STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-19-054 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Hatice Gecol	43	916-327-2222

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

D) Title of Project
Demonstrating Code-compliant Energy Storage Systems and Their Capabilities for Grid Harmonization

E) Term and Amount

Start Date	End Date	Amount
7/18/2020	3/31/2024	$ 999,841

F) Business Meeting Information

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

Proposed Business Meeting Date 7/8/2020 ☐ Consent ☒ Discussion

Business Meeting Presenter Quenby Lum Time Needed: 5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description:

ELECTRIC POWER RESEARCH INSTITUTE, INC. Proposed resolution approving agreement EPC-19-054 with Electric Power Research Institute, Inc. for a $999,841 grant to install and evaluate the performance of commercially available energy storage in new construction single-family homes and multifamily affordable housing and adopting staff's determination that this action is exempt from CEQA. This Agreement will also assess the values of energy storage for the customer and determine whether any future changes to the Title 24 building code would be valuable.

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":

2. If Agreement is considered a "Project" under CEQA:
   a) ☒ Agreement **IS** exempt.
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15301 ; Cal. Code Regs., tit 14, § 15303
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

   Explain reason why Agreement is exempt under the above section: California Code of Regulations, title 14, section 15301 ("Existing Facilities") provides that

projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use, are categorically exempt from the provisions of the California Environmental Quality Act. The project will install lithium - ion (Li-ion) battery energy storage units at approximately 15 fully developed single family homes and two multifamily affordable housing complexes with existing rooftop solar photovoltaic panels. Installation will require minor alterations to the interior or the exterior of the garages of the single family homes and the interior of the building utility rooms of the multifamily affordable housing complexes with no expansion of footprint. Specifically, containerized energy storage units will be installed near the electrical panel in the existing garage of each home and the building utility room of each multifamily affordable housing complex, and connected to the home's and building's rooftop solar. For these reasons, the project will have no significant environmental impact and falls under section 15301.

Cal. Code Regs., tit. 14, sect. 15303 ("New Construction or Conversion of Small Structures") provides that projects which consist of construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure, are categorically exempt from the provisions of the California Environmental Quality Act. The battery energy storage units described above are commercially-available, residentially-sized Li-ion batteries. Specifically, the power and energy capacities of the batteries will be either 5 kW (8.6kWh) or 7 kW (13.5 kWh) units. The commercially-available battery units likely to be used for this project include LG Chem RESU 10H/SolarEdge StorEdge, Generac PWRCELL 9, Tesla Powerball, and Sonnen eco10. The dimensions (L x W x D) of the battery and inverter enclosures are approximately 36 in x 30 in x 8.5 in, and approximately 37 in x 12.5 in x 7.2 in for LG Chem/SolarEdge unit, and approximately 68 in x 22 in x 10 in and 25 in x 20 in x 8 in for the Generac unit. The dimensions (L x W x D) of the battery enclosures are approximately 46 in x 30 in x 6.5 in for Tesla unit and approximately 75 in x 26 in x 14 in for the Sonnen unit. For these reasons, the project will have no significant environmental impact and falls under section 15303.

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

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

Legal Company Name:	Budget
TRC Engineers, Inc.	$ 300,193
Abstractal LLC	$ 36,750
	$
	$
	$
	$
	$
	$
	$
	$

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

Legal Company Name:

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	$819,476
EPIC	19-20	301.001G	$180,365
			$
			$
			$
			$

R&D Program Area: ESRO: ETSI TOTAL: $ 999,841

Explanation for “Other” selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Cynthia Toth

Address: 942 Corridor Park Blvd

City, State, Zip: Knoxville, TN 37932-3723

Phone: 865.218.8106

E-Mail: ctoth@epri.com

2. Recipient’s Project Manager

Name: Ramachandran Narayanamurthy

Address: 3420 Hillview Ave

City, State, Zip: Palo Alto, CA 94304-1355

Phone: 650-855-2419

E-Mail: rnarayanamurthy@epri.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-19-306

☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

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

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Homeowners Recruitment and Site Assessment
3		Modeling and Design Optimization
4	X	Deployment Strategy
5	X	Field Implementation, Commissioning, and Operation
6		Technology Evaluation and Recommendations
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
API	Application Programming Interface
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCA	Community Choice Aggregator
CPR	Critical Project Review
JA12	Joint Appendix 12
SB-100	Senate Bill 100
T24	Title 24
TAC	Technical Advisory Committee
TOU	Time of Use

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

A. Purpose of Agreement

The purpose of this Agreement is to install and evaluate the performance of commercially available energy storage connected to solar panels in new construction single-family homes and multifamily affordable housing complexes. This Agreement will also assess the values of energy storage for the customer and determine whether any future changes would be required to Title 24 building code to benefit deep decarbonization, electrification, and energy flexibility.

[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

In 2018, California signed into law Senate Bill 100 (SB-100), committing to 100% clean energy by 2045. Achieving the goals of SB-100 requires full decarbonization of the building stock. Further, following the turn of the new year, California instituted the 2020 solar mandate, requiring new residential homes to be equipped with photovoltaic systems, subsequently pressuring the grid to mature to become a flexible asset. To accommodate these ambitious energy goals means transformative improvements are necessary to the statewide Title 24 (T24) building code to assist zero net electric energy construction techniques.

Solution

Grid operators must call on flexible resources needed to enable electricity supply-demand balance with increased customer-sided solar production. One solution being investigated is deploying energy storage in combination with solar photovoltaics to change the technical potential of distributed energy resources by supporting load shifting and solar self-utilization. Many energy storage technology providers offer market products that claim to have the ability to intelligently control a battery's output power, charging schedule, and state of charge. Some providers only allow the user to monitor and command the energy storage system via their proprietary mobile apps and web portals, while others enable users to control the unit more directly with an application programming interface(API) and the manipulation of inverter control registers. For this Agreement, the Recipient will work with various home builders and community choice aggregators (CCA) located in northern California, central valley, and coastal climates to install energy storage connected to solar panels being installed by developers or homeowners at 15 - 20 residential buildings, of which two will be multifamily affordable housing complexes, which are compliant with the 2019 T24 code. The Recipient will model the homes for compliance and total energy use, work with builders and storage providers to understand controls and implementation of energy storage operations and use measured data to evaluate how the energy storage units provide grid harmonization and evaluate energy impacts for both electric and mixed fuel homes.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Analyze different compliance pathways, with and without energy storage, to achieve the energy and efficiency requirements and goals of new residential construction under Title 24;
- Quantify the impact coordinated operation of localized energy storage can provide to mitigate demand surges and benefit the utility and the grid, at the distribution level;
- Report on potential areas of improvement of the current building code; and
- Suggest a prioritization to further develop control and optimization strategies, as needed to improve grid harmonization of the building code.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs by providing T24 and Joint Appendix 12 (JA12) recommendations that promote future solar and storage combinations optimized to provide reliable back-up power during outages and lower costs through programed discharge of the battery during times of peak energy rates. Storage provides back-up power for essential needs during outages at the installation site. For customers with critical loads like medical or communication equipment, having battery energy storage to provide backup power can be lifesaving. Integrating solar with battery energy storage can also protect customers during extended public safety power shutoff (PSPS) events. In October 2019, these events impacted nearly two million Californian customers during two separate weekends. If programmed properly, the energy storage device is also capable of charging during the day and discharging according to higher-priced time of use (TOU) rates established by the local utility, saving the customer money at the meter.

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 providing expert recommendations derived from field demonstrations to enhance current T24 building code and JA12 to better suit California plans for decarbonization through renewable generation. The expected deployment of more than 3,500 MW of residential and non-residential energy storage in five years in California could yield a CO_2 emission reduction of over 390,000 metric tons of CO_2, based on the Energy Storage Association's estimates of CO_2 emission reductions from U.S. energy storage deployment (2019)[4]. Potential new homes built in alignment with a better-developed T24 building code and JA12 favoring controllable energy storage could also yield benefits to grid infrastructure and prepare for ancillary grid impacts as a result of increased renewable generation. At the distribution level, leveraging onsite energy storage devices improves power quality through voltage and frequency support and increases the potential integration of renewables. At the bulk level, storage mitigates the impacts of fluctuations in electricity supply by renewable energy injections on the power grid and thereby reduces the system's need for operating reserves.

Agreement Objectives

The objectives of this Agreement are to:

- Model project site homes for code compliance and total energy use;
- Work with builders and storage providers to understand controls and implementation of energy storage operations;
- Evaluate commercially available residential energy storage technologies, configurations and capabilities to better understand what is needed to support residential customers during unplanned outage events;

[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).

[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.

[4] ESA (2017): A vision for 2025, https://energystorage.org/wp/wp-content/uploads/2019/06/esa_vision_2025_final.pdf

EXHIBIT A
Scope of Work

- Deploy energy storage in at 15 – 18 single-family homes and two multifamily affordable housing complexes, which are compliant with T24 and JA12 2019 code in three climate zones;
- Use measured data to evaluate how the energy storage units provide grid harmonization and evaluate energy impacts for both electric and mixed fuel homes;
- Evaluate how to maximize the use of energy storage for efficient energy use during utility grid congestion; and
- Determine whether any future changes would be required to Title 24 building code.

III. 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, including the Final Report Outline and Final Report

- 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.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

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.

o **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 administrative portion of the meeting will include discussion of the following:
  - o Terms and conditions of the Agreement;
  - o Administrative products (subtask 1.1);
  - o CPR meetings (subtask 1.3);
  - o 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.

EXHIBIT A
Scope of Work

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 progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and 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.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Fund and in-state 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 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 the 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. *(See Task 1.1 for requirements for draft and final products.)*

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

CAM Product:
- Style Manual
- Comments on Draft Final Report Outline
- Acceptance 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, Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.
    - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.

        - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
        - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
    - Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
    - Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
    - Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the 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.
  - If different from the solicitation application, provide 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 shall include the expertise of each proposed TAC member and the value to the project. 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.

EXHIBIT A
Scope of Work

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.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project’s strategic goals.

Products:

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

IV. TECHNICAL TASKS

TASK 2: HOMEOWNERS RECRUITMENT AND SITE ASSESSMENT

The goals of this task are to (1) work with home builders and CCAs to identify residential participants (2) assess site-specific system deployment intricacies, and (3) assess builder and homebuyer preferences when it comes to common building practices and technologies to determine potential drivers for T24 adaptations.

The Recipient shall:

- Engage home builders and CCAs to recruit single-family home buyers and multifamily affordable housing owners interested in installing battery storage in a minimum of 15 residential buildings, of which two are multifamily affordable housing complexes. These residential buildings shall be compliant with T-24 and JA12 2019 code that reside in a minimum of three different climate zones (at least one home in a coastal climate zone, one in a central valley climate zone, and one in a northern California climate zone as defined by the California Energy Commission's California Building Climate Zone Areas map.
- Collect any building plans including architectural, mechanical, and electrical drawings for the participating homes.
- Review current building plans and document equipment and electrical system information.
- Conduct site visit to review building operations and verify information reported in building plans.
- Determine any necessary changes to enable storage installation to meet code.
- Prepare a *Site Audits Report* that includes results for all unique sets of homes.
- Prepare and conduct *Builder and Homebuyer Surveys Report* to determine drivers for T24 energy storage systems.

Products:

- Site Audits Report
- Builder and Homebuyer Surveys Report

TASK 3: MODELING AND DESIGN OPTIMIZATION

The goals of this task are to (1) evaluate the structure of current T24 code and JA12, and (2) create the anticipated use case for each unique customer install. The outline will establish the arrangement of technologies and control strategy in each location based on comprehensive modeling simulations.

The Recipient shall:

- Conduct a review of current T24 2019 and JA12 requirements.
- Run detailed modeling simulations producing total energy use and compliance to determine peak energy demand and understand effective battery control strategies.
- Identify any potential limitations of existing T24 code that impacts energy storage use that could benefit the customer.
- Produce *Energy Use and Code Compliance Modeling Report* using simulation results.
- Engage home builders to identify certain tradeoffs when selecting battery storage to meet T24 requirements.

- Understand controls and operation capabilities and limitations of potential energy storage and solar providers.
- Select battery energy storage based on home builder preferences and capabilities.
- Document selection and reasoning in *Technology Selection and Operation Analysis Report*.

Products:

- Energy Use and Code Compliance Modeling Report
- Technology Selection and Operation Analysis Report
- CPR Report #1

TASK 4: DEPLOYMENT STRATEGY

The goals of this task are to (1) engineer and document the pathway for successful integration of the selected technologies (2) develop the requirements for installing new monitoring equipment to collect household circuit level and storage and solar equipment power data, and (3) create a customer and developer guide to promote education and awareness of selected technologies and building code requirements.

The Recipient shall:

- Prepare an *Deployment Plan* that describes, but is not limited to, detailed battery communication plan and design of control strategies including TOU and grid harmonization, networking design for remote control and data upload, cyber security assessment, a detailed schedule for procurement, installation, and commissioning activities including quality control procedures, quality assurance reviews, inspections, and code check.
- Provide a *Measurement and Verification Plan* that will include the collection and measurement and verification (M&V) of data on the installation over the **one-year demonstration period**. The duration of data collection may be reduced with prior CAM written approval. M&V includes, but is not limited to, plots of charge/discharge power levels, storage efficiencies, ambient temperatures, and PV output as a function of time.
    - o
- Create and distribute *Homebuyer Technology Guidebook* for each battery storage and solar equipment package to homeowners to promote user education.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings)).
- Participate in a CPR meeting.

Products:

- Deployment Plan (draft and final)
- Measurement and Verification Plan (draft and final)
- Homebuyer Technology Guidebook
- CPR Report #1

TASK 5: FIELD IMPLEMENTATION, COMMISSIONING, AND OPERATION

The goals of this task are to (1) carry out activities outlined in the Deployment and M&V Plans, and (2) carry out commissioning tasks to ensure proper communication and functionality of installed equipment.

The Recipient shall:

- Prepare *Field Installation Materials Guide* containing necessary materials to integrate battery storage equipment and solar array in residential homes.
- Acquire applicable permits to install the system from local authorities having jurisdiction.
- Work with storage technology partners to install battery storage systems in conjunction with the solar array.
- Oversee commissioning tasks alongside technology partners.
- Record dates of equipment installation and commissioning in an *Installation and Commissioning Checklist* document.
- Prepare an *Installation and Commissioning Summary Report* that details lessons learned and best practices from installation and permitting and results of commissioning for all units.
- Deploy control strategies as detailed in the Deployment Plan..
- Monitor, collect, and periodically analyze data in line with the M&V Plan to support the evaluation of technology and project benefits over the **one year demonstration period**. The duration of data collection may be reduced with prior CAM written approval.
- Prepare *Interim System Performance Report*.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Field Installation Materials Guide
- Installation and Commissioning Checklist
- Installation and Commissioning Summary Report
- Interim System Performance Report
- CPR Report #2

TASK 6: TECHNOLOGY EVALUATION AND RECOMMENDATIONS

The goals of this task are to (1) analyze capabilities and performance of the employed equipment and control strategies, and (2) tailor recommendations of T24 and JA12 conforming to findings and lessons learned.

The Recipient shall:

- Compile all equipment costs and analyze the economic tradeoffs in a *Cost Analysis Report*.
- Evaluate how storage controls in native mode (TOU for JA12) impacts hourly energy use, customer operating cost and distribution grid impacts in *Energy Use Impacts Analysis Summary*.
- Evaluate consumers ease of use in adjusting operation to newer TOU rates.
- Evaluate other control algorithms such as self-consumption for the same criteria.

- Conduct customer and builder surveys to understand propensity for adoption of energy storage in new construction and buying new homes.
- Compile customer and builder responses of the integration of battery energy storage in *Customer and Builder Perceptions Document*.
- Provide recommendations for improvements to current building codes and JA12 as needed in *Building Code Design Transformation Report*.

Products:

- Cost Analysis Report
- Energy Use Impact Analysis Summary
- Customer and Builder Perceptions Document
- Building Code Design Transformation Report

TASK 7 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*.
- 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:

    - o <u>For Product Development Projects and Project Demonstrations:</u>
        - 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.

▪ Additional Information for Product Demonstrations:
- Outcome of demonstrations and status of technology.
- Number of similar installations.
- Jobs created/retained as a result of the Agreement.

o 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.

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

TASK 8 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:
  - o 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.
  - o A description of the intended use(s) for and users of the project results.
  - o Published documents, including date, title, and periodical name.
  - o 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.
  - o A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
  - o The number of website downloads or public requests for project results.
  - o 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(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 20-0708-9i

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 (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves Agreement EPC-19-054 with Electric Power Research Institute, Inc. for a $999,841 grant to install and evaluate the performance of commercially available energy storage in new construction single-family homes and multifamily affordable housing. This Agreement will also assess the values of energy storage for the customer and determine whether any future changes to the Title 24 building code would be valuable; and

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

CERTIFICATION

The undersigned Secretariat to the CEC 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 CEC held on July 8, 2020.

AYE:
NAY:
ABSENT:
ABSTAIN:

Cody Goldthrite
Secretariat