California Energy Commission

Policy Issues Associated with the Development of Renewable Energy in the California-Mexico Region

Good Neighbor Environmental Board

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Background

The CEC was created in 1974 by the California Legislature as the State's primary energy policy and planning agency.

The CEC has five major responsibilities:

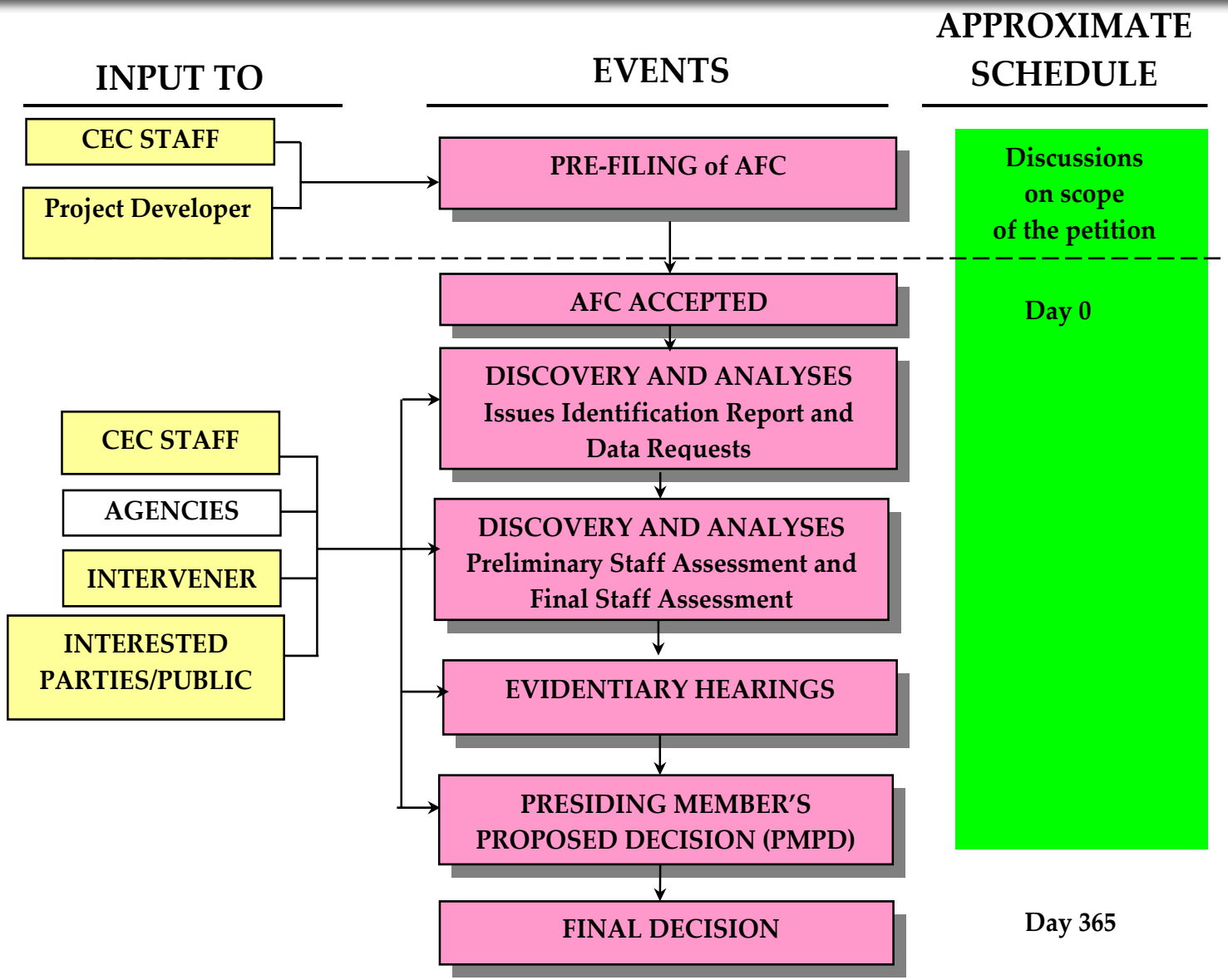
- **Licensing thermal power plants 50 MW or larger.**
- **Forecasting future energy needs and keeping historical energy data.**
- **Promoting energy efficiency through appliance and building standards.**
- **Planning for and directing state response to energy emergencies.**
- **Developing and supporting research and development of renewable energy technologies.**

Licensing Authority

- **The CEC has licensing authority over thermal power plants that are 50 megawatts or greater, <u>including solar-thermal and geothermal power projects</u>.**

- **<u>The CEC does not have authority over photovoltaic, wind, nuclear or hydroelectric power plants.</u>**

- **The CEC is the lead state agency for California Environmental Quality Act (CEQA) review and ongoing compliance.**


INPUT TO
EVENTS
APPROXIMATE SCHEDULE
CEC STAFF
Project Developer
PRE-FILING of AFC
Discussions on scope of the petition
AFC ACCEPTED
Day 0
DISCOVERY AND ANALYSES Issues Identification Report and Data Requests
CEC STAFF
AGENCIES
INTERVENER
INTERESTED PARTIES/PUBLIC
DISCOVERY AND ANALYSES Preliminary Staff Assessment and Final Staff Assessment
EVIDENTIARY HEARINGS
PRESIDING MEMBER'S PROPOSED DECISION (PMPD)
FINAL DECISION
Day 365

Renewable Energy Guiding Legislation

AB 1007 – Transportation and Alternative Fuels

AB 118 – Alternate and Renewable Fuels and Vehicles Deployment

AB 2021 – Energy Efficiency for POUs

AB 2160 – Green Building Acquisition Financing for State Facilities

SB 107 – Accelerated RPS Goals

SB 1250 – PIER and Renewables Incentive Programs Reauthorized

SB 1 – Renewables Goals for New and Existing Residential and Commercial Structures

SB 1368 – GHG Emissions standards for POUs

AB 32 – Global Warming Solutions Act of 2006; aggressive goals for 2020

SB 1250 – PIER and Renewables Incentive Programs Reauthorized

AB 2778 – Self-Generation Incentive Program for Fuel Cells and Wind

Governor Brown's Renewable Energy Action Plan, 8K MW Re Energy and 12K MW DG by 2020

Renewable Energy Policy Drivers

California's primary short and long-term energy driver is the state's GHG emission reduction goal.

At the same time, California needs to maintain reliable and affordable energy supplies while using reduced carbon-intensive energy sources.

Renewable Energy Policy Drivers

In April, 2011, Governor Brown signed the renewable portfolio standard (RPS) into law, which requires all retail sellers of electricity and all publicly owned utilities (POUs) to procure renewable energy resources with the following targets:

- **20% by December 31, 2013,**
- **25% by December 31, 2016; and,**
- **33% by December 31, 2020.**

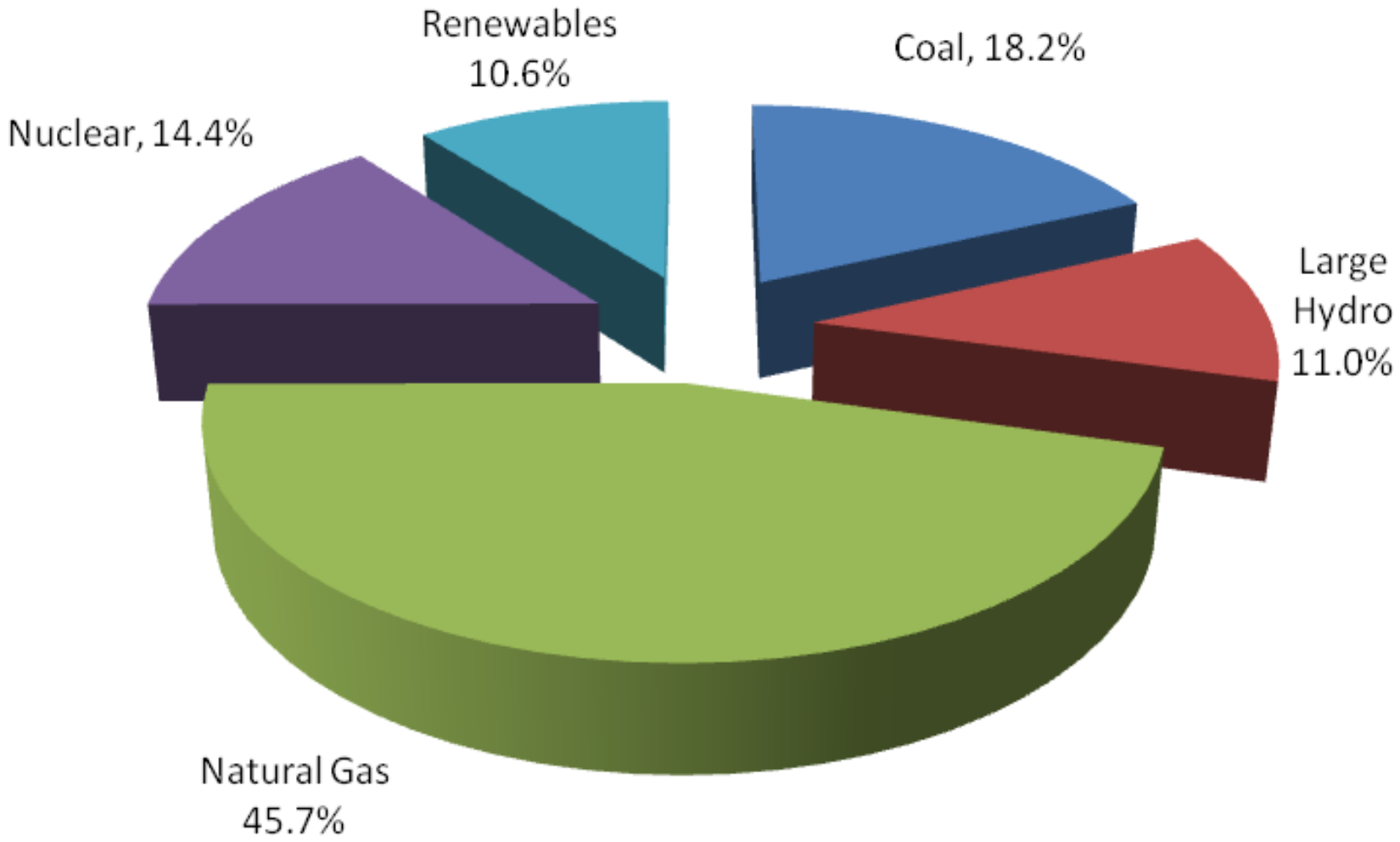
Renewable Energy Policy Drivers

The state's main challenge is to ensure adequate electricity supplies while reduce greenhouse gas emissions as directed by AB 32 (33% reduction by 2020).

Since 2003, California's energy policy has recognized an electricity "loading order" as the preferred sequence for meeting electricity demands. The loading order lists:

- **Energy efficiency and demand response,**
- **Renewable resources; and,**
- **Clean and efficient natural gas-fired power plants**

California's Electricity Supply Mix (2009)



California's Electrical Grid

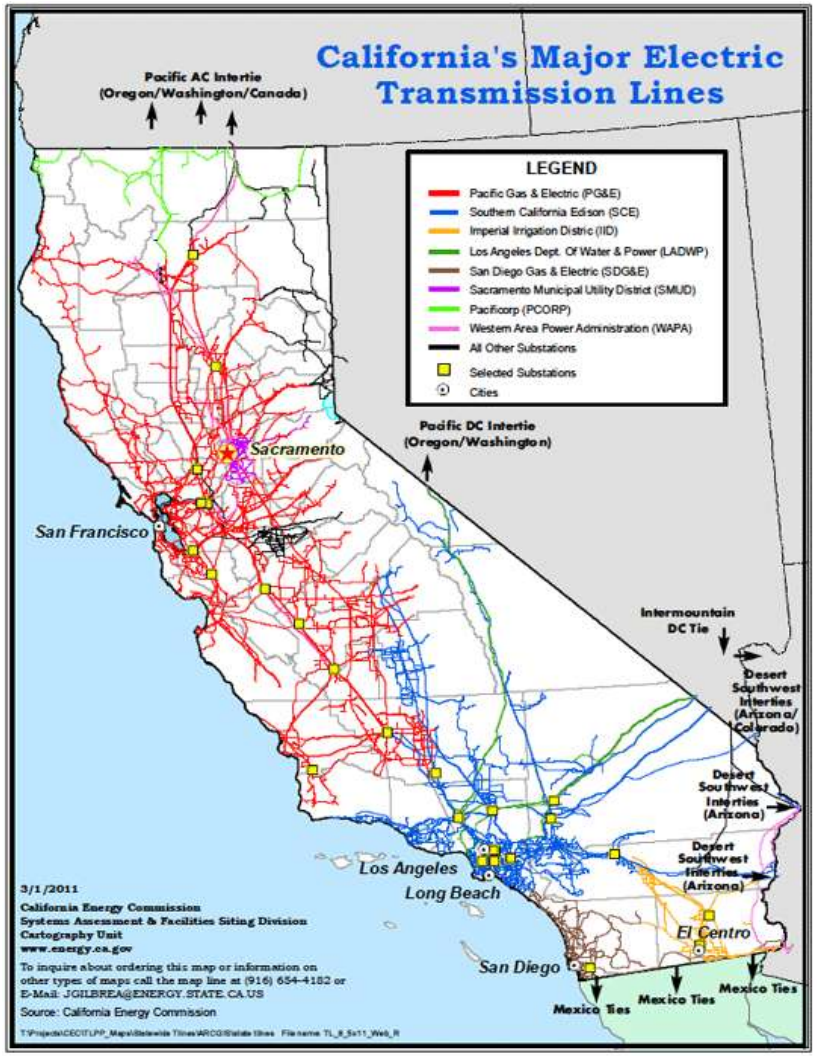
California's electricity generation system produces more than 296,000 GWh/year and is transported over 32,000 miles of transmission lines.[1]

In 2009, California produced 69% of its electricity.

7% imported from the Pacific NW

24% imported from the U.S. SW

The installed capacity of the 1,008 in-state power plants totals 69,709 MW.



1. California Energy Commission, 2009 Integrated Energy Policy Report

Infrastructure Challenges

- Transmission and distribution congestion
- Ensure adequate electricity supplies while
  - Reducing greenhouse gas emissions
  - Increasing renewable energy resources
- Variable (intermittent) resources such as wind and solar can impact grid reliability
  - Forecasting of renewable resources (wind and solar)

Barriers to Geothermal Development

- Environmental permitting delays (e.g. CEQA, water quality and rights, air, and drilling permits)
- Financing (capital costs)
- Exploration costs
- Loss of incentives (production tax credits)
- Supply shortages – competition with oil and gas companies for drilling rigs
- Lack of information – e.g. resource assessments, exploration tools
- Lack of access to transmission

CEC's Geothermal Program

Mission: promote the research, development, demonstration, and commercialization of California's enormous geothermal energy resources.

Since 1980, the Geothermal Program provided funding for research, development, and demonstration projects with over 174 public and private entities.

Geothermal Program 2011 Grant Awards

- **Imageair, Inc., Surface Deformation Baseline in Imperial Valley from Satellite Radar Interferometry, (Imperial County), $672,234.**
- **Layman Energy Associates, Inc, Exploratory Well to Confirm Liquid-Dominated Hydrothermal Resource on Margin of The Geysers Steamfield, (Lake County) $2,377,364.**
- **Renovitas LLC, Exploration Drilling and Assessment of Wilbur Hot Springs, (Colusa County), $1,492,722.**
- **Simbol, Inc., Potassium Production from Geothermal brines (Imperial County), $949,545.**

Geothermal Status in California

California has a very large geothermal resource base.[1]

- **2,565 MWe installed capacity, 49 power plants.**
- **2,100 MWe running capacity.**
- **30 projects under some stage of development with potential to increase installed capacity from 712 – 738 MW.**

1. Geothermal Energy Association, Annual U.S,. Geothermal Power Production and Development Report, April 2011.

Geothermal Status in California

- Additional potential from know geothermal resources is estimated up to 4600 MW [3.]
- Undiscovered resources may provide an additional 3,200 to 25,000 MW. [3.]
- The Geysers: world's largest geothermal producer with 1250 MW.
- Salton Sea area: huge identified resource, but underexploited with 625 MW.
- Glass Mountain: major potential resource, currently unexploited.
- Many unknown or smaller resource areas currently unexploited.

3. U.S. Geological Survey

Geothermal Status in California

- **California has developed over 2/3 of the U.S. geothermal projects delivering ~2,100 MW of baseload power.**
- **High temperature geothermal resources are distributed throughout the state including:**
  - **The Geysers (1,250 MW),**
  - **Long Valley/Eastern Sierra (37MW),**
  - **Coso (240 MW); and,**
  - **Imperial Valley (625 MW)**
- **Nearly 40 geothermal companies are based in California representing nearly 60 percent of the U.S. geothermal industry.**

California Geothermal Resource Areas

Installed Capacity in the CA-Mexico Region

Four geothermal fields have installed capacity of 625 MW. [1.]

- **Salton Sea (350 MW),**
- **Heber (130 MW),**
- **East Mesa (95 MW); and,**
- **North Brawley (50 MW)**

This is more than 1/3 of the installed capacity in California. 16 plants are currently operating in Imperial County.

1. GeothermEx Report, 2007; Aerospace Report to IID, 2011)

Geothermal Potential in the CA-Mexico Region

Currently there are 13 geothermal prospects have been documented in the Imperial Valley for a total of 3,263 MW [1.] geothermal capacity.

- **Salton Sea (1750 MW likely capacity),**
- **Niland (776 MW),**
- **Westmoreland (50 MW),**
- **Glamis (6 MW),**
- **East Mesa (148 MW),**
- **Heber (142 MW),**
- **Dunes (11 MW),**
- **Superstition Mountain (10 MW),**
- **North Brawley (135 MW),**
- **East Brawley (129 MW),**
- **Mesquite/South Brawley (62 MW),**
- **Mount Signal (19 MW); and,**
- **Truckhaven (25 MW)**

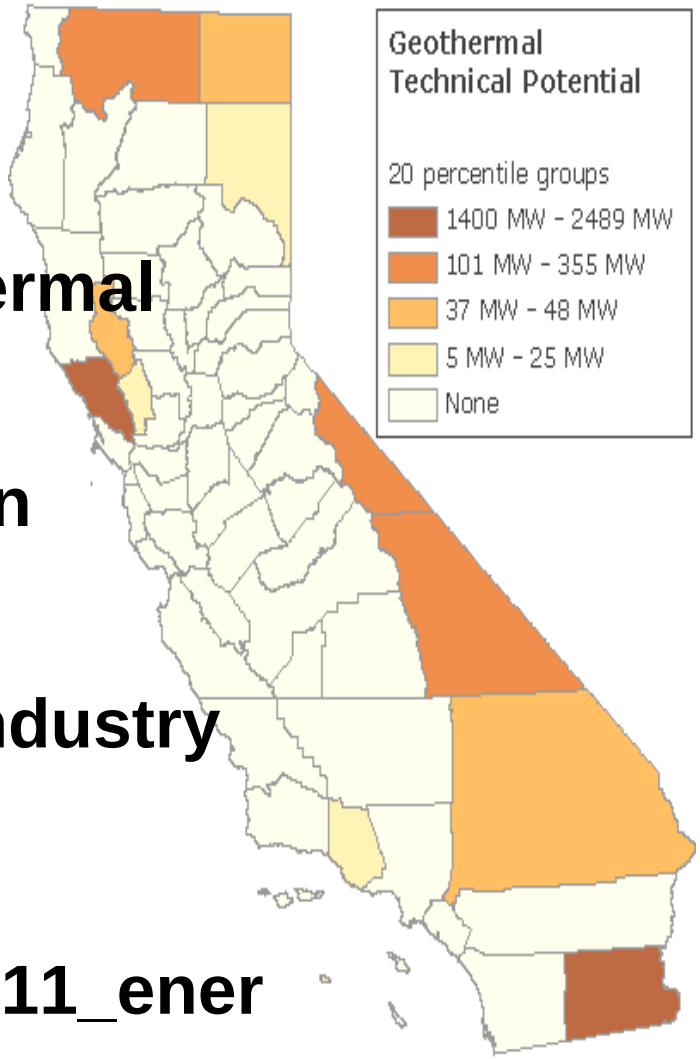
1. GeothermEx Report, 2007; and Aerospace Report to IID, 2011

What's Next?

Continue to support geothermal activities

- **Encourage continued geothermal technologies research.**
- **Promote research focused on energy policy goals.**
- **Encourage the geothermal industry to participate in state policy activities**

[http://www.energy.ca.gov/2011_energypolicy/index.html].



Geothermal Technologies Research

Resource assessment for adding electrical generation:

- **Need to locate unknown high and moderate temperature resources without surface expression.**
- **Need to assess known areas in finer-grained detail for targeted exploration and well drilling.**
- **Exploration of oil and gas fields for geothermal co-production.**
- **Improved surface exploration.**
- **Evaluation and analysis of co-located resources.**
- **Improved environmental protection.**

Geothermal Technologies Research

- **Advanced tools and techniques for exploration and resource assessment, including remote sensing tools, to reduce costs, risk, time.**
- **Demonstrations and/or modifications of existing tools and techniques from the oil and mining industries.**
- **Refined models and modeling tools for reservoir management.**
- **“Smart” tools needed for assessment, drilling, and exploration.**
- **High efficiency binary plants for exploitation of lower temperature resources.**
- **Innovative water use for wet-dry cooling.**
- **Life-cycle analysis.**
- **New materials and methods for use in corrosive and aggressive brine environments.**

Research Focused on Energy Policy Goals

- **Improved environmental protection: Much of the regulatory and permitting barriers reflect the need to carefully assess environmental impacts. RD&D that directly and forcefully addressed key environmental challenges (e.g., emissions, water use and protection, and induced seismicity) could ultimately provide the basis for a streamlined and statewide regulatory and permitting framework that would dramatically reduce project cost and time delays.**

- **Improved subsurface exploration: Focused RD&D that would improve the ability to obtain, at lower cost and higher resolution subsurface imaging and reservoir characterization could dramatically improve project development, reduce cost and streamline facilities installation.**

Research Focused on Energy Policy Goals

- **Innovative water use: Identifying non-traditional water resources for plant operation, as well as improving cooling design efficiencies and hybrid cooling systems, would significantly improve power production economics and environmental impacts.**

- **Life-cycle analysis: RD&D that thoroughly analyzed life-cycle costs and impacts would provide a much more quantitative description of generation costs across technologies.**

Research Focused on Energy Policy Goals

- **Evaluation and analysis of co-located resources: Geothermal energy is often located in regions where other renewable energy resources occur. Optimizing the mix of co-located resources, especially for DG applications, could greatly improve energy management strategies.**

- **Energy storage: Geothermal energy systems can benefit from thermal inputs from other renewable systems. This is, in essence, a form of energy storage and could be innovatively developed to supply DG as well as combined heat and power applications.**

Questions?

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