

ENVIRONMENTAL BARRIERS TO SITING OF RENEWABLE ENERGY PROJECTS

A Focus on Siting and Permitting Constraints for
Renewable Energy Projects in California
Illustrated through focus on Solar-Thermal
Projects

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MEANS INTENDED TO FACILITATE SITING RENEWABLE ENERGY:

- Warren-Alquist Act—All thermal power plants 50 MW or larger—No Filing Fee for Renewable Projects
- Memorandum of Understanding (MOU) between the Energy Commission and the Bureau of Land Management
- MOU between Energy Commission and California Department of Fish and Game
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Legislation, Regulation and Executive Orders

- **Enabling Policies:**
 - Renewable Portfolio Standard (RPS)-SB 1078 amended by SB 107-
 - 20% of load to be renewable by 12/31/10;
 - Loading Order (CPUC & Energy Commission-
 - Renewable Resources are second after efficiency investments
 - Global Warming Solutions Act of 2006 (AB 32)-
 - requires 30% reduction by 2020

Facilitation of Renewable Energy:

- Renewable Energy Transmission Initiative (RETI)-
 - Stakeholder driven, CPUC, CEC, ISO, & Publically owned utilities work to establish Competitive Renewable Energy Zones, and plans of service for priority components of the statewide transmission plan.
- Executive Order S-14-08—11/17/08
 - To Expand and accelerate renewable energy development in California
 - Increases the RPS to 33% by 2020
 - Directs Energy Commission, Department of Fish and Game to form the Renewable Energy Action Team
 - Desert Renewable Energy Conservation Plan with a focus on both development and long-term conservation

Energy Commission Siting Division Conducts Environmental Assessment

- Thermal power plants => 50 MWs and ancillary facilities (T-lines, water, gas lines, access roads etc)
- Process is CEQA equivalent and includes water, biology, cultural, air quality, land use, visual resources among others.
- Staff examines direct, indirect, and cumulative impacts

Memorandum of Understanding with BLM for joint CEQA/NEPA review of projects on Public Lands

- Establishes a mechanism for jointly reviewing large scale solar projects
- Currently before the Energy Commission
 - 12 Solar Thermal projects
 - 1 Solar-Biomass Hybrid Project
 - 1 Natural Gas-Solar Hybrid Project
 - More projects projected by early 2010

Large Scale Solar Project Have Biological Resource Challenges

- Can have significant habitat impacts on lands with protected animal and plant species
- Can affect wildlife movement corridors—mobility, health and population viability
- Potential to impact listed species recovery more difficult due to habitat impacts, which are likely to be large
- Could potentially lead to more federal and state listed species resulting from large-scale project impacts to local species
- Mitigation very difficult for projects covering thousands of acres with insufficient habitat compensation acreage
- Complicated to permit if multiple state and federal permits are required

Scarce Water Resources in the Desert

- Most solar power projects propose ground water for both construction and operation
- There is limited information and understanding of desert groundwater basins
- Potential to impact other groundwater users, causing overdraft in the long term
- Cumulative Impacts from multiple desert developments
- Energy Commission Water policy requires developers to evaluate use of other cooling technologies and water supplies
- Dry cooling technologies or use of brackish/contaminated water supplies may reduce demands on freshwater supplies possibly reducing review time
- “Low Impact Designs” (LID)
 - Maintain the function and value of the natural drainage system while minimizing the risk of accelerated soil erosion and increased storm water runoff. LID makes use of naturally developed drainage features and patterns and can reduce need for major stormwater infrastructure construction and long-term maintenance costs.

Flooding and Stormwater Impacts

- Developments are watershed scale encompassing thousands of acres
- Drainage and stormwater management design is critical as large-scale alteration of natural drainage occurs
- Erosion and sedimentation on site and down stream; possible wind borne dust generation affecting riparian habitat and increasing flooding potential

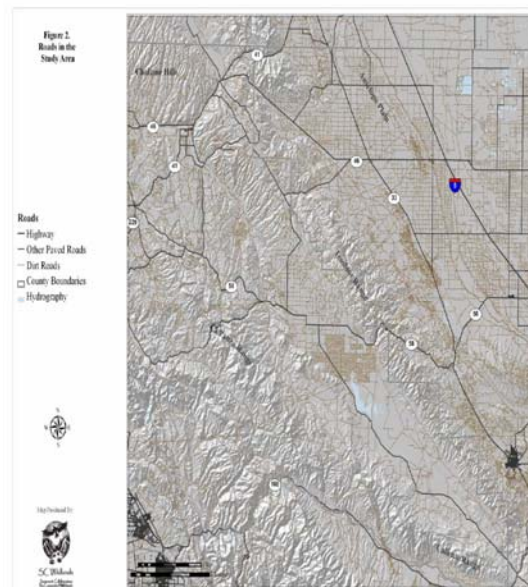
EACH PROJECT IS UNIQUE!

- **SIZE:** Carrizo-640 acres; SES 2-6500 acres
- **LOCATION:** Federal BLM Land; Private Land
- **TECHNOLOGY:** Solar trough, Sterling Engine, Molton Salt Storage, Photovoltaic, and more
- **Environmental Considerations-**
 - Biological Resources including Threatened and Endangered Species-State and Federal including:
 - Desert Tortoise Mojave Ground Squirrel
 - Kit Fox Flat-tailed horned lizard
 - Vegetation

SOME KEY DIFFICULTIES IN THE PROCESS

- The Magnitude of the Area Projects Cover
- The Technologies differ in their resource impacts:
 - --Land Use
 - --Biological Impacts
 - --Soils and Water Impacts
 - --Visual Resources-Scenic and recreational
 - --Air Quality Impacts-dust, emissions

Carrizo Vicinity and Site



Carrizo Energy Solar Farm

- approximately 195 Compact Linear Fresnel Reflector (CLFR) solar concentrating lines, and associated steam drums, steam turbine generators (STGs), air-cooled condensers (ACCs), and infrastructure, producing up to a nominal 177 megawatts (MW) net
- The CESF site will encompass approximately 640 acres of fenced area,
- The 380-acre construction laydown area is directly south of the project site.
- The solar field will operate daily from sunrise to sunset. Typical operating hours for the CESF will be approximately 13 hours per day, or an average of 4,765 hours per year.

Carrizo Energy Solar Farm Water Use

- The CESF is estimated to require about 20.8 afy of groundwater during operation. The expected average daily water use is approximately 18,500 gpd. The peak daily water use is approximately 74,000 gpd, which is expected to occur one day per year to clean the air-cooled condensers.

Carrizo Energy Solar Farm Biological Resources

- Identified Impacted Species Include
- Tule Elk, San Joaquin Kit Fox, Pronghorn Antelope,
- Mitigation Issues Include:
 - Defining travel corridors, appropriate habitat;
 - Securing these corridors through purchase;
 - Insuring that adjacent projects recognize and protect these corridors (2 PV projects)

New Challenges for Renewable Siting

- - Identification of mitigation land challenging when looking for thousands of acres in some cases
- - Use of donated lands (purchased or donated for conservation - Feinstein's bill)
- - Difficulty in finding reasonable alternatives for large-scale renewable projects (Alternatives required for both CEQA and NEPA).
- - Meshing renewable energy policies of various agencies (some with much different mandates)
- - Design-build nature of untested technologies - projects keep changing through the process, altering the impact on the environment, and the review timing and complexity
- - Cumulative land use, visual, etc. impacts (up to 2.5 million acres of projected renewable development with solar and wind)
- - Local desert protection groups pushing for use of disturbed lands

Stirling Energy Systems 2

- The proposed SES Solar Two project would be a nominal 750-megawatt (MW) Stirling engine project, with construction planned to begin either late 2009 or early 2010.
- The 6,500 acre project site is located on approximately 6,140 acres of federal land managed by the Bureau of Land Management (BLM) and approximately 360 acres of privately owned land.
- The site is approximately 100 miles east of San Diego, 14 miles west of El Centro,
- Although construction would take approximately 40 months renewable power would be available to the grid as each 60-unit group is completed.
- Approximately 30,000, 25-kilowatt solar dish Stirling systems (referred to as SunCatchers), their associated equipment and systems, and their support infrastructure.
- Each SunCatcher consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power then driving an electrical generator to produce grid-quality electricity.

Aerial View of SES 2 with Simulated Project Placement



A Partial SES 2 Solar Array



SES 2 Suncatchers



Initial Identified Problems:

- Cultural Resources—Initial Report over 12,000 pps
 - Analysis deemed incomplete by BLM and CEC
- Visual Resources
 - Recreational Users of the Desert
 - Private Land Owners

Agency Coordination is Critical!

- California Energy Commission
- California Dept. of Fish and Game
- Counties
- Bureau of Land Management
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- Existing and newly developed Memorandae of Understanding between Agencies

Accommodation of Requirements

- California Environmental Quality Act (CEQA)
- National Environmental Protection Act (NEPA)
- Clean Air Act
- Regional Air Management Districts Regulations
- California Endangered Species Act
- Consideration of other state, federal and local Laws, Ordinances, Regulations and Standards (LORS)

And Time Frame Issues!

- Energy Commission/BLM MOU calls for approximately a 13 month time-frame;
- American Recovery and Reinvestment Act (ARRA) requires projects to begin construction by December 31, 2010 (there are other time-frames attached as well)