



# GRANT REQUEST FORM (GRF)

## A) New Agreement # EPC-19-033 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Abigail Jacob	51	916-327-1314

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

D) Title of Project
Demonstrating Benefits of Highly Insulating Thin-Triple Window Retrofits in California

## E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/31/2024	\$ 1,850,000

## F) Business Meeting Information

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

Proposed Business Meeting Date 6/10/2020  Consent  Discussion

Business Meeting Presenter Abigail Jacob Time Needed: 5 minutes

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

### Agenda Item Subject and Description:

**DOE-Lawrence Berkeley National Laboratory**

DOE-LAWRENCE BERKELEY NATIONAL LABORATORY. Proposed resolution approving agreement EPC-19-033 with Lawrence Berkeley National Laboratory for a \$1,850,000 grant to demonstrate the installation of thin-glass triple-pane windows in at least 16 multi-family and 30 single-family housing units located in low-income or disadvantaged communities, and adopting staff's determination that this action is exempt from CEQA. The project includes detailed investigations into energy savings, long-term performance, and quality of installed products. (EPIC funding) Contact: Abigail Jacob. (EPIC funding) Contact: Abigail Jacob.

## 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, § 15306

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



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Explain reason why Agreement is exempt under the above section: The activities funded by this agreement are exempt under Cal. Code Regs., tit. 14, &sect; 15301 because they involve minor energy efficiency retrofit alterations to existing apartment buildings and single family homes. The retrofits involve no expansion of existing use, with interior/exterior alterations to improve building performance.

The activities funded by this agreement are exempt under Cal. Code Regs., tit. 14, &sect; 15306 because the purpose of installing thin-glass triple-pane windows system in private homes and apartments is to monitor and analyze the thermal performance and electricity consumption of the apartment units' and single family homes' HVAC and the efficiency of the window solutions. The project is strictly for information gathering purposes and involves basic data collection with no serious or major disturbance to an environmental resource.

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

Check all that apply

- Initial Study
- 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.	\$ 630,498
Stephen Selkowitz Consultants	\$ 50,000
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$

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

Legal Company Name:



**GRANT REQUEST FORM (GRF)**

**J) Budget Information**

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	\$1,850,000
			\$
			\$
			\$
			\$
			\$

R&D Program Area: EERO: Buildings

TOTAL: \$ 1,850,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

**K) Recipient's Contact Information**

**1. Recipient's Administrator/Officer**

Name: Joanna Santoro  
 Address: 1 Cyclotron Rd,  
 MS 64-0240A  
 City, State, Zip: Berkeley, CA  
 94720-0001  
 Phone: 510-486-6824  
 E-Mail: jlsantoro@lbl.gov

**2. Recipient's Project Manager**

Name: Christian Kohler  
 Address: 1 Cyclotron Rd,  
 MS 90R400  
 City, State, Zip: Berkeley, CA  
 94720-8099  
 Phone: 510-486 - 5040  
 E-Mail: CJKohler@lbl.gov

**L) Selection Process Used**

Competitive Solicitation Solicitation #: GFO-19-307

First Come First Served Solicitation Solicitation #:

**M) The following items should be attached to this GRF**

- |  |                          |          |
|--|--------------------------|----------|
| 1. Exhibit A, Scope of Work                          | <input type="checkbox"/> | Attached |
| 2. Exhibit B, Budget Detail                          | <input type="checkbox"/> | Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts  | <input type="checkbox"/> | Attached |
| 4. Recipient Resolution <input type="checkbox"/> N/A | <input type="checkbox"/> | Attached |
| 5. CEQA Documentation <input type="checkbox"/> N/A   | <input type="checkbox"/> | Attached |

\_\_\_\_\_  
**Agreement Manager**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Office Manager**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Deputy Director**

\_\_\_\_\_  
**Date**

**EXHIBIT A**  
**Scope of Work**  
**Lawrence Berkeley National Laboratory**

**I. TASK ACRONYM/TERM LISTS**

**A. Task List<sup>1</sup>**

<b>Task #</b>	<b>CPR<sup>2</sup></b>	<b>Task Name</b>
1		General Project Tasks
2	X	Field Demonstration: Single-Family
3	X	Field Demonstration: Multi-Family
4		Structural Limits of Thin-Glass IGU Configurations
5		Market Characterization and Commercialization Pathways Analysis
6		Measurement and Verification
7		Thermal Performance and Quality Evaluation
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

**B. Acronym/Term List**

<b>Acronym/Term</b>	<b>Meaning</b>
ACEEE	American Council for an Energy Efficient Economy
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CBECC-res	California Building Energy Code Compliance- residential
CPR	Critical Project Review
CPD number	Certified Product Directory number
HVAC	Heating Ventilating and Air Conditioning
IGU	Insulating glass unit
IPMVP	International Performance Measurement & Verification Protocol
M&V	Measurement & Verification
MF	Multi-family
NFRC	National Fenestration Rating Council
SF	Single-family
SHGC	Solar Heat Gain Coefficient
TAC	Technical Advisory Committee
U-factor	Thermal transmittance

<sup>1</sup>Production Readiness Plan Task is not applicable in this proposal. The products utilized in the demonstrations are TRL 8 and the manufacturing pathway has already been developed by our manufacturing partner. All tasks to support development of lower TRL versions of the technology are intended to define the need for and the limits of the technology, and not the development of the technology itself.

<sup>2</sup> 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.

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Vt	Visible transmittance
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**II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES**

**A. Purpose of Agreement**

The purpose of this Agreement is to demonstrate thin-glass triple-pane windows through installations in multi-family and single family housing units, including detailed investigations into energy savings, long-term performance, and quality of installed products. A market characterization will be performed to identify market barriers and opportunities, outline future technology advancements necessary, and support the development of future codes and programmatic approaches in California.

**B. Problem/ Solution Statement**

**Problem**

Windows continue to be the lowest thermally performing envelope system in California buildings, typically constituting around 7% of the envelope surface area but accounting for nearly half of the heat transfer. The large discrepancy in thermal performance between windows and opaque walls results in poor overall envelope performance and creates potential occupant health and comfort issues. Current California best practice for new window performance is met by double-pane, low-solar gain glazing with  $U\text{-Factor} \leq 0.30 \text{ Btu/h}\cdot\text{ft}^2\cdot^\circ\text{F}$  and  $\text{SHGC} \leq 0.25$ . High performance triple-pane windows with  $U\text{-factor}=0.20 \text{ Btu/h}\cdot\text{ft}^2\cdot^\circ\text{F}$  have been available since the early 1980's, but adoption is <1% due to high cost, increased weight, and difficult installation due to increased width.

**Solution**

The thin-glass triple-pane technology to be used in this demonstration offers the performance benefits of traditional triple-pane without the typical disadvantages, such as capital and installation costs. The installation of thin-glass triple windows is easier than regular triple-glazed windows because of the reduced weight. The reduced weight and width eliminate the redesign and re-tooling for window frames, that would normally be required for regular (thicker and heavier) triple glazed windows. This project hopes to make the incremental costs of thin-glass, triple-pane windows competitive with alternative building envelope solutions and eliminate construction and cost barriers to widespread adoption of this technology.

**C. Goals and Objectives of the Agreement**

**Agreement Goals**

The goal of this Agreement is to demonstrate that thin-glass triple-pane windows offer the performance and cost benefits required to overcome the historical barriers to mass-market adoption of high-performance windows. Specific goals of this Agreement include to:

- Demonstrate and achieve the targeted performance of thin-glass triple-pane fenestration systems indicated in Table 1 for low-rise multi-family and single-family applications in disadvantaged or low-income communities.
- Demonstrate best-in-class design and installation practices through quality verification.
- Measure building energy savings and provide supporting data to California Code of Regulations Title 24, Part 6 energy modeling assumptions.

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**Table 1. Target Performance Metrics**

<b>Performance Metric</b>	<b>Baseline Performance</b>	<b>Target Performance</b>	<b>Evaluation Method</b>
Installed cost of windows to be retrofitted	\$350 - \$600 per window	\$450 - \$650 per window	Costs estimates verified after installation.
R-Value (h·ft <sup>2</sup> ·°F/ Btu)	Sliding: 3.4 Fixed: 3.8	Sliding: 5.0 Fixed: 5.3	NFRC certification. CPD numbers provided.
U-Factor (Btu/h·ft <sup>2</sup> ·°F)	Sliding: 0.30 Fixed: 0.28	Sliding: 0.20 Fixed: 0.19	NFRC certification. CPD numbers provided.
Solar Heat Gain Coefficient (SHGC)	Sliding: 0.23 Fixed: 0.25	Sliding: 0.20 Fixed: 0.20	NFRC certification. CPD numbers provided.
Visible Light Transmittance (V <sub>T</sub> )	Sliding: 0.54 Fixed: 0.57	Sliding: 0.44 Fixed: 0.44	NFRC certification. CPD numbers provided.

**Ratepayer Benefits:**<sup>3</sup> This Agreement will result in ratepayer benefits of lower energy bills, greater resilience under conditions where power fails by maintaining habitable indoor conditions longer, improved thermal comfort and health indoors by reducing condensation risk, heat/cold stress, and reducing air-infiltration, and potential downsizing of HVAC equipment when replaced or updated; thus reducing peak loads seen by the utility.

High thermal performance windows, such as thin triple, reduce combined heating and cooling energy consumption of typical single-family homes and multi-family buildings in California. HVAC energy savings estimates are 7%-10% compared to the current code standard double low-e argon filled windows. Utilities should see lower demand from existing buildings, which will make it easier to accommodate new local development without investment in expensive new infrastructure. Overall, this should result in greater electricity reliability and lower costs on both the end use side as well as the generation side, either on site or centrally.

**Technological Advancement and Breakthroughs:**<sup>4</sup> 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 demonstrating the ability of builders and remodelers to deliver high-performance window solutions at incremental costs competitive with other building envelope solutions (such as high-performance walls and attics), facilitating their use as a cost-competitive solution to reduce energy use in California homes. The thin-glass triple-pane configuration utilized for this demonstration project delivers the same thermal performance benefits to homeowners as traditional triple-pane windows without requiring the window manufacturer to redesign the framing system, thus reducing cost and risk to the manufacturers while delivering a lower overall cost to the homeowner.

<sup>3</sup> 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](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF)).

<sup>4</sup> 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.

# EXHIBIT A

## Scope of Work

### Lawrence Berkeley National Laboratory

These efforts will help the State of California meet many of its energy goals as outlined in the following statutes: AB 32 (2006), AB 327 (2013), AB 1637 (2016), AB 2868 (2016), SB X1-2 (2011), AB 2514 (2010), SB 350 (2015), AB 1477 (2018), and the California Energy Code.

#### **Agreement Objectives**

The objectives of this Agreement are to:

- Determine the current and future California market potential for high-performance windows.
- Outline the technology advancements required to reach R-10 window performance goal.
- Report measured energy savings of thin-triple glazing in multi-family and single-family homes when compared to the windows they replaced.
- Validate thermal performance (U-factor) and simulated annual energy performance of thin-glass triple-pane windows.
- Quantify occupant comfort and perception of thin-triple windows.
- Define structural serviceability limits of thin-glass insulating glazing unit (IGU) constructions, including short-term loading, long-term loading, and natural frequency of vibration.
- Define capital and energy cost savings when compared to other envelope measures
- Engage manufacturing partner(s) to deploy high performance thin triple pane windows

### **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.

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#### 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).



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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:**

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- 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:**

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- 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**

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**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:

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- 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***

# EXHIBIT A

## Scope of Work

### Lawrence Berkeley National Laboratory

#### 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

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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).

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**Products:**

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

**TECHNICAL ADVISORY COMMITTEE**

**Subtask 1.10 Technical Advisory Committee (TAC)**

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

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

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

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

**The Recipient shall:**

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.



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**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.

**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

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**IV. TECHNICAL TASKS**

**TASK 2: Field Demonstration: Single-Family (SF)**

The goals of this task are to (1) retrofit a minimum of 10 SF homes in Pacific Gas and Electric Co. territory, 10 SF homes in San Diego Gas and Electric Co. territory, and 10 SF homes in Southern California Edison territory with high performance thin-triple glazing windows, and (2) acquire energy performance data. The homes must be located in a low income or disadvantaged community.

**Subtask 2.1 Write a Site-Specific Measurement and Verification Plan**

The goal of this subtask is to develop a detailed Measurement and Verification Plan for each site.

**The Recipient shall:**

- Develop a detailed *Site-Specific Measurement and Verification (M&V) which will:*
  - Describe of the monitoring equipment and instrumentation to be used at each site.
  - Describe key input parameters and output metrics to be measured.
  - Identify required data acquisition criteria, such as sampling frequency for various parameters.
  - Identify additional information necessary to complete the measurement and verification task.
  - Identify standard operating conditions used as a baseline for the M&V plan.

**Products:**

- Site-Specific Measurement and Verification Plan (draft and final)

**Subtask 2.2 Site Management**

The goal of this subtask is to manage site specific operational tasks.

**The Recipient shall:**

- Prepare and provide a *Site Readiness Verification Document* to include but not limited to the following for each site:
  - Copy of memorandum of understanding with each site. The memorandum of understanding is to inform tenants/owners about the data collection process and expectations for participant participation.
  - Results of site communications and planning which includes selecting units, inspecting existing building conditions, pilot site screening, and metering and communication plan.
  -
- - Results of site survey of pre-retrofit window construction.
  - Baseline building energy performance through at least one year of electricity and gas utility bills (as applicable) for each dwelling unit or baseline monitoring.
- Conduct post-retrofit occupant survey to understand occupants' experience and perception of the technology and include results in the CPR Report required in Subtask 2.3

**Products:**

- Site Readiness Verification Document

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#### **Subtask 2.3 Monitor Performance**

The goal of this subtask is to acquire thermal and energy performance data from the M&V plan.

#### **The Recipient shall:**

- Install and document monitoring equipment.
- Conduct post-retrofit monitoring for triple-pane windows over a period of 12-months, or other period as approved by the CAM.
- Remove monitoring equipment at the end of the monitoring period (except any in-line devices that may be left on site in coordination with the site hosts).
- Prepare a *System Procurement and Installation Technical Memorandum* that documents for each demonstration site the equipment that was procured, along with the make, model, and vendor name, and the completion of system installation.
- Prepare a *Field Monitoring Performance Report* that documents post retrofit monitoring results.
- Prepare *CPR Report #1* and participate in CPR meeting in accordance with subtask 1.3.

#### **Products:**

- System Procurement and Installation Technical Memorandum (draft and final)
- Field Monitoring Performance Report (draft and final)
- CPR Report #1

#### **TASK 3: Field Demonstration: Multi-Family**

The goals of this task are to (1) retrofit two multi-family buildings with at least eight total units in each complex throughout California using thin-triple glazing windows, and (2) acquire thermal and energy performance data. The buildings must be located in a low income or disadvantaged community.

Two specific sites will be selected based on community engagement, DAC CalEnviroScreen score, and low-income criteria (subtask 3.1).

#### **Subtask 3.1 Engage with Local Community**

The goal of this subtask is to engage with the residents and community at the multi-family site.

#### **The Recipient shall:**

- Organize an initial community workshop:
  - To obtain input from the public that lives in the multi-family building or nearby on issues of concern to the disadvantaged communities
  - Introduce the community to this project
  - Prepare a *Community Engagement Report* to describe results from community workshop, attendees, findings and discuss other topics such as how tenants can enroll in existing energy-efficiency programs and incentives.

#### **Products:**

- Community Engagement Report (draft and final)

#### **Subtask 3.2 Write a Site-Specific Measurement and Verification Plan**

The goal of this subtask is to develop a detailed Measurement and Verification Plan for each site.

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#### The Recipient shall:

- Develop a detailed *Site-Specific Measurement and Verification (M&V) Plan*, to include:
  - A description of the monitoring equipment and instrumentation to be used at each site.
  - A description of the key input parameters and output metrics to be measured.
  - Identification of required data acquisition criteria, such as sampling frequency for various parameters to meet IPMVP and CEC requirements
  - Identification of additional information necessary to complete the measurement and verification task.
  - Identification of standard operating conditions used as a baseline for the M&V plan.

#### Products:

- Site-Specific Measurement and Verification Plan (draft and final)

#### Subtask 3.3 Site Management

The goal of this subtask is to manage site specific operational tasks

#### The Recipient shall:

- Prepare and provide a *Site Readiness Verification Document* to include but not limited to the following
  - Copy of memorandum of understanding with each site. The memorandum of understanding is to inform tenants/owners about the data collection process and expectations for participant participation.
  - Results of site communications and planning which includes selecting units, inspecting existing building conditions, pilot site screening, and metering and communication plan.
  - Results of site survey of pre-retrofit window construction.
  - Baseline building energy performance to include at least one year of electricity and gas utility bills (as applicable) for each dwelling unit or alternative baseline monitoring using on-site installed data loggers installed pre-retrofit, as approved by the CAM.
- Conduct post-retrofit occupant survey to understand occupants' experience and perception of the technology and include results in the progress report required in Subtask 3.4.

#### Products:

- Site Readiness Verification Document

#### Subtask 3.4 Monitor Performance

The goal of this subtask is to acquire thermal and energy performance data from the M&V plan.

#### The Recipient shall:

- Install and document monitoring equipment.
- Conduct post-retrofit monitoring for triple-pane windows over a period of 12-months or alternative period as approved by the CAM.
- Remove monitoring equipment at the end of the monitoring period (except any in-line devices that may be left on site in coordination with the site hosts)

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- Prepare a *System Procurement and Installation Technical Memorandum* that documents for each demonstration site the equipment that was procured, along with the make, model, and vendor name, and the completion of system installation.
- Prepare a *Field Monitoring Performance Report* that documents post retrofit monitoring results.
- Prepare *CPR Report #2* and participate in CPR meeting in accordance with subtask 1.3

**Products:**

- System Procurement and Installation Technical Memorandum (draft and final)
- Field Monitoring Performance Report (draft and final)
- CPR Report #2

**TASK 4: Structural Limits of Thin-Glass IGU Configurations**

The goal of this task is to define structural serviceability limits of thin-glass insulating glass unit (IGU) constructions.

**The Recipient shall:**

- Design potential IGU combination parametric analysis which includes glass thickness, width, height, aspect ratio, glass heat treatment, and gap between glass
- Define the bounds of safety, customer esthetics, and visual comfort based on short-term loading, long-term loading, and natural frequency analysis.
- Produce *Guideline on Structural Limits of Thin-Glass IGUs Report* to include the analysis and results from this task.
- Work with manufacturing partners to resolve issues that are limiting them from making large windows (or patio doors) using thin-glass technology. Increasing the TRL for these product types from 6 to 7.

**Products:**

- Guideline on Structural Limits of Thin-Glass IGUs Report (draft and final)

**TASK 5: Market Characterization and Commercialization Pathways Analysis**

The goals of this task are to: (1) assess California's new construction and retrofit markets to determine the current and future market potential for high performance windows (including thin-glass triple-pane), (2) recommend programmatic pathways to advance the adoption of triple-pane windows in California, and (3) outline the technology advancements required to reach the R-10 performance goal requested in GFO-19-307 and minimize fenestration SHGC where desired.

**Subtask 5.1 Market Characterization**

The goal of this subtask is to assess California's new construction and retrofit markets to determine the current and future market potential for high performance windows (including thin-glass triple-pane).

**The Recipient shall:**

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- Update the strategy outlined in 2018 ACEEE Summer Study paper by Berkeley Lab to reflect the advancements in thin-triple IGU technology and changes in market conditions.
- Identify market barriers, opportunities and long-term market cost of these technologies through engagement with leading window manufacturers, home builders, retrofitters, and with market pull partners such as building codes, utility rebate/incentive programs; builders targeting net zero and Passive House designs, and ENERGY STAR.
- Conduct stakeholder surveys as necessary.
- Conduct a market size estimate for residential building sector window retrofit opportunity
- Define existing condition baselines for residential fenestration
- Estimate current and forecasted market penetration
- Characterize ability to deploy triple-pane windows in the retrofit market
- Develop a *Market Characterization and Residential Applications in California* report summarizing the findings of the above sub-tasks.

**Products:**

- Market Characterization and Residential Applications in California Report (draft and final)

**Subtask 5.2 Commercialization Pathways**

The goal of this subtask is to recommend programmatic pathways to advance the adoption of triple-pane windows in California.

**The Recipient shall:**

- Support the development of future codes and programmatic approaches to promote high-performance windows and thin-triple glazing in California.
- Recommend programmatic pathways to advance the adoption of triple-pane windows through education and voluntary programs, including incentives/rebates and the relationship between incentive levels and likelihood of adoption.
- Recommend codes and standards pathways to inform compliance, enhancement, and development of building energy codes to support retrofits from single- and double-pane, and new construction applications of triple-pane windows.
- Recommend workforce education and training to enable further market adoption and industry support for triple-pane windows.
- Engage with national ENERGY STAR updates to ensure that the national program is responsive to California needs.
- Explore how codes and standards as well as voluntary programs can address window attachments such as blinds and shades for management of solar gain. These products are particularly useful to manage cooling and comfort but are not fully regulated since they are typically occupant operated. Explore feasibility, product availability and cost of integration of unitary automated shading solutions for new and retrofit applications when applied to existing window systems, or in combination with new windows.
- Develop a *Programmatic Pathways for High-Performance Windows in California Report* summarizing the findings of the above sub-tasks.

**Products:**

- Programmatic Pathways for High-Performance Windows in California Report (draft and final)

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#### Subtask 5.3 Technology Goals

The goals of this subtask are to outline the technology advancements required to reach the R-10 performance requested in the call for proposal and minimize fenestration solar heat gain coefficient (SHGC) where desired.

#### The Recipient shall:

- Outline current state-of-the-art and most promising future window technologies including current and projected performance:
  - Costs (material, manufacturing, and installation/implementation)
  - Thermal performance (U-factor, SHGC, Vt)
  - Potential annual energy impact in California single-family homes and multi-family buildings
  - Market conditions required for mass-market adoption
- Prepare a *State-of-the-Art Review of High-Performance Window Technologies* document that summarizes current and projected future high-performance window technologies and the findings from this subtask.

#### Products:

- State-of-the-Art Review of High-Performance Window Technologies (draft and final)

#### TASK 6: Measurement and Verification

The goals of this task are to analyze the data acquired through site measurements and provide assessments of energy savings, customer cost savings, etc.

#### The Recipient shall:

- Describe the analysis methods used to quantify all performance criteria of thin-glass triple-pane windows listed in the Agreement Objectives section of this Scope of Work, including:
  - Measurement of energy savings in multi-family and single-family homes.
  - Validation of instantaneous thermal performance (U-factor)
  - Validation of simulated annual energy performance
  - Quantification of occupant comfort and perception post-retrofit.
- Assess energy savings and benefits to the grid with CBECC-res energy modeling software
- Assess customer cost savings and payback period based on installed costs and projected long-term costs of the thin-glass triple-pane window technology.
- Prepare a *System Performance and Impact Report* to document the site performance of the thin glass retrofit glazing and the work completed in this subtask

#### Products:

- System Performance and Impact Report (draft and final)

#### TASK 7: Thermal Performance and Quality Evaluation

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The goal of this task is to identify potential operational performance issues with the thin-glass triple-pane window units selected for site demonstrations.

#### **The Recipient shall:**

- Develop a detailed measurement and verification (M&V) plan for infrared thermography and air leakage, to include:
  - Description of the measurement equipment and instrumentation to be used.
  - Description of the key input parameters and output metrics to be measured.
  - Identification of required data acquisition criteria, such as sampling frequency for various parameters.
  - Identification of standard operating conditions used as a baseline for the M&V plan.
  - Outline of the series of operations to create accelerated aging/use.
- Perform M&V plan on at least one window of each product type used in field demonstrations
- Prepare a *Quality Evaluation Report* that documents the equipment and measurement procedures used, the results, and recommendations.

#### **Products:**

- Quality Evaluation Report (draft and final)

#### **TASK 8 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.



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- 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 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 9 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES**

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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(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.

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

**RESOLVED**, that the CEC approves Agreement EPC-19-033 with Lawrence Berkeley National Laboratory for a \$1,850,000 grant to demonstrate the installation of thin-glass triple-pane windows in at least 16 multifamily and 30 single-family housing units located in low-income or disadvantaged communities. The project includes detailed investigations into energy savings, long-term performance, and quality of installed products; 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 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 CEC held on June 10, 2020.

AYE:

NAY:

ABSENT:

ABSTAIN:

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Cody Goldthrite  
Secretariat