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Docket Number:	17-EPIC-01
Project Title:	Development of the California Energy Commission Electric Program Investment Charge 2018 â€“ 2020 Triennial Investment Plan
TN #:	215952
Document Title:	Karl Johnson Comments: 2018-2020 EPIC plan
Description:	N/A
Filer:	System
Organization:	Karl Johnson
Submitter Role:	Public
Submission Date:	2/13/2017 12:11:18 PM
Docketed Date:	2/13/2017

Comment Received From: Karl Johnson
Submitted On: 2/13/2017
Docket Number: 17-EPIC-01

2018-2020 EPIC plan

I am attaching the file for my comments submitted on February 10, 2017
I do not think they got attached to my input on Friday

Additional submitted attachment is included below.

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The Energy Commission is currently soliciting ideas and stakeholder input for the 2018 – 2020 EPIC Triennial Investment Plan. For those that would like to submit an idea for consideration in the 2018-2020 EPIC Triennial Plan, we ask that you complete the form below. Submittals are due by **5:00 p.m. on February 10, 2017.**

Part 1. Initiative Description and Purpose:

1. Please provide a brief description of the proposed initiative:

The Digital Buildings Demonstration initiative will fund a series of demonstrations of DC and hybrid DC-AC building end use technologies and integrating ZNE buildings with electric vehicle charging and battery storage as a digital building network. This initiative provides multiple benefits for meeting CA ZNE, ZEV, and customer storage gaols -- all required to meet our AB32 targets. DC power uniquely integrates the DC power generated on-site with the DC end-uses.

The initiative would target both new construction and retrofit markets for residential and small commercial customers and provide funding for multiple demonstrations of both emerging DC building solutions and integrated building systems.

2. What technical and/or market barriers would the proposed initiative help overcome? For scientific analysis and tools, what knowledge gaps would the proposed initiative help fill?

The proposed demonstration initiative will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by providing data, information, and design guidelines for the application of DC and DC-AC hybrid power to buildings, with a particular focus on end-use systems in residential and commercial ZNE buildings. This project will analyze and define the savings and market barriers to DC and AC-DC hybrid power and provide new, valuable data, resource information, end-use design templates, and building guidelines. The products from this research will be essential to starting the radical market transition to a AC-DC hybrid and DC electrical system.

Part 2. Benefits and Impacts

3. If this initiative is successful, either fully or partially, what would be the expected impact? Who are the primary users and/or beneficiaries?

This DC building micro-grid initiative will provide needed public information, demonstrations and analysis on the costs and benefits of DC and hybrid AC-DC residential and commercial building systems. This initiative would demonstrate currently available DC and hybrid AC-DC end use systems (lighting, HVAC, appliances, etc) and for ZNE buildings that integrate EV charging and battery storage relative to state-of-the-art and functionally in comparable alternating current technologies. Previous EPIC research and other researchers have estimated savings potential of 10% to 30% for DC-powered systems for ZNE buildings with storage and or EV charging. EPRI estimates that a ZNE DC home could reduce site energy use by 20%, reduce PV size by 25%, and reduce the home cost by $22,000. Especially for ZNE buildings with EVs and storage, DC systems can improve efficiency, and provide California IOU electric ratepayers with lower energy costs, increased safety through the use of low voltage DC, and greater reliability.

Achieving these substantial energy and demand savings from DC buildings could contribute significantly to meeting California's statutory energy goals, requiring ZNE residences by 2020 and commercial buildings by 2030. The project will also identify a path to improve the integration of EVs and energy storage into ZNE buildings, to help meet California's goals of 1.5 million electric vehicles by 2025 and 200 megawatts of customer-sited storage.

4. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed initiative:

- Greater Electricity Reliability. This project will provide new data, analysis, and designs for DC and AC-DC hybrid systems that are digital, so that they improve the reliability, resiliency, and integration of energy efficiency, demand control, and renewable power with buildings and the Smart Grid.
- Lower Costs. All digital equipment requires DC power. Renewable power produces DC power, yet the current practice is to convert the DC power generated by renewables to AC power, only to then be converted back to DC power. Significant savings in money, resources, operation and maintenance, energy, and greenhouse gases are available using DC systems.
- Increased Safety. The use of DC digital networked systems has the potential to increase safety due to the improved ability to control and integrate buildings' use of renewable power, storage, electric vehicle charging, and the Smart Grid. In addition, DC systems for commercial lighting and other low-voltage end uses are powered with 24 volt DC, which eliminates safety issues that are present with the typical 277 volt AC power used for commercial lighting and other end uses.

* Accelerate CA ability to meet AB32 goals with Increased adaption of DC technologies in buildings and integration with EV and battery storage

5. Please provide a list of peer-reviewed references that support the responses for questions 3 and 4. Proposed initiatives that include peer-reviewed references will be given stronger consideration.

Below is the web link to the current DC as an Integrating Platform EPIC project.
This reference list has over 150 references roughly 50 - 75 of the references are peer reviewed

http://dc.lbl.gov/epic-research-project/reference-list

6. (For technologies only) What competitive advantages does the proposed technology solution have over current benchmark technologies? If the technology is beyond the prototype stage, what strategies do you suggest to bring to scale?

successful market development of DC systems in buildings requires the availability of reliable, cost-competitive end-use appliances and equipment that can directly use and enable DC power, as well as mature standards that address DC power distribution voltages, connectors, and protection schemes. Currently, these elements are lacking. Further, DC power distribution in buildings appears to have multifaceted benefits that cross traditional boundaries. While this would seem to be an advantage, not having a single benefit that is a clear winner appears to be another impediment. Policymakers and advocacy groups typically focus on a specific attribute (e.g., energy savings) when deciding to promote and incentivize a specific technology. However, the strategic value of DC power requires a systems approach—encompassing the easier integration of on-site renewable generation with digital building controls, battery storage, and EV charging, to energy savings from reduced power losses, to the potential for increased resiliency and reliability.

For this reason, and as expressed by stakeholders during the workshop, surveys, and interviews, additional field demonstrations of DC power distribution in low-energy buildings are needed to carefully evaluate and quantify the whole spectrum of potential DC benefits. Demonstration projects also would help to address any integration and safety issues, allow manufacturers to field-test their DC-ready products, and raise stakeholder awareness. These demonstrations should include multiple vendors' systems so the results can be generalized to advance our overall knowledge of DC power in buildings.

Part 3. Connection to Energy Commission's EPIC Framework
Energy Commission staff have developed a draft strategic framework to guide the CEC's planning and implementation of EPIC across triennial investment cycles. One of the objectives of the draft strategic framework is to communicate a consistent set of priorities for organizing current and future EPIC investments.

7. Please indicate which of the following strategic framework themes you feel the proposed initiative best fits within:
    - *****Advance Technology Solutions for Deep Energy Savings in Building and Facilities
    - Accelerate Widespread Customer Adoption of Distributed Energy Resources
    - Increase System Flexibility from Low-Carbon Resources
    - Increase the Cost-Competiveness of Renewable Generation
    - Create a Statewide Ecosystem for Incubating New Energy Innovations
    - Maximize Synergies in the Water-Energy-Food Nexus
    - Develop Tools and Analysis to Inform Energy Policy and Planning Decisions
    - Catalyze Clean Energy Investments in California's Underrepresented and Disadvantaged Communities

(Select One)

If Other, Please Specify

New Category _Energy System Integration combined with Zero emission vehicle and customer storage goals