

Exhibit A

Scope of Work

BACKGROUND

The Energy Commission is responsible for developing energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the State's economy and protect public health and safety. The Energy Commission contributes to this core mission by performing the following on-going activities:

- Collecting demand forecasts, resource plans, market assessments and related outlooks from electric and natural gas utilities, and other market participants,
- Providing information regarding the performance of energy industries,
- Developing and maintaining the analytical capability to answer queries about energy issues,
- Analyzing and developing energy policies,
- Providing an analytical foundation for regulatory and policy decision making,
- Consulting with the appropriate state agencies including the Public Utilities Commission (CPUC), CPUC's Office of Ratepayer Advocates, Air Resources Board (ARB), Electricity Oversight Board, Independent System Operator, and the Department of Water Resources, and
- Consulting with the appropriate federal agencies including the Department of Energy, Western Area Power Administration, Bonneville Power Administration, and the Western Electricity Coordinating Council.

The IEPR includes an assessment and forecast of energy system reliability, the need for resource additions, efficiency, and conservation that considers all aspects of energy industries and markets that are essential for the state economy, general welfare, public health and safety, energy diversity, and protection of the environment.

In addition to the IEPR documents, the Energy Commission may also prepare analyses and assessments of energy issues and concerns to provide timely and relevant information for the Governor, the Legislature, energy market participants and the public.

This is a "Work Authorization" Contract and no work shall be undertaken unless authorized by the Commission through a specific written document called a Work Authorization (WA). WA specifying the tasks, deliverables and costs shall be used for all work assignments. WA for technical tasks will be made on an as-needed basis. The specific task(s) and the degree of effort for each task will vary from project to project. Written authorization must be obtained from the Energy Commission Contract Manager (CCM) before work can begin on any WA. Workflow will depend on demand for service. Demand is uncertain and, therefore, there will be no guarantee of work for the prime contractor or any subcontractor.

The Contractor shall provide technical assistance for the following tasks, as directed by the CCM through properly executed WA's.

Task No.	Task Description
1	Contract Management
2	Electricity System and Infrastructure Analysis
3	Improve Demand Forecasting Methods
4	Improve Energy Demand Analyses
5	Natural Gas Assessment And Forecasting
6	Central Station And Distributed Generation Market Assessment

GLOSSARY

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

Acronym	Definition
<i>CCM</i>	<i>Commission Contract Manager</i>
<i>KCM</i>	<i>Contractor Contract Manager</i>
<i>CO</i>	<i>Commission Contracts Officer</i>
<i>Agreement</i>	<i>Contract No. 800-10-001 between CEC and Aspen Environmental Group</i>

Acronym	Definition
CEC	<i>California Energy Commission; also referred to as Energy Commission and Commission.</i>
DVBE	<i>Disabled Veteran Business Enterprises</i>

TASK 1: CONTRACT MANAGEMENT

TASK 1.1 - KICKOFF MEETING

The Contractor shall:

- Attend a “kick-off” meeting with the Energy Commission Contract Manager, Contracts Officer, and the Accounting Office. The Contractor shall include at a minimum their Project Manager, Contract Administrator, and Accounting Officer. The administrative and technical aspects of this contract will be discussed at the kick off meeting.

TASK 1.2 - INVOICES

The Contractor shall:

- Prepare and submit invoices for all reimbursable expenses incurred performing work under this contract in compliance with the Terms and Conditions of the contract. Official invoices must be submitted to the Energy Commission’s Accounting Office.

TASK 1.3 - SUBCONTRACTORS

In the event Subcontractors are part of the Contractor’s proposal, the Contractor shall:

- Manage and coordinate subcontractor activities. The Contractor is responsible for the quality of all subcontractor work. The Energy Commission will assign all work to the Contractor. If the Contractor decides to add new subcontractors, it shall first 1) comply with all applicable terms and conditions of the contract, and 2) notify the CCM who will follow the Energy Commission’s process for adding or replacing subcontractors.

TASK 1.4 - MONTHLY PROGRESS REPORTS

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

The Contractor shall:

- Prepare monthly progress reports which summarize all contract activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the contract within the current budget and any anticipated cost overruns.
- Each progress report is due to the CCM within 15 calendar days after the end of the reporting period.

Deliverables:

- Monthly Progress Reports

TASK 1.5 - 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 contract. The CCM will review and approve the Final Report. The Final Report must be completed on or before the termination date of the contract.

The Final Report shall be a public document. If the Contractor has obtained confidential information from the Energy Commission, it shall prepare 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:

The Contractor shall:

- Prepare a draft outline of the Final Report.
- Submit an electronic draft outline of the Final Report to the CCM for review and approval. The CCM will provide written comments to the Contractor on the draft outline within 15 calendar days of receipt.
- Prepare and submit a final outline to the CCM once agreement has been reached on the draft. The CCM shall provide written approval of the final outline within 7 calendar days of receipt.

Deliverables:

- Outline of the Final Report (draft and final)

TASK 1.5.2 - Final Report

The Contractor shall:

- Prepare the draft Final Report for this contract in accordance with the approved outline.
- Submit an electronic draft Final Report to the CCM for review and comment. The CCM will provide written comments within 15 calendar days of receipt.
- Prepare and submit a Final Report that addresses all of the CCM's comments on the draft Final Report. Any problematic recommended changes shall be discussed with the CCM before finalization. Once final editing is completed, the CCM shall provide written approval to the Contractor within 7 calendar days.

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

Deliverables:

- Final Report (draft and final)

TASK 2: ELECTRICITY SYSTEM AND INFRASTRUCTURE ANALYSIS

As directed, the Contractor shall work with Commission staff on a range of analytical studies in the field of electric transmission and generation system analysis, planning and regulation. These assignments will be varied, complex, and technical, including engineering and economic studies related to integrated transmission and generation reliability issues. The following sub-tasks are divided into core electricity system topic areas.]

- 2.1:** Contractor shall conduct analysis of local capacity area capacity requirements annually over a 10, 15 and 20-year time frame under alternative energy demand, power plant retirement/development, and transmission system upgrade scenarios. Contractor shall acquire, or if not available, develop power flow base cases and prepare analyses of scenario variants to a base case using techniques equivalent to those prepared by the CAISO.
- 2.2:** Contractor shall undertake analyses of the feasibility and costs of reducing power plant capacity that currently must be located in the immediate coastal zone of Southern California. Feasibility shall examine the impacts of upgrades to transmission system elements (line rating increases through reconductoring, upgraded substations, additional interconnections between substations, developing reactive power elements that can substitute for power plant inertia, etc.). For feasible upgrades, contractor shall develop preliminary cost estimates of comparable certainty to industry-standard cost of generation assessments to allow initial tradeoff analyses.
- 2.3:** Contractor shall develop an analysis that illustrates the tradeoffs between imports into Southern California versus internal capacity that must be on line and available to assure system stability under generator and transmission contingencies, including variable energy resources and energy storage. It is expected that this analysis would resemble conversion of the seasonal Southern California Import Transmission (SCIT) Nomogram from the operating time horizon to the planning time horizon in order to guide development of power plant configurations and locations necessary to support system stability under one or more transmission system development patterns.

- 2.4:** The Contractor shall provide technical assistance for studying the implications of the development of specific bulk transmission projects, both planned and conceptual, for the integration of new renewable resources, the need for local capacity in transmission-constrained areas, energy storage and the ability to import energy from and rely upon generation capacity in neighboring states.
- 2.5:** The Contractor shall provide technical assistance for evaluating the need for bulk transmission to meet the state's environmental policy goals and ensure reliable service under different scenarios regarding future load-growth, impacts of demand-side programs (energy efficiency, demand response), energy storage, renewable and fossil generation resource development., and new grid management techniques for managing variable energy resources
- 2.6:** The Contractor shall Identify, assess, and make recommendations regarding the feasibility of improvements in modeling techniques related to electricity system integration. This can include modifications to existing modeling techniques (e.g. – production cost models) or the applicability of new modeling techniques (e.g. – power flow studies).
- 2.7:** The Contractor will collaborate with Energy Commission's staff to define policy relevant scenarios compatible with modeling techniques and availability of data, and assist Energy Commission's staff to translate the general concepts of the new scenarios/cases into simulation models and risk analysis datasets.
- 2.8:** Assist in the development of in-house tools for compiling, analyzing, and presenting data, including but not limited to hourly data on generation, electrical loads, and transmission flows.
- 2.9:** Provide technical support for the development of spreadsheet- and programming-based tools designed to facilitate the compilation and representation of data in useful formats, and summarize said data both statistically and graphically. Develop interfaces which facilitate ease of use.
- 2.10:** Distribution planning. Provide technical support for the development and evaluation of distribution system planning processes and methodologies.
- 2.11:** Distribution system modeling. Provide technical support for the development and evaluation of quantitative models of the distribution system.
- 2.12:** Distributed Generation. Provide technical support for analysis of the costs, economics, operating characteristics, regulation/incentives, and other factors which influence deployment and impact of distributed generation technologies.

- 2.13:** Distributed generation. Provide technical support for evaluating the upgrades to the distribution system and changes in distribution engineering practices or inter-connection requirements needed to incorporate high levels of distributed generation into the electricity system.
- 2.14:** Assist in the development of in-house tools for compiling and analyzing data, including but not limited to hourly and sub-hour data on generation, electrical loads, and transmission flows. Provide technical support for the development of spreadsheet- and programming-based tools designed to facilitate the compilation and representation of data in useful formats, and summarize said data both statistically and graphically. Develop interfaces which facilitate ease of use.
- 2.15:** The Contractor shall provide technical assistance on evaluating the variability and other uncertainties affecting the availability of hydrogenation and how hydro dispatch may change to accommodate intermittent renewable generation.
- 2.16:** Assist staff in evaluating and weighing the various sources of uncertainty that will affect integration of higher levels of renewables into the California and Western grid.

TASK 3: IMPROVE DEMAND FORECASTING METHODS

The Contractor shall provide technical assistance in the preparation of, and recommendations for the improvement of, both year-ahead forecasts of monthly peak demand and longer-term forecasts of annual peak and energy demand. The Contractor shall:

- 3.1:** Identify and assess various peak demand forecasting methodologies and techniques currently being used by other industry and academic experts to forecast electricity peak demand.
- 3.2:** Identify methods to improve the usefulness of staff peak demand forecasting methods, and implement those methods as directed by the CCM.
- 3.3:** Identify methods to improve the usefulness of staff energy demand forecasting methods, and implement those methods as directed by the CCM. This potentially includes separate projects for individual sectors, including:
- a. Residential
 - b. Commercial
 - c. Industrial

d. Agricultural

e. Other

3.4: Transfer sector models coded in Fortran to the SAS platform.

3.5: Develop inputs to the residential and commercial forecasting models from existing residential and commercial surveys.

3.6: Provide analytical and data collection in support of efforts to improve and/or refine Title 20 code of regulations, develop mechanisms, and identify accessible data sources, for easily generating hourly load profiles for forecast years that reflect the shift in mix of electricity use among customer sectors and within customer sectors as energy efficiency programs, customer response to price, and other changes in consumer tastes and preferences take place through time.

TASK 4: IMPROVE ENERGY DEMAND ANALYSES

The Contractor shall provide technical assistance and recommendations related to other analyses conducted in the Demand Analysis Office that are not directly related to energy demand forecast methods. The Contractor shall:

4.1: Develop an econometric model to measure impacts of efficiency standards and programs on energy consumption and peak demand using a “top down” approach.

4.2: Identify, assess, and implement, as directed by the CCM, behavioral methodologies to forecast adoption of efficiency measures.

4.3: Develop a forecasting methodology for commercial sector adoption of electricity self-generation technologies, including photovoltaic systems.

4.4: Provide review and analyses of publicly owned utility evaluation, measurement, and verification (EM&V) studies in support of AB 2021 efficiency goals. Provide training where needed for the publicly owned utilities in conducting these studies. Develop and implement strategies for EM&V collaboration among utilities.

4.5: Provide coordination and other support for activities involving the Demand Analysis Office and outside agencies, including the Demand Analysis Working Group (DAWG).

4.6: Provide analysis on current and forecasted efficiency programs of California utilities and their impacts on state energy consumption.

- 4.7:** Provide analysis on and evaluation of methodologies to determine energy efficiency potential and establish goals of California utilities and other entities supplying efficiency services.

TASK 5: NATURAL GAS ASSESSMENT AND FORECASTING

The purpose of this task is to provide expert technical assistance on a variety of natural gas issues. Assistance will be provided in the areas of infrastructure analysis, supply and production cost analysis, gas demand analysis, price forecasting, risk analysis, and data collection.

- 5.1** Evaluate the capacity of natural gas storage facilities in California and the United States.
- 5.2** Assess the need for pipelines in California and the United States
- 5.3:** Evaluate potential impact to natural gas supplies to California from a switch from coal used for power generation in other states to natural gas
- 5.4:** Evaluate California's pipeline infrastructure adequacy to provide gas to power plants in the state in a 33% renewable technology goal
- 5.5:** Assess potential of shale gas supply and other unconventional sources of natural gas in the next 20 years
- 5.6:** Assess potential of LNG supply to California in the next 20 years
- 5.7:** Assist staff in refining the methods and methodologies used to forecast natural gas parameters
- 5.8:** Help staff in selecting or modifying variables to populate the natural gas models
- 5.9:** Assist staff in evaluating the usefulness of forecasting outputs from models
- 5.10:** Assist staff in designing probabilistic methods to evaluate results from natural gas forecasting models.

TASK 6: CENTRAL STATION AND DISTRIBUTED GENERATION MARKET ASSESSMENT AND ANALYSIS

The purpose of this task is to provide expert technical analysis and support of assessments and analyses related to the costs, locations, and other relevant factors associated with investments in central station and distributed generation. Assistance will be focused on the areas of understanding the underlying factors associated with investment decisions as well as the potential future decisions under various policy regimes.

- 6.1:** Provide assistance in developing estimates of technical and market potential for Combined Heat Power (CHP) for different technologies, in different sectors of the economy and in different locations. Identify economic incentives for the development of CHP and their potential and likely impact.
- 6.2:** Evaluate the performance of existing and new CHP by technology and economic sector. Assist in the development of daily output curves, on-site use and exports by sector.
- 6.3:** Provide technical assistance in developing analyses of the impact of large-scale deployment of on-site and export CHP. Assess the implications of the large-scale deployment of CHP from various economic sectors and their implications for the development of other generation resources needed to meet electricity demand in California
- 6.4:** Provide technical support for the economic assessment of emerging and mature solar thermal and photovoltaic technologies. Assist in the development of cost estimates for project construction, associated transmission costs, and levelized energy cost estimates based on technology and location.
- 6.5:** Provide technical support for the evaluation of the operation of renewable resources based on technology and location. Assist in developing operating profiles, capacity factor estimates, variability and peak hour availability estimates based on historical output and/or generation source (solar irradiation, wind density, etc.) data.
- 6.6:** Provide technical support to update the cost drivers and associated uncertainties affecting the calculated levelized costs of fossil generation technologies. Provide technical assistance to evaluate the probabilities that a combination of uncertainties will result in higher or lower levelized costs to inform decision makers about the possibility that certain policies may impact overall electricity system cost.