

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-097 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Adel Suleiman	51	916-327-3313

Recipient's Legal Name	Federal ID Number
Build It Green	20-0939449

Title of Project
Achieving Zero Net Energy in multi-family buildings

Term and Amount	Start Date	End Date	Amount
	7/1/2016	3/30/2021	\$ 1,955,811

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

Proposed Business Meeting Date	6/14/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Adel Suleiman	Time Needed:	5 minutes

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

Agenda Item Subject and Description

Proposed resolution approving Agreement EPC-15-097 with Build It Green for a \$1,955,811 grant to research and assess pre-commercial space-heating, space-cooling, domestic hot water, and other technologies to validate building energy performance and consumer and building industry acceptance in low income multifamily buildings to determine the potential for achieving zero net energy. These buildings are located in Oakland, Atascadero, Calistoga and Cloverdale.

California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
 Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):
 Explain why Agreement is not considered a "Project":
 Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because
2. If Agreement is considered a "Project" under CEQA:
 a) Agreement **IS** exempt. (Attach draft NOE)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15306
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:
 Cal. Code Regs, tit. 14, sec. 15306 provides that projects which consist of basic data collection, research and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the provisions of CEQA. Specifically, this project involves energy performance measurement of four existing apartment buildings using small equipment. Each piece of equipment is no larger than 1'x1'x1' and will be installed inside of the buildings. The equipment does not produce emissions or noise. Therefore, this project falls within section 15306 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 Environmental Impact Report
 Negative Declaration Statement of Overriding Considerations
 Mitigated Negative Declaration

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

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Legal Company Name:	Budget
Association for Energy Affordability	\$ 541,390
Redwood Energy	\$ 453,640
Stone Energy Associates	\$ 182,777
Lawrence Berkeley National Laboratory	\$ 50,000
Propulsion	\$ 31,000
Resources for Community Development	\$ Match only
Corporation for Better Housing	\$ Match only
	\$
	\$

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

Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	15-16	301.001C	\$1,955,811
			\$
			\$
			\$
			\$
			\$
R&D Program Area: EERO: Buildings		TOTAL:	\$1,955,811
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Bruce Mast			Name:	Amy Dryden		
Address:	300 Frank H Ogawa Plz Ste 620 Suite 620			Address:	300 Frank H Ogawa Plz Ste 620 Suite 620		
City, State, Zip:	Oakland, CA 94612-2056			City, State, Zip:	Oakland, CA 94612-2056		
Phone:	510-590-3365	Fax:	- -	Phone:	510-590-3360 /	Fax:	- -
E-Mail:	Bruce@BuildItGreen.org			E-Mail:	Bruce@BuildItGreen.org		

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-308
<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 _____
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EXHIBIT A Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Project Design
3	X	Quality Assurance / Quality Control
4	X	Post-Installation Data Collection
5	X	Data Analysis and Project Evaluation
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
TAC	Technical Advisory Committee
CPUC	California Public Utilities Commission
DHW	Domestic Hot Water
GHG	Greenhouse Gas
HVAC	Heating, Ventilation, & Air Conditioning
O&M	Operations and Maintenance
TDV	Time-dependent valuation
ZNE	Zero net energy

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

A. Purpose of Agreement

The purpose of this Agreement is to fund research by Build It Green (Recipient) to assess pre-commercial space-heating, space-cooling, domestic hot water (DHW), and other technologies at four demonstration project sites to validate building energy performance and consumer and building industry acceptance in multifamily buildings and to determine the potential for achieving zero net energy (ZNE).

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.

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B. Problem/ Solution Statement

Problem

The research is designed to address a suite of problems and barriers to meeting ZNE for large multifamily projects:

- **Lack of Information.** Poorly understood and potentially conflicting trade-offs between potential technology solutions in terms of capital costs, operating and maintenance costs, functional benefits, environmental and grid impacts, and physical limitations. Examples of trade-offs include central versus individual mechanical systems, combined DHW-space heating and cooling technologies versus separate systems, electric versus natural gas, building shell investments versus mechanical performance improvements, energy efficiency versus onsite renewable investments
- **Performance Risks.** Lack of agreement between design and actual performance for key emerging technologies, which can translate into either (1) unanticipated operating costs for early adopting projects, or (2) lack of compliance credit for projects seeking to demonstrate ZNE compliance at the design stage
- **Human interactions:** Lack of understanding of the impacts emerging building technologies might have on occupants, building maintenance personnel, and property managers, including health, comfort, and convenience

Solution

The research will study four ZNE projects in-depth and compare and contrast the different technology solutions they adopt. The analysis will contrast potential technology solutions in terms of capital costs, operating and maintenance costs, functional benefits, environmental and grid impacts, and physical limitations.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to demonstrate the technical and economic potential for optimized ZNE construction practices in new multifamily buildings.

Ratepayer Benefits:² This Agreement will result in the following ratepayer benefits:

- **Lower costs** for building multifamily developments to ZNE standards by better understanding the economic and performance trade-offs for central versus individual mechanical systems, combined DHW-space heating and cooling technologies versus separate systems, electric versus natural gas, building shell investments versus mechanical performance improvements, energy efficiency versus onsite renewable investments
- **Lower greenhouse gas emissions** by field-testing cost-effective energy efficiency strategies for achieving ZNE standards via 100% electric solutions

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).

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- **Greater electricity reliability** by quantifying the load shifting benefits of thermal storage systems and increasing the energy self-sufficiency of multifamily ZNE developments
- **Reduced planning uncertainty** by reconciling design and actual performance for Aermec systems and developing new methodologies for quantifying benefits from desuperheating and thermal storage for code compliance purposes

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals in the following manner:

- **Water heating:** Quantify the economic and performance trade-offs of central versus individual heat pump systems, both for equipment efficiency and distribution system efficiency
- **Storage:** Evaluate the potential for thermal storage solutions to reduce demands for grid power and mitigate the impacts of all-electric construction on the "duck curve"
- **Zero Net Energy:** Demonstrate that true ZNE performance with 100% offset can be achieved on multifamily buildings, accounting for limitations in the project footprint; evaluate the costs and benefits of all-electric ZNE construction, including reduced Greenhouse Gas (GHG) emissions, improved indoor air quality, and reduced construction costs for natural gas infrastructure.
- **Heating and cooling loads:** Investigate the economic trade-offs of investments in building shell performance versus mechanical system performance for multifamily buildings
- **Non-regulated loads:** Investigate the technologies and behavioral strategies required to optimize the efficiency and performance of non-regulated loads to achieve a true whole-building ZNE standard
- **Code compliance:** Develop new analysis algorithms for code compliance software to give proper credit to advanced technologies that support the state's ZNE goals
- **Human interactions:** Research the interactions between building energy performance, health, comfort, and convenience in a multifamily context

Agreement Objectives

The objectives of this Agreement are to:

- Validate building energy performance and consumer and industry acceptance of multifamily ZNE through four demonstration projects that all have a goal of all-electric ZNE construction with 100% offset from on-site generation.
- Communicate lessons learned to the multifamily design and construction community in a way that facilitates broader adoption of ZNE practices with reduced performance risk

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.

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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.

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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.

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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

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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.

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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.

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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.

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- 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.

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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

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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

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- 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.

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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

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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.*

Note regarding information under this Agreement:

Pursuant to Exhibit D, if any information under this Agreement is “Personal Information” as defined under the Information Practices Act (see California Civil Code section 1798.3(a) and Exhibit D section 3 of this Agreement for the definition of “Personal Information”) then Recipient and any subcontractor or partner who collects or otherwise has access to the Personal Information must comply with the Information Practices Act (California Civil Code sections 1798 et seq.) when performing activities under this Agreement.

Note regarding demonstration project site changes:

The demonstration project sites are currently planned for the following locations:

1. 1715 Washington Street, Calistoga, CA 94515
2. 100 Healdsburg Avenue, Cloverdale, CA 95425
3. 9355 Avenida Maria, Atascadero, CA 93422
4. 901 72nd Avenue, Oakland, CA 94621

Recipient shall consult with CAM to determine the procedure to approve demonstration project site changes.

TASK 2: PROJECT DESIGN

The goals of this task are to identify optimized systems for each of the four project sites to achieve ZNE, to minimize project operating costs and GHG emissions, and to maximize cost effectiveness in multi-family buildings and identify optimized systems for different prototypes and climate zones to achieve ZNE for all four sites in this project.

The Recipient shall:

- Work with the developer’s project design team to understand project goals and objectives.
- Collect detailed building design and operation information needed for energy modeling purposes, performance testing, and energy use monitoring and commissioning measures.
- Prepare and develop a *Site Summary Report* to include discussion of the following at a minimum, for each of the four sites:
 - Project design alternatives to determine system optimization, including cost benefit analysis for each design alternative.
 - Recommendations to the developer’s design team for consideration of specifying higher energy efficient equipment based on review of all construction documents and equipment specifications.
 - Assistance provided to property owners, developers or their representatives in the planning, design and construction phases to help them realize and understand the energy cost benefits of using more energy efficient systems.
 - Development of comparative whole-building computer simulation models using the latest energy code Title 24 approved software and other tools as

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- needed to demonstrate the energy performance of different configurations and the way the building would respond to changes in the energy systems.
- Evaluation of renewable energy contributions required for different simulation models to meet ZNE goals.
 - Adjustments to comparative simulation models for all 16 climate zones in California.
 - Commissioning plan for all four sites in coordination with project design team, general contractor, mechanical and electrical contractor, controls contractor and any other installing and subcontractors or suppliers of equipment.
 - Quality assurance/Quality Control plan for all four project sites.
 - Operations and Maintenance (O&M) plan for each project site, including ongoing data tracking, building performance benchmarking, and monitoring protocols.
 - Monitoring and verification plan for all energy using systems in all four sites.
 - Analysis of the design team computer simulation models for all four sites, and input on the accuracy of the data used in the models and the reasonableness of all assumptions used.

Products:

- Site Summary Report (draft and final)

TASK 3: QUALITY ASSURANCE / QUALITY CONTROL

The goal of this task is to provide technical support to all four project sites to optimize the performance of the installed measures and minimize the performance risks associated with the project.

The Recipient shall:

- Prepare and develop a *Quality Assurance Report* for each of the four project sites to include at a minimum, the following items:
 - End-use monitoring.
 - Predicted performance based on calculations and analyses.
 - Description of the facilities, operations, equipment, and instrumentation needed for monitoring.
 - Description of monitoring procedures and protocols.
 - Description of the data collection and analysis process.
 - Description of quality assurance procedures.
 - Description of field verification procedures documentation on field verification.
 - Commissioning report
- Interview building ownership and management to explore and foresee potential barriers and construction delays and provide solutions before they become a bigger challenge.
- Conduct and document site inspections to confirm construction documents and specifications with as-built conditions.
- Document the installation quality of implemented energy measures and renewables; and validate key inputs to energy savings estimates.
- Verify and document actual building energy and water systems design including building envelope; lighting; heating, ventilation and air conditioning (HVAC); DHW and plug loads to design documents and specifications.

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- Perform quality assurance field inspections and performance testing as identified in quality assurance plan.
- Conduct performance testing for all equipment and systems for each site to ensure proper communication between control systems.
- Execute and document commissioning plan for each project site to ensure all building systems perform interactively according to design intent and operational needs.
- Execute and document the draft-monitoring plan for all four project sites including installation of data recorders, sensors, interface software or equipment. Monitoring will be conducted over a minimum of twelve consecutive months. The period of monitoring can be reduced with CAM written approval.
- Review and document the building performance benchmarking in Wegowise or equivalent benchmarking system.
- Develop customized building *O&M Manuals* for each project site.
- Prepare and provide instructions for delivering tenant education on how to properly operate and maintain all building equipment and systems.
- Assist property management staff in delivering four initial tenant education and training courses, one per project site.
- Participate in the CPR Meeting #1 and prepare *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).

Products:

- Quality Assurance Report (draft and final)
- O&M Manuals
- CPR Report #1

TASK 4: POST-INSTALLATION DATA COLLECTION

The goals of this task are to:

- Document how energy is being used in all four multifamily project sites to inform reduction of regulated loads such as heating, cooling and water heating as well as unregulated loads such as lighting, cooking and appliance loads.
- Document effectiveness of hot water delivery and recirculation systems.
- Document operations and maintenance training and tenant engagement intended to sustain long-term savings.

The Recipient shall:

- Revise end-use monitoring plans, based on findings from Tasks 2 and 3. Test plans and testing procedures should be described in detail including factors such as instrumentation, data collection, data analysis, statistical analyses, and performance curves.
- Complete field verification procedures as defined in monitoring plans including but not limited to recording baseline equipment operating hours, indoor temperature and humidity, and end-use energy and water consumption, indoor air quality evaluation and hot water delivery.
- Prepare quarterly progress reports for the building owner, documenting adjusted building energy and water performance in that quarter and year to-date, and identifying any actions required to ensure that performance meets or exceeds annual energy consumption. Substandard performance will trigger an investigation by Recipient to determine its cause, with the aim of differentiating shortcomings in the savings forecast

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from undocumented changes to building and equipment characteristics or operating patterns. Include quarterly progress reports with the Energy Commission progress reports required in Subtask 1.5.

- Interview operations and maintenance staff on procedures and tenant behavior affecting energy use.
- Evaluate the use of building benchmarking systems to track building performance over time as a substitute for ongoing end-use monitoring efforts.
- Install home energy monitors in randomly selected tenant units.
- Administer biannual tenant surveys to understand impact on operations. The surveys will include but are not limited to satisfaction with:
 - hot water delivery
 - indoor air quality
 - ability to operate heating and cooling systems
 - home energy monitoring systems
- Prepare and develop a *Data Collection Report* for all four project sites. The report will include at a minimum all the work completed in this task and the following:
 - End-use monitoring plans and revisions
 - Field verification
 - Findings from operation/maintenance staff interviews and tenant survey
 - Summary of quarterly reports to building owners
 - Results of building benchmarking and home energy monitor installations
- Participate in the CPR Meeting #2 and prepare *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).

Products:

- Data Collection Report (draft and final)
- CPR Report #2

TASK 5: DATA ANALYSIS AND PROJECT EVALUATION

The goals of this task are to:

- Evaluate how energy is being used in multifamily buildings and how this informs ZNE goals.
- Evaluate Energy Code algorithms so they can predict ZNE multifamily housing performance and guide deployment of public funds for energy efficiency measures and solar arrays.
- Analyze data for economic and environmental impacts.

The Recipient shall:

- Review each project site's utility bills and other operating data.
- Review engineering models and calibrate them as necessary to actual utility bills.
- Interview building ownership and management to obtain their qualitative assessment of project results, including achievement of ZNE goals, operational goals, and tenant satisfaction goals.
- Evaluate additional training needs for operations and maintenance and/or tenants.
- Prepare a *Project Evaluation Report* detailing:
 - Annual pre and post energy consumption at each project site.
 - Findings from physical inspection of energy improvements.
 - Findings from review of engineering models and utility bill calibration.

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- Findings from training evaluation.
- Findings from tenant surveys.
- Evaluate end use consumption for lighting, heating and cooling, domestic hot water, miscellaneous plug loads, and cooking using for hourly and seasonal consumption and report results in *Data Analysis Report*.
- Compare rated performance, actual performance and modeled performance for specific technologies.
- Use hourly data comparing modeled consumption and actual consumption to evaluate impact of technologies that could be modeled in the computer simulation.
- Compare project performance and expectations provided in the proposal to actual project performance and accomplishments to achieve ZNE (after a minimum of twelve consecutive months of data collection, unless a shorter period is approved in writing by CAM) including but not limited to the following (discussion to be included in *Data Analysis Report*):
 - Time-dependent valuation (TDV)
 - California Utility Allowance Calculator and GreenPoint Rated Energy and Water Calculator
 - Site and source energy
 - Greenhouse gas emissions
 - Discussion of co- benefits
- Prepare and develop a *Data Analysis Report* that includes but is not limited to the following:
 - Evaluation of end use energy consumption
 - Comparison of rated, actual and modeled performance for specific technologies.
 - Comparison of expected project performance versus actual and effects on achieving ZNE.
 - Comparison of modeled versus actual consumption methodologies
 - Discussion of whether the goals and objectives from section II.C. were accomplished based on data collected.
- Prepare and develop a *Code Development Recommendations Report* that includes but is not limited to the following:
 - Recommendations for code compliance algorithms for specific end uses
 - Recommendations for further studies to inform code algorithms for new technologies
- Participate in the CPR Meeting #3 and prepare *CPR Report #3* in accordance with subtask 1.3 (CPR Meetings).

Products

- Project Evaluation Report (final)
- Data Analysis Report (final)
- Code Development Recommendations Report (final)
- CPR Report #3

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Task 6: EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other co-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.

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- A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or has resulted in other co-benefits.
 - An estimate of energy and co-benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

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

Task 7: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:

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

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Transfer Plan. These activities will be reported in the Progress Reports.

- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- When directed by the CAM, participate in annual EPIC symposium sponsored by the California Energy Commission.
- Provide at least six *high quality digital photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites.
- Provide signed photo waiver release by the California Energy Commission.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High quality digital photographs
- Photo Waiver and Release Form
- 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: BUILD IT GREEN

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-15-097 from GFO-15-308 with Build It Green for a \$1,955,811 grant to research and assess pre-commercial space-heating, space-cooling, domestic hot water, and other technologies to validate building energy performance and consumer and building industry acceptance in low income, multifamily buildings to determine the potential for achieving zero net energy. These buildings are located in Oakland, Atascadero, Calistoga and Cloverdale; 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 June 14, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat