STATE OF CALIFORNIA
GRANT REQUEST FORM (GRF)
CEC-270 (Revised 10/2015) CALIFORNIA ENERGY COMMISSION

New Agreement EPC-16-004 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Dustin Davis	51	916-327-2223

Recipient's Legal Name	Federal ID Number
DOE- Lawrence Berkeley National Laboratory	94-2951741

Title of Project
Integrated Whole-Building Zero Net Energy Retrofits for Small Commercial Offices

Term and Amount	Start Date	End Date	Amount
	7/30/2016	12/31/2020	$ 2,000,000

Business Meeting Information

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

Proposed Business Meeting Date	7/13/2016	☐ Consent	☒ Discussion
Business Meeting Presenter	Dustin Davis	Time Needed:	5 minutes

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

Agenda Item Subject and Description

LAWRENCE BERKELEY NATIONAL LABORATORY. Proposed resolution approving agreement EPC-16-004 with Lawrence Berkeley National Laboratory for a $2,000,000.00 grant to develop and test cost-effective packages of innovative, whole-building integrated systems and controls to achieve zero net energy performance for small commercial office retrofits. The advanced retrofit package will be pilot tested in a San Francisco building. Lessons learned will be disseminated through an online tool that is publicly available. (EPIC funding) Contact: Dustin Davis (Staff presentation: 5 minutes)

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: Cal. Code Regs., tit 14, § 15301
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
   Explain reason why Agreement is exempt under the above section:
   This project involves minor alterations of existing public or private structures, facilities, mechanical equipment, or topographical features, and involves negligible or no expansion of use beyond the existing use. This project provides material and physical assistance to the property owner's selection and installation of energy-efficient building systems, including the building's HVAC, lighting, windows, insulating, and control and monitoring systems. All of these systems exist in the current building and most or all likely would be modified or upgraded anyway as part of the building's pending renovation. The project will not change or expand the building's use, occupancy, or capacity. For these reasons, the project will not have a significant environmental impact and is exempt under section 15301.

   ☐ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study ☐ Environmental Impact Report
   ☐ Negative Declaration ☐ Statement of Overriding Considerations
   ☐ Mitigated Negative Declaration

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

Legal Company Name:	Budget
Integral Group	$ 378,000
San Francisco 2030 District c/o RMW Architects	$ 218,000
To Be Determined	$ 19,000
	$

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

STATE OF CALIFORNIA

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Legal Company Name:

Budget Information			
Funding Source	**Funding Year of Appropriation**	**Budget List No.**	**Amount**
EPIC	15-16	301.001C	$2,000,000
			$
			$
R&D Program Area: EERO: Buildings		TOTAL:	$2,000,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Betsy Quayle			Name:	Cindy Regnier		
Address:	1 Cyclotron Rd			Address:	1 Cyclotron Rd, MS 90R2000		
City, State, Zip:	Berkeley, CA 94720-8099			City, State, Zip:	Berkeley, CA 94720-8099		
Phone:	510-486-7391 /	Fax:	- -	Phone:	510-486-7011 /	Fax:	- -
E-Mail:	BEQuayle@lbl.gov			E-Mail:	CMRegnier@lbl.gov		

Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-15-308

☐ First Come First Served Solicitation

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		Energy Efficiency Measure Identification and Assessment
3	x	Demonstrations and Testing
4		Energy Efficiency Measure Update and Dissemination
5		M&V and Best Practices
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
CBES	Commercial Building Energy Saver
CPR	Critical Project Review
DR	Demand Response
EEM	Energy Efficiency Measure
GHG	Greenhouse Gas
M&V	Measurement and Verification
TAC	Technical Advisory Committee
ZNE	Zero Net Energy

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

A. Purpose of Agreement

The purpose of this agreement is to develop and test cost-effective packages of innovative, whole building integrated systems and controls to achieve zero net energy (ZNE) performance for small commercial office retrofits. Lessons learned will be disseminated through an online tool that is publicly available.

B. Problem/ Solution Statement

Problem

The aggressive energy policies of the State of California, such as AB32 and AB758 target greenhouse gas (GHG) emission reductions to 1990 levels by 2020 and greater energy savings in existing nonresidential buildings, respectively. California has a further goal of GHG reduction

[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.

to 80 percent of the 1990 levels by 2050. Small commercial represents a significant amount of the energy consumption in the state. In 2012, small commercial offices consumed more than 3,500 gigawatt hours of electricity in California, representing 650 million sf of real estate[2]. Efforts to achieve the state's GHG emission reduction goals will need to address the barriers to support the transition of 50% of the commercial building stock to zero net energy by 2030[3]. Similarly, efforts to achieve ZNE designs require 50%+ energy savings over baseline energy use as demonstrated through numerous case studies[4,5]. This depth of savings for the existing building market requires whole building integrated solutions, and cannot be achieved by incremental equipment upgrades alone. To date, relatively few ZNE buildings have been achieved, and those that exist were largely achieved through new construction activities. Finally there is a need to reduce peak demands in small commercial buildings and ensure their electric load shapes can help improve the electric system reliability and allow more renewables on the electric grid. New technology has been demonstrated that has been developed for small commercial buildings.[6]

The small commercial office market experiences a number of unique barriers to achieving substantial energy reductions. These include: 1) awareness and access to centralized, comprehensive, cost-evaluative information about how to achieve energy targets, and 2) affordable access to energy reduction services such as engineering and auditing services. Existing energy efficiency tools and services have comparatively high cost entry points on a per-square-foot or kilowatt hours-saved basis. Often, small commercial stakeholders cannot afford to hire architecture and engineering firms for efficiency services, with maintenance contractors and product representatives being the closest resources they have for energy reduction guidance, however both resources may not have energy efficiency as a key focus. Further, small commercial existing buildings typically approach energy efficiency upgrades through end-of-life equipment replacement, or light-touch interventions such as light bulb or fixture replacements. While these opportunities can result in significant energy savings, their impact is inherently limited. The commercial building energy services market has not developed streamlined approaches to provide whole building analysis for small commercial due to the burden of developing whole building evaluation tools for the relative payback that would occur per customer served. The small commercial market will not access replicable whole building, ZNE solutions without assistance to develop processes, tools, technology solutions and other practices to lower the cost of discovery and application. Further, the means of engaging this sector must be developed strategically to create new models to support this sector accessing and achieving these energy savings opportunities.

Solution

This project will develop cost-effective packages of pre-commercial, underutilized whole building integrated systems and controls to achieve ZNE for small commercial office retrofits in San

[2] Reducing Costs for Communities and Businesses Through Integrated Demand-Side management and Zero Net Energy Demonstrations Grant Funding Opportunity. CEC EPIC (2015)

[3] J. B. Greenblatt. Estimating Policy-Driven Greenhouse Gas Emissions Trajectories in California: The California Greenhouse Gas Inventory Spreadsheet (GHGIS) Model. (2013) LBNL-6451E.

[4] C. Regnier, A. Harding, A. Robinson. Achieving a Net Zero Retrofit in a Hot, Humid Climate - lessons from the University of Hawaii at Manoa. U.S. Department of Energy, Commercial Building Partnerships (2015). LBNL-189802.

[5] C. Regnier, K. Settlemyre. The Business of High Performance: The USC Darla Moore School of Business. U.S. Department of Energy, Commercial Building Partnerships. (2015) LBNL-6904E.

[6] J. Page, S. Kiliccote, J. Dudley, M. Piette, Al Chiu, B. Kellow, E. Koch, and P. Lipkin, Automated Demand Response Technology Demo for Small and Medium Commercial Buildings (2011). LBNL-4982E.

Francisco and a southern California climate. The whole building packages will be tested and optimized under a range of solar exposures and climate conditions using the Recipient's FLEXLAB. FLEXLAB provides high accuracy, high resolution performance data of integrated systems, monitored at the sub-system and device level. This feedback will be used to assess and validate energy savings strategies as well as impacts on thermal and visual comfort. A full scale pilot of a whole building package will then be conducted at a site in the San Francisco 2030 District, which has adopted the 2030 Challenge of 50% energy reduction in the District by 2030.

The demonstration pilot in San Francisco will have 12 months of measurement and verification (M&V) to study and document energy, thermal and visual comfort performance. Occupant behavior and best practices in operation will also be collected. The validated energy efficiency measures (EEM) will then be updated in the Commercial Building Energy Saver (CBES) online platform as a ZNE retrofit analysis option for small commercial offices. CBES provides a readily accessible platform for small commercial stakeholders, such as contractors, owners and engineers, to conduct whole building retrofit analysis, providing cost-evaluative information on EEMs. The CBES application is publicly available, and currently used by the San Francisco 2030 District for small commercial whole building analysis. This project will also combine the CBES application with automated demand response (DR) systems to ensure the small commercial buildings provide flexible electric loads that are integrated with future demand response programs.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Develop and demonstrate a replicable high-performance integrated, whole building solution package for small commercial office conditions to achieve ZNE, using cost effective technologies and controls. A whole building solution package will be developed for San Francisco and a southern California climate.
- Test the two whole building integrated packages under a range of conditions to understand performance and validate EEM models.
- Pilot the whole building package in a San Francisco site to study and validate energy and comfort, with results and best practices in operations documented.
- Package the validated EEMs in the publicly available tool, CBES, to enable whole building ZNE retrofit assessments, accessible to small commercial stakeholders.

Ratepayer Benefits:[7] This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs. The project will validate technical approaches to achieve ZNE performance while ensuring thermal and visual comfort for occupants, targeting an energy reduction of 50% and greater for small commercial offices. At a 5% adoption rate in small commercial offices by 2030, this would result in an estimated savings of $32 million annually in electricity and natural gas costs. The project will also increase system reliability by significantly

[7] 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).

decreasing peak energy loads, and supporting AutoDR implementation. Given the 5% adoption rate, an estimated peak load reduction of 118.5 MW is forecast.

Technological Advancement and Breakthroughs:[8] 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 developing and validating cost effective deep energy reduction strategies to enable ZNE retrofits of small commercial offices. Current retrofit methods for the small commercial sector predominantly make use of equipment replacement as the main strategy for efficiency improvements. While these strategies will save energy, their savings are inherently limited and will not result in the State reaching its climate and energy goals. Efforts to achieve the state's GHG emission reduction goals will need to address the barriers to support the transition of 50% of the commercial building stock to ZNE by 2030[9], at an energy savings of 50% per site, and current industry practices do not support whole building retrofits at the energy savings needed to achieve this goal.

Agreement Objectives

The objectives of this Agreement are to:

- Develop and validate a ZNE integrated whole building retrofit EEM package applicable to a small commercial office space in San Francisco and a southern California climate, using pre-commercial underutilized technologies and controls.
- Demonstration of a whole building integrated system package in San Francisco, with 12 months M&V for energy performance, comfort and occupant behavior.
- Deploy the validated EEM packages to a publicly available database and online whole building retrofit application tool, the CBES platform.
- Document best practices in energy, comfort and occupant behavior for the deployment of the ZNE packages based on the research, demonstration and analysis of the project.

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.

[8] 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.

[9] J. B. Greenblatt. Estimating Policy-Driven Greenhouse Gas Emissions Trajectories in California: The California Greenhouse Gas Inventory Spreadsheet (GHGIS) Model. (2013) LBNL-6451E.

EXHIBIT A
Scope of Work

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.

- **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:
  - 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 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)
-

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.
    - 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 no permits 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.

EXHIBIT A
Scope of Work

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

*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.* ***Subtask 1.1 (Products)*** *describes the procedure for submitting products to the CAM.*

TASK 2 ENERGY EFFICIENCY MEASURE IDENTIFICATION AND ASSESSMENT

The goal of this task is to develop EEMs for the whole building integrated packages for San Francisco and a southern California climate zone (such as climate zone 8 or 9) to reach ZNE performance for a small commercial office retrofit.

The Recipient shall:

- Work with the project team and TAC to identify candidate EEMs from a list of pre-commercial, underutilized technologies and controls. The Recipient and the Integral Group will lead this effort, with input from the TAC, demonstration site and San Francisco 2030 District.
- Conduct simulation analysis of draft packages of daylighting systems and strategies.
- Evaluate the performance of the whole building packages using the EnergyPlus simulation tool. Iterate on EEM strategies as needed to achieve ZNE performance.
- Produce cost estimates for each EEM in each package. Validate cost effectiveness of ZNE package.
- Develop subsystem level performance metrics to be used in test and demonstration activities.
- Produce a report on the *EEM Selections for Whole Building Integrated ZNE Packages*. Provide descriptions of each EEM in each package, their cost estimates and performance metrics. Provide results of ZNE simulation evaluation for the candidate demonstration site in San Francisco, and the equivalent for a southern California climate.

Products:

- EEM Selections for Whole Building Integrated ZNE Packages (draft)

TASK 3 DEMONSTRATIONS AND TESTING

The goals of this task are to implement and conduct testing of the whole building integrated ZNE packages for both climates. Both packages will first be tested at a representative scale using the Recipient's FLEXLAB to assess performance and optimize solutions. A full scale pilot will then be conducted in San Francisco at a small commercial office site.

The Recipient shall:

- Develop a *FLEXLAB Test Plan* for both whole building integrated packages. The plan will include test objectives, procedures, experimental setup and equipment, test schedule, the test conditions to be studied (e.g., climate conditions – San Francisco and southern California, internal loads, etc.), as well as an M&V plan.
- Conduct testing in FLEXLAB per the *FLEXLAB Test Plan*. Collect performance data and analyze results in relation to energy performance goals, as well as thermal and visual comfort.
- Update the Technical Advisory Committee on the results of the FLEXLAB tests.

- Adjust EEMs based on FLEXLAB test results to achieve ZNE level performance at the subsystem level, and ensure thermal and visual comfort.
- Prepare the *FLEXLAB Test Results Report*. The report will include the energy performance results of each test scenario, as well as thermal and visual comfort results. Any findings on implementation guidance of the EEMs to achieve the ZNE results will also be incorporated.
- Update the draft *EEM Selections for Whole Building Integrated ZNE Packages* report from Task 2 with EEM adjustments resulting from FLEXLAB test results.
- Develop the *San Francisco Demonstration Site Test Plan*. The plan will include test objectives, procedures, EEMs to be implemented, schedule, as well as an M&V plan.
- Conduct San Francisco demonstration, per the *San Francisco Demonstration Site Test Plan*.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:
- FLEXLAB Test Plan
- FLEXLAB Test Results Report
- EEM Selections for Whole Building Integrated ZNE Packages (final)
- San Francisco Demonstration Site Test Plan
- CPR Report

TASK 4 ENERGY EFFICIENCY MEASURE UPDATE AND DISSEMINATION

The goals of this task are to refine the EnergyPlus representation of the EEMs based on the validated results of the FLEXLAB testing and the San Francisco demonstration site. The updated EEMs will be packaged into the CBES platform to provide a ZNE whole building retrofit assessment option for each of these climates.

The Recipient shall:
- Update the EnergyPlus simulation of each EEM for both the San Francisco whole building retrofit package and the southern California climate. The results of FLEXLAB testing will be used to refine EEM representations to match actual performance. Similarly, the results of the San Francisco demonstration site will also be used to refine the EEMs.
- Update the CBES EEM database with both sets of EEMs.
- Update the CBES Application with a ZNE retrofit option for small commercial.
- Document work completed in this task in the *Task 4 Report*. In addition, the report will include but not limited to:
  - Results of simulation efforts for each EEM and refinement (if necessary).
  - Overview of updates to the CBES EEM database
  - Overview of updates to the CBES application

Products:
- Task 4 Report

TASK 5 M&V AND BEST PRACTICES
The goals of this task are to conduct M&V of the San Francisco demonstration site, to determine energy performance, comfort and occupant behavior related to ZNE operations. Best practices in EEM implementation, operations and occupant engagement will be documented.

The Recipient shall:
- Develop a *San Francisco Demonstration Site M&V Plan*.
- Develop baseline performance criteria for the San Francisco demonstration site.
- Develop comparative data for collected M&V data against established baseline performance data. San Francisco 2030 District energy baselines may be used for comparative data analytics.
- Execute the *San Francisco Demonstration Site M&V Plan* with 12 months of post-construction data.
- Collect operational and occupant related information on engagement and behavior in achieving ZNE performance including occupant satisfaction survey results.
- Document findings in the *San Francisco Demonstration Site M&V Report*. The report will include but not be limited to:
  - kWh consumed on a monthly basis
  - kWh generated onsite on a monthly basis
  - Time Dependent Valuation (TDV) evaluation of zero net energy status
  - Occupant satisfaction survey results
  - Summary of operational adjustments and process improvements completed on a monthly basis over 12 months
- Comparison of actual energy and building performance with FLEXLAB testing and Energy Pro simulations.
- Document the operational and occupant related findings in the *ZNE Best Practices Report*. The report will include but not limited to:
  - Design lessons learned and best practices
  - Implementation lessons learned and best practices for each major end use system as well as commissioning and startup.
  - Operational lessons learned and best practices for each stakeholder participating in use of the facility, such as building operator, maintenance, building owner and occupants
  - Opportunities for ongoing facility operations improvements

Products:
- San Francisco Demonstration Site M&V Plan
- San Francisco Demonstration Site M&V Report
- ZNE Best Practices Report

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*.

- 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.
    - Additional Information for Product Development Projects:
      - 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.

  - 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 has 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 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.
- When directed by the CAM, participate in annual EPIC symposium sponsored by the California Energy Commission.
- Provide at least six high quality digital photographs (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites. (All)
- Provide signed photo waiver release by the California Energy Commission.

- 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)

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 16-0713-12d

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: DOE-LAWRENCE BERKELEY NATIONAL LABORATORY

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

RESOLVED, that the Energy Commission approves Agreement EPC-16-004 from GFO-15-308 with the Department of Energy's Lawrence Berkeley National Laboratory for a $2,000,000 grant to develop and test cost-effective packages of innovative, whole-building integrated systems and controls to achieve ZNE performance for small commercial office retrofits. The advanced retrofit package will be pilot tested in a San Francisco building. Lessons learned will be disseminated through an online tool that will be publicly available; 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 July 13, 2016.

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

Cody Goldthrite,
Secretariat