Energy-Related Environmental Research

PIER Renewable Energy Advisory Group Workshop

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Goals and Approach

GOALS

- ***Develop*** *cost-effective approaches to evaluating and resolving environmental effects of energy production, delivery and use in California; and explore how new energy applications and products can solve/mitigate environmental problems.*
- ***Complement*** *national and international energy research efforts by producing California specific products that also inform policy formulation***.**

APPROACH

- **Collaborate** with other Energy Commission Divisions, sister agencies, and all stakeholders to produce long-term research plans to identify and address energy-related environmental impacts.
- **Implementation** through solicitations and interagency agreements.

Policy Drivers

ENERGY

- ***Governor Brown's Clean Energy Jobs Plan***
- ***33% Renewable Portfolio Standard***
- ***California Global Warming Solutions Act***

ENVIRONMENTAL

- ***Clean Air Act***
- ***Clean Water Act***
- ***Porter-Cologne Water Quality Act***
- ***California Endangered Species Act***

Energy-Related Environmental Research

Four areas of research:

- **Climate Change Science for the Energy Sector**
  - Climate monitoring, analysis, and modeling at scales specific for California
  - Investigating cost-effective options to reduce GHG emissions; and
  - Impact and adaptation studies for the energy sector
- **Air Quality and Energy**
  - Building efficiency and indoor environmental quality; and
  - Outdoor air quality implications of new technologies, controls and fuels
- **Aquatic Resources and Energy**
  - Energy generation effects on aquatic species, water quality and water supply; and
  - Energy and water management
- **Terrestrial Resource and Energy**
  - Environmental barriers to renewable energy development; and
  - Tools and best management practices to facilitate siting energy facilities

Energy-Related Environmental Research

- Integrate our projects into three areas:
  - Energy Efficiency,
  - Renewable Energy and
  - Smart Energy Infrastructure

Proposed Portfolio 2011-2012

- **Smart Energy Infrastructure**
  - Evaluate in-basin air quality impacts of electrification
  - Identify potential sources of Greenhouse gas (GHG) offsets/allowances for utilities
  - Investigate beneficial uses of carbon dioxide for the production of chemicals, chemical feed stocks, working fluids, and building materials
  - Estimate potential climate changes impacts and adaptation options for the energy sector
  - Improve regional climate models
- **Energy Efficiency**
  - Healthy indoor air quality for net zero energy buildings
  - Validation of the air quality and energy benefits of cool communities
  - Energy benefits from water conservation
- **Renewable Energy**
  - Removing environmental barriers to the deployment of renewable energy facilities
  - Addressing water temperature effects from hydropower on aquatic organisms
  - Assessing air quality barriers to utilization of biomass sources, such as municipal waste

Renewable Energy

Recent & Current Portfolio

Facilitate Renewable Energy

- Research addressing solar energy
  - Use of Habitat Suitability Models and Head-start Techniques to Minimize Conflicts between Energy Development and Desert Tortoises
  - Cumulative Biological Impacts Framework for Solar Energy Projects in the California Desert
- Research addressing wind energy and power lines
  - Evaluating the Effectiveness of Avian Interaction Mitigating Measures and Processes
  - Radar, Acoustic and Observational Study to Assess Bat and Bird movements and Mortality Relative to Old and New Wind Tower Structures

Recent & Current Portfolio

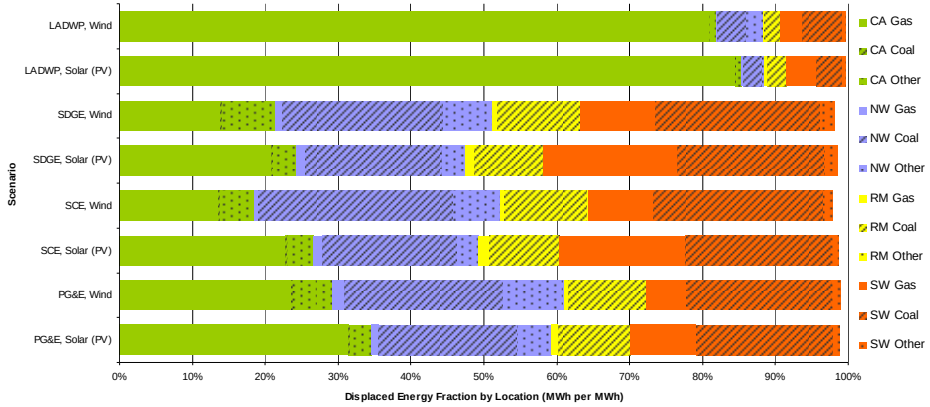
- Research addressing both forest and agricultural biomass/biofuel sources and production
  - Analysis of Forest Biomass Removal on Biodiversity
  - Environmental Impacts of Using Forest Biomass for Energy Production
- Research addressing climate change effects on renewable energy sources
  - Climate Change Impacts on the Operation of Two High-Elevation Hydropower Systems in California
  - Projected Effects of Climate Change Induced Changes in Vegetation on Future Hydrologic Energy Generation in California
- Research addressing forecasting, management and impact analysis for hydropower operations
  - Integrated Forecasting and Reservoir Management
  - Research on Instream Flow Determinations for Hydropower Applications in California

Recent & Current Portfolio

- Research addressing the air quality ramifications of the renewable portfolio standard
  - Life Cycle Assessment of Existing and Emerging Distributed Generation Technologies in California
  - Methodology to Estimate Air Emissions Reductions Through Energy and Peak Load Reductions and Renewable Generation

Energy Scenarios

- Potential Energy Scenarios for California and Their Environmental Consequences
  Second phase-environmental evaluations



Upcoming Activities

- Workshop on PIER research on wildlife impacts of energy infrastructure – tentatively July 20, 2011

- Solicitation on multiple PIER Energy-Related Environmental Research topics released ~August 2011

Proposed Portfolio

Fiscal Year 2011-2012
Energy-Related Environmental
Research Initiatives

Research Initiative

Addressing Environmental Barriers to Renewable Energy Permitting

- Conduct research on environmental issues that will facilitate the deployment and permitting of solar, wind, biomass and other renewable energy sources while ensuring environmental protection. Research will focus on developing tools and methodologies to assist decision makers in balancing environmental protection and the state's renewable energy goals.

Improving water temperature objectives and criteria for Hydropower

- Improving the scientific basis for ecological based water temperature criteria California. Research would focus biological responses to natural fluctuations in water temperature to develop improved water temperature objectives/criteria. Rate payer benefits include greater environmental protection while avoiding the unnecessary curtailment of inexpensive hydropower generation.

Research Initiative

Addressing Air Quality and Biomass

- Scoping study to identify air quality barriers to the utilization of potential biomass sources. For example, municipal solid waste has the potential to produce 13,000 GWh of electricity by 2020. However, combustion of municipal solid waste is prohibited because of potential air toxic contaminants. Study would evaluate technologies and regulatory constraints and identify research needs to address these concerns.

Questions

- How much should PIER focus on addressing environmental barriers to deploying existing or near ready renewable energy technologies compared to the environmental effects of emerging technologies, potentially ten years or more away from commercial deployment?

- Are there synergies or collaborative opportunities with other programs?

- How can we better communicate the benefits to California ratepayers?