

COMMISSION REPORT

THE ELECTRIC PROGRAM INVESTMENT CHARGE: PROPOSED 2015-2017 TRIENNIAL INVESTMENT PLAN Appendices A-E



CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

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APPENDIX A:

Summary of Stakeholder Comments and Energy Commission Staff Responses on the February 7, 2014, Scoping Workshop and Questionnaire for the *Electric Program Investment Charge Program Proposed 2015-2017 Triennial Investment Plan*

The California Energy Commission held a public workshop to seek input from stakeholders and the public on the scope of the *Electric Program Investment Charge Proposed 2015-2017 Triennial Investment Plan (2015-2017 EPIC Investment Plan)* on February 7, 2014, in Sacramento, California. Participants offered verbal public comments during this workshop, and many others submitted written comments to the Energy Commission for consideration. In this appendix, staff summarizes and responds to all written comments submitted through March 13, 2014.

This appendix organizes comments by chapter of the *2015-2017 EPIC Investment Plan*: Applied Research and Development, Technology Demonstration and Deployment, Market Facilitation, New Solar Homes Partnership, Program Administration, and Program Benefits Assessment, with general comments grouped together in Section 7. Each section includes a summary of comments and Energy Commission staff responses.

Many of those who prepared written comments indicated an interest in participating in funding opportunities offered by the EPIC Program. The Energy Commission released its first opportunity for funding through the *2012-14 EPIC Investment Plan* in March 2014. Opportunities for funding through the *2015-2017 EPIC Investment Plan* are anticipated to begin in spring 2015. The Energy Commission plans to use primarily competitive selection processes for EPIC funding applications. Projects selected for EPIC funding must demonstrate investor-owned utility ratepayer benefits and meet other selection criteria.

Applied Research and Development

Chapter 3: Applied Research of the *2015-2017 EPIC Investment Plan* addresses funding gaps needed to help innovative energy technologies and approaches to overcome the “Technological Valley of Death.” Comments on applied research are discussed and organized by topic.

Zero Net Energy (ZNE)

Summary of Comments

TN 72535 Portland State University:¹ Occupant behavior can potentially defeat or degrade the performance of ZNE homes. Due to California’s goal for all new residential construction to be ZNE by 2020, behavior could have a large effect on California’s energy portfolio. Portland State University staff proposes “applying social sciences methods, including on-site observation, interviews, integrated data collection, and critical analysis, [so] researchers can highlight unrecognized snags and barriers to well-functioning ZNE homes and markets.”

Discussion and Staff Response

Portland State University’s recommendations fall within the scope of Initiative S1.3 of the 2015-2017 EPIC Investment Plan: *Apply Advanced Social Science Research Methods to Improve Adoption of Next Generation Energy Efficiency Solutions*. Furthermore, Initiative S12.2: *Demonstrate Large-Scale Deployment of Integrated Demand Side Management and Demand Response Programs in Buildings* emphasizes integrated demonstrations of highly efficient and ZNE buildings to collect extensive data and conduct critical analysis, including analysis of occupant behavior.

Building Controls

Summary of Comments

TN 72566 California Institute for Energy and Environment:² The California Institute for Energy and Environment is concerned that the organization of the 2015-2017 EPIC Investment Plan may adversely affect the attention given to indoor sensor and control systems and proposes that continued research and development of sensors and controls is necessary.

TN 72583 Lawrence Berkeley National Laboratory:³ Lawrence Berkeley National Laboratory (LBNL) staff proposes research and development of real-time residential ventilation controllers and evaluation criteria for these systems.

TN 72599 Lawrence Berkeley National Laboratory:⁴ LBNL staff proposes researching technologies and systems that would decrease building energy use during periods of vacancy or low use.

1 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Mithra_Moezzi_Questionnaire_2014-02-13_TN-72535.pdf.

2 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/UC_CIEE_Response_to_Questionnaire_Sensors_and_Controls_Initiative_2014-02-13_TN-72566.pdf.

3 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_RIVEC_2014-02-13_TN-72583.pdf.

4 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Corrected_Version_2_for_Putting_Buildings_to_Sleep_2014-02-13_TN-72599.pdf.

Discussion and Staff Response

Development, evaluation, and demonstration of advanced building control systems for energy savings and indoor air quality are included in Strategic Objective S1: *Improve Energy Efficiency Technologies and Strategies in California's Building, Industrial, Agriculture, and Water Sectors*. They are also included in Strategic Objective S12: *Overcoming Barriers to Emerging Energy Efficiency and Demand-Side Management Solutions Through Demonstrations in New and Existing Buildings*. Staff acknowledges the comments submitted by UC-CIEE and notes that building sensors and control systems are specifically targeted under Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings*.

Building Envelope Materials

Summary of Comments

TN 72587 Lawrence Berkeley National Laboratory:⁵ LBNL staff proposes to “evaluate the benefits of solar reflective walls, assess and advance available and potential cool wall technologies, and develop the infrastructure needed to appropriately promote their use.”

TN 72601 Lawrence Berkeley National Laboratory:⁶ LBNL staff proposes to develop next-generation building envelope tools, methods, and materials to increase energy efficiency in California buildings.

TN 72628 California Building Industry Association:⁷ The Energy Commission has significantly increased the stringency of energy efficiency building standards in the past 12 years, and the stringency is expected increase further during the next two updates. This raises challenges for builders, designers, contractors, product manufacturers, and local code enforcement personnel. California Building Industry Association asserts that seven key areas demand research and development (R&D) that the EPIC Program can address to help the California's building industry. Those key areas are: 1) roof deck insulation, 2) advanced wall system assemblies, 3) advanced plumbing system design for hot water supply, 4) verifying the impacts of further reduction in air filtration on indoor air quality, 5) expansion of compliance credit for existing rooftop solar, 6) compliance for appliance efficiency and plug-load strategies, and 7) marketable prescriptive packages.

⁵ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Cool_Walls_2014-02-13_TN-72587.pdf.

⁶ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Next-generation_highly_reflective_building_envelope_surfaces_2014-02-13_TN-72601.pdf.

⁷ http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CBIA_Comments_on_the_Second_EPIC_Investment_Plan_2014-02-13_TN-72628.pdf.

TN 72600 Lawrence Berkeley National Laboratory:⁸ Existing high-performance insulation materials (aerogels, vacuum-insulated panels) are too expensive to compete with conventional insulation materials. LBNL commented that there is a need to reduce costs of such advanced materials and/or to develop new materials that offer better performance while maintaining cost and reducing emissions.

TN 72597 Lawrence Berkeley National Laboratory:⁹ Cleanrooms, laboratories, and data centers are crucial to California's high-tech industries and other institutions. LBNL proposed a program that would seek to optimize performance of buildings for high-tech industries and establish a framework for continuous improvement. This program would include researching new solutions, demonstrating new and emerging technologies, developing best practice information, energy analysis tools, and training.

TN 72612 Lawrence Berkeley National Laboratory:¹⁰ There is increasing concern that noncompliance with Title 24 may limit the state's ability to achieve its building energy performance goals. Building inspectors typically do not have the training or the time to ensure that commercial building new construction and retrofit projects conform to Title 24 during the design stage or after construction is complete. Another related barrier is the complexity of current performance-based code compliance procedures, especially in the context of small commercial buildings.

LBNL proposed an initiative to:

1. Obtain quantitative information on code compliance by building type, ownership type, time of permitting, and other factors to understand the magnitude and nature of noncompliance.
2. Develop and pilot test alternative approaches to code design and enforcement.
3. Develop and test processes and tools to implement successful approaches to code design and enforcement.

TN 72579 Lawrence Berkeley National Laboratory:¹¹ LBNL proposed an initiative to identify methods for introducing energy management concepts to energy-consuming sites with potential for energy savings, but without an effective management structure to identify, implement, and sustain energy efficiency improvements.

⁸ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Initiative_Questionnaire_Low-Cost_Advanced_Building_Insulation_Materials_2014-02-13_TN-72600.pdf.

⁹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_EE_in_Bldgs_for_High_Tech_Industrial_Bldgs_2014-02-13_TN-72597.pdf.

¹⁰ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Rethinking_Code_Compliance_2014-02-14_TN-72612.pdf.

¹¹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Response_to_Questionnaire_2014-02-13_TN-72579.pdf.

Discussion and Staff Response

Research and development objectives pertaining to next-generation building envelope materials and energy efficiency improvements for California buildings are included in Strategic Objective S1 of the *2015-2017 EPIC Investment Plan: Improve Energy Efficiency Technologies and Strategies in California's Building, Industrial, Agriculture, and Water Sectors*.

The following are additional responses:

Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings*, of the *2015-2017 EPIC Investment Plan* includes research aimed at improving building envelope performance, systems materials, and components and includes many of the items referenced in comments TN 72587, TN 72601, and TN 72628.

Advanced plumbing system designs for hot water supply is generally included with the natural gas research areas. A solicitation funded outside EPIC and released in December 2013 (PON-13-503) included hot water distribution systems as one of the topic areas.

Reduction of air-filtration in homes is included in PON-13-503, funded outside EPIC. Additional research in this area will be evaluated pending research results from these projects.

Plug-load research and development of more efficient electronics and infrastructure is one of the topic areas under Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings* in the *2015-2017 EPIC Investment Plan*.

Consideration to develop prescriptive packages for ZNE homes and commercial buildings is under Initiative S1.2: *Develop Model Designs and Strategies for Cost-Effective Zero Net Energy Homes and Buildings*.

Analysis and collection of data on various technologies and strategies to support future building efficiency codes and standards are other potential areas of research. Expansion of compliance credit for rooftop solar is outside the scope of the EPIC research goals.

Modeling/Tools

Summary of Comments

TN 72593 Lawrence Berkeley National Laboratory:¹² LBNL staff proposes developing a toolbox to ease the design and deployment of advanced estimation, controls, and fault detection techniques, making them available to a broad audience and increasing the use of these techniques in homes and commercial buildings.

¹² http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Initiative_Questionnaire_for_the_Proposed_2015-2017_Triennial_Investment_Plan_2014-02-13_TN-72593.pdf.

TN 72610 Lawrence Berkeley National Laboratory:¹³ More than half of California’s public schools are 30 years old, and they operate poorly from the perspective of energy efficiency. Retrofitting schools with currently available energy efficient technologies could save about 30-50 percent of energy used. LBNL proposed to develop and demonstrate a toolkit with software tools, methods, and best practices to support and streamline the energy retrofit of public schools in California. The toolkit will identify and analyze measures in lighting, HVAC, water heating, and water use.

TN 72614 Bidgely:¹⁴ Programs provide residential customers access to services and tools that make use of the real-time information from their smart meters and harness new technologies to maximize home energy savings. According to studies reviewed by Bidgely, the operational savings made available by smart meters (per million households) are likely to be around \$77 million to \$208 million, and consumer driven savings are likely to be close to \$100 million to \$150 million. These savings suggest that California consumers could realize significant benefits through these investments.

TN 72605 Lawrence Berkeley National Laboratory:¹⁵ LBNL proposed evaluation and objective comparisons of tools and a description of the method, inputs, outputs, and market segment most appropriate for use required for each of these types of tools: benchmarking, asset rating, code compliance, design assistance, energy information systems, and simulation, energy analysis, and modeling. Public policy is beginning to get ahead of tools, and it is imperative to get a handle on how and when these tools perform and what their optimal use is. It is important to understand the shortcomings and value of specific approaches and methods for different tools.

TN 72586 Lawrence Berkeley National Laboratory:¹⁶ LBNL staff proposes to use an energy user group that was the target of an energy efficiency program to generate a large data set, then develop alternative auto measurement and verification methodology and test criteria to assess the effectiveness of that energy efficiency program.

13 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Development_and_Demonstration_of_a_Toolkit_to_Support_Retrofit_of_Cal_2014-02-14_TN-72610.pdf.

14 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Bidgely_Inc_Response_to_Questionnaire_2014-02-14_TN-72614.pdf.

15 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Response_to_Questionnaire_Improving_interoperability_and_common_methods_in_building_2014-02-13_TN-72605.pdf.

16 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Auto_MV_Controls_2014-02-13_TN-72586.pdf.

TN72656 Center for the Built Environment:¹⁷ Center for the Built Environment proposed to develop new guidance supporting a significant increase and wider application of energy-efficient radiant cooling and heating systems in new and existing buildings. Practical guidance and operating strategies will be tested, compared, and developed for using the improved modeling tools and comprehensive field studies of exemplary California buildings that use radiant systems.

TN72657 California Building Industry Association:¹⁸ California Building Industry Association suggests that EPIC fund a survey of energy efficiency retrofit programs for existing homes to improve field application and enforcement of requirements for energy efficiency in additions, alterations, and repairs for existing dwellings. The commenter recommends using results from the survey to “correlate the HERS II software to actual use and the energy impact of energy efficiency improvements.”

Discussion and Staff Response

Modeling and tool research is included in the 2015-2017 EPIC Investment Plan in Initiative S1.1: *Advancing Efficient Solutions for Lower Energy Buildings* and Initiative S1.3: *Apply Advanced Social Science Research Methods to Improve Adoption of Next Generation Energy Efficiency Solutions*. Some of the proposed sensory and control research is duplicative of ongoing work, but staff is receptive toward innovative tools and toolkits that help promote energy efficiency technologies. Some of the data collection were covered in the 2012-14 EPIC Investment Plan, including S18.3, which focuses on conducting technology and environmental assessments to track progress in the clean energy industry and identify future needs, and S18.4, which focuses on conducting the IOU Portion of the *California Commercial End-Use Survey* (CEUS), a comprehensive study of commercial sector energy use.

Indoor Air Quality (IAQ)

Summary of Comments

TN 72537 Lawrence Berkeley National Laboratory:¹⁹ LBNL staff proposes that studies should identify energy efficiency opportunities in California schools and address widespread ventilation inadequacies in classrooms. Innovative, low-cost ventilation retrofit solutions should be developed and demonstrated. These retrofits will complement energy savings from school retrofits funded through Proposition 39.

¹⁷ [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Center for the Built Environment \(CBE\) Questionnaire - Radiant Controls 2014-02-14 TN-72656.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Center%20for%20the%20Built%20Environment%20(CBE)%20Questionnaire%20-%20Radiant%20Controls%202014-02-14%20TN-72656.pdf).

¹⁸ [http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CBIA Supplemental Filing 2014-02-13 TN-72657.pdf](http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CBIA_Supplemental_Filing_2014-02-13_TN-72657.pdf).

¹⁹ [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Lawrence Berkeley National Laboratory Questionnaire 2014-02-13 TN-72537.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Lawrence%20Berkeley%20National%20Laboratory%20Questionnaire%202014-02-13%20TN-72537.pdf).

TN 72560 Santa Clara County Office of Sustainability:²⁰ A diverse, relevant, and compelling array of tangible and economic energy efficiency benefits has not been sufficiently developed to stimulate public, personal, and private sector investments. The Santa Clara County Office of Sustainability’s proposed initiative suggests the Energy Commission pursue “monetization of the human health, social, and property-related benefits that arise in the nexus between energy efficiency upgrades in existing buildings and their positive impact on indoor air quality and will provide meaningful data to drive acceptance of energy efficiency as a personal, professional, and social priority.”

Discussion and Staff Response

Staff has included indoor air quality research in the 2015-2017 EPIC Investment Plan under research Initiative S1.4: *Develop and Evaluate Strategies to Improve Indoor Air Quality in Energy-Efficient Buildings*. The initiative also focuses on the factors that influence human behavior affecting indoor air quality and the impacts of poor IAQ on occupants. Also, a competitive research solicitation from the 2012-14 EPIC Investment Plan released March 2014 includes funding to develop and demonstrate technologies to improve indoor air quality and reduce energy use in classrooms and commercial buildings (PON-13-301).

Plug-Load

Summary of Comments

TN 72655 Gregg Hardy:²¹ Gregg Hardy proposed establishing a “golden carrot” program with a pool of money that would be distributed first-come, first-served to the service providers who demonstrate actual in-home energy savings through a <1W sleep mode. The funds would be allocated at a rate of \$X/kWh of demonstrated in-home energy savings, until depleted. Pay-TV set-top boxes in California consumed about 4 terawatt hours (TWh) of electricity in 2012. The energy savings potential of deploying deep-sleep technology to all set-top boxes in California is about 1 TWh.

Discussion and Staff Response

Staff has included plug-load efficiency research under Initiative S1.1: *Advancing Efficient Solutions for Lower Energy Buildings* of the proposed 2015-2017 EPIC Investment Plan. An area under consideration is to develop a competition for one or more plug-load devices to encourage the market to go beyond incremental change in existing efficiencies.

²⁰ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Santa_Clara_County_Office_of_Sustainability_Questionnaire_EPIC_2nd_Investment_Plan_2014-02-13_TN-72560.pdf.

²¹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Gregg_Hardy_Questionnaire_2014-02-13_TN-72655.pdf.

Water Heating

Summary of Comments

TN 72624 Rapp V.²² and **TN 72663 Lawrence Berkeley National Laboratory:**²³ Rapp V and LBNL supported development and deployment of tankless water heaters with a low-cost burner system that can reach a performance goal of 30:1 turndown and ultra-low emissions while meeting operational demands. The Rapp V. stated that the low-swirl burner (LSB) is capable of meeting these performance requirements, enabling tankless water heaters to cost-effectively generate hot water with lower emissions and higher efficiency than grid-powered electric water heaters.

Discussion and Staff Response

This research is outside the scope of the EPIC Program since it deals with natural gas improvements; however, PON-13-503 was released in December 2013 and focuses on advanced domestic hot water systems and high-efficiency, ultra-low NO_x water-heating units.

Demand-Side Management

Summary of Comments

TN 72623 G. Ghatikar:²⁴ G. Ghatikar recommended vehicle-to-grid resource modeling, forecasting, and control through the following:

Develop a robust, validated, and scalable load-modeling technique that can be applied regionally and locally.

Market interactions for plug-in electric vehicles through probabilistic forecasting of electric vehicle loads, recognizing that load can become a grid resource.

Develop methods to examine value streams for electric vehicle batteries in grid operations, including bidirectional power flow.

TN 72609 Lawrence Berkeley National Laboratory:²⁵ LBNL recommended an initiative to integrate plug-in electric vehicles (PEVs) into the California grid. LBNL believes future planning is required where PEVs benefit the climate and the vehicle owner, and allow large-scale integration of renewable electricity in the California grid. The initiative would demonstrate the potential for innovative market and policy designs for electric vehicle-grid interactions.

22 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Rapp_V_12-EPIC-01-2014_Questionnaire_WaterHeaters_2014-02-13_TN-72624.pdf.

23 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Lawrence_Berkeley_National_Laboratory_Questionnaire_Water_Heaters_2014-02-14_TN-72663.pdf.

24 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_V2G-JM_2014-02-13_TN-72623.pdf.

25 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Transportation_2014-02-14_TN-72609.pdf.

TN 72565 Green Charge Networks:²⁶ Green Charge Networks recommended demonstrations of direct current (DC) fast chargers combined with intelligent energy storage to reduce the impacts of vehicle fast charging on the grid.

Discussion and Staff Response

Staff included vehicle integration research demonstrations in the proposed 2015-2017 EPIC Investment Plan under Strategic Objective S16: *Expand Smart Charging and Vehicle-to-Grid Power Transfer for Electric Vehicles.*

Distribution: Summary of Comments

TN 72654 Green Charge Networks:²⁷ Green Charge Networks recommended an initiative to commercialize a dual-purpose inverter for solar PV and energy storage.

Discussion and Staff Response

Staff included inverter research in the proposed investment plan under Strategic Objective S7: *Develop Advanced Distribution Modeling Tools for the Future Smart Grid.*

Summary of Comments

TN 72652 Watershed Research and Training Center:²⁸ Watershed Research and Training Center recommended funding low-cost interconnection technology for synchronous generators to reduce costs for community-scale bioenergy projects.

Interconnection costs of distributed generation are substantially higher in Pacific Gas and Electric (PG&E) territory because of the frequent requirement of direct transfer trip (DTT) technology. In PG&E territory, DTT is used in many rural distributed generation applications to provide safety for line workers by preventing islanding. The DTT technology is a direct fiber optic line from a PG&E control/access point to the generating equipment that can switch the generator on and off. The installation of the infrastructure can be very costly, adding 10 percent to 20 percent to the total project budget. Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) do not require this technology; however, PG&E cites the lack of research and differing grid configuration, which prohibits it from adopting the same policies and approved equipment as SCE and SDG&E. This lack of information and research greatly hinders the development and expansion of the distributed renewable energy market in PG&E territory and provides a competitive disadvantage for hydroelectric, geothermal, and bioenergy compared to solar or wind energy.

26 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Green_Charge_Networks_Questionnaire_DC_Fast_Chargers_2014-02-13_TN-72565.pdf.

27 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Green_Charge_Networks_Questionnaire_DC_Fast_Chargers_2014-02-13_TN-72565.pdf.

28 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Watershed_Research_and_Training_Center_Questionnaire_Interconnection_S_WET_2014-02-13_TN-72652.pdf.

TN 72622 G. Ghatikar:²⁹ G. Ghatikar recommended technology research, development, and demonstration (RD&D) of cost-effective and scalable low-cost metering and telemetry solutions to allow demand and distributed resources within the distribution network to participate in wholesale markets.

TN 72592 Open Access Technology International:³⁰ Open Access Technology International, Inc., (OATI) recommended using inexpensive measuring and control devices to provide visibility of distributed resource locations and capabilities to the system operator.

Discussion and Staff Response

Staff included metering and telemetry research in the *2012-14 EPIC Investment Plan* under Initiative S2.1: *Develop Cost-Effective Metering and Telemetry to Allow Customers With Demand Response, Distributed Generation, Plug-In Electric Vehicles, and Energy Storage to Participate in California Independent System Operator (ISO) Markets and/or Provide Grid Services.*

Summary of Comments

TN 72595 Open Access Technology International:³¹ Open Access Technology International, Inc., (OATI) recommended standardizing modeling requirements for demand response-distributed energy resources (DR-DER) to ease its integration into the grid.

Discussion and Staff Response

Staff incorporated modeling research in the proposed *2015-2017 EPIC Investment Plan* under Strategic Objective S8: *Advance Customer Systems to Coordinate With Utility Communication Systems.*

Summary of Comments

TN 72619 G. Ghatikar:³² G. Ghatikar recommended R&D of distribution operator strategies and tools for the future smart grid by creating operational guidance and distribution management system (DMS) integration with communication standards to develop advanced DMS. This comment also recommended enhancement of existing data standards, such as International Electrotechnical Commission (IEC) 61968, to optimize communication strategies, control signals, algorithms, and high-penetration DER strategies for operators. These characterization and communication and control schemes could be developed and demonstrated to measure and control smart grid components.

29 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_Low-cost-telemetry-RG_2014-02-13_TN-72622.pdf.

30 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/OATI_CEC_EPIC_Funding_Distribution_and_Transmission_Operations_2014-02-13_TN-72592.pdf.

31 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/OATI_CEC_EPIC_Funding_-_DER_Modeling_JW4_2014-02-13_TN-72595.pdf.

32 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_Visualization-ES_2014-02-13_TN-72619.pdf.

TN 72621 G. Ghatikar:³³ G. Ghatikar recommended an initiative for a secure and integrated distributed generation management system. This system would include technologies, tools, and secure smart grid interfaces to integrate dynamic distribution and demand-side management systems.

Discussion and Staff Response

Staff included communication and control research in the proposed 2015-2017 EPIC Investment Plan under Strategic Objective S8: *Advance Customer Systems to Coordinate With Utility Communication Systems.*

Summary of Comments

TN 72620 G. Ghatikar:³⁴ G. Ghatikar recommended an initiative for smart grid modeling. It will combine existing modeling tools and existing IOUs' validated models with communication system tools and load-modeling tools to evaluate various technologies and control algorithms.

TN 72661 Joint Venture Silicon Valley:³⁵ Joint Venture Silicon Valley recommended R&D of an areawide power quality monitoring system by aggregating new detailed data from high-resolution customer meters.

Discussion and Staff Response

Staff included distribution impact modeling research in the 2015-2017 EPIC Investment Plan under Strategic Objective S8: *Advance Customer Systems to Coordinate With Utility Communication Systems.*

Energy Storage

Summary of Comments

TN 72567 Green Charge Networks:³⁶ Green Charge Networks recommended an initiative to develop an exchange that provides available one-day ahead, same-day, and 15-minute window energy storage capacity to utilities and the California Independent System Operator (California ISO).

Discussion and Staff Response

The CPUC is already planning to develop capacity markets, one of which is for energy storage. In addition, storage research is being conducted under the 2012-2014 and 2015-2017 EPIC Investment Plans. Specifically, the 2012-14 EPIC Investment Plan includes Strategic Objective S8:

33 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_Distribution-Interoperability-RG_2013-0-02_TN-72621.pdf.

34 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_VirGIL-SK_2014-02-13_TN-72620.pdf.

35 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Joint_Venture_Silicon_Valley_Proposed_EPIC_Energy_Research_Initiative_Real-time_Monitoring_of_Distribution_Grid_Power_Quality_2014-02-13_TN-72661.pdf.

36 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Green_Charge_Networks_Response_to_Questionnaire_RFI_-_GCN_Distributed_Energy_Storage_2014-02-13_TN-72567.pdf.

Integrate Grid-Level Energy Storage Technologies and Determine the Best Applications That Provide Locational Benefits, and the 2015-2017 Investment Plan includes Strategic Objective S15: Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market, and Improve Grid Reliability. This energy storage applied research and demonstration may inform California ISO work on the role of energy storage in capacity markets in the future.

Summary of Comments

TN 72608 VCharge and Sunamp:³⁷ Most existing mechanisms for building renewable energy decouple the “green” from the power: - This happens with both RECs and feed-in-tariffs. These mechanisms end up undervaluing storage on the grid, as they undermine carbon incentives for buying renewable energy as it is being produced.

VCharge and Sunamp’s proposed initiative is to see transactive load become an integral part of long-term distribution planning, viewed as a key for unlocking the potential of distributed generation.

The initiative targets the HVAC residential sector, both single-family homes and multiunit complexes, with a goal of reducing home heating and cooling energy use by 40 percent while making the distribution network more resilient and improving the economics of distributed renewable energy by transforming these heating systems into low-cost, grid-scale storage.

Discussion and Staff Response

Staff included applied research for innovative energy storage concepts in the 2012-2014 EPIC Investment Plan under Proposed Funding Initiative S8.2: *Develop Innovative Utility-Scale and Generation Energy Storage Technologies and Applications to Mitigate Intermittent Renewables and Meet Peak Demand.* Upcoming Funding Opportunities for Advancing the 21st Century Electric Grid are listed at http://www.energy.ca.gov/research/upcoming_funding.html. A solicitation titled “Advancing Grid-Level Energy Storage Innovation to Achieve Policy Goals, Lower Costs, and Spur Investment” is listed on this page.

Summary of Comments

TN 72574 Seeo:³⁸ Seeo, Inc. recommended developing high energy density battery storage grid and renewable energy-tied systems.

TN 72575 California Bioenergy:³⁹ California Bioenergy, LLC (CalBio) recommended an initiative to provide a reliable, multi-MW, multi-hour, distributed bioenergy storage system located at or close to utility substations to assist in grid stability and communicate as needed with utility and California ISO resources.

37 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/VCharge and Sunamp Questionnaire 2014-02-14 TN-72608.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/VCharge_and_Sunamp_Questionnaire_2014-02-14_TN-72608.pdf).

38 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/SEEO Proposed Initiative for an Applied Research and Development Program 2014-02-13 TN-72574.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/SEEO_Proposed_Initiative_for_an_Applied_Research_and_Development_Program_2014-02-13_TN-72574.pdf).

39 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CalBios Response to the Questionnaire 2014-02-13 TN-72575.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CalBios_Response_to_the_Questionnaire_2014-02-13_TN-72575.pdf).

TN 72539 Energy Systems:⁴⁰ Energy Systems, Inc. recommended an initiative for next-generation control technologies that enable utilities to easily create and manage a suite of algorithms that deliver maximum value from energy storage systems and that can be easily managed from a utility's existing Supervisory Control and Data Acquisition (SCADA) systems.

TN 72636 J. Brouwer:⁴¹ J. Brouwer recommended funding to evaluate and advance massive energy storage for high renewable use.

TN 72565 Green Charge Networks:⁴² Green Charge Networks recommended demonstrations of DC fast chargers combined with intelligent energy storage to reduce the impacts of vehicle fast charging on the grid.

TN 72618 G. Ghatikar:⁴³ G. Ghatikar recommended applied research and demonstrations for thermal energy storage used for permanent load shifting and potential demand response applications.

TN 72757 Seo:⁴⁴ Seo, Inc. recommended field demonstrations of distributed energy storage with photovoltaic systems in home and commercial applications.

Discussion and Staff Response

Staff included energy storage research demonstrations in the *2015-2017 EPIC Investment Plan* under Strategic Objective S15: *Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market, and Improve Grid Reliability.*

Grid Operations/ Market Design

Summary of Comments

TN 72590 Open Access Technology International:⁴⁵ Open Access Technology International, Inc. recommended an initiative to provide the framework, tools, and defined business rules for energy transactions between two or more parties or systems, while considering distribution grid and operational constraints.

40 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/1Energy_Systems_Inc_Questionnaire_2014-02-13_TN-72539.pdf.

41 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Brouwer_J_2014-02-07_questionnaire_Massive_Storage_LZ_2014-02-13_TN-72636.pdf.

42 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Green_Charge_Networks_Questionnaire_DC_Fast_Chargers_2014-02-13_TN-72565.pdf.

43 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire-TES-RY_2014-02-13_TN-72618.pdf.

44 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Seo_TDD_Questionnaire_2014-02-28_TN-72757.pdf.

45 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/OATI_CEC_EPIC_Funding_Transactive_Energy_2014-02-13_TN-72590.pdf.

Discussion and Staff Response

This type of analysis may be considered in Initiative S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System*, which will assess clean energy technologies, business models, and strategies under a range of conditions and scenarios to inform investments and decision-making to benefit IOU ratepayers.

Summary of Comments

TN 72591 Open Access Technology International:⁴⁶ OATI recommended an initiative to analyze, develop, and evaluate the concept of distribution system operators (DSOs) within the California ISO energy market and grid operation.

Discussion and Staff Response

Under CPUC regulation, each investor-owned utility is responsible for the operation of the distribution system within its service territory. Each utility coordinates with the California ISO for grid operation and energy procurement. Establishing a DSO is outside the scope of EPIC and will not be addressed in the *2015-2017 EPIC Investment Plan*.

Summary of Comments

TN 72508 SRI International:⁴⁷ SRI International recommended an initiative to further develop and test intrusion detection technologies to accelerate technology commercialization. The initiative would develop a threat detection framework that allows utilities to protect their control systems from cyberattacks at the network, host, and device levels. The integrated solution will complement traditional, signature-based detection with multiple detection algorithms, including model-based and flow anomaly detection and cross-site attack correlation.

Discussion and Staff Response

Cybersecurity may be included in the following proposed initiatives: *S2.1: Develop and Test Demand Response Technologies to Assess Performance, Increase Reliability, and Improve Forecasting Techniques*; *S8.1: Develop Customer Systems to Manage Demand Response, Renewables, and Electric Vehicles, and Integrate These Tools With the Grid*; and *S14.1: Use Microgrids to Evaluate a Combination of Emerging Technologies to Determine the Best Integrated Performance and Least Cost Configuration to Meet the Customers Energy Needs*.

North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) requirements are addressing this research at the national level. The Federal Energy Regulatory Commission establishes and monitors standards for cybersecurity. The IOUs, through their *2015-2017 EPIC Investment Plans*, are also addressing cybersecurity.

⁴⁶ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/OATI_CEC_EPIC_Funding_DSO_2014-02-12_TN-72591.pdf.

⁴⁷ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/SRI_Prevent_Zero_Day_Attacks_2014-02-04_TN-72508.pdf.

Environment and Public Health

Summary of Comments

TN 72639 UC Irvine:⁴⁸ UC Irvine recommended conducting research to assess the air quality and water resource cobenefits from greenhouse gas emissions (GHG) mitigation technologies. This information can help California decision makers prioritize and select energy pathways that will contribute to meeting state energy policy requirements (for example, Renewables Portfolio Standard, AB 32), and to reduce ratepayer costs.

TN 72641 Lawrence Berkeley National Laboratory:⁴⁹ LBNL recommended a funding initiative to develop and evaluate the performance of cost-effective pollutant removal technologies under realistic building conditions, with a focus on key indoor contaminants such as ozone, NO_x, formaldehyde, and other volatile organic compounds (VOCs). Project(s) will develop low-emission building materials and HVAC air-cleaning technologies introduced in the market within the next five years. It will also support future reformulation of ventilation standards (for example, Title 24) to enable higher energy savings by reducing the demand for outdoor air supply. This initiative will benefit California ratepayers by reducing ventilation, heating, and air-conditioning energy costs, while improving building occupants' health and productivity.

TN 72604 The Energy Institute:⁵⁰ The Energy Institute noted that California is an energy leader and has adopted some of the most progressive environmental policies to develop clean energy and address climate change. However, the commenter states there is a lack of understanding of how various emissions policies interact with the electricity generation investment incentives and if these policies actually achieve their emissions goals. The Energy Institute at Haas recommends research to improve emissions estimates for generation technologies and fuels to improve mitigation strategies. Rigorous economic and policy evaluations of current and proposed energy and environmental regulations will provide needed data to guide policy makers in crafting optimal policies.

TN 72582 Lawrence Berkeley National Laboratory:⁵¹ LBNL staff proposes supporting collaborative efforts among impact, adaptation, and climate modeling experts to further meaningful analysis of climate models with the goal of identifying and addressing the impacts of climate change on energy systems.

48 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Brouwer_J_2014-02-07_questionnaire_GHG_Mitigation_2014-02-13_TN-72639.pdf.

49 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Advanced_Indoor_Air_Cleaning_Technologies_-_LBNL_2014-02-13_TN-72641.pdf.

50 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Energy_Institute_at_Haas_Response_to_Questionnaire_2014-02-13_TN-72604.pdf.

51 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Climate_Adaptation_2014-02-13_TN-72582.pdf.

Discussion and Staff Response

Comments under TN 72641 correctly identify a need for important research for moving safely to net-zero and low-energy buildings. Such research is included in Strategic Objective 1 of the *2015-2017 EPIC Investment Plan, S1: Improve Energy Efficiency Technologies and Strategies in California's Building, Industrial, Agriculture, and Water Sectors*.

Staff also acknowledges the recommendation from the Energy Institute at Haas and notes that it is very important to evaluate the effectiveness of California's energy and climate policies. However, a broad evaluation of AB 32 and other major policies is beyond the scope of EPIC. EPIC will cover, to some extent, efforts to assess barriers to climate change adaptation and mitigation in Strategic Objective S5 of the *2012-14 EPIC Investment Plan, S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts*. Strategic Objective S5 will also cover the topics of air quality and aquatic resources. In addition, Initiative S1.4: *Develop and Evaluate Strategies to Improve Indoor Air Quality in Energy-Efficient Buildings* of the *2015-2017 EPIC Investment Plan* will fill in the data gaps needed to characterize and evaluate indoor air quality in low-energy and zero-net-energy building and developing strategies to ensure adequate indoor air quality in these buildings.

S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System of the 2015-2017 EPIC Investment Plan* will assess clean energy technologies, business models, and strategies under a range of conditions and scenarios to inform investments and decision-making to benefit IOU ratepayers. This initiative may include funding to analyze regulatory changes and business models to help accelerate adopting emerging clean energy technologies by making a better business case that benefits both ratepayers and IOUs.

Finally, future investments in clean energy technologies can be informed by the results of Initiative S18.3: *Conduct Technology and Environmental Assessments to Track Progress in the Clean Energy Industry and Identify Future Needs* of the *2012-2014 EPIC Investment Plan*. This initiative, by tracking the progress of emerging clean energy technologies and identifying potential environmental effects of emerging clean energy innovations, will better position the Energy Commission to ease successful market deployment of clean energy technologies.

Ground Source Heat Pumps

Summary of Comments

TN 72514 Terra Structural:⁵² Terra Structural Inc. recommended expanding the research topics to include geothermal heat pump hybrid systems that employ direct-use geothermal loops into nonstructural building voids. The direct-use geothermal method remains unknown by most architects but could potentially have high-energy savings in ideal climates.

52 http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/I_Kreber_Technology_Demonstration_and_Deployment_Questionnaire_2014-02-07_TN-72514.pdf.

Discussion and Staff Response

Geothermal heat pump research and the integration into building caissons fall under the scope of Initiative S1.1: *Efficient Solutions for Lower Energy Buildings*, part 2 (“HVAC: develop and test innovative HVAC systems”). Per the funding initiative, “examples of potential research areas include... air, ground source, and miniaturized heat pumps... and innovative ways incorporate HVAC systems into building structures.”

Fuel Cells

Summary of Comments

TN72664 UC Irvine⁵³ and **TN72658 UC Berkeley**⁵⁴: UC Irvine and UC Berkeley proposed funding for fuel cell activities, including RD&D of high-temperature and multiple-use generation fuel cells and next-generation fuel cells.

TN 72571 SAFCell⁵⁵: SAFCell Inc. proposed an intermediate-temperature fuel cell approach based on the use of solid acid electrolytes (solid acid fuel cell, or SAFC), specifically CsH₂PO₄.

Discussion and Staff Response

One of the goals of EPIC is to increase market penetration of distributed renewable and advanced energy generation. Distributed generation research initiatives are included in the *2015-2017 EPIC Investment Plan* in Strategic Objective S3: *Develop Innovative Solutions to Increase the Market Penetration of Distributed Renewable and Advanced Generation*, particularly in Initiative S3.4 on advanced breakthrough technologies.

Goods Movement

Summary of Comments

TN 72636 J. Brouwer⁵⁶: J. Brouwer commented that identifying and characterizing alternative energy strategies for technologies and fuels that support major port activity will help California meet growing demand for goods transport and minimize the environmental impacts of associated emissions. Strategies reducing emissions can offer important direct health benefits to heavily impacted communities surrounding major ports and improve pollutant levels in areas of the state currently plagued by poor air quality.

53 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Irvine_Questionnaire_-_Tri-Gen_2014-02-14_TN-72664.pdf.

54 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Questionnaire_-_Waste_Air_Energy_2014-02-14_TN-72658.pdf.

55 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/SAFCell_Inc_Response_to_Questionnaire_2014-02-13_TN-72571.pdf.

56 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Brouwer_J_2014-02-07_questionnaire_Massive_Storage_LZ_2014-02-13_TN-72636.pdf.

Discussion and Staff Response

Research and development to address environmental issues in and around California's ports is primarily driven from the Research and Development Natural Gas Program through efficient and clean natural gas engine technology that will help displace diesel vehicles. In addition, there is a project developing natural gas engine technology that will drive NO_x emission levels to as much as 90 percent below current California ARB standards.

In addition, there are opportunities for ports to embrace and expand the use of clean energy to provide electricity for docked ships and electricity for loading and unloading cargo. Initiatives in the *2015-2017 EPIC Investment Plan* that may include topics related to ports in IOU service territories include Initiative S14.1: *Use Microgrids to Evaluate a Combination of Emerging Technologies to Determine the Best Integrated Performance and Least Cost Configuration to Meet the Customers Energy Needs*, Initiative S16.1: *Demonstrate the Ability of Electric Vehicles to Provide Advanced Grid Services*, initiatives under Strategic Objective S19: *Facilitate Inclusion of Emerging Clean Energy Technologies Into Large-Scale Procurement Processes*, and Initiative S20.1: *Develop Innovative Approaches to Integrate Utility and Local Government Planning for Emerging Technology Deployment*.

Technology Demonstration and Deployment

Chapter 4: Technology Demonstration and Deployment will fund activities to test scalability and preliminary operating issues and bring promising technologies and strategies closer to market. Comments on technology demonstration and deployment are organized by topic.

Ventilation and Air Conditioner Precooling

Summary of Comments

TN 72515 Davis Energy Group:⁵⁷ Davis Energy Group suggested providing more research into demonstrating and deploying ventilation and air conditioner precooling to provide substantial energy savings through improved cooling efficiency and effective demand response on peak demand days. Ventilation cooling suffered from slow market adoption due to lack of interest by HVAC equipment manufacturers and setbacks due to changes in motor technology that have recently been overcome. Air conditioner precooling was implemented relatively recently and has been shown to be successful in achieving demand reduction as well as energy savings due to the improved energy efficiency ratio resulting from operation at lower outdoor temperatures.

Discussion and Staff Response

The *2015-2017 EPIC Investment Plan* includes research into alternative cooling efficiency technologies in Initiative S1.1: *Advancing Efficient Solutions for Lower Energy Buildings*, item #2. Initiative S12.2: *Demonstrate Large-Scale Deployment of Integrated Demand-Side Management and Demand Response Programs in Buildings* focuses on large-scale deployment of integrated

⁵⁷ http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/D_Springer_2014-02-07_questionnaire_2014-02-06_TN-72515.pdf.

innovative technologies using, but not limited to HVAC, lighting, demand response, and building envelope. Successful technologies from Initiative S1.1 have the potential to be included in Initiative S12.2 as well.

Bioenergy

Summary of Comments

TN 72653 Humboldt State University Schatz Energy Research Center:⁵⁸ Humboldt State University Schatz Energy Research Center proposed funding initiatives for the research, development, demonstration, and deployment of forest residue densification technologies and biomass gasification technologies.

TN 72649 Watershed Research and Training Center⁵⁹ and **TN 72652 Watershed Research and Training Center:**⁶⁰ The Watershed Research and Training Center commented that adopting low-cost interconnection technology for projects using synchronous generators will reduce costs and uncertainties of community-scale bioenergy projects. The center also recommended that the *2015-2017 EPIC Investment Plan* address a variety of barriers to bioenergy technologies.

TN 72635 J. Brouwer:⁶¹ J. Brouwer recommended allocating funding for overcoming critical barriers for converting waste streams to energy and funding to reduce emissions from waste biomass and biogas combustion systems.

TN 72617 Waste Management,⁶² **TN 72602 Waste Management,**⁶³ and **TN 72607 Waste Management:**⁶⁴ On behalf of Waste Management, C. Martin Public Affairs recommended that funding be made available for demonstrating anaerobic digestion, gasification, and emerging conversion technologies to produce energy from biomass, particularly waste biomass. C. Martin

58 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Humboldt State University Schatz Energy Research Center Questionnaire - Biomass 2014-02-14 TN-72653.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Humboldt%20State%20University%20Schatz%20Energy%20Research%20Center%20Questionnaire%20-%20Biomass%202014-02-14%20TN-72653.pdf).

59 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Watershed Research and Training Center Questionnaire Bioenergy Deployment SWET 2014-02-13 TN-72649.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Watershed%20Research%20and%20Training%20Center%20Questionnaire%20Bioenergy%20Deployment%20SWET%202014-02-13%20TN-72649.pdf).

60 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Watershed Research and Training Center Questionnaire Interconnection S WET 2014-02-13 TN-72652.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Watershed%20Research%20and%20Training%20Center%20Questionnaire%20Interconnection%20S%20WET%202014-02-13%20TN-72652.pdf).

61 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Brouwer J 2014-02-07 questionnaire Waste Air Energy 2014-02-13 TN-72635.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Brouwer%20J%202014-02-07%20questionnaire%20Waste%20Air%20Energy%202014-02-13%20TN-72635.pdf).

62 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C Martin Public Affairs EPIC Questionnaire Organic Waste to Energy 2 13 14v 2 2014-02-13 TN-72617.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C%20Martin%20Public%20Affairs%20EPIC%20Questionnaire%20Organic%20Waste%20to%20Energy%202%2014v%202%202014-02-13%20TN-72617.pdf).

63 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C Martin Public Affairs EPIC Questionnaire Biomass2 13 14v 2 2014-02-13 TN-72602.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C%20Martin%20Public%20Affairs%20EPIC%20Questionnaire%20Biomass2%2013%2014v%202%202014-02-13%20TN-72602.pdf).

64 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C Martin Public Affairs CEC EPIC landfill Bio Funding - DER Modeling JW4 2014-02-13 TN-72607.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/C%20Martin%20Public%20Affairs%20CEC%20EPIC%20landfill%20Bio%20Funding%20-%20DER%20Modeling%20JW4%202014-02-13%20TN-72607.pdf).

also recommended funding advanced biomass fuel handling and delivery systems, and demonstrating advanced technologies for biomethane generation from landfill gas.

TN 72541 UC Irvine,⁶⁵ **TN 72538 UC Irvine:**⁶⁶ UC Irvine proposed a R&D study to evaluate the technology-economic feasibility of a biomass gasification facility to produce syngas to supply a portion of the fuel gas required by an existing combined-cycle plant and produce a natural gas substitute.

TN 72611 Lawrence Berkeley National Laboratory:⁶⁷ LBNL staff recommended assessing a series of bioenergy production scenarios, including feedstock cultivation/collection, transportation, storage, pretreatment, conversion, and use.

TN 72576 Pacific Forest Trust:⁶⁸ The Pacific Forest Trust recommended funding proposed research for ecological impacts of forest biomass energy for specific California woodsheds.

TN 72690 Coalition for Renewable Natural Gas:⁶⁹ Coalition for Renewable Natural Gas recommended that EPIC should fund demonstration of technology that will lower the cost of generation and transmission of pipeline-quality biomethane (renewable natural gas) that is derived from waste to produce electricity at combined-cycle natural gas plants.

TN 72691 Coalition for Renewable Natural Gas:⁷⁰ The Coalition for Renewable Natural Gas recommended that EPIC should fund technology that will preserve onsite landfill-gas-to-energy projects, and bring new projects to California electricity customers by subsidizing advanced pollution control and generation technologies.

TN 72692 Coalition for Renewable Natural Gas:⁷¹ The Coalition for Renewable Natural Gas recommended that EPIC funding should be available for demonstrating anaerobic digestion, gasification, and emerging conversion technologies to produce energy from California's plentiful biomass resources – particularly waste biomass resources.

65 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Irvine_Advanced_Power_and_Energy_Program_A_Rao_Questionnaire_2014-02-13_TN-72541.pdf.

66 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Irvine_Questionnaire_2014-02-13_TN-72538.pdf.

67 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Bioenergy_2014-02-14_TN-72611.pdf.

68 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Response_of_the_Pacific_Forest_Trust_to_the_Questionnaire_2014-02-13_TN-72576.pdf.

69 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Coalition_For_RNG_-_EPIC_Questionnaire_Biomethane_To_Electricity_2014-02-14_TN-72690.pdf.

70 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Coalition_For_RNG_-_EPIC_Questionnaire_Landfill_Gas_To_Electricity_2014-02-14_TN-72691.pdf.

71 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Coalition_For_RNG_-_EPIC_Questionnaire_Organic_Waste_to_Energy_2014-02-14_TN-72692.pdf.

Discussion and Staff Response

Staff has considered the many comments on bioenergy and included opportunities for developing and demonstrating a variety of technologies in the suggested areas. Relevant proposed initiatives for 2015-2017 include:

- Initiative S3.1: *Efficient, Sustainable and Lower-Cost Bioenergy: Innovations to Improve Biomass-to-Energy Systems in California.*
- Strategic Objective S13: *Demonstrate and Evaluate Biomass-to-Energy Conversion Systems, Enabling Tools, and Deployment Strategies.*

Although implementing these bioenergy projects are expected to stimulate workforce development, the focus for these research, development, and demonstration projects will be on the technology and processes and selected through a competitive solicitation. The solicitation will seek to advance precommercial technology demonstration and early stage deployment of biomass-to-energy technologies, systems, and market strategies that have been successfully demonstrated at pilot scale.

Offshore Generation Technologies

Summary of Comments

TN72640 Ocean Motion International:⁷² Ocean Motion International, Inc. and **TN72615 Pacific Marine Renewables, LLC:**⁷³ recommended funding for ocean wave energy generation technologies. Activities include research, full-scale demonstration, and permitting and regulation issues.

TN 72533 State University Council on Ocean Affairs, Science and Technology:⁷⁴ The State University Council on Ocean Affairs, Science and Technology recommended EPIC research and develop more knowledge of the effects of marine renewable energy technologies on the environment. Developers can identify locations for projects that minimize unnecessary damage to vulnerable marine and coastal species and habitats. Moreover, it may be possible to incorporate design elements into the technology itself that minimize or eliminate negative impacts. Once the impacts are understood, plans can be implemented to reduce or mitigate those impacts and provide large-scale technology use.

72 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/OMI_Response_Questionnaire_2014-02-13_TN-72640.pdf.

73 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Marine_Renewables_LL_C_\(PMR\)_Response_to_Research_Questionnaire_2014-02-14_TN-72615.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Marine_Renewables_LL_C_(PMR)_Response_to_Research_Questionnaire_2014-02-14_TN-72615.pdf).

74 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/State_University_Council_on_Ocean_Affairs_Science_and_Technologys_Qu_estionnaire_2014-02-12_TN-72533.pdf.

TN 72523 Marine BioEnergy Inc:⁷⁵ Proposer recommended EPIC engage in R&D exploring the feasibility of cultivating high-yield offshore marine plants, such as California Giant Kelp. The proposed cultivation approach must not interfere with protected coastal zones, shipping, commercial fishing or recreation and recognize that ocean farming need not rely on supplies of fresh water or artificial fertilizers, nor does it take any human food out of the supply chain. Proposals considering projected energy prices, greenhouse gas footprint, and anticipated pace of development would be funded for an exploratory development phase.

Discussion and Staff Response

At this time, the Energy Commission does not propose to allocate EPIC funding for offshore energy technologies, including wave or offshore biofuel. The guiding principles of EPIC and Senate Bill 96 (Peace/Baca, Chapter 510, Statutes of 2013) direct the Energy Commission to focus strategically on the highest priority research and administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state's policies for clean energy. Based on these policy drivers for EPIC, other areas are higher priority for achieving near-term benefits for EPIC ratepayers.

TN 72528 StratoSolar:⁷⁶ StratoSolar proposed technology demonstration and deployment of photovoltaic systems on large buoyant offshore platforms producing electricity that is cost-competitive with coal without subsidies. This would effectively validate the technical feasibility of the power system.

Discussion and Staff Response

At this time, the Energy Commission does not propose to allocate EPIC funding for offshore energy technologies. The guiding principles of EPIC and SB 96 direct the Energy Commission to focus strategically on the highest priority research and administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state's policies for clean energy. Based on these policy drivers for EPIC, other areas are higher priority for achieving near-term benefits for EPIC ratepayers.

Buoyant Atmospheric PV Systems

Summary of Comments

TN 72527 StratoSolar:⁷⁷ StratoSolar proposed the Energy Commission make funding available in the 2015-2017 *EPIC Investment Plan* for technology demonstration and deployment of photovoltaic systems suspended on large buoyant platforms in the upper atmosphere to validate the concept's technical feasibility. StratoSolar proposed that its prototype will reduce

⁷⁵ http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Marine_BioEnergy_inc_Biomass_Grown_in_the_Open_Ocean_2014-02-10_TN-72523.pdf.

⁷⁶ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Stratosolar_Inc_Questionnaire_Response_2014-02-11_TN-72528.pdf.

⁷⁷ http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Stratosolar_Inc_Response_to_Questionnaire_2014-02-11_TN-72527.pdf.

the presubsidy cost of solar photovoltaic generation to a level comparable to coal generation, along with generating other environmental and economic benefits.

Discussion and Staff Response

The TD&D portion of the EPIC plan requires that proposed technologies for demonstration have achieved certain performance verification at the bench to pilot scale, and that the results proved that the technology is viable to pursue a full-scale demonstration and deployment. While the StratoSolar recommendation seems innovative, staff recommends further technological assessments to address scalability, durability, and economics. Such R&D activities related to the StratoSolar recommendation may involve technology development and modeling that could potentially be included under S3.4: *Advance Breakthroughs in Renewable Energy Technologies to Dramatically Increase Efficiencies, Reduce Costs, and Enable Additional Renewable Resources*.

Other Generation

Summary of Comments

TN 72536 Wind Harvest International:⁷⁸ Wind Harvest International designs and manufactures vertical-axis wind turbines (VAWT), with commercial wind farms with good “near ground” as their major market. Commenter states that most of California’s wind farms have good to excellent wind resources at 10 meters above ground level, and although these VAWTs were developed in California, the state is not likely to be the epicenter of its future business. This proposed initiative suggests that funding is allocated for VAWTs.

Its recommendations for EPIC program:

- Focus on products that are past the seed-stage level and have working prototypes in place with good data available for third-party review.
- Do not set limits on what can be considered.
- Take a percentage of the company in exchange for providing the funding for the commercialization process.
- Help companies pull together all the information required to best commercialize their product.

Discussion and Staff Response

The proposed research may qualify under the proposed initiative for the 2015-2017 EPIC Investment Plan, S4.4: *Upgrading California’s Aging Wind Turbine: Design, Cost, and Development Improvements that Meet Local Needs*. Selection of the projects for this initiative will be conducted through a competitive solicitation process and must demonstrate benefits for California IOU ratepayers. They must also meet requirements and priorities set by the State Legislature and the CPUC. Assistance to help companies identify paths to market is included in Strategic Objective S18: *Foster the Development of the Most Promising Energy Technologies into Successful Businesses*.

⁷⁸ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Wind_Harvest_International_Questionnaire_2014-02-13_TN-72536.pdf.

Summary of Comments

TN 72531 K.R. Broome and Associates:⁷⁹ K.R. Broome and Associates recommended a proposal for The Broome Turbine, a commercial-scale demonstration project of a new very low-head (5-15ft) hydroelectric power generation system that will demonstrate operation and maintenance of a small hydroelectric generator for one year in a specified location in the main irrigation canal in Turlock Irrigation District. Results from this demonstration project would provide information for potential customers and help streamline federal permitting requirements.

Discussion and Staff Response

The proposed 2015-2017 EPIC Investment Plan includes Initiative S3.3: *Generating Electricity While Moving Water: Developing Solutions to Expand California's Use of In-Conduit Hydrokinetic Power*. This proposal could include a competitive solicitation for funding to demonstrate a unit within an actual conduit in IOU service territories.

Summary of Comments **TN72659 Wilson Solar Power:**⁸⁰ Wilson Solar Power commented that U.S. Department of Energy (DOE) studies completed in 2011 and 2013 concluded that the technology exists for producing low-cost, reliable, fully dispatchable renewable electricity using a state-of-the-art ceramic low-pressure solar receiver, heat exchanger, and integrated thermal storage unit, with air as the working fluid. Wilson Solar believes this technology does not emit GHGs or air pollutants, and it does not use toxic materials or water except for cleaning mirrors. Also, the technology does not produce noise and has minimal ground disturbance. Funding would allow construction of a pilot demonstration project to test and verify performance and measure environmental impacts.

Discussion and Staff Response

The proposed 2015-2017 EPIC Investment Plan includes an initiative to use a competitive process to fund selected solar thermal generation technologies under Initiative S4.1: *Boost Concentrated Solar Power by Reducing System Costs and Increasing Performance*.

Summary of Comments

TN 72525 Waste Heat Solutions:⁸¹ Waste Heat Solutions recommended that EPIC engage in demonstrating waste-fired distributed generation using air curtain FireBox®, an organic Rankine-cycle technology using solid waste to generate distributed power. Currently, small (100kW-class) distributed Rankine cycle power systems are almost all fossil fuel-fired, and biomass-fired power systems are typically offered in the multimewatt range that require expensive fuel preparation (chipping, pelletizing, and so forth).

⁷⁹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/K-R_Broome_and_Associates_Comments_to_Questionnaire_2014-02-12_TN-72531.pdf.

⁸⁰ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Wilson_Solarpower_Response_-_Proposed_Energy_Research_Initiative_-_Advanced_Dispatchable_Solar_Generation_2014-02-13_TN-72659.pdf.

⁸¹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Waste_Heat_Solutions_Triennial_Investment_Plan_Questionnaire_Response_TN-72525.pdf.

Discussion and Staff Response

Generally, the Energy Research and Development's Natural Gas program supports this type of research. However, if the waste-fired distributed generation is fed by biomass, this system may fall within the scope of Initiatives S3.1 and/or S13.1 of the 2015-2017 EPIC Investment Plan.

Summary of Comments

TN 72627 Lawrence Berkeley National Laboratory:⁸² Proposer recommended an initiative to develop and demonstrate a natural gas combustion system capable of maintaining low emissions (< 5ppm NO_x @ 3 percent O₂) across high rates of turndown (10:1 or greater). Commercializing high-turndown combustion systems would allow for more system efficiency and reduced emissions within California.

Discussion and Staff Response

Although research to decrease GHG emissions and increase efficiency of advanced generation systems aligns with the goals of EPIC, the proposed research is better aligned with the Energy Commission's Natural Gas Research, Development, and Demonstration program and is not included under the proposed initiatives in this investment plan.

Summary of Comments

TN 72626 Lawrence Berkeley National Laboratory:⁸³ The performance of combustion systems for electrical generation is highly sensitive to slight variations in fuel compositions. This sensitivity has been a major technical barrier for the power, transportation, and heating industries to adopt renewable fuels and/or their natural gas fuel blends. Fuel-interchangeable combustion systems that are competitive in cost, reliability, and performance with contemporary natural gas dry-low-NO_x (DLN) systems will overcome these barriers to accelerate the penetration of renewable fuels into the California market.

LBNL proposed an initiative to develop and demonstrate gas fuel-interchangeable DLN combustion systems for commercial to large industrial heaters and power generators. The outcome of the initiative would be to confirm that new combustion concepts can address the issues brought about by interchanging renewable fuels and natural gas, and that these systems can be retrofits and do not increase the size and the footprint or limit the deployment readiness of the systems.

Discussion and Staff Response

Research on fuel-flexible combustion systems is important and has been a focus of advanced generation research under the Natural Gas (NG) program. Through this NG program, staff implemented a R&D initiative on hybrid generation and fuel-flexible systems. Under the EPIC Program, research on combustion systems, if applied in conjunction with biofuel or biogas generated by a biomass conversion system for electricity generation, may be supported under

82 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Combustion_Turndown_2014-02-13_TN-72627.pdf.

83 http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_2014-02-07_questionnaire_BiogasNaturalGasSwitching_2014-02-13_TN-72626.pdf.

Initiative S3.1 on innovations to improve biomass-to-energy systems, and possibly under the Initiative S3.4 for breakthrough technologies.

Summary of Comments

TN 72540 UC Irvine:⁸⁴ Existing small-scale microturbines and fuel cells do not support cost-effective, low-power implementations. UC Irvine staff proposed developing and deploying low-cost, fuel-flexible distributed generation/combined heat and power systems in facilities that cannot support or do not require larger generation capabilities on-site.

Discussion and Staff Response

Staff acknowledges UC Irvine's recommendations and notes that one of the goals of EPIC is to increase market penetration of distributed renewable and advanced energy generation.

Distributed generation research initiatives are included in the *2015-2017 EPIC Investment Plan* in Strategic Objective S3: *Develop Innovative Solutions to Increase the Market Penetration of Distributed Renewable and Advanced Generation*.

Microgrids

Summary of Comments

TN 72603 Santa Clara University:⁸⁵ Santa Clara University recommended developing a microgrid with a solar energy system that could island for at least four days, operate during disasters, use a low-cost "smart" microgrid system that is scalable, and reduce cybersecurity risk to island loads.

TN 72667 UC Irvine:⁸⁶ UC Irvine recommended smart grid technology research and development that should include 1) realistic "living laboratory" microgrids for energy technology testing; 2) interconnection technology development to enable seamless renewable and distributed energy resource integration; 3) dynamic modeling and analysis of smart circuit technology; 4) smart building and smart grid energy management, monitoring, and control systems development; 5) battery electric and plug-in hybrid electric vehicle testing; 6) basin energy management modeling; 7) greenhouse gas life-cycle assessment for novel electric, gas, and transportation technologies; and 8) air quality modeling and assessment of future energy technologies.

84 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Irvine_Advanced_Power_and_Energy_Programs_Questionnaire_2014-02-13_TN-72540.pdf.

85 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Santa_Clara_University_Response_to_EPIC_Second_Investment_Plan_fFinal_2014-02-13_TN-72603.pdf.

86 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/University_of_California_Irvine_Questionnaire_Smart_Grid_Microgrid_2014-02-14_TN-72667.pdf.

Discussion and Staff Response

Staff addressed Santa Clara’s microgrid development comment in the 2015-2017 EPIC Investment Plan under Strategic Objective S15: *Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market, and Improve Grid Reliability*. Staff also acknowledges UC Irvine’s comments and addressed recommendations 1 through 8 in applicable strategic objectives of the proposed 2015-2017 EPIC Investment Plan.

Vehicle-Grid Integration

Summary of Comments

TN 72623 G. Ghatikar:⁸⁷ G. Ghatikar recommended vehicle-to-grid resource modeling, forecasting, and control through the following:

- Developing robust, validated, and scalable load-modeling techniques that can be applied regionally and locally.
- Market interactions for plug-in electric vehicles through probabilistic forecasting of electric vehicle loads, recognizing the flexibility of that load to become a grid resource.
- Development of methods to examine value streams for electric vehicle batteries in grid operations, including bidirectional power flow.

TN 72609 Lawrence Berkeley National Laboratory:⁸⁸ LBNL recommended an initiative to integrate plug-in electric vehicles (PEVs) into the California grid. LBNL states there is a demand for future planning where PEVs benefit the climate and the vehicle owner and allow large-scale integration of renewable electricity in the California grid.

TN 72565 Green Charge Networks:⁸⁹ Green Charge Networks recommended demonstrations of direct current (DC) fast chargers combined with intelligent energy storage to reduce the impacts of vehicle fast charging on the grid.

Discussion and Staff Response

Staff included vehicle integration research demonstrations in the proposed investment plan under Strategic Objective S17: *Provide Federal Cost Share for Technology Demonstration and Deployment Awards*.

Summary of Comments

TN 72630 ChargePoint:⁹⁰ ChargePoint, Inc. proposes an initiative for multifamily dwelling PEV charging equipment. This project will develop a product specifically for this market that

87 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Ghatikar_G_12-EPIC-01_questionnaire_V2G-JM_2014-02-13_TN-72623.pdf.

88 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Transportation_2014-02-14_TN-72609.pdf.

89 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Green_Charge_Networks_Questionnaire_DC_Fast_Chargers_2014-02-13_TN-72565.pdf.

reduces costs for multifamily housing, shifts costs to the driver, and limits the costs that the landlord or homeowners association has to pay. This initiative will demonstrate innovative strategies to achieve high penetrations of the state's investment in plug-in electric vehicles in multifamily locations that minimizes system impacts and upgrade costs.

Discussion and Staff Response

This proposal is not within the scope of the *2015-2017 EPIC Investment Plan*. The Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program is leading the Energy Commission's development of future funding initiatives to support plug-in electric vehicle chargers deployment. You can receive updates about this proceeding and the Energy Commission's other alternative fuel proceedings by subscribing to the Altfuels E-Mail List Server by going to the following Web link: <http://www.energy.ca.gov/2013-ALT-01/index.html>.

Summary of Comments

TN 72666 California Center for Sustainable Energy:⁹¹ The California Center for Sustainable Energy (CCSE) commented that energy storage technology can help manage and complement renewable intermittency issues since energy storage technologies allow direct control to retrieve, store, and dispatch additional power at various times. The proposal has the potential to provide low-cost and advanced energy storage capabilities to meet California's energy storage, renewable energy, and grid reliability goals. The repurposing of PEV batteries for second-life applications will support the PEV market by increasing the total lifetime value of PEV batteries, and reducing the risks and costs associated with commercializing PEVs.

Discussion and Staff Responses

The proposed research is not part of the scope for the *2015-2017 EPIC Investment Plan*. There is a project funded through PIER Electricity, *The Market Impact of Standardized Design in PEV Battery Pack Purchase and Disposal*,⁹² conducting a comprehensive survey of the PEV marketplace and propose value-based design options for standardization of battery modules for vehicle and stationary second-use applications. Findings from this research will better inform future research initiatives.

90 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/ChargePoint_12-EPIC-01_Cover_letter_Questionnaire_Second_Investment_Plan_CPI_Submission_2014-02-13_TN-72630.pdf.

91 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/California_Center_for_Sustainable_Energy_Questionnaire_PEV_Second_Life_Batteries_Solar_Firming_and_NGR_2014-02-14_TN-72666.pdf.

92 Agreement Number PIR-12-005, *The Market Impact of Standardized Design in PEV Battery Pack Purchase and Disposal*.

Clean Energy and Transportation

Summary of Comments

TN 72585 Lawrence Berkeley National Laboratory:⁹³ LBNL staff proposes research that leads to “a better understanding of the impacts of PEV adoption on the electrical grid, GHG emissions, and local environmental quality.”

Discussion and Staff Response

Research on impacts to the electricity grid, greenhouse gas emissions, and local environmental quality is consistent with EPIC program research and goals. Initiative S5.1: *Implement Roadmap to Address Public Health Effects from Energy Technologies* includes work to prioritize research on clean energy technologies.

TN 72562 Los Angeles County Metropolitan Transportation Authority:⁹⁴ The Los Angeles County Metropolitan Transportation Authority proposed an EPIC project that would master plan a series of demonstration projects along the Metro High Desert Corridor (HDC), a new transit and highway corridor. Construction of a new multimodal link between State Route (SR) 14 in Los Angeles County and SR-18 in San Bernardino County will be designed as a sustainable and environmentally responsible project, using wind and solar energy. The renewable energy elements of the HDC, particularly relative to high-speed rail, could be duplicated as a prototype for other high-speed rail efforts within California.

Discussion and Staff Response

The proposed research is not included under proposed strategic objectives in the 2015-2017 *EPIC Investment Plan*. Funding may be available through other sources, such as the AB 32 cap-and-trade allowance auction proceeds.

Summary of Comments

TN 72534 Energy Conversions:⁹⁵ Energy Conversions, Inc. requested a program set aside for train transportation projects, commenting that “commuter locomotives are great hybridization candidates because of the start and stop nature and the extra space available by adding a ‘B’ Unit locomotive. This ‘B’ unit is basically a 2nd ‘booster’ locomotive with its own traction motors and power source, but without an operators control cab.” In addition to the near-zero emissions benefits, this compressed natural gas (CNG)/hybrid propulsion system would provide 75 percent fuel operating cost reduction, 45 percent GHG reductions, and double the acceleration rate.

93 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_PEV_Adoption_2014-02-13_TN-72585.pdf.

94 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Research_Questionnaire_on_Behalf_of_LACMTA_2014-02-13_TN-72562.pdf.

95 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Dave_Cook_Public_Comments_2014-02-13_TN-72534.pdf.

Discussion and Staff Response

The proposed research is not included under the proposed initiatives in the *2015-2017 EPIC Investment Plan* and may be better suited for funding under the Energy Commission's Natural Gas R&D program because it reduces fuel operating costs of vehicles using CNG.

Market Facilitation

Chapter 5: Market Facilitation addresses funding gaps in market processes that drive clean energy investment within IOU service territories. The CPUC EPIC Decision highlighted three focal points for market facilitation activities: regulatory assistance and permit streamlining, workforce development, and program tracking and market research. Comments on each of these market facilitation topics are organized by topic.

Programmatic Environmental Impact Report

Summary of Comments

TN 72578 Sustainable Conservation:⁹⁶ Sustainable Conservation supported a programmatic environmental impact report for biomass as long as biomass is defined to include dairy digesters, not just forestry by-products.

TN 72596 Center for Biological Diversity:⁹⁷ The Center for Biological Diversity (CBD) stated that it takes no position at present on whether the Commission can or should expend EPIC funds to prepare a program environment impact report (PEIR) for SB 1122 facilities. According to CBD a PEIR may be prepared on a related series of actions that can be characterized as one large project. A PEIR should not and cannot be prepared in a vacuum for the sole purpose of streamlining subsequent environmental review. Whether the Commission or another agency is the proper lead agency will be determined on how the underlying project is defined and which agency has the primary role in approving it. (CEQA Guidelines § 15151). A PEIR must disclose and evaluate the significant impacts of the broader program under analysis and identify feasible ways to avoid or mitigate those impacts. Asking on how the PEIR can be structured to best capture benefits for IOU ratepayers betrays a potential misunderstanding of the purpose of an EIR. Under CEQA, an EIR is intended to disclose, analyze, and mitigate the environmental impacts of a project so that California's environment can be protected and decision-makers can be held accountable for their actions.⁹⁸

⁹⁶ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Sustainable_Conservation_Comments_on_the_EPIC_Second_Triennial_Investment_Plan_2014-02-13_TN-72578.pdf.

⁹⁷ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Center_for_Biological_Diversity_Comments_2014-02-13_TN-72596.pdf.

⁹⁸ Laurel Heights Improvement Assn. v. Regents of Univ. of California, 47 Cal. 3d 376 (1988).

Discussion and Staff Response

Staff acknowledges Sustainable Conservation's comments, but funding for a programmatic EIR for bioenergy projects may be too duplicative of the California Department of Resources Recycling and Recovery's (CalRecycle) anaerobic digester programmatic EIR and will not be included in the 2015-2017 EPIC Investment Plan. Energy Commission staff recommends that another state agency take the lead in developing a programmatic environmental impact report for thermochemical conversion technologies using solid-fuel biomass. The PEIR should focus on streamlining the environmental review process for projects related to Senate Bill 1122 (Rubio, Chapter 612, Statutes of 2012).⁹⁹

Data and Analytics

Summary of Comments

TN 72580 Lawrence Berkeley National Laboratory:¹⁰⁰ LBNL staff proposed that EPIC funds target collecting and managing urban data for modeling to aid developing sustainable urban systems.

Discussion and Staff Response

One of the initiatives proposed for 2015-2017 is Initiative S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System*. This initiative would assess clean energy technologies, business models, and strategies under a range of conditions and scenarios to direct investments and decision-making that benefit IOU ratepayers. If funded, this initiative may include analysis of the electric portions of sustainable urban systems in IOU service territories.

Summary of Comments

TN 72598 Lawrence Berkeley National Laboratory:¹⁰¹ LBNL staff proposed identifying managerial and procurement obstacles to conventional energy retrofits for state and local governments of California.

Discussion and Staff Response

Staff concurs that there are unrealized opportunities for capturing significant energy savings by large institutions using clean energy technologies in the public and private sectors. Staff also agrees that barriers to deployment of emerging technologies include a lack of knowledge and information by building managers, procurement officers, and contract managers on how emerging technologies fit within existing and highly structured procurement processes and the cost-effectiveness, performance, and reliability of emerging technologies. To address these

99 California Energy Commission, February 2014, *2013 Integrated Energy Policy Report*, CEC-100-2013-001-CMF, page 107: <http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CMF.pdf>.

100 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Response_to_Questionnaire_Urban_Systems_2014-02-13_TN-72580.pdf.

101 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_CORRECTED_Assessing_and_addressing_obstacles_to_paid-from-sav_Efficiency_in_the_Non-Fedl_C_2014-02-13_TN-72598.pdf.

barriers, staff has included a strategic objective in the market facilitation chapter of the proposed 2015-2017 EPIC Investment Plan. This strategic objective includes funding initiatives to 1) develop tools and strategies to encourage large-scale purchasers to adopt emerging energy technologies and 2) facilitate innovative procurement strategies to reduce purchasing costs for clean energy technologies.

Summary of Comments

TN 72573 California State University, Council on Ocean Affairs, Science & Technology:¹⁰² The California State University, Council on Ocean Affairs, Science & Technology (COAST) requested funding for scientific research on the impacts of marine renewable energy technology on the marine environment. With sufficient knowledge of the effects, actions can be taken to reduce or eliminate potential negative impacts. Environmental mitigation will be critical in moving these technologies to large-scale deployment and commercial use.

Discussion and Staff Response

Staff acknowledges the comments submitted by COAST but notes that since the Energy Commission does not propose to allocate EPIC funding to offshore energy technologies, it is outside the scope of the EPIC plan to fund research on the impacts of marine renewable energy.

Summary of Comments

TN 72631 California Center for Sustainable Communities at UCLA:¹⁰³ CCSC proposed creating an ongoing database that links high-resolution energy use data to information on land use, building stock, weather, and sociodemographic characteristics. This will improve targeting investments to reduce ratepayer expenditures and greenhouse gas emissions, improve climate change adaptation planning, and increase grid reliability. California electric investor-owned utility (IOU) ratepayers will receive significant benefits from reduced energy and climate change adaptation costs and increased grid reliability.

TN 72633 California Center for Sustainable Communities at UCLA:¹⁰⁴ CCSC proposed funding a system to collect, link, preserve, and analyze the following data for at least 10 years: permanent site identification of residence or commercial establishment; customer account ID; meter-level monthly electricity consumption data; address-level program participation data, including program type and intervention date; and other significant modifications to building stock that may affect energy use, including retrofits, expansions, adoption of solar photovoltaic panels, electric vehicle charging stations, absorptive chillers, cogeneration equipment, and others. Current evaluation, measurement, and verification practices often rely upon modeled data and short evaluation periods.

102 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CSU_COAST_EPIC_Second_Investment_Plan_Comments_2014-02-13_TN-72573.pdf.

103 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CCSC_EPIC_Initiative_Energy_Database_final_2014-02-13_TN-72631.pdf.

104 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CCSC_EPIC_Initiative_EE_final_2013-02-0_TN-72633.pdf.

Discussion and Staff Response

Ideas from these comments helped develop Initiative S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System* in the proposed 2015-2017 EPIC Investment Plan.

Workforce Development

Summary of Comments

TN72634 CalCERTS:¹⁰⁵ CalCERTS suggested a comprehensive program to provide workforce education and training to the construction industry workforce, architects, designers, planners, contractors/subcontractors/installer/technicians, building owners/facility energy managers, business development and sales personnel, and real estate professionals, and others. The program would include creating mandatory guidelines and policies for publicly funded program(s) to ensure proper deployment of energy-efficient equipment; incentives for consumer purchases and permitted installations of energy-efficient equipment, including registry of equipment, data tracking, workforce information, and assurance to achieve predicted savings; and industry-credentialed quality assurance.

Discussion and Staff Response

The 2012-14 Triennial EPIC Investment Plan includes a funding initiative for workforce development. Incentives for energy efficiency are available from the IOUs. Guidelines for eligibility for these incentives may be outside the scope of the 2015-2017 EPIC Investment Plan.

Commercialization Assistance

Summary of Comments

TN72708 The Energy Coalition:¹⁰⁶ The Energy Coalition suggested an initiative providing access to experts familiar with advanced clean energy technologies, identifying and evaluating the costs and benefits for specific applications. The program would bring together objective, third-party energy engineering expertise familiar with the proper application, evaluation, and commissioning of advanced technologies, including quality contractors with demonstrated energy efficiency retrofit experience. This would assure successful identification and execution of energy efficiency projects that incorporate advanced technologies. Funding could help expand services to areas in California not currently served by the Southern California Regional Energy Network.

Discussion and Staff Response

Staff agrees with the need to reduce end-user uncertainty regarding the application, performance, reliability, performance, and cost of emerging clean energy technologies. To address this barrier, the 2015-2017 EPIC Investment Plan includes technology and market

¹⁰⁵ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CalCERTS_Response_BH_and_MEB_Final_2014-02-13_TN-72634.pdf.

¹⁰⁶ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Energy_Coalition_Response_to_Questionnaire_2014-02-13_TN_72708.pdf.

analyses to assist decision making, support developing new and expanded procurement strategies, and developed innovative local planning and permitting strategies.

Summary of Comments

TN72660 Metro Organization:¹⁰⁷ This comment proposed a California water-energy innovation cluster to address transportation, treatment, storage, and distribution of water, sectors that use large amounts of electricity. The initiative would draw together universities and research entities, water agencies, the engineering and industrial communities, and water agencies to focus on public education that values using less energy and water, and values developing and testing of emerging water and energy technologies that can be commercialized.

TN 72564 Maps.com:¹⁰⁸ Barriers to entry for new technologies and energy solutions for the community exist in viability, reliability, metrics for comparison of competitive approaches, and an understanding of the research, development, and implementation process. Maps.com proposed funding to leverage many existing and proposed programs to develop a “game changer” in the innovation cluster approach to technology development

Discussion and Staff Response

Staff concurs that there is a critical need to help market-ready clean energy technologies overcome institutional and knowledge barriers that prevent the widespread adoption of these technologies in a variety of potential end-use markets. The *2012-14 EPIC Investment Plan* includes a funding initiative (S5.3) for improving water-energy management. In addition, the Air Resources Board *Cap and Trade Auction Proceeds Investment Plan* recommends funding for wastewater-to-energy competitive grants for pilot projects. In addition, the *2015-2017 EPIC Investment Plan* includes Strategic Objective S18: *Foster the Development of the Most Promising Energy Technologies Into Successful Businesses* for technology testing, information sharing, and measurement and verification of selected technologies.

Summary of Comments

TN 72530 Technikon:¹⁰⁹ Technikon’s Renewable Energy Testing Center (RETC) suggested developing a streamlined process to select the most competitive technologies for testing at RETC facilities.

107 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Metro Organization Questionnaire Water Energy Innovation Cluster 2014-02-14 TN-72660.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Metro_Organization_Questionnaire_Water_Energy_Innovation_Cluster_2014-02-14_TN-72660.pdf).

108 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Maps-com Questionnaire for the Second Investment Plan and the Central Coast Innovation Cluster 2014-02-13 TN-72564.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Maps-com_Questionnaire_for_the_Second_Investment_Plan_and_the_Central_Coast_Innovation_Cluster_2014-02-13_TN-72564.pdf).

109 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Technikon Inc Response to EPIC Questionnaire for 2014-2017 Investment Plan 2014-02-12 TN-72530.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Technikon_Inc_Response_to_EPIC_Questionnaire_for_2014-2017_Investment_Plan_2014-02-12_TN-72530.pdf).

Discussion and Staff Response

Staff considered these comments and has included assistance in applying for testing centers in the 2015-2017 EPIC Investment Plan under S18.3: *Provide Support for Entrepreneurs to Test, Verify, and Certify Their Innovations*.

Summary of Comments

TN 72532 San Marino Ventures Group:¹¹⁰ The San Marino Ventures Group, in association with Economic Development Results (collectively SMVG/EDR), recommended that EPIC develop a renewable energy technology innovation cluster in association with NASA/Jet Propulsion Laboratory. There is a direct pipeline to identify promising renewable energy technologies from NASA/JPL, supporting their commercialization, and testing/deployment at industrial end-user locations.

TN72625 California Marine and Intermodal Transportation System Advisory Council:¹¹¹ CALMITSAC recommended a marine and intermodal statewide renewable energy technology innovation cluster comprising all major California ports, local universities, selected federal laboratories, and the industrial and engineering community. The cluster would evaluate and help commercialize renewable energy technologies in California port and intermodal transportation facilities.

TN 72890 Enterprise Futures Network:¹¹² A questionnaire response submitted by Enterprise Futures Network proposed an “integrated renewables innovation cluster” that will draw together core universities and research entities, cities, and special districts, including ports and water agencies and the engineering and industrial communities. The proposed cluster would provide ongoing review and support of emerging, market-ready technologies for adoption by the public sector.

Discussion and Staff Response

Staff agrees there is a critical need to help market-ready clean energy technologies overcome institutional and knowledge barriers preventing adoption of these technologies in potential end-use markets. To address this concern, the 2012-14 EPIC Investment Plan includes a strategic objective targeting innovation cluster support, S10: *Leverage California’s Regional Innovation Clusters to Accelerate the Deployment of Early Stage Clean Energy Technologies and Companies*. Also, the 2015-2017 EPIC Investment Plan includes a strategic objective to help commercialize promising clean energy technologies and strategies, S18: *Foster the Development of the Most*

110 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/San Marino Venture Groups Comments to the Questionnaire 2014-02-12 TN-72532.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/San_Marino_Venture_Groups_Comments_to_the_Questionnaire_2014-02-12_TN-72532.pdf).

111 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CALMITSAC Energy Research Questionnaire 2014-02-13 TN-72625.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CALMITSAC_Energy_Research_Questionnaire_2014-02-13_TN-72625.pdf).

112 [http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Enterprise Future Network Response to Triennial Investment Plan Questionnaire 2014-02-13 TN-72890.pdf](http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Enterprise_Future_Network_Response_to_Triennial_Investment_Plan_Questionnaire_2014-02-13_TN-72890.pdf).

Promising Energy Technologies into Successful Businesses. A competitive process will be used to select projects for funding.

Summary of Comments

TN 72709 The Energy Coalition:¹¹³ The Energy Coalition suggested that advanced technologies have additional added entry barriers that must also be overcome, including greater perceived risk, higher first costs, lack of education on proper application, installation, and commissioning. The Energy Network provides a comprehensive program delivery structure that meets these challenges and can result in greater synergies and efficiencies.

Discussion and Staff Response

The 2015-2017 EPIC Investment Plan includes initiatives to help overcome barriers to commercialization of clean energy technologies that provide benefits for IOU ratepayers and help achieve California's clean energy goals. Proposed strategic objectives related to commercialization assistance include S18: *Foster the Development of the Most Promising Energy Technologies Into Successful Businesses* and S19: *Facilitate Inclusion of Emerging Clean Energy Technologies Into Large-Scale Procurement Processes*.

Summary of Comments

TN 72588 Lawrence Berkeley National Laboratory:¹¹⁴ LBNL suggested funding a research center to coordinate research on effects of the water-energy-climate nexus on California ratepayers. Research would include developing tools to predict the impact and effectiveness of climate mitigation and adaptation measures and other water-energy-climate topics.

Discussion and Staff Response

The proposed 2015-2017 EPIC Investment Plan includes water conservation research under Initiative S1.5: *Develop and Test Advanced Industrial, Agricultural, Water, and Demand Response Technologies and Strategies to Reduce Energy Use and Costs*. This initiative will develop, validate, and document energy-saving technologies that are in the research and early development stages in industrial, agricultural, water, or wastewater plant settings. The objective is to develop and test innovative technologies and expand the technical proof-of-concept performance data to make these technologies eligible for future demonstrations or deployment programs.

In addition, Initiative S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System* will assess clean energy technologies, business models, and strategies under a range of conditions and scenarios to inform investments and decision-making to benefit IOU ratepayers. The initiative will help select priority areas for future technology development and deployment projects and provide analytical tools to help reduce the cost to IOU ratepayers to achieve California's climate goals under a range of climate and energy scenarios.

113 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Energy_Coalition_EPIC_Workshop_Comments_on_Investment%20Plan_2014-02-13_TN-72709.pdf.

114 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Water_Energy_2014-02-13_TN-72588.pdf.

Summary of Comments

TN72776 California Clean Energy Fund:¹¹⁵ The California Clean Energy Fund (CalCEF) proposed creating a market-facing partner for all California innovation support programs that provides information on clean energy technology commercialization prospects from the perspective of private investors. Emphasis will be on market comparables and diligence to help identify critical milestones separating early concepts from subsequent private financing.

Discussion and Staff Response

The 2015-2017 EPIC Investment Plan includes Initiative S18.2: *Integrate Market Insight into the Selection and Management of EPIC Funded Technologies and Strategies*. This initiative will complement the technical expertise of Energy Commission staff to ensure technologies funded through EPIC are viable from a technical and market standpoint and can be economically scaled and widely deployed in IOU service territories.

Summary of Comments

TN72777 California Clean Energy Fund:¹¹⁶ CalCEF proposed creating a program to coordinate the state's clean energy incubators, the consumers of clean energy solutions, and the policy drivers stimulating innovation in a framework of demand-driven innovation (DDI). The DDI framework would be deployed by a capital-efficient, meta-incubator model that coordinates and finds efficiencies within the diffuse collection of clean energy incubators operating in California today.

TN72778 California Clean Energy Fund:¹¹⁷ CalCEF proposed a new statewide "demand-pull" service, the California Climate Solutions Accelerator (CSA), to address the problem of California businesses facing emissions constraints under AB 32. The CSA would coordinate and accelerate near-term distribution of critical clean energy technology upgrades to achieve GHG and critical copollutant reductions in underserved and economically disadvantaged California communities.

Discussion and Staff Response

Ideas in this comment helped develop Initiative S18.1: *Facilitate a Commercialization Assistance Network to Foster Successful Clean Energy Entrepreneurship* in the proposed 2015-2017 EPIC Investment Plan. This initiative will help facilitate a network of stakeholders to provide commercialization assistance, services, and insights into specific market opportunities and

115 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/D_Adler_2014_EPIC_questionnaire_-_CalCEF_Maximizing_Private_Capital_Participation_2007-03-13_TN-72776.pdf.

116 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/D_Adler_2014_EPIC_questionnaire_-_CalCEF_Demand-Driven_Innovation_2014-03-13_TN-72777.pdf.

117 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/D_Adler_2014_EPIC_questionnaire_-_CalCEF_Climate_Solutions_Accelerator_2014-03-13_TN-72778.pdf.

customer needs. In addition, this initiative includes possible funding to convene a consortium of clean energy customers to define and articulate end-user needs for the electricity sector in IOU services territories. Information and intelligence from this consortium would be disseminated and deployed to the network of incubators and accelerators.

Open-Source Standards

Summary of Comments

TN 72526 1EnergySystems:¹¹⁸ 1EnergySystems recommended EPIC funding to support developing open, nonproprietary standards to integrate energy storage, distributed energy resources, demand response, and related technologies into the smart grid.

Discussion and Staff Response

Southern California Edison (SCE), Pacific Gas and Electric (PG&E), and San Diego Gas and Electric (SDG&E) have identified open communication and control standards for storage and other devices as a high priority item for their second EPIC investment plans.¹¹⁹ The Energy Commission's research will focus on interconnection standards and communication protocols to accelerate interoperability, scalability, safety, quality, availability, and affordability in energy storage, inverters, and microgrid components and systems. Applied research for smart inverters is included in Strategic Objective S6: *Advance the Use of Smart Inverters as a Tool to Manage Areas with High Penetrations of PV*. Technology demonstrations and deployments for microgrids and energy storage are included in Strategic Objective S14: *Take Microgrids to the Next Level: Maximize the Value to Customers* and Strategic Objective S15: *Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market and Improve Grid Reliability*, respectively.

Summary of Comments

TN 72668 Solar Energy Fields:¹²⁰ Solar Energy Fields, Inc. recommended an EPIC initiative to facilitate purchasing renewable energy from small renewable energy projects in California to meet the California High Speed Rail goal of 100 percent renewable energy.

Discussion and Staff Response

The California High Speed Rail Authority has stated, "The Authority wishes to achieve the 100 percent renewable energy objective with a manageable number of suppliers or generating facilities."¹²¹ It has also stated that it seeks input from industry on how best to meet its goals, including purchasing RPS-eligible energy through power purchasing agreements with

118 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/1Energy_Systems_Inc_EPIC_Triennial_Plan_2014-02-11_TN-72526.pdf.

119 http://www.energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/presentations/Investor-Owned_Utilities_Presentation_EPIC_Stakeholder_Workshop.pdf.

120 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/SEF_Initiative_Idea_in_Response_to_the_Questionnaire_2014-02-14_TN-72668.pdf.

121 California High-Speed Rail Authority. April 23, 2013, Call to Industry: Sourcing Renewable Power Supplies for California High-Speed Rail, http://www.hsr.ca.gov/docs/programs/green_practices/operations/Letter%20Renewable%20Energy%20Call%20to%20Industry.pdf, p. 4.

renewable energy facilities. A third party could aggregate RPS-eligible energy from small-scale producers into a single PPA for sale to the High-Speed Rail Authority. *The RPS Eligibility Guidebook*¹²² explains the steps for RPS eligibility for aggregated facilities, focusing on facilities serving on-site load, net-metered facilities, and other very small RPS-eligible facilities.

Furthermore, the proposed *2015-2017 EPIC Investment Plan* includes Initiative S19.2: *Facilitate Innovative Procurement Strategies to Reduce Costs for Clean Energy Technologies*. Aggregation of RPS-eligible energy is a strategy already available in California, although perhaps for smaller facilities than envisioned by this comment. If S19.2 is approved and leads to a funding opportunity, the opportunity will require bidders to compete against each other and demonstrate IOU ratepayer benefits.

Summary of Comments

TN 72569 Haas School of Business Cleantech to Market:¹²³ Cleantech to Market (C2M), Haas School of Business, University of California, Berkeley, suggested the *2015-2017 EPIC Investment Plan* include funding to address the problem that, “Too often, potential solutions remain in the lab because they achieve technical rather than market breakthroughs. ...investors need to see both winnable entry markets as well as potentially profitable and large growth markets in order to make an investment. If the technology inventor cannot persuasively present their innovation in these terms, investors will not be interested and simply pass them by. ... Early market research and investor exposure programs are extremely important in helping technologies make the long transition from lab to market. At a recent gathering of clean energy CEOs, they agreed that it is taking an average of 13 years for them to begin to become commercially viable.”

Discussion and Staff Response

Ideas from these comments helped develop initiatives in Strategic Objective S18: *Foster the Development of the Most Promising Energy Technologies into Successful Businesses* in the proposed *2015-2017 EPIC Investment Plan*.

Regulatory and Permitting

Summary of Comments

TN 72572 San Francisco Bay Area Regional Energy Network:¹²⁴ The San Francisco Bay Area Regional Energy Network (BayREN) and Southern California Regional Energy Network (The Energy Network) indicated significant potential for increased penetration of advanced

122 California Energy Commission, November 20, 2013, Renewables Portfolio Standard Eligibility Guidebook, <http://www.energy.ca.gov/renewables/documents/index.html#rps>.

123 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Cleantech to Market \(C2M\) Haas School of Business University of California Berkeley Response to Questionnaire 2014-02-13 TN-72569.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Cleantech%20to%20Market%20(C2M)%20Haas%20School%20of%20Business%20University%20of%20California%20Berkeley%20Response%20to%20Questionnaire%202014-02-13%20TN-72569.pdf).

124 [http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/San Francisco Bay Area Regional Energy Network and the Southern California Regional Energy Network Response to Questionnaire 2014-02-13 TN-72572.pdf](http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/San%20Francisco%20Bay%20Area%20Regional%20Energy%20Network%20and%20the%20Southern%20California%20Regional%20Energy%20Network%20Response%20to%20Questionnaire%202014-02-13%20TN-72572.pdf).

technologies through improving processes at the local government level. Some areas for improvement include:

- Local government participation and involvement in energy technology program design and implementation.
- Use the array of local government buildings to demonstrate and evaluate technologies.
- Evaluate and improve the rate of compliance with Energy Code standards through education, regional coordination, and capacity building.
- Develop tools and resources to integrate planning documents local governments use.

Discussion and Staff Response

Staff concurs that despite their potential benefits to ratepayers, adoption of emerging energy technologies and strategies can often be hindered by a lack of updated regulatory, permitting, and land use requirements and tools. Improved planning at the regional and local levels can help accelerate the deployment of new clean energy technologies and strategies in a manner that optimizes the energy, environmental, and societal benefits to the local community as well as the larger electricity grid. Strategic Objective S20: *Accelerate the Deployment of Energy Technologies in IOU Territories through Innovative Local Planning and Permitting Approaches*, addresses these challenges by accelerating the deployment of energy technologies in IOU territories through support for innovative local planning and permitting approaches.

Summary of Comments

TN 72563 California Energy Efficiency Industry Council:¹²⁵ The California Energy Efficiency Industry Council offered the following observations and recommendations on the economic and social benefits and values arising from the impact of energy efficient buildings on enhanced indoor air quality.

Retain contracting approach for EPIC funding; comment states that for-profit consultants are effectively excluded by grant-only approach.

To the extent grant agreements are used, provide more flexibility with respect to grant agreement match funding requirements.

To the extent grant agreements are used, reduce administrative burden associated with grant.

Discussion and Staff Response

Most EPIC funds are appropriately awarded through grants as opposed to work-for-hire contracts. Grants are typically for the recipients' projects and benefit recipients by paying for labor, equipment, materials, and other costs of their project without having to repay it like in a loan situation. Contracts, in contrast, are typically used when the Commission wants to hire a contractor to assist in administering the EPIC or other programs. These contracts are for the Commission's benefit and the Commission's work (typically in fulfillment of the Commission's

¹²⁵ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/California_Energy_Efficiency_Industry_Councils_Comments_on_the_EPIC_Second_investment_Plan_2014-02-13_TN-72563.pdf.

public interest mission). Although EPIC solicitations for research, development, and demonstration provide a framework of general requirements, the resulting research projects will be what the recipients propose. As such, they are generally more aligned with grants instead of work-for-hire contracts.

The Energy Commission encourages participation of a range of participants, including for-profit consultants in the EPIC program for both its grants and contracts. Staff acknowledges the suggestions by the California Energy Efficiency Industry Council and will consider options to provide more flexibility within requirements established by the Legislature, the CPUC, and DGS when awarding EPIC funds.

New Solar Homes Partnership

Summary of Comments

TN72657 California Building Industry Association:¹²⁶ The California Building Industry Association requested that the Energy Commission consider including an appropriate level of funding for the New Solar Homes Partnership in the *2015-2017 EPIC Investment Plan*.

Discussion and Staff Response

The option of funding the New Solar Homes Partnership through EPIC is discussed in Chapter 6 of the *2015-2017 EPIC Investment Plan*. At this time, the Energy Commission is interested in keeping all options for NSHP funding open, including combining different funding sources, provided that total funding does not exceed the \$400 million cap for NSHP under Senate Bill 1 (Statutes of 2006).

Data and Analytics

Summary of Comments

TN 72581 Lawrence Berkeley National Laboratory:¹²⁷ LBNL staff proposed developing new metrics to evaluate the performance of energy efficiency upgrades at the system-level rather than at the current device level.

TN 72584 Lawrence Berkeley National Laboratory:¹²⁸ LBNL staff proposed research into changing the way the state determines the expected useful life (EUL) of equipment and

126 http://www.energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/CBIA_Supplemental_Filing_2014-02-13_TN-72657.pdf.

127 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Performance_Metrics_Operational_Performance_Data_Low-Energy_Intgr_Bldg_Sys_2014-02-13_TN-72581.pdf.

128 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Improved_EULs_2014-02-13_TN-72584.pdf.

buildings. Current techniques may underestimate the EUL of equipment and buildings, causing some energy benefits to go unrealized or unaccounted for in benefit assessments.

TN72613 Lawrence Berkeley National Laboratory:¹²⁹ LBNL suggested the Energy Commission, EPIC Program, and California, should cultivate support for and drive research projects through California-based facilities to address market barriers. Test beds and research facilities are required that can accurately quantify the potential savings of emerging technologies; demonstrate their performance; model, measure and manage their impacts and advance policy solutions that reflect these research realities.

Discussion and Staff Response

Staff finds that LBNL's recommendations are consistent with the state's energy policies and research program goals. As the *2012-2014 EPIC Investment Plan* focused on applied research related to technologies, tools and models, the second investment places more emphasis on demonstrating technologies. The *2015-2017 EPIC Investment Plan* provides for demonstrating technologies at both the device and system level and collecting and evaluating the data in Initiative S12.1: *Identify and Demonstrate Promising Energy Efficiency and Demand Response Technologies Suitable for Commercialization and Utility Rebate Programs*. The *2015-2017 EPIC Investment Plan* must focus research funding on priority areas and keep investment initiatives within the scope of the CPUC EPIC decision. The EUL analysis does not meet the current EPIC research goals or scope. Cultivating and supporting California-based facilities is included in Strategic Objective S17: *Foster the Development of the Most Promising Energy Technologies into Successful Businesses* of the *2015-2017 EPIC Investment Plan*. Initiative S18.3: *Provide Support for Entrepreneurs to Test, Verify, and Certify Their Innovations*, provides support for entrepreneurs and startups to obtain third party certification for their innovations.

General Comments / Other Topics

This section discusses comments addressing other chapters of the *2015-2017 EPIC Investment Plan*, as well as general comments.

Nuclear Energy

Summary of Comments

These comments recommend EPIC research on topics related to nuclear energy:

TN72616 Robert Steinhaus:¹³⁰ Robert Steinhaus recommended funding for research, development, and deployment of D-D (deuterium or heavy hydrogen) fusion power. The

129 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/LBNL_Questionnaire_Facilities_and_Programs_of_Accelerating_Building_Performance_Solution_2014-02-14_TN-72613.pdf.

130 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Robert_Steinhaus_Response_to_Questionnaire_2014-02-13_TN-72616.pdf.

specific purpose would be to develop “a conceptual design for a sound path to commercial introduction of a practical fusion power plant.”

TN 72577 Randall Benson:¹³¹ Randall Benson supported the development of “a closed nuclear fuel cycle that minimizes the quantity and radiotoxic longevity of spent nuclear fuel generated by nuclear power” to address the waste problem preventing the development of nuclear power. This can be accomplished through the development of safer GenIV breeder reactors that produce substantially less waste than currently operating plants.

Discussion and Staff Response

The guiding principles of EPIC and SB 96 (Statutes of 2013) direct the Energy Commission to administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state’s policies for energy efficiency, demand response, renewable and distributed generation, storage, electric vehicles, and associated electricity system infrastructure. As discussed by Mr. Steinhaus in comment TN 72616, there is currently a moratorium on the construction of new nuclear power plants in California. Because no new nuclear plants can currently be built in California, there are no plans to conduct nuclear energy research under EPIC. In addition, as discussed in the comment letter TN 72577, nuclear fusion research has been and is being conducted by Lawrence Berkeley National Lab and the Department of Energy. Use of EPIC funding in this area might be duplicative of that research.¹³²

131 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/comments/Randall_Benson_Response_to_Questionnaire_2014-02-13_TN-72577.pdf.

132 <http://scitation.aip.org/content/aip/journal/pop/20/5/10.1063/1.4802194>.

APPENDIX B: Summary of Stakeholder Comments and Energy Commission Staff Responses on the *Electric Program Investment Charge Proposed 2015-2017 Triennial Investment Plan* March 17 and 21, 2014, Workshops

The Energy Commission held two public workshops to discuss proposed initiatives for the draft 2015-2017 *Electric Program Investment Charge Proposed Investment Plan (2015-2017 EPIC Investment Plan)* on March 17, in Sacramento, California and on March 21 in Westminster, California. Participants offered verbal public comments during these workshops, and many others submitted written comments to the Energy Commission for consideration. In this appendix, staff summarizes and responds to all written comments submitted through April 4, 2014.

This appendix organizes comments by topic. Each section includes a summary of comments and Energy Commission staff responses.

Many of the written comments indicated an interest in participating in funding opportunities provided by the EPIC program. The Energy Commission plans to offer funding opportunities from the 2015-2017 *EPIC Investment Plan* in 2015 and will use competitive selection processes for applications. Projects selected for EPIC funding must demonstrate investor-owned utility (IOU) ratepayer benefits and meet other selection criteria.

Demand-Side Management

Plug Load Research

Summary of Comments

TN 72864 Ecova:¹ To better understand consumer behavior patterns, Ecova staff proposed a “comprehensive field survey of plug load electricity consumption in homes and offices” in Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings*, Ecova indicated that such research will help better understand how and when consumers use plug load products in buildings and these findings will inform existing California initiatives. Ecova staff also proposed creating an additional “golden carrot” program for more efficient clothes dryers and hot tubs, and creating realistic test procedures for clothes dryers.

¹ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Ecova_EPIC_Investment_Plan_Comments_2014-03-28_TN-72864.pdf.

Discussion and Staff Response

Ecova's recommendations regarding plug load consumption studies fall within the scope of Initiatives S1.1: *Advance Efficient Solutions for Lower Energy Buildings* and S1.3: *Apply Advanced Social Science Research Methods to Improve Adoption of Next Generation Energy Efficiency Solutions* of the 2015-2017 EPIC Investment Plan. Initiative S1.1 indicates that potential research could include addressing consumer behavioral patterns for plug load equipment use. Initiative 1.3 specifies that one of the focus areas is to identify opportunities for behavior change savings. Staff has revised Initiative S.1.1 (item 4, Plug Load Efficiency Research) to include research associated with consumer devices, consumer electronics and the electronic infrastructure that supports communication. This change will provide flexibility to conduct research on other consumer devices, in addition to electronics. Staff has also added developing test procedures as another potential area of research. As for expanding the golden carrot program to other devices, such as clothes dryers and hot tubs, staff has provided flexibility in Initiative S1.1 (item 4, plug load efficiency research) to do this if it is determined beneficial and feasible for California electric ratepayers.

Summary of Comment

TN 72868 AGGIOS:² AGGIOS, Inc. staff suggested broadening "the scope of the EPIC funding to include technology and user behavior synergies between plug loads and battery powered mobile devices." AGGIOS also recommends replacing the set-top box golden carrot program and focus on the energy efficient design methodologies and design standards rather than replicating particular physical devices.

Discussion and Staff Response

AGGIOS' suggestion is included in Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings* (item 4, "Plug-load efficiency research"). Potential research in this area includes addressing consumer behavioral patterns for equipment use and potential acceptance of new technologies and operating strategies. Initiative S1.3: *Apply Advanced Social Science Research Methods to Improve Adoption of Next Generation Energy Efficiency Solutions* will also address consumer acceptance and social science research components that anticipate end user needs, expectations, understanding and capabilities. Regarding replacing the golden carrot program, staff has elected to keep this competition mechanism but have broadened it so that it can include developing designs and standards to achieve California's energy target goals.

Energy Information and Demand Response

Summary of Comment

TN 72862 Bidgely:³ Bidgely suggested modifying language in Initiative 1.1: *Advance Efficient Solutions for Lower Energy Buildings* (item 5, "Existing building energy efficiency retrofit

² http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/V_Zivnovic_Comments_2014-04-01_TN-72868.pdf.

³ [http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/J_Hawley_L_Gonzales_DSG_Dewey_Square_Group_Bidgely_-_EPIC_Comments_\(clean\)_2014-03-28_TN-72862.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/J_Hawley_L_Gonzales_DSG_Dewey_Square_Group_Bidgely_-_EPIC_Comments_(clean)_2014-03-28_TN-72862.pdf).

strategies”) to: a) Modify the language to include retrofits and solutions, with the latter encompassing new technologies that enable efficiency savings through strategies such as better management; b) conduct research and product demonstration beyond pilot level to reach wider populations; c) recommend that energy use information be by device with specific recommendations or options on how the consumer can save energy; d) suggest that devices be “open” so that residents can have real choice for energy management services and online offerings.

Bigdely proposed changes to Initiative S2.1 including more attention to residential demand response, including support to demonstrate and early deploy, applied research and pilot programs. Bigdely suggests additions to the objective: Evaluate and demonstrate the extent (1) new technologies can allow more devices in residential and/or commercial buildings to participate in demand response programs and deliver cost-effective, reliable savings and (2) strategies that provide the consumer control (as opposed to direct or remote appliance control) can deliver cost-effective reliable savings.

Discussion and Staff Response

Regarding Initiative S1.1 (existing buildings), staff has considered and responded to Bigdely’s recommendations as follows:

- a) Modify the language to include retrofits and solutions: Staff has modified the language in the *2015-2017 EPIC Investment Plan* to consider energy saving solutions and encompass retrofits and strategies.
- b) Conduct research and product demonstration on a broader scale than pilot level: Initiatives S12.1 and S12.2 allow for large scale demonstrations beyond the pilot level.
- c) Recommend that energy use information be by device to provide recommendations on how consumers can save energy. Staff has modified Initiative S1.1 (item 5) to include evaluations at the device level.
- d) Suggest that devices acquired be “open” so that residents can have real choice for energy management services and online offerings. This is a specific detail that could be considered when solicitations are developed for the funding initiatives in *the 2015-2017 EPIC Investment Plan*.

Regarding the recommendation for Initiative S2.1, staff has included Bigdely’s suggested language in the initiative.

Local Government Sites for Testing Energy Efficiency

Summary of Comment

TN 72879 Bay Area Regional Energy Network:⁴ Bay Area Regional Energy Network (BayREN) proposed including Regional Energy Networks (RENs) and local governments as stakeholders

⁴ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/G_Lahr_12-EPIC-01_BayREN_Comment_Letter_EPIC_03-28-14_TN-72879.pdf.

in all the five focus areas of Strategic Objective S1: *Improve Energy Efficiency Technologies and Strategies in California's Building, Industrial, Agriculture, and Water Sectors*. BayREN also “urges the Energy Commission to recognize that local and regional governments play a key part in the furthering of EPIC initiatives, and include language within the priority areas of Strategic Objective S1 to reflect the inclusion of local governments in the development and testing of new technologies, codes, and measures.”

Discussion and Staff Response

Staff has included local governments and Regional Energy Networks as stakeholders in the five areas of Initiative S1.1 that include lighting, HVAC, building envelope, plug loads and existing buildings. Staff does not believe it is necessary for local governments to be included in developing and testing new technologies, codes and measures. The EPIC Program solicitations are open to public and private agencies and local governments can respond to solicitations to do this work.

Water-Energy Nexus

Summary of Comment

TN 72867 California Institute of Food and Agricultural Research:⁵ The California Institute of Food and Agricultural Research recommends that Initiative S1.6: *Advance Strategies to Reduce the Impact of California Buildings on the Water-Energy Nexus*, related to the water-energy nexus be expanded to include the industrial sector, in particular to the food and beverage processing industries.

TN 72859 California League of Food Processors:⁶ The California League of Food Processors (CLFP) recommended that Initiative S1.6 related to the water-energy nexus be expanded to include the industrial sector, specifically, the food processing industry.

Discussion and Staff Response

Staff acknowledges the comments from the California Institute of Food and Agricultural Research and CLEP. Water-energy nexus related projects in the industrial sector fall under the scope of Funding Initiative 1.5: *Develop and Test Advanced Industrial, Agricultural, Water and Demand Response Technologies and Strategies to Reduce Energy Use and Costs*. This initiative will develop, validate and document energy saving technologies that are in the research and early development stages in industrial, agricultural, water or wastewater plant settings. Staff has clarified this initiative by indicating that water-energy nexus improvements are included in S1.5.

⁵ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/M_Maulhardt_Comments_Funding_Comprehensive_Assessments_2014-03-28_TN-72867.pdf.

⁶ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/R_Neenan_Comments_EPIC_Second_Investment_Plan_2014-03-28_TN-72859.pdf.

Summary of Comment

TN 72867 Mike Maulhardt:⁷ Mike Maulhardt proposed funding comprehensive assessments of commercial and industrial customers where a water-energy nexus can be evaluated to reduce electricity use, electricity demand, natural gas usage, and greenhouse gases.

Discussion and Staff Response

Water-energy nexus related projects in the commercial sector fall under the scope of Initiative S1.6 of the *2015-2017 EPIC Investment Plan: Advancing Strategies to Reduce California Buildings' Impact on the Water-Energy Nexus*. The purpose of this initiative is to conduct research to improve and develop cost-effective techniques, technologies, and methods to promote water and energy efficiency in residential and commercial buildings.

Water-energy nexus related projects in the industrial sector fall under the scope of Initiative S1.5: *Develop and Test Advanced Industrial, Agricultural, Water and Demand Response Technologies and Strategies to Reduce Energy Use and Costs* of the *2015-2017 EPIC Investment Plan*. This initiative will develop, validate and document energy saving technologies that are in the research and early development stages in industrial, agricultural, water or wastewater plant settings.

Alternatives to Natural Gas Heating

Summary of Comment

TN 72873 Bay Area Climate Collaborative:⁸ The Bay Area Climate Collaborative (BACC) suggested EPIC funding for research alternatives to natural gas heating, such as radiant heating tiles.

Discussion and Staff Response

Research into alternative heating technologies is included in the *2015-2017 EPIC Investment Plan*. Initiative S1.1: *Advance Efficient Solutions for Lower Energy Buildings* may include developing approaches to maximize efficient energy use in HVAC systems.

Integrated Approaches

Summary of Comment

TN 72865 Lawrence Berkeley National Laboratory:⁹ Lawrence Berkeley National Laboratory (LBNL) staff suggested clarifying language in the *2015-2017 EPIC Investment Plan* to emphasize system integration approaches for buildings and campuses, communities and regions. Research is needed in: a) integrated envelope, lighting, and plug related load reductions, HVAC system optimization and proper installation; and b) development of whole building design and

⁷ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/M_Maulhardt_Comments_Funding_Comprehensive_Assessments_2014-03-28_TN-72867.pdf.

⁸ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/R_Ryes_BACC_Comments_Re_Second_Investment_Plan_2014-04-03_TN-72873.pdf.

⁹ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/A_Ward_Comments_2014-03-28_TN-72865.pdf.

operations platforms and models that include integrated multi-disciplinary efforts involving integration, training, retrofit identification, measurement and verification (M&V), demand response along with attractive financing. Energy efficiency at community scale should be added as a research initiative. It will be essential to bring the findings of the research from the first plan into the second plan. Bridge language of how applied research, technology demonstration and deployment and market facilitation are linked will be helpful.

Discussion and Staff Response

LBNL's recommendations regarding integrated, multidisciplinary approaches for energy efficiency measures are covered in Initiatives S1.1: *Advance Efficient Solutions for Lower Energy Buildings*. Specifically, Item 5 - Existing building energy efficiency retrofit strategies. In addition, S12.1: *Identify and Demonstrate Promising Energy Efficiency and Demand Response Technologies Suitable for Commercialization and Utility Rebate Programs* and S12.2: *Demonstrate Large-Scale Deployment of Integrated Demand-Side Management and Demand Response Programs in Buildings*. S12.2 focuses on large-scale deployment of integrated technologies and innovative approaches (such as HVAC, lighting, building envelope, demand response, and M&V) with the goal of either very energy efficient buildings (retrofits or buildings that may not be capable of reaching ZNE) or ZNE buildings and communities. Staff anticipates that results from the 2012-2014 EPIC *Investment Plan* will feed into recommendations in the 2015-2017 EPIC *Investment Plan*. Technologies, strategies and approaches that are successful could be further assisted by market facilitation activities, through training and procurement approaches. Integrated demand side management approaches using energy efficiency, demand response, distributed generation, metering, and other grid related technologies were covered under the 2012-14 EPIC *Investment Plan* (S12.2).

Summary of Comment

TN 72845 David B. Fisher:¹⁰ David B. Fisher recommended rewarding participants of innovative energy saving concepts with grant and/or rebate programs with EPIC funds similar to the New Solar Homes Partnership rebate program formula.

Discussion and Staff Response

The 2015-2017 EPIC *Investment Plan* includes funding to encourage innovative energy saving concepts and other breakthrough ideas for clean energy solutions in Initiative S10.2: *Conduct Incentivized Grant Competitions to Foster Breakthrough Ideas for Clean Energy Solutions*. However, EPIC is focused on advancing technology innovation and is not designed to duplicate the efficiency incentives provided by the IOUs.

¹⁰ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/D_Fisher_Comments_2014-03-26_TN-72845.pdf.

Generation

Transparent PV

Summary of Comments

TN 72873 Bay Area Climate Collaborative:¹¹ The Bay Area Climate Collaborative (BACC) suggested EPIC funding for research into transparent film photovoltaics (PV).

Discussion and Staff Response

Research and development for transparent film PV is covered under the 2012-2014 EPIC Investment Plan (S3.3) and may also be supported under the 2015-2017 EPIC Investment Plan with Initiative S3.2: *Develop Integrated and Hybrid Photovoltaic Technologies and Strategies to Reduce Costs and Advance Zero-Net Energy Buildings*; and S3.4: *Advance Breakthroughs in Renewable Energy Technologies to Dramatically Increase Efficiencies, Reduce Costs, and Enable Additional Renewable Resources*.

Bioenergy

Summary of Comments

TN 72878 Pacific Forest Trust:¹² The Pacific Forest Trust recommended that the 2015-2017 EPIC Investment Plan include “more specific language from the 2012 – 2014 EPIC Investment Plan that more clearly calls for ensuring the environmental sustainability of forest biomass energy,” particularly in proposed Initiative S13.1 from the 2012-2014 EPIC Investment Plan. The Pacific Forest Trust also recommends highlighting forest biomass as a renewable energy technology requiring environmental mitigation in proposed Initiative 5.2: *Develop Environmental Tools and Information for Future Renewable Energy Conservation Plans*.

Discussion and Staff Response

Staff concurs that sustainability should be a key priority for the development of forest biomass resources and added the language to the 2015-2017 EPIC Investment Plan as recommended.

In-conduit hydropower

Summary of Comments

TN 72827 K. Broome:¹³ K. Broome recommended adding another objective to Paragraph 3.3 in Table 6: Ratepayer Benefits Summary for Strategic Objective 3, as follows: *Develop Innovative Solutions to Increase the Market Penetration of Distributed Renewable and Advanced Generation*, as follows: “Generating electricity using innovative technology, from water falling over very low

11 [http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/R Ryes BACC Comments Re Second Investment Plan 2014-04-03 TN-72873.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/R%20Ryes%20BACC%20Comments%20Re%20Second%20Investment%20Plan%202014-04-03%20TN-72873.pdf).

12 [http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Doherty Pacific Forest Trust EPIC Investment Plan 2014-03-28 TN-72878.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Doherty%20Pacific%20Forest%20Trust%20EPIC%20Investment%20Plan%202014-03-28%20TN-72878.pdf).

13 [http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Kenneth R Broome Comment on EPIC Statement of Objectives 2014-03-25 TN-72827.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Kenneth%20R%20Broome%20Comment%20on%20EPIC%20Statement%20of%20Objectives%202014-03-25%20TN-72827.pdf).

dams on irrigation canals and at discharge spillways from major hydroelectric projects, that are cost competitive and close to end-users.”

TN 72846 K. Broome:¹⁴ K. Broome recommended adding another objective to Strategic Objective 3: *Develop Innovative Solutions to Increase the Market Penetration of Distributed Renewable and Advanced Generation* that would focus on generating electricity from renewable sources of water, using prototype-tested innovative technology without significant effects on the environment. Electricity would be generated from water discharged over existing low dams on irrigation canals and over spillways downstream from existing hydroelectric power plants. Commercial scale demonstration is needed to prove that the technology is competitive with other renewable energy technologies in the area and that projects can be operated independently from the grid.

Discussion and Staff Response

S3.3: *Generating Electricity While Moving Water: Developing Solutions to Expand California’s Use of In-Conduit Hydrokinetic Power* allows for “...pilot-scale demonstrations of pre-commercial turbines and generators such as a demonstration of an individual unit within an actual conduit.” Staff considered the most pressing research for this technology is at the applied research stage, not at the commercial scale demonstration stage proposed by Mr. Broome. Staff also believes the state will receive benefits much sooner from research on in-conduit hydrokinetic energy than from in-stream research efforts.

Fuel Cell

Summary of Comments

TN 72861 FuelCell Energy:¹⁵ FuelCell Energy, Inc. proposes that the *2015-2017 EPIC Investment Plan* include an initiative to consider rapid load response hybrid fuel cell systems that provide transmission and distribution system relief, critical facility hardening during grid disruptions and can use hydrogen storage for peaking, demand response and/or hydrogen refueling.

Discussion and Staff Response

As noted in proposer’s comments, such hybrid fuel cell systems may qualify for funding opportunities under Strategic Objectives 2, 3, 4, 5, 10 and 15 of the *2015-2017 EPIC Investment Plan*. Specifically, the last potential topic in Initiative S3.4: *Advance Breakthroughs in Renewable Energy Technologies to Dramatically Increase Efficiencies, Reduce Costs, and Enable Additional Renewable Resources* identifies “novel technological solutions to enable increased deployment of clean and advanced distributed power generation.”

¹⁴ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/K_Broome_Pages_from_Comment_on_EPIC_Statement_of_Objectives_2014-03-26_TN-72846.pdf.

¹⁵ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/F_Wolak_FuelCell_Energy_CEC_EPIC_Investment_Plan_Comments_2014-03-28_TN-72861.pdf.

Offshore Renewable Energy

Summary of Comments

TN 72851 California State University Council on Ocean Affairs, Science and Technology:¹⁶

The California State University Council on Ocean Affairs, Science and Technology proposes research on the impacts of wave and tidal energy conversion devices on California's marine and coastal environments, including impacts to benthic habitats and organisms, pelagic species (including fish, birds, mammals and turtles, and coastal dynamics and geomorphology.

TN 72856 Redwood Coast Energy Authority:¹⁷ The Redwood Coast Energy Authority proposed substantive support for offshore renewable energy in California, particularly wind and wave energy research, development, demonstration and deployment projects.

TN 72858 Schatz Energy Research Center:¹⁸ The Schatz Energy Research Center recommended that the *2015-2017 EPIC Investment Plan* "be amended to support research, development, demonstration, and deployment of technologies that can be used to exploit California's vast and untapped offshore renewable energy resources," particularly wave and offshore wind energy technologies.

TN 72860 Ocean Geothermal Energy Foundation:¹⁹ J. Shnell of the Ocean Geothermal Energy Foundation recommended an initiative targeting ocean geothermal energy is added to the *2015-2017 EPIC Investment Plan*. J. Shnell suggests that ocean geothermal energy opportunities are incorporated into Strategic Objectives 4, 5 and 6 of the *2015-2017 EPIC Investment Plan*.

Discussion and Staff Response

At this time, the Energy Commission does not propose to allocate EPIC funding for offshore energy technologies. The guiding principles of EPIC and SB 96 (Statutes of 2013) direct the Energy Commission to focus strategically on the highest priority research and administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state's policies for clean energy. Based on these policy drivers for EPIC, other areas are currently higher priority for achieving near-term benefits for EPIC ratepayers.

Regarding geothermal energy, applied research and development (R&D) for land-based geothermal is addressed in Initiative S4.3: *Develop Advanced Technologies and Strategies to Improve the Cost-Effectiveness of Geothermal Energy Production*, with a focus on improving the cost of

¹⁶ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/K_Kramer_CA_State_University_2014_March_27_COAST_2015-17_EPIC_Investment_Plan_comments_2014-06-28_TN-72851.pdf.

¹⁷ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Redwood_Coast_Energy_Authority_Comments_2014-03-27_TN-72856.pdf.

¹⁸ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Schatz_Energy_Research_Center_at_Humboldt_State_University_Comments_2014-03-28_TN-72858.pdf.

¹⁹ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/J_Shnell_OGEF_Comments_EPIC_Second_Investment_Plan_12-EPIC-01_2014-03-28_TN-72860.pdf.

geothermal energy in California. At this point, staff does not believe offshore geothermal energy would be able to provide benefits to California's electricity ratepayers on a timeframe consistent with the EPIC guiding policies for the 2015-2017 EPIC Investment Plan, considering the significant costs and other obstacles involved in developing these resources.

Nuclear Energy

TN 72794 Casey Thormahlen:²⁰ Casey Thormahlen supported Randall Benson's proposed initiative "Closing the Nuclear Fuel Cycle with GenIV Reactors" (TN 72577). His comments outlined the potential for nuclear power to be affordable, reliable and efficient. He also discussed the technologies capable of handling nuclear waste.

Discussion and Staff Response

Please see response to this issue in Appendix A.

Environment and Energy

Summary of Comments

TN 72865 Lawrence Berkeley National Laboratory:²¹ LBNL recommended continuing the EPIC initiatives from the first investment plan regarding "climate modeling and adaptability, life-cycle cost analysis, and research at the intersection of the energy water nexus ... to prioritize technologies and integration policies that will meet the state's goals."

TN 72852 California Institute of Food and Agricultural Research:²² California Institute of Food and Agricultural Research proposed to expand the Water Energy Nexus (WEN) efforts to include the industrial sector, in particular to the food and beverage processing industries.

Discussion and Staff Response

The 2015-2017 EPIC Investment Plan includes Strategic Objective S5: *Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts* that addresses climate change and the energy sector.

The Water-energy nexus is addressed in Initiative S1.5: *Develop and Test Advanced Industrial, Agricultural, Water and Demand Response Technologies and Strategies to Reduce Energy Use and Costs* and in Initiative S1.6: *Advance Strategies to Reduce the Impact of California Buildings on the Water-Energy Nexus*.

²⁰ [http://energy.ca.gov/research/epic/documents/2014-03-17-](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Casey%20Thormahlen%20Email%20in%20Support%20R%20Bensons%20Proposed%20Initiative%20Fuel%20Cycle%202014-03-17%20TN-72794.pdf)

[21 workshop/comments/Casey Thormahlen Email in Support R Bensons Proposed Initiative Fuel Cycle 2014-03-17 TN-72794.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Casey%20Thormahlen%20Email%20in%20Support%20R%20Bensons%20Proposed%20Initiative%20Fuel%20Cycle%202014-03-17%20TN-72794.pdf).

²¹ [http://energy.ca.gov/research/epic/documents/2014-03-17-](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/A%20Ward%20Comments%202014-03-28%20TN-72865.pdf)

[21 workshop/comments/A Ward Comments 2014-03-28 TN-72865.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/A%20Ward%20Comments%202014-03-28%20TN-72865.pdf).

²² [http://energy.ca.gov/research/epic/documents/2014-03-17-](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/R%20Armon%20Comment%20EPIC%20Secound%20Investment%20Plan%202014-03-28%20TN-72852.pdf)

[21 workshop/comments/R Armon Comment EPIC Secound Investment Plan 2014-03-28 TN-72852.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/R%20Armon%20Comment%20EPIC%20Secound%20Investment%20Plan%202014-03-28%20TN-72852.pdf).

Summary of Comments

TN 72825 Y. Sungtaek Ju:²³ Y. Sungtaek Ju of UCLA commented that Initiative S5.3: *Improve Science for Water Management in Power Generation: Hydropower Forecasting and Alternative Sources of Cooling Water* does not adequately address the demand for water resources in energy generation and recommends an initiative “supporting concentrated research efforts on developing innovative alternative dry cooling technologies that can overcome the limitations of the existing dry cooling technology.”

Discussion and Staff Response

Research on such technologies is addressed in the 2012-14 EPIC Investment Plan under Initiative S5.3: *Develop Analytical Tools and Technologies to Reduce Energy Stresses on Aquatic Resources and Improve Water-Energy Management*.

Summary of Comments

TN 72857 Electric Power Research Institute:²⁴ The Electric Power Research Institute (EPRI) posed several questions for consideration in developing the EPIC program. EPRI asked, “to what extent has the Commission considered conducting environmental characterizations (including public health impacts) of new technologies related to the integrated grid?” EPRI also asked questions relating to the possibility and procedure for an organization such as themselves to offer its services to the Energy Commission as well as conduct more conversations between EPRI and the Energy Commission regarding “how best to address the environmental and human health aspects of the Commission’s Second Investment Plans?”

Discussion and Staff Response

The EPIC Environmental Area group supports research in the areas suggested by EPRI. Initiative S5.1: *Implementing Roadmap to Address Public Health Effects from Energy Technologies*, in the 2015-2017 EPIC Investment Plan, supports research in the areas suggested by EPRI. Staff suggests enhancing this support after developing a research roadmap as part of the 2012-14 EPIC Investment Plan.

Summary of Comment

TN 72877 Americas Group:²⁵ The Americas Group proposed that funding be made available in the 2015-2017 EPIC Investment Plan for a brand of monolayer evaporative suppressant that, according to Americas Group document, can save both water and electricity in California. The Americas Group commented that the technology has already been tested and deployed and estimated that this technology can save between 30 and 35 percent of evaporative water loss.

23 [http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/I Sungtaek EPIC second investment plan comment UCLA 2014-03-21 TN-72825.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/I-Sungtaek-EPIC-second-investment-plan-comment-UCLA-2014-03-21-TN-72825.pdf).

24 [http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Electric Power Research Institutes Comments 2014-03-28 TN-72857.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Electric-Power-Research-Institutes-Comments-2014-03-28-TN-72857.pdf).

25 [http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Frank Ramirez WaterSavr for 2015-17 Tri Investment Plan 2014-04-02 TN-72877.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21-workshop/comments/Frank-Ramirez-WaterSavr-for-2015-17-Tri-Investment-Plan-2014-04-02-TN-72877.pdf).

Discussion and Staff Response

Staff agrees that the technology described by the Americas Group has potential for saving water with implications for hydroelectric system performance. The material submitted with this comment showed that the particular evaporative suppressant has been extensively demonstrated here in the United States as well as overseas. However, further advances not yet demonstrated may be included in Initiative S1.5: *Develop and Test Advanced Industrial, Agricultural, Water, and Demand Response Technologies and Strategies to Reduce Energy Use and Costs.*

Smart Grid Enabling Clean Energy

Microgrids

Summary of Comments

TN 72848 Clean Coalition:²⁶ The Clean Coalition provided information about their Community Microgrid project in the Bayview-Hunters Point area of San Francisco in partnership with PG&E. This project is demonstrating how local renewables can supply at least 25 percent of the annual energy consumed in the community while using existing urban space to deliver renewable power. The Clean Coalition used innovative and predictive modeling techniques to demonstrate how and where higher levels of renewable energy can be supported along existing electric utility lines. This project will provide economic, energy, and environmental benefits to the community.

Discussion and Staff Response

The Energy Commission acknowledges the Clean Coalition for the information, which will be considered when reviewing proposed demonstration projects under Strategic Objective S14: *Take Microgrids to the Next Level: Maximize the Value to Customers.*

Energy Storage

Summary of Comments

TN 72826 Extreme Physics:²⁷ G. Roesler with Extreme PhysicsSM recommended energy storage research to advance Strategic Objective S3: *Develop Innovative Solutions to Increase the Market Penetration of Distributed Renewable and Advanced Generation* and S4: *Improve Power Plant Performance, Reduce Cost, and Accelerate Market Acceptance of Existing and Emerging Utility-Scale Renewable Energy Generation Systems* to provide ratepayer benefits in every category of Tables 6 and 7 of the 2015-2017 EPIC Investment Plan.

²⁶ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/G_Thompson_Clean_Coalition_Comments_to_CEC_EPIC_Investments_2014-03-27_TN-72484.pdf.

²⁷ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/G_Roesler_CPU_CRecommendation_for_CEC_EPIC_second_triennial_research_plan_2014-03-23_TN-72826.pdf.

Discussion and Staff Response

Applied Research and Development for energy storage was included in the 2012-2014 EPIC Investment Plan. For the 2015-2017 EPIC Investment Plan. For 2015-2017, Energy Commission staff proposes Technology Demonstration and Deployments of energy storage under Initiative S15.1: *Demonstrate Advanced Energy Storage Interconnection Technologies and Systems in Transmission, Distribution, and Customer-Side Applications to Transition to the Commercial Market.*

Summary of Comments

TN 72830 Proton OnSite:²⁸ Proton OnSite recommended adding large-scale hydrogen energy storage demonstrations to Proposed Initiative S15.1: *Demonstrate Advanced Energy Storage Technologies in Transmission, Distribution, and Customer Side Applications to Transition to the Commercial Market.*

TN 72849 ITM Power:²⁹ ITM Power recommended including one or more commercial validation demonstrations of electrolyzer-based Hydrogen Energy Storage under Strategic Objective S15: *Demonstrate Advanced Energy Storage Systems to Lower Costs and Improve Grid Reliability.*

TN 72855 California Hydrogen Business Council:³⁰ The California Hydrogen Business Council recommended a “full-up” demonstration of hydrogen energy storage systems for load leveling and load following for renewables integration and grid optimization. Many Hydrogen Energy Storage projects use the existing natural gas grid for transportation and storage of hydrogen.

Discussion and Staff Response

Large-scale hydrogen energy storage demonstrations are considered in Strategic Objective S15: *Demonstrate Advanced Energy Storage Systems to Lower Costs and Improve Grid Reliability.* The different types of energy storage mentioned are just a few examples.

Vehicle Grid Integration

Summary of Comments

TN 72871 ChargePoint:³¹ ChargePoint, Inc. indicated its support for Strategic Objective S16: *Expand Smart Charging and Vehicle to Grid Power Transfer for Electric Vehicles* and recommended that electric vehicle demonstrations expand beyond fleets to real market opportunities such as multi-family housing. Smart charging facilities at residential and mixed-use, multi-dwelling

28 http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Steve_Szymanski_TN-72830.pdf.

29 http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/ITM_Power_Incs_Comments_to_the_Second_Triennial_Investment_Plan_2014-03-28_TN-72849.pdf.

30 http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/California_Hydrogen_Business_Council_Comments_2014-03-28_TN-72855.pdf.

31 http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/C_Quinn_ChargePoint_FINAL_EPIC_Second_Investment_Plan_Comments_2014-04-02_TN-72871.pdf.

unit locations and workplace charging should be a high priority target for vehicle grid integration (VGI), as well as the consumer sector of commercial and government fleet operators. ChargePoint recommended \$20-40 million in EPIC funding for Strategic Objective S16.

ChargePoint also recommended that demand response programs in Proposed Funding Initiative S8.1: *Develop Customer Systems to Manage Demand Response, Renewables, and Electric Vehicles, and Integrate these Tools with the Grid*, and programs under Strategic Objective S9: *Advance Electric Vehicle Infrastructure to Provide Electricity System Benefits*, call out workplace, multi-family housing, retail, and municipal markets for funding.

Discussion and Staff Response

The Energy Commission acknowledges ChargePoint, Inc. for supporting Strategic Objective S16, Smart charging at residential, multi-dwelling, retail and workplace facilities are included within the scope of Strategic Objective 15 and Initiative S9.

Staff agrees there are benefits in continued research for developing smart charging tools to support VGI efforts, including expanding into non-fleet PEVs. Proposed research will be considered for future investment plans. The fleet PEVs offer an ideal scenario to perform early development work as those fleets will likely run scheduled routes in relative fixed distances. Findings from this initial research will inform and be expanded into broader markets that include non-fleet and the more complex driving and charging scenarios for future EPIC transportation research

Market Facilitation

Commercialization Assistance and Market Analysis

Summary of Comment

TN 72810 Sacramento Regional Technology Alliance:³² Sacramento Regional Technology Alliance (SARTA) suggested contract awards relating to market penetration, market acceleration, and technology deployment require submitting a commercialization plan developed with the support of an approved business incubator. SARTA recommended the Energy Commission develop criteria for approving commercialization service organizations to provide required coaching and review. In addition, SARTA suggested the Energy Commission define a basic scope of services for the commercialization organizations to provide to the awardees. Multi-year funding and developing a network for the commercial assistance organizations to share experiences and provide mutual support was also recommended.

Discussion and Staff Response

Staff acknowledges the ideas suggested by SARTA and will consider these strategies to improve links between technology development and successful business development.

³² http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Gary_Simon_Comments_on_Second_Triennial_Plan_2014-03-20_TN-72810.pdf.

The proposed 2015-2017 EPIC Investment Plan Initiative S18.1: *Facilitate a Commercialization Assistance Network to Foster Successful Clean Energy Entrepreneurship* includes funding related to commercialization assistance and networking opportunities for clean energy incubators, investors, potential customers, and entrepreneurs. S18.2: *Integrate Market Insight into the Selection and Management of EPIC Funded Technologies and Strategies* includes funding to review and evaluate commercialization plans submitted by EPIC recipients as part of their grant or contract agreement deliverables. These evaluations will be used by Energy Commission staff during critical project reviews to assess whether to continue funding, re-scope funded work, or terminate funding for a project.

Summary of Comment

TN 72850 William F. Lyte:³³ William F. Lyte, Business Developer Manager of Burns & McDonnell provided comments expressing the necessity for a methodology that engages the California engineering industry in assessing and using technologies being implemented under the EPIC program. Suggestions include:

- Categorizing EPIC technologies by program use type to allow easier presentation of technologies to the correct departments of the respective engineering firms. Example categories could include demand response, transmission and distributions, distributed generation, and building energy technologies.
- Categorizing EPIC technology developers by location so that convenient interface with mid-level engineering industry representatives can be established.
- Requiring industrial and regulatory standards and certifications to be distributed by the Energy Commission as a part of all EPIC project awards.
- An ongoing briefing from IOUs for developers regarding the use of EPIC technologies in current and upcoming projects so that EPIC technology developers can have a full understanding of the candidate markets for their technology.
- Establishing a series of funded “mentor-protégé”-type relationships between the technology and engineering firms to promote transparency and discussions on application of technologies within engineering projects.
- Showcasing these relationships and successful technology system deployments through engineering industry associations statewide.

Discussion and Staff Response

The proposed 2015-2017 EPIC Investment Plan includes initiatives to facilitate information dissemination in Strategic Objective S18: *Foster the Development of the Most Promising Energy Technologies into Successful Businesses*, and S21: *Inform Investments and Decision-Making through Market and Technical Analysis*. In addition, Initiative S21.2: *Develop a Clearinghouse for Advanced Energy Technologies, Strategies and Tools* for use by the residential, commercial, industrial, agriculture and water and other sectors. Cross-referencing funding opportunities and project results by place in the loading order and by region may be included in those initiatives. S18 also

³³ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/W_Lyte_Comments_EPIC_Strategic_Objective_19_2014-03-27_TN-72850.pdf.

includes initiatives to increase access to advanced clean energy testing, validation, and certification services, initiatives to provide tools, expert assessment, information on potential customer and investor needs, and guidance to accelerate commercialization of emerging clean energy technologies and strategies with strong market potential.

Summary of Comment

TN 72853 Palo Alto Research Center:³⁴ Dr. Sylvia Smullin with Palo Alto Research Center (PARC) provided comments suggesting EPIC funding is used for pilot studies that include collecting higher-time-resolution data such as 1-minute electricity data and half-hour gas usage data and demonstrate innovative tools that use such data. Also included are business models for providing and sharing these data with the entire community of potential analytics and market engagement innovators. Allowing access to higher-frequency data will promote the development of a further set of tools for diagnostics, prediction, optimization, guiding customer service interactions, and measurement and verification, at grid-scales and in commercial or residential buildings.

Discussion and Staff Response

Innovative tools for collecting, synthesizing, analyzing, and disseminating high-resolution data is included in Initiative S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System*. Applicants must demonstrate how the proposed project would provide IOU ratepayer benefits, obtain permission to use this data, and explain what safeguards and strategies would be used to maintain end-user privacy.

Summary of Comment

TN 72857 Electric Power Research Institute:³⁵ In addition to EPRI's comments on energy and public health discussed earlier in this appendix, EPRI asked the following questions related to market facilitation for clean energy:

Would an independent and credible entity be a valuable resource to the Energy Commission as research and demonstration projects are rolled out in response to the *2015-2017 EPIC Investment Plan*?

How would an entity like EPRI best offer its services and expertise to the Energy Commission during the procurement process?

What would be the process or procedure for the Energy Commission to have further conversations with EPRI regarding how best to address the environmental and human health aspects of the *2015-2017 EPIC Investment Plan*?

³⁴ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/S_Smullin_PARC_Xerox_Co_EPIC_Comments_from_PARC_2014-03-28_TN-72853.pdf.

³⁵ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Electric_Power_Research_Institutes_Comments_2014-03-28_TN-72857.pdf.

Discussion and Staff Response

Independent third-party measurement, evaluation, and verification is included in S12: *Overcome Barriers to Emerging Energy Efficiency and Demand Side Management Solutions through Demonstrations in New and Existing Buildings*, and Initiative S21.3: *Measure and Verify the Ratepayer Benefits of EPIC-Funded Innovations*. Increased access to independent third-party testing of new technologies is included in Initiative S18.3: *Provide Support for Entrepreneurs to Test, Verify, and Certify Their Innovations*. Regarding opportunities for experts to provide technical advice to the Energy Commission during the procurement process, please see S18.2: *Integrate Market Insight into the Selection and Management of EPIC Funded Technologies and Strategies*. Participation in public workshops and providing written comments is an effective way to provide input into the development and implementation of each triennial EPIC investment plan.

Summary of Comment

TN 72865 Lawrence Berkeley National Laboratory:³⁶ Alecia Ward with LBNL recommended EPIC support for climate change adaptations, and “Tools, metrics, measurement methodologies and best practices for moving the needle in the marketplace.”

Discussion and Staff Response

Initiatives addressing energy reliability under a wide range of conditions seek proposals informed by climate change as well, specifically: the energy assurance component of S20.1: *Develop Innovative Approaches to Integrate Utility and Local Government Planning for Emerging Technology Deployment*, and the following analysis in S21.1: *Conduct Analyses on Different Technology Options and Strategies for the Electricity System*:

Identify trends, gaps, and performance characteristics required for emerging clean energy technologies, business models, and strategies to succeed under a wide range of potential energy scenarios and climate outcomes over the next several decades.

Encourage modeling efforts that investigate the long-term system impacts of policies that promote technology development.

The 2015-2017 EPIC Investment Plan includes many initiatives to advance tools, metrics, measurement methodologies, best practices, and assess market trends, including these examples: S18.1: *Facilitate a Commercialization Assistance Network to Foster Successful Clean Energy Entrepreneurship* and initiatives under Strategic Objective S21: *Inform Investments and Decision-Making through Market and Technical Analysis*.

Procurement Processes, Permitting, and Standards

Summary of Comment

TN 72874 CALMAC Manufacturing Corporation:³⁷ CALMAC Manufacturing Corporation suggested Initiative S19.1: *Develop Tool and Strategies to Encourage Large-Scale Purchasers to Adopt*

³⁶ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/A_Ward_Comments_2014-03-28_TN-72865.pdf.

Emerging Energy Technologies be modified to include under-utilized energy technologies, specifically thermal energy storage technologies for shifting cooling loads from peak electric rate period to nighttime, off-peak hours.

Discussion and Staff Response

The Energy Commission acknowledges CALMAC Manufacturing Corporation for the comment and plans to consider under-used energy technologies high priority, including technologies such as thermal energy storage, under Initiative S19.1: *Develop Tools and Strategies to Encourage Large-Scale Purchasers to Adopt Emerging Energy Technologies*.

Summary of Comment

TN 72875 1Energy Systems:³⁸ 1Energy Systems, Inc. commented to support the 2015-2017 EPIC *Investment Plan*, particularly Initiatives S2.1, S14.1, and S15.1. Similar to previous funding from the Energy Commission to develop Open ADR 2.0 standards for demand response, this set of comments recommends EPIC funding for energy storage standards to reduce costs and increase adoption by utilities. The comments recommended changes to Initiative S19.1: *Develop Tools and Strategies to Encourage Large-Scale Purchasers to Adopt Emerging Energy Technologies* to include funding in the 2015-2017 EPIC *Investment Plan* for utilities and vendors to provide a standard for energy storage.

Discussion and Staff Response

Southern California Edison (SCE), Pacific Gas and Electric (PG&E), and San Diego Gas and Electric (SDG&E) have identified open communication and control standards for storage and other devices as a high priority item for their second EPIC investment plans.³⁹ The Energy Commission's research will focus on interconnection standards and communication protocols to accelerate interoperability, scalability, safety, quality, availability, and affordability in energy storage, inverters, and microgrid components and systems. Applied research for smart inverters is included in Strategic Objective S6: *Advance the Use of Smart Inverters as a Tool to Manage Areas with High Penetrations of PV*. Technology demonstrations and deployments for microgrids and energy storage are included in Strategic Objective S14: *Take Microgrids to the Next Level: Maximize the Value to Customers* and Strategic Objective S15: *Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market and Improve Grid Reliability*, respectively.

37 [http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/E_Burger_CALMAC_EPIC_Comments_\(2\)_2014-04-03_TN-72874.pdf](http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/E_Burger_CALMAC_EPIC_Comments_(2)_2014-04-03_TN-72874.pdf).

38 http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/Daniel_Malarkey_1Energy_Systems_Inc_Comments_TN-72875.pdf.

39 http://www.energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/presentations/Investor-Owned_Utilities_Presentation_EPIC_Stakeholder_Workshop.pdf.

Summary of Comment

TN 72873 Bay Area Climate Collaborative:⁴⁰ The Bay Area Climate Collaborative (BACC) recommended EPIC funding to support the following: 1) accelerated public agency deployment of emerging clean energy technologies; 2) funding for a pilot clean energy demonstration project that engages local building officials to advance permitting and model code development; and 3) developing standards and regulations for clean energy technologies, including advanced energy efficiency, to enable market introduction.

Discussion and Staff Response

Accelerated deployment of emerging clean energy technologies by public agencies is addressed in Strategic Objective S19: *Facilitate Inclusion of Emerging Clean Energy Technologies into Large-Scale Procurement Processes*.

Advances in permitting and model code development are addressed in Strategic Objective S20: *Accelerate the Deployment of Energy Technologies in IOU Territories through Innovative Local Planning and Permitting Approaches*.

With respect to standards and regulations related to energy efficiency, staff anticipates that many of the projects resulting from Initiative S1.1 in the proposed *2015-2017 EPIC Investment Plan* will help inform future building and appliance efficiency codes and standards. Research resulting from Strategic Objective S1 in the *2012-14 EPIC Investment Plan* will also help inform future building and appliance standards, such as lighting, HVAC, building envelope and plug loads.

Siting

Preliminary project review

Summary of Comment

TN 72845 David B. Fisher:⁴¹ David B. Fisher, President of Fisher Investment Real Estate stated that there is a lack of assurances for the merit of proposed clean energy development projects other than the developers' own words, and recommends the adoption of an Endorsement Letter or a Letter of Interest from the Energy Commission. He suggested that similar to the SCE Pre-Application Request for grid interconnection, the Energy Commission could provide a non-committal and non-binding Preliminary Project Review. This would provide greater security for potential green-investors and help reduce the zoning approval time for a green project.

Mr. Fisher stated determining locations for green-development site selection is currently costly and time-consuming due to pre-application requests per site. Mr. Fisher recommended

⁴⁰ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/R_Ryes_BACC_Comments_Re_Second_Investment_Plan_2014-04-03_TN-72873.pdf.

⁴¹ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/D_Fisher_Comments_2014-03-26_TN-72845.pdf.

allowing a point of contact at the California ISO or the Energy Commission with an established relationship with the developer/applicant or running background checks on the developer/applicant to address this issue.

Discussion and Staff Response

The suggestions for changes in siting practices are beyond the scope of the EPIC program. Suggestions on this topic should be addressed to the Energy Commission's Siting Division and local siting jurisdictions within California.

Alternative placement of panels for NSHP

Summary of Comment

TN 72845 David B. Fisher:⁴² David B. Fisher recommended the Energy Commission NSHP program allow developers to apply for an on-site alternative placement of the panels that would qualify for the rebates that are roof-mount only.

Discussion and Staff Response

The suggestions related to changes in the guidebook for NSHP should be directed to the Energy Commission's Renewable Energy Division's proceeding for this topic (Docket 06-NSHP-1).

Intellectual Property

Summary of Comments

TN 72866 FAFCO:⁴³ FAFCO, Inc. commented that the 1.5 percent royalty required on future sales (for 10 years) as described in the EPIC terms and conditions is a barrier to submitting a proposal for this EPIC program. Specifically, FAFCO is seeking funding to conduct applied research and development.

Discussion and Staff Response

While FAFCO, Inc.'s concern is noted, the royalty provisions for EPIC projects were established to provide benefits to California IOU electricity ratepayers while balancing the impact on recipients of EPIC funds. The royalty repayment requirements in EPIC have less of an impact on applicants than the royalty requirements under the Commission's PIER program. This reflects lessons learned from PIER. The PIER royalty terms required royalty payment from the first day of sale, whenever it occurred even if years later, and then for 15 years following the first sale. The PIER terms did not cap the royalty payments due and did not take match funding into consideration. In contrast, the EPIC royalty terms only require payment within 10 years of the end of the agreement, which reduces the timeframe for having to make payments, has a cap on the total amount due, and reduces royalty payments proportionally to the match funding provided by the applicant. These differences represent significant changes in royalty

⁴² http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/D_Fisher_Comments_2014-03-26_TN-72845.pdf.

⁴³ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/M_Rubio_FAFCO_Comments_2104-03-28_TN-72866.pdf.

repayments meant to reduce the burden on applicants while preserving a fair benefit to IOU electricity ratepayers. Energy Commission staff believe that EPIC funding with these royalty terms compare favorably to alternative funding available to applicants such as bank loans and venture capital funding.

General

Support for Proposed Initiatives

Summary of Comments

TN 72863 Natural Resources Defense Council:⁴⁴ The Natural Resources Defense Council (NRDC) commended various aspects of the EPIC program administered by the Energy Commission, especially initiatives related to distributed generation, storage, and grid services from electric vehicles. Also, NRDC suggests several projects for IOUs to consider.

Discussion and Staff Response

Staff notes NRDC's comments and expresses gratitude for the support of the proposed initiatives.

⁴⁴ http://energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/comments/N_Jimenez_Natural_Resources_defense_Council_comments_on_epic_tri_investment_plan_workshops_2014-03-28_TN-72863.pdf.

APPENDIX C: Summary of Stakeholder Comments and Energy Commission Staff Responses on the *Electric Program Investment Charge Proposed 2015-2017 Triennial Investment Plan*

Demand-Side Management

Home Automation Network Devices and Systems

Summary of Comments

TN 72907, **Bidgely, Inc.:** Bidgely, Inc., recommends that “gateways” which can leverage California’s AMI infrastructure, be added to the list of technologies listed in the third paragraph of page 123 of eligible product lines/technologies for which demonstration funds could be used in EPIC’s second triennial investment plan. Bidgely also states, “Arguably, gateways are already covered through the mention of ‘cost-effective retrofit technologies’ or ‘other cost-effective technologies,’ but we would submit that the promise of AMI-enabled technologies such as gateways, or more generally, ‘HAN devices,’ is high enough that it would be helpful to provide explicit guidance.”

Staff Discussion and Response

In response to these comments, staff has changed the last paragraph in the purpose section of S12.1, page 123, to make a non-substantive change to the list of examples to add “home automation network devices and systems.”

Staff agrees that HAN technologies should be specifically included in the list, even though they are included in the broad categories. Staff agrees that this category of technology will likely be subject of significant interest during the funding period. However, rather than restrict the category to “gateways”, as suggested by the commenter, staff believe all possible home automation system designs and configurations should be included. Further specification will be addressed during development of the competitive solicitations.

Cross-Cutting: All Value Chain Elements

Standards for Smart Inverters, Energy Storage, and Microgrids

Summary of Comments

TN 72913, **MESA and SUNSPEC:** The Two alliances of MESA and SUNSPEC assert that the Commission can and should play a stronger role in supporting the development of standards for smart inverters, energy storage, and microgrids as it has with the demand response. They

assert that given California's ambitious goals for renewables and energy storage, the lack of funding to advance standards for interoperability in the next Plan would represent a serious lost opportunity and risk for the state's electrical grid. The alliances refer to the recent deployments experience of smart meters without any common standards to foresee the unnecessary costs and lost benefits from that deployment. They recommend that the Energy Commission can send an important policy signal for open standards and accelerate industry efforts to reach agreements by creating a new strategic funding initiative under the Market Facilitation heading.

Staff Discussion and Response

Southern California Edison (SCE), Pacific Gas and Electric (PG&E), and San Diego Gas and Electric (SDG&E) have identified open communication and control standards for storage and other devices as a high priority item for their second EPIC investment plans.¹ The Energy Commission's research will focus on interconnection standards and communication protocols to accelerate interoperability, scalability, safety, quality, availability, and affordability in energy storage, inverters, and microgrid components and systems. Applied research for smart inverters is included in Strategic Objective S6: *Advance the Use of Smart Inverters as a Tool to Manage Areas with High Penetrations of PV*. Technology demonstrations and deployments for microgrids and energy storage are included in Strategic Objective S14: *Take Microgrids to the Next Level: Maximize the Value to Customers* and Strategic Objective S15: *Demonstrate Advanced Energy Storage Interconnection Systems to Lower Costs, Facilitate Market and Improve Grid Reliability*, respectively

¹ http://www.energy.ca.gov/research/epic/documents/2014-03-17-21_workshop/presentations/Investor-Owned_Utilities_Presentation_EPIC_Stakeholder_Workshop.pdf.

APPENDIX D: Links to EPIC Program Solicitations

Current solicitations for the Electric Program Investment Charge (EPIC) Program are posted online at <http://www.energy.ca.gov/contracts/epic.html>.

To receive announcements of Energy Commission funding opportunities, including EPIC solicitations, please sign up for the Opportunities list server. You may sign up for Opportunities list server at <http://www.energy.ca.gov/contracts/epic.html>.

PON-13-301

Program Opportunity Notice: Developing a Portfolio of Advanced Efficiency Solutions: Technologies and Approaches for More Affordable and Comfortable Buildings.

Release date: March 21, 2014.

<http://www.energy.ca.gov/contracts/epic.html#PON-13-301>

PON-13-302

Program Opportunity Notice: Developing Advanced Energy Storage Technology Solutions to Lower Costs and Achieve Policy Goals.

Release date: April 16, 2014.

<http://www.energy.ca.gov/contracts/epic.html#PON-13-302>

APPENDIX E: Summary of Verbal Stakeholder Comments and Energy Commission Staff Responses on the Electric Program Investment Charge Proposed 2015-2017 Triennial Investment Plan

The Energy Commission held public workshops to discuss scoping for the Electric Program Investment Charge *2015-17 EPIC Investment Plan* on February 7, 2014, in Sacramento, California,¹ and workshops to discuss proposed initiatives on March 17, 2014, in Sacramento, California, and March 21, 2014, in Westminster, California. Several participants offered verbal public comment during the workshop, most of which provided written comments as well. Many others submitted written comments/questionnaire responses to the Energy Commission for consideration.

Below is a summary of comments presented during the workshop not subsequently included in written comments. During the workshop, panelists and Energy Commission staff provided responses to many of these comments. Additional responses are provided below. Staff has considered verbal comments, along with those submitted in writing, in preparing the staff final proposed *2015-17 EPIC Investment Plan*.

Verbal comments from the February 7 Scoping Workshop

Methane Flare Gas Recovery, Molten Salt Reactors, and Other Topics

Summary of Comments

Walter Horsting from Business Development International (BDI) on behalf of Terrestrial Energy and Light Systems asked Blaine Collison of the US Environmental Protection Agency (EPA), if there are any programs in the United States for methane flare gas recovery.

Walter Horsting asked Camron Gorguinpour of the US Department of Defense, “in your global based deployment, are you looking at molten salt reactors for base electrical supply in terms of something very compact and mobile?”

Walter Horsting asked Randy Walthers of Raley's, if Raley's fleet “is going into a natural gas mode and whether it could be looking at a source of fuel such as Naphtha to burn?”²

For Josh Gould, ARPA-E, US Department of Energy, Mr. Horsting asked if there was any research of funds out there for mitigating flare gas emissions.

1 The transcript from the February 7, 2014 workshop is available online at:

http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf.

2 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 86, Line 3)

Mr. Horsting also asked Mr. Gould a question regarding rare earth elements. Mr. Horsting stated that green energy requires a large amount of rare earth elements, lithium for batteries, magnesium for magnets, and various rare earth elements for solar panels. He said there is a vast wasteland of toxic material leftover, including thorium, from mining rare earth elements. Mr. Horsting suggested that the federal government look at the possibility of a federally chartered development bank for thorium and rare earth elements to allow the private sector to develop a useful local stream of rare earth elements from material leftover from rare earth mining.³

Panelist and Staff Responses

Blaine Collison stated the EPA has methane recovery programs and natural gas startup programs.⁴

Camron Gorguinpour commented that he was not aware of any DOD programs specific to methane flare gas. In addition, he stated that he has not heard of DOD projects using molten salt reactors.⁵

Randy Walthers of Raley's responded that previously Raley's found natural gas trucks were not powerful enough to transport their goods over the mountains. Raley's is looking into newer natural gas trucks with this capability.⁶

Josh Gould of ARPA-E, US DOE commented that the DOE cannot talk about potential future programs before they are officially announced, to ensure fairness for potential applicants. Mr. Gould also stated the DOE has a program investing \$35 to \$40 million for finding rare earth replacement materials.⁷

Focus on High Priority Projects

Summary of Comments

Laurie ten Hope from the Energy Commission asked panelists to offer suggestions on how to prioritize selection of projects for EPIC funding to ensure the focus is on the best possible candidates.⁸

3 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 141, Line 7)

4 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 88, Line 2)

5 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 87, Line 19)

6 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 86 Line 16)

7 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 148, Line 9)

8 http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 144, Line 10)

Panelist and Staff Responses

Beverly Alexander of the Energy Institute at HAAS, UC Berkeley responded they ask two groups to screen applications. The first consists of internal UC Berkeley experts who have worked in tech transfer and who have experience commercializing technical innovations in the energy sector. The second is an investment-oriented group. Out of those two screenings, they pick their winners.⁹

George Crandell of Technikon commented that they have an internal screening process that narrows down the projects. They send the narrowed set of projects to the funding source to seek approval.¹⁰

Josh Gould of ARPA-E, US DOE said ARPA-E tailors commercialization assistance to the needs of each team of entrepreneurs participating in ARPA-E programs.¹¹

Jennifer Garson of EERE, US DOE, explained that EERE Commercialization Assistance programs fund other organizations to find good teams and companies. To be considered for EERE commercialization assistance, each team or company must show a strong commitment to developing its technology.¹²

Verbal Comments from the March 17 Workshop

Indoor Environmental Quality

Summary of Comments

Mr. Fred Bauman from the Center for the Built Environment, UC Berkeley, said, “it is important to specify strategies that will improve and promote indoor environmental quality in relation to all of the energy efficiency and demand response research efforts.” In his view, indoor environmental quality research should include thermal comfort and overall indoor environmental quality, which are important for the success and adoption of any efficiency or demand response technology. Mr. Bauman encouraged staff to explicitly include these topics in the investment plan.¹³

Panelist and Staff Responses

Staff has included S1.1: *Advance Efficient Solutions for Lower Energy Buildings* in the proposed 2015-2017 EPIC Investment Plan. This initiative will address strategies to improve energy efficiency and performance of major energy-using systems. The initiative will also support

⁹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 144, Line 17)

¹⁰ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 146, Line 24)

¹¹ http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 146, Line 16)

¹² http://energy.ca.gov/research/epic/documents/2014-02-07_workshop/2014-02-07_transcript.pdf. (p. 149, Line 7)

¹³ <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 85, Line 4)

expanding acceptance of energy efficiency measures. In addition, staff has included indoor environmental quality (IEQ) research in the *2015-2017 EPIC Investment Plan* under research Initiative S1.4: *Develop and Evaluate Strategies to Improve Indoor Air Quality in Energy-Efficient Buildings*. The initiative may include research on factors that influence human behavior affecting IEQ and the impacts of poor IEQ on occupants.

Demand Response for Grid Stabilizing Services

Summary of Comments

Dave Watson from Slice Energy suggested the investment plan emphasize newly emerging demand response (DR) technologies that can provide regulation up and regulation down ancillary services, similar to grid stabilizing services available from generators.¹⁴

Panelist and Staff Responses

Initiate S2.1: *Develop and Test Demand Response Technologies to assess Performance, Increase Reliability and Improve Forecasting Techniques* specifically includes development of technologies that "...provide control...capabilities sufficient to replace fossil generation in providing ancillary services..." Development of technologies that provide regulation up and regulation down clearly falls within this research area.

Solid State Lighting

Summary of Comments

Walter Silva with Phillips Lumileds Lighting Co. suggested the investment plan identify lighting as a separate category. Within the lighting category, Mr. Silva suggested a separate research initiative for solid state lighting.¹⁵

Panelist and Staff Responses

Lighting is specifically called out under Initiative S1.1: *Advanced Efficient Solutions for Lower Energy Buildings* to advance next generation lighting technologies, controls, and systems to provide improved energy efficiency and customer satisfaction. Research and development of advanced lighting technologies will be considered for funding under this Initiative. Also, a competitive research solicitation from the 2012-14 EPIC Investment Plan released March 2014 includes funding for developing and testing of next generation lighting systems, such as advanced light emitting diode technologies. For more information:

www.energy.ca.gov/contracts/epic.html#PON-13-301

Federal Cost Share for Offshore Energy

Summary of Comments

Bill Toman stated that he is working with CalPoly San Luis Obispo on a DOE grant to facilitate siting and costing studies for potentially siting a national wave energy test center offshore from California. He commented on the issue of federal cost share. He is concerned that EPIC limits cost share to 10 percent of the project cost. Further, he states that DOE has told him that they

14 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 76, Line 10)

15 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 77, Line 12)

wonder why there is an apparent lack of support for wave energy on the part of the state of California. He would like to look to the Energy Commission to help provide an answer to that question from the DOE, and to address the issue of limiting EPIC fund cost sharing to 10 percent of project costs.¹⁶

Panelist and Staff Responses

Regarding wave energy, at this time, the Energy Commission does not propose to allocate EPIC funding for offshore energy technologies. The guiding principles of EPIC and SB 96 (Statutes of 2013) direct the Energy Commission to focus strategically on the highest priority research and administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state's policies for clean energy. Based on these policy drivers for EPIC, other areas are currently higher priority for achieving near-term benefits for EPIC ratepayers.

In the first Investment Plan, the Energy Commission allocated up to 10 percent of the total funding for Applied Research and Development and Technology Demonstration and Deployment, \$15.8 million and \$12.9 million respectively, to be used as federal cost share. Individual projects are not capped at 10 percent.

Schedule for EPIC Funding Opportunities

Summary of Comments

Ken Broome, following up on his response to the Energy Commission's EPIC questionnaire to demonstrate commercial scale low head hydro power, asked when EPIC funding opportunities will be available and how much time applicants will have to respond.¹⁷

Panelist and Staff Responses

Energy Commission staff responded that a schedule of funding opportunities for the 2012-2014 EPIC Investment Plan is available on the Energy Commission Web site. The schedule will be updated as more information becomes available. Concerning the 2015-2017 EPIC Investment Plan, the funding initiatives are staff proposals at this point. The plan will not be finalized until the end of 2014. The plan must be approved by the Energy Commission and the California Public Utilities Commission. Staff does not anticipate solicitations from the 2015-2017 EPIC Investment Plan until spring 2015 at the earliest.¹⁸

Vision and Structure of the Proposed Investment Plan

Summary of Comments

Scott Elrod, Palo Alto Research Center, commented that he was concerned that for \$160 million, this is a "very ambitious agenda." He suggested organizing solicitations around a vision for the future energy system. For example, he suggested focusing on "the energy user in the home of the future" or "the corporation of the future and its interaction with the energy system." He suggested limiting the investment plan to 10 solicitations or 15 solicitations, addressing

16 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 72, Line 24)

17 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 74, Line 22)

18 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 75, Line 15)

different pieces of the value chain, such as the communication required, the energy storage required, and the renewable generation that could be sited in those places. This would further focus the effort and ensure that there is enough money to help advance the vision.¹⁹

Mark Berman, Davis Energy Group, echoed Mr. Elrod's comments on this topic. Mr. Berman commented that he was concerned that the available funding may be spread too thin across too many initiatives. Mr. Berman suggested the investment plan focus on the theme of efficiency within buildings and energy in and on buildings for both new and existing buildings. He recommended the theme include a focus on how to motivate homeowners to take actions that are in their own interest.²⁰

Panelist and Staff Responses

Staff acknowledges these comments and may further consolidate initiatives when preparing solicitations.

The guiding principles of EPIC and SB 96 direct the Energy Commission to focus strategically on the highest priority research and administer EPIC funds to improve electricity system reliability, safety, and affordability in California for EPIC ratepayers; and help achieve the state's policies for clean energy. Based on these policy drivers for EPIC, the proposed *2015-2017 EPIC Investment Plan* includes initiatives in high priority areas for achieving near-term benefits for EPIC ratepayers and overcoming barriers to achieving California's clean energy goals. The CPUC Phase 2 decision (Decision 12-05-037) requires EPIC investments to be linked to the elements of the electricity "value chain," which consists of grid operations/market design, generation, transmission, distribution, and demand-side management.

The vision that drives EPIC investments administered by the Energy Commission is removing barriers and stimulating breakthroughs to achieve a more resilient and reliable electricity system for California featuring near-zero-net energy buildings, highly efficient businesses, low-carbon generation, sustainable bioenergy systems, more localized generation, and the electrification of transportation. To support and integrate these features, the *2015-2017 EPIC Investment Plan* also includes initiatives for advances to achieve a highly flexible and robust distribution and transmission infrastructure.

The proposed initiatives identified in the *2015-2017 EPIC Investment Plan* represent the full scope of possible awards and includes energy efficiency, demand response, clean generation, smart grid enabling technologies, transportation, and market facilitation. The Energy Commission may not issue solicitations or make awards in every initiative area if funding is inadequate, there is a lack of qualified applicants, or further analysis of market conditions indicates that an initiative is not currently a high priority or it is already adequately funded by other entities.

19 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 78, Line 14)

20 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 82, Line 24)

Verbal Comments from the March 21 Workshop

Commercialization Assistance

Summary of Comments

Mr. In S. Kim of ADC Energy USA, Inc. commented that ADC Energy has a demonstration of its new patented technology that can help reduce energy use for lighting or future electronics. ADC Energy seeks information and assistance on next steps for commercializing this patented technology.²¹

Panelists and Staff Responses

The proposed 2015-2017 EPIC Investment Plan includes initiatives to help commercialize emerging clean energy technologies in S18: *Foster the Development of the Most Promising Energy Technologies into Successful Businesses*. Funding will be awarded through a competitive process.

Federal Cost Share

Summary of Comments

Kelly Hull with Bright Footprint asked for clarification of Strategic Objective S11: *Provide Federal Cost Share for Applied Research Awards*, which would provide federal cost share for applied research awards. She asked whether S11 refers to funding from Proposition 39, passed by California voters in 2012.²²

Panelists and Staff Responses

If a project is pursuing a federal opportunity announcement (FOA) that requires cost share, the 2015-2017 EPIC Investment Plan includes two initiatives that provide EPIC funds for this purpose, through S11 and S17. Cost share funding will be awarded through a competitive process. For projects deemed eligible for S11 or S17 funding, the Energy Commission could provide a letter of support or commitment stating that if the project received the federal award, then EPIC funds could be used as potential cost share for the project. However, S11 and S17 only apply to use of EPIC funds for federal cost share and not cost share for state programs. State incentives and funding (e.g. Proposition 39 funding) could be used as match funding in EPIC competitive solicitations if it meets the project and match fund requirements stated in the applicable solicitation. Please refer to specific EPIC solicitations regarding project and match funding requirements at: www.energy.ca.gov/contracts/epic.html.

Verbal Comments from the April 22 Business Meeting

Please see the transcript for the April 22, 2014, business meeting for information on verbal comments and responses during the business meeting.

21 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 56, Line 24)

22 <http://energy.ca.gov/research/epic/documents/index.html#0317212014>. (p. 57, Line 18)