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EPIC topic suggestion

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 document proposes an initiative on Advanced Grid Monitoring and Communications (AGMC) Technologies. Situational awareness through proper data acquisition is the key for Smart Grid development. As California increases its renewable generation capacity, it becomes even more necessary to upgrade our state's existing grid monitoring and sensor data communication capabilities at power distribution level and also to some extent at power transmission system; otherwise grid reliability will be jeopardized. Several start-up as well as well-established companies have developed cutting edge advanced power system sensor technologies over the past few years, such as high-precision, low-cost, light-weight optical line sensors, feeder meters, distribution level phasor measurement units, waveform sensors. A wide range of advanced low-cost reliable wireless and wired communication technologies are also being developed to support data collection and big data analytics based on the data collected from these advanced sensors. These technologies will help addressing many of the challenges that exist or soon emerge in integrating renewable energy resources that can benefit California IOUs and ultimately California rate payers.

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?

There are three technical and market barriers that a CEC initiative can help overcome. First, while the level of innovative in many of these recently developed sensor and communication technologies are impressive, utilities would not start adopting them in practice unless they are properly tested and demonstrated in field trials with proper settings. Second, the variety of options becoming available in this field make it difficult for utilities to decide which technologies or combination of technologies they shall adopt; and also what exact applications and benefits these technologies can offer. Third, there is still a gap in developing analytical tools to exploit and clearly identify and demonstrate the true benefits of each technology in this field. All these technical and market barriers could be addressed by teams of industry-academic partnerships supported by the AGMC initiative.

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?

The direct primary beneficiaries will be utility companies, grid operators, as well as providers of grid services such as demand response aggregators. The growing California industry in high-tech power system technologies (many of the leading companies in this field are based i California) will also benefit from this initiative to rely on the available fundings as well as the field demonstration results to grow and eventually expand their footprint not only in California, but also nationally and internationally. Ultimately, the IOU rate payers will also greatly benefit from this initiative due to lowering the cost of grid operation, enhancing reliability and safety of the power grid, and facilitating higher penetration of renewable power generation resources.

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

Energy cost reduction, demand response capacity increase, renewable generation capacity increase, transmission and distribution upgrades deferral, improved electric service power quality improved electric service reliability, electric supply capacity release.

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] A. L. Liao, E. Stewart, and E. Kara, “Micro-synchrophasor data for diagnosis of transmission and distribution level events,” in Proc. of the IEEE PES T&D, Denver, CO, May 2016.

[2] K. Bohnert, P. Gabus, and H. Brändle, "Fiber-Optic Current and Voltage Sensors for High-Voltage Substations," in Proc. of the IEEE ICOF, Nara, Japan, October 2003.

[3] Z. Taylor, H. Akhavan-Hejazi, E. Cortez, L. Alvarez, S. Ula, M. Barth and H. Mohsenian-Rad, “Battery-Assisted Distribution Feeder Peak Load Reduction: Stochastic Optimization and Utility-Scale Implementation,” in Proc. of IEEE PES GM, Boston, MA, July 2016. Available at: http://www.ee.ucr.edu/~hamed/THCAUBMRcPESGM2016.pdf

[4] A. Shahsavari, A. Sadeghi-Mobarakeh, E. Stewart, and H. Mohsenian-Rad, “Distribution Grid Reliability Analysis Considering Regulation Down Load Resources by Micro-PMU Data,” in Proc of IEEE SGC, Sydney, Australia, November 2016. Available at: http://www.ee.ucr.edu/~hamed/ShSSMRcSGC2016.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?

Current benchmark technologies that are used in practice have lower precision, lower time resolution (e.g., typical minutely time resolution at SCADA systems versus millisecond time resolution in these new sensor technologies), lower cost (e.g., many of the new sensor technologies are non-contact, thus, they don't need expensive CT or PT installations), easier installation (e.g., they can be installed with hot stick on a distribution line within a few minutes), time synchronization, just to name a few.

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

Create a Statewide Ecosystem for Incubating New Energy Innovations