



CALIFORNIA ENERGY COMMISSION

Electric Program Investment Charge

First Triennial Investment Plan Development

September 27, 2012

Energy Research and Development Division
Efficiency and Renewable Energy Division
California Energy Commission



Workshop Overview

- Draft Investment Plan posted on CEC website on September 21, 2012. The plan presents:
 - The proposed funding areas for the three year investment period (2012-14).
 - The recommended implementation process.
- Today's workshop purpose:
 - Present overview of draft plan.
 - Seek detailed input from stakeholders, experts and public on the plan.



Next Steps After the Workshop

- Written comments can be submitted up to October 1, 2012.
- CEC staff will revise plan based on feedback at workshop and written comments.
- Staff final investment plan will be issued in mid-October time frame.



Schedule for Investment Plan Development and Approval

| Activity | First Triennial Investment Plan (covering 2012-2014) |
|---|--|
|  Northern CA scoping workshops | August 2-3, 2012 |
|  Southern CA scoping workshops | August 9-10, 2012 |
|  Propose Investment Plan to stakeholders | September 27, 2012 |
| CEC Posts Proposed Investment Plan | mid October, 2012 |
| CEC considers adopting Investment Plan at Business Meeting | late October, 2012 |
| Submit Investment Plan to CPUC | November 1, 2012 |
| CPUC proceeding | Dec. 2012 – April 2013 |
| CPUC Decision adopting or modifying Investment Plans | May 2013 |



Investment Plan Outline

Chapter 1 – Introduction

Chapter 2 – Program Directives

Chapter 3 – Applied Research and Development

Chapter 4 – Technology Demonstration and Deployment

Chapter 5 – Market Facilitation

Chapter 6 – New Solar Homes Partnership

Chapter 7 – Program Administration

Chapter 8 – Program Benefits Assessment



Background

- In its EPIC Phase 2 decision, the CPUC designated the Energy Commission as one of four administrators of the program.
- The Energy Commission's development work on the EPIC investment plan is being conducted in accordance with recent legislation, Senate Bill 1018 (Chapter 39, Statutes of 2012), and overlaps significantly with the Energy Commission's broad authority under Public Resources Code Sections 25216 (c) and 25401.
- All funds will be administered under CPUC oversight.
- Energy Commission staff developed the draft EPIC investment plan with input and guidance from Energy Commission Chair Robert B. Weisenmiller, in his capacity as the lead commissioner on research, development, and demonstration matters, and with input and guidance from Commissioner Carla Peterman, in her capacity as lead commissioner on renewable energy matters.



Programmatic Elements Required in the Investment Plan

- Specific funding areas
- Funding amounts by area
- Project eligibility criteria
- Project selection criteria and approach (e.g. RFO)
- Per project funding limits
- Matching requirements
- Metrics for measuring benefits and success
- Treatment of intellectual property

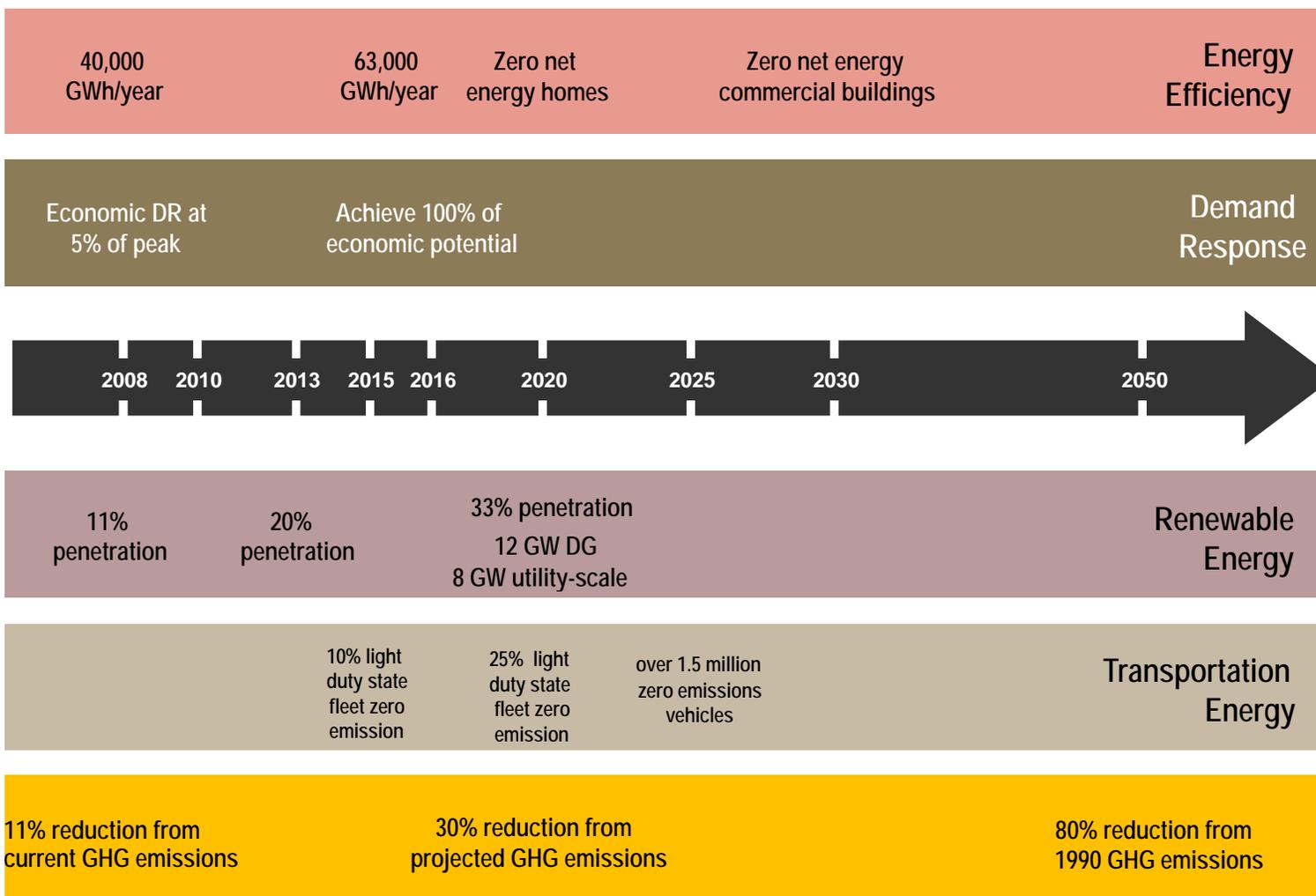


Proposed CEC EPIC Budget (Million\$)

| Funding Element | 2012 | 2013 | 2014 | Total |
|--|--------------|---------------------|---------------------|--------------------|
| Applied Research and Development (AR&D) | 48.7 | 55.0 | 55.0 | 158.7 |
| Technology Demonstration and Deployment (TD&D) | 39.8 | 45.0 | 45.0 | 129.8 |
| Market Facilitation (MF) | 13.3 | 15.0 | 15.0 | 43.3 |
| Program Administration (PA) | 11.3 | 12.8 | 12.8 | 36.9 |
| Sub Total | 113.1 | 127.8 | 127.8 | 368.7 |
| New Solar Homes Partnership (NSHP) | 0.0 | up to 25.0 | up to 25.0 | up to 50.0 |
| Total | 113.1 | up to 155.58 | up to 155.58 | up to 424.3 |



California Energy Policy Drives Proposed Investments





State Policy and Planning Reports Provide Direction for EPIC Investments

Efficiency

- “Develop smart lighting and other technologies, systems, and solutions that are optimized for energy savings, demand response and human performance” – CA Energy Efficiency Strategic Plan (CEESP)
- “California will need new, cost-effective technologies, strategies and innovations for existing and new buildings to reduce energy use, such as new building materials and fabrication techniques, and “smarter” building operating systems, such as visual displays of real-time energy use” – CEESP
- “New technologies and practices are needed in the industrial, agriculture and water sectors to maintain or increase productivity while reducing energy consumption and costs” – CEESP, various IEPRs

Generation

- “Energy storage can provide a variety of integration services, but additional evaluation is needed” – 2011 IEPR
- “Distributed generation technologies will be deployed at significantly higher levels” – CCEF
- “Biomass electricity generation will be a major component of base-load generation in California” - CCEF

Smart Grid

- “The distribution systems needs to use technologies that easily allow for two-way flow of electricity as well as improved communication technologies” – 2011 IEPR
- “Better model and simulation tools are needed to evaluate operational requirements of the grid with a high penetration of distributed generation resources” – 2011 IEPR

Cross Cutting

- “Establish an incubator program to accelerate commercialization of most promising technologies” – CEESP
- “As investment in the clean energy economy expands, there is increased need for a coordinated approach to workforce training that is closely aligned with labor demand” – 2011 IEPR



CEC EPIC Vision

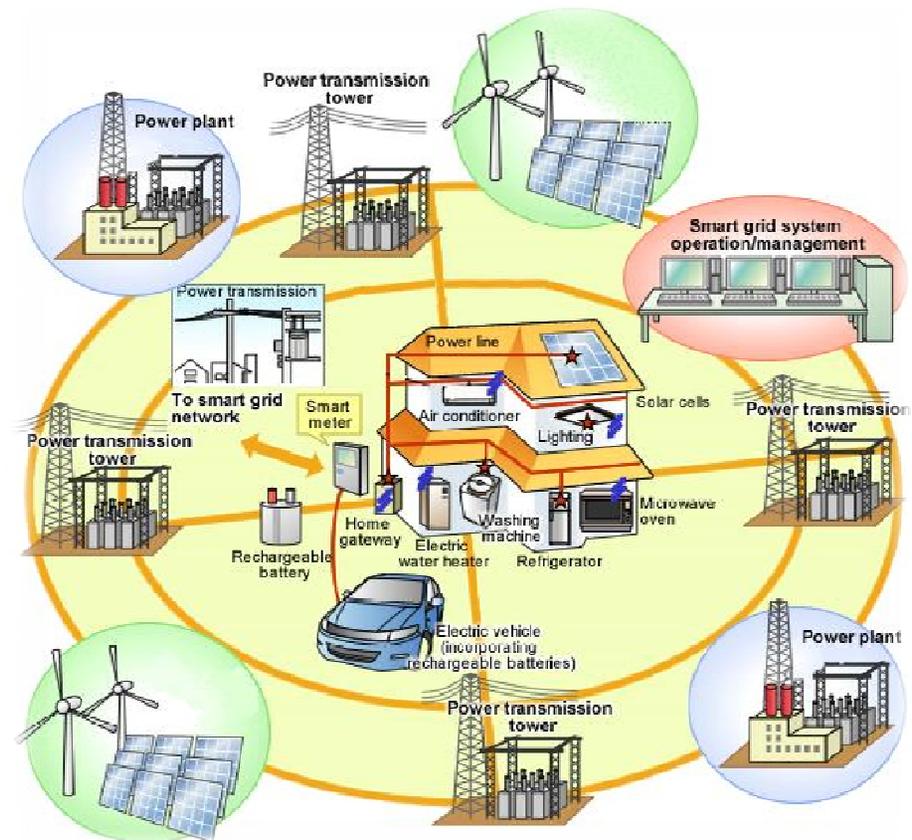
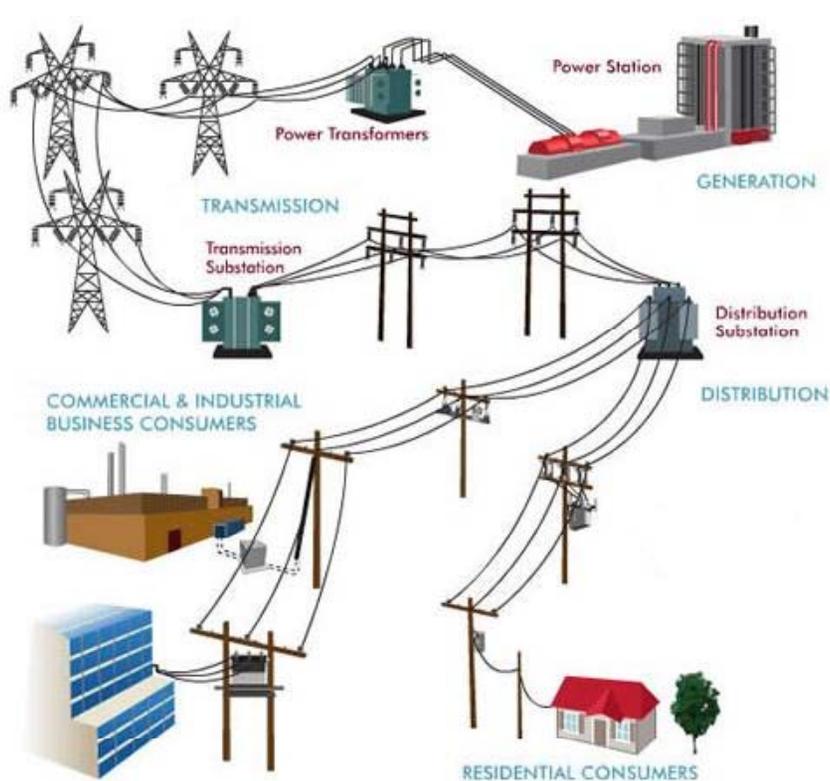
California's future electricity system will consist of near net zero energy buildings, highly efficient businesses, low carbon generation, sustainable bioenergy systems, more localized generation, and electrification of transportation, supported by a highly flexible and robust distribution and transmission infrastructure.

CEC EPIC Mission

The Energy Commission through EPIC will fill critical funding gaps within the energy innovation pipeline to advance technologies, tools, and strategies that provide California's IOU ratepayers with clean, affordable, and reliable electricity and help enable the 21st century power grid.



EPIC Will Accelerate the Commercialization of Technologies that Advance the Electric System





CPUC EPIC Phase 2 Decision Budget

ENERGY INNOVATION PIPELINE

APPLIED RESEARCH AND DEVELOPMENT

CEC - \$55 million/year

Pre-commercial development
Lab-scale demonstration
Pilot-scale demonstration

TECHNOLOGY DEMONSTRATION AND DEPLOYMENT

CEC - \$45 million/year
IOUs - \$30 million/year

Pre-commercial
demonstration
Pre-commercial deployment

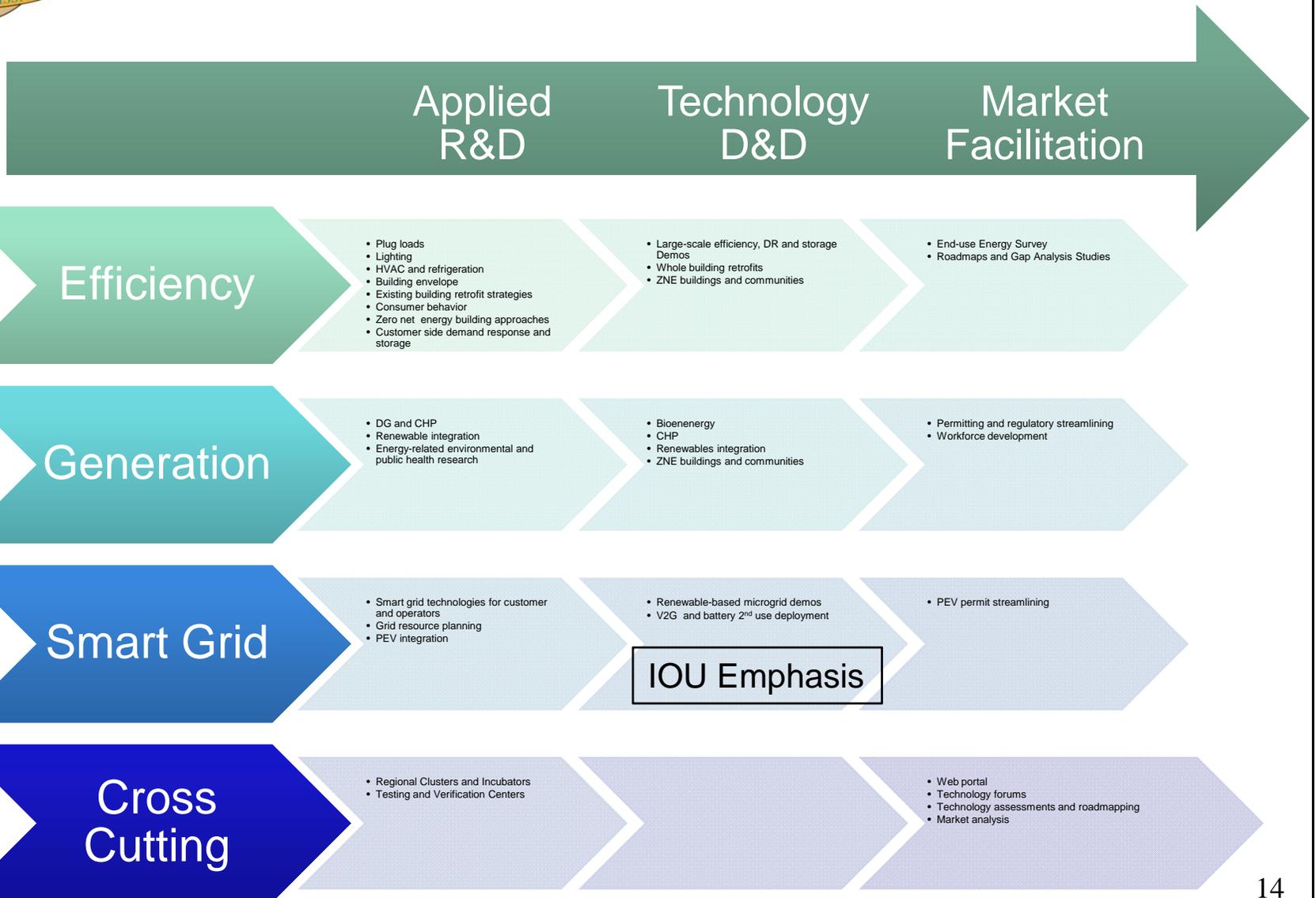
MARKET FACILITATION

CEC - \$15 M/year

Regulatory assistance
Workforce
development
Program tracking
Market analysis



CALIFORNIA ENERGY COMMISSION





Draft Proposed Three-Year CEC EPIC Budget Plan (FY12/13 - FY14/15)

| | | Total |
|---|-------------------------------|----------------|
| Applied Research | | \$158.7 |
| Energy Efficiency and Demand Response (S1, S2) | | \$64.7 |
| Clean Generation (S3, S4, S5) | | \$44.0 |
| Smart Grid Enabling Clean Energy (S6, S7, S8, S9) | | \$23.0 |
| Cross-Cutting (S10) | | \$27.0 |
| Technology Demonstration and Deployment | | \$129.8 |
| Energy Efficiency Demonstrations (S11) | | \$37.3 |
| Clean Energy Generation Demonstrations (S12) | | \$24.0 |
| CEGD--Bioenergy | | \$27.0 |
| ZNE Buildings and Communities (S13) | | \$41.5 |
| Market Facilitation | | \$43.3 |
| Regulatory assistance and permit streamlining (S14) | | \$23.3 |
| Clean energy workforce (S15) | | \$4.5 |
| Clean energy innovation, analysis & outreach (S16) | | \$15.5 |
| Program Administration | | \$36.9 |
| Sub Total | | \$368.7 |
| | | |
| New Solar Homes Partnership (NSHP) | proposed not to exceed amount | \$50.0 |
| | | |
| Total | proposed not to exceed amount | \$418.7 |

Notes:

1. Estimates based on loading order, gaps in funding, stakeholder comments, and other guidance in CPUC EPIC Phase 2 Decision.
2. Estimates may change once draft IOU EPIC investment plans are published and CEC staff review additional comments docketed with the CEC in 12-EPIC-01.
3. S1, S2, S3,... represent the strategic objectives from the CEC Staff Draft EPIC Investment Plan.



The EPIC Investment Plan Framework Reflects Five Guideposts

1. Enable cost-beneficial achievement of the state's clean energy goals.
2. Accelerate "home-grown" technology innovation.
3. The project selection process is designed to:
 - a. Select the most promising technology solutions that do not duplicate other ongoing public or private research activities.
 - b. Assert downward pressure on administrative costs.
 - c. Maximize in-state investments.
4. Ratepayer benefits are embodied in the entire plan.
5. Build on lessons learned and create a new program that is updated to meet today's priorities and guidance from the CPUC EPIC Phase 2 decision.



Staff Proposed Funding Initiatives for the Draft Investment Plan

- The investment plan presents a range of potential project funding initiatives.
- Proposed funding initiatives incorporate:
 - CPUC EPIC Phase 2 decision's defined program areas.
 - Guiding principles.
 - Electricity value chain.
 - Policy and other ratepayer benefits as described in the Decision.
- The proposed funding initiatives are based on:
 - Stakeholder comments received.
 - Current knowledge of state-of-the-art technologies.
 - Existing RDD&D efforts, known barriers and gaps.
 - Key factors driving clean energy development.



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Applied Research and Development

| | |
|--|---|
| 3-Year Funding for Applied Research and Development | Up to \$158.7 million |
| Estimated Minimum/Maximum Project Award Per Recipient | \$250,000 to \$3 million |
| Match Funding Requirement | None but those providing match funds will receive higher scores during proposal evaluation. |
| Estimated Funding to Match Federal program investments (3 years) | \$xx million* |

*Staff seek stakeholder and public input on the amount of EPIC funds that should be reserved to match federal program investments.



S1. Develop next-generation end-use efficiency technologies and strategies for the buildings sector.

- S1.1 Develop, test, and demonstrate next-generation lighting systems and components.
- S1.2 Develop, test, demonstrate, and integrate advanced equipment, systems, and components that improve the energy efficiency of heating, ventilation, air-conditioning, and refrigeration systems in buildings.
- S1.3 Develop, test, and demonstrate advanced building envelope systems, materials, and components.
- S1.4 Investigate and improve understanding of consumer behavior to increase and sustain energy efficiency improvements in buildings.
- S1.5 Develop and demonstrate prototype graywater reuse technologies and approaches to reduce the need for fresh water in buildings.
- S1.6 Develop cost-effective retrofit strategies to achieve greater energy efficiency in existing residential and nonresidential buildings.
- S1.7 Reduce the energy use of plug-load devices through the development of products, systems, and controls, and evaluation of consumer behavior that affects energy use.
- S1.8 Develop and evaluate ideal strategies to improve indoor air quality in energy-efficient buildings.
- S1.9 Develop cost-effective technologies and approaches to achieve California's zero-net energy buildings



S2. Develop new technologies and applications that enable cost-beneficial customer-side-of-the-meter energy choices.

- S2.1 Develop cost-effective metering and telemetry to allow customers with DR, DG, PEV, and energy storage to participate in California ISO markets.
- S2.2 Develop demand response technologies and strategies to allow customers to participate in ancillary service markets.
- S2.3 Standardize communication system hardware and protocols for customer premise and neighborhood-area networks.
- S2.4 Lower customer costs and uncertainties of interconnection of customer-side resources through testing and standardization.
- S2.5 Develop and test novel technologies, strategies, and applications that improve the business case for customer-side storage.
- S2.6 Demonstrate and evaluate the integration of distributed energy storage at the community scale.



S3. Develop innovative technologies, tools and strategies to improve the affordability of distributed generation.

S3.1 Develop innovative technologies and approaches to improve the performance of combined heat and power systems.

S3.2 Develop innovative technologies, techniques, and deployment strategies to accelerate the commercialization of sustainable bioenergy systems.

S3.3 Develop advanced distributed photovoltaic systems to reduce the cost of energy, increase interoperability, and advance plug-and-play capabilities.



S4. Develop emerging utility-scale renewable energy generation technologies and strategies to increase power plant performance, reduce costs, and expand the resource base.

- S4.1 Develop advanced utility-scale thermal energy storage technologies to improve performance of concentrating solar power.
- S4.2 Develop innovative tools and strategies to increase utility-scale renewable energy power plant performance and reliability.
- S4.3 Develop advanced technologies and strategies to improve the cost-effectiveness of geothermal energy production.
- S4.4 Investigate the economic, environmental, and technical barriers to offshore wind energy in California.
- S4.5 Investigate the economic, environmental, and technical barriers to wave energy conversion technologies in California.



S5. Reduce the environmental and public health impacts of electricity generation and make the electricity system less vulnerable to climate impacts.

- S5.1 Air quality research to address environmental and public health effects of conventional and renewable energy and to facilitate renewable energy deployment.
- S5.2 Research on sensitive species and habitats to inform renewable energy planning and deployment.
- S5.3 Develop analytical tools and technologies to reduce energy stresses on aquatic resources and improve water-energy management.
- S5.4 Develop analytical tools and technologies to plan for and minimize the impacts of climate change on the electricity system.



S6. Develop smart grid technologies, tools, and strategies to integrate intermittent renewables and other emerging technologies

- S6.1 Enhance distribution automation to integrate distributed energy resources and improve grid reliability.
- S6.2 Monitor customer premise networks and microgrid activity to share resources across the grid.
- S6.3 Develop technologies to enable power flow control and bi-directional power flow through the transmission and distribution system.
- S6.4 Develop automation and operational practices, including those for outage management, congestion mitigation, and infrastructure protection to make use of smart grid equipment.
- S6.5 Integrate forecast data of renewables into automated grid operation.
- S6.6 Enable energy-smart communities to facilitate renewable integration and resource aggregation.



S7. Develop operational tools, models and simulations for improved planning of grid resources.

- S7.1 Characterize the generation fleet of 2020 for grid operators and planners.
- S7.2 Improve operator dispatch and visibility of distributed energy resources.
- S7.3 Develop and run real-time scenarios to support operations, including energy storage utilization.
- S7.4 Develop interoperability test tools and procedures to validate new subsystem integration into the grid.



S8. Integrate grid-level energy storage technologies and determine best use applications to provide locational benefits.

- S8.1 Develop innovative plant-level energy storage technologies and applications to mitigate intermittent utility-scale renewable energy generation and meet peak demand.
- S8.2 Optimize energy storage deployment with respect to location, size, and type.



S9. Advance plug-in electric vehicle infrastructure and use EVs to improve the operation and performance of California's power grid.

- S9.1 Reduce both plug-in electric vehicle costs and distributed storage costs through the development of second-use battery storage applications.
- S9.2 Develop and evaluate smart charging technologies and approaches to integrate plug-in electric vehicles into the power grid.
- S9.3 Develop novel technologies and strategies to increase the energy efficiency of the electric transportation system.
- S9.4 Develop advanced recycling technologies and processes for recycling plug-in electric vehicle batteries.
- S9.5 Develop grid communication interfaces for plug-in electric vehicle charging to support vehicle-to-grid-services.



S10. Leverage California's regional innovation clusters to accelerate the deployment of early-stage clean energy technologies and companies.

- S10.1 Provide small grants to early-stage energy companies and entrepreneurs through regional innovation clusters.
- S10.2 Support demonstration testing and verification centers to accelerate the deployment of pre-commercial clean energy technologies.
- S10.3 Provide cost share for federal awards.



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Technology Demonstration and Deployment Program Area

| | |
|--|--|
| 3-Year Funding for Technology Demonstration and Deployment | Up to \$129.8 million |
| Estimated Minimum/Maximum Project Award Per Recipient | \$1 million to \$5 million |
| Match Funding Requirement | 20 percent of the requested EPIC funds. Those providing match funds in excess of 20 percent will receive higher scores during proposal evaluation. |
| Estimated Funding to Match Federal program investments (3 years) | \$xx million* |

*Staff seek stakeholder and public input on the amount of EPIC funds that should be reserved to match federal program investments.



S11. Demonstrate and evaluate the technical and economic performance of emerging efficiency and demand-side management technologies and strategies in major end-use sectors.

- S11.1 Identify and demonstrate promising energy efficiency and demand response technologies suitable for commercialization and utility rebate programs.
- S11.2 Demonstrate whole building retrofits – using emerging efficiency technologies – for residential and commercial buildings to achieve targets identified in the California Energy Efficiency Strategic Plan and AB 758.



S12. Demonstrate and evaluate clean energy generation technologies, including strategies to enhance grid integration of intermittent renewable energy resources.

- S12.1 Demonstrate and appraise the operational and performance characteristics of pre-commercial biomass conversion technologies, generation systems, and development strategies.
- S12.2 Demonstrate and deploy pre-commercial technologies and strategies for combined heat and power applications.
- S12.3 Demonstrate and deploy technologies and strategies to improve integration of intermittent renewable energy.



S13. Expand the development of energy smart communities through technology deployment strategies using renewable-based microgrids and the smart grid.

S13.1 Demonstrate zero-net energy buildings and communities.

S13.2 Demonstrate renewable energy-based microgrids capable of sharing resources across the larger power grid.

S13.3 Demonstrate advanced vehicle-to-grid energy storage technologies and second-use vehicle battery applications.



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Market Facilitation

| | |
|---|--|
| 3-Year Funding for Market Facilitation | \$43.3 million |
| Estimated Minimum/Maximum Project Award Per Recipient | \$25,000 to \$3 Million |
| Match Funding Requirement | None: Those providing match funds will receive higher scores during proposal evaluation. |



S14. Collaborate with local jurisdictions and stakeholder groups in IOU service territories to establish strategies for enhancing current regulatory assistance and permit streamlining efforts that facilitate coordinated investments and wide-spread deployment of clean energy infrastructure.

- S14.1 Pilot Demonstrations of Localized Energy Resource Markets.
- S14.2 Provide planning grants to cities and counties to incorporate clean energy technology planning and permitting processes into local government land use planning.
- S14.3 Conduct a local government needs assessment study that identifies regulatory gaps within local planning and zoning processes.
- S14.4 Collaborate with local jurisdictions and industry stakeholders to create model ordinances for emerging clean energy technologies.
- S14.5 Provide funding to assist in the development of the General Plan Guidelines.
- S14.6 Develop consensus-based educational materials for local officials interested in facilitating clean energy market growth.



S15. Strengthen the clean energy workforce by creating tools and resources that connect the clean energy industry to the labor market.

S15.1 Develop a standardized methodology to assess job creation and net jobs.

S15.2 Provide grants for the development or enhancement of training and/or apprenticeship programs to support clean energy deployment programs in IOU service territories.



S16. Guide EPIC investments successfully through the clean energy technology innovation pipeline by connecting all stakeholder groups involved in the development, deployment, and integration stages.

S16.1 Create a web portal that connects innovators, investors, educators, job seekers, and policy makers to facilitate wide-spread adoption of new clean energy technologies to benefit IOU ratepayers.

S16.2 Conduct technology forums to connect innovators of clean energy technologies with potential investors, customers, job seekers, and policymakers.

S16.3 Conduct technology and environmental assessments to track progress in the clean energy industry and assist in developing roadmaps for future EPIC investments.

S16.4 Conduct the IOU portion of the California End-use Energy Consumption and Saturation Characterization Survey.

S16.5 Market Analysis of Innovative Strategies to Facilitate Clean Energy Storage, Demand Response, Electric Vehicles, and Renewable Energy.



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New Solar Homes Partnership

- The NSHP provides a one-time, upfront incentive for eligible projects.
- The NSHP requires that all projects exceed the energy efficiency requirements of the current Title 24 Building Standards by at least 15 percent.
- Staff Draft EPIC investment plan proposes up to \$25 million per year in program funding for the NSHP.
- EPIC funds for NSHP are in addition to the \$162 million identified in the CPUC's EPIC Phase 2 decision.
- Total NSHP funding capped at \$400 million.



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Program Administration

- Select the most promising technology solutions through a competitive process that applies to both public and private applicants.
- Limit admin costs through solicitation selection criteria.
- Maximize in-state investments through solicitation selection criteria.
- Federal match set aside.
- Coordinate with other RD&D efforts to avoid duplication.



Questions for Stakeholders

1) Program Scope

- a. Are there proposed initiatives in the staff draft Investment Plan that should be dropped from the plan? Indicate the initiative(s) and explain why.
- b. Are critical initiatives missing that are consistent with the EPIC mission? If so, please describe the initiative using the template in the Investment Plan (and outlined below).
- c. Are there proposed initiatives that are too narrow in scope? By contrast, are there proposed initiatives that are too broad in scope? Please indicate which initiative(s) and explain.
- d. Do the initiatives identified in the investment plan put the right emphasis on technologies that would significantly benefit from new innovations (e.g., in the applied research category) verses those that would significantly benefit from scale-up (e.g., in the technology demonstration & deployment category)? Please explain.



Questions for Stakeholders

2) Funding Priorities

- a. Where should the greatest amount of funding be allocated among the initiatives to maximize the deployment of clean energy technologies?

3) Project Match Funding

- a. Are the minimum match funding requirements appropriate for applied R&D and technology demonstration & deployment categories? What level of match funding from local government is appropriate for the proposed market facilitation grant award?

4) Funding Priorities

- a. What is the minimum and maximum amount of EPIC funds that should be set aside as match funding for federal awards? Please explain.



Questions for Stakeholders

5) Intellectual Property

- a. Are the IP rights in the Plan an appropriate balance to encourage innovation while returning applicable benefits to the ratepayers?

6) Advisory Structure

- a. Should there be an advisory structure, and if so, what elements are most important?
- b. What coordination with the IOUs proposed Investment Plans will be most helpful to you?

7) Other Comments

- a. Please articulate additional comments that would strengthen the Energy Commission's proposed EPIC Investment Plan.



Template for Investment Plan Initiative

Issues: Provide a few paragraphs describing the issues/challenges to be addressed by this initiative.

Purpose: Provide a few paragraphs explaining the actions and results to be produced by this initiative.

- How will this technology or strategy help address the issue(s)? Which objective of the draft investment plan does this initiative address?
- Please include a summary of relevant stakeholder support for the strategy or technology (if any).
- Describe how this technology or strategy will provide ratepayer benefits as described in the CPUC EPIC Phase 2 Decision.
- Please provide a table to indicate the innovation pipeline stage and map to value chain.

Background: Provide a few paragraphs discussing the context for this initiative.

- What has been done or is currently being done on this technology or strategy?
- Where in the innovation pipeline is the technology or strategy?
- Describe any public and/or private successes and failures the technology or strategy has encountered in its path through the pipeline.
- Summarize other related programs and initiatives in California, such as DOE funding initiatives.



Next Steps

- Submit Written Comments by COB on October 1, 2012
- Email: Send comments to: docket@energy.ca.gov
 - Please include the docket number **12-EPIC-01** in the subject line.
- Mail: Send a paper copy of your comments to:
California Energy Commission Dockets Office, MS-4
Re: Docket No. **12-EPIC-01** 1516 Ninth Street
Sacramento, CA 95814-5512