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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 #:	215916
Document Title:	Francesca Wahl Comments: SolarCity Comments EPIC 2018-2020 Investment Plan Initiatives (2)
Description:	N/A
Filer:	System
Organization:	Solar City
Submitter Role:	Public
Submission Date:	2/10/2017 5:00:47 PM
Docketed Date:	2/13/2017

Comment Received From: Francesca Wahl
Submitted On: 2/10/2017
Docket Number: 17-EPIC-01

SolarCity Comments EPIC 2018-2020 Investment Plan Initiatives (2)

Additional submitted attachment is included below.

CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov

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:

Develop a study that evaluates and recommends a mechanism(s) to credit load shifting and energy storage technologies for the value they can provide for Title 24 building code compliance to meet Zero Net Energy (ZNE) goals for residential buildings by 2020. If possible, this study should utilize field or lab verification/testing.

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?

One of the prominent metrics by which new homes can achieve Title 24 certification is the "Time-Dependent Valuation" (TDV) methodology, whereby kWhs of energy used or produced are "weighted" to account for the value and carbon-intensity of grid power at that particular time of day or year. As a result of significant amounts of solar coming onto the grid, daytime TDV scores are expected to be significantly lowered in coming years, resulting in a paradoxical situation where a home's solar PV array would need to be over-sized relative to load in order to reach ZNE. This situation could fairly easily be remedied by energy storage and load-shifting devices that can shift PV energy to the higher-value evening hours and/or shift energy consumption to the lower-value afternoon hours.

When solar PV systems are combined with smart load control such as electric water heaters the water heaters are not consuming electricity during the hours that the current code assumes as outlined by the CEC hourly water heating schedules listed in the ACM reference manual. Instead, water is heated during the day using solar energy and stored for later use. In this example, the current TDV methodology is applying peak TDV values to electric water heating consumption even though water heating would only occur during the day and be heated using solar energy.

While energy storage and load control devices have strong potential to shift energy consumption in ways that maximize the TDV score, however, the Energy Commission currently does not have a way to guarantee or verify that those devices will in fact be operated in a TDV-maximizing manner. Thus, the capabilities of those devices are not captured in the time dependent valuation (TDV) methodology. To remedy this problem, a method is needed to ensure that devices capable of maximizing TDV scores are in fact operated in that manner, or if they are operated in a sub-optimal manner, their TDV scores should be "de-rated" to account for their likely operation. One potential way to create such a method would be to deploy battery storage and load control devices in the field at customer homes and expose those customers to time-of-use rates that send economic signals to those customers to operate the devices in a way that would maximize TDV performance. Data could then be collected on the operation of those devices and used as the basis of crediting storage and load-shifting devices for the purpose of assigning Title 24 credit. An alternative method would be to deploy software and controls that ensure the devices respond to grid signals.

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?

Accurately valuing time dependent valuation (TDV) for energy storage and load control can also have a critical impact to meeting the state's clean energy policy goals and addressing grid needs in the next 5 to 10 years. Applying appropriate TDV credits within the CEC building code will incentivize builders and homeowners to adopt energy storage and load control devices along with PV. Doing so will slow down, or help avoid altogether, reaching renewable hosting capacity limits on many utility distribution circuits. Energy storage and load control limits how much PV each house exports onto the grid when properly controlled to do so. As a result there is less impact to the transmission and distribution system which overall decreases the mitigation requirements and costs due to renewables on a per capita basis. By encouraging the adoption of energy storage and load control devices now, the state can avoid the challenges of interconnecting renewable energy on high penetration circuits in the future, as is currently experienced by states like Hawaii. California has established a goal of having all new residential construction be zero net energy (ZNE) by 2020. In order to achieve true ZNE status, many homes will need to utilize very large solar PV arrays. Doing so will result in significant energy being exported back onto the distribution grid for nearly every ZNE home or community.

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

Ease of application of verification mechanism for builders and CEC when utilizing it to meet Title 24 code for new construction.
Testing of devices to ensure actually conform to the expected discharge, water heating schedules and HVAC schedules .TDV values applied in the design phase accurately represent how the systems performs after installation.

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.

"Does Zero Net Energy Mean Zero Net Carbon? Reevaluating California's Time-Dependent Valuation Metric as the State Moves Toward a Net Zero Code"
http://aceee.org/files/proceedings/2016/data/papers/10_1114.pdf

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?

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

If Other, Please Specify

Also fits into "Advance Technology Solutions for Deep Energy Savings in Building and Facilities"