

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-058 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Anthony Ng	51	916-445-5297

Recipient's Legal Name	Federal ID Number
The Regents of the University of California, on behalf of the Berkeley campus	94-6002123

Title of Project
The Oakland EcoBlock - A Zero Net Energy, Low Water Use Retrofit Neighborhood Demonstration Project

Term and Amount	Start Date	End Date	Amount
	6/27/2016	3/23/2018	\$ 1,500,000

Business Meeting Information
 ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	5/17/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Anthony Ng	Time Needed:	10 minutes

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

Agenda Item Subject and Description

UNIVERSITY OF CALIFORNIA, BERKELEY. Proposed resolution approving Agreement EPC-15-058 with the Regents of the University of California, on behalf of the Berkeley campus for a \$1,500,000 grant to develop and design a block-scale retrofit plan combining deep energy efficiency retrofit strategies, integrated distributed energy generation systems, and water conservation and capture systems in a low-to-middle income neighborhood in the City of Oakland. The development of this plan will also inform innovative ways to further plan, permit, and finance similar Advanced Energy Community developments.

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: CCR., tit 14, § 15262
 Categorical Exemption. List CCR section number: _____
 Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:

Cal. Code Regs., tit. 14, §15262 provides that projects involving only feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted, or funded are statutorily exempt from CEQA. This project consists of the feasibility study and planning of a proposed Advanced Energy Community - no future actions beyond the feasibility study and planning are currently being considered. Creation and funding of the Advanced Energy Community will be subject to future environmental review under CEQA and approval by the City. Therefore, the project falls within section 15262 and will not have a significant effect on the environment.

In approving the proposed project, the Energy Commission considered environmental factors, as required by California Code of Regulations, title 14, section 15262. The approval itself involves the expenditure of funds to develop and design a block-scale retrofit plan combining deep energy efficiency retrofit strategies, integrated distributed energy generation systems, and water conservation and capture systems in a low-to-middle income neighborhood in the City of Oakland. Funds will also be expended to evaluate how best to further plan, permit, and finance this and similar projects. Once the design is completed, it would be up to the City of Oakland to determine whether and how to implement the design, subject to CEQA and other applicable requirements. Implementation of the design would not be expected to result in any significant, adverse environmental impacts. Any physical changes would occur to existing structures and would be for the purposes of reducing energy and water use, resulting in an overall benefit to the environment.

14 CCR Section 15306 Information Collection Exemption: This categorical exemption applies to basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These may be strictly for information gathering



purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. This agreement will fund information collection, research, analysis and evaluation activities related to existing processes, planning, and funding opportunities for possible use by advanced energy development efforts, and which do not result in a serious or major disturbance of an environmental resource. Specifically, this project will be performing feasibility and planning studies, through the development of a retrofit plan and local government engagement activities that create a community-level design for possible future projects which the Energy Commission has not yet approved or funded. No physical changes to the environment will be made. Therefore, the project falls within section 15306 and will not have a significant effect on the environment.

14 CCR 15061(b)(3) Common Sense Exemption: A project is exempt from CEQA if the activity is covered by the general rule that CEQA applies only to projects that have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is not possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. This agreement will fund information collection, research, analysis and evaluation activities related to existing processes, planning, and funding opportunities for possible use by advanced energy development efforts without the possibility of having a significant effect on the environment because it consists of information gathering, analysis, and sharing. Specifically, this project will be performing feasibility and planning studies, through the development of a retrofit plan and local government engagement activities that create a community-level design for possible future projects which the Energy Commission has not yet approved or funded. No physical changes to the environment will be made. Therefore, the project falls within the common sense exemption and will not have a significant effect on the environment.

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

Check all that apply

Initial Study

Negative Declaration

Mitigated Negative Declaration

Environmental Impact Report

Statement of Overriding Considerations

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

Legal Company Name:	Budget
Lawrence Berkeley National Laboratory	\$ 450,000
Stanford University	\$ 199,330
Sherwood Design Engineers	\$ 50,000
Build-It-Green	\$ 50,000
Michael Baker International	\$ 100,477
Ramboll Environ US Corporation	\$ 24,830
Integral Group	\$ 150,000

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

Legal Company Name:
City of Oakland

Budget Information

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	14-15	301.001B	\$1,500,000
			\$
			\$
			\$
			\$
			\$
R&D Program Area: EDMFO: EDMF		TOTAL:	\$1,500,000
Explanation for "Other" selection			
Reimbursement Contract #:	Federal Agreement #:		

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION



Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Daniel Kammen			Name:	Daniel Kammen		
Address:	310 Barrows Hall Spc 3050			Address:	310 Barrows Hall Spc 3050		
City, State, Zip:	Berkeley, CA 94720-1103			City, State, Zip:	Berkeley, CA 94720-1103		
Phone:	510-642-1139 /	Fax:	- -	Phone:	510-642-1139 /	Fax:	- -
E-Mail:	kammen@berkeley.edu			E-Mail:	kammen@berkeley.edu		

Selection Process Used

<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-312
<input type="checkbox"/> First Come First Served Solicitation	

The following items should be attached to this GRF

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

_____	_____	_____	_____	_____	_____
Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Develop a Case Study Documenting Actions Taken
3		Deep Energy Efficiency Retrofit Plan
4		Integrated Electricity System Designs
5	X	Integrated Water System Designs
6		Community-Scale Zero Net Energy Retrofit Master Plan
7		Create Recommendation Options for Planning and Building Departments
8		Develop Innovative Financial and Business Cases
9		Develop an Outreach Strategy
10		Evaluation of Project Benefits
11		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
Cal Enviroscreen	A screening methodology that can be used to help identify California communities that are disproportionately burdened by multiple sources of pollution
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CO ₂	Carbon Dioxide
CPR	Critical Project Review
DER-CAM	Distributed Energy Resource Customer Adoption Model
Energy Commission	California Energy Commission
EV	Electric Vehicle
GHG	Greenhouse Gas
Green Bonds	Financial tool used to raise capital towards projects that have positive environmental benefits
kV	Kilovolt
PACE	Property Assessed Clean Energy
PV	Photovoltaic
TAC	Technical Advisory Committee
ZNE	Zero Net Energy

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.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the design development (technical design, planning, permitting feasibility, and financing models) of a whole-systems approach to retrofitting a low-to-middle-income neighborhood block in the City of Oakland from a high energy and water dependency to the lowest energy and water footprint possible, thus transforming a more resource-wasteful model into an integrated design that guarantees long-term sustainability while providing a replicable, scalable model consistent with the goals of AB32, SB 350, SB 375, SB 1275, Executive Order B-30-15, and Executive Order B-29-15.

B. Problem/ Solution Statement

Problem

For California to reach requisite reductions in CO₂ emissions mandated in Assembly Bill 32, deep energy efficiency retrofit strategies, renewable energy supply and storage and the decarbonization of transportation must be found for existing housing stock. In addition, California faces a future of serious water shortages and severe heat waves due to climate change. The Oakland EcoBlock represents typical housing development in first-ring neighborhoods around almost every city in California, equaling approximately 40-45% of its housing stock. The pressing issue is: can these neighborhoods be retrofitted to achieve ZNE, zero-carbon emissions, low water usage, promote the adoption of EV's and create climate positive mitigation/adaption to global warming; and, can the retrofits be rapidly deployed at the community scale?

Solution

The hypothesis of the EcoBlock concept is that retrofitting on the block-scale is more efficient and cost-effective than the individual house-scale, because it combines the flows, efficiencies, cost benefits across multiple residential units, systems and household budgets. Early cost analysis of the EcoBlock concept indicates that it will be net revenue positive, sufficient to cover the life-cycle costs of all systems, while significantly lowering ratepayer costs. Key co-benefits in environmental quality and health for community residents could create rapid demand.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- To test the hypothesis that retrofitting on the block-scale can be more efficient and cost-effective than the individual house-scale in achieving maximum energy efficiency, renewable energy supply and storage, electric vehicle (EV) charging, energy management and control, water conservation, and local wastewater treatment and reuse – because it combines the flows, efficiencies, cost benefits across multiple residential units, systems, and budgets.
- To advance preliminary research and development of the EcoBlock integrated system concept to move from promising schematic level to a detailed design and master plan for demonstration integrated with actual field testing.

- To blueprint a pilot system that demonstrates a highly-efficient, affordable neighborhood block-scale energy, EV charging, water, and wastewater treatment-and-reuse platform and retrofitting-process that stimulates consumer demand for its application anywhere in California.
- To use the block scale test case as a measure of appropriate scale and scalability. As the smallest step increase in scale from the single house, it will provide a proof of technical feasibility that might show that it can be aggregated at a larger neighborhood scale to be even more cost effective.

Ratepayer Benefits:²

This Agreement will result in broad benefits to ratepayers by reducing the cost of future Advanced Energy Communities (AEC) developments. This Agreement will result in a better understanding of AEC developments at the local jurisdiction level, resulting in streamlined permitting, and planning processes related to these developments. Additionally, the financial and business models developed under this Agreement will make AEC developments more financially attractive to both developers and consumers, increasing the likelihood of future AEC developments throughout California.

If the EcoBlock is ultimately constructed, additional benefits would apply to ratepayers in the form of decreased peak load, decreased carbon emissions, decreased water use, and increased clean energy production. The EcoBlock itself will reduce peak load on the block by 19 to 36 kilowatts depending on season. Water usage will fall by 70-80% for a savings of roughly 1.5 million gallons of water per year at the EcoBlock. Since electricity supply will come entirely from rooftop solar, carbon dioxide emissions will fall from 289,000 lbs CO₂ to zero lbs CO₂.

If the EcoBlock model can be scaled to other residential city blocks of similar age and construction type, then the benefit to California ratepayers will be very high. We estimate a potential carbon dioxide emissions reduction of 19.8 million (U.S) tons of carbon dioxide or 4% of California's greenhouse gas (GHG) emissions. Per block savings of gas would be 16,600 therms, so California's potential savings would amount to 2.3 billion therms, or 47% of California's overall residential gas use.

Technological Advancement and Breakthroughs:³ This Agreement will support the development and commercialization of technological advancements and breakthroughs that overcome barriers to the achievement of the State of California's statutory energy goals by creating a model for zero net energy (ZNE) retrofits for existing buildings at a city block scale. The Oakland EcoBlock is a project that has major implications for AB32, SB350, the California Public Utilities

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

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

Commission (CPUC) Energy Efficiency Strategic Plans, and the New Residential ZNE Action Plan.

For California to reach its target reductions in CO₂ emissions as mandated in AB32 and SB 350, the pathways for deep energy retrofits, community solar supply and storage, and decarbonized household transportation need to be found for existing housing stock. Many areas around California are now moving forward with ZNE homes for new construction. However, a large question remains around whether existing homes can be cost effectively retrofit to be ZNE. The EcoBlock project seeks to prove that an entire city block can be retrofit to be ZNE and net zero carbon emissions.

Agreement Objectives

The objectives of this Agreement are to:

- Document the integrated design process developed by the EcoBlock team.
- Design deep energy efficiency retrofit assessments and an implementation plan for the contiguous EcoBlock of residential buildings to achieve 70% energy savings.
- Model the production of carbon-free electricity from solar photovoltaic (PV) at a block-scale, and identify key designs and control strategies.
- Design a water and wastewater system for the EcoBlock to achieve up to 80% water savings, and assess the potential for decentralized water systems as components of sustainable urban infrastructure.
- Develop a block-scale ZNE master plan for residential building energy efficiency, integrated electrical supply, and integrated water systems for the EcoBlock.
- Develop recommendations for how planning and building departments can facilitate the rapid deployment of projects similar to the EcoBlock.
- Determine novel financing and policy tools necessary to accelerate the retrofit of millions of energy inefficient and water wasteful California homes to advanced ZNE community standards.
- Develop education and outreach materials to inform local governments, developers, and community groups of project costs and benefits; the approaches and methods used; and benefits to ratepayers, grid reliability, and safety.
- Estimate projected benefits, including green jobs, apprenticeship programs, projected market penetration, energy use and cost, operating conditions, and emission reductions.
- Transfer the knowledge gained, experimental results, and lessons learned to the public and key decision makers.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below

by the dates listed in the Project Schedule (Part V). Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “days” means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

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

For all products

- Submit all data and documents required as products in accordance with the following:

Instructions for Submitting Electronic Files and Developing Software:

○ **Electronic File Format**

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

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

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

- **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)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
 - 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.

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

IV. 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: DEVELOP A CASE STUDY DOCUMENTING ACTIONS TAKEN

Using a ‘case study’ methodology, the goal of this task is to do a thorough documentation of the processes by which the interdisciplinary team arrives at an optimum design of the integrated systems and components for the EcoBlock demonstration project, prepares the design development documents, specifications and cost estimates, and prepares a schematic monitoring plan. It will document all the key decision points in the critical path and the key constraints that informed them.

The Recipient shall:

- Review the literature of community-scale research projects to learn from and build on lessons learned and best practices.
- Document the legal, zoning, planning and entitlement constraints and processes required by the City, State, and utility, including CPUC regulations and mandates. (This task will build on the preliminary pro bono analysis of potential legal frameworks conducted by our legal team).
- Document the community engagement process; work with the neighborhood association to standardize a survey protocol and design metrics (value-to-criteria) that the community members can weight to best assess the community’s concerns and wishes and integrate best compromise solutions.
- Document the decision process (key pros and cons) by which the Team chooses a legal framework for the construction, maintenance and operation of the EcoBlock, taking into

account the specifics of the Oakland pilot, but also the potential for deployment at scale in California and the nation.

- Document the process by which the Team chooses: 1) the deep energy retrofit strategies and their installation; 2) the detailed designs and topology of the electrical system including: the PV collection system, AC/DC backbone configuration and distribution, type/size/design of storage, EV charging configuration, and system metering, controls and management; 3) the detailed water conservation strategies, rainwater capture and reuse designs and the waste water treatment and reuse designs.
- Document the process by which innovative business models are identified and analyzed, including their impact on system designs and decisions. The models will include, at a minimum, a utility-led model, a 3rd party developer model, a city-led model and a homeowner association model. The documentation will pay special attention to the role of legal constraints and how the cost and benefits are distributed amongst ratepayers, the utility, the city and the environment.
- Document the process by which the design development documents and specifications are developed.
- Document the process by which the cost/benefit analysis is conducted including all the critical assumptions and variables.
- Document the preparation of an instrumentation and monitoring plan.
- Submit draft *Oakland EcoBlock Case Study Report* for CAM review.
- Incorporate feedback from CAM on draft *Oakland EcoBlock Case Study Report*.
- Assemble the accumulated project documentation and prepare and submit final *Oakland EcoBlock Case Study Report* for approval by the CAM.

Products:

- Oakland EcoBlock Case Study Report (draft and final)

TASK 3: DEEP ENERGY EFFICIENCY RETROFIT PLAN

The goal of this task is to design a deep energy retrofit assessments and implementation plan (70% energy savings) for the contiguous “Eco-Block” of residential buildings, as identified by the City of Oakland (up to 28 buildings), working in collaboration with the Task 4 (Integrated Electricity System) and Task 5 (Integrated Water System) teams towards developing a Master Community Design Plan. Working with our subcontractor partner, an energy retrofit savings plan will be designed for space conditioning (heating and cooling), lighting, appliances, miscellaneous electrical plug loads and water heating energy end uses. The identified energy efficiency retrofits will be designed such that the indoor environmental conditions (indoor air, lighting, urban noise and thermal comfort quality) of each building are maintained or improved per any applicable California Building Code in coordination with Task 7 findings. Additionally, an overall coordination with the Task 6 Master Community Design Template development will be approached with the intent to support a specific master plan implementation for a Phase II Oakland EcoBlock project as well as a long term template, serving outreach for broader use and adoption at scale.

The Recipient shall:

- Work with the City of Oakland, PG&E, and property owners/tenants to obtain detailed building description data and energy and billing histories for each building.
- Conduct a preliminary Phase I (no site visit walk throughs) energy analysis of each building, calculating baseline whole building and energy end use profiles.

- Categorize each building into groups (i.e., Air-sealed, duct sealing needed, fuel switching opportunity, etc.) based on already existing detailed assessments and retrofits work, being sure to address at a minimum the following component categories:
 - Envelope and heating, ventilation, and air conditioning (HVAC) (including Indoor Environmental Quality and Ventilation)
 - Lighting and Daylighting
 - Large Appliances
 - Small Appliances and Miscellaneous Electrical Loads
 - Domestic Hot Water
- Design deep energy efficiency retrofit strategies for each building with a reach goal of 70% building energy savings from existing to improved conditions.
 - In cases where existing energy efficient assets are present, the savings goal calculation will be adjusted accordingly.
- Design the energy efficiency retrofits such that they maintain or improve the building indoor environmental conditions (indoor air, lighting, urban noise and thermal comfort quality) and meet all applicable California Building Code requirements. Energy efficiency retrofits will be modeled against current Title 24 2013 for single family and multifamily residential including envelope, HVAC and electrical sections. Identify opportunities for retrofits to meet green building certifications for home and community.
-
- Identify building home description gaps in the preliminary data and develop a Phase II plan to conduct targeted on-site visits and/or property owners/tenants interviews to obtain the needed information in order to complete a detailed benchmarking assessment of the EcoBlock buildings.
- Work with subcontractors to identify gaps in green building evaluation and certification work scopes for Phase I planning and Phase II implementation plans and assist in their development of the needed planning content.
- Conduct a Phase I Level detailed benchmarking and retrofit opportunity assessment analysis, providing:
 - Baseline energy use estimates for all end uses
 - Quantified potential energy savings for each end use
 - Baseline and improved Energy Costs
 - Retrofit costs
 - Payback
 - Lifecycle Cost
 - Draft materials inventory
 - Envelope improvements including insulation and windows
- Coordinate with Tasks 6 thru 11 to ensure Task 3 results support long term outreach goals for Master Community-Scale Retrofit Plan Template.
- Work with subcontractors to ensure that Task results are provided in the correct format for their development of deep energy efficiency retrofit bid specifications for Phase I and Phase II master planning document packages.
- Populate the *Draft Master Community-Scale ZNE Retrofit Plan Template* (Task 6 Product) with the Phase I deep energy efficiency retrofit analysis results, including but not limited to details on:
 - Phase I energy analysis results
 - Phase I retrofit measures work scope & bid specifications results

- Plan and work scope for Phase II onsite audits and detailed analysis to refine and finalize the Phase I preliminary results
- Submit draft *Deep Energy Efficiency Retrofit Analysis Report* and *Draft Master Community-Scale ZNE Retrofit Plan Template* to CAM.
- Incorporate CAM feedback as necessary on draft *Deep Energy Efficiency Retrofit Analysis Report*.
- Submit final *Deep Energy Efficiency Retrofit Analysis Report*.

Products:

- Deep Energy Efficiency Retrofit Analysis Report (draft and final)
- Draft Master Community-Scale ZNE Retrofit Plan Template

Task 4: INTEGRATED ELECTRICITY SYSTEM DESIGNS

The goal of this task is to design the electrical system for the EcoBlock of residential buildings, by developing block-scale design and coordination schemes that improve leveled energy costs beyond what a fully-decentralized or fully-centralized model can provide. In a collaborative effort in this task the project team will identify and evaluate candidate designs and control strategies for optimized solutions. The resulting integrated microgrid designs and strategies will be coordinated with Task 6 Master Community Design Template development and approached with the intent to support a specific master plan implementation for a Phase II Oakland EcoBlock project as well as provide a long term template, serving outreach for broader use and adoption at scale.

The Recipient shall:

- Define the baseline energy use and generation context for the block, including:
 - Generating post-retrofit end use profiles for the buildings (estimated in Task 3)
 - Preparing *Schematic Design Drawings and Specifications* to capture the design intent and provide a basis for cost estimating PV installation (rooftop, parking canopy and other arrays), as well as EV chargers, and electricity storage.
- Develop the controls design strategies for storage, PV, EVs, and loads to minimize impact on distribution system operations and planning, including:
 - Developing distribution network models representative of distribution company infrastructure in regions where the EcoBlock concept could operate (e.g. suburban vs urban, 25 kV network vs 12 kV network, capacity-constrained vs. not).
 - Simulating the impact of EcoBlock on distribution network infrastructure using topologies and base-case control strategies identified in Distributed Energy Resources Customer Adoption Model (DER-CAM).
 - Identifying design and control tools that optimize benefits, e.g. DER-CAM tool.
 - Developing EV, battery and PV inverter control strategies that minimize impact on distribution network.
 - Evaluating potential electrical system components, connections, features, and capabilities.
- Develop a Cost/Benefit Analysis for several electrical system configurations, including:
 - Developing a DER-CAM model for each configuration, to: (a) determine optimal capacities of central/individual PV, storage, and power electronic converters, and (b) determine the associated optimal operation scheduling to determine the total investment/upgrade and operation cost for each configuration.

- Conducting detailed simulations (e.g. Monte-Carlo simulations considering PV and load fluctuations) for the most promising configurations, in order to further verify the estimated cost/benefit figures.
- Defining comparison methods and criteria for design options to select preferred approach.
- Prepare draft *Integrated Electrical System Design and Evaluation Report* including:
 - Update Basis of Design and Schematic Design Drawings and Specifications to capture options to be priced.
 - Several overall system design and wiring topologies for more detailed modeling and analysis.
 - Results of modeling and analysis of selected system design, and evaluate according to the criteria developed above.
 - Comparison between the recommended system design and typical approaches for either a completely decentralized approach (each residence a separate electrical infrastructure) or centralized (reliability and storage provided within the utility grid infrastructure).
- Submit draft *Integrated Electrical System Design and Evaluation Report* to CAM for review.
- Incorporate CAM feedback as necessary on draft *Integrated Electrical System Design and Evaluation Report*.
- Circulate the draft *Integrated Electrical System Design and Evaluation Report* for review and feedback with stakeholders and other researchers.
- Prepare and submit the final *Integrated Electrical System Design and Evaluation Report* which summarizes the results of this analysis and recommends design options to use in phase II and gives guidance to the detailed engineering design conducted in phase II.

Products:

- Schematic Design Drawings and Specifications
- Integrated Electrical System Design and Evaluation report (draft and final)

Task 5: INTEGRATED WATER SYSTEM DESIGNS

The goal of this task is to collect and evaluate information to best design, build and assess performance of the EcoBlock water system. A design will be generated that maximizes the ability to assess the potential for, and impacts of, decentralized water systems as components of sustainable urban infrastructure.

The Recipient shall:

- Work with property owners/tenants and East Bay Municipal Utility District to collect and evaluate data on past and current water use including:
 - Water use broken down by categories
 - Information on homes' water using appliances and systems
 - Individual and neighborhood behavior and preferences
 - Building and landscape characteristics
 - Climate/weather
- Evaluate the potential of water conserving systems and components, and select the most promising for inclusion in EcoBlock retrofits, including:

- Pre-commercial and commercially available appliances—e.g., dishwashers and shower systems
- Drought tolerant landscaping
- Drip, climate controlled irrigation
- Evaluate the value, costs, and overall system impacts of waste reclamation and reuse systems—from in-home to neighborhood scale. The primary emphasis will be on water, but the nutrient value of wastes and their potential for capture and utilization will also be considered.
- Assess reuse benefits, indoor (e.g. toilet flushing) and outdoor (irrigation), for both water supply and neighborhood enhancement (urban agriculture, enhanced tree cover).
- Analyze home and neighborhood infrastructure requirements and infrastructure impacts—at home, block, and municipal scales; current and retrofit. Examples of systems to be considered include:
 - Subsurface greywater dispersal systems
 - Home treatment & reuse systems
 - Neighborhood scale treatment and reuse systems
- Evaluate the potential of rain and storm water systems that collect, store, distribute, and use precipitation, including:
 - Rainwater harvesting supply potential
 - Stormwater control benefits of rainwater harvesting
 - Neighborhood level stormwater management strategies
 - Rainwater storage, treatment, conveyance requirements as a function of use
- Integrate and summarize the above work in a *Water System Evaluation Report*. Evaluation will include but not be limited to consideration of:
 - Value, costs, benefits, environmental impacts
 - Appropriate scale integration of water systems taking into account potential impacts on local government, existing utilities and current infrastructure regulations
 - Public health issues and implications
 - First and higher order effects of water system interventions. For example:
 - Use of water conserving fixtures and appliances may reduce irrigation supplies.
 - Water saving shower systems may reduce water heating requirements
 - Providing water to promote tree cover may curb air conditioning costs and promote neighborhood vibrancy.
- Prepare *Water System Design Report* that will include:
 - Designs of water system retrofits that bring value to the EcoBlock.
 - Permit testing and evaluation of identified products and systems.
- Prepare *EcoBlock Water System Assessment Program—Monitoring and Modeling Report* discussing data needs and develop protocols and models for monitoring and evaluating the performance of post construction/retrofit EcoBlock water systems.
- Submit draft *Water System Evaluation Report*, *Water System Design Report*, and *EcoBlock Water System Assessment Program—Monitoring and Modeling Report* to CAM for review.
- Incorporate CAM feedback on draft *Water System Evaluation Report*, *Water System Design Report*, and *EcoBlock Water System Assessment Program—Monitoring and Modeling Report*.
- Submit final *Water System Evaluation Report*, *Water System Design Report*, and *EcoBlock Water System Assessment Program—Monitoring and Modeling Report*.

- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Water System Evaluation Report (draft and final)
- Water System Design Report (draft and final)
- EcoBlock Water System Assessment Program—Monitoring and Modeling Report (draft and final)
- CPR Report

TASK 6: COMMUNITY-SCALE ZERO NET ENERGY RETROFIT MASTER PLAN

The goal of this task is to design and develop a master plan covering residential building energy efficiency, integrated electrical supply systems and integrated water systems for the EcoBlock. Work products developed in Tasks 2, 3, 4 and 5 will provide the technical background for the master plan. The work in this task focuses on integration of the master plan elements, working in parallel with Tasks 3, 4, 5 and 8, as well as partnering with the City of Oakland to identify permitting and project approval requirements. Particular focus will be to identify permitting barriers and to work closely with the City of Oakland and other agencies as necessary to streamline permitting requirements. In addition, sequencing plan and rough order-of-magnitude cost estimates will be developed.

The Recipient shall:

- Participate in developing design scenarios and system typologies for Tasks 3, 4, and 5
- Integrate the knowledge of innovative business models gained in Task 8 into the assessment and selection of different design scenarios in Tasks 3, 4, and 5
- Develop a *Master Community-Scale ZNE Retrofit Plan Template* that consolidates the design results and workscope plans from:
 - Task 3 - Deep energy efficiency building retrofit designs
 - Task 4 - Integrated electricity system designs
 - Task 5 - Integrated water systems designs
- Submit draft *Master Community-Scale ZNE Retrofit Plan Template* to CAM.
- Incorporate CAM feedback on the draft *Master Community-Scale ZNE Retrofit Plan Template* as necessary.
- Design a community-scale energy assessment strategy which first maximizes aggregate building energy efficiency potential, thereby reducing the build-out cost and energy demand for renewable electricity generation to obtain community ZNE performance.
- Develop a project sequencing, or roadmap.
- Develop a rough order of magnitude cost estimate of elements included in Master Plan.
- Synthesize the *Master Community-Scale ZNE Retrofit Plan Template* with results from the three Subtasks to establish a *Phase I Oakland EcoBlock Community-Scale ZNE Retrofit Plan Document* to hand off to Task 7 and 8 activities.
- Submit draft *Phase I Oakland EcoBlock Community-Scale ZNE Retrofit Plan* to CAM.
- Incorporate CAM feedback on the draft *Phase I Oakland EcoBlock Community-Scale ZNE Retrofit Plan* as necessary.
- Submit final versions of the *Master Community-Scale ZNE Retrofit Plan Template* and *Phase I Oakland EcoBlock Community-Scale ZNE Retrofit Plan* to the CAM.

Products:

- Master Community-Scale ZNE Retrofit Plan Template (draft and final)
- Phase I Oakland EcoBlock Community-Scale ZNE Retrofit Plan (draft and final)

TASK 7: CREATE RECOMMENDATION OPTIONS FOR PLANNING AND BUILDING DEPARTMENTS

The goal of this task is to develop alternative recommendations so planning and building departments can facilitate the rapid deployment of community scale, deep energy efficiency, renewable supply and storage, EV charging, water conservation, rainwater capture/reuse and distributed wastewater treatment and reuse in an integrated systems approach. The work in this task will include a comprehensive review of the applicable development standards that the City of Oakland applies to the project, and development of recommendations for how those standards could be amended to allow for the creative approaches necessary to reach the project objectives. These work products will include recommendations for all applicable local standards, but will be directed at Planning and Building Departments, which are the likely leaders in implementing the changes at the municipal level.

The Recipient, based on the case study documentation of the process outlined in TASK 2 above, shall:

- Prepare recommendations for how planning departments may have to revise General Plans and Specific Plans to facilitate the approvals and entitlement process for the various land use, transportation, and infrastructure elements of the EcoBlock model.
- Prepare detailed recommendations for how planning departments may have to modify zoning codes, subdivision ordinances, and procedures to facilitate the approvals and entitlement process for the wide scale deployment of the EcoBlock model.
- Prepare recommendations for how planning departments can integrate revised planning and building procedures into the planning, budget, review, and approval processes of other municipal departments, to ensure uniform municipal development standards that allow for the design and construction of the EcoBlock model.
- Prepare recommendations for how building departments may have to modify their building codes and inspection processes to facilitate the integrated systems approach of the EcoBlock model and its wide scale application.
- Provide recommendations on potential incentives that local governments may consider to further support projects pursuing the EcoBlock model, including financial, administrative, procedural, or other mechanisms which the local government may apply to make such projects more feasible or cost effective.
- Provide explanation and detail in the Planning Department Report to document the extent to which the proposed changes can accomplish a variety of environmental and social goals, including GHG reduction, enhanced social equity, improved indoor and outdoor air quality, and reduced resource demands.
- Provide recommendations on ownership, management, and operational components of non-traditional infrastructure systems contained in the model, including recommendations for how municipal governments and utility providers, both public and private, can more effectively enable block-level or neighborhood-level water and sewer systems to be developed and implemented.
- Prepare recommendations for non-municipal operators of infrastructure, including public and private utilities, to revise standards, conditions, and approval processes to facilitate Eco Block model solutions to infrastructure issues.

- Prepare recommendations for any changes in state law necessary to enable the alternative business model/legal frameworks explored in Tasks 4 and 5.
- Adjust recommendations based on which of the innovative business models and legal frameworks prove to be most favorable.
- Prepare and submit draft *Planning Department Report*, *Building Department Report*, and *Legal Statutory Report* to CAM for approval.
- Incorporate CAM feedback on draft *Planning Department Report*, *Building Department Report*, and *Legal Statutory Report* as necessary.
- Submit final *Planning Department Report*, *Building Department Report*, and *Legal Statutory Report*.

Products:

- Planning Department Report (draft and final)
- Building Department Report (draft and final)
- Legal Statutory Report (draft and final)

TASK 8: DEVELOP INNOVATIVE FINANCIAL AND BUSINESS CASES

The goal of this task is to determine the novel financing and policy tools necessary to address the challenge of accelerating the retrofit of millions of energy inefficient and water wasteful homes to ZNE, zero-carbon, high water-conservation standards over the coming decades. In this task the Recipient will propose business models and policy reforms that incentivize homeowners to upgrade their homes and decarbonize their neighborhood blocks, simultaneously. To this end, the Recipient will review solar energy consumer business models and probe why their structure prevents dramatic scaling of residential renewable energy systems, despite mandated 2030 renewable goals. The Recipient will explore Green Bonds as a source of mobilizing institutional investment in sustainable energy and water, and show how these structured finance programs can stimulate the broad and rapid deployment of the EcoBlock model to city-size spatial scales.

For greater clarity, the Task is arranged in four categories:

- Business Model
- Legal & Policy Support
- Revenue and Profitability Simulation
- Investment, Public Finance and Green Bonds

The Recipient shall:

❖ Business Model

- Create a quantitative framework for analyzing innovative financing structures that will enable a low-carbon transition to ZNE homes and neighborhoods; assess the different business models according to legal constraints, policy reform, and how, in each case, costs and benefits are distributed among ratepayers, the Utility, City, State, lending institutions, independent investors, and the environment.
- Review the current business models that underpin the California renewable energy market and identify their limitations, specifically how CPUC regulatory structures, PG&E programs and state-backed financial incentives, such as a Property Assessed Clean

Energy (PACE), have not promoted widespread deep-energy and deep-water retrofits because they target the individual homeowner without addressing cities at scale.

- Tap project finance experts in a range of fields, including renewable energy, sustainable development, real estate development, and energy efficiency, to delineate existing and potential new options for sustaining the EcoBlock model.
- Explore a suite of potential business models for EcoBlock scaling, including:
 - Property tax-based, project finance such as a PACE program that would apply to entire city blocks. The Principle Investigator was part of the founding team of Renew Financial, a PACE financial house that targets projects that engaged in integrated efficiency and clean energy deployment of which the EcoBlock could define an entirely new scale of lending for clean infrastructure.
 - Demand Reduction Induced Price Effect – a measurement of the value of demand reductions in terms of the decrease in wholesale energy prices, resulting in lower total expenditures on electricity or natural gas across the grid.
 - Utility-based, metering the energy and water saved at the building or multiple-building level using real-time metering technologies.
 - 3rd-party retrofit developer, based on a non-recourse project finance.
 - Hybrid developer/city-based structured as a Public Private Partnership.
 - Neighborhood Association-based with direct loans to property owners grouped into a block-wide collective.

❖ Legal and Policy Support

- Examine local and state permitting and legal barriers to EcoBlock development; identify policy reforms needed to accelerate the implementation of innovative finance models for mass, block-scale adoption of carbon-free, ZNE-EV-water efficient homes.
- Review the promising existing legal structures that could support an EcoBlock prototype:
 - Purely local distribution for non-public use - An EcoBlock Trust, (a communal organization owning/managing the energy facilities would provide electricity only to non-public individuals (those participating in the EcoBlock)).
 - Community Solar - PG&E Sponsored Enhanced Community Renewables Project - The EcoBlock Trust would own and operate a solar project and, while the electricity would be funneled through PG&E, the properties on the block could secure access to the electricity and remain PG&E customers.
 - Microgrid Pilot Project - The EcoBlock would be developed as a full partnership with PG&E, subject to CPUC approval.
- Examine best consumer incentives for homeowner adoption of the EcoBlock model.
- Assess the need for state financial support to encourage public and private investments in the form of loan guarantees through the California Infrastructure Bank.

❖ Revenue and Simulation

- Simulate capital investment in a standardized EcoBlock retrofit program; model how the capital investments can be repaid over time by owners and tenants from saved energy, natural gas, water and transportation (gasoline) costs; model these aggregated cash flows to assess degrees of profitability according to different payback periods, interest rates and risk/reward profiles of various time horizons, state backing, etc.

- Evaluate the opportunity to securitize the cash-flows as an attractive, investment-grade asset-backed security.
- Anticipate the probability of future carbon prices and carbon credits; simulate these as an addition to positive cash flow to help secure financing.

❖ Investment, Public Finance and Green Bonds

- Identify the size that public and private finance will play in financing Low Carbon Climate Resilient investment needs to 2030.
- Measure California's debt financing requirements through 2030 for mandated renewable energy; investment in building energy efficiencies, EVs adoption; water conservation requirements in the light of Executive Order B-30-15; Senate Bill (SB) 350; SB 1275; and Executive Order B-29-15.
- Simulate the scale at which the bond market, and specifically Green Bond issuance, can fill the large-scale financing needs of utilities, municipalities, banks and other financial institutions (Insurance) to accelerate EcoBlock roll-out across California cities.
- Draft a *Selected Innovative Business and Financing Models Report* on the most promising models to accelerate the deployment of advanced energy, EcoBlock-type communities, ranking the models according to a weighted average of key parameters (capital costs, risk-return profiles, CO₂ avoided, water saved, Utility (electricity and water) infrastructure investments avoided, and scalability).
- Draft a *Green Bond Opportunity Report* assessing the size of Green Bond capital pools for EcoBlock scalability and providing recommendations to policy makers.
- Submit draft *Green Bond Opportunity Report, Selected Innovative Business and Financing Models Report* to CAM for approval.
- Incorporate CAM feedback on draft *Green Bond Opportunity Report, Selected Innovative Business and Financing Models Report*.
- Submit final *Green Bond Opportunity Report, Selected Innovative Business and Financing Models Report*.

Products:

- Green Bond Opportunity Report (draft and final)
- Selected Innovative Business and Financing Models Report (draft and final)

TASK 9: DEVELOP AN OUTREACH STRATEGY

The goal of this task is to develop an outreach plan, supported by appropriate education and outreach materials that could include articles, conference presentations, workshops and/or seminars, a speaker's bureau, community action toolkit and an online toolkit, depending on an outreach assessment with stakeholders. These materials will inform local governments, developers and community groups of project costs and benefits; the approaches and methods used to overcome planning, permitting and financing barriers; and the benefits to ratepayers, grid reliability and safety. Further goals in the process are to promote a culture of dialogue amongst stakeholders; make technical, legal, and cost/benefit information easily understood; and demonstrate explicit response to and consideration of stakeholders' concerns.

Oakland is one of the most diverse cities in the world, with both a highly vocal and engaged citizenry and a number of significantly disadvantaged communities. While the neighborhood under consideration is not considered a Disadvantaged Community according to the Cal EnviroScreen standards, it is a working class community whose residents are considered low-to-

moderate income for the sake of city programming and services. Developing an outreach plan for this community will set an important template for ambitious sustainability and resiliency outreach to diverse communities that will be highly useful and replicable to communities across the country.

The task will be coordinated with and build on material developed in the Task 2 - Case Study.

The Recipient shall:

- Develop an Outreach Assessment by conducting interviews with representative stakeholders (City, utility, third party developers, contractors, residents/ratepayers) to identify key interests, issues and concerns.
- Analyze information from stakeholder interviews to identify and develop key components, communication and engagement techniques that are most appropriate for the different constituencies.
- Utilize the coolclimate.berkeley.edu household and block-level resource accounting. This project has made analytic tools and property-level climate accounting available widely across the US and in Europe, at some times of high demand, reaching > 100,000 people (measured as website hits per day). This platform, used and funded by the California Air Resources Board has been part of the AB32 scoping plan and process.
- Develop the outreach strategy in consultation with stakeholders and the Project Team, clearly articulating the methods used to communicate and gather information including a timeline of participation, a transparent record of project information and participation summary results. This strategy will be further informed by the City of Oakland's experience with public outreach processes such as those used in developing and updating the City's Energy and Climate Action Plan, and in writing and adopting neighborhood specific plans.
- Develop a draft *Outreach Strategy Report* that covers the following components: 1) Representative stakeholder identification, 2) Key messages, 3) In-person engagement opportunities (meetings, seminar/workshops, conferences), 4) Online engagement opportunities (webinars, website), 5) Toolkit and information sharing opportunities, 6) Approach to summary of results, 7) Schedule of target dates for events, 8) Outreach material development responsibilities.
- Submit draft *Outreach Strategy Report* to CAM for review.
- Review draft Outreach Strategy Report with Project Team, City Staff, and Energy Commission Representatives in order to finalize alternate strategies and appropriate techniques.
- Incorporate feedback from CAM and stakeholders as necessary.
- Develop final Outreach Strategy Report that articulates how the performance results from the pilot demonstration project will be gathered, summarized and messaged in the various outreach strategies finalized in the plan.

Products:

- Outreach Strategy Report (draft and final)

TASK 10: 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 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 11: 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. This project is highly replicable due to the use of currently available technologies, and the representative nature of the housing stock and neighborhood configuration. The City of Oakland will share the ongoing progress and results of the EcoBlock project with its network of other local governments, regional policy entities, and professional networks within the Planning, Permitting, and Building fields. It is the City’s experience that innovations in planning and permitting are often more readily assimilated within local municipal departments when best practices are shared directly from other local governments.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Submit *Initial Fact Sheet* to CAM
- Incorporate CAM feedback as necessary.
- 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 end-resulting 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.
- Submit *Technology/ Knowledge Transfer Plan* to CAM.
- Incorporate feedback as necessary.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

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: UNIVERSITY OF CALIFORNIA, BERKELEY

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-15-058 from GFO-15-312 with the Regents of the University of California, on behalf of the Berkeley campus, for a \$1,500,000 grant to develop and design a block-scale retrofit plan combining deep energy efficiency retrofit strategies, integrated distributed energy generation systems, and water conservation and capture systems in a low-to-middle income neighborhood in the City of Oakland. The development of this plan will also inform innovative ways to further plan, permit, and finance similar Advanced Energy Community development; 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 May 17, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat