

Project Narrative

Introduction

If California is to meet its aggressive greenhouse gas reduction and renewable energy development goals, select communities will need to take the lead and show how it can be done. Humboldt County is poised to set this example and to become a renewable energy secure community (RESCO). Humboldt County has adequate renewable energy resources to provide for all electricity, heating and transportation energy needs¹. In addition, there is strong local commitment to develop a secure renewable energy future. What's lacking is a detailed analysis and a corresponding strategic plan for the orderly, capital efficient development of local renewable energy resources. The products of this RESCO proposal will provide the needed analysis and planning guidance and will empower the community to move itself toward a renewable energy secure future.

This project narrative is organized into three sections. First, we discuss the technical approach and merits of the proposed project. Next, we describe the project team and their technical and management qualifications. Finally, we describe the existing community framework and explain how the proposed RESCO project will integrate into this framework and will lead to the eventual adoption and commercialization of RESCO solutions developed in this project.

Technical Approach and Merits

We propose to create a plan for developing an integrated mix of renewable energy resources coupled with energy efficiency, demand management, and other grid-integration technologies that meets most or all of the county's electricity needs and a large fraction of its heating and transportation energy needs using locally available renewable energy resources. In considering alternative plans, we will compare the associated environmental, economic, and social benefits for Humboldt County.

Humboldt County is fortunate to possess vast renewable energy resources in the form of wind, biomass, wave, and to a lesser extent, small hydro, solar energy, biogas, and others. For over twenty years the county has received nearly half its electricity from local, biomass-fired power plants. In addition, Humboldt County is geographically isolated and the normally available capacity of the transmission lines (estimated at 70 MW) that connect the county to the larger grid is less than half of the county's peak electrical demand (168 MW in 2007 and 2008). For this reason, Humboldt County behaves as a micro-grid, where electrical loads and resources must be well balanced.

Renewable energy developers can assess the cost-effectiveness and profitability of individual projects in isolation. However, with only modest development of local intermittent resources, the reliability of the local grid will become a limiting factor and effectively halt progress toward a RESCO future. By comprehensively analyzing the local energy resources and demands, we can identify targets for resource development and demand management that best benefit the economic, environmental, and social priorities of the community. The relatively isolated Humboldt electricity grid offers a natural experiment or test-bed for successful integration of a very high proportion of renewable energy supplies, with varying degrees of intermittency, combined with demand management, conservation, and energy efficiency.

Our proposed study plan is as follows. In Task 2, we will model a spectrum of resource mix options, assess their impact on the local electrical grid, and identify options that will function acceptably on the local grid. We will identify and assess both near-term and long-term options.

¹ Humboldt County Energy Element Appendices: Technical Report, Schatz Energy Research Center, Humboldt State University, October 2005 (included in Appendix to this proposal)

Based on a review of the challenges of integrating renewable energy into the electrical grid and of grid integration technologies such as smart grid, energy storage, and demand response technologies, we will identify those technologies that appear to best facilitate integration of renewable energy technologies on the Humboldt County electrical grid and assess their commercial readiness and availability.

We will identify the major renewable energy resources available in the county and will assess the readiness and availability of associated energy conversion technologies. This assessment will include wind, biomass, wave, solar, landfill gas, anaerobic digestion, food waste digestion, small hydro, tidal, and ocean current resources. While some of the associated conversion technologies are not yet fully developed, they may still fit within the long-term implementation schedule. The technology options that pass this initial review will be investigated further. For each energy source identified, we will estimate the current and maximum possible amount of energy available and prepare a database of local renewable energy resources.

Biofuels such as cellulosic ethanol and bio-oil are potentially important future forms of renewable transportation fuels. Both are still in the early stages of development. We will conduct preliminary assessment of the potential for and utilization of biofuels. This will include a resource assessment, evaluation of technology status, and examination of how biofuels might be integrated into the RESCO model for Humboldt County.

We will also identify energy efficiency and conservation measures that could lower energy consumption and demand. In addition to conventional energy efficiency measures, we will consider smart grid, energy storage, and demand response technologies. We will assess these technologies for their commercial readiness and availability, and those that pass an initial review will be investigated further. For each measure identified, we will estimate the maximum reduction in demand that might be achieved.

We will also examine the ability of energy storage and transportation fuel production technologies to allow for fuller development of renewable energy resources on the local electrical grid. This will include an assessment of plug-in hybrid and all electric vehicles, hydrogen fuel production, and heat pumps with heat storage for space and water heating. We will examine the ability of these technologies, when matched with smart grid and demand response technologies, to allow an increase in the percentage of intermittent renewable energy resources on the grid.

These lists of renewable energy sources, demand reduction measures, and energy storage/transportation options described above will serve as the universe of options that we will investigate when modeling energy supply and demand. Figure 1, included at the end of this narrative, depicts the system we will model.

To investigate how well renewable energy resources can meet Humboldt County's electrical demand, we will initially model community energy supply and demand at the county level. We will generate a wide and diverse combination of renewable energy sources and energy efficiency and conservation measures from the lists above and evaluate the ability of each combination to satisfy a set of reliability and performance criteria. This county-level analysis will utilize stochastic time series availability models for each local renewable energy resources. These resource models will be based on the best information and data available. Shell WindEnergy has indicated they may provide wind resource information for their planned wind energy development on Bear River Ridge. Wave data are available from our local NOAA weather station for monitoring sites on the Humboldt coast. Solar insolation data are available at several county stations, including two monitoring stations operated by SERC. We will work with our local biomass power plant operators to determine the dispatchability of biomass electricity.

Stochastic time series models of energy demand for Humboldt County will be developed from recent hourly demand data by sector (e.g., residential, commercial, industrial, and agricultural) provided by PG&E. We will estimate the impact of various energy efficiency, conservation and demand management technologies on the demand profile. Since the ultimate staged implementation of the plan may require 10 or more years, we will develop demand scenarios for 10, 20 and 30 years into the future based on PG&E projections. We will assemble this information into a database of current and projected energy demands.

Our countywide model will compare energy supply and demand generated by the stochastic models on an hour-by-hour basis for a design period of no less than one year. Using a computer model such as EnergyPLAN², we will systematically explore combinations of renewable energy resources, demand reduction measures, and storage and transportation options and assess the reliability and performance of each option. For each combination, we will estimate the greenhouse gas reduction relative to the current system, the number of hours per year that the demand was not satisfied, the fraction of the annual load provided by renewable energy resources, the total renewable energy harvested, the total heating demand satisfied with renewable energy, the total energy provided by renewable sources for transportation, and the load following and dispatchability benefits.

From the wide range of local renewable energy supply, demand reduction, and storage/transportation combinations, we will select those that provide at least 75% of the local electricity demand and at least 20% of heating and transportation energy needs. This high performance subset will be subjected to more in-depth analysis. For the highest performing combinations, we will select one or two promising options for which we will develop a staged implementation schedule to progressively increase the proportion of energy consumption met by local renewable resources.

In cooperation with PG&E, we will assess potential costs and benefits to the electrical grid that may result from implementation of the one or two highest performing combinations. This preliminary assessment will involve a steady-state power flow analysis and a spot transient stability analysis for a few key hours and will identify the need for major transmission system upgrades. This assessment will be performed for 1 or 2 preferred scenarios that are identified in Task 4 (see below).

In Task 3 we will identify and explore different business and organizational structures, financing mechanisms, and ownership options that could be used to effectively develop the renewable energy portfolios identified in Task 2. The usual model for incremental renewable energy development is a private developer model with bank financing secured by a power purchase agreement with a load-serving entity. While that model may be functional for incremental development of renewable energy supplies, it is not likely that it can be used to comprehensively develop renewable energy/demand management/conservation/efficiency portfolios that are both economically efficient and meet 75 to 100 percent of local electricity demand, as well as meeting a large quantity of heating and transportation energy needs.

We will investigate the merits of an investor owned utility development model, as well as that of a public-private partnership and other possible approaches. We will work with our local utility company, PG&E, to explore possible collaborative partnerships between PG&E and the community that could facilitate the implementation of Humboldt County's RESCO vision. We will evaluate different financing alternatives, including equity, bonds, and bank loans, and take into account other funding sources such as up-front sale of carbon or renewable energy credits. As a final point, we will evaluate different ownership

² EnergyPLAN is a deterministic hourly energy simulation model developed by the Sustainable Energy Planning Research Group at Aalborg University in Denmark.

structures for renewable energy generation facilities and related infrastructure and capital equipment, such as the “flip” ownership models employed in the development of Midwestern community wind projects.

Task 4 will provide an economic analysis of the various renewable energy portfolios identified in Task 2 when matched with a development model as identified in Task 3. The main objective of this task will be to identify the least-cost renewable energy supply options that meet community goals for renewable power development. We will conduct a lifecycle cost analysis that utilizes engineering and economic data derived from documented commercial applications, when such data are available, or otherwise derived from authoritative engineering and economic research. The life-cycle assessment will also incorporate the economic impacts associated with renewable energy portfolio development, such as direct jobs created from construction, operation and maintenance, and multiplier effects tied to these investments. Data used to estimate direct economic development benefits will be drawn from documented case studies or other authoritative sources. Multiplier effects will be derived from authoritative input-output analysis tools (e.g., IMPLAN software and RIMS II multipliers). The cost-benefit analysis will also include environmental benefits, such as the value of achieving a given unit of carbon-equivalent emissions reduction or climate benefit.

Although the Humboldt electric grid can be treated as a micro grid, it is still subject to larger market interactions. Consequently, Task 4 will include an analysis of the market and policy interactions that influence micro grid energy prices and the import/export interactions with the greater California grid. Local renewable power development may require infrastructure investment, such as local electric grid upgrades, or alternatively could result in deferred infrastructure investment, such as avoidance of a major transmission line or gas pipeline upgrade. We will include an assessment of these added or avoided infrastructure costs. The economic analysis will also assess the costs and benefits of using excess renewable electricity to generate hydrogen for use as a transportation fuel, to charge electric vehicles, and to switch end-use heating loads from natural gas or propane fuels to electrically driven heat pumps.

The effort in Task 4 will be coordinated with that of Tasks 2 and 3. Analysis of lifecycle costs in comparison to market referent prices will provide an indication of the cost-effectiveness of renewable energy options identified in Task 2. The cost effectiveness analysis will likewise provide insight into the appropriate and feasible development, financing, and ownership structures to be identified in Task 3. Consequently, the information gleaned in Task 4 will be used to further refine the analysis of options identified in Tasks 2 and 3. Using an iterative process, the analysis will identify preferred renewable resource portfolios and development models so that these options can be assessed at a greater level of detail. The analyses in Task 4 will specifically address a key barrier to implementation of a high-renewables energy portfolio – inadequate information on the economic viability, cost-effectiveness, and quantified economic development and environmental benefits of the proposed portfolio alternatives.

Task 5 will examine the regulatory environment in which a RESCO must be developed and will identify potential regulatory barriers that may inhibit RESCO development. Communities are at a great disadvantage when it comes to RESCO development. Most local governments have not traditionally been involved in the power supply and delivery sector, and consequently they are not knowledgeable of the associated regulatory framework and market structure. In order to facilitate the economically efficient development of RESCOs, local government officials must gain acumen in this area. Task 5 will outline the regulatory and market framework and identify potential barriers and associated mitigation measures. This information will be assembled in an energy policy and regulatory guide so it is easily accessible for local government officials. This guide will be used to inform the Humboldt County RESCO strategic planning process, and will also made available to other California communities who are striving for greater energy security through local energy planning efforts.

In Task 6, the knowledge gained in Tasks 2 through 5 will be compiled and presented to a select group of Humboldt County RESCO stakeholders. Stakeholder groups will likely include: local government officials, Pacific Gas and Electric Company, Shell WindEnergy, Humboldt Transit Authority, Humboldt Waste Management Authority, local timber/pulp industry representatives, local Native American Tribes, local environmental and economic development groups, and local regulatory agencies. We will develop a set of RESCO options and an overall RESCO vision to be shared with the stakeholder groups. We will then employ a multi-criteria decision support framework that utilizes weighted criteria to solicit input from stakeholders about the relative merits of various RESCO options. We will also seek to ascertain the key interests and levels of influence attributable to each stakeholder group, and we will use this information to develop strategies for securing stakeholder support toward further development of RESCO strategies.

We realize that the scope and complexity of our proposed project is ambitious. In particular, the technical, regulatory, and economic sophistication involved in Tasks 2 through 5 will present challenges. However, by employing sound scientific, engineering, and economic principles our proposed effort will produce technically valid solutions to the problems being addressed. The validity of our technical approach and likelihood of success will be further enhanced by engaging the involvement and guidance of key experts throughout the study. This will be accomplished through the participation of key project partners (as listed in the scope of work), the involvement of key stakeholders (in Task 6), and the development and use of the Project Advisory Committee (PAC) as detailed in Tasks 1.8 and 1.9.

The main work product from Task 7 will be a strategic plan that presents a RESCO vision, identifies preferred resource and technology options, and lays out a plan for staged implementation of the RESCO vision. Information gained in all previous project tasks will inform the development of the strategic plan. The plan will present a roadmap and timeline for implementation. It will identify key tasks and milestones, measurable outcomes, parties responsible for implementation tasks, required resources, and possible funding sources and mechanisms. It will also include a framework for program evaluation. In addition, the strategic plan will identify “next steps” for RESCO development and associated pilot scale projects that should be pursued. The strategic plan will be presented to key local decision makers, including the RCEA Board and the County Board of Supervisors. RCEA is committed to working with these local decision makers beyond the time frame of the proposed project to ensure follow-through and make sure that the “next steps” for RESCO development are acted upon.

Task 8 will involve the development of a community outreach plan that can be used to engage the local community and secure their support for the continued development of the RESCO vision. The outreach plan will include a PowerPoint presentation and brochure, a plan for media outreach, and a plan to engage local municipalities. One “town hall” meeting will be conducted to share the RESCO vision with the community and begin a dialog regarding RESCO implementation.

The goal of Task 9 is to develop a RESCO planning workbook that will allow other communities to learn from Humboldt County’s RESCO strategic planning experience. The workbook will briefly summarize the key activities involved in Humboldt’s RESCO planning process and will provide a step-by-step process that will make it easy for others to employ similar methods in their communities. Most of the work products developed in Tasks 2 through 8 will be transferrable to other communities. This includes the resource and technology assessment methodology (Task 2), the assessment of development, financing, and ownership options (Task 3), the economic analysis methodology (Task 4), the Energy Policy and Regulatory Guidebook for Local Government Officials (Task 5), the stakeholder analysis framework (Task 6), the strategic planning model (Task 7), and the community outreach plan (Task 8). All of these tasks will be described in the RESCO Planning Workbook and a list of key contacts that took part in the Humboldt RESCO planning process will be provided. Figure 2, included in the appendix, depicts the information process flow we will carry out in Tasks 2 through 9.

Technical Qualifications, Management and Project Team

Project Team

Our proposed project brings together a highly qualified public-private partnership with multi-disciplinary representation. This includes the Redwood Coast Energy Authority (a Joint Powers Authority), the Schatz Energy Research Center at Humboldt State University (a university research group), Pacific Gas and Electric Company (the local investor owned utility), and additional key project partners and stakeholders who can help further the Humboldt County RESCO vision.

The Redwood Coast Energy Authority (RCEA) is the prime applicant, or contracting agency. RCEA was formed in 2003 with the purpose to develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient and renewable resources available in the region. RCEA is a Joint Powers Authority (JPA), representing seven municipalities (the Cities of Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Trinidad and Rio Dell), the County of Humboldt, and the Humboldt Bay Municipal Water District. As a JPA, RCEA is governed by a board composed of representatives from each of these jurisdictions and is authorized to plan and implement a RESCO vision for Humboldt County. As the regional energy authority, the County Board of Supervisors has designated RCEA to implement Energy Element strategies on a regional basis through a Comprehensive Action Plan for Energy. The RCEA Board has adopted a resolution (Resolution number RCEA 2009-1) to pursue and carry out this proposed RESCO project.

RCEA will be supported with the strong technical expertise of the Schatz Energy Research Center (SERC) at Humboldt State University. SERC was founded in 1989 with a mission to promote the use of clean and renewable energy resources. Over the years SERC has been involved in extensive research, planning, design, and analysis activities for the development and implementation of sustainable energy systems, including energy efficiency, solar, wind, small hydro, biomass, and hydrogen and fuel cell technology for portable, stationary, and transportation applications. SERC and RCEA have worked together since RCEA's inception. SERC has provided local energy analysis, training, and public outreach services to RCEA. In 2005, SERC worked closely with RCEA to develop an Energy Element for Humboldt County's General Plan Update. Through this effort SERC gained intimate knowledge of local energy use characteristics as well as the local renewable resource base and opportunities for its development. SERC has conducted preliminary modeling of Humboldt County's renewable resources using the EnergyPLAN computer model, and this analysis showed there are sufficient renewable resources to meet all energy needs, but that integration technologies such as energy storage, flexible demand and a smart grid are needed to operate an integrated system.

Partnering with RCEA and SERC is our local investor-owned utility, Pacific Gas and Electric Company (PG&E). PG&E has ambitious goals to reduce their greenhouse gas emission and to increase the portion of renewable resources they provide to their customers in an environmentally sustainable and economically efficient fashion. They have demonstrated strong interest to participate in the Humboldt RESCO project, and have committed technical data and technical assistance and guidance, as well as collaborative partnership to this project.

Additional project partners will provide data and information critical to this RESCO planning effort. MSEI Fairhaven Biomass Power Plant personnel will assist us with information about biomass power. The Humboldt Transit Authority and local municipalities will provide information regarding their potential use of alternative fuel fleet vehicles (hydrogen powered vehicles, electric vehicles, biofueled vehicles). Municipalities will also provide information on opportunities for other community energy projects. The Humboldt Waste Management Authority will provide information on the potential for landfill gas-to-energy and food waste-to-energy project opportunities. Our local National Weather Service Office will provide wind and wave data critical to our resource analysis, and Shell WindEnergy has also indicated they may provide wind data for the premier wind site in the County. Many of these key partners

will be involved in the stakeholder analysis and will provide their expertise and guidance to the project effort. Letters of support from many of these partners are included in the appendix.

Project Roles

As prime applicant, the Redwood Coast Energy Authority will handle all project administrative functions and will provide overall project coordination. As the lead public agency handling energy policy in Humboldt County, RCEA will be the public liaison for the RESCO project. Appropriately, RCEA will lead all tasks that involve interfacing with public officials, community stakeholders, and the general public. This includes the stakeholder analysis (Task 6), community outreach plan development (Task 7), and strategic plan development (Task 8). RCEA will also play major roles in the examination of development structures, financing and ownership options (Task 3), and regulatory analysis (Task 5). Finally, RCEA will lead the effort to develop the RESCO Planning Workbook (Task 9). Project Administrator and lead Project Manager at RCEA will be RCEA's Executive Director, David Boyd. Mr. Boyd has been RCEA's Executive Director since 2004, and has been in the energy field for over 30 years. Prior to his time with RCEA he was a Career Executive with the State of California, and managed the California Conservation Corps' Energy Program. Supporting Mr. Boyd will be RCEA's Operations Manager, Dana Boudreau.

Working closely with RCEA, the Schatz Energy Research Center will provide technical leadership and will manage all technical tasks. This will include the resource and technology assessment (Task 2) and the economic analysis (Task 4). SERC will also lead the examination of development structures, financing and ownership options (Task 3) and the regulatory analysis (Task 5). SERC will provide major contributions to the stakeholder analysis (Task 6), community outreach plan development (Task 7), strategic plan development (Task 8), and RESCO Planning Workbook development (Task 9). The lead project manager at SERC will be Senior Research Engineer Jim Zoellick. Mr. Zoellick has worked for SERC for the last 13 years and in that time has managed many of SERC's premier projects with budgets totaling approximately \$1.28 million.

Supporting Mr. Zoellick will be Dr. Charles Chamberlin (HSU Engineering Professor and SERC Co-director), Dr. Steve Hackett (HSU Economics Professor), and Mr. Colin Sheppard (HSU graduate student/instructor and SERC Research Assistant). Dr. Chamberlin, with support from Mr. Sheppard, will lead the effort to develop stochastic time series models and simulate renewable energy integration on the Humboldt grid. Dr. Steve Hackett will lead the economic analysis effort and will play significant roles in the examination of development, financing and ownership options, as well as the examination of regulatory and market issues. SERC Director Dr. Peter Lehman and SERC Co-director Dr. Arne Jacobson will provide technical oversight for Tasks 2 and 4, as well as for other key project tasks.

Pacific Gas and Electric Company will provide in-kind technical assistance and technical data in support of this RESCO project, and will engage in collaborative planning efforts to explore possible RESCO development structures and options. Key data provided by PG&E will include hourly energy demand data for the Humboldt area.

Qualifications

Since 2003 the Redwood Coast Energy Authority has been working to reduce energy demand, increase energy efficiency, and advance the use of renewable resources available in the region. RCEA was created as a model to develop and coordinate rural, regional energy efforts, and to overcome economy-of-scale barriers faced by the small jurisdictions such as those in Humboldt County. RCEA's principal funding has come from the Public Goods Charge, with oversight from the California Public Utilities Commission. In 2004-05 RCEA received \$900,000 as a "third-party" energy efficiency information program. In 2006-08 RCEA became a "local government partner" with PG&E, and received about \$1,700,000 to implement efficiency projects that result in cost-effective direct energy savings. RCEA has also successfully

administered a US DOE grant in support of its Million Solar Roofs program. In 2005 RCEA coordinated the development of an Energy Element as part of Humboldt County's 2025 General Plan Update, and was subsequently designated by the County as the "regional energy authority" authorized to plan and implement activities such as those in this RESCO proposal.

The Schatz Energy Research Center, located at Humboldt State University in Arcata, CA, has twenty years of experience working in the areas of renewable energy, energy efficiency and alternative transportation fuels. SERC's mission is to promote the use of clean and renewable energy. SERC meets its mission by performing research on renewable energy systems; designing, building, operating, and demonstrating clean and renewable energy technologies; providing training for students in renewable energy technologies; and educating the public about the advantages of clean and renewable energy technologies. SERC works primarily on research and development, technology demonstration, project development, energy systems analysis, and education and training. SERC also performs feasibility studies, resource assessments, and energy planning studies.

See the Key Staff Biographies section of the proposal as well as the appendix for further materials documenting the qualifications of the key organizations and individuals who make up the project team.

Market Connectedness

In 2005, under the direction of RCEA and in collaboration with local consultants, SERC developed the Energy Element for Humboldt County (see Appendix). The Energy Element provides goals, policies, standards, and implementation measures that strive for sustainable renewable energy and self-sufficiency in the County. Stated goals include countywide strategic energy planning, increased energy efficiency and conservation, increased supply of energy from local renewable sources, and increased local control, ownership and management of energy supply. The Energy Element work involved an assessment of County energy use (how much is used and how it is used) and County energy supply (where does the energy come from), as well as an assessment of the County's renewable energy resources and how they could be used to serve local energy needs. This work provides critical background information and lays solid groundwork for the RESCO strategic planning work we propose to conduct in this study. Via the Energy Element, the County was able to identify strategic goals and objectives. The next step that is needed is a detailed analysis of which integrated renewable energy technologies are feasible, economically efficient and practical, and a strategic plan for how to proceed. This is the work we propose in our RESCO proposal.

We are confident that a successful strategic plan will accelerate renewable energy development in Humboldt County. The State of California is aggressively promoting the development of renewable energy by capping state-wide CO2 emissions and mandating renewable portfolio standards among electricity retailers. These policies guarantee a growing market for renewable energy for decades to come, with increasing premiums on that energy as regulations tighten each year. Humboldt County is uniquely endowed with significant renewable energy resources. Once the technical limitations and economic opportunities for local development are understood, the information barriers to investment will be effectively removed and investment efforts can begin in earnest.

Local municipalities and agencies in Humboldt County have a common vision of an energy secure future. In addition to the Energy Element work described above, the Cities of Arcata and Eureka and the County of Humboldt have all joined the Cities for Climate Protection and have developed or are developing greenhouse gas reduction plans. These efforts are spurred by a desire to comply with AB32 guidelines and to be a responsible citizenry.

In collaboration with RCEA, our local community is already making great strides promoting sustainable energy. Between 2006 and 2008, RCEA's Energy Watch energy efficiency program has accomplished an

electricity peak demand reduction of 709 kW, annual electricity consumption reduction of 4.2 million kWh, and annual natural gas consumption reduction of 48,000 therms. RCEA is also actively pursuing development of a local green building program, a time-of-sale program to address energy upgrades at the time a property changes ownership, and a solar energy financing program (“on tax bill” financing under AB811). Other local efforts include Eureka’s development of a “green team” which aims to make Eureka as environmentally friendly and energy efficient as possible.

RCEA has established itself as the local clearinghouse for energy projects and issues. As a JPA, it represents seven local municipalities and the County unincorporated area, and accounts for Humboldt County’s entire population base. Its programs serve homes and businesses as well as local governments, and include energy efficiency services, a lending library and tool bank, informational support services, workshops and trainings, a local vendor database, an electronic newsletter, sponsorship of the annual solar homes tour and other local energy related events, and a local Million Solar Roofs Initiative. RCEA is the source people turn to regarding local energy issues, and it has held public meetings on local energy projects such as: the Humboldt County Energy Element, the PG&E Wave Connect Project, the Shell WindEnergy project, the DG Energy Solutions Tri-Renewable Energy Project, PG&E’s Humboldt Bay Repowering Project, the Hydrogen Power Park project, and community choice aggregation. RCEA has become a trusted voice regarding local energy issues, and this close connection with the local community puts RCEA in the perfect position to lead the RESCO planning process.

The proposed RESCO project offers great benefit to the local community. We will develop a strategic plan for developing an integrated mix of renewable energy resources coupled with energy efficiency, demand management and other grid integration technologies that will best meet the county’s need and best capture the environmental, economic, and social benefits for the county. Since our planning model will identify economically efficient, least-cost strategies for achieving RESCO status, the resulting plan will offer significant dollar savings for CA utility ratepayers compared to non-optimal renewable resource development. Based on preliminary calculations, we estimate that the plan we develop will meet at least 75% of the County’s electricity needs and 20% of the county’s heating and transportation energy needs with local renewable energy resources will reduce local greenhouse gas emissions by approximately 366,000 tons per year, a 26% percent reduction. These results would put Humboldt County on the forefront of meeting the State’s AB32 and Renewable Portfolio Standard goals. We estimate annual end use energy expenditures in Humboldt County to total approximately \$320 million. Local RESCO development will serve to keep more of these energy dollars circulating in the local economy.

In addition to the local benefits to Humboldt County, the Humboldt County RESCO study will create a RESCO planning model that can be easily applied in other communities throughout the state and the country. To accomplish this, the RESCO planning model and process will be documented in a user-friendly RESCO Planning Workbook. The workbook will briefly summarize the key activities involved in Humboldt’s RESCO planning effort and will provide a step-by-step guide to the process. In addition, work products from other RESCO tasks will also be easily transferable for use in other communities. This includes the Energy Policy and Regulatory Guidebook for Local Government Officials and the community outreach plan. This will help distribute the benefits from this project to many CA utility ratepayers and citizens. The economic and technical analysis produced with a collaboration of university researchers, investor-owned utility, and joint-power regional energy authority will serve as a model that can be applied to other RESCO communities.

Much of the technical work performed in this study can help further renewable energy development efforts throughout the state and the country. For example, the uniquely transmission constrained electricity grid in Humboldt County can serve as a scalable test-bed for other possible RESCO communities. Because Humboldt County is isolated and served by a relatively small transmission connection to the larger electrical grid, it must be treated like a micro-grid with regards to the

management of supply and demand. This will be particularly critical with the aggressive development of renewable energy resources as proposed in a RESCO. Humboldt County already serves a large portion of its electricity demands with biomass fired power plants, and adding a large portion of intermittent renewable resources, such as wind, wave and solar, will pose significant challenges for grid management and reliability. Engaging in such a study in Humboldt County will allow us to use the County as a case study and examine the benefits of various grid management strategies and technologies. The lessons learned in this case study could then be applied over the larger electric grid, serving all of the CA ratepayers and other utility customers throughout the country. The Professional Advisory Committee that is utilized throughout the proposed project will provide guidance and expertise to ensure the validity of the analyses that are performed and will provide suggestions on how the work can best be applied at the state and national level.

Lessons learned in this study about ways to overcome market barriers to renewable energy development will also be applicable at the larger state and national level. For example, while Humboldt County has considerable renewable energy resources, much of this potential remains unrealized. There are important informational and network-coordination barriers that result in an adverse business climate for developing local renewable energy resources. In particular, while renewable energy developers can assess the cost-effectiveness and profitability of individual projects in isolation, based on renewable resource analysis, such an approach does not take into account the portfolio of technologies and sources that is optimal for maximizing overall renewable supply from the standpoint of the entire grid. Thus, for example, wind energy may be the most cost-effective renewable energy resource in isolation, but intermittency and costly storage places an upper bound on the percentage of the grid supply portfolio that can be made up of electricity generated from wind. In contrast, a grid-scale analysis could identify a renewable generation portfolio that includes technology and resource components that in isolation may not be the low-cost choice (e.g., wave energy conversion), but that in combination offset intermittency shortcomings of low-cost choices and thus allow a higher overall percentage of renewables on the grid.

Looking beyond the barriers to maximizing the share of renewable generation on a grid, a renewable energy development strategy focused at the project scale will also not take into account opportunities for policy innovation that promote enhanced demand-side management, use of smart-grid technology, energy efficiency, and conservation. But at a network scale these policies can serve as strategic complements to the development of a high proportion of renewable energy on an electricity grid. As a final point, project-scale analysis is less likely to successfully identify cost-effective means to utilize surplus renewable energy for heating or transportation energy needs.

Taken together, these informational and network-coordination problems result in a business climate with daunting barriers to fully realizing our local renewable energy potential. In the current context of a deep recession, limited access to credit, and low fossil-fuel energy prices, it is unlikely that local renewable energy resources and associated energy infrastructure will be aggressively developed without broad-based community planning and support. By improving the local business climate for renewable energy development, this project will both promote economic development and help California achieve the ambitious goals under AB 32, while maintaining a reliable and cost-effective electricity supply. The best strategy for a reliable future energy supply is to make it right here at home.