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Building Rooftop Space to Reduce Building Energy Footprint

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:

This initiative is aimed at optimizing the use of residential and commercial building rooftop space to reduce building energy footprint in cities. Buildings in urban areas contribute to the urban heat island effect which increases local temperatures, which in turn increase cooling energy demands. To reduce this impact, technologies for building rooftops coverings such as reflective roofs and green roofs are of interest. Other technologies to reduce building energy footprints, however, such as solar PV and solar thermal heating also require rooftop space. Depending on the type of building and the location of the city in which it is based, energy demand profiles will also vary as well as available rooftop space.

Therefore, to minimize building energy footprints, a question arises regarding what the optimal use of available rooftop space is between these technologies for a different building types and demand profiles. This initiative will explore answers to this question for cities in California.

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?

This initiative is focused on building system modeling and will fill knowledge gaps regarding the effectiveness of different rooftop-based technologies (reflective roofs, green roofs, solar PV, solar heating, etc...) to reduce the energy footprint of buildings of distinct types located in dense urban areas, and will help to:

1) Identify necessary improvements to be made for major technologies in the mix in each of these phases and highlight research and development of these improvements.

2) Allow the development of a renewable, low-carbon energy system in California which is more sustainable from both energy and material standpoints and less susceptible to limitations from material availability constraints.

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?

If this initiative is successful, the expected / potential impacts are:

1) The development of energy resource portfolios for California's future renewable and low-carbon energy system which exhibit high energy returns on energy invested (EROEI) and correspondingly reduced energy system costs.

2) Enabling the development of energy resource portfolios for California's future renewable and low-carbon energy system to avoid constraints associated with material use and availability of rare materials.

3) Streamlined and improved processes for manufacturing and end-of-life handling of renewable and low carbon energy technologies

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

Metrics or indicators to evaluate the impacts of the proposed initiative include but are not limited to:

1) Systemwide, life-cycle ratio of energy returned on energy invested (EROEI)

2) Greenhouse gas and air pollutant emissions intensity of the overall energy system including life cycle processes (MMT CO2e/MWh, g/MWh)

3) Materials usage intensity of the overall energy system (g/MWh)

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.

1) Marco Raugei, Enrica Leccisi, "A comprehensive assessment of the energy performance of the full range of electricity generation technologies deployed in the United Kingdom", Energy Policy, Volume 90, March 2016, Pages 46-59, ISSN 0301-4215, http://dx.doi.org/10.1016/j.enpol.2015.12.011.

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