

Exhibit A
SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	ADMINISTRATION
2		IMPROVEMENTS OF THE SWITCH MODEL
3		REPRESENTATION OF THE REST OF THE ENERGY SYSTEM
4		DEVELOPMENT AND ANALYSIS OF SCENARIOS

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Dan Kammen (UC Berkeley)		
2	Dan Kammen		
3	Dan Kammen	Lawrence Berkeley National Laboratory	
4	Dan Kammen		

GLOSSARY

Specific terms and acronyms used throughout this work statement are defined as follows:

Acronym	Definition
CARB	California Air Resources Board
CPR	Critical Project Review
Energy Commission	California Energy Commission
GHG	Greenhouse Gas
LEAP	Long range Energy Alternatives Planning System
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
SWITCH	Solar, Wind, Hydro and Conventional generation and Transmission Investment model
VERs	Variable Energy Sources

Problem Statement

California's expressed intent to reduce its Greenhouse Gas (GHG) emissions to 1990 levels by 2020 and to 80% below 1990 levels by the year 2050 presents the state with a clear and quantifiable future goal. This goal requires that California put in motion a set

of effective policies that are based on a mix of technological and behavioral solutions for achieving that target. To date, California has engaged the scientific community to provide long-term solutions to the climate change problem with a focus on sector-specific policies. Distinct studies commissioned by the California Energy Commission (Energy Commission) have estimated the potential to reduce energy consumption in the state's residential, commercial, agricultural and industrial sectors over varying medium and long-term time horizons. There are also studies that examine carbon mitigation potential through supply side alternatives including carbon sequestration and storage. Studies focusing on reducing GHG emissions typically look at the potential for efficiency technology, for fuels alternatives and for demand management to reduce GHG emissions from energy consumption. However, a comparison and combination of these approaches has been challenging due to differences in time horizons, the variety of options considered, and the interactions between approaches.

Since the research is reaching a level of maturity where a reasonably accurate assessment of future scenarios can be assembled based on existing knowledge, the logical next step is to put these options together within an integrative framework that is flexible and transparent, in order to provide policymakers with an apparatus to evaluate policy alternatives to address the climate problem. An on-going Public Interest Energy Research (PIER) project ending by the summer of 2011 is exploring this approach but it has become abundantly clear that not taking into account the geographical location of the energy providers and the demand centers can result in unrealistic projections on how the energy sector could evolve in California. The same problem arises if the analyses do not take into account the time dependent availability of energy resources (e.g., hourly and sub-hourly resolution) and energy demand.

The environmental evaluations of proposed renewable power plants (e.g. solar thermal) placed before the Energy Commission have been problematic due to the lack of background environmental data needed to better estimate potential impacts and to design sound mitigation measures. Given the fast pace of transformation of California's energy system as required to comply with the Scoping Plan adopted by the California Air Resources Board (CARB) and the 2050 GHG emission goal, more nontraditional power plant (e.g., offshore wind) applications should be expected. To make sure that reducing GHG emission from the electricity system does not result in unintended environmental impacts, there is an urgent need to anticipate the potential evolution of the energy system and to start the investigation of the environmental implications of these potential energy scenarios.

The Energy Commission's Research, Development and Demonstration Policy Committee approved the design of an exploratory project with the fiscal year 2010-2011 PIER budget to start addressing the issues described above. This is phase Ia of this project dealing with the evolution of the energy system. A companion study is being developed to address environmental issues (Phase Ib).

Goals of the Agreement

The goal of this Agreement is to develop several potential energy scenarios under different policy options (e.g., carbon prices or cap-and-trade programs). The Agreement will also simulate the intermittent nature of renewable energy resource demands with high temporal and spatial resolution with the goal of minimizing the cost of meeting projected electricity demand with generation, storage, and transmission from present day until 2050.

This project comports with Public Resources Code Section 25620 (c) by advancing “energy science or technologies of value to California citizens,” and is part of a “full range of research, development, and demonstration activities that ... are not adequately provided for by competitive and regulated markets (Public Resources Code Section 25620.1.(a)); and supports California’s goal to implement all strategies identified by the Climate Action Team as needed to meet the Governor’s 2050 GHG emission reduction goals, including recommendations developed as part of the 2005 Integrated Energy Policy Report per the Energy Action Plan 2005. The objectives of this project will assist with the compliance of Executive Orders S-13-08 and S-14-08, which focus on climate change adaptation strategies and increasing renewable energy generation in the State.

This project also addresses SB 1078, the Renewable Portfolio Standard, which requires the state’s renewable energy share to be increased to 20% by 2017. The Energy Commission, along with CPUC, shares responsibility of implementing the program.

Objectives of the Agreement

The objectives of this Agreement are to:

- Estimate the potential evolution of the energy system in California by 2050 under different policy scenarios;
- Estimate the potential location of energy facilities (e.g., offshore wind) which would allow their preliminary environmental evaluation under Phase Ib of this project;
- Characterize the carbon reduction potential in terms of technical, economic, and politically/socially realizable options through the use of costs and uncertainties associated with the emissions reduction options.
- Provide a proof of concept test that would be used to design a more ambitious and far reaching project (Phase II).

TASK 1.0 ADMINISTRATION

MEETINGS

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Contractor shall:

- Attend a “kick-off” meeting with the Commission Contract Manager, the Contracts Officer, and a representative of the Accounting Office. The Contractor shall bring their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the Commission Contract Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Contract Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Terms and conditions of the Agreement
- CPRs (Task 1.2)
- Match fund documentation (Task 1.7)
- Permit documentation (Task 1.8)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Contract Manager’s expectations for accomplishing tasks described in the Scope of Work;
- An updated Schedule of Deliverables
- Progress Reports (Task 1.4)
- Technical Deliverables (Task 1.5)
- Final Report (Task 1.6)
- Establish the PAC (Task 1.10)
- PAC Meetings (Task 1.11)

The Commission Contract Manager shall designate the date and location of this meeting.

Contractor Deliverables:

- An Updated Schedule of Deliverables
- An Updated Gantt Chart (if included)
- An Updated List of Match Funds
- An Updated List of Permits
- Schedule for Recruiting PAC Members

Commission Contract Manager Deliverables:

- Final Report Instructions

Task 1.2 CPR Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, deliverables, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Contractor. CPRs generally take place at key, predetermined points in the

Agreement, as determined by the Commission Contract Manager and as shown in the Technical Task List above and in the Schedule of Deliverables. However, the Commission Contract Manager may schedule additional CPRs as necessary, and, if necessary, the budget will be reallocated to cover the additional costs borne by the Contractor, but the overall contract amount will not increase.

Participants include the Commission Contract Manager and the Contractor, and may include the Commission Contracts Officer, the PIER Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Contract Manager to provide support to the Energy Commission.

The Commission Contract Manager shall:

- Determine the location, date and time of each CPR meeting with the Contractor. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Contractor the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks. If the Commission Contract Manager concludes that the project needs a formal amendment or that satisfactory progress is not being made and the project needs to be ended, these conclusions will be referred to the Commission's Research, Development and Demonstration Policy Committee for its concurrence.
- Provide the Contractor with a written determination in accordance with the schedule. The written response may include a requirement for the Contractor to revise one or more deliverable(s) that were included in the CPR.

The Contractor shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other deliverables identified in this Scope of Work. Submit these documents to the Commission Contract Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.

- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Contractor Deliverables:

- CPR Report(s)
- CPR deliverables identified in the Scope of Work

Commission Contract Manager Deliverables:

- Agenda and a List of Expected Participants
- Schedule for Written Determination
- Written Determination

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Contractor shall:

- Meet with the Energy Commission to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Contractor, the Commission Contracts Officer, and the Commission Contract Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Contract Manager.

The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Contract Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Contract Manager and the Contracts Officer about the following Agreement closeout items:

- What to do with any state-owned equipment (Options)
- Need to file UCC.1 form re: Energy Commission's interest in patented technology
- Energy Commission's request for specific "generated" data (not already provided in Agreement deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential deliverables
- Final invoicing and release of retention

- Prepare a schedule for completing the closeout activities for this Agreement.

Deliverables:

- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

REPORTING

See Exhibit D, Reports/Deliverables/Records.

Task 1.4 Quarterly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement.

The Contractor shall:

- Prepare progress reports which summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Contract Manager within 10 working days after the end of the reporting period. Attachment A-2, Progress Report Format, provides the recommended specifications.

Deliverables:

- Quarterly Progress Reports

Task 1.5 Test Plans, Technical Reports and Interim Deliverables

The goal of this task is to set forth the general requirements for submitting test plans, technical reports and other interim deliverables, unless described differently in the Technical Tasks. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

The Contractor shall:

- Unless otherwise directed in this Scope of Work, submit a draft of each deliverable listed in the Technical Tasks to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide

written approval of the final deliverable within 5 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

Task 1.6 Final Report

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work done under this Agreement. The Commission Contract Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

The Final Report shall be a public document. If the Contractor has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report.

Task 1.6.1 Final Report Outline

The Contractor shall:

- Prepare a draft outline of the Final Report.
- Submit the draft outline of Final Report to the Commission Contract Manager for review and approval. The Commission Contract Manager will provide written comments back to the Contractor on the draft outline within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final outline to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final outline within 5 working days of receipt.

Deliverables:

- Draft Outline of the Final Report
- Final Outline of the Final Report

Task 1.6.2 Final Report

The Contractor shall:

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.
- Submit the draft Final Report to the Commission Contract Manager for review and comment. The Commission Contract Manager will provide written comments within

10 working days of receipt.

Once agreement on the draft Final Report has been reached, the Commission Contract Manager shall forward the electronic version of this report for Energy Commission internal approval. Once the approval is given, the Commission Contract Manager shall provide written approval to the Contractor within 5 working days.

- Submit one bound copy of the Final Report with the final invoice.

Deliverables:

- Draft Final Report
- Final Report

MATCH FUNDS, PERMITS, AND ELECTRONIC FILE FORMAT

Task 1.7 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. While the PIER budget for this task will be zero dollars, the Contractor may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained before the Contractor can incur any costs for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:
 1. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter.
 2. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:
 - A list of the match funds that identifies the:
 - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.
 - Amount of each in-kind contribution, a description, documented market

or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Contractor shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.

- A copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.
- Discuss match funds and the implications to the Agreement if they are significantly reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Contract Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Contract Manager within 10 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Deliverables:

- A letter regarding Match Funds or stating that no Match Funds are provided
- Letter(s) for New Match Funds
- A copy of each Match Fund commitment letter
- Letter that Match Funds were Reduced (if applicable)

Task 1.8 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are reimbursable under this Agreement. Permits must be identified in writing before the Contractor can incur any costs related to the use of the permit(s) for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:

1. If there are no permits required at the start of this Agreement, then state such in the letter.
2. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies the:
 - Type of permit
 - Name, address and telephone number of the permitting jurisdictions or lead agencies
 - Schedule the Contractor will follow in applying for and obtaining these permits.
- The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting, and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the appropriate information on each permit and an updated schedule to the Commission Contract Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Contract Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Contract Manager within 5 working days. Either of these events may trigger an additional CPR.

Deliverables:

- A letter documenting the Permits or stating that no Permits are required
- Updated list of Permits as they change during the Term of the Agreement
- Updated schedule for acquiring Permits as it changes during the Term of the Agreement
- A copy of each approved Permit

Task 1.9 Electronic File Format

The goal of this task is to unify the formats of electronic data and documents provided to the Energy Commission as contract deliverables. Another goal is to establish the computer platforms, operating systems and software that will be required to review and approve all software deliverables.

The Contractor shall:

- Deliver documents to the Commission Contract Manager in the following formats:
 - Data sets shall be in Microsoft (MS) Access or MS Excel file format.
 - PC-based text documents shall be in MS Word file format.
 - Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
 - Project management documents shall be in MS Project file format.
- Request exemptions to the electronic file format in writing at least 90 days before the deliverable is submitted.

Deliverables:

- A letter requesting exemption from the Electronic File Format (if applicable)

PAC

Task 1.10 Establish the PAC

The goal of this task is to create an advisory committee for this Agreement.

The PAC should be composed of diverse professionals. The number can vary depending on potential interest and time availability. The exact composition of the PAC may change as the need warrants. PAC members serve at the discretion of the Commission Contract Manager.

The PAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter
- Members of the trades who will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives)
- Public Interest Market Transformation Implementers
- Product Developers relevant to project subject matter
- U.S. Department of Energy Research Manager
- Public Interest Environmental Groups
- Utility Representatives
- Members of the relevant technical society committees

The purpose of the PAC is to:

- Provide guidance in research direction. The guidance may include scope of research; research methodologies; timing; coordination with other research. The guidance may be based on:
 - technical area expertise
 - knowledge of market applications

-linkages between the agreement work and other past, present or future research (both public and private sectors) they are aware of in a particular area.

- Review deliverables. Provide specific suggestions and recommendations for needed adjustments, refinements, or enhancement of the deliverables.
- Evaluate tangible benefits to California of this research and provide recommendations, as needed, to enhance tangible benefits.
- Provide recommendations regarding information dissemination, market pathways or commercialization strategies relevant to the research products.

The Contractor shall:

- Prepare a draft list of potential PAC members that includes name, company, physical and electronic address, and phone number and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting. This list will be discussed at the kick-off meeting and a schedule for recruiting members and holding the first PAC meeting will be developed.
- Recruit PAC members and ensure that each individual understands the member obligations described above, as well as the meeting schedule outlined in Task 1.11.
- Prepare the final list of PAC members.
- Submit letters of acceptance or other comparable documentation of commitment for each PAC member.

Deliverables:

- Draft List of PAC Members
- Final List of PAC Members
- Letters of acceptance, or other comparable documentation of commitment for each PAC Member

Task 1.11 Conduct PAC Meetings

The goal of this task is for the PAC to provide strategic guidance to this project by participating in regular meetings or teleconferences.

The Contractor shall:

- Discuss the PAC meeting schedule at the kick-off meeting. The number of face-to-face meetings and teleconferences and the location of PAC meetings shall be determined in consultation with the Commission Contract Manager. This draft schedule shall be presented to the PAC members during recruiting and finalized at the first PAC meeting.
- Organize and lead PAC meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the Commission Contract Manager.
- Prepare PAC meeting agenda(s) with back-up materials for agenda items.
- Prepare PAC meeting summaries, including recommended resolution of major PAC issues.

Deliverables:

- Draft PAC Meeting Schedule
- Final PAC Meeting Schedule
- PAC Meeting Agenda(s) with Back-up Materials for Agenda Items
- Written PAC meeting summaries, including recommended resolution of major PAC issues

TECHNICAL TASKS

The Contractor shall prepare all deliverables in accordance with the requirements in Task 1.5. Deliverables not requiring a draft version are indicated by marking “(no draft)” after the deliverable name.

Task 2 IMPROVEMENTS OF THE SWITCH MODEL

The goal of this task is to improve the Solar, Wind, Hydro and Conventional Generation and Transmission (SWITCH) model to more realistically represent the electricity network in the Western Interconnected System. Storage is expected to play an important role in future power systems with high penetration levels of variable energy resources (VERs). A number of storage technologies are currently in development, and since they differ widely in their capabilities, research into the possible applications of both utility-scale and distributed storage options must be undertaken.

The Contractor shall:

- Investigate the reliability of the electricity system suggested by SWITCH by testing the model with operating hours that were not used by the model during its initial execution (optimization phase).
- Investigate the development of SWITCH to dispatch on a full year of hours to better simulate annual Renewable Portfolio Standard (RPS) constraints.
- Enhance the SWITCH model to consider variations in load and renewable output on the sub-hourly timescale.
- Consider local capacity requirements and system inertia when enhancing the SWITCH model.
- Research the feasibility of considering grid reliability issues and load impacts of electric vehicle charging.
- Enhance the SWITCH model to capture more of the effects of intermittency by including ancillary services such as regulation, spinning reserves, and non-spinning reserves to balance generator outages, load variations, and renewable generation variability. The addition of ancillary services will also help assess more sources of value for storage and other technologies that can provide balancing services that are crucial to the ability of the grid to reliably integrate high penetration levels of intermittent renewable generation. The researchers should consult the California ISO’s 33 percent integration study and the any publically available study using the “PG&E Renewable Integration Model (RIM).”
- Test the model with more detailed short-term electricity models that simulate

challenging modeling situations for a long-term planning model such as SWITCH.

- Update, as needed, the dataset (e.g., potential resource availability for electricity generation) used to drive the SWITCH model.
- Improve the representation of potential energy technologies that may become available in 20 or more years.
- Investigate potential modifications of SWITCH to simulate potential manipulations of future carbon markets.
- Investigate and if feasible enhance the SWITCH model to account for the potential increased penetration of combined heat and power units.
- Prepare one or more brief technical protocols describing how the proposed changes would be implemented. The protocol must be approved by the Commission Project Manager prior to their implementation. The protocol(s) should include proposed criteria to determine if the proposed improvements to the model have been successful.
- Prepare a draft and final technical memorandum entitled “Improvements to the SWITCH model.”
- Present the details and findings of this task at the PIER annual climate change conference.

Deliverables:

- Improvements to the SWITCH Model Technical Protocol(s)
- Improvements to the SWITCH Model Technical Memorandum
- Conference presentation PowerPoint file (no Draft)

Task 3 Representation of The Rest of The Energy System

The goal of this task is to simulate the rest of the energy system using an enhanced version of the LEAP model. Only a soft linking (manual transfer of data) between LEAP and SWITCH will be attempted.

The Contractor shall:

- Meet with federal energy regulatory authorities to discuss this project and gather their feedback on possible regulatory issues to be reflected in the model simulation.
- Further enhance the LEAP model to provide electricity demand data to SWITCH at the temporal and geographical resolution required by the model.
- Explore non supply-related electricity options (e.g., aggressive energy efficiency programs and demand side management) that may improve the technical performance, costs, and environmental considerations of the electricity system.
- Assess non-electricity sector (direct fuel combustion in stationary and mobile sources) GHG mitigation pathways using the CARB data as a starting point.
- Explore ways to account for uncertainty and risk assessment in model analysis of future energy systems.
- As much as possible, include the consideration of human behavior factors on the adoption and use of technologies.
- Prepare one or more brief technical protocols regarding the representation of the

rest of the energy system describing the proposed methods that would be used to implement the processes listed above. The Commission Project Manager must approve this protocol before it is implemented.

- Prepare a technical memorandum entitled “Enhancements to the LEAP2 model” documenting the work under this task.

Deliverables:

- Representation of the Rest of the Energy System Protocol(s)
- Enhancements to the LEAP2 model Technical Memorandum

Task 4 DEVELOPMENT AND ANALYSIS OF SCENARIOS

The goal of this task is to develop energy scenarios for California considering issues related to the rest of the Western Interconnected System.

The Contractor shall:

- Form a Policy/Technical Advisory Committee. The committee membership must be approved by the Commission Project Manager.
- Organize at least two in-person meetings for the Policy/Technical Advisory Committee at the beginning and near the end of the project.
- Organize conference calls, as needed, to receive input from the Policy/Technical Advisory Committee and to present research results.
- With input from the Policy/Technical Advisory Committee (PAC), identify the policy questions that will be investigated using the SWITCH-LEAP2 modeling system.
- At least one of the scenarios would explore the potential implications of increased temperatures and changes in hydropower production due to climate change using past and on-going PIER studies on this topic.
- Prepare report on the lessons learned from the interaction between researchers and the Policy/Technical Advisory Committee and how the project informed energy policy in California.
- Prepare a report entitled Potential Energy Scenarios for California: Phase Ia.
- Give a presentation at the annual PIER climate change research conferences if requested by the Commission Project Manager and provide presentation materials such PowerPoint files.

Deliverables:

- Lessons Learned Report (no draft)
- Potential Energy Scenarios for California: Phase Ia Report
- PowerPoint files and/or other presentation materials as needed (no draft)