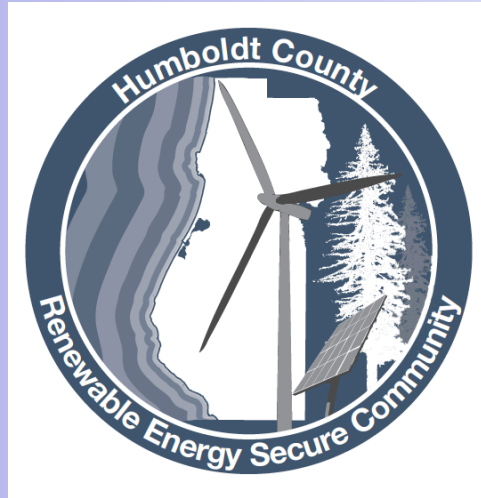


Energy, Greenhouse Gas Emission and Economic Impact Modeling of Local Renewable Generation: Case Study for Humboldt County



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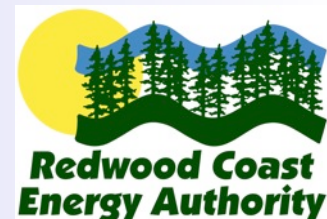
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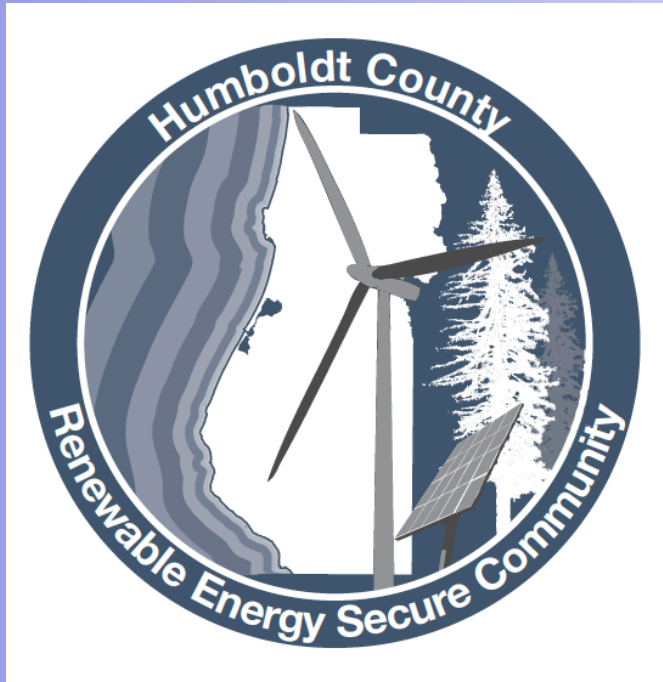
RECD. May 13 2011

Presented by: James I. Zoellick
Schatz Energy Research Center, Humboldt State University
May 9, 2011

CA Energy Commission IEPR Committee Workshop
Distributed Generation - Getting to 12,000 MW by 2020



What is RESCO?



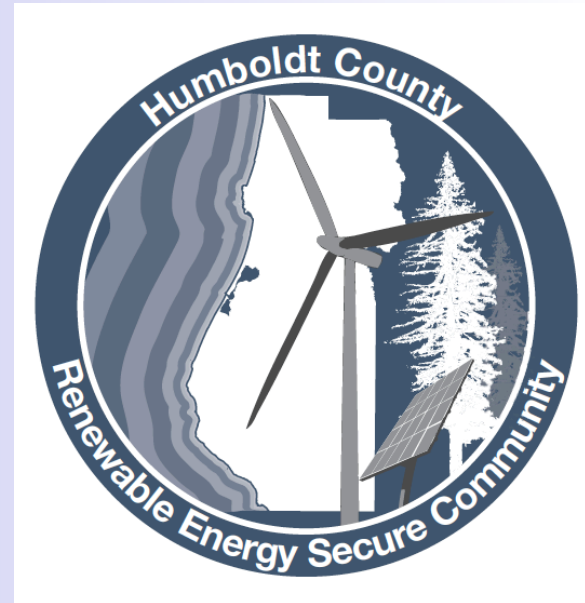
**Renewable
Energy
Secure
Community**



What is RESCO?

Renewable Energy Secure Community

- ◆ Community that has achieved local energy security
- ◆ Developed local renewable energy resources
- ◆ Achieved high levels of energy efficiency
- ◆ Realized benefits such as:
 - Energy price stability
 - Security in energy supply
 - Local jobs and economic stimulus
 - Climate protection goals
 - Environmental benefits



RESCO Project Team, Funding & Schedule

Funding:

- California Energy Commission = \$200,000 (CEC Grant # PIR-08-034)
- Headwater's Fund = \$38,780
- Pacific Gas and Electric = \$18,000 (in-kind cost share)

Team:

- Prime contractor – Redwood Coast Energy Authority
- Lead researcher – Schatz Energy Research Center
- Project Partner – Pacific Gas and Electric Company

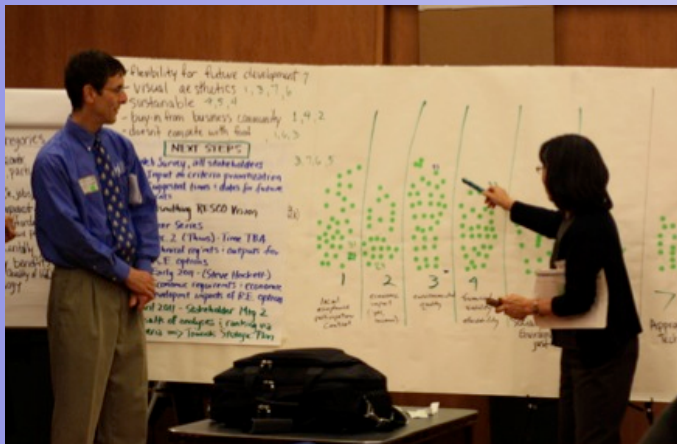
Schedule:

November 2009 through October 2011



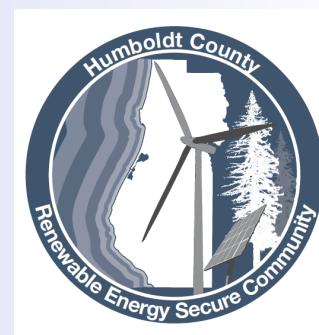
Project Goals

- ◆ Create strategic plan to meet 75%-100% of electric demand & significant fraction of heating and transportation energy needs with local renewables.
- ◆ **Bold long-term vision. Realistic near-term next steps.**
- ◆ Maximize local benefits and build local support.



Humboldt County RESCO: A Recipe for Success

- ◆ Successful model for local community energy planning and development
- ◆ Applied to a remote, rural community on CA's beautiful North Coast
- ◆ Redwood Coast Energy Authority (joint powers authority) a public face, politically engaged
- ◆ Schatz Energy Research Center (university research center) strong technical leadership, unbiased research
- ◆ Led to: Humboldt County Energy Element, Comprehensive Action Plan for Energy, climate action planning, RESCO and beyond



Technical and Economic Analysis:

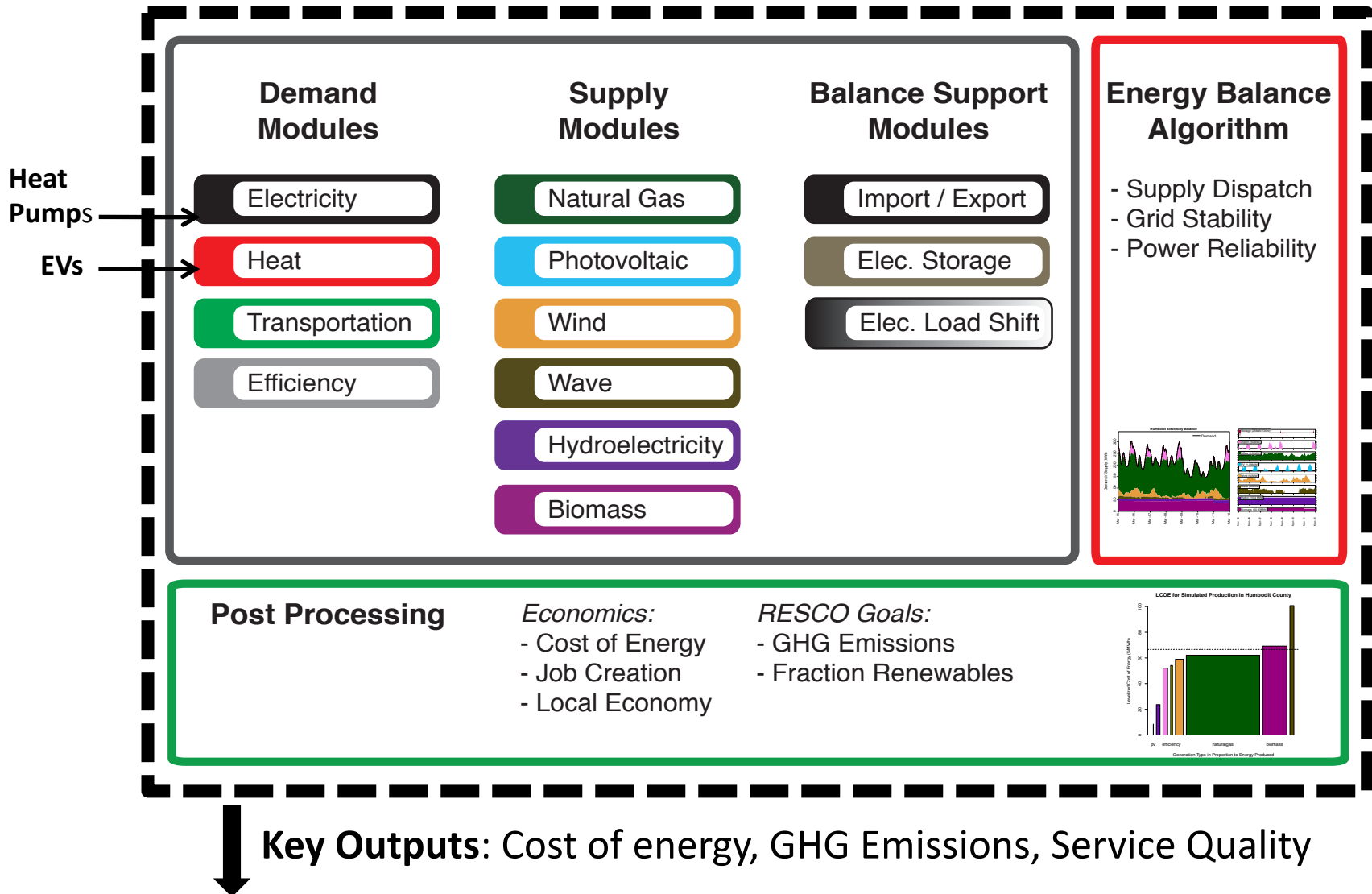
RESCO Models and Tools

- ◆ Assess ability to use local renewable energy resources
- ◆ Examine optimal mix (supply and demand side)
- ◆ Estimate:
 - job creation / economic stimulus impacts
 - greenhouse gas reductions
 - cost

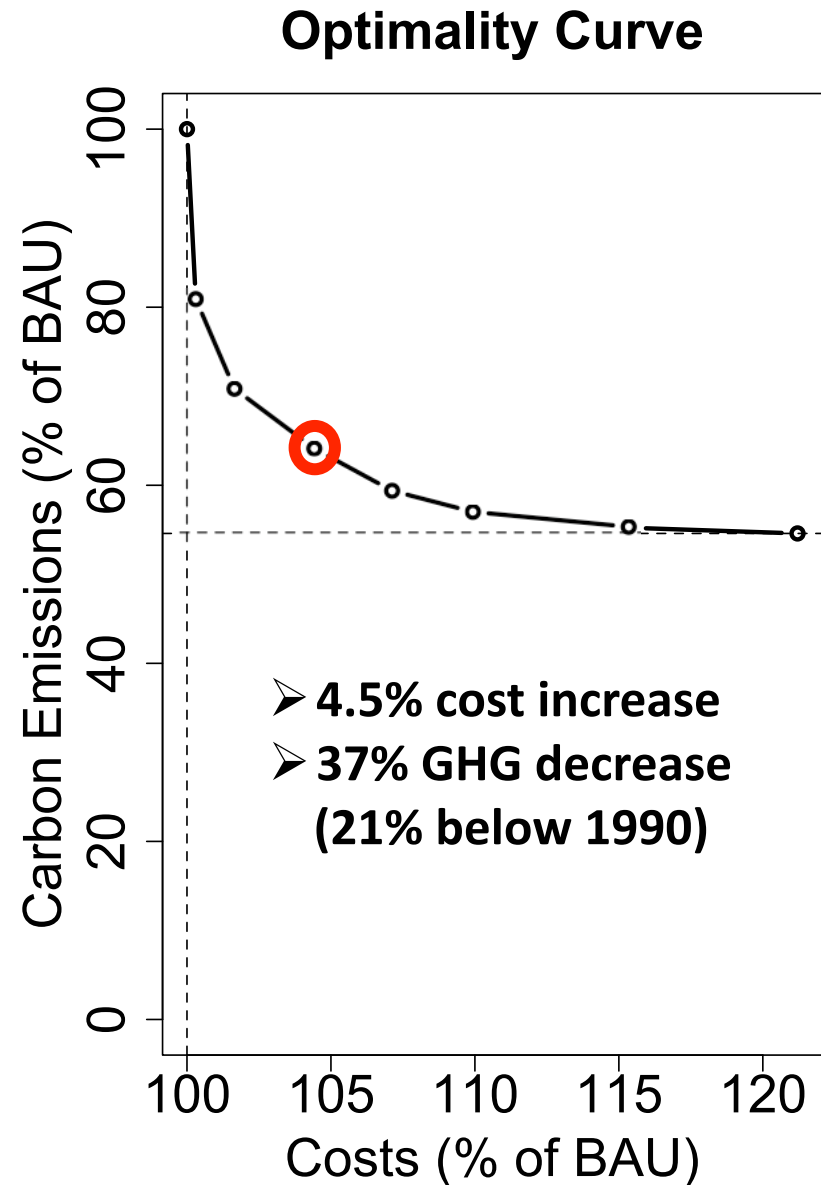
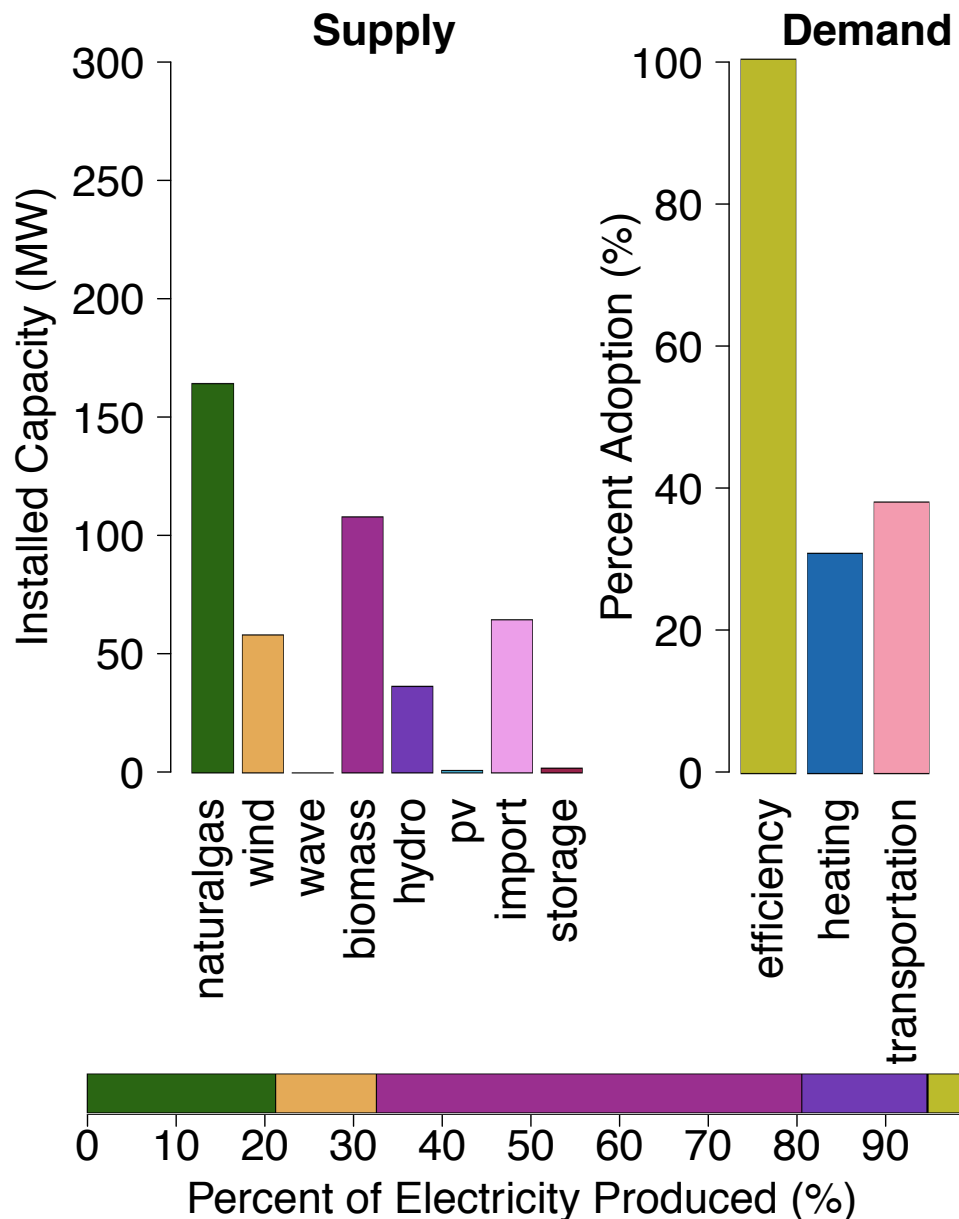


Regional Energy Planning Optimization Model

Key Inputs: Demand levels, Installed capacities



Sample Optimization Results

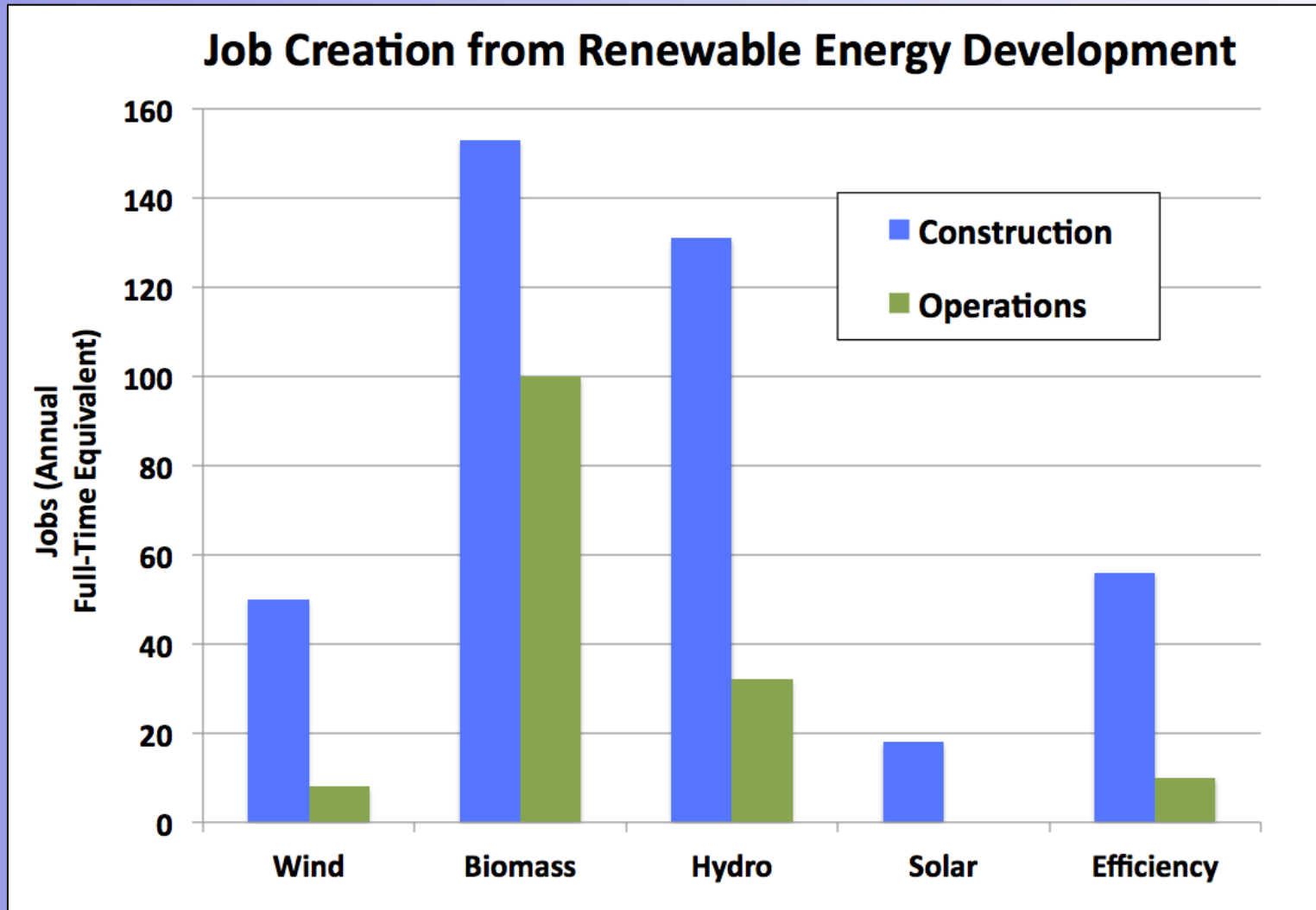


Economic Impacts: Jobs and Stimulus Model

- ◆ Standard economic input-output analysis
- ◆ Utilized IMPLAN multipliers
- ◆ Developed models for: biomass, wind, small hydro, distributed PV, natural gas engine-generator, and energy efficiency.
- ◆ Utilized available NREL Jobs and Economic Development Impact (JEDI) models, customized inputs for Humboldt County, developed custom models where JEDI models not available



Sample Results: Net Job Impacts



- Net job creation = 408 construction and 132 operations phase jobs.
- Not shown are 18 operations phase jobs lost for the natural gas fired power plant.

Key Lessons Learned

- We can meet a large fraction of our energy needs using local renewables and substantially reduce our GHG emissions
- We can do this at a modest cost increase
- We will realize increased jobs and economic stimulus
- There are many possible resource and technology options, a diverse mix probably makes most sense
- It is likely that biomass, wind and hydroelectric energy and electric vehicles and heat pumps will play a key role
- Pursuing energy efficiency is a key place to start
- Distributed generation can play a smaller but important role



Opportunities for Further Research

- Adapt models to apply to other communities
- Develop user friendly interface for energy models
- Expand energy models to apply to distributed combined heat and power (CHP)
- Demonstrate communities with large percentage of local renewable energy resources: Humboldt County as a case study
- Grid integration – power flow studies for DG and local renewable energy portfolios
- Ways to utilize remote forest biomass from fuel reduction efforts – torrefaction is one option we are pursuing

Thank You!



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Barriers and Strategies for Developing DG and Local Renewables

Barrier	Strategy
High up front cost	Incentives, financing, public/private partnerships
Permitting hurdles (wind, wave, small hydro, biomass)	Interagency coordination, streamline permitting
Political barriers (NIMBY)	Public outreach and education, collaborative efforts, broad stakeholder engagement
Energy planning is new for local government, assistance needed	Provide assistance
Lack of local power to make key energy supply/demand decisions	CCA, collaborative models working with utilities
Limited examples of successful community power projects	Develop case studies & examples, provide assistance
Grid infrastructure needs (T&D)	

Recommendations

- Provide planning assistance to communities
- Expand definition of DG goals to include small (≤ 20 MW) community-based power projects (wind, hydro, biomass, biogas, etc.), especially important for rural communities
- Promote collaboration between IOUs and community-based renewable energy planning and development

