STATE OF CALIFORNIA

CONTRACT REQUEST FORM (CRF)

CEC-94 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

A) New Agreement 500-15-003 (To be completed by CGL Office)

B) Division	**Agreement Manager:**	**MS-**	**Phone**
500 Renewable Energy Division	Elizabeth Hutchison	45	916-654-3838

C) Contractor's Legal Name	**Federal ID Number**
"ITRON, INC. WHICH WILL DO BUSINESS IN CALIFORNIA AS IBS"	91-1011792

D) Title of Project

New Solar Homes Partnership Photovoltaic Systems Operational Performance Audit and Evaluation

E) Term and Amount	**Start Date**	**End Date**	**Amount**
	6 / 1 / 2016	4 / 30 / 2018	$ 419,930

F) Business Meeting Information

☐ Operational agreement (see CAM Manual for list) to be approved by Executive Director

☐ ARFVTP agreements $75K and under delegated to Executive Director.

Proposed Business Meeting Date	4 / 13 / 2016	☐ Consent	☒ Discussion
Business Meeting Presenter	Elizabeth Hutchison	Time Needed:	5 minutes

Please select one list serve. Select

Agenda Item Subject and Description

Proposed resolution approving Agreement 500-15-003 with "ITRON, INC. WHICH WILL DO BUSINESS IN CALIFORNIA AS IBS" for a $419,930 contract to audit and evaluate the operational performance of solar energy systems that received incentives through the California Energy Commission's New Solar Homes Partnership program. (RRTF Funding) Contact: Elizabeth Hutchison. (5 minutes)

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

Explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because .

2. If Agreement is considered a "Project" under CEQA:

☐ a) Agreement **IS** exempt. (Attach draft NOE)

☐ Statutory Exemption. List PRC and/or CCR section number:

☒ Categorical Exemption. List CCR section number: 14 CCR 15306

☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

This agreement is exempt under 14 CCR Section 15306, Information Collection, because it consists of basic data collection related to operational performance of solar energy systems under NSHP and does not result in a serious or major disturbance to an environmental resource.

☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)

Check all that apply

☐ Initial Study ☐ Environmental Impact Report

☐ Negative Declaration ☐ Statement of Overriding Considerations

☐ Mitigated Negative Declaration

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	Budget	SB	MB	DVBE
Amerit Consulting, Inc.	$ 30,000	☐	☐	☒
	$ 0	☐	☐	☐
	$ 0	☐	☐	☐

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:

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J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
RRTF	FY 15/16	500.007	$419,930
Funding Source			$
Funding Source			$
Funding Source			$
Funding Source			$
R&D Program Area: Select Program Area		TOTAL:	$419,930
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

K) Contractor's Administrator/ Officer				Contractor's Project Manager			
Name:	Angela Nenn			Name:	Smita Gupta		
Address:	330 Madson Place			Address:	330 Madson Place		
City, State, Zip:	Davis, CA 95618			City, State, Zip:	Davis, CA 95618		
Phone:	509-891-3189	Fax:	- -	Phone:	509-891-3189	Fax:	- -
E-Mail:	Angela.Nenn@itron.com			E-Mail:	Smita.Gupta@itron.com		

L) Selection Process Used (For amendments, address amendment exemption or NCB, do not identify solicitation type of original agreement.)

☒ Solicitation RFP Solicitation #: RFP-15-502 # of Bids: 1 Low Bid? ☐ No ☒ Yes
☐ Non Competitive Bid *(Attach CEC 96)*
☐ Exempt Select Exemption (see instructions)

M) Contractor Entity Type

☒ Private Company *(including non-profits)*
☐ CA State Agency *(including UC and CSU)*
☐ Government Entity *(i.e. city, county, federal government, air/water/school district, joint power authorities, university from another state)*

N) Is Contractor a certified Small Business (SB), Micro Business (MB) or DVBE?

☒ No ☐ Yes
If yes, check appropriate box: ☐ SB ☐ MB ☐ DVBE

O) Civil Service Considerations

☐ Not Applicable (Agreement is with a CA State Entity or a membership/co-sponsorship)
☐ Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)
☒ The Services Contracted:
- ☒ are not available within civil service
- ☒ cannot be performed satisfactorily by civil service employees
- ☒ are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system.

☐ The Services are of such an:
- ☐ urgent
- ☐ temporary, or
- ☐ occasional nature

that the delay to implement under civil service would frustrate their very purpose.

Justification:
The Energy Commission does not have the technical resources or knowledge available to complete the data collection, processing and analysis required for an operational performance audit of solar energy systems under NSHP

P) Payment Method

☐ A. Reimbursement in arrears based on:
☐ Itemized Monthly ☒ Itemized Quarterly ☐ Flat Rate ☐ One-time
☐ B. Advanced Payment
☐ C. Other, explain:

Q) Retention

1. Is Agreement subject to retention? ☐ No ☒ Yes
   If Yes, Will retention be released prior to Agreement termination? ☒ No ☐ Yes

R) Justification of Rates

S) Disabled Veteran Business Enterprise Program (DVBE)

1. ☐ Exempt (Interagency/Other Government Entity)
2. ☒ Meets DVBE Requirements DVBE Amount:$ 30,000 DVBE %: 7%
   - ☐ Contractor is Certified DVBE
   - ☒ Contractor is Subcontracting with a DVBE: Amerit Consulting, Inc.
3. ☐ Contractor selected through CMAS or MSA with no DVBE participation.
4. ☐ Requesting DVBE Exemption (attach CEC 95)

T) Miscellaneous Agreement Information

1. Will there be Work Authorizations?	☐ No	☒ Yes
2. Is the Contractor providing confidential information?	☒ No	☐ Yes
3. Is the contractor going to purchase equipment?	☒ No	☐ Yes
4. Check frequency of progress reports		
☐ Monthly ☒ Quarterly ☐ Other...		
5. Will a final report be required?	☐ No	☒ Yes
6. Is the Agreement, with amendments, longer than a year? If yes, why? Must fulfill SB1 requirement to perform annual audits	☐ No	☒ Yes

U) The following items should be attached to this CRF (as applicable)

1. Exhibit A, Scope of Work	☐ N/A	☒ Attached
2. Exhibit B, Budget Detail	☐ N/A	☒ Attached
3. CEC 96, NCB Request	☒ N/A	☐ Attached
4. CEC 95, DVBE Exemption Request	☒ N/A	☐ Attached
5. CEQA Documentation	☒ N/A	☐ Attached
6. Resumes	☐ N/A	☒ Attached
7. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A

Scope of Work

TASK LIST

Task #	Task Name
1	Agreement Management
2	Phase I Data Collection
3	Phase I Data Processing
4	Phase I Data Analysis
5	Phase II Data Collection
6	Phase II Data Processing
7	Phase II Data Analysis
8	Alternative Data Collection
9	Final Report

ACRONYMS/GLOSSARY

SPECIFIC ACRONYMS AND TERMS USED THROUGHOUT THIS SCOPE OF WORK ARE DEFINED AS:

Word/Term	Definition
CAM	Commission Agreement Manager
DGS	Department of General Services
DVBE	Disabled Veteran Business Enterprises
Energy Commission	California Energy Commission
NSHP	New Solar Homes Partnership
Proposal	Formal written response to this document from Bidder
RFP	Request for Proposal, this entire document
SB 1	Senate Bill 1 (Murray, Statues of 2006)
State	State of California

BACKGROUND

Enacted in 2006, SB 1 has three main goals to be achieved by the end of the program:

- Install 3,000 megawatts of solar energy systems;
- Establish a self-sufficient solar industry by making solar energy systems a viable mainstream option for homes and commercial buildings; and
- Install solar energy systems on 50 percent of new homes.

SB 1 also tasks the Energy Commission with conducting random audits of the operational performance of solar energy systems. To fulfill this requirement the Energy Commission is undertaking this auditing and evaluation project for systems installed through the NSHP program. Approximately 18,200 systems have been installed through the NSHP program, and an additional 21,100 systems are projected to be installed over the next three years. The NSHP program is available to applicants that install solar energy systems on newly constructed buildings that meet specified requirements and are located in one of California's three Investor Owned Utilities (IOU) territories (Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison).

The NSHP program offers incentives to solar energy systems installed on newly constructed single family and multifamily residential buildings and common areas that are able to achieve high levels of energy efficiency in conjunction with installing their solar energy system. The program is currently administered by the Energy Commission, but has been administered by the IOUs during much of the program's history.

GOALS AND OBJECTIVES

The goal of this agreement is to conduct an audit of the operational performance of solar energy systems that received incentives through the NSHP program. The Contractor will report on the average performance ratio of NSHP installations and provide an estimate of what percent of systems are performing within an acceptable range of this average performance ratio. Performance ratio is defined as the actual performance of a PV system relative to its expected performance. Expected performance for systems in the data set shall be calculated using actual weather and irradiance data obtained by the Contractor from sources including, but not limited to, the California Irrigation Management Information System (CIMIS). The Contractor shall obtain CAM approval of the expected performance calculation methodology prior to determining any performance ratios.

SCOPE OF WORK

The audit will be divided into two phases:

Phase I (Tasks 2 through 4) will consist of creating a statistically valid data set from operational performance data for installed solar energy systems that received NSHP incentives since NSHP program commencement in 2007 up to the Phase I cut-off date. (The CAM, in consultation with the Contractor, will identify a cut-off date for performance data included in the data set that will be used in the Phase I analysis (Phase I cut-off date).) The Contractor will then analyze that data set to compare the actual performance of the solar energy systems to their expected performance to determine an average performance ratio. The Contractor is required to collect data for up to 19,000 unique systems in Phase I.

In Task 3, the Contractor will consult with the CAM as to the validity of the data. If the Contractor finds the available data set(s) to not be statistically valid or identifies significant data gaps, it shall consult with the CAM. The CAM may propose an alternative data collection approach to be performed under Task 8.1, to develop a representative sample or the CAM may provide written approval of the data set even though it is not a statistically valid sample. Examples of alternative data collection approaches are installing third party meters to measure system production or conducting site visits to verify system operation. The use of an alternative data collection method and associated funding will be subject to the CAM's approval.

Phase II (Tasks 5 through 7) will include collection, processing, and analysis of additional data for all installed systems included in the Phase I data set created after the Phase I cut-off date thru the Phase II data collection cut-off date. It will also include data collection for additional

NSHP systems installed after the Phase I data collection cut-off date set by the CAM, but before the Phase II data collection cut-off date. (The CAM, in consultation with the Contractor, will identify the cut-off date for data collection (Phase II cut-off date).) For Phase II, the Contractor is required to collect new data accumulated since Phase I for up to 19,000 unique systems identified in Phase I and for new NSHP systems installed after the Phase I data collection cut-off date through the Phase II cut-off date.

In Task 6, the Contractor will consult with the CAM as to the validity of the data. If the Contractor finds the available data set(s) to not be statistically valid or identifies significant data gaps, it shall consult with the CAM. The CAM may propose an alternative data collection approach to be performed under Task 8.2, to develop a representative sample or the CAM may provide written approval of the data set even though it is not a statistically valid sample. Examples of alternative data collection approaches are installing third party meters to measure system production or conducting site visits to verify system operation. The use of an alternative data collection method and associated funding will be subject to the CAM's approval.

For both phases in this agreement the Contractor shall use data sets that provide statistically valid results that will be representative of all NSHP installations, unless the CAM approves a different data set.

- The Contractor will conduct an analysis to determine the average performance ratio of solar energy systems that received incentives from the NSHP program.
- The Contractor will also determine what percentages of the systems are operating within an acceptable range of the average performance ratio.

The Contractor will be responsible for procuring or developing resources (i.e., weather and irradiance data, and system performance data) and will provide expertise in the following areas:

- Project Management;
- Data Collection and Processing, and distributed generation data collection;
- Data Analysis.

Prior to the conclusion of the contract, the Contractor will prepare a comprehensive written Final Report that incorporates a description of the project and approach and presents detailed findings and results of the work completed and recommendations to the Energy Commission. The Final Report shall include:

- A background of project and work performed.
- A discussion of the limitations of the data set and the steps taken to create the representative data sample, including details about acquiring performance data using the alternative data collection method, if applicable, and the associated results.
- Hypotheses explaining limitations in the data set.
- An explanation of how the average performance ratio was determined.
- An explanation of how the range of acceptable performance was calculated.
- An interpretation of and a discussion of the results of the analysis of the data.
- A discussion, based on the findings of this project, of what the Energy Commission could do to help address systems that had below average performance ratios.
- A discussion, based on the findings of this project, of possible needs for future photovoltaic/distributed generation programs.

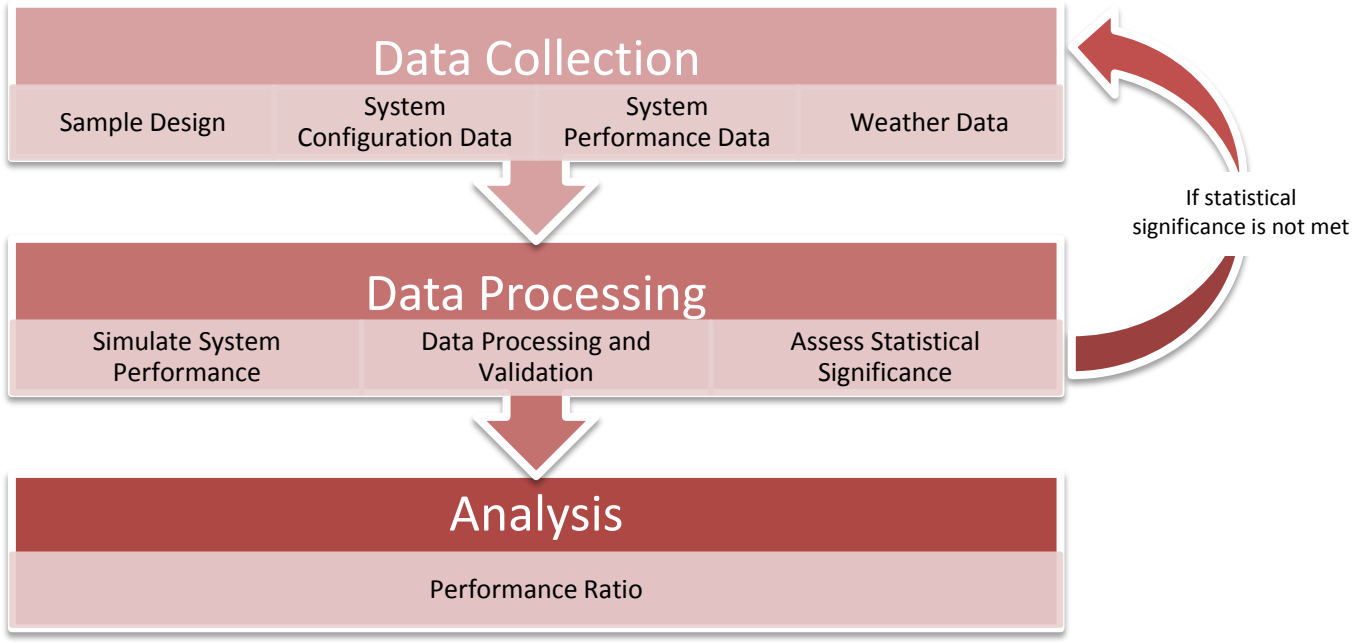
- A discussion, based on the findings of the project, on how future distributed generation programs can be designed to ensure high levels of (solar photovoltaic or other) system performance.
- A discussion, based on the findings of this project, of how the State can prepare for a Zero Net Energy future. (Zero Net Energy building is defined as "the societal value of energy consumed by the building of the course of a typical year is less than or equal to the societal value of the on-site renewable energy generated.")

PROJECT APPROACH AND METHOD

GENERAL APPROACH

The general approach in conducting solar evaluation will typically follow the flow of activities shown in the Solar Evaluation Flow Chart appearing below. Contractor shall tailor and customize the specific evaluation approach to make the best use of available data in meeting the evaluation objectives.

Solar Evaluation Flow Chart



The first steps will involve collecting the data that serve as the foundation for developing expected performance and observed performance. In instances where systems do not have metering or Contractor is not certain that the metered data will be available to them, it will rely on a statistical approach to obtain data that can represent the entire population of installed systems with a specified degree of certainty.

SAMPLE DESIGN

The sample plan will balance evaluation goals, available resources, and budget. A defensible and efficient approach the Contractor will use follows the *stratified ratio estimation* method

contained in NREL's Uniform Methods Project for sample design.[1] This method uses installed system counts and capacities combined with the expected variability of actual generation performance versus simulated generation. The Contractor's estimate of variability is based on the thousands of PV systems for which it has metered generation data. Strata are based on those factors that have the most impact on performance. The Contractor will typically use system configuration, age and ownership as the minimum strata for the sample design.

DATA COLLECTION - SYSTEM CONFIGURATION DATA

System capacity, tilt, azimuth, and location are critical in estimating expected system performance. In most cases, the Contractor will obtain these data directly from program tracking data. Sometimes not all of these data are available from the tracking data. However, if the Contractor has system location they can use onsite inspections or virtual inspections (using Google Earth and Street View) to confirm panel count, determine azimuth, and the approximate tilt. Virtual inspections can be used with site inspection data to develop accurate estimates of installed system characteristics.

DATA COLLECTION – SYSTEM PERFORMANCE DATA

The Contractor will use two primary methods to obtain performance data:

Request data directly from installers, which is the most direct and often the most cost effective route because a single installer can provide data for dozens or even thousands of installations. The data also tends to be in the same format so processing costs are minimized. The Contractor has an extensive history with successfully obtaining data from the larger installers in the state.

Request data directly from host customers via a 'call for data'. Most PV Systems now come with monitoring accessible by host customers. In a 'call for data,' the Contractor will request data directly from customers via a web survey and online data upload. The Contractor will contact customers either directly via email (when host customer contacts are available) or by a call for data in a public forum like the CSI Newsletter.

DATA COLLECTION - WEATHER

The Contractor will collect weather data from a number of sources to support system simulation and aid in data validation. In California, the first source is usually the California Irrigation Management Information System (CIMIS) that provides weather data, including irradiance at multiple sites throughout the state. In cases where fine weather resolution is needed, the Contractor will purchase data from a number of sources including Clean Power Research, Global Weather Corporation, and WhiteBox Technologies.

SIMULATE SYSTEM PERFORMANCE

To determine expected system performance, the Contractor will use the model used to develop claimed savings with real weather data and use actual system configuration data to 'drive' the model. If that is unworkable, the Contractor will use NREL's System Advisor Model in batch mode to simulate performance. Additionally, the Contractor can use weather data in combination with performance ratio (PR) to estimate system performance.

[1] NREL/SR-7A30-53827, The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures: Chapter 11: Sample Design Cross-Cutting Protocols, April 2013

DATA PROCESSING & VALIDATION

Data from installers and host customers often arrives in a variety of formats. The first step in processing data is to translate all data streams into a single format using automated templates. The Contractor has already developed templates to read and translate the output from a variety of companies including large installers such as SolarCity and SunPower.

Once the data are processed to a common format, the Contractor will validate the data using an automated script that flags suspicious values and generates plots of suspicious weeks of data based on metered generation, weather data, and simulated generation. This allows the Contractor to efficiently investigate data to determine its validity.

QUANTIFY UNCERTAINTY TO DETERMINE STATISTICAL SIGNIFICANCE

Once data are collected, processed, and validated, the Contracot will compare the available data to the targets set forth in the sample design. In addition to comparing valid data quantity, they will analyze the variability of the data compared to our estimates, and, if necessary, recalculate their estimates of confidence and precision.

ADDITIONAL DATA COLLECTION

In some evaluations, there may be limited host or installer data. Working with the system owner, the Contractor may install meters as primary data collection agents. When customer contact information is directly available, the Contractor will randomly select customers in strata that need additional data to install meters. In cases where customer information is not directly available, the Contractor can use a service to distribute ‘door hangers’ to neighborhoods with solar to directly solicit performance data from hosts.

Analysis

In the final step of the evaluation, the Contractor will use available data to analyze the impacts of the program. One measure of impact is to compare observed performance to expected performance. The Contractor will do this by summing metered data and estimating the performance of unmetered systems via stratified ratio estimation. In this technique, they will use the mean ratio of actual generation to expected generation for a statistically valid sample of metered systems to estimate the performance of similar unmetered systems. The Contractor can use the variability of the metered system performance to estimate how many systems in the population fall above or below a certain range of performance.

Agreement Management Tasks

The Contractor shall manage a team capable of successfully performing all work assignments identified in this Scope of Work.

All project work performed by the Contractor team shall be directed by and coordinated with Energy Commission staff as designated by the CAM. Work performed by the Contractor or its subcontractors beyond the term end date of the contract will not be reimbursed for payment.

Task 1.1 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement. The meeting may be held via Web-Ex, teleconference or in person at the Energy Commission; the CAM will coordinate scheduling with the Contractor. The administrative and technical aspects of this Agreement will be discussed at the meeting.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Administrative deliverables;
- Project meetings and briefings;
- Match fund documentation (if applicable);
- Permit documentation (if applicable);
- Subcontracts; and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical deliverables;
- Progress reports and invoices;
- Final Report; and
- Any other relevant topics.

The Contractor shall:

- Assist in planning and attend a "kick-off" meeting with the CAM, the Contracts Officer, and a representative of the Accounting Office.
    - The meeting may be held via Web-Ex, teleconference or in person at the Energy Commission. The Contractor shall include its Project Manager, Contracts Administrator, Accounting Officer, and others designated by the CAM in this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting.
- If necessary, prepare an updated Schedule of Deliverables based on the decisions made in the kick-off meeting.

The CAM shall:

- Work with the Contractor to plan and arrange the meeting, including scheduling the date and time.
- Provide an agenda to all potential meeting participants prior to the kick-off meeting.

Deliverables:

- Hold Kick-off Meeting.
- An Updated Schedule of Deliverables (if applicable).

Task 1.2 Invoices

The goal of this subtask is to produce, process and submit invoices in a timely manner that contain all required information and are submitted in the appropriate format.

The Contractor shall:

- Prepare invoices for all reimbursable expenses incurred performing work under this Agreement in compliance with the Exhibit B of the Terms and Conditions of the Agreement.
- Invoices shall be submitted with the same frequency as progress reports (Task 1.4).
- Invoices must be submitted to the Energy Commission's Accounting Office.

Deliverables:

- Quarterly Invoices

Task 1.3 Manage Subcontractors

The goal of this task is to ensure high quality products are produced by subcontractors, to enforce subcontractor Agreement provisions, and in the event of failure of the subcontractor to satisfactorily perform services, recommend solutions to resolve the problem.

The Contractor shall:

- Manage and coordinate subcontractor activities. The Contractor is responsible for the quality of all subcontractor work and all work the Energy Commission assigns to the Contractor.
- If the Contractor decides to add new subcontractors:
    - The subcontractor shall comply with the Terms and Conditions of the Agreement,
    - The Contractor shall immediately notify the CAM who will follow the Energy Commission's process for adding or replacing subcontractors.

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 objectives of this Agreement.

The Contractor shall:

- Prepare progress reports that summarize all Agreement activities conducted by the Contractor and any subcontractors for the reporting period; including an assessment of the ability to complete the Agreement within the current budget, any anticipated cost overruns and the ability to complete tasks on time. Each progress report is due within 15 calendar days after the end of the reporting period. The CAM will provide the format for the progress reports.

Deliverables:

- Quarterly Progress Reports.

Task 1.5 Project Meetings and Briefings

The goal of this subtask is to determine whether any modifications must be made to the tasks, products, schedule, or budget. Project meetings provide the opportunity for frank discussions between the Energy Commission and the Contractor. As determined by the CAM, discussions may include, but are not limited to, project status, challenges, successes, findings, project goals and benefits, recommendations, and final report preparation. Participants will include the CAM and the Contractor, and may include the Commission Agreement Officer (CAO) and any other individuals selected by the CAM to provide support to the Energy Commission.

The Contractor shall:

- Attend or participate in program support and project-related meetings or discussions in person or via WebEx or conference call, as requested by the CAM.

- Respond to e-mails or other written communication requests regarding project management status and issues, as requested by the CAM, within 5 business days.
- Prepare and distribute meeting notes to the CAM, within 5 business days after each formal meeting, that: (1) discuss the progress of the Agreement toward achieving its goals and objectives; and (2) include recommendations and conclusions regarding continued work on the project, as requested by the CAM.
- Submit the meeting notes to the CAM for review and approval.

Deliverables:

- Responses to CAM requests on project status.
- Meeting notes for each formal meeting.

Task 1.6 Final Meeting

The goal of this subtask is to discuss closeout of this Agreement and review the project. The meeting may be held via Web-Ex or teleconference.

The Contractor shall:

- Meet with Energy Commission staff prior to the term end date of this Agreement. The meeting may be held via Web-Ex or teleconference. This meeting will be attended by the Contractor Project Manager and the CAM. The CAM will determine any additional appropriate meeting participants. The administrative and technical aspects of Agreement closeout will be discussed at the meeting.
- Present findings, conclusions, and recommended next steps (if any) for the Agreement, based on the information included in the Final Report.
- Prepare a written document of meeting agreements and unresolved activities.
- Prepare a schedule for completing the closeout activities for this Agreement, based on determinations made during the final meeting.
- Provide ALL Draft and Final written deliverables provided under this Contract on a CD-ROM or USB memory stick, organized by the tasks in the Contract.

Deliverables:

- Written documentation of meeting agreements.
- Schedule for completing closeout activities.
- CD-ROM or USB memory stick containing ALL draft and final written deliverables provided under this Contract, organized by task.

TECHNICAL TASKS

Task 2 Phase I Data Collection

Under this task, which is required to be completed within 90 days after the Phase I cut off date is determined by the CAM in consolation with contractor (or a greater time period as approved in writing by the CAM) , the Contractor will collect measured performance data from solar energy system installers for NSHP projects that is necessary to successfully implement Phase I (Tasks 2 through 4). The CAM will determine, in consultation with the Contractor, the time frame for which data may be collected for Phase I beginning with NSHP program commencement in 2007 to the Phase I cut-off date determined by the CAM. The data collected must provide the

Contractor with measured solar energy system energy production over time and allow comparison of actual performance against the system's expected performance. The data collected shall include the following data points to complete the required tasks:

- Site Address:
    - Street,
    - City,
    - Zip Code.
- PV System Design Characteristics:
    - Orientation,
    - Tilt,
    - Nominal Size (DC, kW),
    - Module/Inverter manufacturer, model, and quantities of each equipment type,
    - Shading information,
    - Loss Factor or Degradation Factor,
    - Array square footage,
    - System efficiency multiplier,
    - Weather information *(solar irradiance and temperature).*
- Time stamped production data:
    - Energy or power produced on an hourly basis at a minimum,
    - Measured performance data of 15 or 30 minutes intervals or a greater interval as approved in writing by the CAM.

The Energy Commission will provide solar energy system ownership structure (e.g., customer-owned vs third party owned) and host customer sector (e.g., single family, multi-family, affordable housing, common area) information.

The Contractor shall:

- Acquire operational performance data, and weather and irradiance data, for solar energy systems that received incentives from the NSHP program from the commencement of the NSHP program through the Phase I cut-off date.
- Sign Non-Disclosure Agreements with solar energy system installers prior to installers providing the solar performance data to the Contractor, if requested by individual installers.
- Acquire solar energy system location and design details and any other information the CAM, in consultation with the Contractor, determines is necessary to calculate the expected performance of the solar energy system. (Including actual weather and irradiance data for the system locations, and system design data such that the expected performance of the system can be calculated using the weather and irradiance data. Weather and irradiance data may be obtained by the Contractor from several sources including, but not limited to, the California Irrigation Management Information System (CIMIS)).
- Store and manage collected data using Contractor-owned resources.

Deliverables:

- Summary of all collected data stored and managed by Contractor-owned resources in MS Excel format.
- The Contractor shall provide to the Energy Commission all data they obtain directly from solar installers in MS Excel format.

Task 3 Phase I Data Processing

The goal of this task is to process and organize the raw data to create a statistically valid data set. In this task, the Contractor will validate the solar operational performance data and filter out suspect or erroneous data. Validation of solar energy system data shall include utilizing irradiance, temperature, and other actual weather data obtained by the Contractor to determine if any measured data is suspect or erroneous. Questionable data could include, for example, particularly low or high daily or hourly power output when compared to available solar irradiance. Questionable data shall be reviewed by the Contractor and either be validated for inclusion or invalidated and excluded from the data set.

The Contractor, in consultation with the CAM, will determine if the available data for Phase I is a statistically valid data set representative of all systems installed in the NSHP program. (Example: As determined, by the Contractor in consultation with the CAM, statistically valid sample size equals 5% of installed systems across the 16 California solar climate zones, also taking into consideration construction type, single family, multi-family, and common area.) If the Contractor, in consultation with the CAM, finds that the available data set is not statistically valid or identifies significant data gaps, the CAM may propose an alternative data collection approach to develop a representative sample or the CAM may provide written approval of the data set even though it is not a statistically valid sample. Examples of alternative data collection approaches are installing third party meters to measure system production or conducting site visits to verify system operation.

If the CAM determines that an alternative data collection method is necessary, that work will be performed under **Task 8.1 Phase I Alternative Data Collection**

The Contractor shall:

- Create a statistically valid data set or other CAM-approved data set of measured performance data.
- Identify gaps where individual system performance data was not available.
- Filter out suspect or erroneous data from the data set.
- Consult with the CAM to assist in determining if an alternative data collection method is necessary and identify a cost to complete the alternative method. If alternative data collection is determined necessary by the CAM, that work will be performed under Task 8.1.

Deliverables:

- Statistically valid data set, or other CAM-approved data set, of measured performance data in MS Excel format.
- Breakdown of number of systems by zip code, climate zone, utility, equipment manufacturer, and age of the system.
- Provide a possible explanation for why performance data gaps exist.
- Provide an explanation for why any data was invalidated

Task 4 Phase I Data Analysis

In this task the Contractor shall analyze the data set created in Task 3 to determine a performance ratio [actual performance vs. estimated/expected performance (under actual weather conditions)] based on real weather and solar irradiance. An average performance ratio must be calculated for all systems along with determining the percentage of systems operating within an acceptable range of the average performance ratio. The Contractor shall obtain written CAM approval of the expected performance calculation, average performance ratio methodology, and range of acceptable performance methodology prior to determining any performance ratios.

The Contractor shall:

- Determine an expected production amount for each system using actual weather and irradiance data.
- Compare the expected production of each site to the measured production data.
- Determine a performance ratio for each site and an average performance for all systems based on the expected performance and the measured performance and the following factors:
    - Age of the system (date of installation),
    - Location of the system (zip code, climate zone),
    - System size,
    - Ownership structure (e.g., customer-owned vs third party owned),
    - Host customer sector (single family, multi-family, affordable housing, common area),
    - Panel technology,
    - Inverter technology,
    - Meter technology.
- Create a range of acceptable performance ratios and determine what percent of systems are performing within that range.
- Complete interim report summary for Phase I once Tasks 2 through 4 are completed. This will also be used to develop and complete the Final Report.

Deliverables:

- Interim report summary in MS Word format that summarizes the findings of the data analyzed in Phase I, that includes the following:
    - Discussion of the limitations of the measured data set and the steps taken to create a representative data sample.
    - Provide a hypothesis for why any limitations in the data set exist.
    - Explanation of how the average performance ratio was determined.
    - Explanation of how the range of acceptable performance was calculated.
    - Interpretation of the results and include a discussion of the results.
    - Recommendations for what the Energy Commission should do to address systems that were below the average performance ratio.
    - .

Task 5 Phase II Data Collection

Under this task, which is expected to be completed nine months prior to the termination of the contract, the Contractor will collect additional measured performance, and weather and irradiance data for systems analyzed in Phase I for the time period after the Phase I cut-off date

through the Phase II cut-off date for data collection as determined by the CAM. The Contractor will also collect data from systems that were installed after the Phase I data collection cutoff date through the Phase II data collection cut-off date. The data collected must provide the Contractor with actual measured solar energy system energy production over time and allow it to compare the actual performance to the system's expected performance. The Contractor must collect system location information for newly installed systems not analyzed in Phase I. The data collected for systems installed after the Phase I data collection cut-off date shall include the following data points to complete the required tasks:

- Site Address:
    - Street,
    - City,
    - Zip Code.
- PV System Design Characteristics:
    - Orientation,
    - Tilt,
    - Nominal Size (DC, kW),
    - Module/Inverter manufacturer, model, and quantities of each equipment type
    - Shading information,
    - Loss Factor or Degradation Factor,
    - Array square footage,
    - System efficiency multiplier,
    - Weather information (solar irradiance and temperature).
- Time stamped production data:
    - Energy or power produced on an hourly basis at a minimum,
    - Measured performance data of 15 or 30 minute intervals or a greater interval as approved in writing by the CAM.

The Energy Commission will provide system ownership structure (e.g., customer-owned vs third party owned) and host customer sector (e.g., single family, multi-family, affordable housing, common area) information.

The Contractor shall:

- Acquire operational performance data and weather and irradiance data of newly installed systems not analyzed in Phase I that are receiving incentives from the NSHP program through the phase II cut off date.
- Acquire updated operational performance data, and weather and irradiance data after the Phase I data collection cutoff date through the Phase II cut-off date for systems included in the Phase I data set.
- Acquire solar energy system location and system design details, and any other information the CAM, in consultation with the Contractor, determines is necessary to identify the expected performance of the newly installed solar energy systems not analyzed in Phase I. The information collected shall include actual weather and irradiance data for the locations, and system design data such that the expected performance of the system can be calculated using the weather and irradiance data. Weather and irradiance data may be obtained by the Contractor from several sources including, but not limited to, the California Irrigation Management Information System (CIMIS).
- Store and manage collected data using Contractor-owned resources.

Deliverables:

- Summary of updated data for systems previously analyzed in Phase I in MS (Microsoft) Excel format.
- Summary of performance data collected in Task 5 of newly installed systems not analyzed in Phase I in MS Excel format.
- Summary of all data collected under this contract that is stored and managed by Contractor-owned resources in MS Excel format.
- The Contractor shall provide to the Energy Commission all data it obtains directly from solar installers during Phase I and II in Excel format.

Task 6 Phase II Data Processing

The goal of this task is to process and organize the raw data to create a statistically valid data set combining the Phase I and Phase II data sets. In this task, the Contractor will validate the solar operational performance data obtained after the Phase I Task 2 data collection cut-off date for newly installed systems, and updated data for systems included in the Phase I data set by filtering out suspect or erroneous data. Validation of solar energy system data shall include utilizing irradiance, temperature, and other actual weather data obtained by the Contractor to determine if any measured data is suspect or erroneous. Questionable data could include, for example, particularly low or high daily or hourly power output when compared to available solar irradiance. Questionable data shall be reviewed by the Contractor and either be validated for inclusion or invalidated and excluded from the data set.

The Contractor, in consultation with the CAM, will determine if the combined Phase I and II data set is a statistically valid data set representative of all systems installed in the NSHP program. (Example: As determined, by the Contractor in consultation with the CAM, a statistically valid sample size equals 5% of installed systems across the 16 California solar climate zones, also taking into consideration construction type, single family, multi-family, and common area.) If the Contractor, in consultation with the CAM, finds the available data set is not statistically valid or identifies significant data gaps, the CAM may propose an alternative data collection approach to develop a representative sample or the CAM may provide written approval of the data set even though it is not a statistically valid sample. Examples of alternative data collection approaches are installing third party meters to measure system production or conducting site visits to verify system operation.

If the CAM determines that an alternative data collection method is necessary, that work will be performed under **Task 8.2 Phase II Alternative Data Collection**.

The Contractor shall:

- Create a statistically-valid data set or other CAM-approved data set of measured performance data combining the Phase I data set with data collected in Task 5 and, if applicable, data collected in Task 8.
- Identify time gaps where individual system performance data for Phase II was not available.
- Filter out erroneous data from the data set.
- Consult with the CAM to assist in determining if an alternative data collection method is necessary and identify a cost to complete the alternative method. If alternative data collection is determined necessary by the CAM, that work will be performed in Task 8.2.

Deliverables:

- Statistically valid data set, or other CAM-approved data set, of measured performance data in MS Excel format that includes Phase I and Phase II data.
- Breakdown of number of systems by zip code, climate zone, utility, manufacturer, and age.
- Provide a possible explanation for why performance data gaps exist.
- Provide an explanation for why any data was invalidated.

Task 7 Phase II Data Analysis

In this task the Contractor shall analyze the combined Phase I and Phase II data set from Task 6 to determine a performance ratio [actual performance vs. estimated/expected performance (under actual weather conditions)] based on real weather and solar irradiance. The Contractor shall use the same calculation methodologies approved by the CAM in Phase I of this contract. An average performance ratio must be calculated for all systems along with determining the percentage of systems operating within an acceptable range of the average performance ratio.

The Contractor shall:

- Determine an expected production amount for each system using actual weather and irradiance data.
- Compare the expected production of each site to the measured production data.
- Determine a performance ratio for each site and an average performance ratio for all systems based on the following factors:
    - Age of the system (date of installation),
    - Location of the system (zip code, climate zone),
    - System size,
    - Ownership structure (e.g., customer-owned vs third party owned),
    - Host customer sector (single family, multi-family, affordable housing, common area),
    - Panel technology,
    - Inverter technology,
    - Meter technology.
- Create a range of acceptable performance ratios and determine what percent of systems are performing within that range.
- Complete interim report summary for Phase II once Tasks 5 through 7 are completed. This will also be used to develop and complete the Final Report.

Deliverables:

- Interim report summary in MS Word format that summarizes the findings of the data analyzed in Phase II, that includes the following:
    - Discussion of the limitations of the measured data set and the steps taken to create a statistically valid data sample.
    - Provide a hypothesis for why any limitations in the data set exist.
    - Explanation of how the average performance ratio was determined.
    - Explanation of how the range of acceptable performance was calculated.
    - Interpretation of the results and include a discussion of the results.

- Recommendations for what the Energy Commission should do to address systems that were below the average performance ratio.

Task 8 Alternative Data Collection (If necessary, and by Work Authorization)

If the data, for either Phase I or Phase II, is determined by the Contractor, in consultation with the CAM, to not be statistically valid, the CAM may propose an alternative data collection approach to develop a representative sample. Examples of alternative data collection approaches are installing third party meters to measure system production or conducting site visits to verify system operation. Activities within this task shall be conducted by Work Authorization and fall within **Task 8.1 Phase I Alternative Data Collection and Task 8.2 Phase II Alternative Data Collection**.

Work Authorizations

The activities that result from **Task 8 "Alternative Data Collection"** shall be conducted as a "work authorization" Agreement. No work shall be undertaken on this task unless authorized by the CAM through a specific written document called a "work authorization."

The CAM will prepare and issue the written work authorizations and shall set a maximum price, budget, and schedule for the work to be performed. The CAM will work, in consultation with the Contractor, to assign work to either the Contractor or a subcontractor.

The Contractor shall:

- Consult with the CAM before proceeding with the Alternative Data Collection.
- Conduct the work identified on the Work Authorization(s).

Deliverables:

- Provide the deliverables identified in the Work Authorization(s).

Task 9 Final Report

The goal of this task is to prepare a comprehensive written Final Report of Phase I and Phase II, including tasks 8.1 and 8.2 if applicable, that incorporates a description of the project and approach and presents detailed findings and results of the work completed under this Agreement. The Final Report must also include a summary of all data collected and the results of the audit activities performed during the project. The Final Report shall be prepared in language easily understood by a layperson with a limited technical background. A critical component of this project is to develop recommendations based on project findings for the Energy Commission.

- The Final Report shall also include the following:
  - A background of project and work performed.
  - A discussion of the limitations of the data set and the steps taken to create the representative data set, including details about acquiring performance data using the alternative data collection method, if applicable, and the associated results.
  - Hypotheses explaining limitations in the data set.
  - An explanation of how the average performance ratio was determined.
  - An explanation of how the range of acceptable performance ratios were calculated.
  - An interpretation and discussion of the results of the analysis of the data.
  - A discussion, based on the findings of this project, of what the Energy Commission could do to help address systems that had below average performance ratios.
  - A discussion, based on the findings of this project, of possible needs for future photovoltaic/distributed generation programs.

- A discussion, based on the findings of the project, on how future distributed generation programs can be designed to ensure high levels of (solar photovoltaic or other) system performance.
- A discussion, based on the findings of this project, of how the State can prepare for a Zero Net Energy future. (Zero Net Energy building is defined as "the societal value of energy consumed by the building of the course of a typical year is less than or equal to the societal value of the on-site renewable energy generated.")

The Final Report must be completed once Phase I and Phase II have been completed and one (1) month before the termination date of the Agreement.

The Final Report shall be a public document. If the Contractor's work on all or part of this project has obtained confidential status from the Energy Commission, then the Contractor must prepare both public and confidential versions of the Final Report, and the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report. When creating the Final Report, the Recipient must use a Style Manual provided by the CAM. The Energy Commission will provide details on publication standards, format and style to ensure consistency with Energy Commission protocols.

Deliverables:

- See tasks 9.1 and 9.2

Task 9.1 Final Report Draft

The Contractor shall:

- Prepare and submit draft Final Report to the CAM for review and approval. The CAM will provide written comments to the Contractor on the draft. The Contractor shall review the comments and discuss any concerns regarding the recommended changes with the CAM.

Deliverables:

- Draft Final Report

Task 9.2 Final Report

The Contractor shall:

- Prepare and submit the Final Report, incorporating CAM comments from Task 9.1.

Deliverables:

- Final Report, including electronic format and five hard copies.

SCHEDULE OF DELIVERABLES AND DUE DATES

Task Number	Deliverable	Due Date
1.1	An Updated Schedule of Deliverables	At Kick-Off Meeting
1.2	Invoices	Quarterly
1.4	Progress Reports	Quarterly
2	Summary of all data	90 days after Phase I cutoff date is determined
2	All data obtained from solar installers	90 days after Phase I cutoff date is determined
3	Statistically valid data set of measured performance data	6 months after start of contact
3	Breakdown of number of systems by zip code, climate zone, utility, equipment manufacturer, and age of system	6 months after start of contract
3	Possible explanation for why performance data gaps exist	6 months after start of contract
3	Possible explanation for why any data was invalidated	6 months after start of contract
4	Interim report summary	1 year after start of contract
5	Summary of updated data for systems analyzed Phase I as well as newly installed systems not analyzed in Phase I	9 months prior to contract end
5	All data obtained from solar installers	9 months prior to end of contract
6	Statistically valid data set of measured performance data combining Phase I data set with data collected in Task 5.	6 months prior to end of contract
6	Breakdown of number of systems by zip code, climate zone, utility, equipment manufacturer, and age of system	6 months prior to end of contract
6	Possible explanation for why performance data gaps exist	6 months prior to end of contract
6	Possible explanation for why any data was invalidated	6 months prior to end of contract
7	Interim report summary	90 days prior to end of contract
9.1	Draft final report	60 days before contract completion date
9.2	Final report	On or before contract completion date

RESOLUTION NO: 16-0413-11

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ITRON, INC. WHICH WILL DO BUSINESS IN CALIFORNIA AS IBS

RESOLVED, that the State Energy Resources Conservation and Development Commission (Energy Commission) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the Energy Commission approves Agreement 500-15-003 from RFP-13-502 with Itron, Inc. which will do business in California as IBS, for a $419,930 contract to audit and evaluate the operational performance of solar energy systems that received incentives through the California Energy Commission's New Solar Homes Partnership program; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on April 13, 2016.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat