.2 solution "Soliton tomation Realing Solar Challenge" sizes to indice the administation cross for Pry reprints. "This is a estimat close polition for local and regimal frames of generations, unkilles, multiletes, and infers to "complete for back to implement their plan to ender a deministratific to a regiment to itself and so and assume that and any to insident plan to ender administratific to a regiment to the plan to ender administratific to a regiment to the plan to an out a dimensional solar.

12 Sate America Roard for Scalar and Standards, one mean

^{12.} Datherts Superinter of Linematic Science and Nonling meet, Nam. 'In NULL Arrival address on an and the large Mountainform's 107-05-2008/LINE address rate.

Vel, Argens Teamment of Water and Print, "LBDP to Anlands Same Networks Proposit ADS Remain Insertion Losses and Disastronal Economy Devices," proc. Hospital, August 2, 2011, Nat. Acad. Sci. Comput. Comput. Comput. Natl. 111, 2012, Nat. Acad. Sci. Sci. Comput. Comput. Comput. Natl. 111, 2012, Nat. Acad. Sci. Comput. Comput. Comput. Natl. 2012.

M. For a list of the 25 Selar America Direct care parameters commenters and parameters

St www.art.magagalizachiteger.

PV inclutations by chearding, standardizing, and digitizing admonstrative processes.⁷⁹

 The Every Community Swap Awar Planting South provides information for local governments to and in-responsing DS in their persolutions and sagprets a voide soundly of insplationstations through to point the Quegarity.¹⁴

Workforce Development Issues

As preschared in the create energy economy repaids, there is incorpore much the a constitution program in the workforce factories that is created pathod with table demand. While growth is create toch regelerates at the memory files and, solar photositization, and tamel grid is creating another to workers and there are a monitor at workforce toating programs in place. This fugile economy, barries the workers at these photoment rates for constant at these programs. In definition, we are accounted at these programs. In definition, we are accounted at these programs. In definition, the process of the programs, in definition, experiment of statuted at these manifer programs of statuted statutes benefing the muchters development may make it data at the muchters is experiment in a statute class and promandly colleges, that expectations, and other framming provides to capacitate that make it.

Efforts to address workfletz development shalllength activity

 In 2118, a survey by the Center for Energy Efficiency and Remeatain Inclusion/park (20181); and/and/ that Household of everyones with an excellationese 2018 – 7015 to hald gover allocity bring programs or Sandhere California, with hundreds of performant or Sandhere California, with hundreds of performant and anothermanic paths control for the used.

 verd antereppinfoldstaftstudies, star, skilmasar tis Cartoria Dergi Samoon, Burg Asia Planop Bell.

Admini (11), ann an gu (a gu 7107646) dian (12). 103 1239 123122 100 1089 12791 Satur (2).

44

 California Department of Yrampertalian (California) is pursient the installation of YP along the California highway typical constituted with Convent Biowesh support of the California Schell Highway, Dow proget in Sanka Clara County is in Envirophenet, Caltonia Sira, and utshifted 29 Usate sevent checkness for antipation of PP parents. 'Si of them facilities are presenting energy with the remaindem regarding is in producing energy by the end of Nacia plane 2011. -2013.

The Explantment of Water Restances (1998) is realisting science transmitter energy projects, locateing downloping straid hydroletercitic grownloss in the Shot Hydro Program of sciences, building for a faith project for in-specificit hydroleters, grownloss, 1998 is also regulating with the Haiverstey of Catherina on a science projection of the science of the Catherina Agendect and not be social the purpleg plants, and is segrificiting a power architesta agreement to wind means with the science of the Catherina (344).

 California's targeounds have installed solar PV at 25 of the 74 study fargeounds canging in son their 4) kilowarts to 1 100, with a total installed capacity at 6.5 MW.

 The Department of Tarretry and Fore Protection will continue to require the featibility of biometry facilities of contentration content.

The California Department of Corrections and Relations (DCRE has two spectrums) and proud-memory with a weap of state process with prover particular arrays of state process with construct the mean of the marks 94ML CDCR and has prover particular agreements for these additional takes, for a total 212.5 MW at these distinct takes, for a total 212.5 MW at these states are summing properties for an additional 18 Automation, CDCRS send subar attach will include solar that can be considered for additional processing that can be considered for additional processing that can be considered for additional processing that agreement and processing are stilling processing to a sub-implementing read-imputed to 2013 MR, CCRE to a sub-implementing read-imputed. juits to build 2,000 PV projects totaining 6,000 MR with a 18-year partial woold traubs a minible powerpy of 10,000 juits."

The Dark Energy Workberg Yaming Program. He integrate that-constant group of that into program. In the station, a require question statistic in program. In the station, a require question statistic in statistic integration of the statistica. A statistic integration of the statistical of the statistical of the statistical of the statistical data statistical d

Ine Datas Energy Workhora's leaving Program also are an interaptive approximation with the Englishment Suscent (Provide Acids Provide) and ELS, million and grantis for current advancement framing. Genetics State machines and acids in their states provides a data menticing a 20 day employment reduction period when the training is completed. The program is with to frame menty 1,000 incurtained workers.

The Dans Inservation Disations Guad program to histing convenity unlegar tradients in the Line Frantices Pair Area Same To Malling Same Same Same repairs and maintenance to attach is and attaching hard welches, helping the Dan Dangs region to diset college level conventions and confidents for ensemp onlings level conventions and confidents for ensemp ortholical educity, and holping to than PV total uniform. Synthe designees, and marketing policytionants.

 SHAT I (Shortnerg, Chapter 2, Watates of 2011) will provide up to 30 million in handing aerosoly to the

12 Data to Deep History and America Schwarger, anisotran to the Data Keth America and U. 2011 ever over expREstropolar/URL_SLices_20191_ever/exp Mugd.

M. In very elements in the Date they, Braters having Propert, the even merging performing path?

PI for several one halding contraction projects as well as a request for information for west interacts accordanties.

The State Larch Connection managers Meanandy, of across of "schedul and", at a revenue source for the State Southers Microsself Systems Unide the utility of approvers, No State Larch Committies of Norsting on additive using meetingment scher that DG. It has approved Nates It revendable meng symptot to the lards and is carefulness application. In new property ands and is carefulness application. In new property.

 As part of 8x offset to relace generations gat particular fourth to your 2001 towers to 2004 and 2000 horsts to 2006. The University of California And Set Aggressive energy efficiency togets, and has while traditability descriptions; togets, and has made traditability of sectore to contained hard and generations. The Settember 2007, the University to California kat 8.4 MW of sector PV workplot or uniter instituteding and an additional 8.2 MW of largelgeneration.

Recommendations

Building on the Compy Connection's study, memorion public workshops, and the input of standards: from varient connections and inductive thimsphere California, the Evergy Connection programs for overacting studyings to guide the chain as it works theories activeney the 33 percent PFS wandout, the 12.800 MW DG perc, and promoting economic receivery and gits roughts through societation is the plane evergy tasks.

1. Useday and prioritize gauguing areas in the state the balt meansate eithly scale and decided presentate development. Priority press should have high length of theoreality instantion. In foculty when development will have the payer meansaterial impact. Separatesident of Palitic Instruction Ia separatesid and administry against pargine for fixed class energy gain. Anothing academics in particit schedule for galaxy, 3 – 12. The partner play academics, which some promoting administration of the second schedule schedule in Caracteria is energy and schedule schedules, removable energy patielland schedules, and called a schedules.

The PER Program towering XIV willow to the California Performing Realitions' General/Case Multi-tow Is built there to grave and pathways for students in grades the California Department of Education that they also assistance and Case of Education that they also assistance and Case of Education that they also assistance and Case of Education horizone, partnerships, multi-right and indexection, horizone, partnerships, multi-right and indexection with a locate program cannot such as prover fuldings, touchandan they be also and partner partnership.

The PECR Program powelled can't stave funding that helped leverage ARAR backing the the Celebraia State brivery by Scaramenta, to thereing a clean senergy winkferst constantion for the levelshi gainers instruction spectra and state of the levelshi gainers instruction and the state of the levelshi gainers instruction and the state of the levelshi problem and the spectra of the levelshi field fragmentation state of the level field fragmentation in test proclean and reportantion discussion in the proclean and the level and another in the proclean and the level and another the the intervalues with proclean and the level proclean and the level and another the the proclean and the level and another the proclean and the level and another the proclean and the level of the level and the intervalues with proclean and level and the development of the level.

Public Leadership Issues

California has the petrettel to deserting science-able searcy systems on state search buildings, properties, and rights of way to tany word the state's conversion energy point. Leading priori (bits, and reduce greentense gas constants and other harmful air patholanty.

 Fanding for this effort was appropriated by Asserting Rel 228 Hodget Converting, Disaster Vol. Stationes of 1978.

.

and he close to plasmed, neiding, or approved housmission or clubitodon infrastructure. Prioritophys. clubul arts includio increasing affinish federator studie and local approach to coordinable local fand was glanring and approved forcesions that provide the strateg and genericing of encoughte energy related relevantuals.

E. Evaluate the start of researchin using projects, beyout bedwing tests – selecting casts assudue with using publics, permitting, and interconnection – and their offset or relial intersective rules. This resolution that he magnite with a value startbound that must potentially lead to researching the serious system and new renerg hardeds altolation to renevable research hards for advantages, particularly linear learning address and starts and reduce miniments that policits reals.

3. Develop a sharkey that minimum administration has not and from and maximum administration and expansion at the distribution level law, to as a distribution provides the distribution opicit and the transmission need back as improved forcienting, the development of a mining includual market, and processment of Seguritudin tempolation indext, and processment of Seguritudin tempolation improvements to integration techniques, and improvements to integration techniques, and improvements to integration techniques, and the status vestime analog applications that their term of the status vestime analog applications part that the status vestime analog applications part of the status vestime analog applications part of the

4. Premier incredues the reasolative behaviogen and aneighnesic projects that could in-scalar gates and support in-state industries, including membrabeing and construction. In implementing this staticity the state should sustant how correct remeable energy prices and programs are affecting as totals pay growth and company. Activity, these to aptimicther efforth-energy and iterativity which membralist histheraparency and iterativity which membralist histheraparency and iterativity that provides the biol opportunities for Calibrane Diameters. Basig aroutdownity will get under a mongy such as state buildings and speaks new memory fails gave evanued. Howgit the base of a state if at simulat look. Tarks tradition of a data downsolute the biosektru of seconds to Gard and second gave so are state parts traditioned for state and account the speaks.

A reacher of their papers internal into a network tandow of initial-taining in Pleanshor 2013 to powhich the downlowed of initiality to ensigh projection with the downlowed of initiality to ensigh projection that the properties. All pair of the direct, the Concyg Commission shaft indexed a shaft region in Aged 2013 (but divelofied ensured direction) and another direct angle projection. All pairs and solutions to the falses displayment, exportantises for further three directions address the fault segment in the damily superfixes interacting of statements of the damily superfixes interacting of statements of the damily superfixes interacting of statements of the damily superfixes for the damagnetist of statements of a state of 2022. "Based on the sensitive of state properties to indexidy superfixes for a statement is presented a staget of 2.500 MM of the sensitive generating capacity on while paperties to \$1020.

Efforts anderway by various shall approace, that will contribute toward meating these targets include.

The Degarisment of General Derivative DOC Hacks energy on all stable buildings to investore programs. Neural indicing seeing personalities of Parameter 2020 as called for high seanching distance 5 26 dist. DOS unto instance three requests, the programs with the landow PV at stats facilities and answering campoints. The links instance of the individual search of the individual search of performance and both the search of the links instance of the individual search of the endle of the links instance of the individual search of the endle of the links in the three search of the search of the search of the links, the target and search of the endle of the links in the search of the search of the search of the endle of the links in the search of the search of the search of the search of the links in the search of the search of the search of the search of the links in the search of the search of the search of the search of the links in the search of the search of the search of the search of the links in the search of the search of the search of the search of the links in the links in the search of the search of the search of the links in the links in the search of the search of the search of the links in the links in the search of the search of the search of the links in the links in the search of the search of the search of the links in the search of the

 Carltoni Umgi Carmaniti, Biologong Annosatiti Scientific en 2016 Papels, Noveline 1011, New Artist expediti Index etimol 22 (10.011) 400-002 335 2010 001-022-pdf

 The majority of these ISSI sortiests are in USSI features, strent field of a lasherpart factor and these of the ballies of the source of the so

5. Prevents and proclassic moting that and holeral basicity and inclution programs. In other all fourmentance presents, development, and dissocrations, precommentational and adaptment. In particular, the other insult maximize the size of holeral cost grants and have parameter prepare by preclining the preventing or interamentions of Californiabased reserved in stream, processing Californiabased reserved in stream, processing Californiabased reserved in stream, processing the preventing of the based attempts to the Californiabased reserved in stream, processing the californiation of the california stream.

Detailed ineptimentation strategist and action since will be identified in the unuming 2022 integrated target ratics forpert backets proceeding in provide target patience on uncertain activities in which variants that and lead on their can engage to sectors when carry out these high-lead strategies in the sector solution, and leag lead.

÷i,

CHAPTER 3

This chapter summarizes the **Energy Commission final staff** report Achieving Cost-Effective **Energy Efficiency for California**

Atti-Attist actualing key panels have the report, progress as addition wangy efficiency savings and increasement and verification efforts. and pullicy recommendations, ⁴

California kgr dowers blated a strong commitment to cost effective every efficiency for the last 30 years with the adoption of propressive policies, programs, and actu-bes, in 2003, the state's test Energy Action Plan established the state's loading online, sating to studiedly week to be met first with increased every efficiency and domand response, Accorday 54, 32 made parlymor side energy officiency a key stralegy for reducing prevenues gas americans to 1995 levels by 2020.

12 Cardieria Congo Connectoria, 2011 Al 2021 Property Result Achieving Card Photos Corgo Objectory for Gathering December 2011, some areas in gate 2011 Cardie Corgo (2011) (2012) 2012 2013 2014 2014 2014

Table 5: 100s' and Publicly Owend Utilities' 2008 and 2010 Savings and Expanditures

	inestede	and Utilities	Publics Owned Utilities		
	1009	2010	2009	2010	
Opwatt kiurs	1114	4,618	páx .	525	
Wagnedt horrs	201	. 818	100	3	
Demo	. 94	16			
Levid Antianai (E. Millanai	101	171	214	1810	

-11

a data attavat her tha title know hards to 100 and 200 tega pack and 1000. Degr?how or Calman Age Prover Spectry & Status Waret Waret 1933 and March 1937 School and

here worked to third such well-shots. Regimerer with the 2006-2008 program implementation cycle the CPUC legitideal a more campoheersive process. for confirming, vehaloning, and reporting or post to aluation results. The OPIC's 2004-2008 EMAP results shee a significant difference between reported and evaluated savings for that period. Misle The XODs reported surgaring their everys taxingt goals, the evaluation report indicated that the utilities achieved between 37 percent and 71 percent of their goals for that period. However, the CPUC's 2019 Energy CF Konney Statuster Report for the 2009 Bridge Funding Period verified that the KUIs achieved 181 percent of the GMs goal and 104 precent of the MW goal.19

A new CPUC Potostal and East: 33xb/br stfallowing is uniformity and respected to be complicited in tale summer 2002. The results of this study will be incorporated into the next AB 2023 interet to be retrieved in 2014

Lations Feld, Utina Developer, Deg. Desig Julio and Apart for the 2019 Mage Analysis (ed.) (ed.) even opt. 1 a preMillion even Statistical Office (ICC 421) 010701101555511 and an Apartment Statistical Statistics 010701101555511 and an Apartment Statistics

Publicly Owned Utilities' Progress

in 2018, all publicly served all littler's combined sport a total of \$173 million on emergy efficiency programs, at 15 percent decrease have 2009 and the first drop in energy efficiency program sponding times 2006. (Table 51 Likewise, fully energy and prob Lawings machined for the publicly isoned utilities to the first time pince 2006. In 2008, the 39 reporting publicly served utilites provided 573 (24h of electric energy savings, a demand of 25 percent from 2008. The publicly exercit abilities achieved 74 percent of their 2020 energy samings larged set in 2007. The decline in the 2010 numbers, however, is larged ate to the completion of a large contracted lighting program at Las Angeles Depictment of Water and Power (LADAP) 1º Depide 2005's tacktevily economic conditions, wild sized

Achieving Cost-Effective Energy Efficiency for California Assembly Bill 2021 **Progress Report**

in 2005. Savata Brit JELF (Reltar, Display 364, Statutes of 2000 wade every efficiency a priority studie's to electric stillion to send their measure words. 38 2037 requires the California Public Unities Commission (CPUC) and the Energy Commission to sheetify polyelially achievable cost effective electric. and subarar gas average efficiency savings and saf gight by stretche swend altitles 2000 is achieve this potential ¹⁴ Balli agencies much review the procurrent plans, to become the consideration of every efficiency and other past effective scepty options, to addition, 58 1857 requires all publicly neveral addition. reperdence of size. To report annually to their customars and to the Lawyy Commission on investments in support officiency programs.

Assertative Bull 2021 Laureen, Shapper J.S.A. Shatuties of 20000 added more specific legal delectors for increasing California's energy efficiency programs. All 302) requires each publicly owned utility to

· Degraining in 2007 and every firms years theread tor usedity all patientially achievable post effective electricity yearsy savings. Using the efficiency patested activation antabiot sexual targets for every officiency savings for the next 10 year period.

· August us program cost effectiveness and thedparts every evaluation, microarement, and verification (DMAV) of program savings.

AR 2011 dwecks the Energy Commission to

 Include a summary of the publicly oward utilities" taxings and evaluation, measurement, and verificaton (1989) station is the Jobpathy Deepy Pality Report (1)/101

El: Dalatores for energy History, "Exploit "energiptic" an axial close (supplicing Theorem et al. et al. Effects and the formation of their mean Effect the direct Part (Ellis and the test "parts", " Articles and articles for a admittant tests to the Targets", since fails in the test and and a 42 (21).

· In consultation with the CPUC as the regulator of 1205" avergy afficiency proptants, provide a ferrinal claiments and analyzed an energy efficiency periodical and targets for a 10-setar period.

· Provide incodemondations to publicly owned stiller, Legislature, and the Governor of percilie improvements by the publicly owned utilities.

in response to AN 2021, the Energy Commission vicand the 676 annual final statt report Actioning Cast-Offictive Gregy Efficiency for Deliteria 2010-2020 COLL AR 2021 Progress Report on Depender 73, 2011. The following section provides an inertal summary of the edition' property in merry. Micimo program savings, EMS2 reporting, and a more defailed description of setting energy efficiency Targets, followed by recommendations for inprovemust of Here efforts

Staff Assessment of Utilities' Progress

Investor-Owned Utilities' Progress

The 10th administer efficiency programs under the DPUC's Decree 15-25-047, which approved the story ethoremy program pertokes he 2010-2012 with a total budget of \$3.1 billion. The combined Klis reported 4.607 gigawatt towns (DMH) of press protect taxings, \$17 megaeutts (MR) of seak taxing). and AU million therms at eatheral gas savings in 2018. which exceeded their 7018 UPDC-mandaled guals. The 2010 natural gas savings follows a 54 short of the CPUC's natural pro goals for 2013

The 2010 IOV taxings numbers are still in unitsavings, that is, soft-reported savings that have not

ù

B. In P.D. Berneller, 23, 2012, which is consent on the dwort 2023 BPR, UCRAP Analysis, Science and program sectors of the lighted program, which will be tagened 5-14 dataset and science and programs. An effect of the lineary programs " source energy or application with difference programs." Source energy or applications, and with difference programs." Source energy or applications, and applications of the spectra program sectors. A sector programs. " Source energy or applications of the sector programs."

por soul utilities performed reasonably well in bulk influency spending and samings.

Encouper confairs matters that an ensues the progress study by the publicly down publics in thep energy efficiency propulate, therefu is reported energy of theore, a propulate, many of theorem publics as a proceedings of research, many studyers publicly to absorb targets, to seep the least of the Somera of History opposed.

Longy Communes shaft has requested information the publicle onesed statistic that woold help to integred data on efficiency pergress. Their organises to observation regards that all regions and the public communities to util and regions and surged and address. As shaft forms, there specifie algorithms to data sharing, the Energy Communities and the publicly sound all statistics can alwaying registrations.

Evaluation and Verification of Publicly Owned Utilities' Efficiency Savings

The probaby sensed addeter taking reported as this discussed have not been mellified as a result of independent workpoint schafts, black the DBA; be which the GFUE can report evaluated savings, mult pulsity remail additud is out put have constanted evaluation methods. Since the parameter gain V48 2021 to 2020, marks half of the publicly would ultitles have their advices that the publicly would ultitles have their advices to UMAV instance that for angum years 2020-2020. The function communities down oped 1986/29 gainstitutes to 2028 but transmits down and advices that with the publicly evend addition. UMAV can support such yorking neural advices.

is marked samings patiential, which is the presentiage of eccession patiential that results which an program discourse, exclusion particles results which produces are accurated. Wolk a few enceptions, the publicly assure alkalogs used the market patiential as the travelat largeth to 2013 present of their eccession generation, as the entite longet vertice as 2000, theory constructivities there are larget within the 2010 features that states entite longet vertice as 2000, theory constructivities thereas largets and the 2010 eccession patiential. Is greated with 2010 eccessions patiential, the greated within the 2010 eccession patiential, the greated within the 2010 eccession for levels messaged in 2007, the targets listing they the utilized, and approved by their generate paties.

While Tate Interaction of Lance individual utilities achieve 10 proceed samples over 10 press, the comlossing patientsy several utilities' Langett als not neer the 48 2021 communities reflections gave reactions (3.4 generate Langes from Superactions 2020 bare energy press Ceta 3 of the 38 publicly several allottees individually neer the 38 publicly several allottees individuable parts to 38 patient and 2 athress halling only stightsy short.

For much allaber, manhat savings potentials were instantined using a bit present subAnnur measure incomese level." Additional meaking indexand thus where a 72 present levelshow of additional addition meet the 12 preparit ensemption induction guid. This indexative that the publicly owned addition ran meet the comparison induction guid of AD 2021 pot may require a logical loss for guid of AD 2021 pot may require a logical loss for guid of AD 2021 pot may require a logical loss for the logical measures. The measure is not started and the induction solution of the move all cost distances is a logidation of string annulate losses and distances above, of the move all cost distances is a logical measures. The measures that the distances is a logdation of additional addition programs. Increasing issues the lowshile in 22 present may not be cost of the lowship in addition.

20. "Unparameter instance instance insufficie insuff," Imperi that the colling part for 52 percent of Maximum of the integra of history, Prolonge, and an Unreage & Maximum. al policity owned stating provide exercised hading for EMEV in More budgets as frame care to transmitlandment paper third party resultation and provide teg prepara retrieves. Other publicly assets distinct had distudy naming the Earcy Conversion's part policies between descript in each researces, care target space, and program delivery approaches makes if stiftcarts is west' non-our fits all' procurption gladelius to HUW attrieves. The Mith all procession following using study recommendations to improve delivering and program thread theory targets. HUM procession that all processions delivers to HUW attrieves thread HUM studies, including using study recommendations to improve dials to tracking study recommendations to improve their tracking study recommendations to improve

Status of Statewide Estimate of Energy Efficiency Potential and Targets for 2011– 2020

All 2013 expanse publicly evened attrites for storages extractors of revery efficiency published and trapers on a Triesmit facts. Sure to the suscentiability of contrain care. In the Sange Deministers on and east art the relatively efficiency estimates for all validates were the method directory on All 2021. After the participan of All 2024, the foreign Commenties coordinated 19 years suscept largets in Discontine 7000° for both the DDs and publicly served attribute. In 2007, all the attribute parts and guarts form which to directing the relativistic taming spectral estimates. In 2007, all the attribute tamings parterial estimates, the 2004 of ageneral flue parts and guarts form which to directing the relativistic taming spectral estimates. In 2004–2013, however, the DDs gate tables. Scarsmith Managed attribute submittes and guarts controlled. Scarsmith Managed 10 Mark (Thirtee)

14

Recommendations

Information Requested to Interpret Efficiency Progress

The must important data sended by staff to evolvable annual currents in the L3 Reporting fuel, which catupates some priorital for next-publicly uneed widely based on specific accessferes. In 2016, the publicly award utilities stated that the masses for withinking, the data base is protect combined intertilies. The Catego Camerases is not interpublic of which and the state of the sense is protect combined intertilies. The Catego Camerases is not interpublic of which an appropriate soft is widely a maximum balance an appropriate or reductive adjustment of the L3 bala.

 The Energy Connection requests data by Warch 302 m wildly energy effectives expended uns with effort sizes of Polick Geols Ourge PGC handing frelations, research and homeigneeric and intervalle energy projects.

Definition of the particle works attribute process indexects to the particle particle of energy efficiency is independent executive parameter arrays of Converse is independent executive parameter for attributes that were ablecting fraudu to influence programs. Spring were ablecting models to influence on independent their PCC Stating, but there is no independent procession. While some patholic issues along and an assessment. While some patholic issues along and spring the grand states the resistory along another, but an expanding insight of the pathol of spring attributes the spring attribute ablest patholic spring at a total aphysicant. And an expanding tomparable to apply in spring."

 Despathic and prevention for their integrated second states for example, and the Physics are included particular physics.

ii.

Table E: Estimated Patentials for Publicly Owned Utilities (Excluding SMUD and LABWP)

	Ellergy Felicitual - SWI			Dynami Patential - Will a		
	Series .	ferrome.	Name	Terrinal !!	Reports-	Married
Lovert Avegia (702). 2011-2029	100	1375	60	2365	3.701	375
Panina Malpin (2007), 2007-2018	1.445	4.0.0	2.08	- 117		=

Area, Galaxies (ADM) and DM20.

Starta KAR, Int. 10th Award Deep / Roma Renate and Topics. Int. 201. 201. 201. 201. Au. 201.

CORRECT did not have a revent primital Godg.¹⁴ and CLOMP Bit out have evolved serving partners arranged.¹⁴ As a study. The 2013–2020 efficancy target accides F2 accessed at all partnership word efficient tars saming and Agences at all California's study tarsets,¹⁴ Alloin this petmeter includes the studiation accessing of the patient california's distantial accessing of the patient california's distant at the study in the patient california's distant at the study of the stud

- M. DRUCK INTERACT IN DECEMPTION OF THE ADDRESS O
- 17 Long Commany (with net with LEBP interaction) of Aquin 201 and LEBP is in the ports of density to get and an updeb depicts from LEBP gets interact in Discontrol 31.2 (auchino symbolic is in the 947 AUE 209 With the general resource unique samples in Disording 2012).
- (d) The a speed of 2020 stars have Advancey Al Each Obstitue (Englishments for Cardinana Al-AR 2027 Pagasani Report Datasetine) 1938, 2012 2020 2020 2020, analisis process serving as prior VE Spatial priors 2022, 2020. 2020. DOI: 10.1016/ 2020.2021.00.0101
- LADAP is working on a patientisk perturger shalp with DataP Energy Tarment, its original data biol was during for DDB 2002 that with two callest provide contents for otherway patientisk patients.

The Cathlerina Minimum Utility Accumulant GAMAI, somethyped 26 mollow steel and work work address that want the Catherina Cone of Utilityer, Resource Accessioned Mother Is driving Indexecut economic, and market lower Lawarg potentials. Takes Implies 28 1657 and 48 2021 market tapped to the out-off-Hittine, Supakin, and relation: Tapped Collecwers distinguist for these attributes and associations worksholds. Mathematical Distributes and association evolutions. Mathematical Distributes and associations and and we worksholding Distributes and Index

Incluses of efficiency poleschall represents the complete semilations of efficiency misasers where they are becknackly beautists. The sectoder of backets are orgo sources polential in 18:825 GMz have 2011-2020. This antibade represents 12 percent of an energy commanytion. 27:027 and in 15 percent of an energy commanytion. 27:027 and in 15 percent of a percent the decade 7000 -2016 [UBH 6]. Commany affairers polential is this second argument polential estimated for the policity second addies in the 2010 backets of 1000 -2016 [UBH 6]. Commany policitation estimated for the policity second addies in the 2010 backets of 15:25 CMH 62 UBH -2010 and policity are policitation in 13.5 percent layer that the 2017 actiment of second policity for the the 2017 actiment of second policity for the the 2017 actiment of second policity. This exclusion of accessions policitation in 13.5 percent layer than the 2017 actiment of second policity actions.

the most upplicat trial of officiency potential

11

Publicly Owned Utility Efficiency Evaluation, Measurement, and Verification

 The paticity revert allottes should continue with their current plans for 2011 UAR's shouldes, represently the Evalution Cathorna addition that we solving on their that DMEr stations addition that we solving on their that DMEr stations since 2007. The During Commutants in expensibly interested in working through the repeat should provide with LADIPP stati because of the negativate of their savings.

The Earry Commission will engage with publicly award obline to device arrives of revised MAW produced decrements. These, and services appropriate to the three priops. These proposes an stratified is then others anapolities of savings, canced to perform and manage (MMV states, and anapole ments to spontic evolution information. The foregocommission will upercent too EMMV workships path year to investiga agency and publicly metel strates, and ensurem agencies of MMV workships with occurs to left 2002.

Publicly Owned Utility Potential Estimates and Target Process in 2010–2011

OD gasts will not be excited or approved unit. 2012.¹ Die Except Commission is toentimating with the CPUe pairs 2013 permittal and pairs process. Ner goal at holfs approved as to before align the efficancy planning process of the CPU and plancky second children from the Lowage Commission shauld attentify these 201 2021 schedule morei, discara there with the ublities and CPUC, and, if eccentary, encounted as adjustment to the biomain studies for statemine potential estimates and targets.

 While No. 2021 register of all publicly dwend addition to statemic officience potential excitations and fungers by Jane 1, 2010, mother 3MUD on CADAP was in that compliants by that data. It is the behave, revenues of patiential and targets should avecuate Add 2021 deadlines.

Catinates of lectrocal takings petiential for the publicly would whites in 2020 avers satisficiently provide than these at 2020. The methic axed by the publicly would white: aversatisfic Resequent for estimuting petiential in 2021 was different from the methic axed by their 2020 consultant (block blocks) behavior. Here much accessing and the set testimates the testimates are appreciated to an one metions to the sense category an estimattion much residence to the set of a state on states the Category Energy Theoremy Research Association the testimates are appreciated and data the category there are thereing in residue and data theory from our thereing investors to the send to maintain antiperson of the process.

The Large Demosphere organize their discards table from the publicly event abilities to understand the assemptions below the applicit estimates and average efformers targets adopted. Unders shault prevals the Every Commission will be version of the model that they used to calculate targets. The

If Stage and advantation for the researed (SA) part 2023 effective patiential mode and parts is workshow of sever space or get (match20449712100 [10.1 part)

publicly owned address should decorrent the wars in which they conformed the reader and the respons for the conformation.

The peopless of every efficiency performance adopted toppes sharely shared that some package sound adobtes some ment approxime an jurname programment, than alters is most their shar. The efficiency pediential analysis before that for the share adopted performance and the shares of the start of the period adopted adopted that for most adopted period adopted adopted that for most adopted period adopted adopted that for most adopted period adopted adopted adopted to the 2012 by exercising assessing adopted at 2020.



CHAPTER 4

Achieving Energy Savings in California Buildings

pioniai for achieving the trade's grants for juda zevalian, exposurine investiganced, and anormorhential partyclass, including the following:

The Everyy Action Plan has paided Galifersia averyy pathy sites in the Qalifersia everyy stylent without and an energies the segment everyy system mutuality and manage every. The join established the prioriph of fulfishing the "scaling order" for new growplane mutuarry, develog that power is everyy seads mutual is not fully be paid athere everyy etfusione, supposed.

To Galaxi Revine Johnson Art Johanshi Uli 20 Julier, Chapter URI, Stacker et 20063) has been the bindline of California (Carlor) and the part fore prays to address clinicat charge by induing personance para (SIG) instants in the binds of para strategies (SIG) instants in the binds of para strategies (SIG) and strategies (SIG) in transmission of a california wideling. " Net Serge Common sects (SIG) and strategies (SIG) in transmission of a california wideling. " Net Serge Common sects (SIG) advances to the section person control of the california wideling. " Net Serge Common sects (SIG) advances to the section person control of the california wideling." The Every Common sects (SIG) advances to the section person consistential data causance: challenge of the restoring California and california widely to store the stat California and california widely to store the stat California and America (Maria energy efficiency) and California and sections) widely to store the stat California and America (Maria energy efficiency)

 Caldenna's Crime Large Peters 200511 initiative is a collaborative effort of the stabil's energy and esoenvirontel agricers and the California followards californ-tabling removalue and grow pilo treatment. It articularies this expertance of new investments is

21 Earlieria da Bassarini Eseri, Ultrade Chinge Baserig Peter Alfanisande de Chinges Securites 2018, page 18, etc. in por colonization for complete constraints and their. energy efficiency, as well as in electricity transmision, smart grid applications, and increased use of reservable-instances.¹⁹

Coverses Brown S. Claur Every J. Intel (2010)¹¹ subscript the scenario or retrovable serrary and average of Scenary Instantiagen III accesses California's economic receiving and grown Brank, counting wave that half a million grown place. In the sense of building officiency, the place califs for.

 Adopting champer appliance islandarity. for lighting, consumer electronics, and other products.

Detailing this efficiency standards for new buildings.

 Adapting a plan and tonalise for achieving "ann and energy" homes and businesses through the building standards to integrating sigh levels of annugs efficiency with positio innervable electricity prevarian.

 Recruising public influention and anteramost affarits to that the galesy provided by California's efficiency standards are realized.

 Making surphing buildings mem efficient, represally the half of California Source that were half before the advent of metare building, reardards.

90 The furthermode in Terminant Ward, Latternia Patrice (2010) Evolutions: The Every Euroscience and Elastronic Evolution in the Ended Agency and patricines with the Elastronic With the every effective is substant elastronic in Elastronic Enterprised Sector Sector (2010) and Elastronic Using Enterprised Agency and Marting Elastronic Using Enterprised Sector (2010) and Alexandro (2010) and Enterprised Agency and Alexandro (2010) and Enterprised Agency and Alexandro (2010) and Alexandro

17 Dearest are direct, the new projectory (in an Joseph



This chapter summarizes the Energy Commission staff report Achieving Energy Savings in California Buildings: Saving Deep finite Integration

The pueries contains key points from the report, scholag backpound, chultegers, and challengers in actioning the state's manage efficiency and chinally change goals, and recommendations to help accelerate progress.

California has a long history of leadership in additioning the manufact, environmental, and sensory system reliability breachs that draws from its energy efficiency statistical and programs. Expension and acceleration of energy efficiency inductions are of the feerboard of the table's mergin policy graduated modulation for any of the feerboard efforts to achieve all costs of technic energy efficiency in statistics, any is address of achieves all costs of technic energy efficiency in statistics, and in a statistical sensors.

26 Centerio Trega Conversion, Achieving Assign Centerio In Centerio

Reitings, Samp Deep in Deeps Konnig aut Antoine & dee Am Deep News Very 2011, U.S. 445, 2011 AUT 33, separate a resolution is providing and constant 37, 440, 2011 AUT 33, parts

14

 Praceding eventsy particulates infantiation to participal interclient and fluorehumers by requiring discharge prior to the parchase of the building or bons.

Is surgered to these policy expectations, the Erepy Community and John Apendix are solutionating to strategies to active mission energy couples of newly constructed and anothing buildings, benefiting all Californians to individue range costs and the missionismust and couple respects of haldings.

Goals and Strategies for Newly Constructed Buildings

Zero Net Energy Buildings

The Energy Commission, Coldmania for Resources forum (1982), and the Coldmania Public (1976) as Conmission (2002) have adapted the poler goal transision (2002) have adapted the poler goal trantistion with existing statistics, and state for resolution buildings and 2010 for summersial buildages through the 2016 Using Action Film, 2020 VIPC, and the 2016 Coldman (sing-Term Frenzy Obcimity Stocky) Plan. The CCCF antistates and Disense Tomaria Course Longo Jobs Film site Hearthy File as a pairwing puis.

8.206 building has zero nel everge consumption Consistent with the landing order. The gask is to mommic every set as stuch as between generation of brough cost official or fifticiant activation, and the generate the bailets of the building's energy words with under-conservable inductory prevailing mark as safe photoentals synchrons are und -driven electroning generation. The inductabuil of every efficiency.

entities buildings, recluding to develop a station Hare Energy Rating System Program Clanate Ball 1927 (Lowis, Chapter 553, Statutes at 1994)), develop and report to the Legislature recommendations for learning the service efficiency of examine buildings in California (Asserbilly Bill 545 3 angolia, Diapter 105. Statutes of 20013, investigate ophions and diversip a plan is decrease peak electricity domand for air pow allowers acress the state (Assembly Bill 2025 (Levine Chapter 754. Statutes of 2556CL and establish a program inquiring momental building meaner In bouchmark the energy use of their baildings in comparison to other similar buildings and disclose the inscheating data and ratings to projective bears. letions, and lenders chinemity list 1122 (Santaha Chapter 101, Statutes of 2007] and Assembly Bill 511 (Sathafia, Chaptier 323 - Statutes of 2008). Building on this prior legislation, Assembly Bill 758 (Skeener Chapter 828 Statutes at 2020 devoted the Leavy Commission to develop, policy, and implement an angoing, comprehensive, statewide program to reduce every conception in packing buildings, including The adoption of regulations for energy radings and inprovement's as mosting buildings.

This comprehensive portfolio of programs is required to implement a variety of complementary furthingen, explorations, and paraffers to activity grader energy efficiency in known and homeness. All 754, for complements channess and homeness. The program to primite

- Energy assessments to identify and incomment superfunctions for salving energy use in individual buildings.
- Longy efficiency features and other foruncial incontines.
- Selemation and education to ansately owners to help them implement energy efficiency improvements.

expressions built into THE building's contribute when to excertaining and improving the building's constant and functionality.

While the 2765 size is charget/howard, translating the particle site distance, guidelines, and instanton chardness remains implained on the site of 266 with Certensia energy spheric establishing and particle guide. The Certegy Connections recommends the sist of netrices that account for the societal value of energy, including the certeal results of avoiding peak distant due to endue of avoided cathon emissions and of the energy sphere. The Sector Certearium work additional to the latery Connection of energic constant on the Longy Connection of energic constant on the Longy Connection of energy constant on the Longy Connection of efficiency standards, and the COUCh of the substation of efficiency standards, and the COUCh of the substation of efficiency standards.

Building Energy Efficiency Compliance and Reach Standards

California's manufatory likeling. Lengry Ethicsney Standards (Investing Standards) are kundamentally particular to halo enter humbling are an attenuates to percentrative requirements for including transport to a structure to the control of a structure of contractors the flow likeling is accessed with their antibulies (solid as a used attenue) photomap in humblings using as wells areas of manager photomap in humblings using as wells areas of manager theory, all their manthection graph and managers that thi their manthection graph and managers that the flow lineer's rest.

The Building Standards see an important shrahegy for reventing the 2004 goal, an such subsequent standards update stores on a three year systel with properties for some the law to requiring increased energy-scale features in building designs and

N. Solar the time dependent satisfies of pareign time value of solarithing BDer dependent solarity and theirs parts (satisfield) and the value of satisfies and pareity per bases. This dependent values or bases are the code for articles to prevail arrange at 87 hours linear.

м

 Systematic workforce training to ensure that workers enginged to provide the services weathed under the program will be will trained and exp period to deliver high-gapity work.

The Energy Conversion is required to invaluate the end of the line ways to require this energy accession event studys and affectives improvement incommendation in the program (water income) the energy efficiency improvements and determining the effective types of function income (water income) and care its and its exemption to improvements. The bill also elevents the Large Conversion to invaluate this agreements werthing to improve advances the pathod with the read the read tension of invalues incoming elevented the second tension in produces the pathod with the read the read tension of invalues incoming efficiency improvements.

All TSE carls for the Exergy Conventions to develop and inspirate the program in calibration with the EPIC and inductory characterises. The EPIC is fractaff is invaridgate the additional framework even of alloca to provide financing to their cartowark for energy-efficiency improvements and to regard to the Logiththem the progress of the addition or implementing the progress.

operantiobuchy with the partrage of All 758. The faderal government passed the favorupe Recovery and Reinvestment Act (AARA); ARRA funding provided California additional resources to develop and traduct programs arread of saving energy, total ing play, and combiliating to Coldannia's accounting second through every efficiency approdupments a sting buildings. The Energy Commission designed the AMUR funded programs to incorporate the name approaches that were called for by AB 758 at a way to pilet these approaches. The ARMA programs emptysized collaborations of local governments and industry to define energy actionments, rutings, effici ingrovements, and papity accurates. MINA and did the nation's largest workforce descripts offort, mething the well-established state and local ment adjustmenture with stationide earkhavie musta

equipated. Using part effective effective regionmunits. The Concept Dominipur's goal's its perform a 21% to 10 percent energy concepts for each horizont a 21% and the percent energy concepts for each horizont backing Standards with address high effective participation performs, and renergy domaint respond management theorematics.

No matter have wards domand in reducted, however, some ansated of entitic generation will be requested Ap part of the policy settings responsibility women Sande Bor 1 (Mexing, Oraginal SL, Steletoni of 2006) and its management responsibility for the New Solid resource Perturbation, the Canage Contemport interactive and that he achieved in the entitemation interfacients and that he achieved in the entitlemation realizing protocolase (PV) systems. Densis standards, and have reinigened D primitial high efficiency will a recept patient compresends, effective installation practicities, and stationalism. They will some as the function of the consultance, They will some as the function of the consultance.

The just agency shalege for achieving the INE goals calls for establishing not only mandatory daniards is such treaslat update of the Building Standards, but vehictary "reach standards," The rtuch standards further a "warket au@ shalegy" by establishing higher standards that required, which can be used when developing minimum clandard), in absopent cycles. These Hack shawlands are offen and by a substantial parlian of analy inertructed buildings, downstrating their heardolity, und office Exercise, and value in the market. In developing fitness standards. the Everys Commission collaboration with the CPUC and the utilities' new construction programs to incrediving builders to meet the reach standards, in utilities. They are included as velocitary measures in Ne California Green Building Standards Code (Tille 24, Cal. Cole Republics, Part 111,

Other provemental agencies incorporate the reach standards as locally manifated improvements

ettarts to implement assegg efficience adgrades in existing buildings.

In an unprecidented collamination, the Energy Connection, DPGC, fixed governments, and validities, came together for clouds sourchisate evolution and continential building approve paragraphic websit the Energy Experise Endlowers¹⁰ france. The collaboration phild programs provided a sounder of componenty and/orange.

- Public Awarmens and Extracts
- Ittaklace Development
- Financing Options and Youncial Deputyies (Reliabel)
- Everyy Performance Kallegs and Disclosure
- Efficiency Recommendations and Improvements Decision Quality Assurance)

Major efforts have successed at over California to phatement and pilot sack of these AB 758 program potents. These efforts leveraged the ARSIA hand ing to collaborate an the defails of dollaring story. efficiency segrates in entring buildings. In the error of clean energy feating options, for example, the ARKS. funded programs have allowed California to estation revelving lase programs that will remain in specifies after the SMLS funding course, princip lear ess represents to increasingle headers to provide Tissue ing for everys efficiency apartalist, and plat Preparity Assessed Data Trengs (PACE) Revising in concert with local property associatests. Di August 7, 2021. Generate Venet signed According Wet 83: 54: Gloreer, Chapter 8. Statutes of 2011. authorizing the State Improve to animitatic a new \$50 million program to provide huse liest reserves. for every supposes constitued with Energy Commission purdelines. This new program represents a maps reportionly for the Energy Commission, State Teasurer's Office, OPOC

In their regulations and programs. For suscepts, total parameters are including them is local prior holds ong and energy characters, and the Cathema las-Candd Alexanian Camerites has incorporated threat relationshi at its regulations previous pacifications for holdward and status targeneits the although the funcdering and status targeneits the although the funcpations of the statistication sectors is labeling that more the statistication constructs landings that more the statistication isosciencial landings that and their statistication isosciencial landings that and the statistication isosciencial landings that and the statistication isosciencial landings that and the statistication isoscience for a statistication is devicent generation based of the formation and to pay planame monitorizes authors than primiting and to pay planame monitorizes resource in granted them.

Strategies for Existing Buildings

Mare than that of California's 13 million residential units and more than 40 percent of the commercial buildings were built before 1978, when the state loss inglomethyl Balling Corpy Officency Dandards. here existing buildings, and the next built unstar previous sintages of the finiting Cash, provide a huge separturity for two-cast energy savings. The All 27 Japping Plan specticles that anyowing the sweeps efficiency of exchang version that and commercial buildings is the most important way to reduce GHG emissions in the electricity and national gas sectors the CPUC's Long Term Energy Efficiency Strategie Plan tell major grady for actioning they, which building energy takings in mitting resiliertal and connectal buildings. Efficiency organizations existing buildings are also a priority goat at both the COLF initiative and Governor Brown's Close Energy Index Plan.

The Lapitalaes of sineral points in time tax directed the Energy Committee to directop policies and programs to particle improved efficiency in

and other partners to create lowering solutions for doubling essents waiting to inspirotent energy expands projects in addition, no hanneys to 2017, the OVG instant an Admenistration Law Judge's ruling as annues which expands and any projection or energy affectives; function, activity a 2010 - 2016, a straint property the OVGC on service financing framework and paper, and a property by the Commendial Defense Paper and a property by the Commendial Defense Paper and a property by the Commendial Defense Paper and a property of the Commendial Defense Paper and the Commendial Defense Paper and the Commendial Defense Paper and a property of the Commendial Defense Paper and the Comm

The Energy Commission's next storys are to complete results assessments for both residential and movesidestral buildings, steatily what must be done in each of AR 758's program component areas liaking advantage of the lettons learned from the ARRA printing); and showing action plans for more broast with AX 758 program divergenced. The All 154 program will be developed in three phases. Phase 1 (2018-2012) will actually developing infrastructure and implementation plans. Phase 2 (2012-2018) will toppert market development and partnerships, and Phase 3 GB18 and Sepond) will reclude development of statewide ratings and appraiss repairments.²⁶ Disinglenerslatur plate developed andre Phase 1 wit in clude detailed schedules of activities, and such Plane will include angle apportantly for public input. New senses of Nacial Anti-de recommending improvements to the Home Energy Halong System program, developing the Communical Building Energy Acost Rating System SEARC, and building strategies for effective rating. labeling, and disclosure of energy efficiency informaion. Attention will also facus on improving compliance with and exteriorment of California's Hulding Energy Efficiency Mandards requirements for allerations of withing buildings. As a morthlow for accepting ADRA State Energy Program Rending, each state's governor

 Lamona Falle, Utitina Dotoscow, Americanistica (an adapti Parlay Repeting Deeps (Noroscy Transing, Service 31, 2011). New York, or provide National Network (North Cold Parl).

If he may whim does so the program, and, a we change is give

converted to pathing advanced state every codes why other basic as the foreign Conversion's 2008, and subsequent Basing Concept Standards and developing approaches to achieve table looks of compliance with three standards.

AB 25d descript the Every's Commission and the OPUC to catagorize on how to best definer fearming and testign while programs the optioning facility cycles to advance the comprehension AB 75d program.

Efficiency Improvements in Appliances

The Applyance (Theorem STandards (Appliance Standards) are another struting for indicing energy are in servic scatterin trading to indicing energy are a construction of an electronic structures are a construction part of the haldship's senergy and ¹⁰ excitances and other devices placing or the automs which us a growing parties of Collecting's senergy are, Construction part of the collecting's senergy are, Construction in the indication of the indicated of any application and electronic, devices in offlow module in the generation, and electronic, devices in offlow module in the generation, and electronic, devices in offlow module in the generation, and electronic devices in offlow module in the generation, and electronic devices in offlow module in the generation, and electronic devices in offlow module in the generation, and electronic devices in offlow module in the generation. The sense products that we

The Courge Committion's Appliance Statistics can address this insut its softing cost-effective even.

 The transferred of 2007 growth Reserves Restricting resourced on North Janis, P. Marg, 27. Servicel, information and Proceed. The service Media and Proferesponses. J. Department: An extension of the service of them. 7 Service: A transmission of the service of them. 2007. Neurosci. Schwartz and Konston, N. Januard, K. Januard, and Employment. 11 protects. Derived Intellig. J. Service, and Employment. 11 protects. Derived Intellig. J. Service, and Employment. 12 protects. Derived Intellig. Neurosci. 2017. Derived Schwartz Media Constraints Comp. Report 1013, Japp 1, versioning is a profiliation annual Version 1014. Service 31, 100 Version 41, 41, 495.

conserve domain. Over it a risk that hardney to with scruptures of LEDs read result P California ensureat host negative represents with two-performing products. In advances the rule, the Uning Communities is seeining with CLU regiment, industry, the state's wildres, and the CPUC is develop product quality provided costs in LEDs. That candid serve as a lawsh for fidera side products grappers.

Achieving Better Compliance With Standards

Compliance with finishing Silandards in much laritie for sea coerdraction than for attentions to existing buildings, presarily because alterations; are frequently made without the required parents. Mithout the marright of local building efficials, every efficiency codes are tamly followed. Tor orangle. from than 10 ecost at contractory pull bailding permits and abele by legal tequirements for charge outs of furnaces and orrs, to general local building deportments have beind resources for extending building under, ergenially these beyond minimum health and unlate requirements. The tack of constituent with standards can musit in defective construction and in statistics, including improper installation of wait and met resulption, HVAC systems, and other efficiency reatures, all of which can drive up energy costs for horse and halding sectors.

Waterproof secondlance will appliance expansions ato a loss foroight to light through compliant lings by competing mainfactures and attern. Biscart materia array of Stochas publicasts and attern. Biscart materia anime research by solar of maching lange with the Appliance Danklards, holding large numbers of stochast saturates to lead only for large numbers of stochast saturates to lead only for large numbers of stochast saturates. neur officiency requirements for approach, includes ics, and their diverses. These efficiency standards inf the har and a lower limit that affects only the search officient persberts. Seen 1974, the Europy Commission has adopted blankanity systems a webs range at auguances, including at augus however and applications, are conductories, franceice, and water hardworks. In may instances, California standards have subsequently have adopted as national includents by the limited factor franceice of lower 2014, 2002.

Instancials, California's energy efficiency shardard's Awy resulted in significant reductions in energy consumptions. The Lengy Conversions colonates that applicate reflections valuated adapted between 52% through 2005 seried 18.732 (gamant town 100m) in 2016*** Decempensation 4.7 percent of California's externic total and it insulptive transational of energy perdamed by Colifornia's two largest power plants. At an anergin rate of 17 cents per Unionet Theor, applicates officiency exploites a same California comments and \$12.83 (billings in 2015).

Drapht the success of applaness efficiency standards, the amount of energy companies by hereing progged in by betting occupants if plog hear? Note been contemp and by ^{6,44} is address theory private plag leads, the Dergy Contension has adjusted and samptified service educations has adjusted and samptified service educations.

El Sarrag, Yan Catherery, applicate efforms strength proferences by prior 127121 200 e para le 1022. Proceedsammer 62 process of program bland in 2020. At the speed operation of the proceeding of part of the para strength prior 2020. Displayment from 7th operation of the para strength 21.0 blank for 2020; and new order para blang para strength prior blank for 2020.

El Li Jorig C. Sang A. Antonio, and J. Patrich, Nanoue 1920, Desling Alexes approx. Nanasch Pair, N. Antonio et Washington, Distance and An Antonio Weight Stream formation Design (procedure) of 22 Nana-tomol, J. Design 40(1):77–751–7323, page Lawne and participal physics with Distance.

64 U.S. Drogg (Annual se Advancement, Ward JR, 1911, Date of Deep Date in Aprilation and December Distances (Instance of U.S. Proc. and Solid Advances and December Solid and Advances and December 2018).

14

Addressing the recent Processinglescep Aux Serie extension difficult Incurates the Energy Commission Late that feedball and the state explorement actions against manipation annulations, Altituters, and relations. If an applicate visit function, Altituters, and relations of the applicate visit function for some compliant with a relationship to the target processing couple annulat an administration function of the time distance of the series semigraphy profiles. However, the Lengy Commission will required to part ture the Attention Density for some enterthem a power for some interpretive entertheet. This admentication function for administration and more factories can be easily ensuits or prior that days in the tories can be for any ensuits or prior.

On Getaler R. 2011, Generater Downe signal San ard Bill AG Paylog, Chapter SH, Stahlers et: 2010 in Bill Alex wetter Hull help address 19 totaling with widesaread neccentrations by statistications and statistics. This legislation along the statistication is a degree an environment processor for windows of algebraic Thismany regulations and segment out persulties at up to 22-200 for mack worklass. The tail persulties and person 23-200 for mack worklass. The algebraic Thismany regulations and segment out parallelistic the algebraic Thismany Control of the relationship the algebraic Thismany Control of the Statistics of the tail providy work will be dependent high care from the space space agreement of the phote high tain the partial selection and elementsmith of

the appliance officiency chandrads. The Energy Commission will use the following officies or associating a chief penalty:

- · The holiver and seriousness of the vielation
- · De nonter of valutions
- · The periodence of the violation
- The length of line aver which the solution accurrent
- · The willfalless of the weighter
- · The violation's access, fidbilities, and not worth

turit as beleasants, actional moor turnlast if PCI DVD players, and compact audit devices. These regulations provide minimum afficiency in maxim power par expressionly for more than 76 reduce and tales per practify. It million 2010, 195-20-5 million 2005 Dell 13 million compact audio 11 million The Energy Commission is also developing blandardy ter the estimated SR million haltery chargers cold (300% in California per year. The estimated energy tavings for ballery charger Mandards is 2,000 Gals. per year.⁴⁴ of which 1.606 GHB will be attributable to reduced residential plug lead energy demand and \$100 GMR forward to the self commercial plug load energy leward. The ballery charger standards will improve the efficiency of a wide range of plug leads, such as lasting computers, gower louis, electric taulhis some. call phases, mp2 pipers, and gall caris

The Energy Connection is developing a new totasignation to identify the applicance types that should be created in every tabilities and the suppose booth of existing standards. Statistication proposals have incontent up to 7.200 (2004 in potential tarrings from two statistics), represents include sequencies part computer servers, tot top bases. Since Numerous of futures, and addition tapfiting as long paper lawlies for som Applicans University.

Improvements to Lighting Efficiency

Lighting is the largest electrical hard in both barrys and basimetices, accounting for 25 protect of ears mercial actual electricity are and 22 protect of

B) Follow service addressed to be achieved in one para where the index or parts of agreements that are converted by the parameters must be concentrate in the parameters. This would happen in a following in the advector gatematics followers conduct load pract the defaulties gate of the foreignments in an energy in event occurse they been exclude the out of them used in even occurse they been exclude the out of them used. residential annual est. Assentity Bill 1112 tolutti wan, Chapter SJA, Salettes et 2007 repairs su il perceri indication es situitricité consumption frame residential apliting auto au 66 merceri indication losse contenential hybring. Activities print waint indexe California Autol Decholity site la most that 6 amentes.

Since the participant of AD 1109, the U.S. 1000 has adopted new federal blandards for general terrock Numericant lange and accaminated reflecter lange. California Nas exercised its discription to implem the folloral standards are said aband of the follows schedule. The Energy Commission has also pase leaved the scope of the loderal clandards by alcohor now standards for motal halide and periodic lamisares, applicated lighting ufficiency, and design and one standards in the 2018 Building Except Efficance Dasslards, and will further address lighting efficiency is spinning transial aphaber. The above initiatives will advance the ulgies's propriets to mosting the All 1389 essilential lighting mandalus, However, Dechabred of months commercial lighting and subber lighting mandales must be addepeed through ad attonal standards and solutions programs developed is collaboration with the lighting and why contamers. to CPUE, and the states ublikes

Light-century stude U.I.W. langer are a provining example for advancing bound current mandatory ighting standards, 1775, hour employed muster savings priorital given their intervel efficiency all converting electricity to light. However, a number of challenges, regarding cent, quality, and atheaty much te addressed. Rapid advancemently in 122 lynthology have lied in a problem time of sectority in a preasing range of opplications at boost prices. Research of the California Lighting Technology Center 40.100 kas revealed large cartalians in public attents a number of performance parameters, including light guality and langevity, which could mituge consume acpegtance of the technology Air with early efforts to bring compact Represent Surges to market, when tentar performance quality scaret serverely dampened

 The hand to compare and to the state from the annual of energy world locasts of the violation

Following their criterius will encount that the Exorgy Commission imprant sink appropriate presiding appoint worken haved on specific concentions. By presiding this authority in the Exercy: Commission, No Capitalian two helps because a lower playing hald for all regulated mean factorest.

Recommendations

Newly Constructed Buildings

 The Europy Commission and DPUC shault wan partie on developing a defaultion of 2PUC that incorporates the societari value of energy taxonical exist the time represented energy saturation approach valid for california. Healting Energy (Forence) Standards).

 The Everyp Commission should adopt Internal bolding standards splitter that internate the energy efficiency of every strends splitter to achieve 200, stanfacts for every trends splitte to achieve 200, stanfacts for every trends addres to achieve 200, stantarts.

 The Exercy Commission should aslight each standards for sevely constructed buildings that provide least practices energy efficiency levels for the manufaptace to show for and server as a means to post file inductry rapidly to the invest mended for achieve. 2MC graft.

 The Energy Constitution, CPUC, local governments, the stark's address, and builders should calibrative to encourage the baseling industry tomath these addressed energy efficience bench in a trainibilities segment at the market through industry specific typing and themathe insertion. The Energy Communes and CPUC should conduct functional function on the conduct shifty "see control while "being "see control while the Energy Communes" of the first to work the Sec goals towards transmissi sociations of manipulary and reach closelarch. By plenness sectored paradoxy becoming providing becoming international and down providing becoming international and socialized paradoxy and conductors, we technologies and building practices will be interpreted paradoxy and socialized and applied with appending becoming to providing the technologies and building practices will be interpreted by specific to will be interpreted with guestion and while any second.

 The targe Connection. CPUC Initiality, and smar shakeholders stracke collaborate to accomplish workforce directiogeneous to length the oxide, neutracy to change twicking practices to accomplish New system constructed publicitys.

Existing Buildings

· The Energy Commission and CPUC sheard comsoute tyles investor owned attilty energy efficiency patholos with the programs and rates developed in the Energy Commission's A& 758 precisiting. The Em orgy Commission, in collaboration with stratestations should develop an assortiating system for reservidental buildings that can be used to rate the energy afficiency of commercial according, and provide mers and petrolial logery with internation about the energy efficiency of the buildings they need at an curtiliting he base or purchase. This will help drive market demand for efficiency. The Emergy Commissio atus through contrider how the cost effectivenests of options to achieve provide energy efficiency in these Buildings can be addressed in conjunction with build ing actual radioge. The Energy Deconstruction, utilities. the CPUC, and other stakeholders should cullaborate is plot the implementation of the rating uplom Netuph education and financial in The Energy Committion strukt notices ARDA (s2o) programs to stantily became barred and spainfunt tes la ingenerants in rating tuttemi, baarcait products, weakhersr development, companie aduce tion, and program tatedisplane.

· De Levip Commonen thiald sofulwate with

inducity to dove his reach standards for appliances

The Entry Committee and CPOC sharid col-

· The Emergy Commission should regard in DOE

Compliance With Standards

protectings that are developing federal terri methods

· The Every's Commission should immunitately begin developing regulations to replement the entreponent

authorities provided to SB 454 to increase consulseen with the Appliance Slandside

· The Energy Commission and CPUC shared are phatics good after(s. to achieve improved compliance

with the Building Energy Efficiency and Appliance

tableafe to downing vehiclary LED quality performance

ity and parlormance of key sopharces.

Gardents."

Standards.

and appliance standards.

that set higher expectations in California its the goal

 The CPUC, the Energy Commission, the State Require put the apprix sheald colution is with local governments, the financial industry, and office stors to promote the availability of hours ing anotacits for the segrate of all building taik-sectors.

- The Energy Commission shaved heart significant research: during the hard Rubbing Shandards update so efficiency improvements in building additions and attentions

Appliance Efficiency Standards

 The Energy Generouser should adopt appliance shandard), that hat an reducing plug heart, to make Catherna's JNE posts to be achieved.

 The Every Commission should continue to adult standards for applaness that represent the much significant shalowith unargy tunings polastical

The Every Community and CPUC should callaborate on resourch to identify the most card affect tion superfunities for some appliance classifierts and to remulate existing standards to identify the most cost official apportunities for updates to achieve phale stop takes.

· The Every Commission and DPUC, in radiabata ten with utilities and other stakeholders, should postfu develop a readeup to most the lighting energy savings mandated by AN 1125, including new appliaver and building efficiency shandards and asarket transformation programs to achieve higher invest of ency efficiency that required by standards,

This chapter reports on the status of the California's Clean Energy Future (CCEF) joint agency collaborative effort.

ting the proving interdept can among the staty's arrange and provincemental approces. The California Ar Resources Board (2003), Dalifornia Leukonmental Protecture Agency (California, California) na Energy Commission, Culturnia Public Million Commission (CPuC), and California Independent Spriner Operator (California (CD) dowlused a cision, replementation plan, and resulting to achieve a chuse energy future for California P Lourished in 2012, the planning effort scen in 2020, with considerables of the gual to induce gravitance and GHG employed to 30 partner below (1910 levels by 7253.*

N The birth provide a second second second BY Canadian Drive 5 45 49, pages protocol profile-1811.

CHAPTER 5 California's Clean **Energy Future**

The purpose of the CCEF effort is to.

- Cample outring policy goats to suggest into agency planning and management.
- · Mentify policy interdependencies, key milestower, and delivery cicks to improve commuterations and color gine.
- Use adaptive management practices "to identify policy evertage, coefficie, anarticipated or seintended consequences, and its make microscopy trade offs and course connections."**

The California's Chair Elergy Fotum Them (Derwinst suffrage the agencies' which for 2010. The agencies remarked the planning document in Taylorber 2015, bul it has not jet been updated to infact the gaps of the Breach Administration. The agencies plan is refrest their planning efforts is reflect significant dowingments since its release, such as the potrage of legislation to exact the 33 percent Resewation Portfolio Standard (RPS). Future stansing ethirts will also reflect findings carning from the Gavereor's July 2011 Conference on Local Revenable Energy Ausantes, the Energy Commission's report. on Australie Paret in California John and Asian and His Energy Commission's APR and Revenable Shuttyic Play that will be developed in 2012.

The Overview locages on loar alements for achiev-ing the stude's 2028 electricity and salaral gas goals. with the head being energy domainst. As your drafted, the agencies target reductions of 5,000 te 8,330 Million proh by 2020 with advancements in ethcrency and domand response. This is to addition to the 2,305 MW (an exak) converted everys efficiency can egs already included in the 2009 diseased forecast Ne carried version also calls for webping 5,000 MW of distributed generation (DC) by 2020, attenigh the

H. Garberga Daan Gaege Solver. 2018. Network page 1, on press on history pyrolation on 2021/2021/0142/2018.pdf.

agencies recepture Geverner Brown calls for 12,000 Mill of tocalized resemulai prostation by 2020.

The second element is energy roughly. The Dervice contains athening a 11 prepari 892 while munitations withinly woods and moniting onvinenontal grats, north as phasing not area-through said ing is power plants. The agencies pull forward a goal of developing at least one willity scale carbon capture and storage facility in California by 2020.

The third element is transmission, shift and questions. The agreement structure a coordinated aftert for planning and permitting to resure that sufficient loss and and distribution-level sets structure will be available to meet revewalite goals and GHG reduction targets. Investments in advanced metaloog and smart grid will omposed tastioners to vist energy mere efficiently. Through agonty-support ed plat studies. The agencies are targeting 1,000 MM of additional sharage capacity by 2020 to promote wable integration

The Yourth allowent is additional tapparting proonces, including cag and trade, to provide apportune tier for Inert-cold Grid reductions and physicsments in stranging technologies. The Diservice advantage next that alternative had vehicles, and veschriftcalize of the humperfallow texts in performer, will be a costral component in energy security and voluced DHC emissions. The therwise calls for California to develop the infractional and operational capability ties recentary to abserb a targetted 1,050,005 tarly electric and plug-in habrid electric vehicles (PMCV) by 2020." In addition to efforts to reduce GHG area seen, California will seed to plan far and adapt to actual changes in climate, such as henperature and proceitation charges and other inspects attaching energy supply and domand. Finally, the plan calls for engaging California's institutions and residuets an partners in achieving these grain.

CCEF Updates and Metrics

On July G. 2013, the Exergs Committance hast an RUM working pointy with the ARIA Califford, California 2013, and EPUC federoset septiates to the California's Cases forcegr Context planning discussion (Updates arreste an separatelisty for occupantified, one policy developments and sites/byteg any areas. that need courses correction: The agencies self-tigate the planming apolities to include.

 32 general Researches Particle Mandard SPSJ regulators Senate Bill SEC at 2 Genetian Ocaster 1, Valuates of 2011-12 Fort Detautioner Senated.

 The guart in the Governan's Oten Energy John Plan, including

- 12.860 MR of localized energy by 2020.
- 8.300 WH of large-scale resenable and maniabed buestmented lites.
- Develop 5,500 MW of condoned heat and power 104P1 over the exet 20 years.

 Wattiss and auto-informers to indicate program, forward activities California's clean energy graits and indicate opportunities for the CCEF agencies to proprior source correctmen.

At the warketsp. the EFR Committee requested promounts their Malehalders and the public on dust matters and reprinted 25 while the apposite route while the apposite reput without all the summarist, While document leader lightly the charges made for the mathers in yrappent to statesteality space. Notice is a

25 If analog surrough array facilities (2 Mit and oracle labor 1200 Mit of which the and contorner arm 202 are constant trained the 17 102 the gray has builded remember over go or the Doorney's gigts wind out they requiring to Discourt 2 pills which all head 12 pills third win encodes a energy barriers by 10 pills which all head head waves pills pills then gravely and the discourse pills pills of discourts with a second with a second to the limit tank " and waves with the second to the limit tank" and waves with the second to the pills pills with the limit tank and the second to the limit to the second term of the second term term of the second term of actioned to 2022 payried the leastly included in the 2022 process descent forstand. Many Server and contraction is region from we have been because GADDEDLL in ghort through the drift here, CARL, stratistic, JURMappel, Energi, T. Nair, C. The GPI gave analysis in EQL Asseming a trac unservice numeric with the asseming through gave parts in distances and the parts find appear parts in galar significant of the CAL parts and the DI-galar significant of the CAL parts and the DI-galar significant on the standard of the LIP galar significant on the standard of the parts in the standard in memory and memory in the standard in the standard of standards. and is question from anong using standards. and is question from anong using standards. and as question from anong using standards. Standards from another of the standard standards. The standards of the standard of from standards. The standards of the standard standards. The standards of the standard of standards. and the second s contracts, which consists represents alread 10 partials of total generation solving California separate in dative by 42 present between (10) and (20) due to carefy some imposed by Na Emispie Parlamenta Statilare Renairies tal contracts, we expected to engos between 1817 and 2018, which will require replacement 102 and 2007 strait and assessed intervention and a two of assessing sectors of an end when form assessing to could an end of the form, we want for the sector and the form, we want for the sector and the form, we want for the sector and the form, and the sector and the form, and the sector and the form of the sector and the sector and the form of the sector and the sector and the form of the sector and the sector and the form of the sector and the sector and the form of the sector and the sector and the form of the sector and the sector and the sector and the form of the sector and the sector and the sector and the form of the sector and the sector and the sector and the sector and the form of the sector and the sector

Animation of the method and here they were apticled from the workshop th. The approved publicly peopled the owned metrics

on the COIF weindow as December 22, 2011. The agricultural law setting the metrics periodically in influct new internation.

GHG Emissions

The methic presented at the workshop block holosical and tenceshof GHE measures have 2000 to 2000. Exemption beneating provide 4 reference for available for effect at GHE induction measures. In response in utilization of GHE measures, the response include information on GHE attenuity, such so EME executions per capacity and per provide at suggestion by Sengra. Other terminan include: adding a finishme are staal projections (see New Spectrum attenuity) and perioding a graphic theory attenuity for a staal projection (for all includes includes information (for all perioding a graphic theories Faed) and perioding a graphic theory includes in Staamstep 66.02 Denies, Chapter 488. Stabilities 2000,1 per Mataria Researces Latences

Energy Efficiency

The metric presented at the workshop straws Cathler via inserties assess publics, 10022 and painting saved effolders' energy saving hum 2006 to 2005. Do ended after shows the 1007 annual energy tarveys, people saving, and where it on savers in comparison with the gasts sit by the DFDC. For the gastety even of address, the enders shows not annual energy savers

EL 8 Fer weight, 224 property course retring perform table characterization and table to provide approximation extension shareholds and table to provide a submatrixy character standards for all detection informers. CEA references and restings, and other instantifies all as "restings."

R Strewscolumnerg/date na.

ж

platforminal the matrix for these that contracts for large reservable resonances in California are scheduled to come on-time all an average annual process such adds of 12 percent per user them 2018, 2018.

The COUT includes a gual to add 1,000 MM of energy strenge by 2010. In experime to comment, calling the new industrials about through established board 2,000 MM of proyeed bydropeer ment and low in 2010 in Caldresis. An establishing arguests in Caldresis form with a constituted capacity of A (NIL DM have excluded accrease these the functional foreign Regulative Caemics in. The gast to add location with a constituted capacity of A (NIL DM have excluded accrease these the functional foreign Regulative Caemics in. The gast to add location of the PUVID. Exercise theorem and the caedia and the location of capacity completes commenses of gammaling and cames are locating by TVD. Exercise theorem in protects of the location of capacity completes commenses to a protect to the construct Scalaris, For example, more to the the TVD cars well to the strengt backbing strengths and the to the TVD cars well as and the protect scalaris the singulative foreign streamage thready the streames whether and then the completely of the stream form, the results of addite tamps demonstrate the location and the treames with the camp demonstrate the location and the streames and their tamps demonstrate the location of the stream.

Staff revised the mether to show estandards of OPP periodical and a gase of adding about 6.500 MB of DeP by 2012. In accesse the gask, shaff estimates their OPP weekly seed to grow about 4.7 percent terr over them. 2013-2012.

Sensor stable that new if the mergy efficiency guits are net. The path for two electricity facilities cannot be mell because supply would execut down for electricity. It is required to the cannot fully regarded the directions of the interaction of path for logit that many efficiency and the Gaussian's guits for renewable many and GMP.

Transmission Expansion

Swhe homercoic projets are unlessed in the California 6015 hadpoint that will provide sufficient capacity for the study to achieve

H. Animotorgy to gan? [21] _ morphis (in provide and \$102] [-17:18], wellmagic analog. Sprayer, Strong, United _ Colorano, Training_uit_ inte_9, 2011 07:19; 94 41402 apt; and not yourk savings as reported by the winidian in comparison with efficiency pape set to the Everys Commission. Statebuller commission en this metric included 1600C1 pagartfine by these indicators of not installs of energy efficiency programs and energy efficiency codes and plandards. Simple suggested adding an indication of the energy interestly of existing and two liabilitys. Berliaceae Anight Inc. supports adding the carriegs repeated from zero ad avergy strategies included in the California During (Nations Stategic "fact" Dalt served the motion is provide adjustes of part effectivesets for additionation offerency perflates. the energy whereally itantiants for California lower contracted after 2001, propress based and well enough history, and inverge varings Hern Datting poder and plandards.

Demand Response

Descard integrate generally toher to a induction in containey: electricity assumption over a given time informal in responde to a price signal, within feasitial monthere, a variability space. The remain response weither peniders a Michael was of the estimated point of meand engineers for the 20th feasi assumes and peniders a structure of an 20th Learners and peniders of a descend regime or another through 20th, and a projection to 20th (Mich Evenues and peniders of a descend regime or another and peniders of a descend regime or another descender a walkable through the OFUS for and the Relationship.

Renewable Energy

The metry: persented at the workshap plane; the antexed of removable prevarians for Salifornia, social rig large typics, from 1963–2001 and estimates of the antioxel of removable personation sended to resul the terms

RC Cartoria friego Commissione (ep. 6, 2017) another, commune pointers of non-section (1, point), comparing ((non-section (2), point), and an another (2), and (2)

the 31 percent RPS.⁴ The works, tracks the approval statist, capacity and expected on line date of these projects.

Electric Vehicle (EV)

This metric presented at fise work-thes shows achair sales to date of CVI in GRBHenis, a stematic of anticipated sales and/or the Zen Constrone Whichs approx, and the presentain sale of a million CVI consistent with the CGEF past. For the Zene Exercision Vehicle program, the interic influence and considere analysis. The interic influence and considere analysis of the Dist Nation YC, now PPRCh. In response to influence another for the expendence and internations on etherly available and shows a solution and and internation and their first National.

Energy Demand

The events's an energy domaind shares statemolds electricity and national gaps semisimption from 1939 for 2008 day end out surgitur and these interfacily encomparises beyonsity. Staff aliae annucled darks on socconsument statemole and parallel measured for 1930 for 2009, sufficiency as uncertainties of parals that effects actual all difference in addresses flatemole areas that address, shared these is addresses flatemole parallel address, shared these is addresses flatemole parallel and its that provided darks on minimized statemole paral iterations, which is the paral domained for Calibunia all for same paired in time.

10 Net york is that each sity, benned all york of the cursole link, pice all hyperbolicities and distribution basis), many pairs denored and by soft generation. 2012. 2018, and 2020 RPS targets. Stata are atta preended showing formation prevailies to test types. Since the RPS calls for a specified percentage of initial scale, count of the enseard of resteadule energy, the works: these a range for the annexet of resteadule energy and the most field and the state of the state at lefts that and a set of the percentage and the state and a set of the percentage and the state and a set of the set of the set of the pertender of the set of t

Commonly from statementers included a segure Son by the Servic Club to add attaination on project taken by president of program (SR 32, California Splar Industry, Researching Auction Mechanics, Red w fault). Pacific East and Electric (PSBE) suggested adding indicators related to the DDFF goal that "a significant fraction of restmables will be droughth able." NOE asked staff to starty the repart of recenfracting on property lowerd RPS graft, in response to comments, staff added information an property for each proparisment mechanism and information to track altopatchable remeable resparatos. Also, shaff motion the telephone on pagement and punching RPS contracts to show only calificants for non-responses Fields a graphic chowing the development property of new revenuelly projects under contract with the 1004 was invited to three extended project transhilts taxed on the DPUC's available **

Installed Capacity

This metric presented at the workshop statust an-ion, manutate capacity for at featurizing primitive insparatus in calculations (a technology neuro 2001 to 2016." If at contracts for new large-scale minorable senger holdstars in California parameti, they will add meter them 5.000 MM. To response to technopositat (2ergy Production 2), Pri saggestions to take provert and/or

 Ministerie (1999) Ministerie (14) (14) (12) (44) 4227-Ministerie (1997) Ministerie (1997

D. Nersey is carrier to reach a processing from a provider facility only specify institutes at property by the head-boxes.

Reserve Margia

*

A source margin is a service of the sensel of electricity imports and in-caliby generative sepacity available one service path formand coad-based to sense which calibrate valuable service wanged a samplesame to calibrate valuable service wanged assess target. The planning means margin target is trivingle to active sufficient individual targets can mark with line sepacating means requirements and essain that and approxing means requirements and essain that and approxing means requirements and essain that approxing the second second second to the second second that approximate the second second second that approximate the second second second second that approximate the second second second that approximate the second second second second that approximate the second second second the second second second second second the second second second second second second that approximate the second second second that approximate the second second second the second second second second second second second second the second second second second second second the second second second second second second second the second second second second second second the second second second second second second the second second second second second second second the second second second second second second second seco

System Average Rate

The system average rate is calculated by dividing, the power events requestion of the IGEs by Toke annual reliab tasts. This method provides a sourcasied basis for extremal threads to within y tables are lines, but if data set means are in which a their rates ar iteration of these rates and increased by different calculater classes.

Once-Through Cooling Phase Out

This metric provides information to track congliance with regulations to phone and near-through motion (IREO at 19 point years) in California of theses. It points thating nearly 10/500 WM are in the Califorion OD dataseting Avia Authority, and 2 are in the tax. Angels: Department of Kultur and Yoans' Makacang Ana Judicely, Complexes datas to the phone particrange from 2010 to 2020. Dataf added a description of the technologies and to begin parts and the subschild Collision patient and their strengthenes for the technologies and to phone the rest parts of the subschild Collision (California) plane in tragments for comments them MOC.

The surface of learning sector (20 differs from the 2 property distribution in Chapter 7 Sections from restor rescales with property within the California (20 learning sector); arts.

Additional Metrics

Accel on Input Item The workshap and written comments, the CCLP agentiati added the following line metrics

Expected Jobs

This metric procedure a performance measure of jult constraine as sensified of COLF networks and effectively solutions. This approach takes in a account camment from stationation that support function channels metry pats on California and Hostic cardinates that if it, afficial to provide a procise measurement of the effects of energy photons the plots.¹⁰

The paragous estimates grees policication and, does not attempt to estimate pilk does we pilk anound it. This analysis is in them of a "pill-perce" which is a bib time pilk that both one had convolve piler and includes estimates of denet, indexed, ¹⁰ and indexed¹⁰ atts.

Private Investment

This provides a rough indication of the level of provide sensitive of them new transmission and reservable projects despite the atomotic downfarm for karentin

- B. Spings aways, "The unitally learning of using that a used have been repeated of califyread's relenge default for a lowgeneric relation association and ensuring that appendic metalities going that that starting in energy 4 highly metalities per approximative even unequicat per Vol. [Jumps per approximative (VOL) (VOL) and personal personalized.
- Martine (and the officiency proved). No metales, more written the form that suggest contraction metalets.
- (iii) The increased spectra (iii Pro-present advectory from except and porting in enging and indeed pairs and related energy supports). If from the last of indeed pairs in the internation in ground antipoper laster and related pins.

son. On fully anticipated investment is an the action of \$75 billion. The coal estimates are collected from interconnection studies and public trings

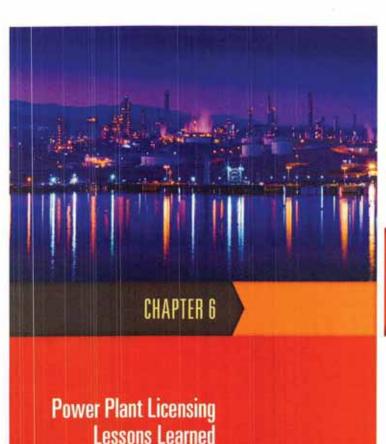
Estimated private insertionant on central stations inversarials facilities in transit as instruct and, proveadjustment to as "oversight cent" as "initial capital expenditions." No facilities connections spagement central excluses compared, land, tilestopment, and prewriting casts, Rahia includes connections spagement centra tools as for homenations and evolvementual capital. This initiate cent is the next symbolic at their based and the tools assumed with the lines of takes to this beneficial cast of electricity, but it dues not initiate tools to be to accounted with the lines of takes. In both private power glanch, takes of the set to this beneficial casts of electricity, but it dues not include the tools assumiated with the effort in tenaring complexity.

Staff extended investment in researche distribwind gewenden ihr aupliete the cert havin wind to the brief distribute. Strawy in the the theory aregues, efforing cach grants in gluin at the 10 percent instriment tax peaks. The advances is mitaced by 15 percent is 2011 and 2011 in which the percent and heads is metal-bit cache to glutowelfame advances heads is metal-bit cache to glutowelfame advances heads is metal-bit cache to glutowelfame surfames.

Energy From Coal

The fracts interest to cash to exact Calibratis's antitrol (2014), Control to Carego (1011) on Association (2014)), Control for Carego (1011) on Association (2014)), Control for Carego (1011), Control and Diero Chit supported fracting the evolution of Calibratis.¹¹ The models: shows that the electricity work in Calibratis.¹¹ The models: shows that the electricity percented from reads and performance rates patients to inperchet to method by 40 percent (2120). Some, just the percented generalized patients of carbon languages.

BLDeep Lemman, Joy S. Dill, 479 Autority, top 2014, Ann International Systems, Computing State entrol 2015, J. H. Schwarts, 2015, Nature 19, 199 (1996) 41-30, 55, 108, 102



.

dust 200,0 to 12 million beta betaren 2000 and 2029. The duckine in casil contract deliveries it, due to the contrainity organized by the Contraints Performance. Standard (Sinuh Bill 1368, Perels, Chapter 558, Statutes of 20042. The Electronic Performance State dard prohibits California utilities from receptuling or tipping new methods for bacalland privatelian flight excends 1.100 No of CO, a solutions per MMA Second contracts with stud generation facilities that record the Environment for further water will experiment in the decade and cannot be renewed with profiler longtion contract Same qualitying facility contracts for small power plants bagined in California that and shall and petitieses take are stated to experit theory. the docum, but some summers are renegatively contracts for an early hornicalian or comprising reprisenting in bern natural gas or bomass family.

Besource Flexibility

The agencies added a metric as resource feedbolty for initiality is impaired to cammark than the CMUR. (CP, and CC, supporting as indicate of the doubling of yoution spontons). The mitrix shares that the resource finability sensitives with declaing availability of independent metamore aparts for the neurograph pendent of available resources to apacely expansion to in manage the changes to are and a 2000 for expansion to in manage the changes to are and in a set of the metamore and the metamore apacely in a set of the changes to an an expansion.

10 Service a approximate the third organist in support integra requirements, or well as parsing pair (our strong pairs) measures. Responsive Catacolar industry measures and for energing registration researce, and took industry as well as for indigate control augent when specifically results in a model of the transport sectorements.

18

Interaction particular postures: ⁴⁴ The Anthry stance both appeard and determined Recolidity responsession. Upward Recollidity is previded the retrainers that are capable of responsibility for anti-balant and-market prevention combots to increase adaptation methods to address balancing and kade balances preparameters. Conversely, there can be been as a second to capable of the retraining welfault.

Distributed Generation

It propertial of the bay 5 workshop, the installed cospecty works included information about economic QC 20 MW and positive produces path generation and scheducalet, but the USET agreecing much GG a pepticate works to reflect more clearly the Disament's 12 MIO W and the includes tensoriality generation.

Interference and a second s



New stigs" process for permitting threads prove plants 50 MW or targer. Convertige the preserve taken 21 et 8 months and schedus as understand nervieweness and an experiment next spikel a schedul as statement and experiments and target a schedul as the scheduler of target and that applications as well as 30kd presenteds. The subschedul as hard applications are well as 30kd presenteds. The subschedul as the functional explosion of a 3 million approximation taken to an explosion of a 3 million approximation taken and the functional explosion of a 3 million approximation of the schedul explosion of a 3 million approximation of the schedul and local present on explore the the Chergy Communities predictation. In solidants of developing the 50, the 13 in 13 million review protein checkes pathic workshops, scheduling and the threads as a through a plant, and schedul present barring. Is December 2018. The Every Commission's School Consultance without an a their industriang order-machines (2000 Proceeding 40 - Streams, Nacrosl' data); the Everying of Proceeding 40 - Streams, Nacrosl' Approximational And LARAN participation and a stream gas lived gover plants resource funding 2009 and 2018. The GH resourcing conformation with a streamplise strategy attended by solvious tradewide with a support of program and any solvious tradewide sensitivity attended by solvious tradewides. Sociology program proposed by solvious tradewides. Sociology approximations, and a species and the Machine. Moreegy programmers, and approximation and programmers, and approximation respectively. Sociology approximation and and the licenseq procession field were presented to tradewide to the billowing hights:

 Torcing type disactors with fielderal porteds for large with projects located on fielderal lands managed by the U.S. Disease of Land Management (BLM)

 Shaff's advectation reparements to thereing the SA, such as:

- The length of the DL and the complicitly of the enlightum
- The cochaing intervention process and the contoneous doctored ting procedure.
- Reductions on communication between Energy Commission shall and the applicant on subclastice intervi-
- Local approx and public participation in the planning and permitting of lengt salar projects.

 Eding process simultance kohoree mitteom totar project proceedings, including comulative analysis determinations and deliveriant that affect significant impact determinations and associated milligation

 California Exvironmental Quality Act (2004)/National Exvironmental Prefaction Act juint inverse and alternatives analyses contribution In the events following the initial scoping weaking, foregr Connection staff larges and will relative a present to avoids tableages to effective environmental review and healthy tenerating. Staff also will develop anyoned changes to obtained these challenges, weak with they becaution the process attribute groupout of tangen to the process attribute groupout of tangen to the process traditional provide the second of the time participation. It introduces these, staff to tensione tableares, and the paties present.

In addition, staff worked is the UD is closely bylikning the separate but related Desert Reseable Georg Castanyalian Hea and Programmate Environmental ingast Statement processes to relater that the CP access accessed and see associated to worker remeably energy and Staff are associated by

Development and Drafting the Staff Assessment

The Energy Commission faces a shadenge with the increased begth and complexity of Mx and condifore of cyclification. This was expectable from the vig 2018, when the Emergy Commission revenued several large solar projects - office posits with the RLM - as part of the ARRA instaction. To help address the issue staff is evaluating whether the SA can be "pared er" or botton Turination in Induie proces while shill marking the organoments of CCGA and Energy Committies regulations. Shall in comparing Energy Commission invessioning incuments to these of other state and local periodictions is visionly ettoclive thrategies in drafting enversamental analysets. This comparative analysis will help determine I shall decoments are within the scope and depth of other appendix," environment of the private of a Evergy Commission documents are outliers. The Every Commission is under different manifales and

represents that local adherdnes, including its pliecomparising Resear, addes helds where particle based determinations and de new "owe strep strep process" and utilization of the context of 15% pair Every Construction determine.

Evaluation networking other paraditations' averagesimular discussionly, another provisional schedupy that have transactions in goal of the OE constructional Proceeding is shall be using, which is adready improving the avoid goalds of the OE Anot and technicity of exclusional goalds of the OE Anot and technicity of instructional processing. The basing of instrument of the instructional goald of the exclusion is the SA and clambing shall member rules in the propert review and structures of the Processi.

Another safety process challings is the second of data required uphoni in a propert application server what information yould be printighed throug the Bitchery phase. Mostly New propert proprieted Copplecant sheald him a well-developed project application for certification (BFC) and provide near complete side sets at the two of the AFC's Ming, in that shall can officiantly believing the print mean't jud leving appropriate mitigation mission to officed these. reparts to loss than significant levels. For various reasons, however, applicants are of the available to salored key components of their proposed project al the fune of the AFC lifest and have bouild providing the recentary information early, not only for data admonstry purposes, but during the discissory phase of the 12 month property. UtaH is reviewing the informa-Non-and data gathering property to presare that any charges will failurez the need for information with the additivy to shaft the SA is a towerly manner it major cavie of part prayert-litening delays

a. Analyse Lander as pairs property memory dependence of how the property dependence making applications of landers of the pairs of the second part of the second

as calling hicknelling, wohe superst, gas los raves, transistican live roules, or facility liquids that is the percess, all of which cause theirs. Projects that practice polations: choose the following the facil practice polations: choose and the campion territory process factor and with loss indeptors offs, foreign sourcing program programsta, weighters, regulators, and the public of a property subliding and confundity in turns of the tanggalan lists the tangen weighters.

for addition, offsets are underscap to improve the docketing process and to implement an e-foling process, which this indications for water of salined long documents and induce hows artistic posts for supplicants.

Evidence and Hearings

The Deergy Connection is making a concerted other to socies the involutions forming process and itselfspecial of the focurring record. COVE is in the process of arounting the following spectrum.

- · Are evidentially hearings please weeked?
- When a bearing is required, can the proceeding be more forward?
- What evidence is administed what use he relied up for a destant?
- · Dars the public fied the process nice bissida!

The goal is to trave a process that is finally everyth to abbe receivability projects a new televisity presess while maintaining a formal learning structure the projects with significant environmental science or metricines.

Public Process

The Lergy Commission and other statistications promises there gordinate meeting mathematics, succe statist does not make the decimient. And these which there are hyperprivate that there are statist at other approximation and the GPUCC. An expected, must there ensure there to all bandly opported mixing the sourching statistics recommenders, in this place the traditistics recommenders, in this place the traditistics recommenders, in this place the traditistics recommenders, in this place the place the statistics recommenders, in this place the place the statistics recommenders, in this place the place the statistics recommenders. In this place, the place the statistics recommenders, the statistics of the applicant. Statistics, this may the all place the statistics of them exciting the.

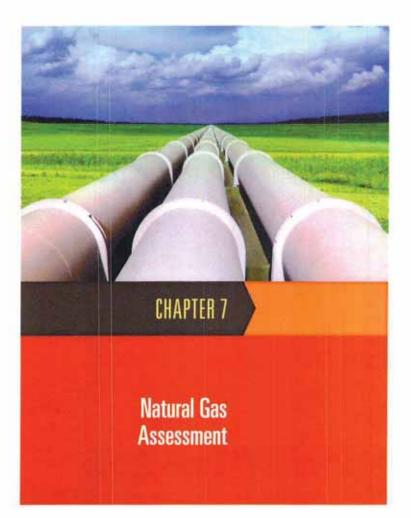
The retroit Laury Commission departments, miching the Public Advance's Diffuse, are discossing patholise regulations or changes in Europy Commission procedures to advance thermatics processing participations, and appropriate antineous procession with officiency and bits periods for intraministic line string programs. These topics and others will be processed all Maria work-information.

ы

Next Steps

÷.

The Gill Proceeding with centimes analling variware which papers and a checking pairs workshops, making for a process of publishing dealt recommande forms for the Cambridge and Deny Commission. The Dangs Committee with also contrained atoms. The Dangs Committee with also contrained to evaluate printy instant associated with the proceeding to evaluate procession may along a the values of resisting meantmentations. Then is, the perchaling the contrained forcing Commission may along a data worksholing Relationality for adapting and sugmenting the runks and explosions that guide and defines the Compg Commission's Data, Transformant, and Thomamental Indexices Discusse and by sense.



÷



This chapter summarizes the Energy Commission's staff 2011 Natural Gas Market Assessment: Outlook that was

prepared in scepart of the 2020 ADVC** The Energy Commonster, California Environmental Protection Agency, California An Benautices Record UABL California Pather Utilities Commissiones (CPUC), and the California Independent System Operator (California US) company that extend gas plays a significant and migring role in California's energy supply, spatically the intertwelpy generation and for meet ing the todates class energy and environmental gasts, National gas ensures and automates to be ensured in canding California's reargy domates, and presententiate in the ensure of detector's program domates, and presententiate and todates programs will detwoir responses method for systems and taskit inlashity requirements and colonin aquinest reads for

DA Exchange Longe Conversions, 2012 Research Research Association Station, and Andrews, Reprinter 2011, and antigers approximately detection OCI 102 (2011) IEEE/CONTROL 221 (2012) 111 (2012) applied in the 2012.

.

The use of national gap an a transportation has in compressed natural gas whiches, and as a hostituik In other mothanil all there. We choose a barrier gaugine, may give natural gas a "bridging" nile attaining California Dean Energy Februs (CCEF) goals. However, the parentral on of satural gas in the transportation sector is also ancertain. Due to 45 lowing efficiency wile train belows inhushing the and user familiarly and relatively clean combectors satural pas wit continue as a significant everys top ph soarce he residential, commercial, and inderivia end upon such as possing, space boating, and to hard insident and amongs heaters, in the longer term, the row of national gas in these sisters may deminish as avery efficiency and conservation innewsitia substitutes such as solar thermal or binges applications, and single-lighter hereiter ment ravi-effective or plus a targer role in monting the state's closure charge goods. While exclused gate network at a fee to manufacture another. Rettilizers, additioning pharmacruticals, and fabrics, additional factors tenides energy and environmental policies will determine follow demand for these and local

Natural Gas Uncertainties

Abother to choose or receivable, malwork gass with play a sugnificant role in California's energy follow. This conclusion prompts the following basic questions:

- To what subset will California's fatture energy topply include extensil gas - what might be the domant for softward gas?
- What will be the sout to California of this domaint for nutural gas - at what price wight if he available?
- What can be store to unitercland and to manage the make accorded with this role of natural gas as Cathornia's energy todolof

With apperts agrees that it is not freeded to make single-point herecards of balance gas practice and after single-point herecards and bala? A may onl be particularly within here and bala? A may onl be particularly within here and balance and any only appendix the actions: and deep anonplations and balance the actions: and deep anonplations and balance and appendix that are here any appendix appendix the formation that are here any appendix to state the formation that are here any appendix to state.

imply give threads all have national gas prices are not say incorrary, but not wards in boaring proper attention on the gas marked's complexity and range of photbial actives. Instead, the longy Commision bar, it this, BPK, theaterf are a range of planshis anthrong positions, to dowing considered at oil market of prices that load room. The approach can increase the channer of being explorational inclimation of prices that load from the approach can increase the channer of being explorating trappined by a fulles not considered and the rangeble compounted as one transitional marks water conditioned that did out materials.

Despite the installing all anyone in accurately prefect future gas marked instances, wave propininstanting California's publics parties and the termine decisions tamed on an expectation of which these softwares might for Fare scannyle, the California angles for "simplement all california full-time energy efficient angles for the software gas positions. So, housing some markedbase of huber gas positions, and mark in fact all gas entractions, transportation, and parts is a transmoment of this analysis and decisions enaising. Total its imprising the analytical process cause.

singling basis and basi committies to using its models to derived misights index that singly quarkitative models, comparing enable of shall be used in using the relevant shaders, evoluating allowable constraints or follower using effortune and autoparties experimeing both what its known and unknows, and making every athrong to present the automs hing and county Rangstature and the nucleit grappin with each to object and back-appreciated factoring opstaturat gas, wit play a rule on supporting rearry aller along sizes, and therefore the exciting thermal size range data back to be monitored to pseudometric plant that will have to be monitored to pseudometric plant that will have to be monitored to pseudometric plant that will have to be monitored to pseudoneuro bequest classification generation. This multification will allow that shale to be preventions while generating the level answer of pseudows gas states and approximate the level assumed of pseudows gale SIGE emissions. State agencies and the pseudows gale SIGE emissions. State agencies and the classifier of allowed to prevent to ensure a states and a maked relates to prevent to ensure galebilismal agenching and maniferences control converses publicant galerating and maniferences control.

Rehard pay preductive from skale formations in the United States is transferring the Autoral gas starbed, in the lost from yours, statut of put negative from shale plays has increased from 2.5 billion to 22.5 billion cubit hert ann day fachtal. Sholk ann non comprises roughly 34 percent of the total gas product face in the United States. Experts in the give sector and the emissionistial community have juiced mental colores with the technol adv conf hi produce their gas. These theory cause from the chemicals involved in the hubbank: fructure ing lattempte to syack the shale fermulants where the gas is about to him amount of water stard in the proetts. Energy Commission staff is ministering and will continue to moviey the potential impacts of bulk sale fracturing and passility one excitormental protection suppresents. At the state lousi, the Every Commisex will work callaboratively with the California for Personation Staard, the Degartment of Conservation's Division of DR, Gas, & Geothermal Researces, and the California Environmental Photochen Agenca to address the stone issues.

Future Role of Natural Gas in California's Economy and Energy Supply

Calibration two Nato No effort, typeser, replace, and an entropide soure that EL2005 MW of extrand part fired generation to incomplexible training (NED areing the Start Start, Start, Marchael Lands, Start Start, Marchael Start, Start, Start, Start, Start, Start, Marchael Start, Start, Start, Start, Start, Start, Marchael Start, S

Due the long torse, see cabinal gas lond poses plants becading consenses that, and poses plants, continued will sensely efficiency, demand response, and control dialon and distribution researching and of traffic dialon and distribution from relating and of traffic meaning, and possibly methad poses plants, Complex meaning, environmental, and pddir, tarbity states make the negativide and tioning of these power plant thermostric accurates. Therefore, tachnal gas, feed gover plants could be a walke uption to make a galaxies and pageseine.

Exploring California's Potential Gas Price Vulnerability Natari gas is a bravity trade connected by is a rearied connected by trade connected by is a rearied connected by trade connected by is a rearied connected by trade connected by its a rearied c

e.

daily upor warked proces he national pair trached and Lineatones's bioectivatio Heavy Hole have tiplated several forms. Tigues 4 teams the preservations the pair 6 occubs in current peer or warming datater. The worker periods at 2006–2001 and 2001–2004 save priors upon to 2018 Upper entities Bolical Holestan and MMG101 and 2018 EER/MMD1011, inspectively. Curl evaluation, which increased densities and pair saleward perturbation periors, higging of these increases in Sequencing 2005, Natitations. Natives and PAIR cancel Barband and pair Arthology works in the Galf Capati ta be shelf as, which knowned available having and clanned prices to speke to one train statement and pairs to speke to one train statement.

Brace tole 2008, Saily cast market jeczys kaw temp60 lower in the 14.55 to 15.55 caugit and only one all previous measure alone 18.00 to 2009. The lower plans televies the 0.50 perces split cast be explained by low becters. The tole 2009 neuroscie remotories tradeout avoiral distance for exclusing apr, espocodily in the solution and several split apr and several processing technically and economically recomtor transition technically and economically recomtor transition technically and economically recomender and their tereased the teapter of shelling paends the encoder block solution of the terp part of the technical several term teapter of the terp part of the term part 2008. Journ 2007, News York Carlor test approach and thest temp betw. One the test plans shell 2018. Journ 2007, News York Carlor test plans shell apper 415-MMEND.

The Europy Communics 2012 Robust East Model Assessment Index systems have a plausible maps of accompliant admitting that Olders admitting processing and menand conditions might affect this has from anothe average mainted price of eaturar gar 1⁴⁶ EMFS anapolis is based to the webreceivent global gas averal assertion of consultant disc however. Nations is ¹⁰ Dr. Markotto word the Markettheriter global m to contrast the lines Revet Cas Task Blobal WHCTRE, for this singles, Dr. Markies and staff worder there hypertite in smally, the MARCEM for your in the AVX-AFF presenting. Shaft's analysis contains the following four cases that focus as globals follower and some for analysis.

- Reference Case: activities a "humeric as actual" starting point care
- High Eas Price Case: aniumot light get domaid and noise contrained. Tighe cost get monarcas.
- Low Gas Price Case: intuition linear gas stemand and lines condramed, lower cost gas instantast
- Constrained Shale Sax Care: arranes higher gay operation; and inquirtenance such, to ensure that drankgareet is common entable acceptable

In addition to the four cares mattered address, line additional factors were added to the analysis in ensponen to statistication and suggesting that the estimated varient gap prior angle such to tamove as versil at diagong the same of discasses some across at same. The two additional cases are

²⁰ Lantonia Linggi Grancisson, Zastanova Giant (Europerfolm de Danseu de Merio y Catalonia I Linggi est Diamonia en Danse de Gener, Pares Danse - 2010 de Menol 102 - 001 - 001 - 002 a seu a seu a seu a seu a presa de Micheley en 1981/017-005 - 004 Michiel (TUMASMICANSMIC) (Antonio TUTA).

²⁰ Berlinstein Laur B., Yachisson, Kateri Hansay, Koja Wass, Festi Yapis, William Host, 2011 Kenser Die Richel Annansonet Annae, Carlona Unige Diempisen, Kultrichy Laurgh, Enzymite Honsen, Andreaster Martine 2021, 2021 (2021) 810 (2017); and oper casasian March 2021.

^[2] Dr. Wellink is the lanesch Raws. If and Same & Asses. Index in Origin with Process Economics and Digata Director of the Director Transition. A Raws III: Institute for Palace Palacy of Plan Internets or Human. Social.



14

WINNEL LAWRENCE

· High Finding and Development Cost Case accumes that sely a small present of gan beyond what is merestly proved will be added to the parent shock due to high costs of linding and development, arving erarlief prozes tighter. This caser uses the High East Proce Scow as a charting point and changes only the

- Low Finding and Development Cost Case: occurrent that a larger than average persons of gan tergonal what is concernity preved will be added to like current shelp put to low could of finding and developmost driving market prices lower. This case ates the Low Gas Price Case as a starting prior and changes andy the Boumory empty.

Kay reput assumptions for the Reference Case. togolighting those according that change in all trail are of the charged cents, include the following

are decreasing as technological developments allow deployment of adequate environmental mitigation suffered specific and most of conditioners, benefities tions that reverted natural gas development are starting to save regulations.

The Constituted Shale Gas Care is a service for care to the Reference Care that assumes environ inertal conterns, surficularly about the insufement and disposal of order used in the hydrautic fracturing presents. These concerns privatel many participants to represent additional regulatory requirements on diversignment of national past train situate formations. Regulatory compliance after 2002 adds arethin \$2.40 per 3000 rubic list (MOF) of salaral gas is the cont at production of shalls extend part and \$5,30,MCF on convertional protection (2595 Aultaru), Figure 5 pluts the annual average equilibrium price for spot gas purchases at iterry Hub for 2855 through 2638 for the six paper, or rear 2018 dollars, ""

Biginning is approximately 2012, the Role once Cave price symple have about \$4.00 to \$6.00r MMS70, intuming the economy receivers and instant increases, fewrity reestablishing a Balance between supply and domand. A rath in interdiments scours in the market, and the result atomorphical shale plays are being developed lifts,110 As these shale areas studium. They produce locs gan, and the relatively more we shale plays shart bringing yupply to market. Record 2015, the price romains Sairly Bat, growing from about \$5.00 MMRTG to just unlike the \$6.00 MMBTU by 2000 IN 2009 Avlant.

- LEE The HCM performs of all scalarships in real 2005 affects in read-animations are exercised in 2005 Relevan-er water. Surfacements in statuted for and 1028 Million aning the beyond Arrays Dirto's 2007 AM information reals. Not-esticate physical address ingel affects are the located to convert 2017 workship careto pair or reasonal Arrays.
- It is any pay a property set in the opposite of the primel solutionary task displaying the following characteristics. Particles are the rank of tray in sits containing high provinge of pinal (and introdiction California), 3 the mails nature, has balancelling. Hind private and the permutation is providented user a large prior, and account production requires hardware allowed production

 Among sensel positi rule in 85, pero danen Te patiet is 2.6 percent

- · The rearginal cost cores for part supplies reflects year 2013 vietage state of knowledge about the underlying gas remains have and production
- · Average annual rate of "leaning" inpediement in gat lochestigy it | percent."*
- · Shale gas development in New York is considering per consult incruiterium.
- · icon, Ring, and Venezuria do and exter the market ave 1 (1078)

128 "Landing represented," means included postal arband firing? proving laft perfection and more many -



Participants in the 2011 APR proceeding cautioned that shaft's range of falses annual average Henry Hub spel market prices might be for narrow - that feture prices usual pescality the higher or tower. El Place offered a case that is leave than shaft's Network Case with 2017 but higher afterward. Staff and other parties generally agent that a significant coefficient factor to Mall's narrow price range is the underlying atouruption that the gas recourts marginal Top24 carves are all relatively flat and remain to.

even across the cases that modify them supelicanty Figure & itseleates new shall's assumptions aland marginal gas tapply carses differ between

2007 EFR and 2012 dP# Notestaia Cases. The survey represent the summation of all of the different supply curves for each subscal gas. play The significant increase regar, sugary reflects the industry's view about North American shale gas resources - that much more valural gas to available tiend accercible of lower conti than provincing throught

The 2037 and 2011 Reference Case curves make on of an "reported value" econterion at the quantihas of recoverable gas recovered largered recorvers. plot a "PSP assessment of growth in Annuel Interview and antilocovered resources). By industry Lonvestion the PSD associated's mean there is a 5d percent. pstubility that at least this much gas is recoverable from that play using current inclinatory. In increase the special of resulting gas prices, additional cases with run accuming higher probability but lower

Figure 5: Henry Hub Annual Average Natural Gas Spot Market Prices



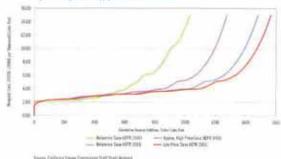
- · Liquited satural gal exports are allowed to second of
- · Passine tapacity additions are alread to estar
- The hitsen passer generation mix for U.S. Ualet. lightwoi married freeds kaund on 12.5. Swirgs John rates Adventures (10) plate level behaveal fails month rementable generalizes
- · Cathenia mosts its pointing RPS target or 2426
- · Other states with an RPE ment targets free sears take
- · Gravit of remeable green alter in chains without HPS targets fallows past brends.

101 The photon "allowed to could" have expand that their bound encours to out produktion part that the feature if any expose is a result of any pairs, papertient as the result of exclusion of th Topics's communial califies good the anti-presse suffered for gate prices that, pressed, and follows in Net case

The High Gas Price Case made plausible acsumptions that would shove natural gas starket prices higher than in the federation Case. On the domined state. the increasing is growing strongly lad 2.5 percent sensativi, while 58 OW at entrong your head. power plasts and a showing of resonable generation engraves in other states to 15 years are mading to Acreated sofwol pay Remark for electric generation On the supply side, some jurisdictions in the Deleted Ittaks are rectricing the levelopment of subgrafpet resources, particularly shale linearities, Also, in places where production predictions, suffile macanet wer tydraulic fracturing, water and adaptual, and other potential inspects we causing analyzemental compliance costs to ene for convertisinal and onconventanul pro production activities.

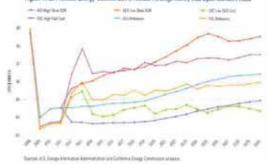
Technology development dumination the Low Cast Price Case. In this care, the lectnosigy scoreing improvement to hald conclude at any partner provurly. Do the domasti side, the incomery in seash, with penual Gross Demethic Product growth suspend at 2.1 approved. All status with RPS programs are completing on Time. Thereby reducing the need for gas-fired gas erglise. The the tagely side, environmental concerns,

Figure 6: Marginal Gas Supply Curves for National Cases



10

Figure 7: BA Annual Energy Outlook 2011, Annual Average Henry Hub Spot Market Prices



12

response amounts to PM cases and how portability toot before exception and the tart of cases. Alternative and the result of these cases should be done carefully because, as this mother difference attention of a tarsion king with the resource exception of .¹⁰

Staff's marginal and's in the tangle correst represent as a serial being and development and evidenment that stranger prior from: Figure 5 also these this consultative effect on the fiberence Carlos's anyphol gai supply dare than stranger is assumptions in the high and card Carl Yest rais's through the supply correst to the left and right, respectively. The Constrained that carlos cards are the same year, grant recepts some as the fiberence Carlo. It higher prevention that we also card rais the same year, grant recepts some as the fiberence Carlo. Its higher prevents a strate are at availed in the samp prevents and the area and availed in the samp prevents, actuality as other range of neuronmonial miligation stafts, or when eventile specified, card, would be another way is service in the specified of such the same.

Comparing the Energy Connecticies autorating to transcard to thread paraliaries disensities in a essenanciale check for connectores, totally, the assumptions and wetched varies of the Longenize concess wet transpoent aroung to shard to ansates their placeholisty and compare them to the Energy Dotomicson cause, and, as a world scale sandal weights. The U.S. Foreign to formation followerlanderia is among theory dottima 2020 APIZ 2020, is a supras of tack world comparison.

Figure 7 exception: annual average Newsy Holl Start municipances for starts' fieldwares Case and High and Low Fielding and Development Cast starts for the ART XML Information Case is and how other cases to the ART XML determine Case is and how other cases to confer at a space to examine the effect or evaluating gain press from accurately in factors related to understarge otherwise of the location (a received and share gain resource bare).

Safety Bauel WINE both Insected investigation and the registrian. The Energy Commission eropanded by transforming Valide Instruct Carety Dissourch Program hands to the CPUC, making them available for safety research, and by affering assistance to the CPUC. California CBI and PGLI and devices to blees the Energy-Commission to charally membring for polongial result, from persistent multi-states. If the major result from persistent multi-states in the regist result from persistent multi-states in the regist result from persistent multi-states in the spatian end of service for forcing as the CPUC and the gas allither with the average the californian.

The CPUC socially tedents previous reductions in an encodule sequent to the explorer. Then, is amony 2011, the NTSE anematical that the failed cogniest of Line 122 has been longitudinally seamed contrary to PEAE's excerds showing the segment war manings. As a report, the NTSE encouragedend the OPOC ordinal - PGAL to begin scarching for "transition well-after and transition" records. is unified the balance and matthium allowable penalong processors (MAGP) of its propriets in "High Consequence Artus," (MCAL). The NTSH minuted the Pypline Accident Report on August 38, 2013 Collegion August 30, 2011214 is the report, the NYOR identified a todatandard and poorly weited pipe techan that entually last to fite mattern of the papetine. The CPUC atus unitered PGAE its restace speculing pressures on ees of similar vietage and charactericfics to Line 332 located in NCA's by 30 percent being the MADP.

The CPUC expanded this infer or lane 2011 where it travel as order as upper lat Oxio instituting Rationalizing 11-02-025 into reve popular study rates, discring PCUC. Southern California Gao, Can Dugg Can & Dechm, and Souther California Gao, Can Dugg Can & Dechm, and Souther California Gao, Souther Into the popularity, our just these is ICAL, to which the sports of a volt Avia "Transition, voltable, and canadatis" reservice of MADE. This tecting is separately the talks second years. Under this is canadation, the califtic will adapt appendict it items shafty measures.

18 and 101 particular to be starting "Will the

The high study reporting axis arisones the edit worker particular to histograph encounted is security taken backeding schema (conserved in 52 percent) higher Rack in the ALCAUL Holmering Calas. 1.23() totals taken hell (licit instead of KET hit. The two study instances rate axis and in KET hit. The two study memory security and the requires how in Migeneral lives threas in the ARD 2010 federesion Casis 423 first sectoral of KET first.

 The High Date EBR Care assumes the estimated admitted researcy 8.590 per shake gais well in 58 percent legister than in the AID 2007 Reference Care due to before atmitted percent and percentions technologies. We care a consider lower care per and of percention result in the investigation.

 The type Stight EVIR Cype assumes the EVIR perthink gas with in 50 percent levels than in the AOO 2007 Reference, Cyan, two in Atter than reported ratios of decime wight production. The case's according together cast per soil of production results in the bighset gas prices.

The sample of Honey Hall prices from the AVE 2011 modified vesturite iteau cases track very cloudy with the range of proces in staff's cases. The inglanations for all of these cases are fairly considered. The more reliance AED 2007 canes illustrate the affects an prices how changing assumptions retained to gave remeter samp cover. Stakeholders suggested staff's analysis did not stress this mough. While Figure 7 may provide a more usuaful picture of the pole unite for annual inverse proofs the wore \$4.50 and \$3.50 is 2010 philes), the process for develop these cales affects have they are interpreted and compared to others. The two exclusing ALD JWU course storg with the two outlying Every's Commission cases. are less likely to be adsorved than the other cases. simply because they were satisfructed by me awar hus the curnally "expected" agine for figure

That include instrument particuling and local numeries. As white perturn the redenise numeration of papelon spation reaction, candide typebol after trading, and register papelone, constraints any asymptotic reaction spation persones and capacity as well as commonial realizers. The CPUC discrimination and addines to approxe papelon nucley entrumenteer plans. In these trappercises spatiants to structure how the papelone trappercise spatiants to structure how the papelone that anyone.

PEAE then toward specifing precisions as speiral additional placeter arguments based on its low. 30 "Chains reactions Ships" The Care Landiau Shiphy found had server of PEAE's pedient were invalued toward had server of PEAE's pedient were invaltived, basing to these papers property approach at the tupb a prostore gister the pipeline property promoty is human, and taplications.

On August 76, 2011, PGLC time its Paulone Tathy Cohamonsof Flue an empirical by the CPUC Tathy Cohamonsof Flue an empirical by the CPUC and cabls for proprine medianization, spine automation, meanth subgrachine, and minimis satify measures. This card all the glue is estimated to be 12.2 follow poor the next flue grant, and it measure in the Seets Nancords will be recovered provide GPUC approval of the plane TGEX has aready started with on the glue automation of representing and cards more in 2011 will be recovered provide of the plane automation of representing and cards more in 2011 will be former by chardwalation. At violation tart all the recovered provide and a CPGAC types and the plane a charace to common (or PGAC types an part all the recovered processed).

SoCatOve and SOCAE white subwrited its Pipelese Subsy Exhancement Plan on August 2X, 2011. The plan converts of lower and compared phases with Phrase 12 constants to extend compared phases with Phrase 12 constants to extend two 7212 CoUSE Phrase (24 cashs the payetier medimization, value automation, extained incident dataction and Compare another, and the investment of a "Smarring" of a compositionary acceleration of the phase of the datact and the plan for both localDate and SDGEE is estimated to be about 14 E biblios Phrase 3(a). Plane 32 and zostimate work Uniford in Phrase 3(a). Plane 32 and zostimate work Uniford in Phrase 3(a). Plane 32 and zostimate work Uniford in Phrase 3(a) with type than 7215 in 2020.

Managing Potential Natural Gas Risks

Does the significant releval extend para in Califoria, any process, marking an equivalent of these encompositions in marking an equivalent of these encompositions into the future mattered gas prices. ¹¹ Mode laws 6 actuals gas marked accessments can prevale controllistical efforts prevalent, for the vector and the site of the second statement of the depends on a transparent descention of actual tases, are enderchanding of their informed instrumentary scale descept the advector cares, and a reflection importance and an art second.

Constituting the payubility and incomparisons of high high and low provi exhaning heigh goard against res-taked bloces. Generally, when using a conditional estimate it is profind to mission the potential comppercent wing one activate for a specific purpoist should be future estimate tark and to be different This is especially low-when the experts have no dotensible argument for new tribula being more likely to some than another talkward solutions and denied west likely" will thill occurs. For manyin, doctoons based on accomptions that future gas prices will be too could have significant segurite consequences if per prices here ead to be high, and vice versa. The consequences issued on the specific one of the tional evidenates, whether 8 is an individual en og tie ethnals is pertane a more energy officient when, or a shifty assessing the cost effectiveness of a proposed energy efficiency program.

The manufacture parameters are experimentation of the test of test of

÷

caring shoul 12.4 follow. The plan is still waiting for OPDC final approval as part of the valuetaking program. The Europe Convertings has should need a

Los rearge commente alterative mentioners the topics policities and approximate pressures for any impacts on services its national gas concurrents, including the national gas find gaves glants, that Calibrania subsets are that allow 14.3, percent all in the clickly. Such anygoing approximation greaters are a payment of the subsets and approximation of search and gas that can be delivered through that payments in a gaves parent. Such explainment is a paid denixed policit and like to transitioners as a second of enclaration of the bolies. To date. PEAE has reported ne cartainments for containment is a paid of enclaration of MAOP to proteam consolitated this the location cares selects.

Second, lower pressures reduce PGBC's state specified Restality. This Residulty is embedded in what PEER calls "pipeline system inventory" The inarchery describes a minimum and minimum presult of natural gas that PGLE needs in the pipeline surface In east destand. Normally the range between the minimum and maximum in \$550 million cabler that MMcfl. With the additional processor reductions a pepphyled by the Bedlegs of the Class Location Study. PGBC's 600 MMcl per day permittikik mientury twoji bicane 200 MMc1 per day. PG&E was, as of July 1. 2011, resump high and low immediary Operational Flaw Orders (OFD); simultaneously, which required cashing orn to match they deliverize of gas who the PGER system many closely with their staty usage than they the perifyr spectral papeling as to be or period and a second tes. Mile generates have asked the California (53) # they will be resultarised for penalties or ceels incurred at a result of the lighter balancing trimantes, and some third, party tralancing service agreements may have know modified, shalf has detected as impact on oitygate or horder prices paid to Californians as a recoil of the tighter balancing. Staff after roles that as of Decomber 1, 2011, PGAR had reformed the mentary seng to \$10 MAct, similaring the most for the simultaneous high and low OFOL

The learn's does assumments of polositial regret arcsociated with their east of multiple althornative instantors may being blann chronos, horned on their antionators may being blann chronos. The set of possible gas police antionator. What results is a discrimine that hops a before chronos of performing according work a well or stage of generative therese. Science well an employs can advance translated them, and they retransition and local advance they particle actual of the retransition and local advance they particle actual of the retransition and local assumptions to give parts. [Intern

Potential Effects of the Gas Pipeline Explosion in San Bruno

On September 3, 2010, a 329-ech diameter tephipropane naturit gas theoremistic spectre sequenced andre a explosite text in the Tam Brees, Cathering, The regression of Line 132, even de by Pacific Gas and Unomer, les additions to the texple for all heres and definitions of the explosition of additional of a temperature resultantian. New poissons resultant in a femperature resistantian, texpes here community description, and existences is signified public values. In Case text National Interesting

It for a function of her a report interpretate for users of forecasts management and a singly forecast (start sur and the encourse) was alrange three sources are specified factor forecasts accurate from classific and equilated for a forecasts accurate from classific Restrate Apple for a forecasts accurate from classific Restrate Apple for a forecasts, meaning, meaning and 20 pt //

Theil helperlate testing means taking position segments and of service for several days. If the lost careet the popular to had, there it must be replaced staring which hime the segment remains out of service In date, PGBE has had fee segments fail typicalized terding, and near Rakerplaid on Line 1008 and one esar Wandhide on Lines 132. (PGAZ atto discovered ola feedbag a buik on Live 137 in Publikhtic to each af these cases, and as long as the testing carbours to eccurautatio of high domand pariets, PESE should have the addity to measure water of gas to continue serves to martly collamore, including gas-lived electricity generating plants. The Enougy Commutane is working with its littler agenties to provide informatax and confrequency planning support to address any potential outlages during the testing

By roal commer, the approprie offect of the lower iperating premiare reduced capacity on the "backtans" periors of PGAL's transmission system by about tild MMcCrit With the puttibility of such inductions acting into Dependers, staff analosed whether the eductions could have an effect on service to conform ers and antite what conditions these inquety might scare.¹⁷ Dialf feel holed at whether the reduced Bowi would affect FLAC's ability to fill undergenous gas sharage during summer months. Analysis showed had PCEE should be able to visit 1 into starage must if out all, of the gas it would be protect service to save zachniers even with the reduced speratog antroarts and lower get News. Ail discussed at the September 27, 2213, 6741 Committee Walkshop on natural gas. sciences suchaster's sould be madent to use availably backbone capacity to legent as much gar as people time the time

Dial't New Isoland of whether the reduction on Isour backbone transmission analogisty court affect the state's ability to meet monthly projected satural

⁽¹⁾ An available. He applies of which propagation in a control of the second second

¹²⁷ Nacawayini vi Selip Anuritani vi Dragna II vi 2002 Kenser dan Manut Asawawan Bulaak soon Brathwarta, 198 2005 11258, seni www.maraja.ca.gov.2005 pailing-sanattif. 200 2013 6021201 106 2013 202 204 art.

Table 7: PG&E High Demand Day Gas Requirements and Sources

UNCO.	Det 6, 2009 Recorded	Dec 8, 2029 Recorded	Weter Paul Day Forecast from 2010 California Gas Reports
Demarks			
Care	2,948	1.074	2016
ABUTW	8/2	\$82	422
Detric Consister	-101	528	1000
pri types	38		
Net at a second s		azia	6.71
Cepacity & Supply			
Reported	907	10	1808
844	100	1.0%	03
Sherak (SAPosicited	(29)	(3)	100
PS& Imp	1.344	118	134
Independent Sample	800	188	547
Tetal	100	470	4218

Sume Description of State and and Add Part Associations (Section 2) and and add states

Chevrone, and supplice strength (Seeplice engine of entering, second in POD interproperty leaves, second and the feature when the second strengthmenter that is, supposed (specified).

Endowing the processing of the formula part of the type and a process (of the order of the type to be and one part and part of the order of the order of the type of the type of the type of the second part and the part of the type of the the part of the order of the type of the second part of the order of the type of the type of the type of the second part of the order of the type of the type of the type of the second part of the order of the type of get demand. The analysis suggests that RGE's valued get captor (y-resort to margin could be packed to vary plant to asso in December and January, most under menni weather conditions, without using tables that neuropaint strange without that of December 1, 2011. PGEC has reviewed the investings using the CO MMAT.

Finally, staff holds of what would happen and/or "Nieter Proj. Day "UPPD conditions. The capability to serve NPD demand and a companies to here with days with A formatic and a lay NPD here. December 2007 are there is failer. The key conclusion in the december 2007 are there is failer. The key conclusion in the december 2007 are there is failer. The key conclusion in the december 2007 with more this cost and the target and december 2007 with more this cost and with the dependent shough. This independent sharing its main spin fail workspin failer shoughs that believedwelt sharing its main spin failer workspin factor shoughs that believedwelt sharing its main spin failer workspin factor.

This analysis does not holk at patiential head area cartalismeth PGEL completed hydrotecting or someal key bap lens here, and inspaceted napatilited volves to restore package processes an fiscue time. The OPUC promote PGAC to magnitude Document IN, 1011.

10



CHAPTER 8

Electricity and Natural Gas Demand Forecast



Measuring California's energy use is the essence of a much broader analysis conducted every two years as part of the

Integrater Deeps Anice Report AUAID. This stageties summarians the Tampy Gammanians staffs's Antisonary California Deeps Densard Anternard 2002–2003 (2012) Periodicary California Deeps Densard Antarchiners this of the of an annual california density and the house the barries of the the trade of the antibiotic and california's density of the the present of the series and california's density of the series of the series of the California's density density of a series of the California's density density of the series of the california's near Petersary and tespects to adout a density as series (2012).

10 Aurile, Dirs, Die Lass, Kan Daniel, Koman Agen, Jaak Davian, and Der Weg, Annoues (antres Deep Auran Annae, 200, 400, 200, 202, 203, 203, 203, annue a new meger pairt (paneumos) (3) No 203, 401,021, 204,025,03,10,24

Samp from, the CPUC has intrarel and held a workshop on a Chao program of the characterization regulations viewed for charged. The CPUC has after record a completeness of the part detailing its findings and under proteomic resonance/films for charges at PCER.¹²⁴ the Langs Constitution conference to other its associations or an enable.

PEAE hist teen sloadly rettareg product capac By and analights incentory as pape to private how tom phared through tecting. At al Navenitar 29. 2011, system reparty story the Redwood Path was al 2220 MAchie - which is 76 potent of maximum capacity Testern capacity along the Raja Path was specifies at 72 present at mission capacity (822 MNRCM1. PGMI reports that as of Decordor 5, 2021. austable system investory stands at 4383 MBUT - an increase from 7000 MMc1 due to pipoline testing. The immate in investory is aspected to stanisate the need In sail high/few meetary Operational Flow Delars (DFDs.) However, it is supected that that calls for are taked O'Ds will confirm in an anguing tasks as success in Revealer 6, 2013, PGA2 reported that Northern California's charage investory levels were higher than they have been in the last three years for this poid is tone of the sheage teasor. Thirefore, PG&E expects as heritalises in regular withdrawal tapublities for the storage facilities located in PG&I's options this minister.

18 Zaminus hutu ahling Zaminana Zanama Angeles A Saha Jonese Juanda Manggania Rand Zamina A. 2017 (KIZ Angeles Ratio at Sami Zamina Angeles R. Bill sense para angelek integration (KIS) (KI 2017). Artic 421 (10):1381/1312114.pmi/d-dhapma.doi/10). Zarki sati angeles angele.

im compiled around 272,328 pips watt bears tillbhi at sherbially is 2010. Natural gas consequine, toolading hard for electroids generalize, reached aloved 12,702 rollion florence that some year formation of meeting provide in energy instand underto California's attents to inverse effective price construct natural resources, printed the environment. use accessive public headth and cably while propried adequate energy togelies and introduct growth. To Had and, the Likegy Commonwer's long term forecast approval in many version, as the Normbalies for policy commendations to the Geometry and Legislature mough the 20% as a simplick to which is measure the utilities' need for new generation restartes in the California Public Utilities Committian's 10790 Ling here Precarement Planning pracenting, on a schwares point in the Re Research Reard's All 37 Scoping Plan at a last heavy he attenting the statu's property loward mosting its Reviewaliks Forthelia Standard OPE as a baseline for estimating energy efficiency savings assorial and as must into the Energy Comention's identively and anoth

The hescard is also used by the CPVC and the California (52 in sexual researce advenance present) ings addressing expands much, which depend on prosched peak instand. Derhand he singlescily varies pair time with dath, would, and seatenal codes and Surfactor con within a given base. If it goverally lower at right and un someoids and ball-bars, with the maximum would terraring on hat sometime workday afternaire. Exarchel prok demand is a ortical factor in sinchrephy and transmission planning, since it attentions possigling and transmission capacity injummit.

Turn an analysis cannot be conducted in Italiatun. The Unity Committee sugments its own mention with agul from other government agreement utilities, advectes propis, and consultants. Repolar entropy of the Domand Analytic Working Croub. formed by the Degry's Contempone in 2008, provide ors the eggerhanity to share believealure.

dula. Heat, and methods, and to suggest changes in The existing process.

In the word record torocast and accompany ing tegent, COD 2012 Preliminary, visit incorporated Hatchilder Sciclings up a number of secondard training including the uncertainty convending noir lawn sconenic conditions (which are difficult to predict). and the salative impacts of summers efforts. which are difficult to measured. Multi-devoted public periodents in complex of statebuldy provides on then two results, as they carry sufficient companies

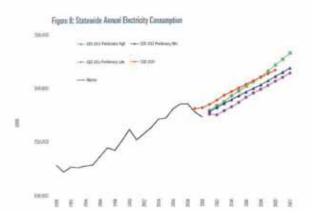
Demand Forecast Results

The (212 2017 Periminan Series and includes New temand scenarios, high, will, and low. The high ilumand cate incorporates relations high economic regraphic growth. New electricity and natural gas rates, and low efficiency program and soft generation impacts. The low doward taxis includes lower commolitionsgraphic growth, higher assumed rates and higher efficiency program and soft generation epochs. The mid-case aries regisf accompliants of lively between the bigh and his carety

Table & compares projected electricity contamp You and senta-incident¹¹⁰ pauk domand under the then forecast scenarios. Historical and ferecasted values from the previous RPH froncast (2029) provide points of interests."

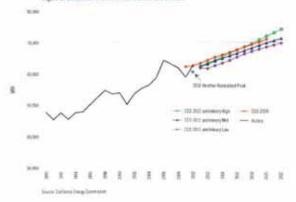
Figure 8 compares projected consumption under the three scanarise alongside California Energy Remand 2012-2029 Adapted Famcaul (CER 2029) Concurption growt at a factor average aroual rate from 2018 to 2020 in the mid- and high-sourge

2014 report is convident page in the actual ands for the which the homostalisticar passe is the south of actual people for sub-indirect which may return at a Desert Series.



100

Figure II: Statewide Annual Novconscident Peek Demand



104

Table E: Statewide Electricity Demand Furecast Comparinan

		Contemporter (List)		
	CED 2009 (December 2009)	CED 3011 Protessary High (Accust 2011)	CCD (011) Performance Med (August 2011)	CERTIFICATION Production of Const (Account 2007)
896	778.473	222.585	(22.5m)	121386
2011	294.236	DIAN.	31.408	PALADS.
7818	382,843	JENE.	III.M.	TUNE
mid .	298.421	216.821	292.398	26.00
tete .	201200	321,04	10,442	HELSE
1873	-	832.518	1826	- RIAIL
Iverage Arrivat	Growth Rates			
1012204	1466	1.00%	1395	1.38%
101.712	TER	110	8405.	LIPS
(105 E00)	1.23%	1.18%	1474	1.955
101.202	1.22%	1175	1125	11/1
1285 810	-	1105	1305.	1.185
		constant Paul Offi	ñ.	
	December 2005	CED 2011 Perintery High Name 2011	CED 2011 Perinten Mid Disput 2011	CED 2011 Performance Low Magnet 20211
URL	4.91	438	ALSIB	41525
2004	11.761	15,700	11,759	11,703
10011	102.010	88.455	65,415	10.455
1923	06.058	. 46.567	6.01	64298
2273	TLOF	12,818	11.616	84,410
1011		28,228	71,781	13.738
Average Avenual	Growth Rates			
1005-2000	13156	1375	1176	1.175
1000 2000	1176	119%	11%	1175
1018-2013	1.376	1896	1185	1.076
2010 2020	1.41%	1395	LADE	1215
100.202		1125	LIFE	1.22%

Sturie Cathoric Seige Command

a 2021 forecasti una 2028 estate minimatent (esta latte fran actual la esta



domand carrier 15,37 and 1,67 antoint, respectively, compared to CV2 200512.25 percent). In the low domand acception, annual growth is legter than in 232 2023 after 2012, Higher projected growth value in the 2013 forecast reflect a desper recessive in 2025 than attanted as well as a very mild weather year in 2018. and thursdow failur growth in reventing to impected long leven assighter and economic brench. Forecast conservations reaches CEP JDRP projected levels by 2018 in the high-stonand scenario and surgarium the 2020 CVD MUSt projection in the mid-case by 2022. By the cod of the foregast period. California's electr By contamption is superclast to reach between 313,308 and 333,000 Date.

Consumption to the image driver for paid consumption projections, or the depiction in Figure 9 of the probanary peak formant sconarios leales much like Figure 8. Crowth to peak domand how 2000-2020, relative to a weather normalized 2010, in factor in the high and and cases (1.76 percent and 1.45 percent, respec-tions) than in 229 2029 (1.12 percent). Statewide muk domand is projected to reach the COP 2029 level to 2017 in the high-de-trand scretario and is torparch the 2020 ZXII 2009 projection in the rest case by 2022. Average unreal growth rates have 2020-2020 dative to actual peak in 7010 and projected to be 1.4) portrol. 1.10 percent, and 0.51 percent, respectively in the high - and - and low-domaid scenarios. By 2022, peak domand is expected to mack between 88,700 and 74,200 MM.

The CEF JULI Preformery Natural pay Territori parallels the electricity contastantian formula Neural Neural cali data is incorporated sp through 2010, and the name woolsh are used to produce filtere scenarios (high-, mid-, and low-demand) under this same seamic temprophic ansamptions developed for the electricity favorant. Historical consumption in 2018 is higher than the value projected by 220 2009 Presented growth values are higher, her, such that all three distand scenarios project greater someonplane a 2022 has providely repetted. By 2022, cannot tion is supported to want between 13.773 million and 14.175 million Mannet, Table 5 compared projected satural gas concomplian autor the three schurzed

Modifications to Forecast Method

Additional concerning data became available after publication of the 2029 integrated Europy Parky Expert The (227 2011 Periminary attached the Sins ion to Hut 2010 is the historical bear year and the mail harizon extends to 2022, compared to 2020 in CED 2029 Reyard this touber adjustment, stuff made neveral significant modifications to the 2022 EP# demand foreight wethod.

Far see, staff developed the maan economic tothes - esidential, someonial, and industrial - be randoming the Longs Committee's traditional and are readen and a new econometric approach longed by staff in 2011; Additionally, shaft soversignal peak projections using its Heavily Electricity Laud Model and a new accounting model. Draft mode adjuctments to recally have relating models leated on the expression ectivulture. For example, price elastutties estimated in the residential and inductival econometric mannis oplaced previous and use elasticiters. Nacionmenda have been a recent scalarities of the demand madel method methodist staff to develop a rebuil, mattcondition modeling approach to Riemand Sirvicyclarg.

Shaft have poled vesilitiestal adoption of photoshaic (PC) systems and salar water teaters yoing a predictive medial spliter than a long analysis for is previous fewerantic. The new method is based on estimated paylack periods and cost effectiveness determined by apriced costs, every rates, and varisas separate levels. Staff developed spanarios using varied accumptions about electricity rates and new home conditioning

Finally, CER JULI Pertomony acceptorates patient hal global comple change insuchs more comprehenuvers. The Design Commission domaind forecasting process typically mobile there impacts by adjusting

Table 9: Statewide End-Uper Natural Gas Forecast Comparison

		ornamptical little ther		
	CKD 2009 (Decaritor 2009)	CED 2011 Permitan High (August 2011)	CKD 2001 Postminary biol (Ariginal 2011)	CED 2011 Protecting Low Heater 2011
pea.	12.855	12,815	12.891	10.00
2016	11.617	11.018	10.014	11.00
103	10.007	12.895	12,945	12.66
201	12.74	13.347	11.106	12.81
2021	12.930	11.817	11.789	11.91
1111	-	14.275	.11,997	-11,41
Average Avera	ar Groeth Rates			
100-200	8.78N	139%	1.05	1.03
201.02	1345		-06	
2010-2010	8.10%	1098	LDOL.	8.353
2010-2010	1475	103	1215	101
200.007	-	1.945	8 875	8.775

Socia Cattorna Kongi Communi

special the number of causing and heating deprodups in the function provides the heating deproratio of depres days in the last 12 years for that will be tast 23 years. The result of this adjustation it is and increases in the projected advanced of causing and a decrease on locating, installed advanced to the decrease on locating, installed advanced to the location of approximation of a provide.

However, hongerstawn activated in the peak functed to avoing of days temperatures are a 28 year provid on out affected by the adjustment, or a functed of percent and affected by the adjustment, or a doctant of percent years of the property temperatures ments, in the form of higher maximum temperatures in a given year. Therefore, many doctary changes into access the internet temperatures investiged interaction to maximum temperatures investiged accession. The means temperatures investiged by the doctage sampling, shift applied there to the pesis teamments avoid labels websites a conflicted

e testead e testead w year Energy and the Economy

peak model results.

Economic projections are one of the key inputs to the diseased function. For the CAU 2007 (Polylocatory function), scall transmission multiple recommits and disease tables scenarios. The other was to guardify the impacts from a requirable right of accomption

be maximum temperatures and used the prosected

The COLUMN Performent American Hana

changes, along with farecast results and assisting

ctimals charge impacts to adjust the satsling and-ane

121 Known, Don, Son Garn, Han Drovett, Accurate August book Lanton, and East Dong, 2011, 30-34

14

ear's economy may deviate from its Notivical pattern Start consistent same key golds, made during the discussion.

 The substantial deep in twenned prioris may affect negration partners, specifically interaining in ingrafam, it is iding that California will not exponence the scale pathons of depending peoplation growth as seen in proceeds toraxismes.

- Charges Is average home size and location may have a significant effect on demographic drivers.
- Duer the saming decide, climate change may introduce constructs on water suggines.

 Alternative indicators, such as personal dist, may become non-calculate of previding resignt and energy concomption pathons.

As Galleria's scenary recent and charges, is in colorady important that the foreign Commission adopts is a consider functional models' appropriately Drift will consider insurgraphic parts tachers in folder CPR for access while conforming in morgan with a county of reconnect and comprisible reports.

Self-Generation Impacts

The CLD 2011 Prelowary function of which the organity of an other distribution growthin CDG used in large maps faultitus and of the ways transmission programs any space to be provided and prevariants. The function a strong analysis to properly still prevanance, security in the case of residential PVs and solid wayter business, where it were predictive maked the security angress and solid.

 Energing Removables Program EXP): This program is managed by the Deergy Commission.

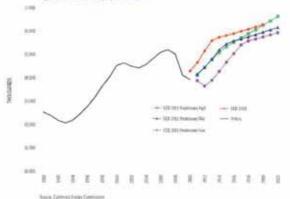
- California Totar Initialiae (CE). This program it: managed its The OPUC.
- Self-Goveration Incodesi Program (SSP). His program is menapot by the CPUC.
- New Setar Homes Partnership didlet's Thirt program is managed by the Lengy Commission.
- Utility incentions: Administreed Ry publicly served whites such as Surgements Municipal Unity Doc Viet (DAVID). UKIMP: Segretal lengths District, Berlank Water and Priver, City of Gendale, and City of Paradenia.

The gamma's strategy of the CBP, CSU, SGP, and MGP programs is to excessing in iterate for endpresentation behaviour, such as VP systems, with Searcies excessings with the market increases and activeness uscensings of scalar and decreasers the rapidial cash. The ended to which compares sea market with the which compares sea and price editors and dependent to the scattering topping respectations, the future and of accentions, and thread as manifested to fine sender at states of scattering schedules. Figure 11 stores instanced and copieted page

Types 11 seems numerica and opacies prain imparts of 160 Seemsition, which are proported to reduce peak load key more than 3.500 MHz by 2022. Michield impacts were revised dimensionly be used set of proposition data and howed be enclosed where set of proposition data and howed be enclosed where a loss of the set of the enclosed and a set estimation of initialized impacts. Represented above estimation of initialized and applies with above estimation of initialized and applies and a set estimation of initialized and the set operation. The throughout initialized of the course alth 2016 Conresponde to explanation of the CO2 program.

Table 18 shoes historical and projected statework structions consumption than well promotion, well to bollow and with VV and are -PV applications: for indificient accession had a and power CMPT bicknowging, self-protocols and and power CMPT bicknowging, self-protocols and and power CMPT bicknowgen; self-protocols and and power CMPT bicknowgen; self-protocols and and power CMPT bicknowper; self-protocols and and power CMPT bicknowper; self-protocols and and power CMPT bicknowper; self-protocols and power complexity and power CMPT bicknowper; self-protocols and power complex and power CMPT bicknowper; self-protocols and power complex and power comp





se electricity itemani, Staff selected three sets of temaning projections from Monly's Contores conand PIC Goldal Insight, Thaff three sciences that control The Tophest and Neutri projected tesets of Sciences provide.

Figure 12 stress belanced and proposed swets for energy-colored energies were provided to the phase of the commercial and industrial herecards. A comparison of the propositions of the first stress of coast-fidems, about the folger of California to associate tacks uses associates California will experiment a partial of shard provide as the annihum projects in increase from the 2020 armst, followed to a robar to motion from the 2020 armst, followed to a notice to most final parts.

The most significant decorpancy between these recommic properties lies in the database of the mentions and in the Sinney and rate of the measury. Escopy consumption treats with enginyment and after ensemic indicates to final transformer encryses in our final transformer encryses in our final transformer encryses in our final transformer encryses. We alternate storage and the receiver final the end of the final transformer encrises that its the end of the final transformer transformer, uncertainty introducts and transformer transformer and the memory of the attended to attend at an enclose the transformer and the interact period, the transformer and.

Insoftward inductions such as employment, porserval income, and population are impactual, but are will be only sceneric takins that could while the formatist, to Landson 19, 2011. The Dancy Common tion herbit a public workshop white toward regist sceneral insorance ways in which a before a public evolutions, statistications, policy waters, and but nests evolutions, statistic ways in which a before all collines towards insorance ways in which are before all collines



Table 10: Electricity Consumption From Self-Generation (GWN)

	1991	2900		2505	2000	
Bat Phone this Set Generalize	139	\$378	KRI	3138	11/52	11.001
Pretoxitiac, Los Barrierol	1		List	1.043	410	Litt
Photosottaic, Mill Florinard		10	Litt	230	6.118	3.230
Plumotac, Rel Danald		- #	1.110	180	1994	6.856
Notal Sect Keneralian, Kow Partone	8,245	NIR.	10,91	11.479	11.541	11.17
Nos July Severator, Mill Demote	100	10.05	10,00	1148	1.16	(8.37
total Set Generation, Migh Bernand	8,545	2.183	10,765	12.479	JA718	10.824

Date Division (sep Compile

selling CMP glants are regarded with one mere with on each charge in generation as the parent familiar. Group the Governa's paths goals the OPP and ICand the result spatisling bacity settlement to DMP as future 40°CC there will be a more compatibility at balant 40°CC there will be a more compatibility at balant 40°CC there will be a more compatibility at balant 40°CC there will be a more compatibility of the 40°CC there will be a more compatibility at balant 40°CC there will be a more compatibility at the 40°CC there will be a more compatibility and parts for 3100 test first 10°CC the foregoal. Growth an even for balant 40°CC the results foregoal.

Energy Efficiency Impacts

Cultures a serge policy liber Mes arrange officiency as the "researce of fest strains" for monting Califor sia's future energy words. As such, efficiency upon and standards, programs, and other pericass play a contractions in California's energy procurement and Europeicaet plans and are a titulogic element in the state's presidents gas attracts collection guart. Unlike other responses that are deployed to recel demand, using y this ency reduces consumption and is therefore apendened in the domand frontact, office orbaided death within the forecasting models or as an incremental effect subtractor hant the model and put in bith cases, staff is ensuring that the itemani keepingst reflects regionable brails of efficiency from a comprehensive set of efforts appointed to eccur. The CVD 2011 Pretiminary familiarit stationers the

The LOS ON TENENT of ALL AND A

waing at program and prior effects. Staff will conlines to and with stakebolies on these inters, with the goal of showing attribution for all least some prior is shown report. Figure 12 shows that instrumed and projected convention afficiency samings from the them sometry starting in 1296. Annual Mala are enables to conditions in 31%, before the stafe implemented the first effectives.

Beyond House consolited anguests, the DPUC, Tarayg Commission, California AV Mexaniza Nauel, and Drival and Landon Hannes. A Microarca Nauel, and Drival of specific program designs or authentication of actual program. Sanding twicks. Staff work transition long-losin abits survivage posts. Nater auditer to Tatle 19 (abit Table 3 or autors and calabetic), and Lahmedo policity autorities on Automatica, knotsenatid and surveys efficiency impacts – unguests Nater in adaliants theme abatesy histories. That are in adaliants theme abatesy histories that barroles foreigned

During the JUGH SIPP cucle, at the request of the CPUE, staff began to assess the effects of increment (a) assumed led everys efficiency policy inflatives. Duff included policy initiatives in the analysis timetar to these and inally evaluated by these and advaited by the OPUC in the 2008 Energy (Meanly David Spithtle port UNIX dask libets.¹⁰ The incremental ancient related analytics for CVII JULT Platininery and refers. on the 2014 Gam Dudybal is updated to account to be extract of ten. Therefore tone initialized carcillated uncanneithed in 2009 are new incorporated in the committee Investor. (Figure 12 includes estimated tailings.) The weaty committed initiations cluit Assembly Bill 2029 Huffman, Ocapter 534. Statutes of 25671 and the 2610 Title 24 Building Crole Revisions. In addition, the CEID 2001 Performance tools an anomitted analysis to publicly parent allifert The anomental efficiency indiatives in 202 202 Automitary outside

Di trais, Inc. Anniesse in Judenig de Diego Minora Dange Jaint de 2017 au Papert, schattel für UNC in West 2017, eine pp. 1 auge McFengens 2019 (2): PCI - 401 als 3 and 2010 (2018) University and an extension of the Consent 2010 (2018) University and an extension of the Consent 2010 (2018) University and an extension of the Consent 2010 (2018) University and an extension of the Consent 2018) (2018) University and an extension of the Consent 2018) (2018) other manet allicity or instant descrips in transposed and projection. These sciences are incorporated descrips and bits for sciences. The description of the science of additional science of the science of the science of the static splanness that and a science of the instant of these singlementation—are casacitored impactively while the GLI 2010 Antimicroproparity.

The Evergy Connection directions the special forecarding endors in a weight of point of the sectotion of hadding and appliance officiency stratebards. The match distinguish among endogs in their specities and the distinguish among endogs in their specitif appoptions (in addet, the arow halding or press of appoptions) is addet, the arow halding or press of appoptions (in addet, the second accurace of a endoging the characteristic numer - all a major calles standards, following the effective englances a feature transmission and - all an anisotation of a spectra standards, following the effective englances a feature standards, following the effective englances a feature standards for the bold biolong and applicable call be investated to determine the additional energy lassing caustilized flow receives.

Measuring the solitists of addition programs prover a provide charlingers, as catalower gardiscipation is indutary and in multivelated by a complex and a dispatches indiments. Also, accounters way registers and a dispatches before the evod of their contralisess, and while data may be available on the distance of new applications for the reducence individual of Quences (so other anisons for the reducence individual of Quences) is other anisons for the reducence individual of Quences (so other anisons for the reducence individual of Quences) is other anisons for the reducence individual of Quences (so other anisons for the reducence individual of Quences).

Is before income prepare sequences, staff invesaged the OUCs would would effort to measure additing programs causes, this OUCs comp Densary, wouldnake Association and programs taking the OUCS and the Association and programs taking the Vield Densary and the output of the Association proceeding to programs, conversely a finite the bar and the Association that are a therefore, staff measured the second work to an another the Association of Association and the approximation of the Association and the association of the Association and the Association take and the Association and the Association and the association of the Association and the Association and the constraints and the Association and the Association that are association.



 thirty programs beyond 2017, sectualing residential, commoncial, and indexistal.

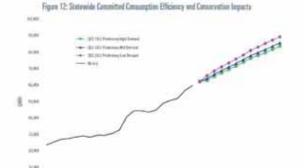
Further apparent to stalls fitte 20 and 20 stall
 funds along with applated federal appliance standards.

· The CPUC's Big bud Energy Efficiency inductives.

As in the 2008 factor 2004, CE2 2017 (Promission presented series is easily of economic ten these produces to insular time scenarios of a successful officiency provides of the scenarios of the AF 2022, proceedings in the most domand care under the methods 3.2 spectral analysis of the scenario constant and 5.2 spectral scale the insulation unstant and 5.2 spectral scale the insulation compared to the scenario of the scenario installates the to their scenario of the scenario installates that to their higher than average paraltic scenario of the scenario of the scenario installates that to their higher than average paral-time scenario of the scenario of the scenario of the scenario installates the to their higher than average paral-time scenario of the scenario of the scenario of the scenario installates the to the scenario of the scenario of the scenario installates the to the scenario of the scenario of the scenario installates the to the scenario of the scenario of the scenario installates the to the scenario of the

Combining the high densed care with the lowintermental automethic efficiency concurs and the low-densed care with the sign influency resures given a surger of "managef" hermatics. Eulershite, adocted concurstance congression and 216,800 CMM in 107/300 CMM, congression to 111,800 CMM in 320,000 CMM, for studyotted concurspillen. (or great densed, the adopted concurspillen. (or great densed, the adopted concurspillen. (or great densed, the adopted concurspillen inde- and twoference) considered means dense to dense dense of the forecast period. Physic denses a fits the card links relight (SC 2000 MM in 31,200 KM, in Neura shorted med- and twoference) cards denses begins to date shorted by the card at the forecast period. Physic denses a fits the card dispersigning basis.

The OPUC's new Arthestor and Exect Study is anthrowy and is expected to be completed in the sammer 2017. This activate data will also the thirdy to be fully incomed in the instance of heat allocate RPR demonst hysically, tool OPUC staff intends in any informat hysically, tool OPUC staff intends in any informat hysical activation afficiency injusc?



Brazes a diaz consistent recent of poliated of lasers program adventionals is not routing probability.¹⁰⁷ Here is a price Board erange instancting anale day visionals of baberai program inspacts. This scientismic anong structures programs, and possibility and another to solid al datales in recent Domain Analysis Working Orses instants. Some potion have instantise National program inspacts Natitional Analysis Working Comp meetings. Some potion have instantise National program inspacts Natimentative National Adults' credit to much sainare unity underschmaded addie credit to much sain-

[1] San Lincours & Mall implements for two in two in teams, One can be direct, We 2011, Howeve Register, two partials instance a Kohnie and Sepa Commune Research research, and card years. Carbons, Decys Commune Research Research, Sepa Research Research, 2012 (2011) 2011, 2011, 2011;2011, 2012, 2013, 2013, 2014. ways in examinants and price effects, expectably before 1958. A record staff paper summarizes the problems of summar partners.²¹

Starf lastness that the lowcarding percent years represents estimatery thrust savings but assumedges and shorts transmission which has been been been assumed to be a start of the last start distribution prevents on attractions in the DPP JUT Applicitizery prevents on attractant, and prior and numeric off-the security or estimates at standard mapped. In other works, it provides as specific zels.

38

118

developed from the 2004 Goats Shidy True, the uncommitted records will being differ in the minimum and adapted XTW forecasts compared to the preliminary





California's Electricity Infrastructure

Bomand and appropriate reverses. ing now power plants is difficult, given the scarcity and communiting cost of affects required to avoid kernful impacts on air gooldy. Even representing of the sile of an aging power plant has its challonges. So, while policies to reduce the use of UIC are recreasing the domand for new poster plants, an untils contracts are retirising the doubgrowt of local fast power plants. This complexity is especially apparted in these areas of the state where existing or quilty tais to satisfy antiken standards. An pollution is a service problem that has adverse beaits and economic effects. The South Caust Air Racia, for manylic is superiorcing the full offsicle of these accepting forces. To salisfy local Expectly require meets (LOR)¹⁰ and help integrals variable resewable presentation. The region will have its replace none of its abler capacity with deparchable. Reable licest power plants where existing OTC preser plaints rative. The 2025 Integrated Energy Talka Report desacted the South Coust An Bacol 5 Infrastian in Botal and made inconnexistance to address the challenges, but

BTG is a form of power plast further condenses ranking learnings that was considered conventional adjustances that makes a power plants seen load to Casterna in the 1936 through the 1937b. Here factualing pumps along the law is the caster, to any river, or induced as shared to be constanted and there through a share to be caster in that the law of small marker manimum, and impacted and cast biological and marker manimum, and impacted and cast biological and marker manimum, and impacted and cast biological and the on surposed depined of law pumps.

25 Wark power plants and the "regression" reasoning Plag and onsentially in time above and is non-one constructed on the spans and there gover plants are introducing in "time" in multilang mean reading main instruction to induce on exercising magnetic splittere in satisfy the DFC policy.

(3) and copy by represents latter the horizont advant of presenting capacity that much be payable within the involution of a loss capacity way. So it press and measure that presenting system conservations for access that press capacity and capacity on a capacity of a cost press capacity of a loss capacity of a cost press capacity of a loss of a loss of a cost press capacity of a loss of a l and people soli all the water initiale structure. In additant, stradbe organisms pare initialized in the classing auxiliarity italiar and kind by the threfores, the people, the hereporture instatus of the water.¹¹ The following Class Welee Art, Section 31456; that king required existing people offsets in welline initiation tactifies to reduce these revelopmental impacts, but the thread Statistic forwareament of hereicitan Agong (st. 2, 1010) and fullet agencies have been shown in sections in durity versitiance to confly refits, in impacts to dotate in ul.5, 17% actions, the UNICK underlink developing drawn equivalent the confly refits in impacts to the 2008 which because attripties of containe 1, 2018.

For many years, local air qualify districts, with time constable have California Air Responses Based URIO and U.S. EPA, have divertiged and administered uniques solucion methanisms to provent harmful impacts to an guality from new industrial facilities. Under State mechanizets, new facilities have had to "affiat" Her emissions by shuffing down moting merces for using efforts from previously shuldown sourcest. that resharing somall set emissions and attuctly seproving air possily. Not, while the offset reschanze estates as monthe for sider aufficient and argonizable inductrial facilities to rates, the amount of emission attracts that can be created by this approach in only regists may be distinctived, in the South Court An Basis, where South Court An Quarty Watapament Dorbici (SCAUMI) administers inc. pit By penditing and attainment programs, commo civity available of bats have essentially decopered for same orderia pollutants, since five existing power plorits and refineries are willing to shall since pull to provide officely to new providement.

Part 1 of this chapter privides a progress superand highlights same key challenger as these has fap-

2077er a nam kösled Baurgine if jeneral instants in 201 MARingen, ein Einfahre beig Diekensen, sowa par Zanzmanterfrahr, Baurel ein ber freige Dieke in 2016 eine Baurel zum 2016 keiner dass Bauf ein seiner seiner zum 2016 keiner dass Bauf 102 - 498 - 402 - 403 - 4 its are resided in the electricity policy and planning proteines of energy and essemented agencies.

OTC Policy Implementation

The SNRCE's adjusted GPC policy wereperalet the reccommendations pointly propertied in 2009 he the Energy Connession, California Public Utilities Commission CPUC: and California Indigendant Factore Sporube (Cattlenia IGD). The May 2018 OTC policy essentially has but dimensions - throughout of requirements and compliance timing. SWRCR determined that evolution five cooling towers insightly a 93 percent valuation of watter as any compared to OTC should be exhabilited as a performance lonchmark. Recognizing that conglusts would probably result in the shuldpury of weiting passer plants and not withing to Breater eliability. SWICH established compliance dates for manific power playin have on an initial resonant its tion builts would be get replacement infrastructure an loss ** further, the OFC policy allows he inforagency advisory committee is properly revealers to These dates, if secondary in

These file state paragried has yokey, Maria have laser free percendings to excise compliance datas for power protectioned by Los Augusta Despartment of Water and Power (2009), in Descension 7913, USINCIR tables LADINP's offers for working file compliance anterdiole for 'Li any combined cycle power plant, or 'D

- 25 Nu 20027, to the number printing to four field priorities on 202 Cardinalist (on texture priority and texture field priorities) and the border, and and the angle of the angle of texture that four the set of the of the set of the set of the defined the definition for angle on the set of the set of the texture that four the set of the set of the set of the set of the set and the set of the set of the set of the set of the set and the set of the set of the set of the set of the set and the set of a set of the set of a set of the set of a set of the set of a set of the set o
- 113 Per Trassent Akonang Lamothia er Gama Raser (nam-Directuret SAKDRO) mindat dief nammerskewie et mabeng Lamonaum, DNA: (primas BE Jahranevier Rach, Directure) Emmission Dathenis Castly Darmin wen aus (2012).

Part One: Once-Through Cooling and Assembly Bill 1318

This chapter of Tax 2011 Integrated Europy Policy Report provides an applied in program multi by the Europy Commission and attenenting a parsens to implementation of the Earlie Klast Hearters Control Boards (2000CB) more through northol (2012) policy and resided aminima affects surveys what David are will are a status report of Europy Commission which they have the theory are without 10 mL Pol-They summary affects and the same challmany for the state of the surveys and applied to some through some key to are policy to surveysmental agreenies for residence for going through a policy to the state. They are stated as a measure-based for going and worksmental agreenies for residence for going through and.

Reflering this impacts on the marine and estimative ensuits, works have an all 21C between pass in allow prever plants and the marined of interestion effects the new band passes statuts are toon of the west impactant challenges facing the intercholog passifing adaptive, the vestice impacts, wave of the assess of challengias agenpriver plants, are challenging to refere rather than marke capital assest marks in the function, capital as seen the new capacity to suitably passimetrics in the function.

10

way power gitant that, one repeated is interplate and of earnine water. On July 17, 2011, 12 MICE methods the IITC pulse, blood is a working reposed atout by LADWP as part at the generative explored starts by LADWP as part at the generative explored starts by faile west the IDRCE on April 1, 2011 16 include. Cal an acceleration of the generative of LADWP representage projects and a data of LADWP representage projects and the explored to the complexent states in the Mag 2018 OCC policy, part by the startering states in the Mag 2018 OCC policy, part by the startering states in acceptory complexent after beyond they material atout the configure projections at the two projection costing processing projections at the two projection costing because. The delayed complexes the projection costing because. The delayed complexes between the the three LADWP power plants with be examined again

The state required all generators to submit replementation plant on April 1, 2021, showing time they sclanded to comply with the OTC policy. Many constatute provided plans readilizing anial prices by others. For example, word generator owners said Hery intended to represent if a CPUC justodictional load-terving entity ESE) would only unto a long-term pour pacture spectrum (PNI) with the prostating und, bis pressnes the CPUC will authorize process teelity and eshablish everyight that leads to tack a FPS, Webset a PPA, no presider was using to invest the many required to represence retri intake structures to comple, therein resulting in a plant chull nove Some tail noticing the CPUCUSE procuratest mechanism with the postory SARCE STC compliance date for their power plant required the CPUC to extablish procurement sufficiely and provide detection to 1525 in part of a feal decision in the 2010 Long Rom. Processment Plan 1.77P) - 8.30-95-006.

is 2012-2013 through mechanisms extablished in the

policy.

Silvether the CPUC deep Line, which would locattate into appendenties to repose involving UTC capaces, expensive appendenties, here the proceeding to the hypothese plants. New likely profileculture cont. Date is the invest to data capacity have highly therable advanced single capits or contributed capits passer plants. That can that net this weaks, and may see a weak range manife, to help to esteprate using and other write at manufacts. Other relearchs may be available is help must these sends, including specialized actor proving with soil sharages, other hovers of oncorps starage, and/or goldberetal plants. Another is the wood its later capacity in total chapterly arrow, or in over more narrowly input subartics. In active local citability close the limitations of the humanizane testion for searching customic loads from remain posisi plants, Athenet the CPUC has get to move a final derivate in Track 1 of the 2015 LTPP relevance; the parties submitted a settlement agreement that would John tach a decision with the Collineau GD tuberty another round of resemble integration analyses. This analysis is underway with campletion expected in the naming of 2012

The California GD prepared an anguidrated power Rewittability study for the CPUC 2003 LTVP proceeding (R. 12-25 2006 in the spring of 2011 that dominants and 10% read for new tapacity is the 2020 time hotizes, in met her juste of the reliationly like and hencycli insulfied down further to domand talk policy impactal caused by the extended cleadance of California's economy. No comparable power have investigation of LDR in the 2012-2020 period wat extired into the record of the 2000 proceeding.16 Southern California Edition Company del valueit results to its festiment unity a mire simplicity result structured by the CPUC. Energy Committeen, and California (SD as a "screening" leaf to understand the tuning anytic plant of other action property that equilit affect the analohity of earland DTC relevenced dates.¹² The California (10 published The results of what studies of local capacity mightemosts and then

The first program of the Userga Tames and ATTL, and Tambing ATTLe 1990 R. Anguering the FERR TO constand a density the INFO R. Anguering the FERR TO constand a second scheme and the ATTLe first and copyright and consumption of the ATTLE first path.

(3) See speculation that we will be described in educe to purchasione 21,2102, on part 24, every science independent https://www.com/function.com/function/ https://www.com/function/ https://wwwww.com/function/ https://wwwww

facilities actually required the system relabelity.¹⁴⁷ Assuming the TSR et A. Marine Frenc, Chapter 2016, Stadarts of USR's powers that AFM theredge a signaler comparison with reprint agencies including the Change Documentation, to means the mult for store power power and the scattering administration of the sounder atthese to the Chapter AFM the same the sounder atthese to the Chapter AFM the same the sounder atthese to the Chapter AFM the same the sounder atthese to the same the sound the means the sounder atthese to the same that the sound these means that the chapter is invited and atthese parentitions and the same that the same power planet. In the deminister while safety-articles grantering attempt 2011, 55 mignet has them attempt 2010 agraph 2011.

The CTC policy and other's to replacement promits an out for ody issues proved by two righttory charges. In 2111, SSABAD weights High 1225. Is actives NGC another method and policy and method (MG2.5, particulare method 23, microsis is determined), it engineering a new factor in with that fact not reserved work deterolysis or actives as balan difficult in method problem (States). The State State is the problem (States) and the State State is the problem (States). The State State States is the problem (States). The state states of the problem (States). The state states are provided and (States). The State State States is the states the problem (States). State States is the states is a problem (State States). State is provided and states are states that States is in targets. Another that problem (States). State is it and the states. Another weight and the states is it is its in targets. The states.

314 Kimpel Kan (2014) Status and party parts that prove the ansatz and parts of p

(2) The AHE and Deeps Contentianer (2012) 40% (Contentiane) conducted a variation and Advancy (5), 2017, at 32(4)(b) investigation (in Statistic Dec. Subflexing, Science) in public regulation (in Statistic Dec. Subflexing, Science) in public regulation (in Statistic Dec. Subflexing, Science). advantesis with OTC tacking interviewent on Deconder 8. 2001, as part of do 2021/12: bianciazone Planeoug Planeous: Direct studies; prevelle zone inductive all the Jargete to which execting capacity at OTC power plant ships taskald be matchaired through repowering an refilling to calcular UK results.

In the case of the Lex Angles area of the California ID Juliacing adult by area, shales thank while on the adult 2014 GPV consult becaut hand like tones, but set all, of the moting animal of capabily needs to be regulated. In a "southby's they' the California ID consenses the works to COC trainactions by califyging the singuists of terminestal image viblings hum. Be layer tool format and motioned programs approximate regions existences. It hand that the regulation for expanse existences. It hand that the regulation regions existences. It hand that the regulation regions existences. It hand that the regulations regions existences.

In the case of the Las Depu area, the California 102% newly released results after the conclusions of private studyy that all 010 contents in the area totald be replaced by absending resources located iteration. The California ISO's new studies show that substantial capacity is needed in the northetclore purties of the San Diege area. If sail at the precise location of the mixing Eachea power grant. he California till has replaced that at least a pertion of its results trian from or association of the sequence of actives that recalled to the September R. 2011, eatlage in the San Divge and Imperial counters of California ps well as partians of western Arcosta Plene recalls are all odds with information submit ted by SDGLI in the OPUC's 2018 LTPP sylomation. It is anchor whether California (SD and SDG4)) have cooling results from different variants of the same studies in it different snatyle methods are causing different conclusions. If earlied, the California 150 secults have allowing contrepondent for GTC registering and/at realsconterf infrastructure much more cleanly played to the Cacina legatus and

and Rothedo Smach, as well as several Les Angeles. Reportedences.

Replicability of Pain 1225 is disclared by reference to TRV2 5 contributes, or its indexperiments of the subar works processors, exceeding 200 temperature 4025, is reparatively by an excession first institutes preparatively as the excession by the specified method. A will be another meditations, Alos, the role institutes preperson relating the sciencified method. A will be another meditations, Alos, the role institutes preperson relating the sciencified method. A will be method meditations, Alos, the role institutes preperson relating the sciencified method are also privated to smit. Plat can encomber medifications affinding only see or a line with at a method prelimit, the shirts (20000) adopted method and fields affact the largest preparative to the case of the state of the 125 will linely affact the largest preparative to smit. Such is instat when theme is a direction.

The AR 1318 project, bright constructing of the intracemponent trans-established by OTC programs and parent by ARB, is assuming the need for expanding and the Carl ARB is assuming the need for expanding in the Carl ARB facts, then empirical hours need capacity match available estimates and permitting estimations of using The effort that along anomalian the activation strangers. This effort that along association the activation strangers in the activation of the sentences of the second strangers and the second strangers and the second strangers and the second strangers and the antences of the research (generalized to the activation transmission stylem expansions to the submetsion of the research (generalized to processions) of the activation of and supply observables in the a Berney function is a maximum seconder in longly opion programme in a maximum seconder in the programme in a maximum seconder in the programme in the metal to def and supply opinformations to the balk power system than your productly adde class.

While the state is related p followed an EVE referenced and the analyzes request for Artisensong the word for disputchedite, bestat power plants that another meeticine promotions word howevers, serveral securitantities are making at official to polity low taxis/by commitsee/sh at this feast. It is blogy that the state will request another mound of generative singlementation plants at some yound in the follows.¹¹

Constrained Emission Offsets in South Coast Air Basin

Recornersy the successive for binded presents of attitional feelil power glant development. SCADAD aniplied roles. Hat would prevels special mechaanims to present new power provin, Buly 1529.2 - the Priority Reserve - would have allowed access to air dishrigt othersall account cought, thefforts "I for a booled amount of new power plant development lineter, Bass study adapted rules, west evertureed be a 2010 court decision. Thus, SCADAD is relying e a úthanel tule provisia. Tar new pever plari projects. Rule 11541a127 provides an derived informal account affiets for new replacement power plasts. using advanced gas harbone locheringier to the estent their capacity does not exceed that of refered earsting power plants. This rule adjust far the representing of xid 01C power plants to devide a separationable. Recol power plants rended within South Cast for Race. Test record evenity identicate hime Rule 135-814/17

can work, in one case, NRC Energy INRC could not obtain the incomment of offsets required for As report using project of U23speeds Unity 1–2, since the new

TET SACLINE Segmentation of Arts Aug. 5, 2011, resolution (TET) -5011) that the 200028 strate adultional segmentations after information from all provides. *IAI2200* properties (Aug. 2011) establish the segments (Aug. 2011) established providciation for segments (Section Advances) (National International Section Advances) (National International Conference on Section (Section 2011)). plant's capacity encounted that of the related units. The Nuis 1304(2012) ecentation did not cover all of the capacity of the new power plant. Toentucity, NMC incided to refer 2nd 3. in addition to Dorts 1 and 3 to stankets its and is secon extense autoches credits in the statemental market for the difference in aparally before the new panet plant and that of retired theits 1-2 Another control or rearrais in Caluar Mesons Deepy's (DMC) exercises reduction credity for its recently learnest Marvat Creak power plant wheth it and/or continguing in CRs of inductive in Los Augiles George After neitorous folied attempts for everytage officials for para con-manual container reduction could's work unattainable or prohibitionity portion, EMI purchased and refined Handington Base's Deits 3-4 Non KFE Conservation in and the compliant from offsets advoced by Rule 2004(arch) for Walnul Creek. Bellt prover placts, long held op to: ether insert, obtained Raw (104 complian from provide at attacks in spring 2021 and brain ground m June 2011.

All of the monytoint generators and excerption of discs to the Starth Court Art Review attreted to the OCC particle are granting Rule (1041a)(2) and the option angue, or within sealth, or part to 10 of 15 anguints or angue, or in the tares of their separator lists, or part the Railout Devic manage. "If Review to the start and their exceptions on the tares of their sealth and in the sealth sealth's care, or inhead, periodic the start of interval startify care, or inhead, periodic the starts to satisfy U.S. 1016. New Sumary Brite of Self seating power plants, to place requirement of all seating power plants, the place requirement of all seating power plants.

[2] All all the galaxies is served, with grants is the South Count for Dataset approximate the Chapter Dataset (Count of Dataset approximations) and automatics for South Dataset (2016).

279

pologi initiatives.¹⁴ Atthough designed compared to anginate from ichinalizes. The analysis wark is underscap jointly by the Loneop Dennisystem, CPUC, and Califaring EGB to support pencilies multifactions to EGC compliance datase. The Califariase ISO completed a particle of this petited values of extension life ICM accentements at part of the ADD/ICM burnerscape planeting process. And this and the ADD/ICM burnerscape planeting process. A set of this anticipation developing a doubt separit data increased by size capacity in Search Court AT and an URACE 2007, while the accenter to the Longializer is the summer of 2007.

Challenges

A fundamental issue that must be Gared in the admittal purble between value price paint and relactive prior metallish. An andre fundament in the region, the California Clean Energy Future (CCEE) of the lange highlite the applic public status (Admit and the regions) and the indulative moments manifeld the value and theiral regionements on the California (CO. Rink must be accompliable california). Auditor using implicit-

next of 202 grants areas from the state grants for event of 202 grants areas from the state grants for evengy efficients and other minitude only policy initiatives. The incremental average efficiency assessment

INExcepting to energy (PDE process and Laborat UD both concentration for the (PDC UDE smooth a strategy and proc. (SE), the observation (PDC UDE smooth a strategy and process the characteristic (PDC UDE smooth a strategy and strategy) and the process of the strategy of device 2000 property the characteristic (Elitors and Nex your device 2000 the strategy and the strategy of the strategy of device 2000 the strategy and the strategy of the strategy of device 2000 the strategy and the strategy of the strategy of device 2000 the strategy and the strategy of the strategy of device 2000 the strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strategy of the strategy of the strategy strategy of the strate pitpoint by the Energy Commission in the 2005 8278. and used with more mublications in the CPUC's 2008 LTPP spinetaking, shows mughty 2,000 Mill of Jacob veduction in the California Kill's L.A. Racio Incal lesishifty sets Pretunably, tack a major load induction enable reducts the amount of GTC capacity mending to he replaced, other through representing of saidhing GIC units or by concinentian of new power plants in the Westers 1.3. Savis subana.27.5 methor that follows is to schult retired should like effects of these policy initiations he presented in hoppes even though three have not yet been committed to by funding of every efficiency programs or adoption of tighter building standards an reacting tion, or adoption of receiv chiegest appliance efficiency standards? Fature ef-The Lagitulature to mauffertize the Public Goots Charge that Notivicely Net Notivit a redictorial portion of OU energy efficiency program activities and growing concern about increasing electricity rates to pay for particy goals range questions whether the state will arthine starge officience goals at the itsel of pace previously desired."* The CPUC has recently author und funding al the same levels as the Public Goods Charge for energy efficiency, ninewables, and receipach and development, but has also soltated a proceeding to consider maps redeciges of 100 programs.17

²⁰ Nu Catavani, KD Aydro, versioni se Structure K. (201). How mapping 2020 MH of interaction in TVC samely that has the representation of an interaction of a physical distribution of physical picture in structure of incomentity analog efficiency party interaction interaction.

^{33.1} No. 4445 arXiv 2016 pages from comparing information (2017) or the 12492 constraints promps afficiency particle and pages in 2028 the 1348 or 1348 arXiv page from pages and pages in 2028 the 1348 or 1348 arXiv pages pages afficiency or 2016 or pages and pages pages afficiency pages in 2016 pages and pages in pages pages afficiency or 2016 pages and pages in pages and page of the 1014 page or pages if pages in 2016 pages and page of the 1014 page or pages in 2016 pages in 2016.

⁽FR35-1) Del. Avegnet Connection V King and Science, News Ingenting 2025. 2022 Array Partition and Ped Arligan Processy, Physica V 201003.

Table 11: Generation Project **Development Timeline**

Lorg Suite Procurement Proceeding	20
Request for Offers Design	310
Regional for Others and Contructing	204
Interconnection and Persit Preparation	3115-2016
Pomitting	3116-7117
Epistruction.	3118-313

Devia, California (UL) Compression In California (UL) Insert.

Table 11 reproduces the expected liest frame for power plant sovelapment as protected to the Califar ata 157 Right in Aurort 2013 for ph OTC among start with a nominal 2020 compliance date. The California this staff postine out to their Board that decisions need to be made time if maps new goveration proocts are to be specificnal by 2020. If construction a new pay starts in the Western L.A. Basis is deferred but the exacted incremental energy efficiency and demand enumers arts its pet out achieved, the justice structure will not be ready as time if A turns out to be economic Au a repuit satisfility standards would not he takinfud, and carinat transmission or groupice salages, if excavitered, would result in higher probabilities of curboner subages or greater action of castemet eutages (er læfté, Although California 100% analysis ware the sprint delowability this approximited concept as that test articulated to CPSIC staff in they 2008 1379' property, the California 528 announced that as reconnectal domand side perics insuchs. een utilated, to contrast, the ONC guidance to (Sits Instant in the 2018 LTPP salemaking) selficited

medification." Is it leavible for the California ISD to dentify transmission rather adgrades that 2015 can regiment to reduce UCR requirements and provide proster prograghic floolably for generation additions?

· SHREE has the solidy to shift DTE complainer. dates its affect the forming of existing power plant setuement and dowingment of replacement pages By requiring affords, wild ShiftOB do to if it allows downand uits subject to defin frond generation of paulies grader and of remark researche generation dependent your burrown tree deviligement

tax appoints are involved in making these decisions. The letting track respect of severy advecy competitive is good for developing a properial for proloneary schedules and prelate reverse all compliance dates, along with DARCH's acceptance of this approach in its DTC settgation policy. The AG 2238 effort has tousioned the DTC local to address the attact scures, which are all the heart of any "solution," More entities must become insided as the source ture to accessing petitions periods of affairs, see that and available and him is deathy scatte about a second competing inhosofts. Devising common planning atoamptons and befor integration of planning poprices is over mages of getting multiple agencies "sethe same page." The state approves have embasied seen improved coordination of efforts through the DOF process, but fighter coordination will be exclude to surmount the challenges of OIC policy implementation while suffictions and nearly shandards.

Field for manyonic the field and any home transmission program. Analysis throught of the a measure to through an expression with load controls, once that the consequences of generally reducing for experision provides another to the function/generally reducing to the second second.

a reduced amount of separat laving used for relativity planning compared to approximal goals, but not an undon of such impacts phyprifer.

Represente integration programmely and action piers of heat capacity requirements not he 10-year time herizons are not fully wohne analytic attivities to if it rol att apparent to what taked preferred estarce types invergy efficiency, demand respond detrological generation (DC), combined heat and power groutuber, and hence of anning through), accurring of the levels identified in the CCCF usion statement or Genetical Brower's 2028 physicsurgy plan, reduce the need for dispatchable forcid generation. Analysis underway will reduce that secontainty, plotting facus to the hard policy plocest that have to be wade in tent of the Result: and posts of the choices.

Next Steps

The state must complete projects and make contain policy incloses before a stear path terward selats far refilting and te representing upon power plants.

Analyses

The inforcegning focum word complete free remaining key analytic sleps is accomptote the onescore uffort mechanism review at required by AB 1218. In proparing literar analyses, the interceptory team of addressing numerous uncortandies to designing a feaming" assessment that would lead to the largest and smallest credible annuality of affields required. First, the interapency loan must complete its initial assessment of LCH and to the 10 year time harped for of level South Court for Racin and Mully same

177

Conclusion

The print out and the California fill in December 2011 brought an abandance of intervent information about the long torm need for now power plant signic By his reptacy GTC units for satisfying CDR, given must assumptions about the future. These results slittler from possi previously teleated by taggerting that wat all of the L.A. Basis OTC capacity has to be replaced, and that much at San Dreps STC capacity their fam is to replaced. The magnitudes of these retails differ impinding upon the DPGC-dehend remeable development transmic that was account. reflecting ancortainty about what now and tocation of instruction will be involved to value/v California's 23 percent by 2020 requirements. The vest messi of analyses planned for early 2017 wit provide additional information about the orbitit to which capacity needed for renewable integration is incrementar to that needed for LDF purposes. It will also where gitizers wood in the AM 1.328 offset to externate future efforts in the South Court Air Basie for power ets that event he faculed in preas subject to SCAQAD's permitting requirements.

 Monagency clandination should seeling a breader pelicy decisions that are inagerograph to the more notices doub of a single agency. Telleragency excerdination should beyon an achieving convertioned decision staking in the proceedings that are underwood

Part Two: Status of **Energy Commission** Electricity Infrastructure Activities

California's commitment to reduce QHS entrations in 26 prepared at 1990 leadsh by 2010¹⁴² requirer develsping doward tale masters (for manple, analys efficiency and floward revolution investment, whereas ar diverting high emission generalian, and developing evenuable and other zero- or low-carbon resources In this and, California has placed everys efficiency at the top of the state's isoding order¹⁴⁴ and requir the atlitics to loss! long how investments to power plants that next the Extreme Performance Dandard EPEI As a result, the Everys Commission expects more than 2.042 MW of capacity and 12.600 pigewald toury (20h) of energy to be alternized Activities move and 2019.¹⁴⁷ reducing the share of California's electricity worth work by contracts with low-ranking of trial-fired generation from reagily 12 percent to less than it porcovel, in addition, California's Renewal Partials Standard maxet that produc answer: of

122 Jacobie Date 5.3-25, here 3, 2025, post-etc at pro-13 gro/mm 3/p7-6-202

- 194 See Style of Carlleria (Serie Achiel Plac (2010, august) usian di wexemperati ng jerar jeratiti 11-11, ACON, NANYI Ale on Date of Jathewickey Adaptive Flort & Supporting 17, 1988, Application of several in gentining, while, good this of \$1,5472,7948,795
- 101 Dec. molulatic the superstance of windowstraps with the Darket was LDM, Dury Lawren (MM, Red Elsevier (MC) and Neural ALT composition, which is processing from the transmission (2017). Socially, and the superstant of solutional code (2) as states working families (training [10] RMI HeI part curr as indextool only).

is specing using the Central California coastle and correct DIC compliance dates between 2013 and 2027 We visible plant is replace this present of capacity on this schedule are speared, in its newly released stydes. The California ISS old sat accurate refreshord all all thei capacity. The interagency UTC Inclused loave have identified further section as terstated, to determine whether the full present of expectly can be reliese without counting local, social or system reliability income

Pulicy Decisions

other security of \$2506.000 Westpressed individual-task

has sheads been identified and is in the planning i

verif of the state, Second, the brass must sumplete

intability-arcelled station will projected emissio

for reprint others pulsituate that would have to be

offset in the primiting processes. These affiel re-

evaluable for power gluels he and.

gainments will be compared against mining althous

The interlapping leave plant to accomplish task

other to that the SHI run include a serilements seatyle result in the draft AR 1318 proped report. The

toport would and top appropriate public review and

management avertight in the early results; of 2017

which agoncy shaff may have to identify the must likely

portice of this range during the first three guarters.

of 2017, due to dis enterparte to patient devisioner and

to that the CPUC's 2012 LDPP precording can triam

and of 2022. Such a decision would put the limites of

Atthough these analytest and highly sverlagaring

with review of UTC power plant compliance dates

for Southern California, there are also GTC insurs in

other perform of the state outside the South Coast

Air Room. More than 3,960 Mill of ferral 1972 canacity

101-80 mage line lines and horizon are noticed the faire

Grant Re Blain, Peop Has percent at an important to provide attaint under SDR200 value als vol page for part

sparts has and etclastic last from & fair etc.

marks. Spinsta send of which Lapacity Standigment the second secon

work has been and particular to a company we

HC 700.21 G for strong synamics and denses further and Damise Carliers, in 2018 often to the spin, 'both of Syn.35," where the Carliers GD bases by sensing sensi-

111

fable 11 into molian.

pials precareneed activity to the UKA by the

Dotte three solid vecats will likely reveat a wale targe alrequired capacity attitions and others, the

prending piprice for most DIC power plants in the

its translation of the new capacity skeetiliest in these

Twe interacting sets of policy itemams must be made anot the analysis provides a range of offset IN DATE OF A D

 Agencies (Energy Commission and CPUC), the California 525, and 52ADMD should adopt a canon test approach to solving or load soluctions resulting how present othe policy initializes for sylubility planning purposes.

 Emprane Every Connicion and DNG. heat land use agencies, and the Lagislature base party influence more transacte development shrategies partage 108 implemented through stragetition market recharging, which affect the orbit of renewable in velopment to satisfy total classicity anna requirements. Gaverner Brown's vinewable DS goals are restaging The thinking along' remails vertax local resource webgenead, which could affect the need to central status power plants or artistized areas to satisfy the heat capacity composed of establishy shouldeds.

· The California (DD and Interpretation element have an addy to influence the orbit to which local capacity area requirements can be also under through ion system dowligment, upgrades, and

owallic entropy will be needed over the longer term to make GNG reduction targets. Finally, the SWRCH's policy on the and of 217, by power plants may entropy age or require the relationshif of an inach as 13,100 MW of gas-Ared prescalion by 2020.100

The polostial relevantil, rights ment, or directly here of more than 15,000 MW of fecal generalizer** on pairs) as attentioned his such inductions capacity will be rended in assure entries system establishy and epta the inpestitue to a tow carbon electricity pertor through 7525 and beyond. While California's energy sends will be increasingly nell by monouslik onto pair the seaf det pair and the development of singelchalte consulte resources (lis manple; gootharmal and Sigmani) your the longer lones. The painting spitter requires threshold amounts of such capacity to ensure taction and fac al unitability. This wood has three facely which are described as follows.

 Tetal capacity, Gver had powit but af an orgy officiency and demand response programs) and the capacity prevaied its office generalitie econeters both in- and nut-of-statut, sufficient capacity from in state gas fired resources must be available for meet systemaily capacity requirements, its the perstation of variable energy resources reconcurs, this Hay require planning and spiriting reserve margins in encrys of these historically hold to provide desired labority of collegality.

346 Property where requires that 1.8% We of gas Wind generation capturing at 1.85WP (Hagner, Tradwiggend, and Tanton on with an Stratte Cartany and Say Diafty surnar factories of did Web come who comprises theme (102) (1021

247 The Appl Keet of Holes an oddrower, \$254,889 of The last loss of incluse as dimensional $120\,$ Me of the power start of the last loss of the start of the last loss of the l · Location. Get first prior days capably in would be specific groupsphic larges to meet good SITUE ** SP2E) and local capacity requirements. The California Kill has identified 10 local caracity areas (and 42 subarces). Here of these areas they Augriei, Tan Deuts, and Eig Crock - Hertural contain significant amounts of capacity that size GFC, most of them facilities are located in subarrays within the targer sense. There are also local capacity requireinserts for the LACINP's balancing authority prog or the Las Angeles Basin

· Operational citatactoristics: Can lived provation capacity word have the specaling characteristics that allow it to provide the untillary services necessary to energy its large armsets of revenues resources while mainfaining reliability. This includes fact start capability, allowing restances to excit all when not seening and is "up! is" to anothery server markets as clean to expl how as permitted for about to officiently appraise over an wide a range as possible and charge output levels as packly as preather, at lowing a minawore to provide substantial annuaris of spinning reserves and half following services, and sprata order actumated generation control, alow ing the recourts to provide regulation torvices.¹⁴⁹ in addition, gas fixed protection resources vary in their provision of inertia, mented to provide willage support

Lett Pare 25 is the lossing parameters and between Northers and Easthern Dathering as W20 refers to the region thank of Faits /1" writing the Carltonia III ballancing authority and

The second second second proceeding to the second s 14.point()(admental/00.008.000) 000/022 058-0020 107.00

Manashie, the Kits have included in thes LTIP Nings on IOLI sate (No XOU Common Case) using an other suffices. Number discussed facet and suith feater ancommitted domand side impacts. Sobile 12 compares the peak domand forecast for 2528 for the base and DEM impacts

Two of the most significant incontanties regardory doward preaffs are separately an hampfants and demand side impacts. The professiony domand fore part is 1.4 percent lower than the 2009 80W furecast because the effects of the recension have been more own than previously predicted. Devenially, the 100 Common Case domand horicard is 7 percent higher than the 2028 all W. In addition to higher growth in the base basers of the 451 Common Case Serviced accuracy lower impacts from overgy officiency, selfgeneration, and dostand retaining programs. The difference of 1.400 MHz is every efficiency is because the KECs have found that some programs are not cost affective and found itsues appended with regiscanext of program mean Every Commission and shifts staff are addressing these and other factorical linues. actualing appropriate accomptions for incremental domand growth hurs electric schicle peselvation Atta are excluded analysis of goals in scheduled to be carepleted in tale 2012, which will be incorparated into the externated samp efficiency unsures.

The 2012 XVV Opticle domains knoward will proothe underted while makes requiring domined prowth (See Dealer # of this report for more details.) The providationed for gas-fixed generation to meet local capacity requirements requires associate the same pived impacts of domand growth, energy ethniance, domand response, and DC at a much four prographic resolution than was movied for bladdismal resource signing. Unif his begue working with utilities and the California (SI) is privilize the richalised data sets to sevent he domand side impacts at the local area? substable loal

and statution the system when suttles come infates causi charges is knowing.""

The 2011 siPW Sensory Online rails has an anneas mont of sender additions to California's also builts in Natifuation fo transition in a low carbon future while maintaining resource indequacy and reliability 14 Other Recursion have taken place regarding infrastructure weath, including transmittains to trapport contralstatus menualies and regrades in the debitation yolow to allow for the divelopment of large amounts if distributed prevention SSI. This chapter at the 2023 APP decision the maser

tainties that affect estimates of the model gat first goverable to help integrale variable merga remembers over the spring decails while maintain ing system and beat initiability. These prearbailities include

· Donald (really

- · Potestial interment of group alone write that use ancia-through cooling.
- · Revenuelly searcy development, including word contrat station salar PV, solar thermal with and without change, portformal, and connaction OC
- · The need for disputchable generation capacity to provide anothery services in successful removable errors alegratus, and the availability of sites restarces, such as energy storage or posthermal plants, which may head a different market to be remenically rele

124

- THE Next sectors against addies of the high production to appendic encoders to resultance. Next is a similar through sufficient spectrag water testing sectors, is a security that effectively reflected to appendy through. nia (resp Catenicala, Cate
- 1996 2022 on agreent Design Policy Report producing during 12-07 II, March 18, 7817, page 5.

OTC Retirements and Local **Capacity Requirements**

The state's policy for addressing the effects of ancithrough cushing will preatly influence the need for too gat find generalize supacity during the summer mittade. The pattern applies to 14 PM MM of existing gat first goveration and may require 13,300 MW of This to comply with GTE policy by 2020.¹⁰³ Justie 12 phones that a large share of this capacity is located in California IS3-steland local reliability areas or The francesistics constrained particle of the LADWP control area.

in May 2016, the SWHCH adopted a loss policy Hat can be interpreted as requiring the pluss-out of UTC: this palicy became effective on Dictober 1, 2018. DANCE determined that evidentiative cooling towers. old extablish the performance benchmark (using mughly \$3 second lens water constant is \$751. mutation units can springly by reducing include Row rates to this benchmark level (Black I compliance) on Funable to 80 to, devocate implegement martality and unbrainment of inverses like by reducing intake flow rafee using a combination of structural and opera-Hanal controls (Nach 2 compliance).

there south substantial ascirtainty about when and how wells will stangly with the DVC peticy. Denses find compliance place on April 1, 2011, but only a handful previded few place for the relationed and

204 Sta Salva VII. 2021. New StatiCE values that two computation involves that 1.421 West of 1.520 million and the 1.620 Westwork for intervalues 11.2223 "Gaussianguest 1.2.324 Westwork 2223 (Harrish L. 7.444 Westwork at 1.221 Westwork 2.22)

Table 12: Companyon of Ferenatty of California ISO 2020 Peak Demand

	Respired for LTPP 12020 1079 (returninged)	Contract Cont for Little	Protection 2011 (0PH Female)	2011/2012 Transmissor Planning Process	CPUC Respired Nati	CPUC Personal Los
Division CAUSER Remark	51.29	11.853	14.568	11.198	12.819	41.768
Dependent Darge Efficiency	100	125	1.4	-	1100	3.00
Rev Cill	817	578	. 44	-		
ERGE Person Rest of 11 and ERF		36.00	-	11.79	MAT	-0.10
Interest Reports	i fuite	4,494		84.	3.10	3,140

Sectors DYO Assessing IS-IN-004-0141, SDL well find large Data Efficient VIDERE (Sector Amount Proc. and the Dagastria, Sectors) Dec 1.1012, a 4-34 set antenance Carlinois OD 2002/0017 Incoments Parallel Proc. New York and the Sector Amount int i

Intercept heard to the 2742 Heards care and the 2005 SPE Benefit heards SSE 2007 All 254 All 2006 Benefits 7, 2019 monotical 2009 hear the visit care in systematical project of theory Policy Solutions Related in the 2007 Seegraphic (step) Policy statement and all of plantal segretar manages the 2011/2012 PF services and concerning.

- · The secondary composition of moving of boar generation, including its ability to provide mertia.
- · Control had and previously deal

The companylor of Net chapter discussion have three uscertainties affect electricity planning and the analysis would during the spreed plasming sycle is develop planting accomptions.

Demand Growth

The California (C) integration studies, and the CPUC's Long-Term Procumment Proceeding ULTPT) are using the 2029 EPR downed threads and accessible as timulars of the tapacity value of accoronitted energy

efficience is their analyses of selectractive nexts."" The Energy Connective completed the Several in late 2009 and, therefore, roled on historical data only Howey's 2008 and accounting projections, blud are new more than two years ald. The Leongy Commission staff In preparing a minimal factor and final in projected to far completed in February 2012, it will be accompanied by accondited investo site management (DDM) arenames based as signard accessents of story efficiency privates that are available at that lives "

"Structure of the stage of the stage of the stage at the first-part to be found on a perturbation of the stage of the allower than any of a structure takes, the structure structure to a first structure approximation of the structure structure for allowing a significant (and the structure) and a structure approximation and structure responses that all contrast prevention approximation assess

(12) The third densited lines and to be adopted in the Drouge Dammakes any set in completed area included 7023

117

Table 12: UTC Casacity With Compliance Deadlines in ar Before 2022

Local Capacity Artis	-
tat legens Root	1315
Sardiep	114
Rg Oren/Tentura	1.942
Pag Are	1.80
LEDHP	985
Summer.	16,534
Note	1100
And and a second se	10007

replacement of winding capacity ⁽¹⁾ These include the table in

· Dyongy believes that its Most Landing 1-2 with 13, EN Mill are stready in compliance. The S2ACH must rule agon this containtion.

eers at 10 ands at 5 facilities totaling 4,737 MM are canadering compliance through the are of structural and operational controls (Frace 71,¹¹⁰ R s wertain. Assesser, that lat such repaisares can loing the units into compliance, and itsi that if they usuit a campliance, Hey will allow notingly aperafaceut the light is provide perified provider or its of

- The Carrie Control of Hills 2000 will be reprinted to March Landred Linear parts is a first new state measure to phase campaignees in the UNIX and the second state of the second state of the first large-state (121). While will be regulated by ever write field them of the second state may be for interval and the second state of the UNIX statement phases in the statement of the second statement of the UNIX statement phases in the UNIX statement of the second statement of the UNIX state statement phases in the UNIX statement of the second statement of the UNIX stateme
- (Marriella) (Ed. Matt. Maximum (ED. 1997); Denoid Board (LSDE Matt. Denoid 4: 1, 12/1, Matt. and Mass Lardeng K-J 12524 844

on a scale that settly a remnar stream sufficient to sprael the recessary investment. Planning antilies. will work with the DADCH over the dowing months to determine if improving structural and operational caritals is a compliance option for these reconvert. Where Track 2 compliance is likely to be inducible the ather of the almie masant), plasters should consider their retirement and the need to register them as a planting properties.

Merchant sweets indulated that much at the mining capacity will be refined, will replacement capacity bring huilt only if they can proceed long-brow power purchase agreements. While shaders have indicaled the read for capacity in subarran containing (1) Sepunda Hustinghas Brach, and Encing.³¹⁷ the state must refine estimates of LDR through 2005. The LDR presents has higherically focusted on neur facin long to three years) rends. During this planning cacle, the Energy Commission, CPDIC, and the California (52) will developing and LOR extendes in conjunction with assisting the SWRCB is implementation of do OTC attics and assisting entrains reduction and mosts. in the South Coast An Eastly Management District (SCROMC) sector Accessity Bull 1118 (X. Manuel Pirec) Okayter 285, Statules of 2026; 14

More than 2.658 MW of aging, non-OTC gas-fired preer plushs in California are candidates for votice nard. Some are seened by publicly owned utilities, and

the The California Net a 1923 - 2023 - and California Tentory The Carlows (FR 102) - 101 and Carpo's features where the enter of a latent semicones (102) at follow, the D Min advance is which D Signath is in the drift cars drawing for the semi-time (1100 and drawing advances) and the semicones are which D Signath is in the drawing for Units, the Number of Archive American Band is constant of the late Supervise Section American Band is semicial and set of forms is standard of BMI. Here been advances in which forms is standard of BMI. Number (1200)

Other a new interest discussion of the supervised to 201 and encourse relation coulds in the Las Region Rank and Part Deput Visa, August unt bloch be replaced.¹⁴ had a magnify of Harpe and annochant owned.¹⁴ in addition, sever plants without centracity or acularity neutrons to cover panel, firward custor may be at lock, as capacity factors may be well before those anticipathy when the plant was brought as line.

Renewable Energy Development

As Capitoreas excesses to relative an encode energy, the annual of dispersibility capacity provided by remetable excesses will also internet.²⁰ The importantic capacity provided by new encodelle transmission and its location will affect the annual and locations of dependence capacity period form new dispersion and the location will affect the annual and locations of dependence capacity period form new dispersion and the location will affect the encoder encoders with respect to locating provide, grad locat capacity regulated with an dispersion of encoder encoders with respect to locating provide, graditmental and is not and provide sharap, capitor, success and metrics.

OFSC shall proposed from WFS scenarios in the 2010 UPP proceeding. The dependance separate sociality with scenario is different, with the most duratic with scenarios leng that of the socialism compared profiles, which accurate the through and all CG on a scale proposed by the Constant's

2012/12/12/19 COMPLETE Dates and Street

Hilfmang Streets 5: 4 Tometra 3: 4 and ang Beat 1-4 Many Z217998.

21. "Dependence capacity? Non-related to the share of sampline, langerly that care to an annual in the sourcement of the result. A first pattern of source and provide sourcements of the sampline share managers and provide sourcements and annual the page. How provides in the sampling or sampling and the sampling the participant, the comparison of the California US sampling sourcements. A support of the sampling california the sampling sampling the sampling or sampling the sampling california.

187

The Technological Characteristics of Gas-Fired Generation

Note in satisfantial uncertainty regarding the quartify and techniqueza is known better for one gas during generations would due meeting planning ensame enages, surveider genotier versionel for integrating large spacefiles of mesocaliti resources, and providing surfacent insetta as in the standark replane stability in the fuer of secondark standark replane stability and import conditions.

The system may require a clear of some gan fixed prescriptor socialized in most systems, music, and to cal capacity requirements. As emergy demond equal is exceeded 32 percent of here calculated apain demond and a bandhal of heres per part. Here mosts can be metwith pathel of heres per part, Mexic most can be metsing pathel at heres per part, Mexic most can be metlegapert entry execution to provide acciding reviews to toppert entry execution to provide acciding reviews to a discussion 4 setties. This requires combined cycle upde hybrid personales that can exploit and by the parties of here a weaking dening the first parties of here?

The system may also need dispatchable gas deed generation to provide mention expectably in Doublers. California, The 2009 diPel first logslighted this incomis disturbance during the proceeding.¹⁰ The interfia

Tab. Converse Westing are the Popular Need Ye Crisis and Instance Castins or the Topolar Need Ye Crisis and Instance, Spectra PL, 2015, no. we set strays a particular strates, Topolar PL, 2015, no. we stray a particular of sentar of the PL, 2015, no. we stray a particular instance of the PL, 2015, no. we stray a particular instance of the PL, 2015, no. We stray and the outer of Castings States and Ensure Descend 1001, 2015, mark 2016, 2016, 2017, 41, 2017, 4 Am and county H. Die at al. Specialize III. Bl. and Photometry Manuschematics to fusion for Topology and Ensure Descentions, Fond Discolary discovery biology American States, Science Discover, Lawrence Services Medical American, 1004, 2016, and all or discovery biological American, 1004, 2016, and all or discovery biological American, 1004, 2016, and all or discovery biological American, 2016, 4105, and all or discovery biological American, 2016, 3105, and all or discovery biological American, 3106, 3105, and all or discovery biological American, 3106, 3105, and all or discovery biologican, 3106, and all or discovery biologican, 3106, and all or discovery biologican, 3106, 3105, and all or discovery biologican, 3106, 3105, and all or discovery biologican, 3106, 3105, and all or discovery biologican, 3106, an Dear Gergchite Plac¹⁰ Inder the Journplane, DG interactions are accorded to dependible capacity value on the topply-lade of load integers assessments.10 Planning entities used to arrive af consistent regard ing to the polisical range of DC development during te current planning cycle. (In the attacation of hand dowitepreter to california and aftirly tide at the meter retrarters, and ht the effective dependially caracily value of each. The 2012 BTW statute domaind frontast sends in make adjustments to getposit for DC on the catherer side of the order and hi alboate tools sets of intervents to balancing authority and total capacity artist. Facally the scenarios should understor environment Nativeorgalate information and analysis from the Desert Revenuable Courses Conservation. Plan and Fad and Programments Environmental Impact Statement adopted land use policies.**

The Energy Constantion's Distributly Deeply Analy on Osimine, the CPUC, and the California (D) and work highthe Analysis the saming metalitis. Its livesing an appropriate soil of planning personghates related to GC development, the California (D) is starting a statistication persons to involved the detoincability of DC and its impact so the prior.

RESso 4 the prevails areas of the DNL Departure concentrative costs on 2.415 WP considered of two 300 thermal flat and with the indexted of two 2004 CVP prevails function that the costs of the DNL CVP prevails for the distribution of the DNL of the DNL CVP prevails for the distribution of the DNL of the DNL of the DNL of the distribution of the DNL of the DNL of the DNL of the distribution of the DNL of the DNL of the DNL of the DNL of the distribution of the DNL of the DNL of the DNL of the DNL of the distribution of the DNL of

NATED that is consistent or other is and "sear the boow" of team of a default of the services, sequence or plantment for the plantment forecard, TEI sequence for and come is branch as a buildy removing

HCDerfor Exhana Yough Deverant controls on the Exhana VEERE INTE Neuroneous Patients Feature (Exhana VEERE), Second Westward Patients, 2010 (EXTENSION Neuronal VEERE), 2011 (EXTENSION Neuronal VEERE), 2011.

provided by internal generation heats the supports only Surthern California. This isourities responsesses in theoring things way high these tail theories of the Surthern California in the survey, while angusts rise with domants, unternal generation is wereful to grouply mettils. This constraints can also be basing theory lines had hauts that prevention from the groups. This tensis of internal generation from gifteen board generation to the Aud hauts is any memory. In the groups, the the tensis of internal generation from gifteen board can beet the address to regard standards, low event pairs and casil-range generation.¹¹

Generative resources that zais GIC provide a significant there all the versities reached by the system. The reference of GIC resources may require replace weeks country theory pay pair forts to report a science answert of thereta, Minis under thermal resources care provide substantial estends of merita, wind ensenances provide substantial answert of particular answerts provide any all all. The devolutiones of a particular reported provide any all all. The devolution of their V dear for inserts them often sources, the shell how sole thermal to make 44 devolutions, the shell how sole themal to make 44 devolutions that may exercut it.

The send for investigation into generative resource exclusion applications for the type and location of any gas front generations. The province of lowest approach to the sector that incremental any application of the method to a large matter of lowest, see grosse paraly should be such following, for paragon, they should be dirighted for disputch and specifies of the tents of notified as a dispatch and specifies of the tents of notified to the dispatch and specifies of the tents of notified. The tents perging resources.⁴⁰ Now gas-

100 Law Hard generative program for load Advances process more morths on a per Well load that practing resources. **Renewable Integration Needs**

recreased reliance on namelie process resources, requires that dispetichable procession resources to available to larkening authorities or real time to previous authorities regulations and such laboring pervision to statication regulations and such laboring pervision to make use for differences in termanical and actual angles.²⁰ A LTIC resources in termanical and actual containers may be exercisely to addition, the quantity of indicatement capacity is actually, the quantity of indicatement capacity is concess of the LS--D percent fluctuation.

The California ISE's recent studies of responsible integrations concluded that the study does not record once incoactivating gas. Need generations for meeting the 13 percent to 1000 Researching Percentation Studies (2019) of contain conditions are unit. These constraints rectains:

That had proch ad at anciented avery of former, the ICM programs, and will generation is contained with the CPU's "mid-cain" actumption for any in the 2010 EVL's "mid-cain" actumption framework and the CPU's "mid-cain" actumption framework and the CPU's "mid-cain". It was in the 2010 EVL's "mid-cain" in the framework actumption of the CPU's "mid-cain". They 2x00 MV shares pro-find generators with the Accustury ".

The second in success in the

On a sequence of the independent sectors raining many experience on a strike previous and the technique V. Bit have shapping losses of demonstrative Demonstrate and sectors of demonstrative Demonstrate and sectors and the sectors and a set of the sectors and the sectors and a set of the sectors and the sectors and a sector basis before the Bit Mich and States Bit Land Mich and States and States and a set of the sector sectors and a sector basis and sectors and the sector

Hit San Heimannischer In Hei Zahlman 202 Bard im Zahlman beine Kett Zang, Kau Praghant für Reinel and einschluchser am Einerstehnt, Augent JL, 2022, ausstates im einer seine com des analysis 2022 Straftsperifichen photologischer Reimaute.

10

And resource would also have to be located without the boundaries of the area officient by the Sochere California Engert Reservicions occuprom.¹⁴

Shades are endering to high orderidant the future sense of the transmission grint. The California 60 is conclusion as subup with Consent Lexets can be appeared to the consent Lexets can be denote the problem and statement of 2011. The California RD alone is Londocting analyses as a mantas of the inforcement working group providing constraints of the site and states.

Combined Heat and Power Development

California tau sel targets ter atticisen combined teant and power CNPT, which can reduce CNE amount by particip predicing instruction, out autorang works head to power initiatival, commercial, and restructural generators nell team has have well be required reparately (1¹¹ The 2001). All 22 Junping Park⁴¹ called

- TERA semigrant is close, increases of Eagraph Data allows the associated and advantages and advantages and advantages and advantages of the semigraph Processor (1986) and advantage (1986) and advant
- 211 There are very UHB prime CM projects in Earlieres taking two: No.4.011 Mile Anto series (Vaporated Prio taking two: No.4.011 Mile Anto series (Vaporated Prio taking two: No.4.011 Mile Anto series (Vaporated Prio taking the prioritization events priority), and taking the 212 Mile Anton Mile Antonio and Common Series (Vaporated Priority Antonia Reset Myster Anazona, Common Series (Vaporated Priority Antonia Antonia (Vaporated Vaporationa)), and the Antonia Reset Myster Anazona, Common Series (Vaporational Priority (Vaporational Vaporational Vaporational Priority), and the priority and priority institution of the Use of Approximation and the Next Anazona (Vaporational Vaporational Priority), and the Next Anazona (Vaporational Vaporational Vapora
- 122 Caltonia de Nepulosi Evand, Dintan Dange Soaria (her Bouring: 2008)

 That California Elli cari reduce load have polyone and that California Elli strenduling coordinates can reduce wind and strate ferenced error. It not addressed the california end instrument arressets of diagatchstatic capacity to instrument page spontifies of variative energy transmission.

The prepared charges in the California (62), septed roles will recrease the solitopers; and adulty of activity generation to provide additional availary services and less para servers, the provides of heavy terrorises in or Model by constant or tool conditions or point restrictions.

 Noticed inputs viet for means adopting may require additional, soliding in view researces to provide energy, reducing their addity is provide anothery services when rended.

In addition, the Carbinna GD is researable integration statistics to 2020 in our cannot be local comparing segments and advance conducted pages. The of adjusted DDC capacity (Bhos) Londing 1-21 and availability of impacts of more those LGCD MM. The URIVE accomption yields a phonen (based to 2020) in exceptions significant of a more those to 2020 in encours throughout a given that near those to 2020 in encours throughout significant of a parent of phone that of a monitories significant interaction should parently yield a word for new impacts that capacity.

The sufficiency reaction as the OPIG's 2015 CIPP Proceeding resignment that there is insufficient indemalians for actualityle estimating weeked Acquatchatin Cognority for writering weikelik energy retraineds to short the states XPES. Inst Energy Commercials antercopies that the OPIC's 2012 CIPP proceeding will executed this indemalian and provide planeting accompliant.

for the desimplenet of 4,000 MH of each OH* by 2007 as a strategy for reducing Did anticians by 6.7 initians matrix lows 2007DL Docener Drawel's Disar Learny Adv Plan calls for the Destropment of 4,500 MH of each OH* by 1923.

The CPUC's qualitying lacitly (07) summaries? ansats the Strainey Pion Regel, altocating it based as relata sales to the tables large 0000 (40, 1000), recept service possibles and quantisative forces appropriate (0.5 MM/), and the start's pairuly reveal antitional (1.5 MM/), and the start's pairuly reveal antitional (1.5 MM/), and the start's pairuly reveal antitional (1.5 MM/). This capacity includes a sum-time target of 1.000 MW for solitan andire CPUC periodiction, but this capacity includes tool and use more all of the next three parts. From 1005 seward, "CPP request the rather's will proceed music CPUC to the base music offic) quantizant exolutions to part have the base music.

The planning assumptions used in the CPUC's 2010 (10PP Proceedings²⁴ splitch a summitteent to beth mantalaiong eventues CoP and developing new predicts. The proceeding assumes the relations of existing CPP (datalog 5.22) (MIR)²⁴ Integraph the

- 128 8.28 47 496, want Describe (FL 2018, in Add 10 811, inte interly \$1.00, and \$2.00, \$4, 1000 and \$2.01, \$6, 100 (School 4, hours
- 23 Partics to the QF addressed sets that the CPUC data with have solved that new publicly seend statistics that autorit if can rel DeC extracted induction targets the the USE, statistic service providers, and comparisy choice approxim
- (2) For the DPF assumptions provided for such to DPC and its the USE(UPF proceeding and the DPF that the operative particular became its (2012), if see a particular PSC bearged increment), 2019 (a), and op line.
- UR Dis 2123 WB are an the capacit scale, numerical searchest to the grad basis for apply scale from the latter 1.223 WB is a series binners 1.242 WB is a series binner to the restoration of the constant for the sector to the distribution search distribution before the other scale of 17 percent.

UB The sense of lived results of horizon California (a) relation to the California (Resentance) California (Resentance) Horizon and Resentance) and Resentance California (Resentance) from california (Resentance). This strateget resentance to the sense of the Resentance California (Resentance) and Resentance of Institution (Resentance) (Resentance) (Resentance) of Resentance) (Resentance) (Resentance) (Resentance) (Resentance) (Resentance) (Resentance) (Resentance) Horizon (Resentance) (Resentance) (Resentance) Horizon (Resentance) (Resentance

planning partial (2020). It answers now CHP is place by 2020 is magnly had of the 4.200 MW organity trapping by the ARE¹¹ The planet of two CHP developed Newsyk 2021

will depend upper a matther of factors besides the etked of the QF settlement. Although many westing CMP generators provide GHG reductions contracted to the brechnick established in the GF softlineert, same do sat. The IDDs may most their share of the periodice reduction target in part to be minuting contracts with CHP resources, that fail to meet the banchmark sathese resumpts may or may not continue to operate. While failing he process the templating shape of the 1.000 MW target samet he haved on convertional resources being lower cash, hird fit, such consider after could be used to justify not reaching the Q4C reduction larget sati forth in the settlement."*Further athough the tofficeend mainfailet a much take stilligation for Chill up to 25 MW in size, it has been nees attack to analog shall DP despite propany, designed to encourage its development, Talso 14 surmanyors these programs and their point to parts. Decempent with DIP presenters and developers

adicals that involved regulatory exercisely and the lock of regulators on the legit unit according to the damby charges and departing hash test negatively affect provide region (OF) and these means that California. The largest Earlier executly to large California to the second activity and a 20 March decision board permitting trans. OFP program they has to take regionsectation and perlorged topic california and topic works to instrumentations.

TTTTN 4 31000 km reduced to 3.242 MM to isomer to may 104 quarted or Mo I ang Constraines And A Social. Not souther is then toward 51.2137 MM to 482 2137 MM and 55 angles of theme do 36.2 m source of ARI 2012 angles for Dignly-room that AI parent of this 2.2537 MM is alwayd to 510 Calabora Distances quartery proc 26 semantic a saranged of themesal of this to and the training pattery prior the 40 parent

Of the latter \$3 of the \$2" addresses appendix

Energy Commissions shaft has commissioned and epilate of the 2005 Public Interest Energy Research IFERS funded Continent Heat and Player Market Assessment, which will be descented in a shaft workshop in February 2012.17 This analysis will provide information for projections regarding potential ranges of GAP development in appropule, as well as information on policidue CVP development in local capacity areas, and thus the residual need for new, constituent gas hand generation both turborneigh and in total artist. Staff also place to produce a white paper as CHP development and related insues in early 7852 and is working wells CPUC shaft to assers the priverial deposition of searing CHP property under the Of sottoment. This body of work, along with input Non stateholders in future EPH proportings, will provide schoration for associateds of Mely (DP divolopment through 2022, the policy measures that will including development during this period, and enactives 2000 targets.

171 Of minimized and, Inc., Destinat that set free Robert Assessed, 202 (20) (20) (20) (4, April 2018, evolution of even temps in proc 2019 path atoms 201 Still (20) (20) (2014) (20) (20) (20) (20)

Table 14: Programs for Senall CHP

	Increase	Prepare Casi	Country In Data (MIR)	Capacity Capacity Calification	el Colle
48.2553.10*	bial Nov. DK.PI	75189	181	304	10
4 57	CHE DAY	51		1.1	
tel lavertar konsistration	Hos, Fair Cell, San Indones, K. Lignes, Merthalters, Kinggriffinge	Lorr Baret ai Propan Fireing		m	
Org Leiseer	CHE DO	LINW			
SMARTH Saladator	210/8/001	1948	1100		

And 1997 was reveal by \$4.22, activated, beningment is related

Poplan a collaboling tax is contributed over contact terms

C The TEP Property Research Energy Searcher entrance of ordered contraction regimes, part forbing, and monopolence for search longer from the angular in 2028.

It for LDH Min a noted proop for them that and an ison around LDM for FLAL LAD to FLAL and D1 to EDED to addition, them is a DDC execution single that may represe all them is provide, both provides AM that private to unknown a that them If Execution on plan splans, but the program is both subscripted (D1 private), they all solars).

10

CHAPTER 10

Transportation Energy Forecasts and Analysis



This chapter provides a brief background and analysis of transportation energy issues with an emphasis on challenges

that have the periodic to after the possibility and market price of backgordation fruit user the near to not join. Cardionian's trans, particles energy action provides models with an disobserve with the market and multicly for many essential activities, industry, common rule brokenistic, this inclusify, transit approxim, and government all evolution energy and excellent that work and government of any in its transportation serving and excellent that we are approximate and brokenistic, this inclusify a service and government and provide the momented of goals and gangle near fugherary, rule was thready, and an Transportation function are proved energy for eff-end adultation approximation comments and using a provide energy for eff-end matchinkit, approximation comments and using a provide energy for eff-end matchinkits.

Any senses of energy for training states has secondly, and we have needed, incrude, and initializing prevention. Notivitient hairs when d hous cracks all, convertige the destructured transportation energy states in California and galands, have inderscally take areas and warkings. These include high energy costient, genetiating, stoppadipredictional onlicits first and requirement takes, and and analyticate relations, there are requirement takes, and and analyticates, then all transportations, through, and delationalism informations, third

incently, patrolicut way a lower priced and well may plant taxang of family, inverses, these adjustingers and pear is he scaling. While petroleure will be possibile by into the fulner^{an} and markets will finctuate, higher privers may be a permanent thatwe of future hashsuccess and affin greater incontines for increased and of alternative and strengthe horis. Same chain failers and analysts have gore further and argued that world-wide trade of production hav peaked, or will that the perturbation dependent global scenary is at high risk for substantial disciplion Petroleum une rature utiler contributions, since if is The source of about 40 percent of state OVC miniscers, in well is other air, water, and lond pollularity Alter California roller hopefu on foreign imparts of peticities, how grapping all sensitive areas, which can create significant sepply and price valuerabilities. As a commence of finne and mirable stargeturistics, state and todarial policies and regulations have trees orgitomented to reduce future principum and There we these ground challenging for inducing

polyclose acts 11 reprocess for efficiency in the face of setucion, sugners, accord, and receive³⁰ 21 young supportations hards, and 31 charging land our and

He loge, have, 1911. The givent drongs discords and the deniating of the Minter Mintel Program Proces

(E) Witten connects in East Earlier, Anne Nazaran 20, 2011, and East Solids. East Investigation 20, 2011, and the process array of profilling or applied processing to marks, 2017, 2017.

(b) She Dang, Dannasang YiKE Pergani a Kakhajithe Darisna ing Dihanny Asaksisi Thak Kakani Daris (Daris Talitati) in Parakan, wink wit serana and spike indisagan find in costa on set of hermitish with select the angular of ansame in program. All that the original select the angular parage in weaks beneric angle scattering with select the language metal beneric angle scattering with select the language metal select angle of hermitish select the language metal select angle of hermitish select the language metal select angle of hermitish select the language metal select angle and hermitish select the language metal beneric the scattering metal select and the performance of the sequencement.

114

HT12 adjusticit annual gazzlinis connucliption ectivate or the High Petrologie Domand Science in Increases to ident 14 Influe galaxies to 2010, on 8 percent increase from 2010.

The RFSZ kas only a modest impact on tom canted deval demand in California. In the prolonicary Rescart, total annual diesel consumption in the The Pointings Demand Sciences increased to 4.2 follow gallers by 2018, largely hexaust of conterval ic powits and bright morened. Adjusting to RES2 propertienal share shigators reduces the faul comption forecast slightly in this scenario to 3.1 killion gallout by 2023, or an organize of 22.3 percast hus 2003. In the High Petroleum Domand Sconarts, which assumed a higher rule of economic growth, total unadjucted annual strated consumption names to 5.0 petion gallors by 2010. Adjusting for NF17 provertional share utiligations reduces dietait manpion to 4.8 billion gallom, an increase of 50.4 Account from 2023 Investor

The AFS2 requirements present California with a dimension without the wake a promotioned to a scientific provide of extransi and fulfill multiple stafts policy exploritions can be to be achieved in the Tambinel, performant stagicament practic and dismorgy Action Pare parts. All of the optimes to increase ethaliant can lace managements in fulfill the UFS2 requirement. The USL CHS3 confinant working all HES2 requirements that all parties produce a winner ments of advanced or collabolist the HES2 requirement. That all parties parties produce a winner ments of advanced or collabolist the HES2 requirements california setters to develop their cachieve barboolist california setters to develop the-cachieve barboolist theory approximation to restrict the thread in section to the theory and users partners of the output the-cachieve barboolist theory approximation to restrict the thread in section to the theory and users partners of the output thecachieve partners and the output the section to the theory and users partners and the output to the output the and theory partners produced as work in the theory and the partners of the output to the section to the theory and theory partners produced as the cachieve barboolist theory approaches.

Available beneratis for riverse vehicles vary widely (add) in magnitude and the split between gain on hybrid varies windless (PRCPVC) and Adv electric vehicles (PRC). There defining procession white considerable variables in astantylines that can be reade about the technology, including immuner acceptance, unless phillules and costs, hose process acceptance, unless phillules and costs, hose process when lessing to reduce entrole function of the converse challenge interaction of the conversion of the theory of other transfer produces all servers, and markets. Which confide produces all servers, a new Tote new systems are propried to anoth negative segarity, how confirmable shafeges have many benefits. Here are allowable shafeges have many benefits, here are pathwable shafeges have many benefits, here are pathwable, shafeges have many benefits, here are pathwable, shafeges have many benefits.

Transportation Energy Demand and Policy Impacts

In bother understand this offices of potential house forming in theoryperforms energy even, the Chengy Commutations startly devided from scenarios at intromostations energy devided and half prices, as well as analyses of the impacts on scapity and theorem of a variety of betteral and status policies and regulations. These sciences gas and available the societies protections of the bulker, but ratios to response the pulsation tanges, magnitude, and direction of breads on energy one and mission, which protections and stagpity and industriation empirical anders a well model analyse to better anders a well model of an energiants. To be an explore the and approximation and apperchances to better anders changer of approximations to better anders changer and approximations to better anders changer and approximations to better anders changer of approximations to better anders changer and changers tange supposed for the to sequentiation energy

Bit Photographics with a simple continues in the are reserved with photographic term design photographic content of the photographic content of the photographic content of the simple content of the photographic content of the margination of the photographic content of the simple content of the photographic content of the simple content of the photographic content of the simple photographic content of the simple con

where travertedly, and energy efficiency ratios compared to parallele websites. Lengt Consociation rately beacasts comparede content hast efficiency standards. 4023, and 202 weather last in or storador parallel effects of the LO22 payment in ITV productions. Barbanese 2009 and 2025, status; bencards where that whethis, which graves and the status; the status there were also beam of the status; bencards the there were also be a last means a table to an analysis will be remained for an additional to the analysis will be remained for accurate and particutions of PROV parallely, company from 445.000 orhocics will be 1.4 and/our additional by status; bench and the status of URON, and They.

Diart Speccylin annael transperiation convergtion of adami go to instrume of a companie densit tate of a var 3 periate the televers 73 million and 256 million gooding galax exprandents by 2010, a coage of 12 for 56 percent alow 2020 heads, 1507 galaxies of the television bet call we steller. 1507 galaxies of their stellar stellar television 1507 galaxies (Mitchin Severy of an televis, 1507) speccalitions (Mitchin Severy of an televis, 1507) specmatices (Mitchin Severy) of and a the transpect maliers conducted by the Decay. Commission and Ke Researces Saved (Mitchin Severy) contentions of Ke Researces Saved (Mitchin Severy) and selection (Mitchin Severy) and selection and Ke

Eleft's rischer and schwal gas hui densod and wince propulsars wire the basis of cancelerials and and writes camerals. In protections, staff briends to faither assess the winder sarger of experisables associated with their Research is hunger staff regards. Bostow, share consumer there and writes charge provide and local calculationshare between the farrage formation, the 2008, and Calculate to growing non-windey write gas calculated thereach.

Federal Regulation — Renewable Fuels Standard (RFS2)

The BS2 growth a maximum epison of same obtained and mandates specific universi of cleaner or more advanced biolaris. These volume itseedpics apply to system and Hs related markets, we well as Catherners, utility to reach the probs set he such pillor guiding decements at the Biointegra Action from the State Attenuation Front Plans varies, Integrated Lange Policy Reports, and regulations tank to the Law Catheon Fael Overhall 2015.

The biarquestation energy glowing scenarios main excurptions about hequiration variables such as how prives, description, but estimates and the ditacts of excelling values and publicles, such as Assamble Biol 1993 (model). Complex 2010, Statistics at 2020;5, the mining Graphice homoge Paril Learning standards, and the Juan Grassion Websh (2010) examples. The temportal comparison the structure there expression, however, 64 and assamed for the efforts for 44 anisting and proportion explosions. Staff mediated the pertending minder guarantie formation to particular the future is (Long Stafface) the particulars. It particular the future is (Long Stafface) the particulars. It maintains is (Long Stafface) (2015), among short, using a southput at assamptions.

Transportation Energy Demand – Historical and Forecast

Due the test several years, California's fatal transpertains energy and transit demand has should be influent, primarily the concensence of high prices and a pottergial economy downlare. Toecilically, the comparegibles of givenine, thesiel and jet had had Berling from a randowed total of 21.2 billion galaxy a 2006 to 21.5 tallion gallers in 2008. This represente a 7.2 pintent dischen in consumption. Navover the decline is privaleous dependence over the same period has been even grader at 3.8 percent. This additional item is iten in the increased use of etherail in gatative. Data for 2501 indicate that gatative and densi concorption for the first series months of 7815 were down 2.0 and 2.1 percent, respectively, from 2018. This weak-ress results from the condon instanted high fael costs, like economy priority, and

contributed high preseptions of bolick street at 11.5 present as al Sociember 2011 for Eakhonial leading fu less moment of greek and greek.

Forecasts of California's petrologies, renow ask and alternative transportation that demand be Charge Commission shaft are based on monaries of High and Low Polyakeum Doceand. Shaff's preliminary terecasts for these time scenarios are not adjusted In the effects of the Joderal HSF2, whereas the local lowcards are. The analysized being all for passing nie in the "Lew Pelesteum Demand Scenario" tats 8.2 garcert from 2009 to 18.2 follow gallian by 2005. largely at a tenalt of ligh hart prost, efficiency gries, and competing fuel lockesingles. In the "High Petroleure Distant Scienaris," accumptions such as the inconstrainty provides and lower reliable flued process tial is gaulie consumption growing 15.8 percent to 171 tolling gallows in 2010, again unadjusted for WS2 Reenvel for California utilgated parties into ers, separters, and blonders! to cample with MCCT ethensi semamptan inganoninets, statt concludes that its gaseline contumption Bolicard would need to he modified is reflect production another of altique Source shaft around that others! Merded in gauging will be capped all 10 percent, satisfying the HESP stingations will require subsharful increases in the up of ethanol, rack as additured DRS, supportion of efficient blended gatebles to \$15 breek or appresive do-styread of low carbon biofait production in California and other states. All of likene agricent face. offication, and additional analyses should access The potential impacts of all of these votions and combacalizes of options.

After adjusting the the officed of California's MICE apportance there estigations, staff systematics the based ferencial of graceline consumption in the Low Perioduce Discussion to device (2.5.5 periods) from 7005 to 11.5 billing galaxies by 2016. This is understandly been than the preferincy instandard proor to 00.122 compliances and, an intel. In primarily the result of instances discussion and primarily the work of places to fulfield MICE compliances. The fauge of more aphysic to fulfield MICE compliances.

111

all petroleum fast protocos valuesedie in California, the likely after of HEE2 and LOT Combined will be graphic concemption of likely carbon extension (UC) stituants (long) community with the model of the Hand form and in more options with be regarded by 700% increased instantification (UC) is one replete a controles open sound before of admonstration of the controles of the sound for the control of the controles of the sound before and the traphics and California consider the sound is not the sound that. Wester manufactures would need to hald move fiscalis functions, provide the sound the poster (ES) entones.

Te realize the MT2 adjusted feedant. Califorma's reliad likeling infrastructure may require the installation of Setween 1.308 and 13.000 FBS dispersons by 2577, depending on total domand and Reporter throughput. The estimated average cost per CFS depressing sort, outsiding installation and sampling of task, departer, and apportmanter, of 13 existing stations funded by the Attornative and Rennwable Fuel and Vehicle Technology Program, was about \$330,000. Notal pay station moneys and epotia turs have no utiligations under the RES2 regulations in other EES for sale and kitts to se fears of incentive to make an avertment of this size. The difficulty facing challest manages to concludently set the celled price of 610 low enough induitive to genetical, while thil making a polit, may be bard to everance. The Challenge sporet aloud bet passe specument who are CH2 in their FFVL will appariance between 23 and 28 percent leasts had accounts compared he preplies that contains only 10 precent othanol. This mean that a retail station owner would need to price 185 at hard 21 percent lower than patoline (210). House California EES wholesale process were calculated to be 20.2 percent lower than E18 in 2009, 24.3 percent lower during 2000, and 16-8 percent lower during the heat & manths of 2011 Ethanel prices pair the last couple of years have not been low enough to proa tarfferent throught to evolute return inducts of CHI to nichedly offer this faet for same to the public at a

lies enough discount is compression for the decreased hard accounts

The need to one more advanced topic of ethouse Is help achieve compliance with the HFST and LOTS regulations shall recensulate recruited and of new hpers of ethanell, such as tragercase officient from Read and collulose ethand, both of which may command an additional price premium compared to traillional core based of baset. This would decrease the likethout that CRS could be competitively marketed to California on a contribute and widecontrad hasts without the ase of even lower rotal (as fread most and/or origing price also participating to pertain suppliers that would need to supply athanal for CES al prices that where earners at feadole-bast vehicles In your ERS. There is no increased one that some or all d the elements necessary for significant pendical of CH5 will not have to part, complicating the adults ef obligated parties in California to comply with the M12 minddel

However, the LDT5 does priords strang subsetion for products of low cardio-advance virtual to proce the product scapitalized to the scapital of reasons, including the LDT2 previous that provide problem codes for low TD5 previous that provide problem codes to the scattle Section of the LdA1 of explanding Advance in the scattle Section of the Advance anticipates Stat ESE may play a specificant mice antibules Stat ESE may play a specificant mice antibules Stat ESE may play a specificant mice antibules that LDT5 regulated parties will help Tain to samply with the LCT5 and the Section Sec

Remain and a set of Alexand Dashali will they indicat the and the substantial valuese of EES. Tamin advanced Darives, Include as gate and collabores whinks, Italia gates, Include as gates and collabores which also gates Structures Their Tamonth proper ties about and an access the QL to USE. Symphone contractabase the QL to USE. Symphone contractabase the COST substants have uses to these their production cardion barbyers. This will include alternal standards that I COST complexes that and the contract and the COST substant. The will be particularly that on the TOST complexes that adult theorem and strangers, availing layer O barb need away althoution seek they generate more unskin. Substantial US, and Zalahana Investionatis in the OL obsion and other birsh sould active attrait latter procdemonstrates for the tasker Crystreent. Solited, there are not seeing of a participanty that the obnet notaring of a participanty that such exertnized will crystions to accur of Eatherma. Through the Unergy Communics Retrieve and Estimates that and batters in Crysteria and accurs of Eatherma. Through the Unergy Communics Retrieve and Estimates that and batters in Chrystelland Strategies (2014) they price in transforming the transportation fault accurs and community solid crusters.

The second cholings assaciated with the HFG2 is itse adulty of the Socherts inductivy to provide sufficient complition of antidation biofacts enclosure to achieve compliance with the federal arrival minimum Larger utures. Further technological advances are resolut to service wither production must related to the costs for convertional biofarit such as core-based ethanit. As a generosente, The U.S. EPA has had to desegrais the maintain to flation; fast in pursuents by 94 possion between 2002 and 2002, 55aft have elected to area a lower projection of talkalexic fael analishify than the minimum standards sof forth by Eargens, Staff's proportional phase RFS7 compliance analysis occupations the pallulesic studied projections provided by the Energy Information Adminis WHY A continuation of the time piece of programs. to commutation of large vehanes of sofulation othanial may prevent shallongen for motifing Cali-formia's LCPS forwards the smill of the decasts. Concept Committies and ARD staff will continue to constraint an these screames to refine them and upwildy adblanal scenarios that car be used to mint the 1075 goats beyond 2013-2018 and to anticipate the variant challenges that may prive.

Another set of concerns aloud the higher mandated levels of tacket size presented to the 4752 encludes of tects as waite sets and white solidy, A shall presented by the Network acceleratory fisness tack sets/field sectors are set in secretizely with the specified sectors are set.

schedule analysis steves their California schell les aning areas (bus 1 silling galants of Brainland Mauni 14, 2016s, willion 31, sinsing 2016 and 10 the encode the thraulitan expansis in the sensity and present of the codding generated during 2016 are then thraulitan efform. These insteads of any 2016 are then thraulitan efform. The site historical figures are all grea COTs, and a special state of any 2016 are then the solution of dispositions to be taken to which thraufing efforts and ABB statel workshow the member volumes of the basis controls to entropy the solution of the desputy figure are taken to long an antificient quantitats of advancent which.

Balsel Costs

Transportation had cashs for consumers and basipresent are forecast for continue rising due to higher much of might. Is the referit same bufuets may be most supervise to produce that the petroleum and enewable facts three displace, at least in the warts yours of the HVS2 and the LOYS, compress and businet may be affected. For example, the extenated aries to miller feasilize ethanel to California has orceged about \$1 more per galler production othanst delivered to California from the Midward thering 2011 and about \$1.50 per gallies greater compared to obtainal delivered to California from the Makeest during the test eight meetins of 2015. The edieral import famili and ad valuem tax expired at the and of 2011, which could decrease the cost of runting Brazilian Ethanel to California beginning a 1817 Given the Atstane at cariadian in the price of Reaction othered and the uncertainty of fature tanity. e in difficult at this time to make reliable projections on future impacts on fuel priors.

(4) Decrywent Agnan cost of Boashan Anhary Is, in park, and the as longer built sequences by the altered Astan. The time of provider annual measures the our of a longering strategies to the sequences and an our of a longering strategies to the space of source provider approximation and the out of the sequence and a sequence of parking with the out of the sequence and a sequence of parking with the out of these of these of source parking and these of the sequences of the sequence and the sequence of parking and the sequence of parks the sequence and the sequence of parking and the sequence of these the sequence and the sequence of parking and the sequence of the sequences of the sequence of the sequence of the sequence of the sequence of the sequences. arguite excisi is provide manifold beliefs, types and anothis if half instruction properties, additional forbitizes and probability experiments for beetback create, published charges in turning methods, and water responses of the distribution of the control technicols may have the probability to taken some instruction may have the probability to taken some instruction in these subject anale, including any that are specify to California, and exception fieldings in black specify.

State Regulation — Low Carbon Feel Standard

The LCFS requests a 18 percent reduction in the poer age OI (as measured by hold denot and indexed into rathe carbon emissional of Canitornia Insector Salars had between 2018 and 2020.11 Staff has prepared care analyses to ensure the teaching of compliance with the LCFE using currans tapen of bishachs and 1273 credits for francamilation electricity and valueal gas. Prices were projected for all of the bollwels inclubed in the antilptic and generally these as increase or earlier. Throughout the forecast due to an assumed Highg safet for famil that have know particular lies than tradilional biofacts. The ANN approved amondments to the LCCC regulation on December 16. 2011, and presented hearboxy plousible scenarios of potential low-carbon had uptions to achieve regula-Net compliance.

Compliance with CO'S throughout the entire forecast journal will entire over time and pressels challenges nel jet expected. It should be reted that 2011 is the cellul year of CI retuctions under any of

[4] Rational Academics of Sciences, Physics Insurfacement of Resident Annualities of the Science Science, 2010, available of annuality insulation of physics (4) – 12123.

EED Passa see the California As Resources that if weather that software background internation and regulation at severals requirements before any

ist.

Affiningly there are no process just for transactions warding enhances whereas the WEX programs two a used excludional another adorg pathwee New productions around to the pathwara anonemotial active of Nex type of tooland compared to traditional come-taxour ethanial. Reference interacy and August 2011, influence, whereas data Materiation Residues and August 2012 anongon along 2010 anise where integrates to taxour too an ethanol. This translates into a price of couplet, 2010 the follow of 2010 means that taxour the follow of 2010 means that and

Biodizzed is another experipte of a bedraft that carriedly crish more than convertional please. Its revealed and in California to a natural result of the WICT volume mandates, and the LOFS will benefit from that increased use because of Similarian's educed (DRD emissions, Prices of biomato-based Biodicard truth as any Basilesett have averaged resisty \$1.00 more per gaffer when compared to performe kated diesel fuel during 2011, California regulated parties may protor to puice the usur of say biodecal due to the higher carbon intensity of that fast and focus domand so biofasis that are care all and used. making all as healthcirk. Devia other types of biofaall may command an even higher promium than too tendesel. The existel is which these bisfuets may cash more is unknown since there is no LOTS credit trading platform currently active that weight extended a surger of sorbor values in the worketplace that could be alant to assimptio impromental could for these lower C) Sarfaels. It should be valed that the ARE advanted installabory an instruments on December 18, 2022, North contain provisions for its Executive Officer to develop regarding requirements of practs for LDPS credit traveactions, so thatf will have a tetthe idea of carture stancing values as the market matures."

The above dispatcion sub-displayed and the standard state of the state

1992 afferts for freestree Band, Band Best, page 14, one water of the professor from (1997) If all forms and The caren isoanized, and it is deficult to feercart with accuracy compliances with the USS sure the long true. For these cases, Energy Committies staff accuracy particles would generalize careline credits for rugstrate particle, Neerest, this accesses the local staff accuracy complifies as assurement of a key particle. Any englishes would generalize access the local staff transfer detection of the local staff accuracy would electricity and may be eligible for credits and of the latentics, accuracy device the particle of careful to the staff of a careful with the particity of careful to the staff of a careful with the particity of careful to the staff of a careful with the particity of trans the sent of balance, accessing in metric basersy primari from the staff of a careful with the staff of how provides the support of careful to the local how

The main challengy passes and with the LOTE is ensured that production and delivery to California at sufficient apartities at the W C behalts are ranged up to help altitude compliance in the later years of the pergram.

Bislosi Araiability

Staff analyses in 1075 compliance cours according to that (3025 compliance free billing through 2015 was according to the through 2015 According to the through 2015 According to the paint of the through 2015 According to the paint of the through 2015 According to the paint of parent for a menutation of the parent menuing Cotherwary 1075 for all the summing Cotherwary 1075 according to the menuing Cotherwary 1075 according to the summing Cotherwary 1075 according to the summary accor

28 During the Knownes IV executing CMT eccentration of during the UST procession that "services from evolution," execution of the procession if 3.5 sampler, a word that process takes for Care. 3. The same takes process allowed they need "Stationary approximation and and the procession of Stationary approximation and the procession of stationary Takes allow 14 how the hitpeng late, were sample, take profit Lawrence (CPL and amount station Claring CPL and amount station Claring CPL and Stationary Amount Claring Comparison of the same station of the station of the same sta

detioned into California. That would have the torotty of twenny process of historic advanced biofunitis. Henrity, enclosed and effectively the efficience network advance. The AMEVET Program is non-source of bundling to chicality detectorement of California biologi productions plants. AME California bioinella for andiation genery-ensemband softwares the ICESS program with the reports shall of neural issuing the isodytantial instruction. In observed biofunct and annualism their singlection.

Espansion of Similar Stundard Outside California

Califerna is the poly state with an achier (GFE program. However, 72 other slates are developing or intering LDIS programs that opporte to 3.7 tile the quality of passing concurrent in California and 7.2 times the quantity of discol hard stansamed in California during 2028. One petchle triad is that the incremental domand for the same type of bodiaris ated to camply with California's CDTS program could inchastics if any other region of the Delled States. pried out implementation of an 1135 like program This could increase comparition and take the market rearing prices of Nese Saltaris for California, it the without of higherit does not increase accordingly. The is an area of functionential importance and excertain by that is, will increased demand the different lyses of hiefusts menuals fast prices in induce production of these fuels at leasts where essentivies of scale car roduce life price effects of highly domand, and ever what hive period will adjustments upper

Rest Steps

Daff wit continue to alcares compliance Neurobergimmerses as not of 45 continuing analytical others, protocolinal with the content APV and beyond. This additional work with include an accessories of the galandia effects of price changes for liabilities to 1225 compliance context and the potential more and liabitical of eccess could generation. Further work will be writted (back to answer Neuronal and all compliance with both the P22 and the 1225. Additionally Energy Commissions's Attenuation and Resemulate Fault and Vehicle Technology Program UNIX VF Programs that awarded EES willow to state of the initial attagent of 17 history projects in California that analy produces as for ANIX making approximation and analysis of the produce to Mill analy paymentialization petters in each project.

The Bend Locations depend, in part, or individu long equilation of researched Relation and Addie Later and Medical Them is not a Relative and an ensured that 56 periods of the testilution that is Beartricity available is early buyering the testilution that the Calibrania for early and all this provides in much to Calibrania for early at the LOTS program. Start has existed and a Calibra 2012 periods of the Calibrania interception (Sector 2014) 2012 evolved in Addient of the interception, surveying works are not spatiations for completing, assuming works are not spatiation for completing, assuming works are not spatiations for completing.

These pro-serveral challenges to any solution an higher biodwool blends. The challenges rectain centring administrationers of ignorific hard types. and for entaring intracturber computability with Righer biodiesel concentrations, and manufactures which angine warrants concerns for biodecul blends is owned of 10 percent, while their considerplant present challenges to the increased use of toudiesat particularly at the higher thresh, sufficient time. fetting and marriemaly are separited to address these concerns. All also has identified the peterdial for recreated modes of schapes (NQ) monitory in Apple budies of blocks bud has expressed its intent to address and intigate this polyofial when it parports a rulemaking to establish chardwate for basenal bloods. product than 6 percent by volume during the latter portial of 2011.11

The final stallings for terfort availability has to its with Brazilian ethanel. Energy Commission

The WE's recently adapted announced to the LOTregulation regarding the bundling of high partonintered provide all may affect source LOTS compliance, and the longs Commission staff with weik with Ally staff in their accurations staff with regelation.

Finally, MR3 surface improvementations prevail for the COT was proportion or 12 2020, with planes to revised the program before the consider long lower officientiants to answer the program care surfaced maintained Directicities Depress? 2020. Minimum, the COT regulation shared maintainers a more surfaced found program reviews, with the regression of lower shared program reviews, with the regression of lower shared program reviews with the regression of lower shared to construct a statistical informat program reviews share to compare the reviews of the program in the test COT programs to relative of lower program to investing adjustments can be used to the program to investing togo from scatamatholy. Carego Commission shared will share cloudly with 2020 partice from all adverses mission.

20 Las Carbos Fair Street GAD Targementer Ingenteer Altainer 20 Net: Carbons in Neuroscitt Hand, Negelitare Advance Sciences (2011) April 1.4 (in p. 10). Revenue 5: 5 in Miles ones article profession VPUIDIDID in signature.

Transportation Energy Infrastructure Requirements

Renewable and Alternative Fuels Supply and Infrastructure

Company for Bucharits in the Gooled States, in superline to entry due to the W12 mandalner, while the shoniand in California in furnicard to prove of an oven higher role the 14 the LUES. Certain kiefvets lethanol in low level kinds highest snewglik first, and researble ganalise) will require only modent fairing infrastrus ture incommend and little to be mobilizations by water whether is sought grouter and However, electricity, ndural gals, and especially hydrogen are examples of otherestical transportation energy that will require billiant of shifters of investment in facing lobadructure and initially higher prices for orbides that run on these facts over the next several years. The challenges faced by these types of afternative fuel technicipies may vestred the estant of ponateuline a the transportation souther without continued and opanited government accellance to help dother yand of these successful costs. Although solvial gas prazi tuon decired to a substantial advartage and petromous faults and the cent of all areas electricity taking into account the greater efficiency of emptywhich every use - is very tampelities will gatelies prices, the high retail price of helitigen will also need to be everyons for expansion of TCV markets over the near to mid-larm. The AMPAT Program's important on promote the development and pro-of attemption hasts through curlunding of projects in public/private patternings. The Clean Facils Dafait program indipates the program is framible for balanges challens of prices for typingpe cauging from roughly two or three times that of passiline

Etherni Infrastructure

California adhanii ata'n widtugrapi and bioxited with gatalise at a concentration of 12 percent by volume. The phate's infraction for receive, absorbane and kined ethanol is stitust and advenues is according Edu a canimond growth of otherati year over the next oral years. Toroign sources of ethanet them Brazil and Cardobaux Ranke toffadiwe countries) are expected It play a more provide the both NESS and LDD. diance and have incendly receptioned with defer eries of Brazilian athanel to File da and to California m El Calculter during July 2011. However, the make for of firmal to reachastic provide sufficient incremental expands of ethonol to the United States, may request additional isospiling of Millwood ethanol in exchange for Brashies athanst Osweshie fael cashs cavit rise. with no corresponding decline in total global carbon ownsaines in fact, the personnel tanker traffic could take environment Much of Brazilian pagarcaire has tees recently diverted have etheral production to tagest production breakest of attractive pixest suppr prices, which has already increased Midwent experts of ethanul is Brazil. They, there are matigle factors that may other? the platial dickritishes of otherist.

Rail reports have accounted for alreal 50 percent of California athanid suggity over the last seven years. olloand its marine imports (5 particul) and in-stale instation it present. There were no marine imports of ethanul during 2018 due to unlavorable inconservain Samps source countries. However, makes imports spuld increase in the future of California is peptitized to preator use of lower-carbon-informity ethunoi from Brazil or Caribbean Basis initiative countries. There are five pathways for foreign officeral to enter California musical annuals does to base Brazil and tal Utionests from another starse forminal establish California. A proposed Sacrastento Annevaltie funts hub terminal, if constructed, realid greatly increase the marine officered import capability of Northane California and he man than sufficient to reason Bracklay athanisi over the year to mak type period Attemptions, offernal least Reard annual be imported

Hopoge the Headan ship channel and loanshowed to said cars before deserve to California, Rodon Mingan Has resultment this backness development sciences and could associate the exercising medifications in legis than size mention apon gaining sufficient clicked

Finderal Weathschie

idead are has been minimal to California and the 652 mendation will bell competed to scatched increase is biodiesel abroard. However, the LOFS is supected to result in greater bindieset use due to the point du of corbos condits that can be priorized under the program. Delike othanot, California's landersal with structure is not enany as developed and will need to be explored to accommodule wideuprod blenday of Instance, However, with sufficient lead time (12 to 74 superior), monthly places created he undertaken and completed to enable an expansion of bioderse ate todeol, Kieler Wargan has already unterfales steps to accommodate increased biodenet actument to converting all GARB depart basis at its Callon factify for size is charing and blending H5 (5 second bodenti by and 2017. A landed number of other term-sats may follow part, attrough the number of such facilities is asknown at this time. The majority of bindletort etca or California is dollared to original from pauline furnition be glad within the style. Reaging 3.4 million gathers of Distances were event an trainportation field during 2018, lens Mark 7 percent at the state's biodesst production capacity. Califoreiu's 8752 obligations for biomasts hased dieter can be well by the 14 existing incident production facili ties in California. However, the increased domand for Integer the contents 2721 Autility within territory qualifies that occess the state's production supporty accessibilities imports from other domicalit or foreign sources, which ipping adirposite to meet these needs and esaid he deleased in rail cars. These scienaries also may competing an and a biodies of production e California. Most disfrikation bentenati wealt alte aread to be medified as that the inscinct erald be

separed and transferred to seprepated storage tanks at the terminatic work that could require a distinuit at 18 to 24 months to complete.

Recard Action front asystematic and sustemations then approximate and sustematical and approximate that anothers biothesist at answerthmitions of top to 3 priorized by outputs, and marghe 2019 persons Histowice the California Strate Walder Resources Control Ryand (WHICD) has vacant a temperatury surfaces have this vertification. Actional generative thread strategies and window strategies and the surgery surfaces have the sea allo surfaces and surfaces that the surfaces in the registrate Actional Bio receptors. According to registrate Actional Bio receptors. According to registrate Resources Resources that and strategies and the surfaces Resource and surfaces and RCID Reported Hadrages).

Bectric Vehicle Infrastructure

Plag in structure setticizes (PEVA) will plag any increase and net in the future 'perspectrations area. Equidicant public and provide investments for moling muture in Galileratory's vientice charging entipel/trachare. A researt strate by free 121 expects that Cardinana trans in 5442 which are galitatic (Vientinos Capital Investment in the large Land 2011) and that investment in they area than prevent 2012 persent intel. 2015 in the strate. The future of personal is account without a molin, muture and all energy Communicate groups in body and other persons and persons have any persons body and other persons (Sattation Control in the strate) fragment settlements in targoury the strateging that chargence interactions to support the strateging that deployment.

The controlling from CF International evidences that on the early marked practs, roughly 50 percent of charging will take place at home or at first facilities.

Sticker St. Powersy increasing Contents a Londog to 2017 to clicity. Writes Proc Hall & Gold Algebra, Increase 2011, workshild and additional Content (Contents), 2011, 3-162, pt

- 1

Table 15: PEV Public Charging Infrastructure Deployment by California Region

	Easters.		Faired			
Repart	PlaistDimmental Station	Public Continued Prints	OC Fail Drarge Stature	Battery Seitzt		
LC Rights		318	55	1		
tas Ingrini	119	410	-	-		
Sectors	.16.	1.452	46	1.7		
Severance	16					
20e	128		1			
No.	403	100	11			

Sares Catura Carp Contains and Name Interaction Issues of editors of More Assessment planet trange 2011.

However, a nager challonge in that while the actual charging parents may have only a flow fours to install, the descal resolution is harging infrastructure may the line as a useful water products to being overching, instaltation, and instantion products. To help overching, instaltation, and instantion products. To help overching distantions, the Caldware IV of calaboration have being instantions and the calaboration of a calaboration instance, incidinge the devolutional a calaboration instance of the calaboration disconstrained action topic instance of the calaboration disconstration, which can help translated information disconstrations, which can help translations and canonication the instance of a patiencitative preparation. The Tearpy Committion after is represent plate. It is topical TKV readments which the MMMP ferences.

Natural Can Vehicle Infrastructure

Primary barriers to the prostructure of national gas entraffice (CCC) and the size of a winterprint densing introductive and the roots requested to upgoin a caing analog backline and analog the topological caing analog backline and analog targets interface. Index, the size of NGV is targets interface to indicatand heavy day balances, which cars are CORC/ING chalances an 4 regular result. First Mater Compares and enter manufacturers glass to other a taske of tight-day interface. vank, wagner, pickape, and ability website: Correstly from an 10 public and 22 pickape CMG being dislows, and 22 public and 32 pickape CMG being dislements of the second second second second pickape for application infinite second second pickape being and statistican resolve from second and pick being and statistican resolve from second lands dislo seath, both at those of technic pickape and local generatories. Insig hand LMG gates resourced toxis force, and parama one CMG statistican with high variance from their second pickape of the second pickape for the field statistical is specific bare dislocation of the field statistical is specific bare dislocation of the field statistical is specific bare dislocation of the second field statistical is specific bare dislocation of the field statistical is specific bare dislocation of the second field statistical is specific bare dislocation of the field statistical is specific bare dislocation of the field statistical is specific bare dislocation of the second field statistical is specific bare dislocation of the field statistical is specific bare dislocation of th

According to the Neural of Equivalences, California score chronound about 22 million patters of program the transportations that in 2018. Programs data the a to product of alther statural gas processing or petrotrans reflecting, however, convent instructs is Moundy announce in the groundcater of programs their secondaries extenses, such as togetation and cash, Propose in were attactive in termin of petring compared to labels direct and genetics. These was almost 22 processor building stations: almostary or patter for verticities in Californias. These mentions can be compared with their distation of the Caustry, a term bargen, and metrores equipment of virtually any prepare altitlebute or stabars in California, the to bears \$37,000 and \$32,000 per aim. Program care play an expended vigotheout regain in wate community, where it a care play windly available. The primary extituates to be the adoption of prepare as a foreign extituation for any vehicle band philing, environment wheth costs, and 4400 ensures quality contributions. At this tame, there are toot high day whether contribute you can be used with only philing. The presented cost her gueschedup a light-duty prepare whether cares in the 53,500 keV. Adv

Hydrogen Valiele Infrastructure

Currently, there are reagily 258 hydrogen FDH agerating as California, but only 15 were regeritered with the Culturals Department of Malor Vehicles (DMV) is 2029. The 2011-2017 Investment Plan for the Alternative and Resemblie Fael and Vehicle Technolny Prepara devictes high hast and which costs at a mass challenge for this technology. If alter shales that which protoclan and fueling inhactuclure are still at a precommercial stage. However, costs are dontating for bills whiches and her infrastructure. Discussions between angleal equipment manufacture ors (EEMs) and Energy Commission shaft indicate the cents of PDVs have declined to the \$305,000 mark. and several OOM, plan to lease whiches to the public at more publicly attractive leave reles. The Energy Commission has also seen the weighthracture could prefueling station decrease, from a range of £1 million to \$6 within to a range of \$2 million to \$2.5 million over only a few years. Through a conception tolicity-Same retrained in June 2028. 31 stations that were strategically located in analywhere automaters have converted to logificant numbers of FCV deployments ers avarted \$25.7 million by the Everyy Commission to provide facility integrituations.

In 2020, the 2018 began investigating the part while modification of its Chear Facts Definition of a to address the tank of having outpartmenter available for metaloss menting the 25V Regulation. The convert regulation requires that partial assemblements of relate gataling stations egog an appropriate number of New statuses with clean attornation built. The regula the date all means reliad outsets he is decisionly ctean fast antil the number of designated close fast eticity projected to be pertilled as that bei reaches 20,000 in a given year. Owner/fermant would be renewed how the regulation larguage and a new deb after added for "referencementary," wheth includes companies that produce in or import into California 505 mitten gafami ar more of gataline per calendar year Progetted president's planted for AHE adoption a 3022 would mattly the regulation to apply only to medicated clean half orbicles that convolution 20 V turls. Deca singlemented, the regulation would particle urts to factory and had not acholes, however, in The future if could be applied to stitchicity for plag-m daids and MVs, aligneding on the existence of a NEV Antida plantan

Petroleum Supply and Infrastructure

California's 20 enforces presented more than 1.7 million barrels per day of cryste of in 2010, Most of this stude of most to imported by matter wester, Actuacally free Marka and a variety of temps sparses.

Cracle Dil Import Butlook

The paintify of order of progenities with California is antervised by the ratio of decline of California of productions, processing capacities, and segmediate states of references. California of productions have failes 47.23 percent sizes 7.29%, and 12th techniques as ange of babare decline of theolesis 2.2 and 2.3 percent per period to contrast to Netherical Interface. J A percent per period to contrast to Netherical Interface, and a period per period trade reflective of periods of graduality incorrange trade reflective periods. The Antone self range from field to declining, trapped as a velocified for theologic discussion for papellow. That Aspects could will segme the samplered to 2520 benetics to one to between 27 antilizes and 204 million tarently per years do 100.4. At this logic exet, their and the declining. momatic is used; the result of declining California studie of production, single relating capacity remains Saud. The functional file free line and it divising primaity for the assumptions of declining relating capacity makazing the week file crudel of targets.

Staff believes higher of imports will repo oligit marine import admin the sold from to from unart, Calibonia's marine impart influstructure for chude joi taas maximu a little inste than 400 million barrets per seal. Since waterbarret imports of crude of during 2010 annualed in tearly 324 million bar rets. Here should be sufficient earthing types import constraints that the loss retiregets for insuretts could be well liveson petroleon marks ferminals in the Pucto of Los Angeles, and Long Reach operate order may term leaves with they pred expected addres and have precidently come under pressure atther to be stuffered or relacated to make way for other types of pertoremential activity Manseet "spare" report capacity phone and he wered as a type of record army points to secure continuity of approximes during prinetial saturator human caused contegracies which apples not put to trade sit. had all principum and removable fael input capacity.

Caronity, there are feat cruits all angest whothreshole spacets proposed in Suchers Calibrania that are of early stages of development. Afters Rel all Pare Ado in the Part all as Angeline and there 17(3), all Pare Line in the Part of Lang Basch. Bronze as Energy Canonicsian analysis. The Surdian Calibran worked thread only engines material and if have could all angua' stacking over the forecast press. Both Surtice and angua' stacking over the forecast press. Both Surtice Surtices

High-Carloss-Intensity Crode Oile

The AND has included provinent in the evolution (LDTS flag) regulation has used at near trade and types that have significantly higher carbon information associated with their paradiations when compared to the average must of crude oil and the reflection in a reflection during 2006. These types at avails with an reflection to an english carbon belowed to the the Vertices and instantiation of that is subcold their belowed more: thus of approtect, brock that you thereastly estates and increases performance. And classifies that have executes the timing of stand and classifies that there exactly the timing of stand and classifies that there crashs and productive operations. As an episodly property the infoCO processions had the performed to attribute own with endowed the time time of the exact of the infoCO processions had the performed to crash and the left sectors and perform of the imported orange and the left sectors that any sector time of a phenomenons without the any sector different sectors have been concerned that California refarm might will and performed that California refarm might will apartitized executive PCOS on the entry of the sector performance and the PCOS on the entry of the sector apartitized executive PCOS regression and an appreciation that the test because of the expectation.

The ARR approved amendments to the LOFT regulation on December 26, 2011. In simplify and enhance the HOCO provisions with a "California Ranage Orale Of Approach. This approach tool-lives De est ablishment of a baseline study O based on a torochid bateline piae relative to the O standard, a Saturious default" would be charged to all regulated parties for CARDON and CARD densel because the Setables shale Cl is expected to be allow the Cl Mandard. The annual average crude C2-would than be calculated for each year, starting in 2013, to reflect The overall CI of the crude oil that is delivered to and processed by California relieses in a given usar, if the anneal average crude O diet inf recent the bacofine trade D is a given year. He California producien would not realize an "incremental defact" -- just We baseline defect. ARE start has also proposed to exclusives a martial, through the representation process to make parket that implement insportive wellholds to reduce emissions for crude oil recovery using tech religies both as carbon capture and preparation in Agen 1075 results 70

32.4. Asservat hare, due legan only Taxmer's Result in Assert Astronomy Papers' Asservant in Science Center For Dealer Taxies (31), page 32, www.ah. organizationscience). 2010;12(2);23(2);24(2);24(2);25(2));25(2);

110

Every Conversion shall will containe to work with ARE shall be examine potential impacts of the IRCCI powlesses in these previous container to poster to achieve splend results for the accounted and postic health while powleng the petitolican roles on an analytic patholy with additional Reschill

Energy Security

Early tecails in humanitable forts palas has increased groupley attention in terrorit years, Everyy to carry can be stelled in many ways. for instance, in a perplip infrarability of increasive reliance on fureign shade all imports, so more generally no amounts of any fait or festplack then having scores, weliably non petroticen fauls. This might take the form of rotation on countries that are not connectly on expectally good tores with the United States, but it might also kings ins dependence on samples that are notice preparticulty. accessionally, or how other potential desceptions of supply limitations. The Energy Commission hast here a workship on the peak of defaits to 2002, welcating It may be desirable to takk the topic in a fidare chila Sies of the Everyy Canonization's Renzast of Rumpurtation but supply and domind.

44 also have a soul, its anythration of singers of sough white to every records, if it equates to additional tources of supply to must a given doward it however, diversification occurs as a result of limiting supply both some setting or princial sources through talectors as regulations, they the energy security implications are more unchrisin. If energy markets are subbled have proceeding leavest cost supplies, the first direct impact would be economic. Should the propried pelky actions lovel famige sources and avoid fair bude issues. Here wight be provide a balance of block effects: that could office! higher don't pasts, in suche cases, diversification night viewed as an incurance pilley against percental disruptions that might occur for a variety of registery. but even plusted seurance is not from

Statf's staticis has raised tome titlers that have energy society considerations. The LOTS appears to incentiving California regulated partners to pursue Safaris But have lower carbon arisenders than the Inditional loss leaved of taxet searched from names aut dowerfic producers healthd throughout source states. Energy Connection shaft analysis closes that this partner robation by a diverse basely of discouts. offused me need to shift to one that significantly increases drewed for Braches supercase factor athated. On the other hand, estater on Reaction top acture is not the poly strategy that can be employed by regulated partiest under the LDFS. There is a heat of exporting solutive may chapter, withday heregoing in lower O'core ethand, which is the approach they are carvedy engineery and it will likely continue to you an important role for the next several years. tubied, core ethanil production protectors regulated with ARR indicate Chuthal are significantly look than and copyring at the second of the LOPS.

Another example is that at stude of relived from Canoda's Ail cando instances, a patrentus HOCO. Enorgy security might arguably be avitamind by doverhaming Canada an an increased science of crude of he California referent, in current lawours are proitemutately Middle Eathers and Lake American. Atta langity faster frigs for Consilian stude oil to less requisited there Argan entire internation was most in more grandwise gas intronet. However, achaving ano ga security and actioning DIC inductions are nel multially exchesive. The APR staff anticipates that adupted endorenti le the CDTS regulate ell'entrere referent' Soublity in securing a variety of study july. ecteding HCECOs from Canadian oil sands. Further, He aroudness's include important second-set that recognize perhadroom producers' efforts to recepto zone value strategies in reduce GHG emissions, even have HCEDs, including carbos stresenitiation and other invocative Inclusingues: Energy Commission staff should continue to work with ANR shaff to advance the graits of proops secondly and carbon reduction

Challenges and Opportunities

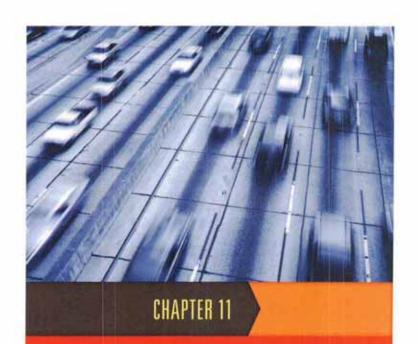
California bezes second challenges and affires and light opportunities to ment attentiative half and califor reduction parts in the transportation sector, including

- Occurtances in tercending what future levels of adversariase and renewable vehicle purchases and faul our will be attained.
- Constraint strength and the effect of WS2 on Collemon's solidly to accomplish energy security eligitations through diversifying transportation had supply and increasing alternative had collows.
- Availability of sufficient two-carbon biofwells to comply with the LCPS at a reasonable card to California constantion.
- Uncertainties of whether increased domand for altheory types of burbank will recruise her prices ar indice production of these herts to lowers whether accounties in trade can enders the price altheors accounties in trade can enders the price altheors of tighter domand.
- High solution sequences in a situating form and vehicles to along substantial electricity rations (and vehicles to along solution), and by the substantial sequences and the solution of the model (as a long way to achieve a COS containpers).
- Supporting the appringment and ups of alternative facts and opticizes in California through in protoes such as the AREVT Preprint and local as district funding programs and federal incretines.

 Balancing monositie fast and carbon vector line goals with energy preasity and other policy edgethere.

The Europy Commission's forecasting and analyticut and have attempted to estimate current and fotion between energy one for a current of the first transportation energy one for a current of the percurrent sector and the estimate percurrent sector and the estimate multiple for analytic sector and have the multiple of the estimate energy tackmitiges, and near-solid leads, cannot endor them, and metry to compare and execution with the intertaines at metry to compare and execution protocol categories and the endormality of the intertaines at metry second protocol endormal design of the categories and the endormality of the intertaines at metry and endormal endormal protocol analysis.

Forther, the AVYTTProgram (AE T28, Nates, Chapter T26, Statulate of 2010), interaction is the work (higher, har evaluate azamismulti-interaction is the name in displaying automative, renewalds, and advanced transportations torologically on California. These methods interface these losses/flows, denait advantively dismet, submarg pat, program, and fundings to taching given. Transport patient in the interface of the target patient and and patient interfaces. And 19 patient patient and interface changing status. So 112 patients patient and interface changing stars, so 111 patient patient and funds, likening to scattering and examples patient and funds, likening to scattering patients in patient and funds. The start patients multitudes the interface



18

Benefits From the Alternative & Renewable Fuel & Vehicle Technology Program



This chapter summarizes projects funded through the Energy Commission's Alternative and Renewable

Fail and Writcle Technilogy Program UNEVT Program) and expected, benefits from performant and generatorus gas (DHG) emissions reductions, as well as tectoranic benefits, and some of the challenges.

The California Lagislature created the ANEVT Program is 2007 formuly parcage of Assembly 401 110 (NAMA: Chapter CHI, Califor of 2007). The shalatic autoreced the Energy Commension to develop and diptive strends and secondarily forces on autoreced tables technologies in long actions the shale's colonate change policies 482 134 markets autoreced the ANE is member the Are Calify Internetional Program (ASP) is suggest development and development of area commenses and technol development by askeduca and tracis. The Energy Community, ANEVT Program Net: a budget of attend 1000 million aproxidy, while the ARE's ADP' rate a budget of 210 million is 124 emilies pressults.

(2) At Nameron Nach, 2022 Beneric Right Is the registration of the Art Dark components: "Appendix process (2021), periods and some data a phosents have reported by any 2021 with registration of the R. The Lagethburg subwind the AMF FT Program with Argonity (BII (19) dutates, Duque 14), Statules and Argonity (BII (19) dutates, Duque 14), Statules and 2008, which represents the Langty Domination to instantise the affinite and banditis of the gauge and more the prace. The Lineage Communice infrastment the adaptert is Dominate Control to the America adaptert is Dominate and America and America and Inspective Dominates and adaptive America and Inspective Dominates and adaptive America and America, USA benefitied challmager torong the program and America.

Through the ANFAT Program. The Everyy Common has a prioriting increasions in accounts for descripment and implement of clean, efficient, low carbon alternative facts and becomingy projects that will help whice California's you and dependence on petroleum Vansportation halls and increase the one of alloc nation and ennounced barts and advanced orbitite technologies. The Energy Commission produces pe investment plan or update for each funding cycle to extability priorities and guide program handleg alloca-Sent. This public process ortaits public workshapp and Instance & multiplaintailor Advisory Committee which includes representatives how industry trade guariation, and representation, responsestal excitomental public health, and alternative savege organizations, balan, and other shats energy and environmental agreecies.

The paintenty presides a station regard as the benefit quantities and expected benefits, if destines approach to the mathema of hering of attracture tocluding electric entropy in an integration between 2018 the baseline pair for the program) and 2021. It also estimates a many of halo pointial periodese rode for and COG entraines reperiodes in the east major that tarkgery - electric drive, national gain, believes, 2018 displayments, between 2021 and 2020. Founds, it anomatical gain constant end evolves to saving benefits to Colorise that escalt have finding.

Summary of Program Funding

This Every Commission has developed and adopted free investment gives incer 2001 that goods TAUC million in that handle for the first have years of the AVEVT Program. Sain 16 Latese the alutification of Ausling from the first memory that Per Incut years 2006–2008 and 2005–2001 according to among first Catalogy, give handling the exciting development and program suspent. Saing hands from this fort insent ever para, gives a pertiant thank then the screend memorane plant. The Every Commission has handled. It provides handling the exciting taxin.

The ABVVT Program emphasizes projects is the commercial displayable phase of the tending development but has one handled a member of extends and chart properties the constant through diff, sometime most, and tennine that may have be program has anticable the thirds provide the program has anticable and thirds provide the program has anticable the thirds provide the program has anticable and thirds provide the program the provide the provide the program has and more provide the projects.

All TIP descript the larger Connectation is locating ratio public manchinesh a planned provide foraget and of the public bandes searces. Nex AW(Y) Program metrifications to the BK perpects total advant 3D/S a wellow. For a functing color of english [1.3]. The largest public bands monocapit by the program that far have least the federal advant bands (hereight bands) 2D/S and/or Program bands are argent bands (2D/S and/or Program bands) are argent bands (2D/S and/or Program bands) and argent bands (2D/S and/or Program bands) and argent bands (2D/S and/or Program bands) and argent bands (2D/S and/or Program bands) (advantagement) Database. The South Database (advantagement) Database (2D/S advantagement) Scithert, and San Josepin Valloy Sar Publics Canters (2D/S advantagement) in database (1) sequents (1) seqpinets for the program.

10

Table 17: ARFVT Program Funding Ingast on Altaniative Fueling Stations and Alternative Vehicle Dephyment is California

	1 Part Ave.	Exciting 2009-2010 Baseling Lowis	Attribute Inne ARFET Program Funding	Parcett
	êncîre.	Läffchargescalaises	4.575 charging covering (public and residential?)	244%
Manufactive Facility Infrastructure	10	20 fairing material	Ritherny stateme	UBN
	Advertise.	443 horing stations	20-mainted	3%
	Network	Kealth: having stateout grid Tomore and/or construction	12 feeting stateme	OF
	Fischi Gars	11.206	111	Th
Riternazione Frank Netherana	Excite Balt.	140	38	113
	Natural Gal Puchi	13,975	111	.65

Even 1 shapped from 2023 Equations of West Wester Aria, put after dataparent late, Easter lock and report and metaantiparent from 2029 Aria.

A Same as prove servation for 20 above subjects and assessed for det with 2011 Program as well for the

R. Energy of Party Communication and HML staff servicing. Name assumption of these securities may are

Estimated Benefits From ARFVT Program Investments

California's shift he a loansporturion system that is likes dependent or posterior. North and more related on a sub-off diverse calculas dimensional topic and vehicles with time time and exame subclassifial meanments time time probes and public sectors. The AMVIT Poppers reservation of 11:94. A major with problem dargeties towards a transport of the sectors and the secsorability of their second-tames and best problem. This can and times resemblances and their problem time executing is word generation whether, and their calification of their second-tames. All the califications of the sectors. The AMVIT Poppers termination of the sectors and best problem time are presented in word generation sectors, and best califications. The california polarity time is antipication, the calcular polarity.

Methods and Analytic Approach

If it likely that equiled spearsts for alternative form, and which is will contend to be severitized because of these technology brackforcegits and exology splatregulations. Memore, the AWAY Program is in its regulations. Memore, the AWAY Program is in its ending prace, will resid of the bandled projects have only higher three accurations in instrementation. Alcordingly, the following profile of analysiss illustrators a two and DMS exotential protection interface tion and DMS exoting to applicable protection that and DMS exoting is suggested by unital AWAYT. Program investments is interime them, status gas, invalues, and Indexing suggested by unital AWAYT. Program investments in interim driver, status gas, invalues, and Indexing suggested by unital AWAYT. Program investments is included by unital AWAYT. Program investments in their driver, status gas, invalues, and Indexing suggested by unital AWAYT. Program investments in their driver, status gas, invalues, and Indexing suggested by unital AWAYT.

Table 19: Program Investments by Fuel Type

Fuel Tale and Program Alea	Total Purify Discontinent In Sectoroper 2011 (\$ rollings)	No. of Projection
Techcilise	62.4	1.9
Bandlan!	31.8	1.18
Reset Sections	81	
thurs.	81	
George Hurst Deture Get and Present	31.3	11.9
Noter .	70.7)
Rostod Destance	12.8	1
Filgran Tutzert	11	
Then the second s	The second se	1

114

Same Colores Deep Linesiane

 Conception provide limit in lash dense bear and served pre-sharped only

August country

nales in the figure product (Net to the area in a constant) of the point

c) The AMT of Report parameter hash where here the property is the dependence of the approximation of the advection property is the dependence of the advection of the approximation of the approximation of the advection of the advection of the advection for the advection.

E models in streams payment of orthogen preparation fragment with the Carteria Inparation of Faul painteendum for the designment of concentration for future.

 Andress and and and the second se second sec

Increases in Alternative Fueling Infrastructure and Vehicles Between 2008 and 2011

An easy indicator that California's hast and vehicle markets are statistic free of alternative and summable fields and advanced vehicle informations in the generation along advancement of which and advathrather suchers. Attempts half on as any parse, the AUFVT Program is allowing a summation who have the target selected to balle (37). California new how the target selected to balle (37). California new how the target selected to advance and exactly advanced and exactly 20). California target and programs the field of markets and advantion. and antoche. The high range meanaine orthogt pational market obschlimme, a violant regulatory regime that viologicate model participants to indexisme in their low rantow hours and vehicles. Nigher sitely for petroloum based lows, and exclusions of reductions is production and rantal analy for adversation family and vehicles.

Static aduated the estimates of attraction from impraval and ensuiting performant implacement to each half upper field and submemperity calculated to a care-training EME and any pelideant enfactment haused on trene numbers. Guits for the analyses answer, decision anyon, the AME, and published expansion decision anyon, the AME, and published expansion decision anyon, the AME, and published expansion devision to indicion driver and FCPs are haused provery on vesticish deployment. Noncapila and par-enty devisioned by websitive or their parts of autometers. The approach you devices are haused parts of autometers. The approach you devices are haused parts of autometers. The approach by websitive are haused parts of autometers for toparises to fundamenta and three planes for impaction, which manyon the matterial gas is haused and candidate supperform examines. Reperform dust their demodules supperform and three planes for impactions, which manyon the matterial gas is haused and candidates and three planes for ingenesis to fundamental gas is haused and accombination at hissing more planes and and accombination at hissing more planes and and accombination at hissing more planes.

The Europy Commission inpects such project to the successful, and majors subhalatial and essen-Stal investments to packness the successful in more inducers, the ARTVT Program account of the program inducers, the ARTVT program account of the program whichs. The Europy Commission and a successful protection. The Europy Commission and a successful protection and the program account of the successful projects require comparability metationer, finded, and molingly success are engenerable from the Successful projects requires and provide successful proending success are engenerable for the Successful and

Estimated Petroleum Reduction Benefits

Hentric Drive Velocies

The increased displayment of glugs in electric vehicles (PCP) in Carlinnia will improve air guality to reducing cotonic pollutants, address, climate change by inclucing DPG energieses, advance energy security to inducing Dependence sa patroloure, and phenolate the California encourse play perioding a new installaand glds. PCVs can belly insign vehicle mandrathness mandrate and California's mandratic GVG and petrolices reflection guidt. The Long's Commission 5.82.2.4 million intertextual in PCVs queues a local statistics of the locality constrained and so its statistics ready chargers and welcoles, mandraticiting regards, composited and battray development, and all sinches heak printinges.

To extinute the gaterial scape of performance and DRE inductions institute from PDFs, a high and late CV indeplement acceleration for the one-shared through 2010. The Cambersus Page in Electric Induction Collaboraliser's induction lange of 500.000 for EL000.000 CVs on the mass in a Caliborator has Page Point and the high and for inspiration processing and the induction for the programment of the page and for inspiration processing and the induction of the page with high for animalisms in an anicular soft the GAT (21) and paged on the PE VI animalian fully tabuted to strandout the the PE VI animalian fully tabuted to be and high transmission for PEVI and improved.

For this analysis, this properties PET population is separated to be a chapteris, but hey electric which as DEC to be a chapteris, but hey electric endowed and the loss of the but here and the PEE's that are been induced your gravities, thing the APE production of the budy compliance with a card for the DEY constant, the TV properties with a card of percent BETs and PE percent PHEVs by 2020.¹¹⁴ Figure 13 these the percent percent are induced instructions resulting the Bison induced percention.

DR Carliers Paper Theory Genes Cardworns, Song Charles Cosmilery Carliers Indexing in the VV Asian state: +++ excellences of Cardio Beneripsethio Secondary, Darge, Ned Lait

(3) The Decay Conversion rate the constraint a superior prior as a discourse strong data which suggests resplicable difference (1) in the line of the wald by (2011)

Di Calteria la Normona Nané "20 Napatan 2020 NAN Spicial" erro et capitolograp" promp/2020/errop/10, pl., dama at.



Figure 12: Annual Petroleum Displexement Front PEVs (Galland)

2028, polantial reductions range from a low case at 121.4 million galants per year to a high case of 200.7 million galants.¹⁰¹

342

2014

10 DOLLED

100

The APT/37 Program has being address many of the challenges to PVV deployment absolute by induity such as the end for early investments in budge and subvestment. However, which performs essentially and examplications, which grant's weatherests will help results the PVV marked to perform these challenges and accessible velocity diployment. These mes mesting 12, 259 Nexus in the NDPs and 3, 2001 Dependent Walt PVV in Calibrana.

THE TAY are parameter to furging a reflective ensuring (31) parless of province up part transmits (322) environments para at 22 energing parales, PAPS is no assessed to furging councing (52) defined a plantice on plan reflection (32) ments parameters at parts of parts (32) and (32) percent of which are a down to algorithm (34). roughly one half and and thed respectively of these whiles automotive.

10.00

Behelp Production

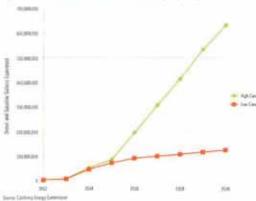
104

Increasing the use of low-cardian, nartiselably gravitocid Salashi will kell Collectia activate right and Volend perior gravity for CRA tenders, perturbaninduction, and Salashi are. For an quarky pargraves, California empires sized 15 killion gaters: per yea to called the segments bioinduck requerements in the retrievalued gatelow. It provides card-derived erbanet is the very locket momentum y publishes all why? Tregues, the Sange Community, topical AVY? Tregues, the Sange Community, topical houses to compose that are derived pocarders how washis based Stonaker resumption or alternative hosticus; their method sources or alternative hosticus; their method wave CRG managines, how examples that the foregate, and failties

1.114

Figure 14: Annual Potenheum Reductions Diobuel Production Projects (Gallous)

114



hand one choices. Conference present infentes of in-citate, wenth-found responses have the technical prioritial to be converted with 2.5 billion galaxies of descil galaxie supervised in 2.3 billion galaxies of garantee galaxies topological each year ^{10,00}

The AM'VT Program insettled \$44.2 million in the Development and production at biofacts that acta watte-based heddlocies ar afternation intererrys

- IRCartana Trep Trentation, 2021 St Intermed Plan, Spin FL
- 2014 Lead on stay from the Cardinen Riseran Fundamentary Int Device, Net Neurgy Conservation strengther that devices website forces from theme in Cardinan is have the protection devices and a Cardinan and Automatic Strengther and and devices and a Cardinan and Automatic Strengther and the Automatic Automatic Strengther and Automatic Automatic Automatic Strengther and Automatic Automatic Automatic Strengther and Automatic Automati

cright that pay singliace pairs as we athanof finishingh The brigger production projects. with \$35.2 million of prigram fumit, any waits streams such as words biomatik, agricultural or dairy resitives, washewater leastment phast recidence ambandful disorted managipal settl works or landfill gat. The program funded Non-densel substitute production property at \$4.2 and law, there of struct use works phenoms as breakfacks. while the other two are instang or monorchipling sigae bound teedstacks. These advanced ethanet exards, funded with \$5.4 million, include the statute fest collabore athanel pilot production facility using agricultural waste finalclacks, the hist commercial busidely contration of sweet perghame as a patential bismergy crop. and an inpartant headbirty evaluaton of super brets excelled with applicatives) resolves to produce a carize scultal wis of ethanel and biogen-These types of projects reduce GHC emissions by a

Net percentage typically 75–85 percent) compared In the petroleum topolise.

This analysis relievales the kigh and for range of liveburs protocless protocles for the VLAPET fragmer projects leaded to date. The extendets come directly then the guart proposet and fallow-op torways and attrovenet with each program or public advects.

The estimated periodium induction to 2020 from these 17 begas, dever satisfication, and advanced ethanic development and periodiction property ranges from 1241 million galaxies to 532.8 million galaxies frigues 140.

In the high case, the rapid growth after 2015 impresents the shell of Sorard Landau propinets have processored and the second Landau propinets have processored and the second landau propinets have the APVT Program to date. A represent a contraries the second provided to be tabular protection protection within the state. For comparison, the iso date capacity for strand of the Policy Society and the capacity for the second capacity on the order 2016 protection protection within the state. The realizable protection of the strand and protection is works? 201 states pathons protion of second capacity for biodential protection is mapple [31, stiffing pathons per air dates which there thand 5.5 million gathers per air dates and a 70000. In the state 5.5 million gathers per air dates which there thand 5.5 million gathers per air dates which there then 5.5 million gathers per air dates the 2000.

Natural Gas Vehicles

The medium-and heavy-duty transportation soctar represents a priors reportionly for the development and rollical of alternative hard vehicles. The curvest

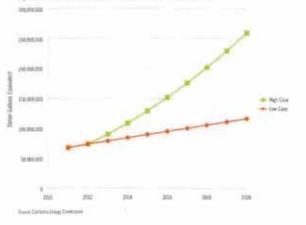
- BEGAN, Shana, Mina Khara, Lin McAness, HU, JHO, 2022 Income their in the interaction and Research on and strend belonging Repress Transmission for and the Assign Community, Full and Transmission for Technical Assignments, Full and Technical Assignment for Assignment and the Assignment of Technical Assignment and Assignment (Technical Assignment for Technical Technical Assignment). 2010;100:100-100 2011;405:0011010-002.pdf

hard of task bracks before showed 4322408, advant 4 generated at the status tablead within their, gold soccurstic the showed 15 generated tablead an annumptons and EDE metasions. Natural gen witholes: are an affraction allocatation to relations and theory without finder sources and imparture with balance sources and the speed of dawned hard recalified being processions with an acadity beathers. Add with an complexent with an acadity beachest. Additional status gas withdets bases there inform to have ENE relations before S1 and 16 generated compared to their desail constrained. If a generate compared to their desail constrained of compared status there are initial of compared status of momethane withday case achiever EDE inductions of momethy ED memory Make and complements.

The AMVI Program's investments in new satural gas applications for medium and leave duty vehicles hat helped increase the number of natural gas core rest whiches be the road and the granth rate of the near all orthogic propulation. The AMCVT Program has dealed sweitherts loward doubland and replaced new raharal gas which lochwingers, addressing established business solds, and expanding Califorma's connell medium- and being-dely natural gas first. To date. The program has funded the deployment of RTE moleum- and heavy duty natural gas solucies. In addition. The program has funded the graduation of technologies that will increase the availability of submit per engines for specialized feet applications The ANTVT Program Bait shir funded an additional 15 conpressed and Iquelaid natural gas ENG hering stations, which will further prompte the adoption of

-inclusive and leaves-body network gas ortholes. The Control Communities downloaded to a scenario to the orthole of inclusions and lowery-body network gas vehicles in Carlierinia through 2018. This tauterioration inputseling is "Advanced-on science" reasonses meet, which incomposed in the EBM orthofs lowed ally the WWT Housean, and the growth calor meaned.





is presented in Figure 15.91

Hydrogen Fand Call Volumer

TCVs that ena hudrogen as fairl per a prominent

altornative lives. Dec of the genulest terrelits of FCPs

is that they end so GHG aminsions as an pollutavite

All the designation for models with forces determines are shall. Note call allow that for tight adds obtaines, so that present of substrate Elaphanes by an individual national gas have not

rhoi nang libeter the tow screpture, national gais reduction gan antigeneet to antightical 4,755 galaxies of libeter gave years "Rasset

in-half of a second. The buildhaft's increase under the

high scattering propriets that hadward paid hughs record with

or data tarties, dragt array 10,710 gatters per seas

have the failings. Like the other afternative fast

propert for encouraging the deployment of

whathers stauly = The Right Scenario represents extimated new vehicle sales, as reported he availant and lowest or supercised finel admittan rates. This scaturn attornet the peoplary' where takes see white set a settion to be repected needs population grawth for the industry, and accumes the existence of antimal market conditions allowing for the sale of all elicies available from the manufacturer. The price from displacement accordance with these scenarios.

course have diverged

and of States Installed States

Table 18: Annual Petroloum, DHE, and Oritoria Emission Reductions by 2020 - Law Case

ŵ

				ette Tirei		
	Prinner Relaction Million Gabrie	CHG Reductions (CD24)	- 100		-	-
lienchie!	1214	336.945	1411	2.988.3	843	331.2
Reputrioutie*	100	4.011.214	79.1	11	112	E.A.
Bodiese Protector	.34	500.AUT	34	28.5	- 21.9	114
Steve Probation	143	111.016	11.4	278	0.5	43
Notice Lie Pared	104	346.010	84.5	42	38.2	28
Kelor .	123	30.05	184	11014	216	316
test	38.4	2144.00	1383	LINE	1943	216.8

Duris Latines Lings Dominant

A Dama and Origination for BUIDT WE on streetung

I man project as Collection in the local set matter of some \$1.5 at \$5.4 Million about stands

entered away 112 (12, 40 to very last and show downed that a light shall be object house

b baseline maked of miningly [1, 1 a 22, a 96] he wanter brand IN AN INCIDENT AND ADDRESS OF THE

I had not been been been at the set In the CEANS, and any page of the second AC second and the part of the second and second and the second and the

I Assign Differences service has to a alas manufa d'halogat schuthartes prioch many my setter manage little it a full school

the product where makes traveled the DHC previousness are regarded on calles devide equivalents (CD a)

Staff uses a timilar approach for calculating unban criteria pair istart interture. The ansart of fael deplaced by each alternative fast type is multiplied by the relative prioria pollutant radiation of that alternative faet against a petroleum lazerine. ** Estenated scilleria pollutarite include solutile arganic compounds (VOC), carbor excite, whopes node MGs1, and particulate matter of 18 eccess ie planeter (PM10).

Looking forward to 2020. The five state estimate for annual printing digitement, D'C program reductions, and reductions or orders ar pellularits are summarized in Table 18.

this includes 380.4 million gallers of printmus hats displaced 1.) whiles metric tanks of CEA DR employees reduced, and 11.265 this tennes of action air pollularity reduced each year by 2020. Table 19 presents the high case, with 1.4 billion galloes of printium

District energy officients rates (20%) for electric structure assumed for ball of each field 103 for fault call with the internation for the 2.5. These presents were descent the Descention 2001 4446 (2012) represents.

HPTHER LEX, August 2007, And You Cycle Processing Market Ways Strengt Space Westman, and Westmannen, California Unsuge Europeanes, 502 4482 2007. DOI: 10.1017/second-pp.et.pp.401023-bits annual 702 4482 2007 2014022, 4100 2012/2014 41-070.

setticle technologies, they can also reduce California's. dependence as foreign imports of could not sient hubigin car be deried him domeshi routes.

Out major challenge to ormating the deployment et these vehicles is the development of sufficient feel ing infraction. To most the wealt of anticipated FOID. He Energy Commission precisited familing for If new and oppraited bylinger having stations. The tetal cost per shatais ranged beam \$7 million to \$3 million, a significant strap from the storage of \$2 million to \$5 million per chafan ham got a few years earlier All of these stations are incalled in register identified by automotions as high-priority, early subplier markets Door continuited, these stations will represent about 13 present of the statewise public forting capacity. A low canit and high carie for FCV deployment

can be derived from the APO's 20V regulation and adomates service. Under this law pate, the camula five sumprish of FCH, improved to 35,700 to 2029. displacing sheet \$6.5 without gathers of garatine per year According to surveys of major advanceors, the number of its state FCVs will regard supply in the parrent decade, from roughly 250 in 2011 to more Hum 50,000 by 2017 Accordingly, the AME has neveroped a scenario for 2017-2020, based on automakers' compliance with the JEV regulation, in which the fotal an year number of light duty FOX within California will least roughly 124,000 by 2020."" This equators to mughls GTE address pattern of greating per year shipteend by FOR by 2020.

By providing furthing substativishing early on, the Energy Commission's investments provide critical carls support for expanded orbitic populations, to a post where private inflativation suppliers can induindentity finance and construct additional stations to store the increased numbers of unbillet.

(Difference in Reserve Real, Earl Real Inter Second of Inseries, Married Dan Gro, IND Papert Readment to the Over free furth Regulated December 8, 2021, were when gainspart (Clinical States of

Total Estimated Petroleum Reduction

The total estimated petholitam reduction accorded with the fasts and withtle locknoiligies supported by the BE ANFVT Program funited projects tonge from mughty 180.4 million is 1.7 billion gallino per year in 2020. This estimated advertial performant endectors. spend to deetly albituded in the program's insert ment bed shrahl he considered as the range of future benefits in a market toffuenced by ARENT Program heading. To put these extenders in particul, pursued averages had temperated in Coldenia totals reagity 18.8 billion galaxy per gran

Estimated GHG and Air Pollution **Reduction Benefits**

The petroleum reductions by atternable fram, and whele behaviours (mentioned abant) and some as He have to determining the information OIC emission and an pollution reductions associated with Hene furit and inclusions. Supplicingly, the insult's on sociated will electric arrive. Nythington, and safewal gas tracks till represent for partall starket level provide of these attenuative faces that are supported by the ANY VT Program, while the boneMts accasizated with higher) production reprisent for projects land their partsible suppresents that are directly funded by the ARIVI Program.

To calculate GHG environme instruction benufits, the amount of held singlaced is multiplied by the relative partiest intensity for each alternative hard type, as provided by the Low Carlow Fast Standard.¹⁰⁰ This calculation incorporates an energy efficiency ratio for electric drive and FCPs to account for the prease of-Sciences of PCIs and ICHs in translating half energy

2018 we immunity for long C all carbon intensity for projects that set hat just here and weighting and descended by The LOFE.

Table 19: Annual Petroleum, GRG, and Griteria Emission Reductions by 2020 - High Case

162

		Owner Tank				
	Petronutt Reductore IMUTION Galactor	ENG Reserves ECON			1104	
Eachts Miles	246.7	LHUNT	1894.2	155%1	1,1418	445.4
Projective .	281.8	E1MARE.	NUN	łi	.815	. 12
Ropicsal Propulses	3943	1404329	385	473.1	-4303	528.4
Ellens Pedetar	382	481.525	48.7	328.2	- 26	- 43
Natural Sat. Roche:	208.4	111,664	186.0	0.1	453	1.1
Ninpe	61	-4(8.235	384	41081	117.8	141.3
Teles	UND	100.00	3118.0	18,858.1	10.2	1.425.1

Tanta Tathati (regi Carrier

furth singlaces; 5.7 million metric terrors of GD_m GHG missions reduced, and 25,055 metric tomory of urban air pollularity reduced such year to 2028.

The economic and environmental benefits in ing time the first round of ARFVT Program funding awards establish a good hosefulion and measurable propries lower inclusive wellate state policy guits The ARTYT Program funding can finlty achieve a goal of searcing 26 percent of California's total Itanipa ling have been attemption seasons by 2022. By 2020. abised and galatime domand is repected to reach roughly 18 billion galloon parastan. The AREVT Program anarchs will support attantiative faults that earn optain 2 to 6 percent of these 18 follow galeni by 2022. Additionally, furth and technologies topperhol to AVE VT Program projects can also reduce grows Monte par entiroises, representing a 1 to 4 percent decrate is especied transportation (Summers - a)stual entrains in 2020. Furthermore, the common culturies principal of California berfult penhactore

starts funded to the AWYT Program represents. 15 percent to 77 percent of the capacity mented to active is discovery Active Plan goal to produce 43. percent of expected Catherina lawfuel consumption from in-clubs starters by 7070.

Workforce Training Benefits

Workford development and basing an obtain an ments in the Energy Commission's attants to develop Epittenia's size transportation model. A trained workfurge rereasoned to develop and verpond to new lachualagies, improve efficiencies, mousture wards and reduce the cost of production. A well-insided workfarter will be certical to the industry's ability to muturfacture ice-intention unterim and componently produce alternative facts, basid furthing infractivations, service and maintain forth and manufacturing space most, and provide information for the going innovation and refracement that will some to increase the searlier acceptance of attenuition facts, and new vehicle technologies.

The Energy Community Nos stilicated \$25.8 milios is program handing to support workforch downlog ment and burning in the last two investment plane to the IOFVIT Program. The Energy Commission and the family to establish indexagoing approximatily with Cattleria's but workhour bialong agreelers, includi ing the Employment Development Department (EDD) of \$2.5 million the California Community Colleges Character's Office (CCCO) at \$4.5 million and the Employment Itaking Panel (CIP) at \$5.8 million. The admagnecy agreements have been intractional to long alternative that and low-emission which specific training as a portion of the partner agencies' becader surviverse projects. The LDG and LTP remeagency apresented a delive workforce training, while the 100 and COCCO interagency agreements provide workfatte training development support activities. octubing surveying indultys burning sends, assessing unking turning programs and inservers, diverspring correction and busing materials, includes basing, and regional inducity clarifier support planning gravity

Is pain, 120 and 13P task associated & regional biolong guests, it regional moderly cherter planning guests, and 12 about employer biologic constructs the trans more than 1.300 individuals. The guests and creatizets associate through the individuance agreements have asian decound more than 312 million w societate moderge fresh.

Job Creation Benefits

Since the projects funded by the MIVIT Program are almost seriesly in the andy straps of reglementation. Non-summary regresses properties gib benefits. The lineage community strate of the sections of all Message as without a same of the sections, while was fullying with tabijation source of the sections. The

Table ZI: Projected Job Creation by Type, as Reported by Recipients Report Lines Total Neurosciences 4:1 514 1254

Engineering 244 (194 627 Operation sind 55 615 647 Multimeter	Tele .	100	1.487	3,251
Contraction 418 1206 2200 Engineering 241 284 427 Operation size 55 418 445 Maintenant	Birg.	148		1.134
the second second	Towards and Mainimized	10	415	-84
Contraction 418 1206 1206	Internet.	341	284	825
	distriction	. 618	1206	181

survey expendents pelicipale that they will create many 5x20 pits to high implement their program. Nonlin project, Regrambility several pits crastless throughted the market spectrum, but supersitivity in manufacturing mechanisms, and stream in balance persistens and antisetures, as survey in their is balance base attempts to the survey, short here pits include pits meanshall be but to 1 to 18 survey, while they turn pits include the fits to 10 to 18 survey.

Reconstructs anticipate the highest workness of jate in mandathering and construction, driven have by the neoreticines of that probation factorized the probaches of had being and components for the electric drive industry. Manufacturing and contrivusfient are servicely excepted at the of California's in the recent number of path additional to there out addrives. The number of path additional to there out addrives. The number of path additional to there out addrives the number of path additional to the commenciation path of the technology involves in the project, where exact of gains.



147

Taxes Caloria Hange Tennesses

The eccentric lawerff is compressible beyond the india faulting when the angunes a excitation product additional actuals involvement, chemistre eccentric support, and urget mera place tang eccentric levels' multipliers. The Levery Commision's monthement in LTDA manufacturing place also created actuality evolveme from LTDA to 5,228 address of the

In addition to join data, sorvey respondents also provided informations on the source of background manded in the textpermetations of the program. Southed projects, The inspirations of text aver BIO Collections deconstant wavel participate in the projects, who SHB of House background and that background.





Bringing Energy Innovation to California Through the Public Interest Energy Research Program



This chapter of the 2011 IEPR provides an overview of the Public Interest Energy Research (PIER) Program.

The research particle continues is novice and the lawdin is address control mengy and economic challings is noticed the baselity to continents - the regraculture, horizense, provimental agriculturesidents, and electrical and agriculture and an electrical agriculture industry, and electrical and agriculture and agriculture theory of the laid 14 percent. The first Program Natiopperior for

staylor weeks and the shaft's energy policy gasts. The program notratic become on exeruscit moving individual components and han programmad to instructions independent in weights energy further begins to available promption, and benefits, for an example, including energy remarks, development, and anteresticulates (SGA2) moving large scales integration at energy efficiency, presentable energy such as a mainterful phythereticacs, and compare forchweights gast and index extended a similar part that propers, containing.

The Public Goods Charge (PGC) that provided funding for energy structures and development explicit on Lanuary 1, 2012. However, the Generator and key legislighter traders's support continuing this sharge.¹⁰⁴ and in Dettine 2012 the GPUE spond a schemating the explored patiential cardinaution of public bestelets funding. The December 112, 2011, 114 GPUE approved the conference of and Nuclei Program investment Charge EPPC to Lond subsectivities and sampt materials, development, and itemestations programs as an automatic based patients to all samples and the proceeding.¹⁰⁴ The Longy Concesstion in patient schema for transfer loads with the a schema automatic transfer loads with the schema target schema for transfer loads with the schema wind a three news of the starget. Note that the schema schema subsect of handing targets for basisenses, toler simples, more patients and development, pile schema explored priorither and development, pile schema explored priorither and advelopment, pile schema explored priorither and advelopment. And instrument priority visibility.

PIER Program Makes a Difference

The PEER Program contributes the advectmag electronity and values at generative and functional point that it may not from entropy and acceptances. For bioangle, the PEER Program was antisemental in bioangle distributed generation (DCI In the Catherin maker), in 1526, the match distribute and and support the inforcemention of phylometrian and phylom DCC Quare that final. PCIN fielded remains to subalitation antisemention and advectors for make DC practicular and fulfillable.

Hilfreis wenn of Liverer Bosets with th Dull Printer Prices Supporter 20, 2011, price guideau Mafail. 2011

[12] prives Association Discoverse, New Yorks, December 20, 201, 401 (doi: 10.004/9800003/ADMD/01.00 (0.01171/ADM0.004)

(1) Earliers two 21 Save ging Vacing improvementation, institute of Earliers at and Earliers to Equipment (2021) 104 Saves, in the expression of Dearliers in Computing Lanternani, 1021 (2021) - monitors, Denominal Institutional Institution, Education, Dearliers in Statistical Institutions, Education, 2021, 2021.

· Coul coult materials for horses.

- · Hotels antonized woher beginning
- Advanced salar walky building components and distribution systems
- · Connector coning explorent for instaurants
- Reverse Annulus Single Ended Hallant Tube (RASERT) for efficient, cinaner process-liked location
- Cachediajos he farture italikariae ie vieieujoig procedes
- · Advanced gas-find drive deper for haid percentered
- Coaling cantool technology with wholeto technology services
- ThermitTarbar Say Fired Hat Water Heat Fump
- Gitsa low, editagon andre 24Ch2 better control fecturary for boller

ie addition to new products and technologies, the PRI Progens also fanded instantik to impleme snergefficiency through selfice design and construction gradients, its obligated of total and thertogies, and analysis of data togaset future building and analysis of data that togaset future building and applicates classified and all futures and thertogies.

- Identifying the putterful energy cavings in California's existing commercial heldings using probability energy of appliphing situategies that focus on incorport comflect.
- Disalogies to monume recollectual test water near ing efficiency

Table For sourcepies, so 2000 FOLR handled insecuruls with Reflection Energies targed sourcases interciantection harmon carnicipate with continent pathemic and resolute dominants system interciantection, and SG implanted and status system interciantection, and SG implanteent confidence system interciantection.

Contributions to Job Growth and Private Investment in the Clean Energy Economy

By twenting in meanwhile, and go volded ROAD projects. He PAR Program advants and gover beek restant and condex juits. Below are some of the PER Program's soccess (Novae H) the area of pix condexts

John Created From Soccessful Research Projects. Significant an provid access when in starth vessils in the safety of advanced technologies.

In the marketplace, PRUP Program staff intervened improved time of 10 comparison who activation the market of 1.32 (b) and a ways to part the PEA heading there gets control as a additional 3.502 per an the function of employees participating appears and the function of employees participating appears and the restanting to an estimate using MMLANDE, a weathy marging of examining impact association amparam

• Venture Capital Investment and Jacks From PIER-Funded Small Grants. Since the PICh holds large properties from all Card (EUD) tagse in 1995, another how gammed more than 11.4 billion in solvergent investment, including EL3 billion in gamma, would by interconst. PICR foods ment of products worth EL3 billion for the provide secture - may Have EL3 million for the EUG program invested. These two companies and the ELG program invested. These two companies and the ELG program invested. These two companies and the ELG program invested. These two companies and the ELG

- Fault Antechen and diagnetric tash: Tar pannanchil mellep beying, unbliding and ar tankfuning patient.
- Energy auditing tools and energy use reduction strategies for peopling buildings and wantewaker treatment facilities.
- · Dandardawd bailding commissioning boots
- Cost effective efficiency shallages for attenuate touring
- Community based strategies to incruse energy efficiency and environmental quality

Breaking Barriers to Achiever California's Renewables Portfolio Standard

Ence its coustain is 1996, the PCM respons has helped culturing automate its unit of respective energy. The program performed initial ensures assumetions to the preference addressive processing to the preference addressive processing to that investigate social last the best locations to shift here ensured as arrange systems. PCR: Assump respective ensured as any systems. PCR: Assump respective ensured as any systems. PCR: Assump respective ensured as any systems and further assumments of Datameters social and further assumments and Datameters social ensured in technologies and matters in the factor matter to ensure at a social matter bit for factor matter to ensure at a social effective performation of effective performa-

and support the shale's representingly approxime remension energy publics used as the BPE. The Catherins State between well believes the BPE the purposes in the end: to tote 2000s, the PER Peopulaionization the Internetitiency Analysis Project, which energy development peopulations in the energy environment of the PER Peopulation of the theory of the Resensitie Frong Strate Community (RESCO).

Energy RD&D Successes and Breakthroughs

Improving the Status Daw Through Energy Efficiency

The I stepy Commission Briefligh California's every efficiency standards for appliances (California Cedit of Regulations, 108 20, Soctions 1621 through 1620 and buildings (Tells 24, Part 61, PER funded research plast a key role in developing and providing tapperiing data to peoply the energy efficiency identants. For example, the 2008 Building Efficiency Standards. acad results of PER funded reynanth including a compliance credit for residential cash risels to help topics as conditioning use leading, ventilation, and ar conditioning (HVRC) for efficiency imper to improve the newspy performance of air bandhes and duct systems, an aftic dust maker to evaluate the interaction of pill measures that affect the least flow in He atla: and more efficient intches and unitriproand pite installon is addition, the 2013 Appliance Efficiency Grandards, included requirements for flat screen informations and the 2007 Appliance Efficiency Standards included requirements for ordernal power supplies - all of these results it strattly from PER. funded research, Daniel, these seven monumet will products are and implied period could cavings of more toe 31 billion for California steetric and natural gas talitymets when fully intelemented.

The the specomog 2013 Building UTCOMOC Quartanda, PER Novield research is conflicting to patiential measures for west cauling using mitroit an low order distribution systems. The controls cauling test water that the same gaps modules. HVVC controls estimations: to cauli commercial systems, Baylighting and lattice.

In addition to the research acceltable 4-bit tesporting the standards, the PEER Program funded annihiltenight neutroproteach that sectorship brought products to the marketplace. For example, the PERR Program's neurol segant of a small busi-

Figure 17: Integrated Clearnown Lighting System



ALCONE FINEN

Figure 18: Concentrating Photovoltaic System



ers fant banken m

ness called Adural'S Technologies contributed to the invelopment of a wireless lighting control activities that consist owngo savings og to 76 percent. This prepartnessings as highling constraints a pre-fact technol ogs for basilities principly that log Allara is exprise \$76 million in suborquist vortice capital. Another rearryle is an unital PER hanted demonstration of an interaction using its control control asserge une in data enters, anothered by Federagiel Centrels from Vigiters factored) As a result, this company received an American Receivery and Reinvectment Act grant to in 1000 This bertrainings in eight data contern Throughout California. The moving emergy use in Three night data conforts wait reduced by UFNs 78 perioet or about \$243.500 annuals. These unshap control systems are used in data perfect theorighted California and the Undert Status."

The PCRP Program has suggested assessed average efficient products and bectmidgess that here relates processing for Collection consumption, save means the Collection consumers, and sequence the reversement. The following potential are new available in the mathematication.

- Integrated affect and classroom lighting systems (Figure 12)
- Advid schart wait series and services for holes:
- Bi-level stained and carrièr lighting
- Smart Righting commits he suitable Righting
- Advanced magnetative ar conditioners for Coltionia climate
- · Butter her colleg
- · miter fear air Zetriftadion Syrborts

Filmini, Joine egitet (million) pro-

111

program, which is highing communities sourcases researcher sweep adjulgement and obligative status integers. The ACECO program is providing features and the ACECO program is providing features and paid program. A total array and the providing paid program and the sources of the sources (splice to community) research and professiones.

The PEE Pegane's Length Heided Connections Generates is integrated with address sectors withing in the solution work of energy probables on an balance scales, in particular, the resurces, is autoining with resold practices for particle interview.

Die af Die weld dawing barver resewalle enwige nangt develapers bezi al every level is bie hats als herer zurst. A wie hadretes the tableman his develandig beer zich als legter officience premis han herbinsligen. Radioaanti, soneraties applicalees leve wich beprocher ce nievel a auditeina beselbt that translate ett curt springer. Für wannger PRA Program participuer Deenvelt, lee, swamper PRA Program participuer Deenvelt, lee, swamper ine cancel and gabalantika. Chr. Vir soften wich leis ett includivien, two eurit mandachrandlig technical performance songrammenter, winneral gesitet hat dispiret, ad comprehensive "springer delayer.

This new GPV spritent will laread the slipplyment and adaption at GPV including in earliest applications. Dispersity finds the the PRIAP incruses. Since this assessed to the other capital faults to deserted the and commercialies the product. The feedbadge is view in fail productions, with an antialutione in California and domain failed (60) kilowealth and seemal laters in therappendication of the since 200 kilowealth II. Energyweit 1.8 2.5 designed there 200 kilowealth II. Energyweit 1.8 2.5 designed therappendic development of these property relations. The development of these property relations in the development of these property relations in the development of these property relations. And more than 30 plans are all development contraction. Since 184

composind); ped - Exe vito

in.

The PR'S Proping has been ind the following esails many princh is help certaine bariers that limit the singlepenet and inlegialist of severaable energy only California's goals

- · Pavorlaph Corporation's photo-ottain: IPVI tracket which ingote the tax to maximize the innount of entrigs produced by a photosyltair system.
- Advanced Every Receivery Typicer (AERE) speording same wirds to clear larger, which loops fael rolls
- · Tenagra log's combined heat and prove system coupled with inverter based technology
- · Dean Longy Testers' further using our contact**line** tochnology
- · Interiord Restatting for variable talar and wind groundles populs to optimize development and eralize of the homositoise grid tection
- · 20 Davis West Williags, a multicut pers sel story. comunity using on the retornables and of feixes to automic anti-divisid energy resources
- · Sovetening with scale take concentraling systems or closed teaching
- · Riamates to energy projects to creatly foligate for on talls electrical production
- · Paulau the integration and use of tentrability in schiture a Reside and sacare energy inhactival tare by integration of PV, electric which changing and through sherpy through

Integrating Renewable Energy Through Smart Grid Infrastructure Development

PER funded research is making threads in the array of advanted generation, businessing, distribution, and smart grid to promote reservable integration. For angle, a record PCR funded solution resulted in contracts. That dowings it a definition for California's Smart Shid of the Fylune Inter Inner perspectively avertize period utilities, publicly named utilities, part The effective instanting to Department 7000, the Energy Committies conducted a joint workshop with the California Public thidlas Commisses (CPUC) to highlight the PER Program's Neve smart gold AD40 road mapping projects that will support the statu's graph to develop a smart god and provide a interarch mouth for smart god abployment plans.¹¹¹ The Energy Commission will contribut the three persons Toes to meate a definition for a single, considerated "California Societ Grid." This effort is belong the that must multiple energy points goals established under Asterntily Dill 37, Setain Elli 17, and Senate Bill 1256, an well at national bechnyings and integration challenges. This affect also established a readeup for Society development for the PER Program to 68 key technik py part.

Synchroptoners Help Integrate Henewahles and Reduce Power Datages:

Variable generation courses assembles in the electro pointy typlice that it sail handled preserts was load to onplanent autapes. Grid approprist name real time sofurmation to bottler manage and operate the metric prof.

Text femalentic measurement to been in logist tion lies provide delailed othernation about the emotion system to help having and prevent power salages. The PER Program funded the Phaner Risk Time Dynamic Worldaring Typism: Physics #10462

at new property politics, respectively have by take and in the local division of

The Evolving PIER Program

Don'the years, the PER Program has continually ited through increased transparency and be ownuthing action stakeholder sugagement

Policy Advisory Board and Advisory Groups

The PER Program canonical three publicly indiced Policy Advisory Roard, FUE, smaftery, non-the paul year to increase public participation and to provide transparency in PER Program planning. The PAB includes Legislative mendant, energy agencies, diffies, and economeetal conternet, and harment argentidates.

The Energy Commission also howed three Policy Advisory Groups (PADa) to augment the PAB and focus on three research program areas - Energy (1) Icency, Resewable Energy, and Smart Infrastructure The FAGL review and ensure relivancy of the PICR region's research witables to the marketplace. find sprangy and and uper apportunities, and avoid research duplication. Shaff hold public workshops is time 2011 with each 255 to discuss the properties county initiations he the sprewing focal year (2011-2017). The workshops brought hyperbar utilities, researchers, manufacturers, and alters, and policy. sakers from state agencies, federal agencies, and the public. The results of the mentiops provided elementation for the PEH Program's future research porticia and solucitations.

RD&D Benefits Assessment

Energy Commission staff is coloung from public from phits are arriented from PER-funded READ projects 10% while presentations and a full transmit we are th

138

and the sumal program. The PER Program livelages a pringram with approach in inwelf4 and card accord ment, which includes integrating banafils untersenant demonts into work plans and databases, evoluting interview, and surveys, identifying required lamelits metrics, and impairing researchers to provide a subsipent report as these matrics.

For oxymple, in the littl quarter of 2011, the Energy Commission satisfiated that PER funded research activities denothy preated 2.128 pm. These pils are assigned to projects prividing the fail time panulinet #70.) of \$70 job-years. Analytic using IMPLAND: on expressic analysis software tool for predicting exposal acaramic effects, estimates that Owie 7 179 july, load to 1 758 industry state, where the antifiet doing the work have to perchase goods. and services, and 2.180 induced plot, where business twents and ongliques purchase goods and varieties. About 5.608 people were employed at least part-time over the parce of these PICR-banded contracts. Rased on the FTC pile-years worked, the MPLAN model extenutes state and texal parameters and lected \$2.3 indian in faxes.

Public Outreach

The Energy Commission has consultrately street the report and publication process for project fact. sheets to disseminate inspectant research vessilis to the public. Its communicate the program's seconses. He Energy Commission published a trachure. PER How Public Research /Sweet California¹⁴ along with sturie fact sharts, reports, and other teschures furpring success in specific typic array such as smart infrastructure, polytoming resonable awargy Barriers. and efficiency projects.

TAT artistic large Direction, FOI, the Plant Respect Direct Carbons, 122 (10) 201, 401 (a), 553 (10), 555 metals (a), e702 (2010) artistical (22) (22) 213 (2002) 100 (2011) (21) 49 (20)

Now Electric Placer Group, LLC, which provides synchrophyson information to the Colifornia builders unt System Operator Kalifornia Killi at a rate of up to 20 times per versed. The states use Seervise Control and Data According spillow only many's a status every low saconds. Dos new technology represented a painer changing environment for future grid management with respect to sestern vehicability and rememble integration

in January 2008, the Phases 410MS system. united California ISD specators plead elected esclilations that were making the shaft's system anothers The Dalifonia ED temporarily shat down a mape power line of the conten of these excitations to avoid a major bischool. The California 102 probably would net have delected the excitation inegalarity todays the installation of the Phases WIDME product. This ment devices/stated the citer benefit of Raving the inclusing yoldies available for grid management

The PER Program aspects taxchrightatist technici tigs to save halve electricity conservers about \$218 million in \$310 million per year on provided exclusion cents and \$30 million per star in resiscing electricity. costs. Support from the Energy Commission and the iteded Males Department of Compy was essential to Bit releasts. Without PICR Program is unlikely and action statedeolder investigement, spectropitation and existentiated development would not have progressed to where it is holds, if would out be failured to California needs, and California wight fact seriest peblices staputing renovable generation and electric solution The PER Program funded monarch in the follow-

ing arms to diverge a smart grid infractionbare and ager I conceable integration

- · Contand response as a spinning reporter, a key amiliary and requirement
- · Salar and wind honcering
- · Charles unicie-in-grid services.

175.

in August 2013. Mn PER Program held a Venture Capital Forum in Eacroneints to increase levels of Coldennia another translat marked investments in PER funded senerging technologies. The goal of the hours was to leave been employed by they they evaluate presention technologies, true to believ ment and inverse PER lends, and have to encourage higher music of contact capital monthment in PERforced factoringies to help kulture the path to market. Recause of the success of this faium, the program plant is been additional forum; in the future

On the Horizon

The PER Program is immediately working with stationations and palicy makers to facilie segring ergy issues accorded with the Ronewalles Part Inder Standard, Jess Nei Energy lauktings, umart guid explorestation, revealenmental barrors to renewable every ingeneriates, and the University goal for DC 31aff will also continue to five fune the admini-Italian of the PER Program with the goal of maximum ing its value to California businesses and residents From Nevember 2018 (tenugh tumory 2017, the PER Program integrant the following spinulations:

- Inductrial, Agricultural, and Water Leverging Rethoningies Diseasephation David Program 8
- · Unumperated Itoury Related to Clean Coorgy
- Ryleid Generation and Fari Filmble Distributed
- Generation-Combined Heal and Power-Combined Coulling, Heal, and Power-Systems

· Mongride

- · Distribution apparent and monitoring
- Ithity-scale energy through
- · Brai fore pid selabily management

Improving the Safety of Return Get Pos

The PER Program singleds to swergy return that are of courses to Californiam, such as callely and among By The PEN Program in fanding projects to support repearch on the safety and security of the statu's subsol gas system intractures as California is the meand largest natural pas-consuming state in the instead States, making this a priority riston. The provwy downed for estarsi gas and the agong esturie gas pprime inhustricture pres significant challenges for the state's substal can users. The state weeks public attentil energy retained to applice apportunities and apply one and energing between periods innovalive options for extratal gat pipeline integrity. operations, and safety

Function Reducements The Unidomsteen 2020 auto-atpromptotion in a Pacific Gat and Electric's (PGRE) opening in Law Brans and to two FEE Automic projects to help terrare gas gipelan evolution and monitoing the project will deschip a harother accessment of current hickneskegies used in California to manager pipeline integrity and safety including current meth adt to provent, detach, and tergrend to pipe loaks and? prophers. Another propert will design, half, and test a family of end goveration merjoritechromitchan cal systemi. (MEMD devices that measure pressure, impact share write, and seried contrilies in natural gas paper with weekers construing above for specifition dated monthring. These prototype doveres car operate words require poer, during formal operations to monitor pipetine safety and integrity.

 Ligardied Natural Cas, Vehicle Infrastructure Ingrounded Research and Georgement

The PER Program is also planning to ophysic the totawing unicitations in 1915.

- Connunty Tcan Remeater Energy Drumpment. Deployment, and integration
- FER Builderei Graet Saterbaise

while the Deergy Commission is confident that research funding will emorge must acar. If this deep nd higger. He agong will have to disperieve what mananth and impartial evaluation, and will livin prodoubles of every RD&D that leavelits the series shalls.

Recommendations

The Energy Committaine second means that Califyria continue funding public interest energy research that heigh maint state energy goals. Advancing snorge RD&D activities in California will afract new basilansas, proats jobs, and allow California comparand research includions to compute for and incomes hely attain federal fuelds.

The Energy Committies recomments confinence to manage a public interest energy research program in California Becaste it advacates for Californians to acting at importal maturies when providing RD&D funding to California interactions. The Energy Commission also have the ampire adulty to select and continuite research across various types of research ers (private baceptors, institutional, groundward appectes, and so factor to manimize the effectiveness of the program and answer contributly with state policy plats.

Furthermore, the Energy Commission visionments for following for a vision of PGR Program.

 Propure a Fine-free Disisting Completent Plan with spline stateboldly expansion, which is pushed by state mergy palicy and would actions a balanced particle at investments including hetmoticg domantitivations and the mere fundamental and applied estimation.

 Design notices around shatepe plus sharebes that an longible quantification of measurable. The netrices, wave contained with metabolic evaluations, will help relies programs, incruise program affectionery, may tagge accurate to imp ineffective program of month, and around residence with the program of a failure calls, the walk of the program for failurebalters.

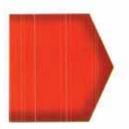
 Incrutal subrack and awaitsens of RDED projects and results by initiality works/ways, research forums and resultances, press south, and other activities with the pather and stateholiter.

Conclusion

The state should particular handing public interest energy manach. The state's public interest MSLD program states a strike in the interest MSLD magnatum. The Sathersis has dependent and an mana including to the dependent public in the physical and meet state paties public.

As advanced by a first PER Program. He Every Communic well ensure that execute sequences and believe states enough parking provides unit-tank becations with share enough problems, and provides benefits to Californian. The Every Communic mediate constructed to antibuing this chair energyresolution area on.

19



This chapter summarizes the Energy Commission's 2011 Bioenergy Action Plan, prepared for the Bioenergy

Intergency Nurking Group (Struking Group)¹¹⁰ And adapted in March 2011, and million cannot adchings and priorithms at the Montang Group disert 2011. The variances struking in-space to how the report, Background information, adaptives for adversing state beamstry partie. Exbinement, why lookings, and maximum states in syschical adaptive to beam in the next that water.

Development of beenergy supports state policies and graft. There are flow types of beenergy statefield for Catherine's

DETW Million tool to account in one enough type?EllipeteicatereD 100 /Nil INVERSION 201 /Nil INVERSION

2019 Services Concerning of the Information Services Concerning Concerning American Americ



CHAPTER 13

2011 Bioenergy Action Plan

Resensative Perfisio Standard, and texposer and tesps. Non-the patiential is present resensative energy to here multi-Generar Disers'. Drive ratio al 12200 Wile of understanding energy generation. Bailauls and texps task are pay a modular role in reducing the Hispack ratios exercisions have toursparticize tasks, tespag Caliberia actives the statistice -Cartes I wile Standard.

Biopergy is every pedaced from biomers in the term of electricity (Seignwert), renewable gas (beight, beamsthum, or control of an analysis) or lepid transportation fuely (Sigherit), California Kes abundaril' kiomato resources from the state's apricultural, forest, and artist waste streams. Nonesold transing production could provide the state with several acasonic, environmental, and establishy kenetits. For example, basenergy creates clean energy pits, antaneze raral reasonic divelopment, and promotion local economic stability. If cash also have the state most its climate change targets and ensure a more statle sapply of energy by reducing the state's dependance on inparted fernit fuels. Bisponer can memory grid initability because it is not intermetioned and can therefore support the current "baseload" or other continuous rearge domand. Despite the statut policies to promote in

energy and Minimpy Damaris is careinly anddrased at an energy taurus, and incruming himsengy proshatton laure many challenges. Fallowing publication of the 2006 Browney Achan Plan, was beened pr facilities over proposed and constructed, some idle Arithm are related Search to 2011 must of these bispower capacity gains were lost due to adverse market conditions. Nigh transportation fault Lotifs, and, in some cases, competition with food for els. Lower cost renovables may also make it difficult for biomain to compete in the RPS competitive tild. process. However, bispower should be able to compete in the new Reisewable Auction Mechanics, since the program is designed to separate bets into definese endert types track in basis load, informitted pola and adapted off peak).

As part of the 2007 that Exergs Communes that investigated has statisticate to invise accelerate the devolution of a finite-range projects by building on the second acceleration acceleration for the 2008 (films). The first attaches any

- Excusings immuted beinnings production at seating facilities.
- Promalle and respective the particulation of new beamings facilities.
- Prevals and incrucings the integration of same argy tackbes.
- · Fund research and downtepresel
- Remore trialelary hardes and dorumles the regulatory present.

Developing the paramital for non-energy producfrom in each disperies intercenting many at the calculation basis (the sector of the secence of the calculation of the sector of the secsion interpret Mexic Management fund how Callingcrists, the Calculation Department of a fault Application, the Calculation Department of Fault and Application, the Calculation of Centry and File Parketive Sci. 87, 87, 81, 148, 53, 5445 Video Research Callingcrists, the Calculation of Centry and File Parketive Sci. 87, 87, 81, 148, 53, 5445 Video Research Callingcrists, the Calculation and Research Center Parketive Sci. 87, 87, 81, 148, 53, 5445 Video Research Calling Russ, the Calculation and Research Center Parketive Sci. 87, 89, 149, 148, 53, 149, Video Research Calling Russ, the Calculation and States Sci. 87, 89, 149, 141, and Holein Agencies, Scholinger, Scialevidiation, and Tata and Holein Agencies Taxone (Scholing-Janua Hardian Holein Agencies Taxone (Scholing-Janua)

Key Findings and Recommendations

The JUST Flow statistics a number of last budget on two the chapterings have all before in state interverse and advertaget of the JUST Flow size that this this intervents in an advertaget ensures that can have the state adverse chaptering parts, bud aggregation actions near the takes to increase biomats and. The findings are as Mattern.

 Califienta kar standard bemarti resources from the state's aphathear. Unroll, and adhan worth strangers, lacosang the sites's beening underfrom well help California actions the state's worth worther. See, meessife energy, and Stealer change peak with a sattanuable and dependante resource.

Summergi has many lensifis, both as a renseable meng rance and an attention displatal splate to browners. De humits of these representation equipring build half with a dispetched energy much displacing build half with a dispetched energy much enurch, providing disched energy much energia, seducing previous egos entitions, and an obtain has added benishts for unreamading consumption for providing approxime, relativy, and hereitry or adher splate dispetch to information throws, nucleosis, addeed quench is unreamading consumption for providing approxime, relative, and hereitry or adher splate dispetch of biomary relative, nucleosis, addeed dispetch to information throws, nucleosis, addeed dispetch is latified, and improved water quells, and exception headsh.

 Markel-based provide mechanisms for minimity, transportation, and wards management the net carverify consider all of the benefit's biometry provides to social connegation.

 These is a read for continued state research and hundred to communication biometric feedbookgies. Destruction and solvaral gas platities estimate aection challenges have initialized the development of distribution biometra similarity and hingpas projects. California must address these shallpenges to increase diversignment of biometrap reparks.

 The zool to collect and framport learning body clock remains an assissance challenge to the development of blowings projects in California.

 Regulatory ancertainty cardinants to induce oplians to focurce projects at the producetopreset stage. Yorther individual file investopreset of Samseryp and other individual energy projects.

Charts to simulation the premiting process, especially for automatic depresenting using dary and arthur wants, continue to be supported for table species, ward are directed, explained water cannot be arthur and the ULL 17A. Reverses: additional activity will be enrelied by the Disservery Indiagness Marking Terms and the Lagritudes in advantative geometring for directabular design projects.

Her 2017 Plose wakes incommendations to suppart the key toolings and toby provide additions to the challenges lacing the tolenengy websity. The following representations are supported by members of the Warning Group.

Action is revealed to the California Padra Station: Commission for proliver the Energy Connecsory opatic intervet response program to dia proving programs and anticipation and anticipation technologies. Menders of the Weining Grags support finding for a new Stationer commercipation to program to the level percentual. Interfers, and what basinergy projects.

 Networked dowingment of Sectors is important in fulfill grain established by the Low Carbon Fuels Standard and the AB 118 program. The state should

Table 21: In-State Birfuel Production (millions upp)

	2008	8001	2008	2009	3010
Allow Prehition	31)	22.2	354	101	+38
Robert Property	718	38	.124	n	111
Tatal II- 20 pix Reduct Promotion	48.5	46.8	111	314	+33
Bold Barlue Censoreptite	1818.5	(812.)	101	101	1.317
Pricest in Date Permittan to Max Befort Consumed	7.85.	tis.	1115	4.0%	+535

ii.

Execution or maximum protection. California theory Communic Laurantie Interface Unique consistence, California Leopy Communic mate series of finantie for particular transition genetics figures.

pph, 145 million has point lowerd propuls, that will excellent as expand the production of level powertice historic. These 12 projects will not wastre-hered two-balance and the projects will not wastre-hered two-balance and any state of the second respiration of the second second second second second respiration of the second second second second age hash will vary. They will heptically range from 70 percent to 15 percent leader the deniet and gaugine topolon.

Must at these projects are still in their surly stages, but the foregy Communication survey of accentones inducted the protectual for accent proved. The survey responses included a flow and high target for the protect instant estimates and acquestion, which request two a bitter of 121 millions. COL analysis galaxies per spee of potentions displacement and/we galaxies or description was initiated protections made the protect of a survey of the second model and the spectra of a supplication strap based activity of the pair of spectra to experiment to respect on the second of spectra to protect the resign's first initiate acquire of a strate based to compare the second second activity of the origin of the second to recognly first initiate acquire of residences by 2026 ht

Status of Biopower and Biogas

is 2555, must at the beginner on California was greataled from solid-Set biometric and tandill gan. Other biogenery sources include dairy digectory, solid-hat Decemberward conversion facilities, organic waster ilignifier, and wastewater digetters.

Since 2000, 727 new troppeer theithics were built in Coloring (1) knowling per and 7 digester facilities; representing 4.1 MW of generating capacity, Atthough no new solid-tast biomass. Including one constructed, four alle facilities replanted, excluding an idle cost face/or permitted to biomass.

Gifting biomets or bioget at convertienal power plasts has been a growing band voter 2008. Three or

21 Third, Liery, John McNa, Hill J Marringk Khan Plan, Cartines (maga Desimption, Efficiency and Nanisating Desime, USL 2014; DOI: 100: UPL analistic on seven maga maga-Will-basistaneous/26: 386-2022 arXiv:2014.0214 (2014);2019 custome in evaluate incomings included and mankets to promote inclusioners, programs, and patients mended to extrantic landwise development.

 The Bioenergy lobraginesy thering George-self socie well Califorms grant attributes and other strainform on through a public prevent to address head and pergrised harming to the dissibilitient at happe and liquidit grais, and the neighbor of laborentians side the California national grangement.

Permitting appropris will trainline its improve rowdisation in the permitting persons to voluce the time former and cash its downlopers. The training down will take obtained they to expedde permits through you grantedic environment of longist reports and charding a web-hand pertial for permit contacts.

 Explore surrant options to quarkly the baselits biomergy provides talographs and sentiuriding paramonitors.

 Enseing santainable heshtlock standards and warde use targets he biomess resources he aniare thail it war supports California's researchite energy. No Law Carbon Feel Standard, recycling and wards selections goals, and itradits new plot.

 Develop a plan to reduce the cost of collection and humanitation of biomaco residues.

 Continue to converse regular meetings of the Working Group to continue agency conduction and collaboration.

 In conjustion with other state agreeties, the (in ergs Committies should continue to another property forward achieving the state's biometry graph through the Rooking Group. **Status of Biofuels**

In 2010, California consent receiple 1 latter galaxy, of texture (galaxies galax seavalue) (ggl), primaity at charal theodol was galaxies or an engineetic relation and statute galaxy manufators will accountable on instrume as the consumptions of removable facts. The comparison or California, Builder (destingment is were completely autors and at California) and the seas completely autors and at California.

California has 158 million gap of annual others production cogarity, with loss than hit million pay produced in 2000. When the otherul blood in Califor na referentiated poetier recruited to 12 potent in 2003, the state's total ethanet are given to search 1.5 tillize gallets. Havever, California ethanal tacalitary partyleybod herr than 4 percent of the yinty's reads. in 7010. Since 2000, five cars attanti reference, have tores built in California. All Nvi of these plants were alls for most of 2029 and 2028 due to adverse marked itees. Sky one of Mese care ethanit refine produced fast in 2010 with two must carried on line in the Test half of 2011. Intol in-state biodicsel tapatify it capable of producing 100 million pay pet year. However, leve Have 5.7 million ggp were produced in 2000. Eably 21 sommarizes the backet production and capacity in California, Hisfael ton nation is repetited to grow over the next abcade

in clube biologi production will make up part 5.6 present of Cathenia's eclosator 1 billion gain balant domand in 2020, for bollow the biologi gaal of 25 present 2020 willion ggmt

Over the paral free parant, the Exercy Communities, through its ARWY Program, Area tengon mending in new protects the develop and develop adhibitional in states binded predictions approprint. The data for the Exercy Committee has invested enceptive \$64 million lower binded predictions, Naming advantivetime, and mildred angleths. This responses the period and the tended ARWY Program assests.

Of the 354 million plucated toward instants pro-

ist.

state and facilities have begun tolking with hismans and have plant to convert to biomass as their sole on ergy mission by 2017. These facilities will contribute og is 130 MW of conevable capacity is the grid. Nos dational cash facilities have indicated an interest in suchhaig to removable feedstocks, although the Every Commission dura not have an expected start date on the conversion. If successful, these facilities sound add another 80 MW of renewable bapacity. The conversions of as chain coal facilities will significantly reduce pressbane gis estimizer, alow the facilities to continue generating conditiond heat and private, and tehate and plaint take in trainmentary depressed communities, to addition, 18 in-state natural gas power plasts logar coloring with pipeline biorechase produced and sejected role the interstate extend gas pipeline sul-of-state, with an effective capacity of 10 104

By the east of 2002, non-tasks had been as that is been even with representing 200 MW. The backhes have either the variant means, task as poor extension catalobies in the located indexity part loss contract prices to energy. Seen tasky manare digestras also alled due to functial influenties and, in some instances, distribution, sensing table taskans Valley die Polytowa Castelle (Doltar Influenties) and (Stal) annexes table and the part and years and Stal) annexes table and the part of the sensitive tapely due taskanging with part bayout approved. The capacy's alled earts 2006 is 100 MR.

Biopower generation increased. III percent han 2005 through the end of 2018, MacK of the generation normanic pane from out of victors for largeburgets around in external gas familities and restarted and/a familities familities and restarted and/a familities familities and restarted managing in our California total familities increased 2006, in statut biogener generates have increased families in California total familities that increased familities in California total familities that increased familities in California total familities that increased families in California total total increased in 17 percent.

In-state biopower generative is expected to increase in the short here as and facilities complete full hast conversion to isomers by the end at 2012, Adattinuity leaguest capacity has recently level proposed on the ensemble without a solution of tabilities took is convert to isomers by 2015, is address, the Group Construction expects that a south excite at fullifies. that shall allow due to like what is an excited recent energy process 2000 and 2019 will evaluate it contains receipting and the test test and the internet of containtenegrations are second. While new projects have been precision. Here over not expected to provide at spelicarilities.

Opperfamilies muit al public versis projects, mercipal waithwater healther efficient, and audith to collect and calculater hydrom entitiewe versisies and produce borget ar barnethane. At two trees, much at two policital areaging resource is thered due to difficulties utiliating air percents and meeting ar attributed in some California and disticuts, and the removing of power generation and disticuts and the removing of power generations. Wells no our power prevention may not be passible biccases of workspace or public compared is forcing, coloring and opplading this pass to most public to the transportation for classifier bisecute due beneficial as al two memore the many production.

Progress on Implementing the 2011 Bioenergy Action Plan

The 2017 disarrays Actors Pleniwas intended to be specialist and influenced as inserted to actors to changing smallures. Parties are contraining to work as completion and adulting mercuries, and the Exempt Commission will specifize qualities and procession in National APPR:

Actives undersize and completed are italed being

Table 22: Begaveer Generation Used to Meet California Load

	17001	2041	2004	2009	2010
In State Bacanet Controlice Matte	N/H	3.316	1.02	5,942	5,94
that of Dana Notioned Generative (SAN)	(101)	EH.	157	80	100
Table Bearson Gamerstein (Care)	k/m	1418	6.177	0.05	1.014
Anne Announce Government States	1223	32.04	31.537	in.m	21.74
Fananti d' Norte des Generalité	1835	1125	0105	10.1%	inga

Dury Liferig Tong Limitaly Mathematics

Actions Initiated in 2011

 Action, Downer's Uffice and the Networky Interapting Working Group are developing the 2007 Benergy Action Plan.
 Completion Date: Interary 31, 2012

Action: Cathenia Department of Fend and Approximations are sovieted a state. Notes: Approximation conting groups of below, state, are reprused approxiand state-balances in promite link development of dury dignature. The working group is development of dury dignature. The working group is development presentations and actions 100 with observative presentations, and address betweening that heatings and accesses accurate and argument resulted to finance sequence.

Load Agency: Calturnic Department of Tand and Agriculture

Completion Date: Perinnuty Report. March 2012

 Action: the learn threads Conservance (DVC) is providing shafe agency is able top is working with a diverse group of tableballers and generoment, estatus for prompts shafe well establishes are prompt that are consisted with learn endpathes, transport, that per consisted with learn endpathes, transport, that per consisted with learn endpathes, there is a shafe to be a shafe to be a shafe to be a Completion date. Draving

Actions Underway

Action 1.1. Diving a website is provide least government with providing planning, and hybridize associations discussed to wholg and diviniging the momentar leastform. Least agency it many Gammicson New completion states. March 31, 2002.

This action was changed to divoltap a program to offer planning and permitting accuracies to becal permitting againties. The new completion date reflects the result to hold a stakeholder workshop in early 2017.

Action 1.2: Develop a temperature website to petrole new priori developers with generating polarest lines, and contacts to permitting agriculty. Lead agreenty, Energy Constitution New completion dates, March 31, 2012 fts. M rewells the web plantal Action 11.2

This action will be vehicled in the development of the Lacad Government Jossishand Program in Action 1.1.

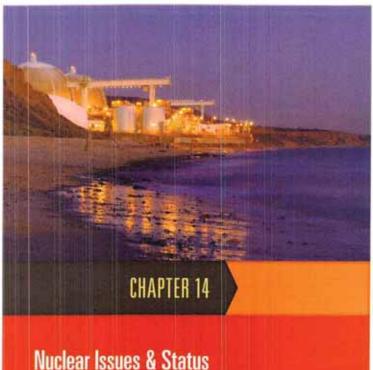
Actions Completed

Action 2.5 (ab) The Program Electronic cutp impact Separt for Assemble Agentian of Digatos Reptile was completed, writhed, and submitted in the Staty Charanghanes in June 2011. This becaman is decayers to support to support the parameters all program to support to writing an assemble align this projects writing catalogues.

 Action 2.5 (g): Collection has soluted pollonce documents that solline has Collection regulations are applier to anomalize dispetition and the tradetoy requirements that Collection and heat addressment approach have requiring assemble, digenters when suld waith in another as in head tests.

· Action 5.4. This action involved minituring changes to believal bisomergy polities, and engulations, to May 2011, U.S. EPA vessed a stay delaying the of feedbase data of the standards for maker music holiver. and convertal and industrial tolid world income turn table colored to as the Buller MACT rubel. On January 3, 7017, the U.S. Dishut Court secured the U.S. EPN's May 2003 stay. Restaring that the reconsult eration was aniantial. The effect of the rating is that the March 2011 Builty MACT Rules weet sels effect an May 20, 2011. It is unainar at this time whether the power is allowing the U.S. OPA to revise the rules before the new standards are receiptrated with the State implementation Plan twittee 3 to 5 years at the effective data of May 2010. New margin constructed after June 4, 2010, will have to comply specialized

14



184

Nuclear Issues & Status Report on Assembly Bill 1632 Report Recommendations



This chapter discusses the implications of recent events in Japan for California's nuclear plants regarding seismic and

framew kacards, speet het pool sakty, patiential status toosh suits. Sakiky coverage, ling form power satupes, and energiesp response planning.

In 1917, nuclear power provided 13-7 present of California's an state interview provestion and 53-7 present of the entire California power run. Intel Scalars out of california for any California prover run. Intel Scalars out of california for any California Provide Cauyota and the Tao Fusion Sensa sing California (UMSGI) on California, and the Fallo Yulia making power plant in Ministan III activity and the Fallo Yulia making prover plant in Ministan

THE best end of the second strategy in the

^{2010/000} Courses for wanter ware failed in the Orizon of the second of the Auto, Course Courses Courses, 2010/2010 Courses and ware for the Courses for the Auto-Lian Autors Course at the second of Course Facultation for the second by Device and Courses of Courses (Courses) and Autors and Autors in Autors and the Facultation Course of Courses (Courses) and Autors in Autors and Second by Devices Courses (Courses) and Autors in Autors and Autors Autors (Courses) and A

These eaching power plants are important to Califor mats electricity supply and electring the static's proce house gas anticipies reduction goats and palenes he clorule change reduction. Reserver, Duble Caspon and SOND are older plants located near major earthmose faults and have significant investories of gent excluse had placed people. Compares about their which you what the previous were share the related harge contributives in Separ-

in 7037, a stager carthquite security in the local of anonly \$ 555 MR of passer of the Kathingpuni-Kaliwa ricclear power plant in Japan, with reast of its parts remaining that down from pract after the event. This poest belianed the Carifornia Legislature's passage in 2006 of Astenday Bill 1412 (Ankenies Chapter 772 Unplotes of 2008), which remained the Entrys Commission In attents file volumentality of California's regar leasifiend plants to a major sarthquake or plant aging ¹⁴ As required to All 1611 the George Communion completed An Association of a California's Rocker Penet Plants All 1617 Report 188 1927 Report in 2008, which provided an instrumental scientific assessment of the patimic hazard and plant commutativities at Diable Compart and SDMCD ¹⁰⁰

in 2018, Partic Gas and Dectre: (PGAL) an neurocal (bat the United States Castego at Sarvey (2020) Aut doctoered the Deceler Facil Acts than mits affoliare from Diality Canent. In 2003, the Tax Smerin surthmaske Istagoshude 6.33 attarred about 35 miles worth of the Diable Canyon site, and the herbour selfine where the earthesaile present approve similar to the total locines: satting all

All Facility Gaussian Contracting (1988), Database Prover Print, Bargarana N. Karamanan, Karina Karang Prove Station Lancase Laurental Works (1), 2010

Distantions Income Community and MRR with Re-Automated in a particular behaviour of the Party AP 2020 Report and AP 2020 Automated of Conference Density Automotive Front Front Density of Neurophysics and Party of a particular theory in a control of a series program a particular theory and

prunity list of actues?" The MIC Chamman, Gregory fuction has veget be seperated forwhere to work formagit the recommendations, had the inductivy in plains for man field is accept the lensage leasted from Valuations and the cost to plant conters from making the recommended changes."* There is no contampoli (of Among NRC Commissioners inguiding the need for expedited action.14

Seismic and Tsunami Hazards

The record hardboulders that affected the Takuchana their to scient to March 2022, and the North Army plant in Virginia an August 23, 2011, exceeded the puels possenue in plant designs and underscand the importance of appliating potentic featured estimates for eactor sites.⁷⁰ No significant safety concorns from the carthoosies every identified of North Anna and the plant was restarted in November 2011. Fukurliona experienced higher ground multan than the plant wirk designed to withstank An international place control og manifesteg data hom around the world to aslamate the scale and late of radiaactive emissions from Pakastana suggested that there was structural itemage to

Discrict Inspectra Commence, Recommensation for Entering Association and the Net Context Rear Sec Internet Network of Stagistics from the Gaussiana data con Ac Stagistic 2000.

Difference: "Analysis After Agestments, Directed Divings for her 25 Rulant 109 [L101] Adorts Rangton and Error 12-4

Diserberg, "Secret Inter for WC Landston Rep Zutors: Strat." August 12:2012. Briat Weghteil

1313 Report 73, 2011. Advice by the Papeles. He has reach factor field number plant in Physics after these. This Papelee manage confidence during the antifugate recent powers white The contribution mainteen storing parameters for the part MIC is away Bostone to metonerate to the bring Exemplate that no functional darkage minureat to feet centery for contrased operation actival under risk to the and we also die the path; Techel with the path a his initial or agenting lanter of the part

Glabbs Canyon.¹²⁷ Better anderstanding of the fasili intes in the seconds of Diskin Carson and SUNCE is ugsibused for plant angineering subscraholy misers. mosts for these plants. The story goundary of faults that bound the Tax Lord Ptome Block, where Duble Carupt sits, is not uniterstand sufficiently to rain early a Tay Series for earthquile directly bound it the afted hit Contacts data that has harvow available since SDREE was built indicate that the site could opplence larger and/or must bequest earth that associated in the plant design and the earthpole droips have for the plast may unincedenate the servers row at the sele. "" In help seculor where tarefore, about the second: Autords of these plants, the Energy Constitution's 2008 APR (putter recommended that PCEF and Toulhave California Edition (SCC) complete solutional solution and human hadard and plant subscalably clubler including using three dimensional terainic velocities married and other advanced bectwares to supplement second instance at the plasts 74

On March 11, 2011, a magnitude %8 narth-paper and Humanic in Japan knowled put power and omepreto thehical environment of the Function's Dulotic nuclear plant in Japan, resulting in reactor methlopers. ingletows, from and widespread satisantive contamivarian Atthough a 5.0 magnitude earthquake from a buildharfiew zone is net thought to be possible year

TECONING Transportation and inspired design by Agent System were recepted profitiely, recepting in which appendi

- 12348, 312 Hyperbert of California (Danating Rocker Plane) ting Agent installant report, p.4.
- (1) Laffren & Longy Connerses, 2021 Adaptive Design Pr Report Design areas an experience of the American Street Lange 42. **D'UC actioned Country** The Premiers and institution of the
- 10-008-ben pdf. Japp 18 INCAMPAGE Datasets, 2018 Strends Dates Av

April 101ph www.mmjpca.go/103_iveganic

ini

the plant and redeatilive material releases fol-The surflyingle even before the facepoint kit (* The equility of builts in Colfornia are not considered capable of generating a stagostate 3.5 carthquide accept for the subduction note that begins surth of Wendozine To Rowsver, the significant secontaintie regarding analogic conditions near Digbie Canyon and IDNCE warrant additional terrunic studies. For SONCE, the targest uncertainty for determin

ing taxismic hazard and plant valuarability pertains to the off-here card potentially proheet thread law? urbans.10 The outling talanic actwork in Southern California has few monitoring stations year SONGS Therefore, defining studies similar to these that leaf to the discovery in 2008 of the Sharefine Fault near Dailte Canyor are not parentile. Similarly the existing gittal prolifering system (SPD) retwork in Southern California Ros New stratows year 10NGL and ye scent flue 175 multiple platent are in the upin Ry of the plant."

For Usible Carbon. We begind ascertantly in te solutil: Recent polecities for the plant's identifind fault systems. The existing totamic analizing network in Northern California has nonempt petition stations in and around Dablis Carpin. However, there are no officieuro classos west of the Hergel and class tauty. Sits New tailmometers, werd at

INCOME & P. Salari, S. Marana, S. Ameria, M. M. Terrar Life and Control 227 Wilson etc. Its Resultes Function Tubultion for one Nation press Part, Internetation of the Basics York, Minisphere Dispersion, and Dispublic Non-Direct Phys. Dennett, 11, 28118 (2019), 2011, nonstyles they also associated and in the province of these 100103000201

20 California Course Deletterario, Ravi Athenae, por al Tempy Contemport Log JL 2011, antidage

12 November Trans Designer Taring Witten (Descrift, "German of Conference November (Dathenia and Carrier, Research Ampé et Nahuring Sourtainty," proprietation et Dongy Com-mission's large (R. 1922, workship).

11000

Diable Carpor and SONDE. the Fakaching accident leightmed concerns about services and transmit has ands as well as suffity insure for California's coastal Nacional plants. On July 26, 2812. Nan Commun from the Energy Commission and two from the OPUC many conducted a public workshop on the onglicature of the Folgettime Dailchi accelent for California's inclust power plants and the utilities," property in carrying not the AS 2632 Report sciammandations." These ganets of expects representing PG&E, DCE, state and federal agenties, the sectors inductivy and public wheread proven participated in this work they along with mondary of the public, to addition, the utilities prepared inspectes to 2018 KPN Committee data reports in makin intert.14

Events at Fukushima Dauchi and Implications for California Nuclear Plants

The S.D. magentum carthogram in March 12, 2012, in: orthone Japan and an extended 40-holl tostare their set of the Federations Datchi start the resulted at sport feel welthingers at three at the plant's sin-

127 Marrieg Sortes, Specific, Social Splitt, Splitt, Splitt, Splitter, Split energy () perflict, enoughly income to incode (10,10).

120 million responses to the 2022 KPA their des netallity, setter, program po2011, migg netallity, setter, program (intell

ù

these faults would greatly increase the ability to an Carphy Suphy knises and urbanes offstare faults to determining the precise tocalities of marthcaulie lines? often merseathquikel spicestert.

To better understand crucial strain in the attutory protomet, pertaneed GPS multi-ing station stoold be placed on the offshare you flags. Offshare QPS statures are resided to measure problat projects lighter understand where the sea floor is deforming? maxing."

For yours, scandists sumations the Hospi-Fault as the itominant source of solumic shaking that issuid offect Duble Caryon. Then the Can Simon surthmake a 2003 demonstrated the patential of strong senses, shaking an previously unidentified blad thread faults in the region."" Identification of the Los Over East indicated a San Sineen style narthquake said assurvers war in bonestil the plant. The USES' analysis of earthquake operations near Dubte Canyon led to the discovery of the provincial union Sharping (and dentify offsharp but the plant in 2008. The USUS is also examining whether the Hengri Fault is particulary with the Las Simon Ray Despen-Fault and etimately test into the San Andress Fault to Bolives. The results of these shades zoold change the magnitude of the maximum probably nurthquake on the Horgel Fault. Sandarly studies are being conducted for access the continuity las appoint to approvations of the Disercise Fault and its potential presention to the Hengel Fault, increasing the Shell-

Straphisti Satha Baragah Europ, Bishari Khanith, naun-sandad ar thu kaji NJ. 2021, seniadagi makazah to tagi sati unkeranaling ng sasake basal di Neurop ten Europ Data unkergenta, tanga, manan keli keli ganiti promit, ten eri sanisang tengki metang tagi sati promit, teng-tang sanisang tengki metang tagi sati promit, teng-andang keli pendara tagi sati pendara tagi sati pendagi pendagi pendara tagi sati pendara tagi sati talang tend ganing kumung dalam te ostatisti atal keti pendara unkengan tengki pendara tengki sati tagi sati pendara tagi sati talang tend ganing kumung dalam te ostatisti atal keti pendagi nastati pendagi kumung dalam te ostatisti atal keti pendara unatati pendagi kumung dalam te ostatisti atal keti pendara unatati pendagi pendara tengki pendara tengki pendara unatati pendagi pendara tengki pendara tengki pendara tengki pendara unatati pendara tengki pendar

2017 The University 37, 2012, Saw Saware Caribanane was a examine a la entregrave on the Central Examination of Caritanna. er 7 miliae inclusion of Tan Simonia reactors, everybeing and damage to speet hard she age parts, exploring and free, large scale minister of cabingcline, scalarizate in the overcomment, and the evolution of an extincted 90,000 pappin. The liquinese generations raised the crisis at a lawer P. the highest passible level on the international scale for evaluating the invitantest of mathie mathe impletents, equivalent to the 1986. Chevenhei shark actuated at the Ukrains. The pulicy decisions resulting Ware the brazels low-real studies from these month will these lite and her decides at eather energy policies Decoghout the world.

Fulurations, doministrated that an intendingry and extreme events can price unsepathed challenges for malater plants. Historicarly, the Nacleur Regain key Commission's (MIC)¹⁷ emergency puddines looklahal in the 1990s) for naclese plants, lockaling the Server Accident Mitgarion Guidetnes, kave been voluntary and her part of its program svintaning mac for safety 14 After Paleshirts, Reserver, the MIC 45 tablithed a task factor to evaluate what belows, wanth apple to the safety of U.S. veachers and instructed WC plast important to conduct insteadule, redepen deaf assessments of each plant's low! of processory preparations, 1940's regional and readerst improtors hand several detrivectors of Diable Carees.¹⁰

The Fukuthinta ments will likity caute recreated inductry-viplance and industrial finderal generations iversight of recikin power plant salets in 2011. NHC's Near Term Task Aerie recent profit Fakardi memoralizing for enhancing marter safely and a

2010 Rector Repairing Commission in the Internal Age required to Regulating Autors power plant carbon Carbon Status.

Different Supiriors Commune, MC reporter Review Seprogramming, PSASM, straid April 17, 2011, photone, or preference 111, 94, 2012, 941, page

20 Nation Researce Deleter Devent, Net Declary, Lee 24 2011 (2017 websites or Definite Review Peer Part In

hand that an earthquake replace may consilio includ along both faults.

The MAC's Task Terrs from multiplier internation miterchanding of science's harrands within the United States and is recommending an upgrade of the droppy hasis and flanding protection of structures, systems, and complements COSC12 for each speculing startur with a re-evoluation of the design basis every 10 years. The NVC is millioning the adequacy of solumit safety margins in all U.S. plants with PGBUS and SCI's participation ³⁶ The additional ociumic shaden for Diable Canum and SDNCS, as recommended by the AB (037 Apport will contribute to these updated laining real-plans

Spent Fael Pool Issues

ther to the unavailability of official charage or depend facilities, most sport had is stared at inaction in cooling points as far greater densities that original plant designs and in significantly less protected buildings than the imachar parent, in 7001 are independent land shalp of safety issues associated with speel fuel peel starage rated concerns about the ternal loward Eigher-density spect fast storage or posts and the pecularity that under certain conditions in which the water is stated from a pest, the fast could merical gold the fast clading, and visual large qualifies d radioactive materials, ^{or} The Rational Academies in 2006 at the request of Congress completed a study an speet full safety and secondy and reported on the

NO Review Registration (Community, Intel Reprint 1988) 2021 49 (2019), "Second Kale Review of the Derivative Technical Social Structures and the Derivative Community, Science on Discounting, Review of Wangingment Sparson (2019), Review of Neuroscience, Latinesis on Wangingment Sparson (2019), Wanging Wanging, Science on Wanging, Science (2019), Review Derivation, Science on Community, Science (2019), Review Derivation, Science on Community, Science (2019), Science Derivation, Liking Parts?

Olikowa, Kitor, Wenerop Performit for Daniel Ignet franz Asieth fort with prime Danie." Science and Data Jacoby (J. J. 32, 2011).

102

18

nexes of a first from provinciality speech that in scholage pairly and the periodial interne of larger quantifies of tradinantion materials. They reactively that any task transpin is interpret, tables and task providly inducting in some well pairly table quarks, they providly interpret would be in equip speech and pairly with the density reachs. In speech to the tables,

International researchers existence evolution califiates assume on failure transit that the third 4 spectra bary point (disputions playma) as a specificacy point or the south-spectra of relationship and the south-spectra terms that submit and the south of the south of the theore tigenations. UMPOINT and proceeding the south spectral assumes and majorithers distanced that the spectra bary point waters before international that the spectra bary point waters before international that the spectra distance of the spectra of the spectra spectra and assign accurred. "It follows and with the spectra distance of the spectra of the spectra ford public weeks and holy tradition." Allowed the spectra for spectra of the spectra of the spectra of the spectra of spectra of the spectra of the spectra of the spectra of spectra of the spectra of the spectra of the spectra of spectra of the spectra of the spectra of the spectra of spectra of the spectra of the spectra of the spectra of spectra of the spectra of the spectra of the spectra of spectra of the spec

of Educational Responses Trademics and Security of Generational Speed Resource Front Energies, Roberton Resolution Prints, 2018.

- (b) Card Diversity, Datter for Part and Security, Destan Damages, "Assessed Particular International Inter Conversion Processis and Security Social Social, Workshow, Nature 1995, 2015 Sciences Print 1995, 522.
- (b) Events, Serti and Balan Register, Turketina Narine Part Research & Marchad Alem Han Disartement East, Salentin Ankorani, Bricket PS-2022, Annu part Hanking Salentina, University Annual Annual Annual Annual International Annual Annual
- (47) Incluses of Nacros Neural Data Alexa, Space Republics for Section Intended of the Indepleting Faunt Register Print Sec. 9470 11-005, Neuralne 2013.
- (Additional Addition, 1754) Elemented Rack Determine Busines Foot Capity, Sprawer, Nr. 111, Sagnardine 2, 2011, pp. (227)–1216
- Distances trapp Continues. MPERAMENT Reserves. Sty 28:201, page 52

14

Nuclear Plant Liability Coverage

issner's variour acculated has highlighted containing about the assessance of hability coverage if another severe nuclear plant accident were to score Extimater of tiamage due to a catachraphic accident at a nuclear glast are in the hundreds of billions of putars.²² Namel congentation belonates show the Evaluations that to nach an given disaster will cost at trast \$32 billion to \$57 billion, well including plant demonstrationing circle and other furthers, ¹⁰⁰ J. explor consideration in estimating liability claims is damage to agriculture, tocheries, and Summitian and the cost of relacating throughds of propile in the evocuation ment. The U.S. Proce Audienzei Act Lowerage limits public liability chains from a naction power plaid incidant to roughly \$12.8 killion. ³¹ The act covers bodily mary, tacketts, strauge or resulting death, or offsite property damage caused by recitat material at the intend in size, while Same U.S. Antenener inter ance policies to nel cover mattere retained damages. Il s unclear whether individuals affected by a method product will be sufficiently operad or windowied for damagts under the Price-Anderson Act. According to

- Thingest, Kinz H. and Later Tester. Transcord Nation Listence (arrays to the Later, Science Insurements, 2021), Interest 20 9, 2024.
- 102 Descript American, "Free Term Role Dealthr Compression of \$25 Attraction- Yandson's Tagtorskie (5, 2021)
- All Aurital Registric Exemistric for even internetomitic construction dust average of the test
- All Partiel B, Dav per Electric, Discoverti en de Sale (K. 2002). Davi entrale Reporting on Eal/Annal Restain-Partie Raule, Report S (2012). Davies (1):107–112, pp. 22–23.
- 323 No Pour America AP, available 44 (35): ext straight in more obligate body and body and body and body and any first analysis for annual reacy and plants? A straight in plants in particular analysis of annual straight and the straight in the straight in more and analysis and analysis and the straight in the entry of analysis and analysis and the straight in the entry of analysis and analysis and the straight in the plants. Straight in the straight with the straight in plants in the straight in the st

shraps capacity that is ready atuate that at the original strongs capacity for the plant ?*

An option for California's walting plants in to repetitie the transfer at the older speet that here posts into the stronge cases bettern are parameter sales."* The Energy Commission's 2008 6298 Option sconnexibil that PG&E and SCE veture the speed fuel point to epon racking providentials at some an hauble PGAE and SCE evaluated whether to made the rafe for moving Duble Caryon's and SONGT speed had from the posts into dry cash sharaps and icherminest that moving faul at a faster rate would actualizate mathemat parity and employee reprove to reduction with the significant increase in callely." ever, if a fukuchina scale event wore to stillar a hyperal U.S. marticle solidet speed flash point. Hereit potentially would be a wome situation than account In Japan pince there is considerably more hart shired or U.S. reactor pools, than at Falsachima. Sloring more Galed had in posts, which are less protected than By catles, insules an under bacard.

Arether coust of Falanchina, an outlied by the NVC Tank From, wort that the generic speculator toda pract adficulty anterchandrag the soundition of the speciload pumh density the accounted technologic specility. The addicts to increase falain musics, the NVC Tank Ferson in accommoning data musics agroups participation products to adjust an advarge annual plants proved multicent subty wright michanementation and sensicipation provides the plants when technicare specility protected replans the technicare.

Tellistive Letters Lange, Augure & O'M Jan August August 1300. Cli Nationes, Alice: "In Systema Jack Ind P Tr

See D. 2011, page 17, Pacific Dar & Tactyon, Connection 2011 (IPR Researcher 17, 2011, page 14 2011 (Second Science).

SQL complements would be required to prive diamages and he adjudicate chaines in state court.

Replacement Power and Reliability

Dee of the income learned from Fakaching is the send to assure replacement power and grid reliability in the event of a long-term solage. PGAI reports that it want and advisate recorded to replace power New 3 and it an outlage lasts longer than 192 days."" For prolonged notages, PS&E would provide replacement power trans a mix of its own-resources. market postchister, and procurement."* PG&E does net expect that a long-term subage of Diable Canyor would require additional transmission facilities for maintain unitage isoport or system or tocal reliability They evaluated resource options, including gas fired condited cycle plants, anongs efficiency, reservable everyy, and integrated coal pacification with carbon capture and segmestration, for replacing Diable Care wor's mughly 7,200 MW capacity.³⁶⁶ It does not addes pails meeting area facilities for transmission support. and shaketty or local reliability have an extended photoleses of Diable Campie, attrough the replacement Sacilities may require additional transmission SONGS is located between two major load contern

Software to be the between two maps wave prove and is an integral part of the Beathern California transmission sphere. A fundament of DORG is viticity prover Raws coming than not ef-state, and a protocol charteneous provide constraining and ortificative chartfalls subsect the clarks improves the

SAParity Lis and Techni, Angenia In 2011 199 Rooter Law Researchicket 13-02 Li page 15 August 5, 2011

W1P solid lag and Decht, Appende A (N2) 419 Autour dats Append Insteil 21-19-12 page 71, here 3 (20),

BiliPacific Eat and Electric Justice Grape Parel Hard Lineage Benaue Pagenet Sciences, Chapter 4, "Inducement Unsup-Electric Weens Lot 5, Innuer, Ph. 2018. reproducts sends that paint sectorementatives and pumps, and an inners. (PAR) respondent that Disalis Compary spectral fract paint employed that Disalis Compary spectra and the sectorementation of the spectra and/or known to the paint on each employed spectra bad and are subgest to Tasken in a hardwise forth employed that, under spectra accelerate combiness, the spectra fracpoint mentions and the spectra acceleration of the estimates of the spectra acceleration of the spectra that, under spectra accelerate combiness, the spect fraction estimates or executive transformers, the spect fraction estimates are spectra accelerations and paint fractional accelerate value for the spectra acceleration of the spectra constitute or executive transformers and paint fractional constitutes are spectra accelerations and paint fractional constitutes are spectra accelerations and the spectra constitutes are accelerated to accelerate accelerate accelerate acceleration acceleration accelerate acceleration acceleration constitutes are accelerated to accelerate acceleration accelerate acceleration acceleration acceleration acceleration accelerate acceleration acceleration

Station Blackout

The functions accident sensitive from what its into sillered to be int entrone event - a station Markeul A stalion blackeel is a tres of eff-site afternating current JAC power and then a subsequent failure of unity everyoes backup poer to support cooling and overgroup tably systems in the reactor and tgest fuel pixels. Emergency crews at Exturbina following the station blackend and fees of energoncy cooling chappled to utop a core matthrait from ecouring of the plant. ^{In} After the earthquake, the Fakonting shad but all allals \$2 passer and then had to transfer the electrical power in the onlyle enter group diesel generators. The transmi strack about 48 moutes tales, building the electrical equipment rooms and thereity disabling the generalters except for the one of their K. When all RC passer was holf. 10/PCD

HAPPenis, but and Plactic, Register & 202 APR ING Report. 549-3 7222 area 15

[11] Justine Californi Union. Develope an Octombia Web. artistic Distribute Nation Part Science Report 8, 2021, -Justinia 8, 23.

2004 via line, "Autor Lasta Laste Rev Can Saran of Gauting Pain Fast," Kields Reena, No.9 17, 1911

transversional systems why subjections.²⁰ SCC conclusion that are explained long times participated Second assessments systems related by as fourthered Continents, explorating with BCC and SCGRA Lowers teredations.¹⁰ Under medicanits to heavy stretchick function. SCC second Second Term is endows there as this disclocation and the factories of the new toperational and participated in sequences for some toperations and generation to a required for new toperations and generations to a required. SCC

different the 2018 JPR (builde hubbled the reed is improve electricity planning and rehability assecondering to fully understand the solidability risks, and other comparently of lengths, unplayed avhaged al these nuclear plants. West accessments have not have completed. Its The Emergy Commission studied then. the overall bigstal bimand balance in the West tre inforcemention is an insertant determinant of the sepacits of a publice, unplassed outage. Replace event power carsis and other sequents will be higher if westlern lessance supplices are small, and replace next power courts and affer inspects will be lower of these are calculate tampions. 20 Which of these conditions can be repected in future years in highly percentage. To the select that reating mined prepriate might be found to be sended. the type of replacement new would be the tubject of further analysis and include such considerations as the load lines loaded for planning, providing, regulatory approval, and combuction of facilities, as well as any polantial environmental impacts and unlightum impairmments for new replacement procession

- Networkers long Loncome, 2018 Impath longhole block lades page 14. solicité et new energy is portfild, reeparticy/releated
- 200 Daufwer Cathorn Hillion, Generalth im 2021 679 Danmitest Meximu of Gelferra Rocket Part Street (aug. 20, August 2, 2021).
 - Stellastovic berge Consumers, M. ALM Australia, 18–34, annuals at new analysis pre-Tradiustication OCC 100 2008-2004202, 102-2008, 405 (200-92).

and the Daparent guerranged arranged for delevery of annulate electric generators to the soft and favoraged regula and conjusted traffic generators from marching the clocky of soft annulation (EUC) arranged for dochery of some particitie generators, they paulo and the assessment (E). This of allow electrical docherdaries typeline as a result of the polynome dapaging the transmit and through provide

Dates Cargan and SDAD have sumprove factory flowed generative with cress line, as need an androgramal table, history a series day dieset had togely in Databa Carases ment of the institute of which generated tables are necessing their perpanden for an entropy of statute tables together from of when person entropy.

The NFC repairer that plants by capable of cooling the reactor carry and regulatoring configuration integrity for the statuture of floor to right hears." Houseves, NVC does not address the impact have see tais solarnal hazards, that it strong, and Reeding, or from maturally excerting events intelling to the loca of sector or efforte power. In addition, reserve pooling water, for teample, the back-up tacking good at trusto Carene, trivid be outerable to a mapp seture point. The NRC Task Facts recommends that the NRC strengthen states blackout mitigatus capability at all equating and new reactors for design-basis and topend design-basic external events its manple. Roots, humilaises, nathouses, furnation, fromphill It is also recommending that plant emergency plans address prolonged station blackouts and events involving multiple machine.

357 michal of Nachan Franz Diseasana, Jone of Hosel an De-Banne Kulleric at the federation death. Nacion from Jonist, 1972 (1):425, Naciona 1922, an Unit: A Nex opt-Incommut/WPC, Federation, Special, Nacional dol: Incommut/WPC, Federation, Special, Nacional dol: Incommut/WPC, Federation, Special, Nacional, Nacional, Nacional Incommut/WPC, Federation, Special, Nacional dol: Incommut/WPC, Federation, Special, Nacional dol: Incommutation, Special dol: Incommutation, Nacional Academics, Nacional dol: Incommutation, Nacional dol: Incommutatio dol: Incommutation

(Silkacitat Ingulatus Connectors, "Entering Reactio Sality in Its Enters," Jage 31, Son 2011.

to light at the extended surfages totated at nuclear our plants in Japan following major cuttlepoleter. In 1007 (Automobil) and in 2011 (Falsystems Daischill a comprehensive and updated analysis of the regulation and mitigation of unexpected, long-term, angluened outspre al one or both of California's merious plants. is monifold. Each an analysist would include an appendment of splicing for their registrement and the impacts of their studieses the example, reliability and would modile multiple California agoncies, portextarly the California 60 The California 63 is uniperte capable of manning the ingact on electricity reliability of m loaded surfagest given it's day to day speculate of the electric grill for excit of the state. Further, the CPOC would play a United rate in authorizing PGLE and SCE to secure additional equatity saidable for entroying a suttion septement, extended excluse of Diattic Cargon and SONCE. The Every Commission after wealth also a role is providing the other energy agencies and the public energy tupply and domand forecasts

Emergency Response Planning

Large-scale indicative materials releases from the Evolution Quecks suchary pairs along with high twoent of radiation summedia (be physical results of anise datary neucodilant, attracting geogets on to about 44. andres two the sole.¹¹ The patientation condemagines area in 2.000 square Manneters (100.000 heretweet).¹¹ Tablesing the neutropace, the MCC cound a travel and vesary to evolutive Advances (100.000 heretweet).¹⁰ Tablesing the neutropace, the MCC cound a travel and vesary to evolutive Advances on out. 10 diseases of Attraces the MCC tars and recommended any changes of Attraces the MCC tars and recommended any changes of the context significant yourseless that the mergeny programme advances of Datas Compose and SDRCS.

1.0

JTCher Dahue, NewYork state, ansarchist at longs Conmission's lots (K. 121), 674 weiterun, page ?

¹⁷⁰ year Martines, how many how highly 1811, 614 and stress and 704

The bills (a seeking with holocal, static, and hoad authorities as a version intergrand; preparekinger 1-bit; The Mills: and Felgers 1 Among ments (abaptered: Aprece regularities and an appendix and an appendix and an presentation and an a collocative glober would likely access and (2) a 54-wide 127 for mentioning and priforms compares the collocative glober would likely access and (2) a 54-wide 127 for mentioning and priforms the particle their second privilative glober and bard, with and an access with the comparison bard, with an attacks within the comparison bard, with an access with the the comparison bard, with an access with the barding for a station people for within a 55-wide radius at 120022, and almost \$45,0000 people for within a 55-wide radius of 2000 people.

PLET recently expansion have patiential carthpacker framage to cards and to infere a sense Tartis-Canyon candit arthor in expansion with the study conclusted that is in a damage would likely occur to be enaporty of bridges and readware serving as evacuations enables.¹¹¹ Deviced, PLAS fund that the estimate avances from 44 and an encode what enable be enabled and the study enabled readware to enable and the service of the service the enabled are serviced by partnerse accordent they are advecuated for merginney partnerse accordent they are advecuated for energinney partnerse accordent to occuration damage as intergence.

In fight of the long-range containstation and interm himmed from Plat-planes and NPCS removed and of 5-mice resource that in the PLS containstation of 5-mice resource that are real-water that adopting the second reasonable and interpret response glasses to allower. The Containstation of the plane and that and the planes are planes and the second second transfer of the production of the planes are planes to their real-black more planes are assess to their real-black more planes are assesses to the real-black more planes are assesses to the real-black more planes are assesses to the model that if well consider the impacts have multiple contact "white planes are seening such also another plane and substates are seening such as a substangular and financing.

1737 solio las nos Eneros. Russone in 202 474 Russe Ann. Resent seu 3.102 auge 3.

19 Cartana (Seg Correspond Associate Arts My 20, 201) (29 works), and 201

1756.000101

Progress in Completing AB 1632 Report Recommendations

The OPAC and the Energy Commission Releases that Databas Campon and ROMOS should comprise the AD ISS2 Bioset occurrentiality should be a traverse the the lacence reveals functioning Package and twices,¹⁷⁵ in spec 2020, the OPAC detailed Package and the samplete these studies as that the OPAC can excert the edisplaces. In terms plant relationship and, in these, plant relations, in the most plan applicability and, in these, plant relations, and these studies are studied or personant malage.¹⁷⁶ Data schemes and their relationship and the term resummership and the Units.

Seismic Studies Update

PGB2 and SG2 have provided periodic splicits to the Catogy Commission and His OPOC supporting their restance plane, and performance results of their AH IG27 Report recommended shuffer, including samous research officies; and applicate.

Diablo Canyon

PGBE comparied a study of the Shortine Fpuilt in torousy 2021 for the ANC which excertise that itsued on newsracipalic information) the plant can will stand more subsets shaking than initiated when the

ThTe-2021 CPR latter into Muthal Revail, Provident 27(2), Sen 25, 2020 In Part Tarting, Training and 222 of 4242 and 824 Tarting, Chambar and 222

1946

Nuclear Waste Issues

For alreaders, this liable Darlas Kan plasmed to civilitating fragment of part that is a primasousi folderal anxiety responsible part thaps in promessing data to increase weapons purplexation concerns in 2000. Nowever, the liabon Administration, is comparison on the the ULL DDC, tools important steps to terminate. The format application journess for a walk in specifical acceptance and a political stationals satismating the static form 4 Paccel Anomalian against tertaments provide provide application and the terminate of provide and a political stationals satismating the static form 4 Paccel Anomalian against tertaments a dipersite apties, an additional site word as found, as the theta Manufan, again them and an blood, as the theta Manufan against test.

Daille Canyor and SDNG3 have generated adout LEEP motive time of spirit nuclear back or legistra about 54 method taux annually. Through this canned Grywar iconous period, balls pained and the depart of about 4.220 metrics taux of spirit eachies bank. Through passatile 729 per plant linear entropyone, they well generate analise 1.2316 and a status of CASM methic faint 0 Hay addats 70-pain foreign releasance. Until the Under States shorters a significant or anosp taur-reache observed.

Specific best sharage issues include the sorthy of thing from strongs of light here on their and two. News funch weight affects the independent of line and hear chalding, expectably in strategies using examinant in an well as the ling-form placego using. PEAK has not performed apolicities that have been line given strategies at Datable Europe and his statement quest have well be shared westig with the folding gassmooted remounts. In FOEK has intermined a by theory for the first parts for their shared westig with the folding gassmooted remounts.

plant was designed in 1921.¹¹² As required, PGAL will transfer additional passing students to identify the asmultiplies between the Depreter and tracing inputs and monitories the existencies of Databia Chargen multiplies are needed in the system's of Databia Chargen multiplies are needed in the system's of Databia Chargen multiplies are needed in the system's of Databia Chargen multiplies multiplies with the Disposite frash. Secarate chargen multiplies and the Disposite frash to restard submarises transmittering to evolution the restard and multiplies their transmittering to evolution the secarate accessed wind and QPS monitoring stations have non-PGAL with and the accesses it is additioned a stationary frash the accesses the additionary CALL with and the accesses the additionary CALL with and the accesses the additionary Landmittand assistence framework (CACHM) multiplies.¹

SONGS

mi.

Throughkail the specularg bolony of ICHCE 2 and 3, ECC has periodically interneed the altipuopy of summic tarking margine bands are sine informations in 2018, SEX worked the SDMCE penaletistic senses hasing danders (2014). "The results are comparable to the 1939 FORM medicating that the ECRCE senses hasing danders (2014). "The results are comparable to the 1939 FORM medicating that the ECRCE senses hasing danders (2014). The results are comparable to the 1939 FORM medicating that the ECRCE senses hasing danders (2014). The sense of SCI is address basing danders (2014), there are are done SCI is address basing of senses; expering reviews the plant's senses; basing of senses; expering is used the market include relational research. SCI plants in sense in calledon." The

This Sector advantation for long of pure This sector and a 2020 L with respective Denoise Fault and the sector advantation

Hilfordient Eatherna (Asser, Sachart Eatherna (Asser) Scalantine of California Design Communitie (Al 2027 Asser) Assertmentation, Tokson's (FU)

Hauthon Lohorn Lesion, Dannisha Horking or Carliera Rackel Prive Part Lanas, Arganise is Gentres In Seri H Singa Diminise Merkup, Linga Contrastic Basia Ni 2019 LL Agent E 2011. He washe away from the reactor tool plans to real an past sharing for careful had generated during a 20 year feature ordensities.

The Indexed presentative's Black Radian Community is nethening the satural poly for notify management and has incontended a new works management glan that cash for foreigning set on more subcost geologic depend facilities and even man commid-allot stores upon fruit through facilities.

Plant Safety Issues

It is expected that places establish and maintain a work excession of where excession of put rophyers are dedicated to parting subty first. The NRC conducts isonal softly assistments of the estators' factor growp plants, including Blatin Cense and DORS. The those assistants with Faring howers parteriors are subtracted assistant of Doble Corpors hand that the place is with Faring howers parteriors are superflow, closelying and resulting problem.¹¹ MIC hand hild FIGE tays made running progenits in Missan, but news with is seening PCE2 completed is subty colore survey in Entrary 2011

Diable Cantern, many 1788, kus had an independent synthy committee, restatistics (by the CPUC paped of a settlement agreement exceeds by FPUC Di-Dencies of Rathpape Advancetics, Catherina's Attorney Fareward, and FSE. FEAS Institute That the United Canyon biologenetic Tarley Committee DOCKC1 is providing multiplication tarley committee DOCKC1 is providing an associated in 2011 of the instant branch providing an associated in 2011 of the instant branch

2539C March M. Tarray, Array Responsibilities & Santa Days, Mech 4, 2011

201 Lanet Stran, feetimory of sets 25, 2021, 1074 weekshuik.

110

venues, of which will be provided to the MAC as part of its regulatory process.

To correspond the seriodic uncertainty at Guilts Compare and SQNCS, ULCS Saw Cultures to Designari Sorrary accentrists have incommendent adolfanant studie et al. desiding acceler builty and Determine sessions of the design acceleration of the sectors of the adoltant biol Compares Communication examination of the International Compares and the adoltant the Compare International Programs for access adoltant these are validicent theory macpine of the planet to another theory pairer distantions.¹⁰

Tsunami Studies Update

Dable Canyon is increase on top of a top constal birth of an alreadow of 25 line of above mean true line(17 SGE 12 speed objects hand in the a combined transmis show more, and total mean length of above 35 birth². The housane installation Maps show the ghost the enclose the transmis installation mode.²⁰ To 2018, PGAE published a charty of transmit Sacord for Dable.

- Historist Status Interpret Lange Witten Deventy Journey of Gatheaute Neurole in Gatheau and Gatheau Noviel Keyle & Melving Decetories, Proceedings of USE Impagate Aprils Appendicionalities - Kanan Intern Hecking, Jone 12, 2020.
- Bildarbera beingen Garry, Drin Hits, promitignal it tre being foremainth key N. 2011, 474 webbing, www.energist.gov.2011, program (physical w/s/HELEP 24, webining transitione).
- 30 Carbon Swap Colonado, 200 KP Konto ago 10 30 Pacillo Sei and Extra converts in the Loy 3C 2012 APA internet, page 31
 - Hildesorty vessel is to Cartonic Energies, Response Ages, Californi, Sangera Surey, ext to Develop et Samer, Californi, Carigora Durin, etc. In Controls of Samer, Californi, 1

al Diathi Canyol in the contact of unions: hazants, it specificated that the plant can inpende and to 40 years, of editorial, without the premained Nermal chara periag a Union to plant solvly that world version NEC separations.

For many years, SUNCE has been writer NPC scrutery to failure to address several tergstanding softh caller inset, its March 7 2003, the NRC card SDNCS a "Chilling Effect" Alter in serger to employent expressing difficulty or Hability to and the correction action program, a lack of knowledge or michael of the Bacteur Safety Contoints Program, is redultariated case of a supervisor proping a chilesi work an immediate limit work group, and a presented Har at intaliation for solving tably calentee, During 2009. The NRC received an elevated marter of salida scient work environment allegations from 30NGS The MPC conducted house group interviews with sheet 400 workers in 2010 and hund "a continued degradation in the tabley concents work environment." The NRC adviced SCI, that these results polycebally affect west safety-indust aver straining human performance. The NHC has raised they inter in terms secondry tably storement pressit. However in September 2013 Johnsong MRC's impactment at SDND2 and a significant reduction in safety sature Regularies in 2018 and 2013. NRC dependent that SDE has made reasonable progress in addressing The worker safely dailtare issues. ²⁴ MPC will partition to monitor work promonitod conditions of SONCE SCE kas stated that it is conmitted to preserving and inserving a shong tably softer at SONUS and ancountering working to rate nuclear subdy concerns.

19MC intern Principality, 1942, Sprinter & 2012

Compose³⁴ while considered the contented effects of transmiss, starets, and takes and include the effects of admicrosic lead/object, which were not precide and contented in the Death Composite insuring analysis. At these takes and additional effects of the Death Composition the avarantic excision risk the Death Compoantigens. At do not Monthly was associated that a admictant deates basis. PEAL concludes that a admictant learns basis. PEAL concludes that a distributive star work admictant to the transmis generated by a stars local submarks to-thicks with a large starts work would bead to an americantific surgestimation of respond.

SEE and NRC workshot the Tostani dut up and mandarises for SIZARIS during plant licensing. Area vecent accessments conclude that. 1. Jarge local plants frontantin could be potential by methanismi other than these considered during licensing for SONES limits 2 and 3. We basis for the 1995 SEE report." However, SCE reports that we local run-up challes based on these machineses are walkly agreed upon, and certainly nove for the SONGS site enalty of Southern California, in conjunction with the California Energency Management Agency, in preparing fourtures ranking maps for Sale Diego Grundy. hat May are not surrently available " The princip for landblide generalest framamit is uncertain, and SCC reports that additional studies are required to incidently how starts transmission when school SCINCS. It make approval of funding to portion sublitional primalogical and Wangel shades, as recommended be the Energy Commission in the AD 32.37 Accord."

- 2007 au 20, Canard Control, Martinessay for Propagation Transmission Assert Analysis, Trax Agaitation for the Static Cargon Prover Prair Day 2016, April 2018, account, at proceeding-static transport Specific Specific Control Specific Control Transport Specific Specific Control Specific Control
- ELICATION CONTRACTOR MUNICIPALITY AND ADDRESS OF ADDRESS AND ADDRESS ADDRE ADDRESS ADD
- (10) Southern California Castors, Response in Boothers, An Ann Ch. 2011, Workshood, August A. 2011, pages 3.

In Petroary 2011. 105 prevented as splated tratass taxed analysis to the DVIC and the Long Commission ^{more} the mag provides a "modifie assertion from the taxed analysis of the DVIC and the Long taxed taxed as the taxed as that taxed as that taxed as

Studies of Seismic Volnerability of Plant Components

In March 2020, a PGAF report evolution the postability of a principal part distributive inclusion. In Dates Conum Yom Konegold revealably extended interfactors franken, and comparative RCC. The report conclusion that and the 15Co are dissipant in the appropriate sensor control-You will five report conclusion de sensor control-You will five report conclusion acceleration and the report and five report acceleration and a 7.5 regulation that the report form from tigstion on.

- (Elizaber to Michael Name, Practical at the DNL, NET & Entryation of Science Contents on MI (KL) Name Recommendations, "Agginetic E, Palmory Y, 2013.
- Herbytana Wasser, and Arrengtion Informations. Earliest Darings & Songe Leiflores Offer of Programs Devices and the intervey of Southern Editoria Theorem Process Conter, "Twenter Institute Weig to Designing Processon" continuous from 1. 2009.
- This manage of the lower law write length of each role law sharehold over the National Total Denvel Sport.
- Different Device, nr., Societ Associated Visite Gapet New York No. Galaxie Distance, Sparse, ed. Generation, West 2013.

112

SSE tomotelind a schole his skottet any "sequetion to executivity," investiging unitational SSE must accele contra a periodicipit addaption of SSMES from a surpose acceler.¹⁷ The state yieldshift theme explored for parse presentation, which are considered insportant to wilsolidars. Additionally, ToC evolution the sourcement block behings needed to surgard prever generatives. SSE constrained for their exploration to access the service capacity of stitules discharge conducts and important on their headings in Appart 2011, "In

322 has not performed studies of the hispaty of manufacty initials 33251 when initialized for setting or plant monitorances had and perform shadles for plant specifies conditions.

License Renewal

NRC issues spectraling knownes for commercial paper trachers for an In 42 years and adjuss 220 year listness relativistic view of a point a first workform of internetial will explore in 2022 SONE2 Units 2 and 11, in 2024 Goldnis Unit 1, and a point workform of the 2024 Solumitized a locarse ensuel application for Distle Campus in Neuroscie 20, 2020, first units a parentime and 2024/CSA. In June 2211, for RRC transfer Units 240(2), in 1998, 2211, for RRC transfer Units 240(2), a low 2211, for

- 2073 actions Lathoris & Bourn Inter, "Forceastion of Cartonia Bready Conversion 401 2010 Space The conversion on a starting to the UVC and Foreign Constraints of Antopology 2011 Eliter option on "Strates Relateding Lowance" with an impartical provide product ALE-Antopology of Eart Related Topology of Eart Related Sciencesing Datase Related Provide Constructions (Sciencesing Datase Related Provide) Constructions (Sciencesing Datase Related Provide)
- 2005/scheme Carterine (Source at a rether to Michael Papersy dynal Angele 1, 2012, regarding at a conservative of the compary sources cancerby constants that the offensive topology can dedit "--want to magnitude is a service in their integrity of and the 20142, "--want theory and paper window of the the cancer of combined comparison of want would not the the cancer of combined comparison."

Seismic Issues

 PCLE shault preduces 4 tomity number to the Lengy Commission, the CDVC, and the independent Procemens Parel (PDP) the technical details, and any opplication patters of their propertial below. Named status priors and findings for Dable Campo.

 PGGE should submit to the Monie Lafety and Genrung Mond (MLM): as part of PGGE's features regard to the AGLE or the Databa Castron Enrures or sensal proceeding, the findings and retimmendations from the California PRP on PGES's series challens. These challens include PGGF's machine and etholities insteam function facilities for VCD Enrices 33–84. 400 x 100 process 32 and the VES of VCD Enrura and etholities.

The CPUC shared establish a SORGE PRP. menganative following county PRP. In molecular isolance haused having years and headings as recommended in the ADDI KPP (Update SCX theirst provide in a beeply manage to the Longy Commission. The CPUC, and the PRP the todowcal intellia, and any implicitual quidates in their proposed torower, haused their prime and therings for IDMAS. SIG: found in cludy the PRP's maintainers, therings, and recommon detects in the PRP's maintainers. The IDMAS is and software to the ADPC Contensity. WPP's for PCAC's and SCC's service students for Datasis Complexities.

SEC stand orchait profile representation on ets SUMAS Spanne Advance found of entrywood onlying experts with an current or prior professional approx.experts with an current or prior professional approx.experts with an current of PCC s SUMAS factors. Advance fract of addression of SEC s SUMAS factors. Advance fract to addression of SEC s SUMAS factors. Advance fract to addression of SEC s SUMAS factors. Advance fract to addression of SEC s SUMAS factors. Sumas SUMAS factors.

 PC32 and SC2 sheald provide updates so their property in completing the AB IX32 Report House, mended lations: studies to the Every Commission pr part of the 2012 AVM spotter.

Spent Fuel Pool and Independent Spent Fuel Storage Installation

 PEAE and SEE should investigate adding substymidiate orderware/grine incapation of withstanding durings handy substantial planometars for another in the samities and key quint for parameters, for example, acade sees, longerizers, and underlaw lowers, during a lowers account on which radiation lowers while the speech radiation lawers

In induce the volume of speet heat packed with through point, and paragraphic that packed with us available to disport all in the word of an available or valuation by disposition of the packed and statistically. PGEE and VEC, as some an predicable, should be another speet fact from point load by calls, which month and/or paneling with MAC, speet heat cash and paid shough myakement and report to the hearge Conventions in the 2012 ACM signature thes projects.

FIGLE and ECE should evaluate as gains of the AUE AVE (build), the photonal back time impacts and proceeds could at quark that Augs in packsental, thy cash should not have been as a photon whether packed pools, and the photon is departicle of balls and packed profile, the two of balls are and dry should pools.

Station Blackout

CEC and PGAE should report to the Energy Commotion, as part of the //EE RVF shoulds, no appears made to addressing the losses learned from the stricture listicistic of shouldman part of the set of support they plants are to withstand satisfy a station blackast listing linguistic and scores lings. This includes reporting at any significant changes, including estimated refl, arrested with NRC requirements to address? application.¹¹⁴ NVC has performed its Annual seased proceeding by 52 months to allow time for FGAL to complete the additional sensors studies. SCE has not of topical for sensoral and will conduct to control at finance to the topical part will control to control at finance to the topical part of control for the topical biolog.¹¹ = NVC Assord topical research to fully here topics. 1.2. and a finance research to fully here topics. 1.2. and a finance.

A major concerns in whether this legiture reviews it antipacting patients (court reviewant in Carliers as including sension contensibility). He MC increase reviewal traview practice delensions whether a glust ment; the MCC increase meansuratarily and applications of patient increase and a memorymodul application increase patient increase and a memorymodul application increase a skattlened 25 provi at glust appendixe. However, the process convertigently excludes to take take to service where adding, plate values adding is forward adding).

Secure Catheria actionat Anier reported the NRC for approx a broader large of insure during matcher appeng pick Remere network belowes. That are of parcians for Catheria's specialize gatests. These many security applications tablety reasons, assume and humane hardeds, entergoncy resonance gatest and execution temienes, space sociality, and parent hard stratage. MRC selenable intermented that the reacting regulatory primary and a submitted of that the reacting with its submitted of specificary reactions. ¹⁰

Dathenia hus a leptemphe elle ili territor removal decisione ili dei foscol authority fui fet theteciste poreation priorites trascel on removier, relability, and movessionedati compress. Delle altibere most ilitazio CPUE appensal le parsate lecence consult before.

2019 Anton Reporters Devention, Date United Report Anton 10 to classic Annual of Partic Depth Rocks Prior Party Select and J. (1991) 2010, and and a database inc. promotely 2010/04;21550(2) and

REFLECTION CONTRACTORS (CONTRACTORS) (CONTRACTORS) Terring and Researce Descing, which this material matrice true submitted datas to task (201) and tai (201).

BELATE IS TAKEN TAKEN TAKEN TON METALAMINE Tempory technic August 10, 1021.

station blacked. If also includes an approximate for eccentrage energients lacking generation and hail, enquanding for enaligies and benchs, sectionable and Recolorg perioded sequipments, and addressing the locations learned from Fubershims.

 PGAL and SQL should report to the Teerge Commotore an the adequary of twiend annula, explorent, and observal support, including willing agreements, the previding interplays prever appropriate and hard for handling an included station blacked.

Nuclear Plant Liability Coverage

Based on the Fakythma experiences, FGEL and 522 shadd provide a samplethenoor study to the Csorg Commission, as part of the 7017 XPR liphth; an the adepace of Price Antomiss Act liability powerage for a struct amount of Outlin Carpon of 50405 smalling in targe athibit integras of radioaction materials.

Replacement Power and Reliability

To support long term energy and contingency planning, the California ASS both support here PCAR. SSE: and planning staff of the OPAC and CRCs should regard to the Energy Colomoscian is at just of 40.7021 OPR and the OPAC as part of the SIELL Long-form Platmenter Plan on what are generalises and/or toerescores technics would be revealed to energy haim system and/or local reliability in the overt of a long term and/or local reliability in the overt of a long term and/or all blatic Courses. SIMES: a Paol Interd. The attilies should require to the OPAC or the estimated parts of these facilities.

 As a contriponcy in the overt that Diable Gauges and SOBGS experience a tong-term subapt following a major sockers or other overt, California (G) with super trans the Trange Connections and DPOC, or cooperpreceiving California raispane funds to clean the casts of the NNC locens applie dise present. In addition, the California Caudial Commission must reveaw the project for constructions while the tokes i Calestal Jone Westgement Act.

The OPOC puscillars whether it is in the best in tarent of calopsance for the societar plasts to coreman spatialism another 30 years. Its precedings address notion that are important to electricity placeing has are not included in NRC's locator renewal system such as the cost effectiveness of loonse reserver company with physiological in letters to PGM and SCE in taxe 2005, the CPUC viversist that the abilities mult address in their feasibility assessments of lutars label in the AF 3622 Report and that the intrination is rended to allow the OFUC is property undertake its obligations under AB 1612 to ensure plant soliability and to turn, enjury god mitability in Nement Dublic Caryon or 30NGE has a prolonged ar premanent outage."" The attractics and transforms of the utilities completing the AB 1633 Report recommovaled studies are critical to the CPUC's ability to make these decreases, litzener, the utilities' escent progress reports indicate they are not an activitie to conside the additional All 1632 Report serves. mended tollows: hacan's shades antik 2013 (PSSE) and 2015 (SCI) at the earliest

Recommendations

In light of the acciliants and/or plant stratowers billweing and Hopasters of Faivethinna Disactic (2011), Kachinacajak Karina (2007), and all the Narth Anna mother plant (Angust 20, 2011) and other comotion aform, the Chergy Commission, is accounting with the CVCC, recommission to the failwarg:

Bill anter han Dhill in Kan Farin, 122 of Lattines Galdweig Hann, Joni PJ, 1999, Later han Dijd, in New Datase, 024 of Nacio, Dis. and Nucleic, and U. (2018).

100

bes with PEEE and SEZ, wheeld hurther evaluate 11 the averthabities of a long low line. A last charter of some therais phote, 10 the online to stack solution that would in resemptional could be solution by the long to some invariant and/or could be long that would in resemption and photes of evaluation to adding any extension prices gains. A constrainty the along form photonic and photes of prices at the CPUC should be availed to research that any regulationed invariants have reference through these tables are sequences from references through these tables are sequences in a body wave.

Emergency Response Planning

The DFUC should approve functing for CarLUSU[®] or the affector equation to realiable the advances of correct encoded on and averagency planet, entering encoded on and averagency planet, the subspace of a very planet, and traffic planet, and traffic planet, and the planet

 The California Department of Public Hoges through evaluate the adequates of equipment, staffing, and/a glance reactiving, and models to departs a style have unit events of the Dakte Canyor is SDRDS, strays making stafficture intrivers.

XII Superior Report 2 and a second 2022 (101) to appendix to a CARWA of a second 4 or of the comparing discription for Superior to second copyl (copyright Supplications) Waters Superior Report Report (copyright Supplications) Waters Superior Report Report (copyright Supplications) (Copyright Supplic

Fukushima Lessons Learned

 PGAL and SQC shield equal to the Energy Cast section, as part of the 2022 dOVE statute, and the OVEC on their program and estimated sorts in samyping and the examinantiations at the ARC Root-Same Guantinia Lask form Appent.

PEAL and SEX strend report to the Every Connections, on part of the NOV AFP Under on the advance of increasers, theiring, and exceptions to compare the twening lated every twenties and strender construct with related to increase every teachinguise. Touring, first, or tourismit attack, the society, the substitution of tourismit attack, the society, the substitution of tourismit attack, the society, the substitution of the strend attack, the society of the strend attack services and wellemingent calculates sensed to the services in and wellemingent calculates sensed to the services in and of the substitution of the strend team statismit thereing a relation supported team.

 The bill's should expeditionally more toround on the Post cylesteria Task First improveduation, performant interactions

Relicensing

To fairing service platel reliability and mission certs. PELE and SEL should complete the remaining AB 1522 Report recommendation service. Lettings and make their heading countries for an evaluation of the Confer-Community, EPUC, Carittenia Coastal Commissions, and the NMC during their research of EACL's cont SEL's, it from gaugity license research applications and malerial certification, SEC should not find a Sciences insured application with the NFC without plate applications provid then THE OFEC. • Deep the regalation phanges and requirements reconversed by the INCE Dear how has low force on Folgethen used would be higher counts. For example, summer, whether, PEAR and DEX should provide and estimates to the CPUE for complying with INC's requirements, and the cashs of phenolitic regularement power is this evolution of an antitudinal and age. The OPDE should associate these autilitational could drive dry. Internat associate these autilitations for the Count of Manual associate these autilitations for the Count of Manual associate these autilitations for Diatos Caupito and Divers. A MCC and phenolity for Economic network of the Count of the Count of the output of the Count of the Manual associate the count of the Count of the output of the Count of the Count of the Count of the Count of the Divers. A MCC and the subjects for Economic network of the Count of the Divers. A MCC and the count of the Count of the Count of the Diverse of the count of the count of the Count of the Count of the Diverse of the Count of the Count of the Count of the Diverse of the Count of the Count of the Count of the Count of the Diverse of the Count of the Count of the Diverse of the Diverse of the Count of the Count of the Count of the Diverse o

The NPEC thread using its discusses an isomer minimal applications peeding simplefrow of the proff-lation of the lation beams of hidden NPC's locanmound review to Galain Campon and SOVCE (1752) applies for lation resound stand reviewe adulted site applicits reformalise or sounce and transmit Audret), energying preparations; and transmit harden, transpergy preparations; and reviewed on terminage, tessare based then Fakachten, specifield instance encoder onlines for adultation affairs of Statings from Fakachten, stating affairs of Statings from Fakachten, stating affairs of Statings from Fakachten, stating.

Plant Safety

116

 PGR2 and SQE should report, as pert of the 2502 style (pidde, on their inflates to improve the safety callsee al Coulte Campon and SCINCS and on the NRCK exclusion of their and percent pixel partnerses.

 The CPUC shault curvaler establishing a SDNCS Independent Subjectmentation, modules after the Digital Carpor nanyoednet Subjectmentation. In presider an independent subjectment standing presider and subject events of SDNCST tables predictations, and fullow only the feature learned from the (electronic Standor State).

Continuing Activities

 The Lange Connections will contrast to most for reviews of Pathle Coupon and SINGS by the NWC and the institution of Machan Prover Eperatems, in particular, the Energy Connections will mather plant performance and tarity college at bath plants.

The Lange Connection will profile the resolution to the billion wave wavegeneed program and oppresent Calibratia in the fracta Workshot Interneting proceedings for the event the protection terreneting to the event the protection terreneting provide and upon the fractangentation impacts to the fact.

 The Energy Construction will continue to partempate in United States Department of Energy and state regional planning activities for end-trai works transportation.

The Everyp Commission will custimar to implicit advantation on the competitionary custors for guars? of 5th regime economic and environmental implicits of textcar energy quarties compared with advancation that seededs impacts there economic anomal, man for competitions, that functions, models querefore, monitoriance and trapics rescher composer registere ment and dispared speech fairs strange. Variagent and dispared discontractions, and "friend droiges hares" accelerate schedules are instranced states litestead trait dispared discontraction.

107

Acronyms

14	Annual Ref.
10	Augunkhy Bull
AC	attainating current
460 7811	damual Exercit Buthox 2011
ARC	Application for Certification
ADP	Air Quality Ingrovement Program
MB	California Na Resources Board
ARTYT Program	Alternative and Revenutile Fuel and Vehicle Technology Program.
ANSA.	American Recovery and Reinvestment Act
RO)	battery electric solution
HLM.	Barnas of Land Management
CalUR	California Environmental Protochen Agency
CALINE	The Department of Forestry and Fire Protection
California 159	California Independent System Operator
Calmans	California Department of Transportation.
00000	California Community Enlinges Observation's Office
CCEF .	California Diear Energy Future
0.2	California Energy Demand
CE1001	Centry for Europy Ethckney and Renewable Technologies
CESA	California Environmental Duality Act
DIP.	combined haid and power
DNG	compressed natural gas
CCDH	cortise disside equivalent
CMUS-	California Menopal UNITIES Aloncation
CPUC .	California Public Utilities Commission
079	concentrating photoentax:
CRE Z	competitive reservable energy asses
C54	California Satar Initiative
0.10	California Lighting Rectineings Canter
00	indeducted generation
24E72P	Desert Respondle Energy Conservation Plan
11588	demand side waragement
138	30 percent othered
EBD	Enginyment Development Department
12	reverse and the second se
EME	Libran Mission Energy
638	Earry: Warmalian Administration
(MEV	evaluation, measurement, and verification
175	external power supplier
1725	consignity planning most
1.00	Energing Browsshies Pengram

1.17 124 14 104 111 110 111 10 045 125 **Gen** HOCO INIC £P. 12.75 1014 100 1.6DWF LOFE 108 120 180 115 1.177 MCF UNIT: line: MMT. 101 MIC. 10h hts: wesh 100 NIDO MIL Nint NSR HOM: 14 24

in

Instrument Training Panel estimated altimate recovery stocky using to luci sell vehicles Residle-fact which: Faris and Transportation Diversion full-little equivalent ganine galas sprivaled prestaute (25 pictul petitioning sythes algorith hoursal High Carbon Infensity Challs Dills teating, ventilates, and ail conditioning Idependent Unings Producers internation (name index Report investion-owned utilities independent Peler Review Panet Los Augstes Department of Water and Power Low Carbon Funi Shandard incal tagacity washesenty light enabling date **Appelled salural 200** had serving entity Long-Term Procumment Plan 1006 cable: feel at natural gas million British Stermal units million cable hut million metric from Market Price Referred represention strops with natural gas whereas Net Hazardisel Geosidary Malarian Nuclear Regulatory Commission Natural Resources Defense Council WE Loop Now Solar Home Partnership New Search Review orginal regipment manufacturers Draw techning Recenting fador Including televisional men through cooling

245	Policy Stiviney Trans.		
MG	Falls Advisory Great		
224	Public Gards Diarge		
152	plug in electric setucle		
PGAR	Pacific Gas, and Linctric		
INEV	plag-in hybrid shehre which		
rntia	particulate matter of two movus manufactor		
PM25	partextate matter 7.5 micros diameter		
1101	Public Interest Energy Research		
Phase-RTDM5	Phator Rual Sina Dynamic Mandaring System		
PTN.	power purchase agreement		
PSRA	prohabilities recome hazant analysis		
PV.	photovitae		
0	qualifying facility		
160	research and development		
4010	research, development, and demonstration		
READ	Howewable Courgy Action Team		
RESCO	Resewable Energy Secure Community		
HCD.	Research Largy Transmisson Initiative		
2.00	Nerewalke Fairly Standard		
MT12	Reservable Foris Standards 8		
APS	Revenables Particle Standard		
BWC718	Rice World Cas Trade Model		
3A	Dialt Assessment		
38	Secure Bill		
SEAGINO	South Coast Air Goalds Management District		
50	Saviters California Edition Company		
SDG&A	San Diego Gan & Olectric		
SOP	Salf Generation Incentive Program		
SMOD	Sacramente Manicipal URA/y District		
SUNCE	San Drotte Nuclear Generating Status		
5508	structures, systems, and companies(s)		
SWRCB	State Water Researces Central Beard		
3.9	frillion public feet		
105	fatal Wissolveil suites		
FCCAA.	Uniform California Earthquake Risplane Frencash-2		
11.2.006	Unded States Department of Energy		
ILS_UPA	United States Environmental Protection Agency		
6505	(Derled States Geological Survey		
YOC	volutile organic compriseds		
25.0 25.0	Zero Emocione Vehicle		
196	war-ver-seedb.		





Geothermal Resources

California has the largest geothermal production and technical potential of any state in the nation with an installed gross capacity of 1,870 megawatts (MW) and an estimated technical potential generation capacity of between 4,255 MW and 4,825 MW. Geothermal is a base load resource. Developing currently untapped geothermal resources can contribute significantly to the Renewable Portfolio Standard goals

Existing geothermal generation is conentrated in 7 Known Geothermal Resource Areas (KGRA) shown below. New technical potential generation capacity is predicted to occur in these and other KGRA's. All of Californa's KGRA's are listed below the map with their existing estimated technical potential generating capacity. The exisiting, technical potential, and predicted capacity in 2020 by county is available on the <u>potential by county page</u>.



Geothermal Resource Area	County	Existing Capacity (MW)	Most Likely Capacity (MW)	Predicted Capacity (MW) in 2020	Ext
The Geysers	Sonoma, Lake	1000	1400	1400	Pot
Salton Sea	Imperial	350	1750	1750	Ene
Coso Hot Springs	Inyo	300	355	300	Tra
Heber	Imperial	100	142	142	Ana
East Mesa	Imperial	73.2	148	73.2	D 20
Mono - Long Valley	Mono	40	111	40	2
Wendel - Amedee	Lassen	6.4	8.3	6.4	20
Glass Mountain - Medicine Lake	Siskiyou	0	304	175	20
North Brawley Geothermal Field	Imperial	0	135	135	SITE
East Brawley	Imperial	0	129	129	ABO
Sulphur Bank	Lake	0	43	43	1
Niland	Imperial	0	76	42]
Mount Signal	Imperial	0	19	19]
the second se					- T

HOME

WIND RESOURCES ANALYSIS

Altamont

Pacheco Pass

San Gorgonio

Solano

Tehachapi

Animation Overviews

Wind Map Viewer

Offshore Wind Overview North Coast

Middle Coast

South Coast

San Diego

SOLAR RESOURCE

ANALYSIS

Solar Map Viewer

Potential by County Solar Profiles by County

Seasonal Variation

or and the second second

GEOTHERMAL RESOURCE ANALYSIS

Geothermal Map Viewer Potential by County

BIOMASS RESOURCE ANALYSIS

Potential by County Land Use by County

SMALL HYDROPOWER RESOURCE ANALYSIS

Potential by County

Runoff Variation

Streamflow Data Sites

COMBINED HEAT AND POWER RESOURCE ANALYSIS

Existing Capacity

Potential by County

CHP Map Viewer

Energy Prices

Transmission Impact Analysis Overview

Existing Sites 2020 Utility Wide

2020 Summer by County 2020 Spring by County

2020 Fall by County

REPORTS & DATA SOURCES

BOUT - CONTACT

https://cairenewableresource.llnl.gov/geothermal/

1

	Totals:	1,870	4,825	4,255
Saline Valley	Inyo	0	0	0
Lassen	Tehema, Plumas	0	0	0
Lake City - Surprise Valley 2	Modoc	0	0	0
Bodie	Mono	0	0	0
Sespe Hot Springs	Ventura	0	5.3	0
Glamis	Imperial	0	6.4	0
Superstition Mountain	Imperial	0	9.5	0
Dunes	Imperial	0	11	0
Calistoga	Napa	0	25	0
Lake City - Surprise Valley 1	Modoc	0	37	0
Randsburg	San Bernardino	0	48	0
South Brawley	Imperial	0	62	0

Click on a geothermal resource area's name to view it in on a map.

The resource potential figures shown here are based on data described in <u>Geothermal Strategic</u> Value Analysis CEC-500-2005-105-SD and <u>Intermittency Analysis Project</u>: Appendix A, <u>Intermittency Impacts of Wind and Solar Resources on Transmission Reliability CEC-500-2007-081-APA</u>

LLNL-WEB-409390 | Privacy & Legal Notice



Lawrence Livermore National Laboratory 7000 East Avenue + Livermore, CA 94550 January 28, 2010

Operated by Lawrence Livermore National Security, LLC, for the Department of Energy's National Nuclear Security Administration



CA.gov | Contact Us | Accessibility | Grack Links

Search

This Site California

HOME ABOUT US EFFICIENCY FUNDING POWER PLANTS RENEWABLES RESEARCH TRANSPORTATION



Home maps renewable geothermal areas

California Energy Maps

List of All Energy Maps

Map of Geothermal Resources in California



Updated: 2005

You can also download an Adobe Acrobat PDF Version of this map (1 page, 440 kilobytes)

CALIFORNIA GEOTHERMAL RESOURCES

IN SUPPORT OF THE 2005 INTEGRATED ENERGY POLICY REPORT

> Elaine Sison-Lebrilla Valentino Tiangco

Research and Development Office Energy Research and Development Division California Energy Commission

DISCLAIMER

-

This paper was prepared as the result of work by a mamber of the staff of the Colorera Energy Commission. It does not necessarily represent the even of the Energy Commission, the employees, or the State of Calduria. The Energy Commission, the State of Calduria, the serphysee, contractors and subcontractors make no warrant, express an implicit, and passume no legal labelity for the information rails not incling upon providely contracting. This paper has not them approved or disapprivate or disapprivated legits. This paper has not them apprivate or disapprivate by the Calduria Energy Commission in the tables. The information providely contract legits. This paper has not them apprivated or disapprivate of the Calduria Energy Commission for the tables.

> APRIL 2005 CEC-500-2005-078

Staff Paper

Keywords

Geothermal, dry steam resource, liquid dominated resource

Abstract

California has the largest geothermal production and potential of any state in the nation with an installed gross capacity of 1.870 Megawatis (MW) and an estimated potential generation capacity of 4.732 MW. Even though geothermal electricity generation has adoclined in the past decade, an estimated 2.862 MW of generating capacity from geotherman may be available for development. Certain drivers have emerged to encourage the development of geothermal resources. The California Legislature adopted the Rinewable Portfolio Standard (RPS); the federal government has made a production tax credit (PTC) available to new geothermal generation facilities. Geothermal resources can contribute significantly to the goals of the RPS.

Introduction

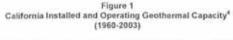
California has a tremendous supply of renewable resources that can be harnessed to provide clean and naturally replenishing electricity supplies for the state. Currently, renewable resources provide approximately eleven percent el the statil's electricity mix.¹ California's Renewable Portfalo Bandard (RPS) established in 2002 by Senate Bill 1078 (SB1078, Sher, Chapter 516, Statutes of 2002) requires electricity providers to procure at least one percent of their electricity supplies from renewable resources so as to achieve a twenty percent renewable mix by no later than 2017. More recently, the California Energy Commission, the California Public Utilies Commission and the California Power Authority approved the Energy Action Plan (EAP), accelerating the twentypercent target date to 2010.²

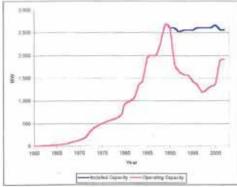
The purpose of this white paper is to provide estimates of the geothermal resources located within California and potentially available for use in meeting the RPS and EAP goals. Estimates are provided on the "technical" potential (i.e., unconstrained by economic or environmental requirements). This information updates and expands upon resource information provided in the Renewable Resources Development Report of 2003.³

Short History Of Geothermal Development In California

Currenty, California's geothermal generating capacity is approximately 1.870 MW from both dry steam and liquid dominated resources (see Table 1). In the state, 46 geothermal power plants are widely dispersed from north to south (see Figure 2). While most development has occurred in The Gaysers, the Satton Sea and Coos Known Geothermal Resource Areas (KGRA) both have considerable installed capacity.

Over the past decade, geothermal resource use stagnated considerably and the geothermal industry has retrenched. As illustrated in Figure 1, installed or namepiate capacity peaked in 1989 at 2,666 MW. Since then, both installed and operating capacity has declined due to plant retirement, and more importantly, operating capacity has declined due to the reduction in steam flow at The Geysers. This decline, over 1,300 MW in 1988 at the nadir and approximately 640 MW in 2002, has had serious ramifications both to the geothermal community as well as stable power supplies to Californian. In the following aecidons the discussion focuses on the individual fields and status.





A Dry Resource-The Geysers

In the late 1950's, companies such as Union Oil Company of California (Unocal), Magma Emergy Company and Thermal Power Company initiated full scale commercial development of vapor dominated geothermal at The Geysers. These companies produced steam to the Practic Das and Electric Company (PGSE) electrical power generation grid. Since then, The Geysers has developed into the world's largest dry steam resource with almost 2,000 MW (1989) of installed electrical generating capacity and is the only dry steam field that is commercially developed in the nation. The Geysers geothermal field reached maximum steam production of 1,866 MW in 1988 and today. The Geysers retains a peak capability of nearly 1,000 MW.

Since the mid 1980s, The Geysers reservoir has exhibited the effects of heavy steam withdrawal. Steam pressure, particularly in the central part of the reservoir, has dropped much faster than was originally expected. In many existing wells, isoam pressure has declined from the initial 500 pounds per square inch (ps) in 1990 to less than 200 pai, shortening the wells' useful life and hastening the need

-2

A liquid dominated geothermal resource was developed in November 1979 for a power generation plant, at the East Masa field in Imperial County, which consisted of a binary application using isobutane as the secondary working Ruid to turn out 13.4 MW of electrical power.

In June 1980, Southern California Edison (SCE) began operating a 10 MW experimental power plant at the Brawley geothermal field with steam produced by Unocal. However, after a few years of operation, SCE and Unocal ceased further development of the field due to corrosion, reservoir uncertainties, and the high sallerity brines.

In June 1982, Unocal initiated electrical power generation at the Salton Sea geothermal resource from its 12 MW plant. In 1982, Unocal added hav additional generation units for a total gross electrical generation of 83 MW.

In late 1985, Magma Power Company (Magma) began continuous production from their first 40 MV power plant at the Salion Sea field. Within a couple years, Magma added 3 more generating units that brought their total to 145 MV. CalEnergy Corporation (CalEnergy) bought out Unocal's and Magma's operations at the Salton Sea, Today, the entire Salion Sea field operation consists of 8 power plants with 298 MW capacity.

CalEnergy and Calpine Corporation (Calpine) planned developments in the Glass Mountain KGRA but were initially halted due to permitting issues related to destruction/disturbance of habitat and conflicts with Native American spintual beliefs. Both projects eventually received permitting approval from the Bureau of Land Management (BLM) to proceed to the development stage.

The California Energy Commission awarded Calpine \$1,108,000 in June 2001 to drill an exploration well in the Fourmile Hill area of the Glass Mountain KGRA. The project was completed as of June 2003, but Calpine encountered a geothermal resource at a temperature of 411°Fantenheit (F) at a depth of 6,860 feet with low permeability. The well can only produce 22 kilo pound per hour (kph) steam and 105 kph total mass flow at a welthead pressure of 14 pounds per square inch gage (psig) which is insufficient to justify developing the 48 MW project. In addition, legal action against this project has been filed by the Earthjustice Environmental Law Clinic (Earthjustice) at Stanford.[®] The status of this project is uncertain.

us project is uncertain. In October 2001, Calpine acquired all of CalEnergy's interests in Glass Mountain KGRA, including Telephone Flat. In May 2003, the Department of the Interior issued a site license authorizing the operation of a 48 MW geothermal power plant in Telephone Flat. Calpine has all major permits to develop a geothermal power plant at the Telephone Flat Prospect. However, current legal action by Earthylatice and the Save Medicine Lake Coalition leaves the status of this project uncertain. for make up wells. This condition is due to cumulative over production. In many instances, the additional supply of steam by new make up wells has proven to be insufficient to maintain the driginal steam output. Also, many of the steam developers are encountering production interference. That is, steam that would otherwise the produced from an existing well is diverted to a new well.

The steam production decline demonstrates the importance of increased water injection to maintain reservoir pressure. While contraving research is helping to determine the best methods for water injection, mitigation efforts such as the Santa Rosa and Southeast Geysers pipeline projects to augment fluid injection to offset production declines have been implemented. Other activities implemented include modifications to plant operations for increasing efficiency. In addition, the older, less efficient power plants have been suspended, and steam rerouted to newer and more efficient plants. Plant operators have installed new turbines designed to operate at lower turbine intel pressures and modified the design and operations of existing turbines, contensers, and gas handling systems for lowlead and cycling. These changes may extend the life of the resource, but come at a higher cost.

Geothermal resources developments are now planned with more caution than before, to avoid a scenario similar to The Geysers. The competition between steam producers and plant operators has eased as ownership of The Geysers has been consolidated and auction strategies have changed. Reservoir management activities are being implemented such as further sepacing of production and injection wells, as well as monitoring water resources for flow, quantity, chemistry, and tendencies toward brine and scaling. As a result, binary and liquid dominated flash extraction systems are the only ones installed today.

Liquid Dominated Geothermal Resources

Geothermal exploration of liquid dominated resources in California began in 1967, when both Unocal and Morton Salt Company deployed small, experimental geothermal turbines operating at the Salton Sea faild. However, problems with silica scaling and high salt concentrations prevented the commercial development of the resources them. In development fauld dominated resources during the 1970's, developers had to consider the degree of risk, greater capital costs, an adverse regulatory climate, and the malative immaturity of the exploration, dhiling, and production technology, which impedied the development of liquid dominated resources. These impediments were mitigated significantly when the federal and state government responded to the oil crisis of 1973.

The development of liquid dominated resources was further facilitated in 1975, when the U.S. Geological Survey (USGS) concluded a nation-wide geothermal resource assessment.⁵ The USGS assessment document was instrumental in expanding interest in developing liquid dominated resources in the Southwestern states.

X



Figure 2 Known Geothermal Resource Areas

Source: California Energy Commission

Table 1 Location of California Geothermal Power Plants and Capacity

- 14	e de la	Li a	1
- 4	C.X.	134	ing

6

MLK-

1

Geothermal Resource Area	County	Gross
East Mesa	imperial	73.2
Heber	imperial	100
Salton Sea (including Westmoreland)	Imperial	350
	Imperial Total	523.2
Coso Hot Springs	linyo	300
Geysers (Lake & Sohoma Counties)	Sonoma/Lake	1000
	The Geysers Total	1000
Honey Lake (Wendel-Amedee)	Lassen	6.4
Long Valley (mono- Long Valley) Mammoth Pacific Plants	Mono	40
Total		1870

Source: "New Geothermal Site Identification and Quantification" by GeothermEx Corporation

Geothermal Resource Assessment

In July 2002, the Energy Commission executed a Public Interest Energy Research Program (PIER) contract with Hatch Hetchy Water and the Power Division of the San Francisco Public Ublies Commission (Hetch Hatchy(SFPUC) to hard studies and projects related to reinfwate) energy. GeothermEx, Inc (GeothermEx) was retained by Hetch Hetchy(SFPUC) to provide a geothermal resource assessment for California and western Nevada. This section summarizes the findings of GeothermEx on the resource assessment for California⁴.

GeothermEx used prior research, exploration, and development results that are available in the public domain. They also used data and information released by some developers into the public domain for this study. Three baseline conditions were used to determine the geothermal resource areas included in this assessment, geographic location, resource temperature, and evidence of a discrete resource. In California, 22 geothermal resource areas were included in the assessment.

Table 2: Most-Likely (MLK) Geothermal Resource Capacity

Geothermal Resource Area	County	MLK	Existing Gross MW	Existing
Brawley (North)	Imperial	135	0	135
Brawley (East)	Imperial	129	0	129
Brawley (South)	Imperial	62	0	62
Dunes	Imperial	11	0	11
East Mesa	Imperial	148	73.2	74.8
Glamia	Imperial	6.4	0	6.4
Hebor	Imperial	142	100	42
Mount Signal	Imperial	19	0	19
Niland	Imperial	76	0	76
Salton Sea (including Westmoreland)	Imperial	1750	350	1400
Superstition Mountain	Imperial	9.5	0	9.5
AD & ZO ADD ADD ADD ADD ADD ADD ADD ADD ADD AD	Imperial Total	2487.9	523.2	1964.7
Coso Hot Springs	inya	355	300	55
Sulfur Bank Field, Clear Lake Area	Lake	43	0	-43
Geysers [Lake & Sonoma Counties]	Sonoma	1400	1000	400
Calistoga	Napa	25	0	- 25
	The Geysers Total	1468	1000	468
Honey Lake (Wendel-Amedee)	Lassen	8.3	6.4	1.9
Lake City/ Surprise Valley	Modoc	37	0	37
Long Valley (mono- Long Valley) Mammoth Pacific Plants	Mono	111	40	71
Randsburg	San Bernardino/ Kern	48	0	48
Medicine Lake (Fournile Hill)	Siskiyou	36	0	36
Medicine Lake (Telephone Flat)	Siskiyou	175	0	175
Saspe Hot Springs	Ventura	5,3	0	5.3
Total		4732	1870	2862

Source: "New Geothermal Site Identification and Quantification" by GeothermEx Corporation

Among the various geothermal resource areas, the amount and quality of technical data are extremely variable. Because of this, a uniform set of required resource criteria needed to be quantified to determine commercial feasibility for each resource area. For each selected reservoir, values for the following onteria were obtained or reasonably estimated; temperature, area, thickness, porosity, and resource recovery factor.

To better capture the uncertainty of each resource, minimum, most likely and maximum values were used for each criterion. These values were then used in probabilistic simulation, based on Monife Carlo random-number sampling, to calculate estimated generation capacity based on the accessible heat in place at the resource new. Because the generation capacity is estimated based on calculate heat in place, there is no guarantee that sufficient permeability exists to allow commercial production for those resources where little or no drilling has occurred.

For the 22 California resource areas, the total estimated most-likely generation capacity was calculated to be approximately 4,732 MW. The total generation capacity, minus the installed gross capacity of existing generation, was 2,862 MW, Table 2 reflects the estimated generation capacity for each resource area, grouped by geographical area and county.

Despite the steam production decline mentioned earlier, The Geysers has potentially 400 MW of most-likely generation capacity available. This total proven reservoir at The Geysers is nearly 40 square miles, as determined by the extensive shallow and deep diffing in the region. For this area, there is a portion of approximately 10 square miles, which has never been developed for continuous sinam supply. Lying between the Aldin project area to the northwest and the areas of units 5-6, 7-8 and 11 to the southeast, these 10 square miles comprises about 25% of the 40 square miles total proven area. In addition, about 2 square miles in the northeastern of the field (within the proven reservoir artia) remained unstapped at the former Bottle Rock project and configuous area to the southeast. In these areas, a reasonable estimate of average installed capacity is 33 MW per square mile. Therefore, the unstitzed 12 square miles should be able to support about 400 MW under the right economic conditions.

Recent Geothermal Development Trends And Future Direction

This section focuses on trends currently observed in the geothermal industry, these trends are differentiated by: (1) technology, (2) environmental. (3) institutional, and (4) economic considerations.

7

Technology

Recent and forecasted trends for geothermal technology development may be characterized within the following four classifications: (1) resource exploration. (2) resource development and completion, (3) drilling, and (4) power generation technology.

Resource Exploration

In 2004, the USGS began to categorize new geothermal resources, principally in the Great Basin of the western United States. This work will update the existing resource assessment completed in the 1980's. Because of the inherent difficulty in assessing geothermal potential, the work is likely to be important to further defere the possibilities for new geothermal development.

Initiated in 2000, Geothermal Resource Exploration and Definition (GRED) Program is a cooperative Department of Energy (DOE)industry effort to find, evaluate, and define additional geothermal resources throughout the western United States. To help mitigate a portion of the initial risk associated with the exploration and definition of geothermal resources, DOE provides up to 50% cost sharing. The DOE and its laboratories also provide technical oversight and monitoring.

Improvements and trends in resource exploration can be grouped as follows:

- Continue to develop of geophysical survey methods to identify those with the most robust signatures.
- Identify the advantages and limitations of imaging technologies (e.g., infrared, SAR, ground penetrating radar) for exploration.
- Identify naturally occurring tracers that provide information on the time scale of interest (1,000's years).
- Integrate reservoir simulation with geophysical methods to predict the exploration signature of geothermal fields.
- · Develop techniques to locate subsurface fracture zones.

Progress continues in applying micro earthquake seismology to identify active fractures. Seismic reflection and refraction techniques are now capable of providing sharper structural resolution, especially in rocks with the chaotic, nonbedded, and poorly bedded characteristics typical of geothermal reservoirs. These improvements have helped to reduce exploration time and costs, and the drilling risk.³

Resource Development and Completion

This element addresses the need to better understand subsurface conditions and develop techniques to modify the subsurface to recover energy from reservoirs lacking sufficient natural flow for economic development. Economically viable peothermal systems have both sufficient heat and permeability. Engineered geothermal systems (EGS) are transformed geothermal resources which had sufficient heat, but lacked adequate rock matrix permeability and/or natural reservoir fluids to transport the heat to the surface in economic quantities. The U.S. was an analy leader in developing technology for engineered geothermal systems (i.e. the Hot Dry Rock effort at Los Alamos / Fenton Hill). During the 1990s, the Japanese program made significant advances, while the European community continues to develop their hid dry rock project located in France

Progress continues to be made in the following reservoir development alreas: Increase fundamental understanding of geothermal fields.

- Develop improved understanding of how to sustain production from hydrothermal systems and enhanced and engineered geothermal systems, and
- Demonstrate tools for designing and predicting the performance of engineered geothermal systems.

Reservoir simulators are being coupled with geophysical models to assist in developing geothermal system models used to frame exploration for new geothermal systems. Integrating reservoir simulators to geochemical and geomechanical models will enable future design and operation of engineered geothermal systems.

Drilling

Geothermal drilling is difficult because rocks are hard, abrasive, hactured, and, by definition, hot. Formation fluids are often highly corrosive and usually underpressure () are, poor pressure is less than an equivalent column of water). These harsh conditions mean that many of the tools used to reduce cost in oil and gas drilling cannot be used in geothermal reservoirs. Also, the requirement for goothermal wells to produce large volumes of fluid means that geothermal wells are larger in diameter than equivalent oil and gas wells of the same depth. All of these factors drive the cost of typical geothermal wells much higher than oil and gas wells of comparable depth.

For the near term, the development of geothermal drilling technology will continue to address the following elements:

10

This may require innovative design and operating techniques for hybrid condensers.

- Geothermal operators will continue to adopt monitoring technology from other power plants to increase efficiency of operations.
- The costs and performance of geothermal plants is poorly documented and not universally understood as only a small number of significant plants have been built within the U.S. for the last decade. This makes it difficult to compare alternatives.

Environmental Effects From Geothermal Developments

While geothermal is generally considered among the most environmentally preferred energy sources, power plants can emit trace amounts of heavy metals. Over the next several years, plant operators are likely to install activated carbon systems to remove metals emissions such as mercury.

A majority of flashed steam plants in California have been built in the Imperial Valley, where the problems associated with waste disposal car be reduced by incovering various minerals from the spent geothermal brine before the fluid is injected into the ground. Studies by CalEnergy have shown that mineral (i.e. zinc, alica and manganese) recovery to be economical. CalEnergy has made substantial progress in reducing waste disposal cost and more importantly been able to turn a waste product into a minerule-enhancing venture through the estimates that these continent waste neduction operations may reduce the amount of wastes generated by 95%.

Because of the strict sitting regulations, developer's typically plan to minimize habit disturbance. Directional drilling will continue to be a preferred technology because of the lessened impact associated with well pad sitting. Drillers will incorporate advanced monitoring systems to minimize fluid leakage during drilling.

Institutional¹¹

Federal legislation has been proposed to "atreamline" the often time consuming and duplicative processes for geothermal power plant siting, development, and operation. Specifically, Indenial and state agencies are now developing administrative procedures for processing geothermal lease applications, including lines of authority, steps in application processing, and timeframes for application processing.

Specific to the US National Forests, efforts are underway to better define and classify the known geothermal resources on USFS lands as well as to develop plans for leasing the land for geothermal production. Further, web-enabled data

- High temperature electronics. Batteries, components, printed circuit boards and monitoring technology with liker optics and high temperature tools will continue to be developed for the harsh geothermal environment. This "segment" will benefit from concurrent development of lostrumentation for jet engines.
- Rock reduction. Considerable advances have been made in cutter technology, bit and drillstring dynamics, and bit hydraulics. New computer simulation techniques and advanced materials are likely to foster greater development in this area.
- Diagnostics-while-drilling. The advances in electronics, sensors, and data management continue to flow into the geothermal drilling industry. Continued improvements in diagnostics will foster greater penetration rates and shorter downtimes.
- Welfbore integrity. Lost circulation zones, cross-flow control, cementing and well completion continue to present challenges to drifters, improved twin-streaming sodium slicate and coment plugs will see increased utilization. R&D efforts on trimie pipe and reverse circulation primary cementing will loater "trouble free" drifting and cementing.

Power Generation Technology

Over the past decade, few geothermal plants have been built. However, discernible trends exist that are affecting electricity production including the following

- The advent of low-temperature power plants has spurred a new interest in developing more efficient cycles such as the Kalina cycle.¹⁰
- The most severe challenge to improving the cycle efficiency for either a steam or a binary cycle is on the low-temperature side – the rejection of heat to the ambient environment. This requires amprovements in heat exchangers used as condensers. The challenge is to use fluid flow to take advantage of opportunities to disrupt and renew boundary layers to enhance transfer rates with no additional parasitic energy losses.
- Some brives are quite convolve, particularly higher temporature brives. These present a challenge for innovative coatings and linings that have sufficient protection to allow the use of inexpensive base materials such as carbon steel while providing the benefits of low initial cost and long service life.
- Many geothermal source locations tend to be in arid areas, necessitating the use of air-cooled heat exchangers for heat rejection. This means an extreme sensitivity to ambient air temperature, especially in the summer.

11

retrieval systems are being implemented to track lease and permit applications and requests.

Because of the vast nature of military land jurisdiction, coupled with the Federal requirement for 2.5% of electricity purchases to come from renewable sources, it is fikely there will be increased exploration and development of geothermal resources on military lands. Coupling the development of military resources to the Geothermal Steam Act provisions will allow for common regulatory or siting considerations for developers.

In 2002, the Governor signed the Renewable Portfolio Standard (RPS) (SB 1078, Sher, Chapter 516, Statues of 2002, This standard requires an annual increase in renewable generation equivalent to at least 1% of sales, with an aggregate goal of 20% by 2017. In the second quarter of 2003, the California Energy Commission, the Public Utilities Commission (CPUC), and the Consumer Power and Conservation Financing Authority (called the CPA - which is now defanct) adopted the Energy Action Plan (EAP) that identified specific goals and actions to eliminated energy outages and excessive price spikes in electricity or natural gas. The EAP recommends aggressively implementing the RPS, with the intent of achieving the 20% goal by 2010¹¹

Economic

The Energy Policy Act of 1992 created a PTC to produce electricity from renewable energy sources. Codified as Section 45 of the Internal Revenue Code, certain renewable facilities (mostly wind technologies) quality for a production tax credit that initially provided 1.5 centers per kilowati-hour.

In October 22, 2204, H.R. 4520, the "American Jobs Creation Act of 2004", was signed into law, expanding the availability of the PTC include geothermal and other renewable resources. Under the terms of this new taw, the PTC is 1.8/kWh (1.5/kWh adjusted for inflation) for a new facility's first five years of operation. The credit will also be allowed against a company's alternative minimum tax. However, to qualify for the credit, new plants must be up and running by the end of 2005. Efforts are currently undertaken by the geothermal industry to have this deadline extended.

Presently, the calculation and payment of royalties on leased Federal lands is a complex process. Recently proposed Federal logistation series to reduce the complexity of the royality payment process and return the funds to the state and county. As or late 2004, the US Department of Intervice (DOI) is planning a new initiative to simplify and improve the geothermal royality system. The DOI has put together a Geothermal Royality Review Committee for examine atternative approaches to geothermal royalities. This committee held a public meeting in late January 2005 to get input from interested parties.

Summary

Geothermal energy provides significant benefits in terms of improved air quality, increased diversity in electric energy sources, local and state revenues, and employment. Californis has the largest geothermal installed capacity in the country with approximately 1,900 MW. In addition. Californis has the potential to produce an estimated additional 2,852 MW from resource areas such as Coso Hot Springs, Imperial Valley, Glass Mountain, and Mereol.com Valley, Imperial Country has 11 KGRAs including Brawley, Salton Sea, and East Mesa, and has the largest potential resource base within the state at over 2,400 MW. Cal Energy applies and received a permit to construct a 185 MW power plant in the Salten Sea KGRA. They anticipate completing construction, at the earliest, in 2006. With the RPS and the PTC in place, geothermal development is poised to increase dimanatically within the next decade.

Endnotes

¹ California Energy Commission, April 2005, 2004 Net System Power Calculation, Sacramento, CA. CEC-300-2005-004SF.

¹ California Energy Commission, May 8, 2003, Energy Action Plan, www.energy.ca.gov/anergy_action_plan

³ California Energy Commission, November 19, 2003, Renewable Resources Development Report, Sacramento, CA 500-03-080F

* California Energy Commission, data provided by Valentino Tiangco; PhD

⁸ U. S. Geological Survey, Circular 726, Assessment of peothermal resources of the United States, 1975, <u>http://pubs.er.usgs.op/fm/balcer/pr726</u>

* Personal Communication with Sean Hagerty, U.S. Department of Interior, BLM-California State Office on April 14:2005

⁷ Personal Communication with Sean Hagerty, U.S. Department of Interior, BLM-California State Office on April 14, 2005.

⁸ Material from this section was adapted from the Energy Commission Consultant Report written by GoothermEx, New Geothermal Site Identification and Quantification.

Into itwww.adveb.org/geotimes/u/y02/tugh_geothermal.html

16 http://www.eera.enertov.pov/consumerinfo/factatioeta/bal9 html

¹¹ California Energy Commission, May 8, 2003, Energy Action Plan, http://www.energy.ca.gov/energy.action_plan/index.html

14

BIBLIOGRAPHY

GeothermEx: "New Geothermal Site Identification and Quantification". California Energy Commission PIER Consultant Report. April 2004

Consumer Power and Conservation Financing Authority, Energy Resturces Conservation and Development Commission, and Public Utilities Commission "Energy Action Plan." 30 April 2003.

Dickson, Mamell, "Geothermal Energy," Geotimes, July 2002, http://www.solveb.org/psotimes/july/32/high_geothermal.html

Farhar, Barbara C. "Report on an Informal Workshop on Geothermal Facility Siting Issues at Federal Lands". National Renewable Energy Laboratory. 14-16 November 2000

Farhar, Barbara C. "Report on an Informal Workshop on Geothermal Facility Siting Issues at Federal Lands". National Geothermal Collaborative. Denver, CO. 17 July 2002.

GeothermEx, "New Geothermal Site Identification and Quantification", California Energy Commission PIER Consultant Report. April 2004

Tiangco, Valentino. Data provided. California Energy Commission. 2005

15

The California ENERGY COMMISSION

Home ->> geothermal ->> background

Background About Geothermal Energy in California

Geothermal energy is produced by the heat of the earth and is often associated with volcanic and seismically active regions. California, with its location on the Pacific "Ring of Fire," has 25 known geothermal resource areas, 14 of which have temperatures of 300 degrees Fahrenheit or greater.

Forty-six of California's 58 counties have lower temperature resources for direct-use geothermal. In fact, the City of San Bernardino developed the largest geothermal direct-use projects in North America, heating 37 buildings – including a 15-story high-rise and government facilities – with fluids distributed through 15 miles of pipelines. Environmentally benign fluids are discharged to surface water channels after heat is used.



When added together, California's geothermal power plants produce about 4.5 percent of the California's total electricity.

The most developed of the high-temperature resource areas of the state is the Geysers (a photo of a Geysers' power plant's Unit # 18 is shown to the right).

Located north of San Francisco, the Geysers was first tapped as a geothermal resource to generate electricity in 1960. It is one of only two locations in the world where a high-temperature, dry steam is found that can be directly used to turn turbines and generate electricity (the other being Larderello, Italy).

Other major geothermal locations in the state include the Imperial Valley area east of San Diego and the Coso Hot Springs area near Bakersfield. It is estimated that the state has a **potential** of more than 4,000 megawatts of additional power from geothermal energy, using current technologies.

Additionally, two forms of geothermal energy – Hot Dry Rock and Magma – have the potential to provide thousands of megawatts in California. Investigations in Hot Dry Rock were done in the Clear Lake area of Lake County; Magma research occurred in the Long Valley Caldera of Mono County.