GRANT REQUEST FORM (GRF)

New Agreement EPC-14-019 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	David Chambers	43	916-327-2356

Recipient's Legal Name	Federal ID Number
Electric Power Research Institute, Inc.	23-7175375

Title of Project
Validated and Transparent Energy Storage Valuation and Optimization Tool

Term and Amount	Start Date	End Date	Amount
	4/11/2015	12/30/2016	$ 1,000,000

Business Meeting Information			
☐ ARFVTP agreements under $75K delegated to Executive Director.			
Proposed Business Meeting Date	3/11/2015	☐ Consent	☒ Discussion
Business Meeting Presenter	David Chambers	Time Needed:	5 minutes
Please select one list serve. EPIC (Electric Program Investment Charge)			
Agenda Item Subject and Description			
Proposed resolution approving Agreement EPC-14-019 with Electric Power Research Institute for $1,000,000 for a grant to develop a publicly available software that assesses costs and benefits and guides the optimization of energy storage projects with respect to use, technology, size, and location. (EPIC funding) Contact: David Chambers			

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:
   Class 6 - Basic data collection, research, experimental management, and resource evaluation activities that do not result in major disturbances to an environmental resource.
   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study
   ☐ Negative Declaration
   ☐ Mitigated Negative Declaration
   ☐ Environmental Impact Report
   ☐ Statement of Overriding Considerations

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

Legal Company Name:	Budget
Lumina Decision Systems, Inc.	$ 210,881
E3M, Inc	$ 206,451
Strategen Consulting, LLC	$ 20,000
Ehud Udi Helman	$ 20,000
Customized Energy Solutions	$ 0
	$
	$
	$
	$

List all key partners: (attach additional sheets as necessary)
Legal Company Name:

Budget Information

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	13-14	301.001A	$1,000,000
			$
			$
			$
			$
			$
R&D Program Area: ESRO: ETSI		TOTAL:	$1,000,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		Recipient's Project Manager	
Name:	David Morrison	Name:	Ben Kaun
Address:	942 Corridor Park Blvd	Address:	3420 Hillview Ave
City, State, Zip:	Knoxville, TN 37932-3723	City, State, Zip:	Palo Alto, CA 94304
Phone:	865-218-8104 / Fax: - -	Phone:	650-855-2208 / Fax: - -
E-Mail:	dmorriso@epri.com	E-Mail:	bkaun@epri.com

Selection Process Used

- ☒ Competitive Solicitation — Solicitation #: PON-13-302
- ☐ First Come First Served Solicitation

The following items should be attached to this GRF

Item	N/A	Attached
1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☐ N/A	☒ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
Scope of Work

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Outreach and Software Needs Assessment
3		Software Development
4	X	Software Review
5		Software Completion, Documentation, and Delivery
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CAISO	California Independent System Operator
CPUC	California Public Utility Commission
CES	Customized Energy Solutions
CPR	Critical Project Review
E3	Energy and Environmental Economics
EPRI	Electric Power Research Institute
ESIC	Energy Storage Integration Council
ESVT	Energy Storage Valuation Tool
LTPP	Long Term Procurement Planning (CPUC proceeding to development utility generation asset procurement plan)
RA	Resource Adequacy (CPUC proceeding to determine needs and metrics that support LTPP)
TAC	Technical Advisory Committee
TPP	Transmission Planning Process

I. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of publicly available software that assesses costs and benefits and guides the optimization of energy storage projects with respect to use, technology, size, and location.

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A
Scope of Work

B. Problem/ Solution Statement

Problem

The California Public Utility Commission (CPUC) has set a target of 1.325 GW of energy storage by 2020, but the role and valuation of energy storage is not fully understood or agreed upon. To support informed and cost-effective deployment, all engaged stakeholders must understand the assessed costs and benefits and optimization of energy storage projects with respect to use, technology, size, and location.

Solution

The Recipient will develop a publicly available software model and reference database that supports assessment and optimization of energy storage projects, leading to informed decision-making by regulators, utilities, and energy storage project developers. The model will be developed collaboratively with an expert project team, open stakeholder processes, and reference data sets.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this project are:

- Facilitate assessment and communication of the value for energy storage projects; and
- Support optimization of energy storage project cost-effectiveness.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of lower costs, increased reliability, and improved safety by making widely available a credible, flexible, and practical tool for determining the value of energy storage projects by technology, use, location, and size in a way that facilitates communication among interested stakeholders. This facilitated communication is crucial to good decision-making for investment in the numerous new energy storage projects anticipated in California, and when made effective by the availability of this new tool, the ratepayers are expected to gain the most valuable set of energy storage projects possible.

Greater reliability is expected due to the incorporation of value sources involving bulk and distribution system reliability and local voltage control. Lower costs are expected because the use of this tool could greatly improve stakeholder communication regarding the best investments in storage. Increased safety is expected, because deploying a flexible resource like energy storage supports public benefits, especially in emergency situations by making available clean, safe, and convenient local sources of electric power not otherwise present.

[2] California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by combining expertise and advancing the state of the art in energy storage modeling. The software will leverage the substantial prior developments of the Electric Power Research Institute (EPRI) Energy Storage Valuation Tool (ESVT)

The proposed project will develop a new cloud-hosted software model that leverages code and approach from the ESVT software to meet the specific needs of California: the energy storage procurement, increasing renewables penetration, and considering the full scope of the California Public Utilities Commission (CPUC) use cases, costs, and benefits. Planned advancements include enhanced representation of services and dispatch in the sub-hourly time domain and enhanced representation of decision-making under uncertainty. Additionally, the current ESVT supports optimization of project design through sensitivity and scenario analysis. Increased automation will be implemented to inform optimized project design in a user-friendly manner. Other development objectives will be responsive to the stakeholder needs.

Execution of this project will enable the development of a cloud-hosted, publicly available software model and supporting database that leverages the ESVT as the knowledge and technology starting point, but which also incorporates complementary advanced modeling approaches developed by Energy and Environmental Economics (E3), and Customized Energy Solutions (CES).

Agreement Objectives

The objectives of this Agreement are to:
- Obtain buy-in from key stakeholders on requirements and approaches;
- Leverage prior investments in models and analyses;
- Create reference scenarios and data sets through coordination with relevant proceedings;
- Develop and deliver a public, transparent, and validated tool as cloud-hosted software
- Achieve broad adoption of software with robust technology transfer activities.

[3] California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

II. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products
The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Submit the final product to the CAM once agreement has been reached on the draft. The CAM will provide written approval of the final product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- If the CAM determines that the final product does not sufficiently incorporate his/her comments, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

For products that require a final version only

- Submit the product to the CAM for approval.
- If the CAM determines that the product requires revision, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

For all products

- Submit all data and documents required as products in accordance with the following Instructions for Submitting Electronic Files and Developing Software:

  - **Electronic File Format**
    Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

    The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
    - Data sets will be in MS Access or MS Excel file format

(version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format. The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- ***Software Application Development***
  Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
    - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
    - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
    - Visual Studio.NET (version 2008 and up). Recommend 2010.
    - C# Programming Language with Presentation (UI), Business Object and Data Layers.
    - SQL (Structured Query Language).
    - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
    - Microsoft SQL Reporting Services. Recommend 2008 R2.
    - XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting
The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:
- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The <u>administrative portion</u> of the meeting will include discussion of the following:
    - Terms and conditions of the Agreement;
    - Administrative products (subtask 1.1);

- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); 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 products (subtask 1.1);
- Progress reports and invoices (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide an *Updated Project Schedule, List of Match Funds,* and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
    - Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Updated Project Schedule *(if applicable)*
- Updated List of Match Funds *(if applicable)*
- Updated List of Permits *(if applicable)*

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
  - Disposition of any state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
  - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.

- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:
- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:
- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize all Agreement activities conducted by the Recipient for the preceding month, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
  - Provide a synopsis of the project progress, including accomplishments, problems, milestones, products, schedule, fiscal status, and any evidence of progress such as photographs.

- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions. In addition, each invoice must document and verify:
  - Energy Commission funds received by California-based entities;
  - Energy Commission funds spent in California *(if applicable)*; and
  - Match fund expenditures.

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review and approve the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use a Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:
- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM.
- Submit a draft of the outline to the CAM for review and comment.
- Once agreement has been reached on the draft, submit the final outline to the CAM. The CAM will provide written approval of the final outline within 10 days of receipt.

Recipient Products:
- Final Report Outline (draft and final)

CAM Product:
- Style Manual
- Comments on Draft Final Report Outline
- Approval of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:
- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline and the Style Manual provided by the CAM.
- Submit a draft of the report to the CAM for review and comment. Once agreement on the draft report has been reached, the CAM will forward the electronic version for Energy Commission internal approval. Once the CAM receives approval, he/she will provide written approval to the Recipient.
- Submit one bound copy of the Final Report to the CAM.

Recipient Products:
- Final Report (draft and final)

CAM Products:
- Comments on Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds
The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:
- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. 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 this in the letter.

  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 cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the 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 Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
  - A copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:
- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*

- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.8 Permits
The goal of this subtask 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 not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:
- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If <u>no permits</u> are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
  - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
  - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project 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 progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:
- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*
- Copy of each Approved Permit *(if applicable)*

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:
- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.

- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts *(draft if required by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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

- Researchers knowledgeable about the project subject matter;
- Members of trades that 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 the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.

- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

III. TECHNICAL TASKS

TASK 2 OUTREACH AND SOFTWARE NEEDS ASSESSMENT

The goals of this task are to: 1) understand the needs of project stakeholders, especially regulators, utilities, and energy storage project developers, 2) develop and assess stakeholder use cases and compare to the technology / knowledge starting point, and 3) derive functional requirements and interface specifications for the software.

The Recipient shall:

- Convene a workshop of Energy Storage Integration Counsel (ESIC) Analysis working group
    - Describe and document stakeholder needs
    - Develop software model use cases
    - Review existing ESVT capabilities and gaps in capability
- Attend conferences and forums and coordinate data and analytical approaches with other forums and initiatives including the CPUC and California Independent System Operator (CAISO) stakeholder proceedings
- Collaboratively refine and review use cases
    - Frequent collaboration within the Analysis working group of ESIC to develop and refine additional use cases
    - Frequent collaboration with CPUC staff and stakeholders in CPUC storage application proceeding
    - Frequent collaboration with California Energy Commission staff
    - Frequent collaboration with consulting organizations under contract for relevant efforts with the California Energy Commission, CPUC, CAISO, Air Resources Board (ARB), and the Governor's Office, etc.
    - Monthly teleconferences to review use case status and key issues
- Prepare and provide a *Use Case Document* which describes the software users, their goals and objectives, and the steps to achieve those objectives
- Identify and review new software feature developments and interface requirements required from use cases
- Prioritize use cases and corresponding "wish list"
- Convene a second ESIC workshop to review and confirm stakeholder priorities
- Develop and provide a *Functional Requirements and Interface Specifications Document,* which describes requirements of the software that corresponds to use cases

Recipient Products:

- Use Case Document (draft and final)
- Functional Requirements and Interface Specifications Document

TASK 3 SOFTWARE DEVELOPMENT

The goal of this task is to develop a software tool that addresses prioritized stakeholder usage needs, and meets the functional requirements and interface specifications.

Exhibit A
Scope of Work

The Recipient shall:

- Acquire and set up the Analytica™ Cloud Player software platform, Gurobi™ solver engine, and the required server hosting to support development and delivery of cloud-based software model
- Prepare a software development plan to reflect identified software needs, requirements, and specifications, in terms of software features, modules, and user interface elements.
- Develop tool design using the agile development process
  - o Expand software requirements into designs for features and functionality.
  - o Develop architecture as a hierarchy of modules with defined interfaces.
  - o Identify key dimensions, including time and location, and levels of resolution, and select trade-offs in resolution and computational complexity.
  - o Set up online tracker for design elements, enhancements, defects, and other issues accessible to the development team.
- Coordinate overall modeling approach and interface with Lumina to incorporate contributions of CES, and other identified parties, and to develop Analytica modules to implement software designs for modules provided by those parties
- Develop approaches, design, and code for incorporating advanced methods for sub-hourly service modeling
  - o Develop new modules for optimization of Regulation pay-for-performance awards and energy storage performance metrics
  - o Develop new modules for optimization of other grid services or market products under development that require energy storage dispatch sub-hourly, including models for, as they are defined, CAISO's flexible ramping product, Energy Imbalance Market,
  - o Incorporate best available knowledge of market design, as well as observed system performance from advanced modeling and real-world data
- Develop advanced stochastic algorithms for optimizing energy storage value under uncertainty
  - o Assess and incorporate relevant developments with CPUC's Long-term Procurement Planning (LTPP) proceeding or Resource Adequacy (RA) for value of flexibility
- Develop and implement software modules
  - o Develop prototype modules from designs and pseudo-code of CES and E3
  - o Review of prototype modules by appropriate team members
  - o Refine and implement reviewed and accepted modules
- Develop and deliver alpha prototype model integrating validated modules for review by project team and selected external stakeholders
- Develop Alpha Software for reviewers in project team and select external stakeholders, which is near feature-complete, with some features still requiring refinement or completion for early testing and review of design and usability
- Prepare and provide an *Alpha Software Manual* which will include but is not limited to; screenshots and descriptions of interfaces, features, tools, menus, etc.
- Update software wish list
  - Develop beta software for further review and testing by key stakeholders, via enabling web access, to inform software finalization
- Prepare and provide a *Beta Software Manual* which will include but is not limited to; screenshots and descriptions of interfaces, features, tools, menus and etc.

- Obtain reference data to incorporate in tool
  - Identify and obtain data from the CPUC, California Energy Commission, CAISO, and other sources for incorporation
    - Perform model runs with Reflex model to provide hourly price / value data inputs for future high renewable scenarios based on Long Term Procurement Planning and Transmission Planning Process (LTPP/TPP) planning scenarios
  - Structure and format data for compatibility with tool
- Develop *Datasets* in Microsoft Excel with reference data, which is an organized Excel spreadsheet of reference scenario data which is readable by the software.
- Develop *Transfer Plan* for the Cloud Player energy storage valuation software platform. The platform software will be transferred at the conclusion of the two year software support and maintenance.

Recipient Products:

- Alpha Software Manual
- Beta Software Manual
- Datasets
- Transfer Plan

TASK 4 SOFTWARE REVIEW

The goal of this task is to validate modeling approaches and quality of software implementation through a structured and phased review process.

The Recipient shall:

- Develop and execute a software and quality assurance test plan for software testing and quality assurance to
  - Test individual modules
  - Test entire model against each test case
  - Develop regression test-rig to compare results from successive runs
  - Conduct sensitivity analysis to key assumptions
  - Conduct simple user-tests with selected stakeholders
- Develop and provide *Software Use Cases and Test Cases* for stakeholders to test alpha and beta software versions, led by E3 to guide software testers how to use the software and provide structured test cases, developed initially for alpha testing and refined and finalized for beta testing
  - Draft user manual instructions for selected use cases
  - Develop test cases for selected software testers to exercise alpha and beta software under different scenarios
- Convene monthly meetings of the ESIC Analysis working group to review the approaches and feature developments of the software model
- Convene beta testing workshop to review model capabilities and clarify beta testing process and objectives with selected experts and TAC
- Document feedback from alpha and beta testing and prioritize issues to be addressed or deferred in a *Software Review Report*.
- *Participate in CPR Meeting as per task 1.3 and provide a CPR Report*

Recipient Products:
- Software Use Cases and Test Cases Report (draft and final)
- Software Review Report
- CPR Report

TASK 5 SOFTWARE COMPLETION, DOCUMENTATION, AND DELIVERY
The goal of this task is to review and finalize software quality assurance, review and finalize software documentation, and to deliver software and documentation on cloud-hosted platform.

The Recipient shall:
- Develop, review, edit and provide *Software User and Technical Documentation* from the software review. The documentation provides user instructions to utilize the software in different circumstances and the technical documentation of model architecture and data sources.
- Respond to all issues identified in the software review related to functionality testing, usability testing, and stakeholder review (in Task 4), and prioritize them for completion.
- Perform final quality assurance review of software model prior to delivery.
- Set up a Microsoft SQL Server to connect datasets to software model
- Provide access to final Software Model and Datasets on a Cloud-Hosted Web Platform to CAM within the Software User and Technical Documentation Report. This is the validated and finalized version of the software model for public delivery by the California Energy Commission.
- Acquire and provide a copy of a *Two Year Software Support and Maintenance Agreement* from the date of software delivery. This is the technical upkeep for the software to ensure it remains live and available which extends two years after delivery of the software to California Energy Commission, sufficient to last until the next biannual review by the CPUC, which is expected to require updates for data and modeling approaches to remain relevant. The support and maintenance will not include model updates or additional user support in addition to making the software and documentation available.

Recipient Products:
- Software User and Technical Documentation Report (draft and final)
- Copy of Two Year Software Support and Maintenance Agreement

TASK 6 EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:
- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) Kick-off Meeting Benefits Questionnaire; (2) Mid-term Benefits Questionnaire; and (3) Final Meeting Benefits Questionnaire.
- Describe and document key benefits for which this project has provided quantitative values, improved value estimates or quantified values with a greater degree of rigor than previously available.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:

- For Product Development Projects and Project Demonstrations:
  - Published documents, including date, title, and periodical name.
  - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
  - Greenhouse gas and criteria emissions reductions.
  - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
  - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
  - <u>Additional Information for Product Development Projects</u>:
    - Outcome of product development efforts, such copyrights and license agreements.
    - Units sold or projected to be sold in California and outside of California.
    - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
    - Investment dollars/follow-on private funding as a result of Energy Commission funding.
    - Patent numbers and applications, along with dates and brief descriptions.
  - <u>Additional Information for Product Demonstrations:</u>
    - Outcome of demonstrations and status of technology.
    - Number of similar installations.
    - Jobs created/retained as a result of the Agreement.

- For Information/Tools and Other Research Studies:
  - Outcome of project.
  - Published documents, including date, title, and periodical name.
  - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
  - The number of website downloads.
  - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
  - An estimate of energy and non-energy benefits.
  - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.

- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Recipient Products:
- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 7 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES
The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:
- Prepare an Initial Fact Sheet at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a Final Project Fact Sheet at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a Technology/Knowledge Transfer Plan that includes:
    - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
    - A description of the intended use(s) for and users of the project results.
    - Published documents, including date, title, and periodical name.
    - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
    - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
    - The number of website downloads or public requests for project results.
    - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop Presentation Materials for an Energy Commission-sponsored conference/workshop on the results of the project.
- Prepare a Technology/Knowledge Transfer Report on technology transfer activities conducted during the project.

Recipient Products:
- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 15-0311

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ELECTRIC POWER RESEARCH INSTITUTE, INC.

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

RESOLVED, that the Energy Commission approves Agreement EPC-14-019 with **Electric Power Research Institute, Inc.** for a **$1,000,000** grant to develop a publicly available tool that assesses costs and benefits and guides the optimization of energy storage projects with respect to use, technology, size, and location; 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 March 11, 2015.

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

Harriet Kallemeyn,
Secretariat