FILED
02-10-12
11:20 AM

ATTACHMENT A

California Public Utilities Commission (CPUC)

Proceeding R.11-10-003

Electric Program Investment Charge

Staff Proposal

Contents

1. Executive Summary

1.1.Background

At the end of 2011, the system benefits charge, also known as the public goods charge (PGC), which was established during the restructuring of the electricity industry in California in 1996 and contained in Public Utilities Code Section 399.8, expired. Previously, funds were used for "public interest" investment in the areas of energy efficiency, renewables, and research, development, demonstration, and deployment (RDD&D). When the Legislature failed to reauthorize funding for the PGC in 2011, Governor Brown requested that the California Public Utilities Commission (CPUC) consider whether and how it could act to preserve the public benefits associated with the expired PGC. This is consistent with longstanding CPUC precedent going back several decades to allow for expenditures related to renewables and RDD&D in utility rates.

On December 15, 2011, the CPUC adopted D.11-12-035, which established the Electric Program Investment Charge (EPIC). In that decision, the Commission directed staff, working in consultation with staff from the California Energy Commission, to develop a report that provides recommendations regarding the renewables and RDD&D activities and programs that should be funded via the EPIC. Issues related to energy efficiency PGC funding expiration are being addressed in a different CPUC rulemaking (R.09-11-014).

In making recommendations on continued funding for renewables and RDD&D, staff was directed to include potential modifications to existing programs that were previously funded by the PGC, and include recommendations for any additional programmatic activities that might be supported by EPIC funds. Finally, staff was directed to provide recommendations regarding programmatic structure, administration and governance, as well as funding levels.

1.2. Recommendations

There is a strong public policy rationale for continuing public interest funding in the energy area where private capital is unlikely to provide adequate support. Public funding at the federal level has been in decline since the 1980s, even considering recent funding from the American Recovery and Reinvestment Act (ARRA). California has a long history of supporting emerging clean energy technologies and strategies, filling the gap to avoid severe underinvestment in clean technology innovation investment commensurate with other industries and the importance of the energy sector in the economy overall.

Continuing ratepayer funding in California for development and deployment of clean technologies in the energy sector, specifically for electricity, can help:

- Meet greenhouse gas emissions reduction goals under AB 32.[1]
- Support the move toward a cleaner energy economy overall.
- Continue California's leadership position as a clean technology innovator.
- Provide energy security and independence
- Leverage private and federal funding for California.
- Continue to bring state and local environmental benefits.
- Promote job development and economic growth.
- Ensure that investment results are transparent, open, and publicly available to promote public purposes.

This proposal recommends continuing ratepayer funding for activities with a clear nexus in the electricity industry. Staff recommends that the following key principles be used to guide the investments proposed. Investments should support:

- Ratepayer and societal benefits
- Assembly Bill 32 and Executive Order S-3-05 goals[2]
- The "loading order" from the Energy Action Plans[3]
- Low-emission vehicles/transportation
- Safe, reliable, and affordable energy services
- Economic development
- Efficient use of ratepayer funds.

Staff analyzes the need for investment in the following areas, designed to correspond roughly with the product development cycle:

- **Applied research and development**. This area supports investment in applied science and technology that provide public benefits but for which there is no current clear business case for deployment of private capital.
- **Technology demonstration**. This area supports assisting technology development through the "valley of death"[4] and toward commercialization.

[1] Assembly Bill 32 (Nunez), signed into law in 2006, established the California Global Warming Solutions Act of 2006. Pursuant to this Act, the state must reduce its greenhouse gas emissions to 1990 levels statewide by 2020.
[2] Executive Order S-3-05 established the following greenhouse gas emission reduction targets for the state, recognizing the vulnerability of the state to the impacts of climate change as well as the opportunities reducing emissions affords the California economy: to 1990 levels by 2020, and to 80% below 1990 levels by 2050.
[3] The Loading Order was adopted by the CPUC and CEC in 2003 as part of the Energy Action Plan I. It establishes the priority set of resources on which the state should rely in the provision of energy services. The prioritization of demand-side resources in utility procurement is also statutorily required by Pub. Util. Code Sec. 454.5(b)(9)(C).
[4] The "Valley of Death" in the technology development context refers to a period prior to commercialization where technologies have difficulty obtaining financing owing to uncertainties regarding a technology's real world viability.

- **Market support**. This area involves supporting technologies that are commercially viable but still need public support to achieve economies of scale and be competitive with other more established technologies.
- **Market facilitation**. This area involves activities to address non-price barriers to adoption of clean technologies, such as regulatory barriers and lack of information, as well as supporting market research and tracking of results.

Prior PGC funding for the Public Interest Energy Research (PIER) program supported investment in applied research and development as well as technology demonstration. In the market support area, prior PGC funding supported the Emerging Renewables Program (ERP), the Existing Renewable Facilities Program (EFRP), and the New Solar Homes Partnership (NSHP) program. In the market facilitation area, previous PGC funds were spent on renewables portfolio standard (RPS) program eligibility criteria, verification and tracking, public education and outreach, and general activities related to power content disclosure.

Staff recommendations for EPIC-supported activities in the future include:

- **Applied research and development**. Funding at the level of $50 million per year.
- **Technology demonstration**. Funding at the level of $35 million per year, with at least 20%, specifically set aside to support commercialization of bioenergy technologies.
- **Market support**. No funding recommended at this time. The ERP is proposed to be rolled into the CPUC's self-generation incentive program (SGIP). Legal impediments prevent continued funding of the NSHP and for augmenting the SGIP. Staff recommends that the Legislature amend the funding caps for the California Solar Initiative (CSI), NSHP, and SGIP to further accommodate support for these important renewable technologies. Staff recommends that the previous EFRP benefits can be provided via utility contracts and the RPS program generally, as well as through new bioenergy technology demonstration activities recommended for funding above.
- **Market facilitation**. Funding in this area is recommended at $15 million per year, to cover the areas of program tracking and market research, regulatory assistance and streamlining, and workforce development.
- **Administrative costs**. Staff proposes to allow the EPIC administrator to charge up to 15% of the funding for administering the program, with an additional 0.5% reserved for CPUC policy oversight and direction.

Annual funding recommendations, beginning in year 2012 and ending at the end of 2020, are summarized in Table ES-1 below.

Table ES-1. Total Recommended EPIC Funding Amounts ($ millions)

Applied Research	$55.0
Demonstration - (Bioenergy minimum of 20%)	$50.0
Market Facilitation - Program Tracking and Market Research	$5.0
Market Facilitation - Regulatory Assistance and Streamlining	$8.0
Market Facilitation - Workforce Development	$2.0
Program Administration- Administrator	$21.3
Program Oversight – CPUC	$0.7[5]
Total	**$142.0**

The above funding amounts will be collected by the three large investor-owned electric utilities (IOUs) with the following percentages:

- Pacific Gas & Electric: 50.1%.
- San Diego Gas & Electric: 8.8%.
- Southern California Edison: 41.1%.

The administrator of the EPIC program will be required to submit an investment plan to the CPUC for approval every three years, covering the succeeding three-year program timeframe. Utilities should also file their funding requests on the same three-year cycle to allow integration and coordination with state funding. A schedule for the triennial investment plan and proceeding is laid out in more detail in this staff proposal. The investment plan will include targeted areas for investment, screening and scoring criteria for evaluating funding proposals, as well as metrics against which the program's success will be evaluated. The administrator will also be required to submit an annual report detailing program activities. In addition, in 2016, staff recommends that the CPUC hire an independent evaluator to assess program success and identify areas for improvement prior to approval of the final investment plan through 2020. The evaluator should provide its independent report based on pre-determined metrics developed by CPUC staff with input from stakeholders.

The CPUC will maintain overall policy oversight for the EPIC program, consistent with its general authority over collection and disbursement of ratepayer funds. The administrator for the EPIC funds will be authorized to operate within parameters set by the CPUC, and further delineated in each investment plan approved by the CPUC.

[5] The CPUC costs will be $0.7 million in all years except 2016, where the amount should be augmented by $1.0 million to fund an independent evaluation.

Staff recommends that the California Energy Commission (CEC) be designated as the EPIC administrator, for numerous reasons, including:

- The CEC's status as a state agency created to develop and support state energy policy.
- The importance of continuity with similar existing efforts.
- Preference for public agency administration over a private entity.
- Numerous continuing statutory obligations beyond the expired PGC for the CEC to provide analysis, support, and programs to support state clean energy goals.

In addition, staff recommends convening scoping workshops and stakeholder consultation with a wide variety of stakeholder input and expertise. The CEC, as administrator, may consult with stakeholders as needed and useful to its work administering the program.

The staff proposal also addresses a few administrative details such as administrative cost limitations and intellectual property issues.

Staff also recommends two options for transferring funding from the utilities to the CEC, to minimize the potential for diversion of funds to other purposes besides public interest energy investment.

Finally, staff recommends that each electric IOU be required to develop and submit to the CPUC an investment plan for its RD&D efforts in all areas except energy efficiency on the same timetable as the CEC as EPIC administrator. Currently, utility RD&D efforts are funded in a variety of different proceedings at the CPUC that were not well-coordinated with the previously-funded PGC RD&D efforts at the statewide level. To improve coordination, staff recommends a parallel process for statewide EPIC RD&D efforts as well as utility-specific RD&D.

2. Policy Case for Ratepayer Support and Guiding Principles

California has a long history supporting emerging clean energy technologies and strategies through a variety of policy approaches and programs. In general, the underlying premise motivating the implementation of these programs has been that, absent such support, there will be substantial underinvestment in clean technology innovation and associated activities. In 2011, the California Legislative session ended without reauthorization of the PGC. The PGC funded a number of programs that helped fill various policy areas, ranging from support for energy efficiency investments, public interest energy research and development activities, as well as a number of rebate and incentive programs to support the deployment and ongoing operations of various renewable technologies.

It is the view of CPUC staff that the loss of the PGC, and with it, the funding for the California Energy Commission's (CEC's) Public Interest Energy Research Program (PIER) and Renewable Energy Programs, creates a significant policy gap, which, if left unfilled, will undermine California's ability to meet its near- and longer-term energy policy objectives, particularly those related to achievement of the greenhouse gas mitigation goals established in Assembly Bill 32, as well as the goal of reducing emissions to 80 percent below 1990 levels by 2050, pursuant to Executive Order S-3-05.

In addition, given the profound role that technological innovation is recognized as playing in driving economic growth, failure to address this gap will almost certainly compromise future economic opportunities in the state. To address this newly created gap in California's energy policy framework, staff believes a new program should be established that builds on the extensive experience gained through the PGC-funded PIER RD&D and renewables programs.

Despite the fact that the PGC was not reauthorized, the policy case for public and/or ratepayer support of clean energy technology development remains strong. As observed by the Legislative Analyst's Office, "…meeting the state's energy goals will require continued investment by both the public sector (including the state) as well as the private sector."[6] Numerous other studies and reports have also pointed to the important role that public investment can play in facilitating the development and ultimate commercial deployment of next generation technologies, and, by extension, driving economic growth. [7,8] As observed by the American Energy Innovation Council, the energy sector has historically suffered from under-investment in RD&D because energy is not valued in and of itself, but rather for the goods and services it enables. Therefore, product differentiation does not drive competitive innovation in the same way as in other sectors. Furthermore, energy technologies tend to be capital-intensive and long-lived. Slow turnover of capital assets combined with the need for large up-front investments mean

[6] Legislative Analyst's Office, Letter to Senator Padilla, January 18, 2011, pg. 6.
[7] "Economic Analysis of Research Spillovers Implications for the Advanced Technology Program"; Jaffe, Adam; December 1996.
[8] "Case Studies in American Innovation: A New Look at Government Involvement in Technological Development"; The Breakthrough Institute, April 2009.

that the sector as a whole is subject to high degree of inertia, a tendency to avoid risk, and dominanceby incumbent firms.[9]

As of 2007, federal support for energy RD&D had fallen by more than half since a high point of almost $8 billion in 1978.[10] Since 2007, a renewed interest in clean technologies and the subsequent economic recession ushered in the American Recovery and Reinvestment Act (ARRA), which designated billions of dollars for energy R&D. Still, the combined total of federal energy RD&D funding and ARRA funding topped out at only $3 billion.[11] As a member of the American Energy Innovation Council, Bill Gates, along with other technology industry leaders, has advocated for a plan to increase public RD&D spending to $16 billion per year.[12] These leaders reason that spending on energy innovation must match the relative size of the U.S. energy market and its importance to the U.S. economy. The Council argues that current public RD&D spending on energy falls well short of this metric. A goal of $16 billion would at least approach, while still falling short of, RD&D investment in other technologically intensive sectors in the U.S. economy, and would bring U.S. national investment in line with those of trading partners and competitors such as China, France, and Canada.

In addition, Nobel laureate Robert Solow estimates that over 90% of economic growth comes from investments in innovation. The private rate of return on RD&D is around 20-30%, while the social rate of return is around 66%.[13] This means that for every dollar invested in RD&D, the return is $1.66.

There are still other reasons to continue California ratepayer investment in energy research and development generally. Those include:

- Continued funding for energy RD&D is critical to maintaining California's leadership position as an energy technology innovator. As the eighth largest economy in the world, California has a unique ability and responsibility to fund innovative energy RD&D.
- Ratepayer funding will allow the state to leverage private sector and federal funding into the future.
- Continued investment in clean energy technology development helps bring significant local environmental benefits to the state.
- Continued ratepayer funding for "public interest" purposes ensures that research results are transparent, open, and publicly available.

[9] "Catalyzing American Ingenuity: The Role of Government in Energy Innovation"; American Energy Innovation Council 2011 Report. http://americanenergyinnovation.squarespace.com/full-2011-report-pdf/WC_AEIC_2011Brochure_v9-1.pdf

[10] Gallagher, K.S., Holdren, J.P. & Sagar, A.D., 2006. *Energy-Technology Innovation.* Annual Review of Environment and Resources, 31, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1081940.

[11] Gates, B., Augustine, N., Burns, U., Doerr, J., Holliday, D., Immelt, J., and Solso, T. 2011. *Catalyzing American Ingenuity: The Role of Government in Energy Innovation*. American Energy Innovation Council. Available at: http://www.americanenergyinnovation.org/2011-report/.

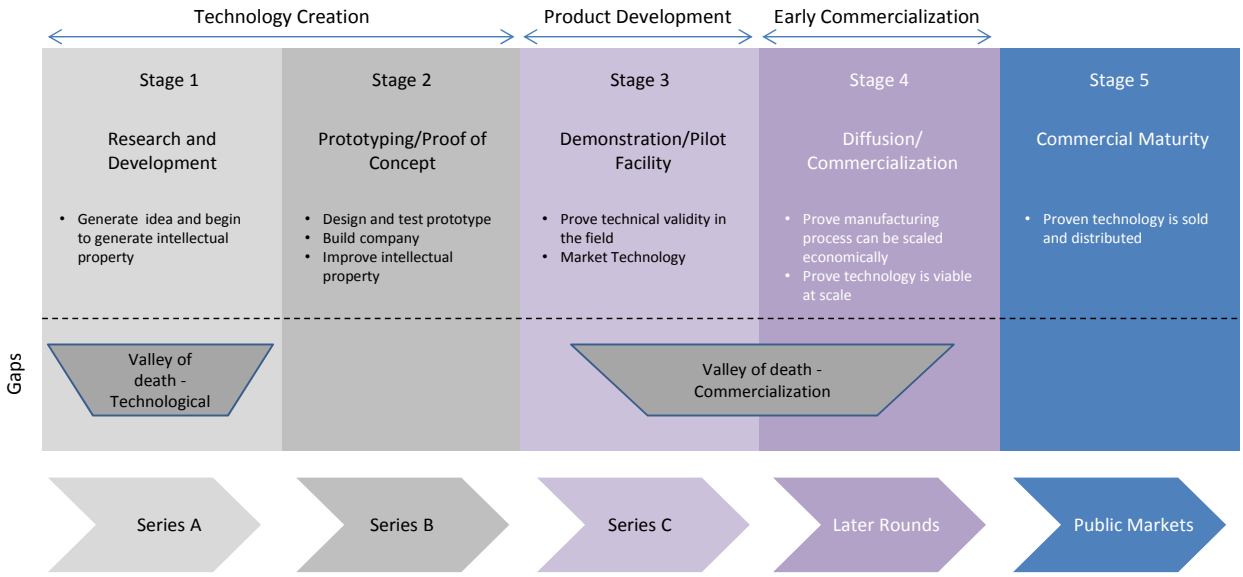
[12] See http://www.americanenergyinnovation.org.

[13] Nemet, Gregory F. "Policy and Innovation in Low-Carbon Energy Technologies." Ph.D. Dissertation, May 2007. https://mywebspace.wisc.edu/nemet/web/Thesis.html.

It is generally recognized that there are a number of stages on the technology maturation curve (see Figure1 below) where public investment is needed to supplement private capital, particularly in the pre-commercial stages of technology development. Basic and applied research as well as technology development and demonstration (collectively RD&D) are frequently identified as areas where public investment is necessary, given the high risk nature of those investments and, particularly in the case of basic and applied research activities, the benefits resulting from research are widely shared. However, the need for public investment is not limited to these areas. Once a technology has been proven and is ready for commercial deployment, a number of other challenges may impede market uptake, including cost competitiveness issues, and various other market barriers and transaction costs.

In addition to technology-specific research and support, as explained further below, systems impact research, which evaluates the implications of new technologies and/or operating realities, including changes driven by climate change, at the system level, represents another category where ratepayer monies can fill an important need that will not be addressed by private capital. Below we identify the various circumstances or categories where judicious use of public or ratepayer support is appropriate and necessary to ensure that promising opportunities and technologies don't simply wither on the vine.

Figure 1: Technology Maturation Curve[14]



In this proposal, once we have established the specific areas and circumstances where there exists a strong rationale for ratepayer support, we will evaluate the existing set of activities and provide

[14] Adapted from "Crossing the Valley of Death: Solutions to the Next Generation Clean Energy Project Financing Gap." Bloomberg *New Energy Finance*. p. 5.This is a slightly modified version of the schematic originally developed by New Energy Finance. The modified version shown here reflects staff's use of the term "demonstration" which New Energy Finance referred to as "deployment".

programmatic recommendations to fill identified gaps, recognizing the legal constraints within which any such support provided by investor owned utility ratepayers must fall. Program recommendations will also consider the state's policy preferences as articulated through AB32, the "loading order" as defined in the state's Energy Action Plan originally adopted in 2003 (as further updated in 2005 and 2008),[15] and California's clean energy policies overall.

2.1. Pre-Commercial Activities that Merit Ratepayer Support

Applied Research and Development

As noted above, the market's willingness to put private capital at risk to support basic and applied energy research is extremely limited. This reluctance is typically attributed to two key factors: the high risk of such investments, and the inability to capture the totality of benefits that may result from such research. As a policy matter, this means, almost by definition, that there will be substantial underinvestment in these activities without public support.

In California, despite the clear policy direction in favor of low and zero emission energy solutions, the appetite for private investment in applied research dedicated to this area is likely to be insufficient for the task at hand, particularly when one considers the magnitude of the challenge. In order to realize emission reductions consistent with those recommended by the United Nations Intergovernmental Panel on Climate Change (UNIPCC) as necessary to stave off catastrophic climate change, per capita emissions in California will need to be reduced by approximately 90% by 2050 relative to current per capita emissions levels.[16,17] Emissions in California related to transportation and the energy industry comprise the vast majority of emissions, totaling over 80 percent, according to the California Air Resources Board's (CARB's) AB 32 Scoping Plan.[18] Thus, the challenges for providing clean technologies and information to help facilitate the deployment of those technologies and scenarios in the energy and transportation areas are particularly important to achieving our long-term climate goals.

In the longer term, there may be a business case to support investment in low and zero emission technologies, particularly to the degree the cost of carbon is made explicit and increases over time.However, there is a need to begin work on the breakthroughs that will enable the transition to a low carbon energy future today. In addition, certain types of research provide benefits that are almost

[15] See http://www.cpuc.ca.gov/PUC/energy/Resources/Energy+Action+Plan/ for all versions of the Energy Action Plans.
[16] *Policies, Instruments and Co-operative Arrangements.* In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change; Gupta, S., D. A. Tirpak, N. Burger, J. Gupta, N. Höhne, A. I. Boncheva, G. M. Kanoan, C. Kolstad, J. A. Kruger, A. Michaelowa, S. Murase, J. Pershing, T. Saijo, A. Sari, 2007: Box 13.7 pg. 776. (http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter13.pdf)
[17] *California's Energy Future – The View to 2050,* California Council on Science and Technology; May 2011, pg. 1. (http://www.ccst.us/publications/2011/2011energy.pdf)
[18] The *Scoping Plan* and related documents can be found at: http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

exclusively public. For example, in the energy sector, research assessing the broader, systems level implications of given technologies or operational issues provide insights and benefits that help regulators and policy makers address emerging issues. Notwithstanding its value from a societal standpoint, there is no clear business case for private investment in this type of research. As such, relying on private capital to fund these activities is unrealistic.

Technology Demonstration

The ability of technologies to attract capital varies over the course of the technology maturation curve, with a recognized gap in financial support for technology demonstration. As noted in a 2010 California Clean Energy Fund Innovations study, "This funding gap occurs when expensive new energy infrastructure exhausts the capacities of high risk venture capital (VC), but cannot yet satisfy the stringent reliability requirements of traditional debt providers."[19] The need for public support of demonstration projects was also identified by Economic and Technology Advancement Advisory Committee (ETAAC) in its recommendations to CARB, with the ETAAC final report specifically observing that the lack of funding for demonstration projects is widely recognized as a "significant impediment to the maturation of new technologies."[20]

Demonstration activities are essential if a technology has any chance of becoming commercially viable to the extent such activities can lower the risk of investment by proving performance in real world conditions. The absence of capital, both public and private, at this stage in the technology lifecycle is often referred to as the "Valley of Death," and represents an important area where ratepayer funding can be effectively deployed to help a technology attract the capital necessary to facilitate broader deployment and commercialization.

A number of programs have been established internationally to specifically fill the gap in funding for demonstrations of pre-commercial technologies. For example, the United Kingdom's Carbon Trust established the £22.5 million Marine Renewables Proving Fund to provide grants to support demonstrations of full scale marine energy technologies in open sea environments.

2.2. Post-Commercial Activities that Merit Ratepayer Support

Even after a technology has been proven to be commercially viable, market adoption is far from guaranteed. High costs relative to alternatives, market awareness, and various other transaction costs can impede the degree and rate of technology adoption, thereby retarding the ability of a technology to achieve economies of scale. To address this, policymakers employ a variety of strategies that for purposes of our discussion here we identify as "market support" and "market facilitation."

[19] "From Innovations to Infrastructure: Financing First Commercial Clean Energy Projects"; California Clean Energy Fund Innovations; Jamison, Eliot; June 2010; pg. 1 (http://calcef.org/files/20100601_Jamison.pdf)
[20] Recommendations of the Economic and Technology Advancement Advisory Committee Final Report: "Technologies and Policies to Consider for Reducing Greenhouse Gas Emissions In California" February 11, 2008, pp. 2-11.

Market Support

These types of programs specifically focus on enhancing the competitive position of targeted commercially-viable technologies relative to incumbent technologies, through the provision of rebates or other financial incentives intended to address first costs, or through the establishment of procurement mandates. Both the California Solar Initiative and the Renewables Portfolio Standard are market support programs. Typically these efforts are part of an overall market transformation program which includes the market facilitation activities described below, with the goal of enabling a technology to scale until it can become self-sustaining without additional support. However, there may be instances where a technology could merit ongoing support to the degree it provides certain non-quantifiable benefits that are not, and are not anticipated to be, reflected in market prices. In these instances, public or ratepayer support may be justified so long as the market fails to effectively internalize/monetize the value of those benefits.

Market Facilitation

Market facilitation refers to activities that seek to address non-price barriers or transaction costs that may impede technology adoption, notwithstanding the economic advantages a technology may offer. Energy efficiency is often cited as example of this, in that without market interventions, there will be far less uptake in the market than the economics of energy efficiency would seem to justify due to other barriers. Similar circumstances can arise in the case of clean energy technologies more generally. Market facilitation also encompasses those activities that are necessary from a regulatory perspective, in terms of tracking program progress and ensuring programmatic integrity. A fairly diverse set of activities fall under this area including, but not necessarily limited to, program tracking and market intelligence, permit/regulatory streamlining, customer education and outreach, as well as workforce development.

2.3.Key Principles

In staff's view, the four areas identified above represent the principal activity areas where there exists a strong argument for providing ratepayer support. However, in each case, in order to further justify and appropriately define the programmatic activities receiving such support, clear guidelines and qualifying criteria need to be established. In the sections below, we will discuss these guidelines and criteria, after which we evaluate activities that have been undertaken or that are ongoing, identify key gaps, and, on the basis of those gaps, provide a staff recommendation on programmatic support and structure.

There are a number of overarching policies and principles with which any ratepayer-supported program should be consistent and/or specifically advance. Staff proposes the following principles below for consideration.

Ratepayer and Societal Benefits – Consistent with the Commission's legal authority to establish the EPIC, as further discussed in D.11-12-035, a key overarching principle governing the use of EPIC monies is that any supported activities provide clear ratepayer benefits and societal benefits, where we define benefits in terms of the extent to which the funded activities promote greater reliability, lower costs,

increased safety, and/or enhanced environmental sustainability in the specific context of the provision of energy services. In general, staff suggests the activities should be able to be mapped to the different elements of the electricity system "value chain" which we characterize as consisting of:

- Grid Operations/Market Design,
- Generation,
- Transmission,
- Distribution,
- Demand Side Management.

While this definition above is a gross simplification, this mapping ensures that there is a clear relationship between the activities funded by EPIC and the electricity ratepayers who are ultimately paying for this program.

Assembly Bill 32 and Executive Order S-3-05 –Supported activities must advance the objectives of Assembly Bill 32 and/or also address medium- and longer-term emission reduction objectives as identified in Executive Order S-3-05, which established a goal of reducing emissions to 80% below 1990 levels by 2050. Pursuant to Assembly Bill 32, the California Global Warming Solutions Act of 2006, the state is required to achieve emissions reductions such that total greenhouse gas emissions are at or below 1990 levels by the year 2020. AB32 recognized the profound implications of climate change to the economic well-being, public health, natural resources and environment of California, and directed CARB to develop a program to dramatically reduce greenhouse gas emissions. To that end, in December 2008, CARB adopted a scoping plan which identified a suite of measures that taken together would result in achievement of the 2020 emission reduction goal. Whereas AB32 establishes goals through 2020, this goal represents only the initial set of steps down the path toward long-term sustainability, which involves the near complete de-carbonization of the energy system by 2050, as articulated in S-3-05.

The Loading Order – Supported activities must be consistent with the state's "loading order." Adopted in the 2003 Energy Action Plan by the state energy agencies, the loading order establishes the preferred or priority set of resources and technologies on which the state should rely in the provision of energy services. The loading order identifies energy efficiency and demand response as the resources of first choice, followed by renewable energy, both distributed generation and utility scale, followed by clean fossil generation, if necessary. A number of state laws have codified or otherwise specified the loading order investments. For example, Pub. Util. Code Sec. 454.5(b)(9)(C) requires utilities prioritize demand-side resources in meeting unmet resource needs, and the recent Senate Bill 1x 2 required 33% of energy need be met by renewable resources by 2020.

Low-Emission Vehicles/Transportation – Supported activities should be consistent with and/or advance the objectives codified by SB 626 (Kehoe, 2009) as section 740.2 of the Public Utilities Code which

directs the Commission to adopt rules to "evaluate policies and develop infrastructure sufficient to overcome any barriers to the widespread deployment and use of plug-in hybrid and electric vehicles."[21]

Safe, Reliable, and Affordable Energy Services – Supported activities must be consistent with the objective of providing safe and reliable energy services at reasonable cost.

Economic Development – Supported activities should benefit the California economy to the greatest extent practicable. Given the profound economic challenges the state currently faces, it is incumbent upon the CPUC to seek to maximize the economic benefits that accrue to California as a result of any ratepayer-funded activities.

Efficient Use of Ratepayer Monies – In addition to the above guiding principles, funding should not be used to support activities or efforts that are duplicative of efforts that are being undertaken elsewhere or that are more expensive than necessary to achieve the goals. Furthermore, administrative costs need to be minimized to the greatest extent practicable without compromising programmatic oversight functions and efficacy.

2.4.Recommended Policy Areas

Utilizing the key principles from the section above, along with the overarching requirement that the funds provide benefits to electricity ratepayers (thus requiring any funded activities to have an electricity nexus), staff suggests that activities could be funded in the support areas described below. Additional areas may be identified either by the CPUC or by the program administrator in a triennial investment plan which will be described in more detail later in this proposal. Below we identify an initial broad set of activities that in staff's view are consistent with the objectives of the proposed EPIC program as described herein:

- Support research and development to enable energy efficiency improvements, including support for future building and appliance efficiency standards;
- Develop and demonstrate emerging and renewable energy technologies and enable integration of distributed and renewable energy sources into the state's electricity system;
- Fund needed advancements in "smart grid," combined heat and power, and energy storage technology; and
- Support environmental and transportation energy research that is directly tied to electricity generation, transmission and use.

[21]Senate Bill No. 626, Kehoe, 2009. http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb_0601-0650/sb_626_bill_20091011_chaptered.pdf

3. Recommended Funding by Support Area

Based on information provided by the CEC, it is clear that over the past decade, the PGC provided a substantial share of the funding supporting RDD&D generally in California via the PIER program. Since 1996, PIER has invested more than $700 million in energy research development and demonstration and attracted more than $510 million in federal and private funding to California. In 2010 alone, PIER's investment of $21 million in funding was matched with more than $500 million in federal stimulus funding from ARRA. It also leveraged more than $900 million in private venture funding – bringing $70 dollars for every $1 in public interest funding investments.

In staff's view, the loss of the PGC and, by extension PIER funding, creates a substantial gap where there is a clear and compelling case for ratepayer support.

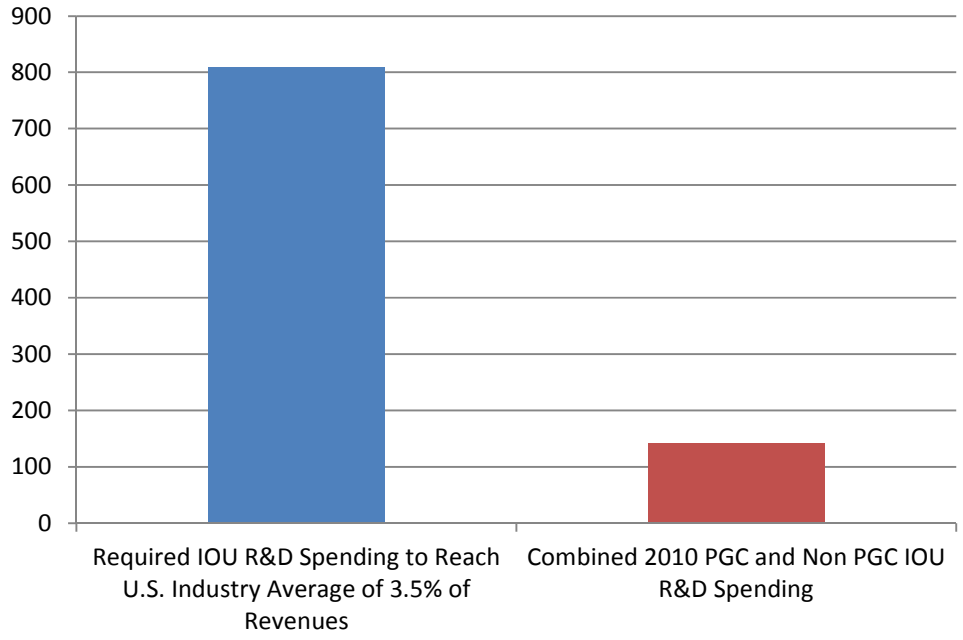
In the past, the PIER program and CEC renewables PGC funds were not tracked and accounted for according to the exact categories we suggest in this staff proposal. However, the overall funding levels, totaling approximately $140 million, are not unreasonable, and, in fact, could be viewed as a conservative amount. As noted by NRDC, et. al. in comments on the Order Instituting Rulemaking (OIR) that opened the instant proceeding, a study by the American Energy Innovation Council indicates that the average spending on research and development activities across U.S. industries is about 3.5% of revenues. By this standard, even with the amounts recommended below, electric industry R&D efforts using utility ratepayer funding would remain significantly underfunded.

Using 2010 data and applying 3.5% of operating revenues as a benchmark, the amount of R&D spending that would need to be undertaken in order for utility R&D spending (including that spent by the State but collected from ratepayers) be at the average amount across industries would be on the order of $810 million per year.[22] Staff estimates that the combined research, development and demonstration spending from both PGC and non-PGC sources in 2010 to be approximately $140 million, or only about 17% of this amount.[23]

[22] According to utility financial filings, the operating revenues associated with the electric side of their business for PG&E, SCE and SDG&E for 2010 were $10.6 billion, $10 billion, and $2.5 billion, respectively, for a total of $23.1 billion.

[23] Staff estimates utility administered applied research spending to be approximately $32 million and utility demonstration spending to be approximately $36 million. These estimates were calculated by annualizing the budgets authorized by the CPUC in various proceedings including General Rate Cases and other program applications over the 2009-2012 timeframe for applied research activities and demonstration activities. Actual annual spending may differ. Combined with the 2010 budget of the CEC's PIER program of $74 million results in a total expenditure of $142 million on RD&D activities. Note this does not include one-time ratepayer outlays for two carbon capture and storage projects (HECA and CHPG) of $30.6 million

Figure 2: Ratepayer Supported R&D Spending Relative to U.S. Industry Average ($ millions)



Another way of looking at the level of expenditures is relative to past authorized expenditures, prior to restructuring of the electricity industry in California in 1996. Prior to restructuring, annual expenditures by the three major investor-owned utilities (IOUs) were on the order of $120 million per year, which equates to approximately $173 million per year in 2011 dollars.

We also note that funding at past PGC levels is a relatively modest investment by individual ratepayers, costing roughly 16 cents per month on the average residential electricity bill (less than one percent), $1.36 for commercial customers and $9.66 for industrial customers. This amount is exceedingly small compared with the approximately $23 billion that Californians spend annually on electricity.

These revenues for RD&D translated into approximately 0.5% of electricity operating revenues for the utilities prior to restructuring, and now equate to approximately 0.25% of operating revenues.

For all these reasons, we recommend that the overall level of spending of EPIC funds remain at similar levels as in the past for applied research activities, specifically. Technology demonstration funding at the statewide level should be similar, to help move technologies through the development cycle. These two categories are most analogous to the PIER program categories utilized in the past. As further discussed below, we do not recommend funding any market support activities at this time, since those activities are already being covered by other programs and/or our authority in those areas is limited. Finally, we recommend modest funding for several market facilitation areas. Overall, our recommendations will result in a small reduction in the amount of EPIC funds collected and spent for the purposes further defined and summarized below.

3.1. Applied Research and Development

Applied research and development refers to R&D activities that are directed toward addressing practical concerns. For example, in the energy sector, this might refer to research activities that are intended to address specific problems like reducing the cost of certain generating or efficiency technologies, or efforts to understand how the electricity system will be impacted under a variety of technology and environmental scenarios, for example, the implications of reduced snowpack in the Sierras on electricity generation and emissions. By way of contrast, basic research seeks to expand mankind's scientific knowledge in more essential or fundamental ways, and does not seek to address or solve a specific problem. While there is certainly a case to be made for broad public support for basic research, it is harder to make a case for ratepayer expenditures in this area. In general, it seems an area better left to national or even international research efforts.

As discussed earlier, both from a legal and equity standpoint, staff recommends that it is appropriate to focus expenditures of ratepayer funds on activities where there is a clear nexus between the research being undertaken and the electricity sector benefits.

Based on information provided by the CEC, the applied research work undertaken recently by the PIER program spans a broad range of areas including:

- the development of rigorous appliance and building efficiency standards that have saved ratepayers hundreds of millions of dollars,
- increasing efficiency of energy use from industrial, agricultural and water end-use
- efforts to understand the implications of, and approaches to, integrating ever-increasing amounts of intermittent renewable generation,
- evaluating the implications of electric vehicle (EV) adoption on the grid, and
- pioneering efforts to increase the visibility of transmission system operations through the use of advanced information technologies
- reducing environmental barriers to energy deployment.

Although staff does not offer recommendations on the specific types of research that should be pursued, beyond advocating that such research efforts be consistent with the policy goals and principles and general categories established above, in this report we lay out a process that will serve as the basis for making those determinations in the future.

Staff recommends that applied research be funded at approximately the same levels as in the past. Based on a review and rough categorization of past PIER expenditures, we expect that this amount should be approximately $55 million annually.

In general, staff believes that applied research projects should be selected on a competitive basis, through an RFP or solicitation process, where the type of projects being solicited and funding amounts by topic area are developed through a stakeholder process and appropriately vetted by the CPUC. The investment plan should describe in detail the evaluation criteria (including screening and/or scoring

criteria or methodology) that will be used to select specific projects. In some cases, if consistent with the investment plan, interagency agreements which are not competitively bid (e.g., when contracting with Universities, or other governmental agencies) may be allowed. However the investment plan must provide a clear reason why a competitive process is problematic in those instances and how those types of agreements will be considered.

In terms of specific per-project funding amounts, a review of the PIER funds provided in 2010 to support various activities indicates funding amounts outside of memberships, and small grant awards ranged from a low of $100,000 to as much as $3.9 million per project, with an average of $972,042 per contract. Although staff does not recommend specific, per-project funding limits here, staff does believe some limitations are appropriate and should be included as proposals for stakeholder comment as part of the investment plan. More details on how the specific research areas would be identified, evaluated and funded is provided in Section 4 below.

3.2. Technology Demonstration

Technology demonstration refers to the installation and operation of pre-commercial technologies at a scale sufficiently large and in conditions sufficiently reflective of anticipated actual operating environments to enable the financial community to effectively appraise the operational and performance characteristics of a given technology and the financial risks it presents. Support for demonstration technologies can come in a variety of forms including the establishment of test-bed facilities/proving grounds, as well as various types of financing support, including power purchase agreements, up-front grants, revolving loan funds, loan guarantees, etc.[24]

Staff recommends that a significant amount of funding should be dedicated to proving the commercial viability of next generation clean energy technologies. The funding levels should be commensurate with, though slightly lower than, the expenditures on applied research, to follow technologies through the product cycle, accounting for the fact that not all technologies will continue to be viable after initial stage applied research. This dovetails with staff's recommendation regarding continued and robust support for applied research and development, by creating a pathway by which those technologies that emerge from the applied R&D efforts can more effectively transition to the market and full commercialization. To that end, staff proposes that another $50 million in EPIC funding be used to support demonstration projects.

Historically, PGC-funded demonstration projects have involved the provision of grants to support individual projects. Staff recommends that a significant amount of funding should continue to be used in this manner through competitive based solicitations, coupled with rigorous review and fund matching requirements. We note that matching is an important element of this proposal. To the degree private

[24] In 2008, the CPUC considered and ultimately rejected without prejudice a proposal put forward by PG&E and San Diego Gas and Electric to implement a renewable technology demonstration program. In their joint application, PG&E and SDG&E requested authority to spend collectively $45 million over two year on demonstration activities.

entities are willing to put their capital at risk, it provides further validation of a technology's viability and at least some indication of its future commercial prospects. As with the solicitation process described in the context of applied research, the investment plan should provide reasonably detailed information regarding the selection criteria that will be used in making ultimate demonstration funding determinations. The investment plan should also provide information regarding per project funding limits and establish minimum matching requirements. Additionally, and also in parallel with staff's recommendations regarding applied research, we recognize there may be instances where a competitive solicitation may be inappropriate or overly cumbersome. There may be instances where a matching requirement is not feasible. Therefore , we do not preclude outright providing some demonstration funding in these cases so long as the investment plan clearly identifies these circumstances and provides a clear explanation for why a competitive process and/or a matching requirement would be problematic.[25]

In addition to continuing to provide for this type of demonstration support, staff recommends creation of incentives that specifically enable demonstration-ready generation technologies to secure power purchase agreements (PPAs) with a utility or other load serving entity, or participate in other programs that target certain technologies.

As defined above, a demonstration project should provide an opportunity to better understand the operations of an emerging, pre-commercial technology at a scale and in an environment that is reflective of actual operating conditions and, in so doing, enable the market to better appraise the risk a given technology represents. A PPA, by holding a project developer and their technology to real world standards, can greatly facilitate a technology's transition from "experimental" to "commercial ready." In order to secure a PPA however, demonstration technologies need to be made relatively competitive to incumbent technologies.

To that end, staff proposes the establishment of a demonstration project production payment program under which a demonstration project would receive per-megawatt-hour (per-MWh) payments, up to some maximum amount per project. The investment plan should propose per-MWh and per-project funding limits and provide a basis for those limits. The objective in providing this incentive would be to enable demonstration projects to effectively compete with other projects that are seeking contracts with the utilities, whether through a utility solicitation, bilateral negotiations or other contractual pathways. Selection of projects that ultimately receive production payments pursuant to this program

[25] A brief survey of demonstration programs shows widely varying degrees of matching requirements. The UK Carbon Trust's Marine Renewables Proving Fund requires 40 percent match (http://www.carbontrust.co.uk/emerging-technologies/current-focus-areas/marine-renewables-proving-fund/pages/default.aspx), Australia's Renewable Energy Demonstration Program requires 66 percent matching (http://www.iea.org/textbase/pm/?mode=re&id=4100&action=detail); and the CPUC's Proposed Decision, ultimately not adopted, approving an Emerging Renewables Resource Program, would have imposed a 20 percent matching requirement (http://docs.cpuc.ca.gov/word_pdf/AGENDA_DECISION/95633.pdf.

would be determined via a competitive process, with the investment plan clearly identifying the selection criteria to be used.

More generally, eligibility for participation in both the grant-based and production-based demonstration programs would rely on a number of factors. Staff recommends that, at a minimum, the following criteria be included in determining eligibility, though the Administrator may propose others:

- Technical feasibility of technology has been proven and documented and independently evaluated/verified.
- Technology has a reasonable chance to become cost competitive with incumbent generation technologies within a reasonable timeframe/at reasonable scale inclusive of the cost of carbon.
- Technology has the technical potential to scale to significant levels in California and/or nationally, or in the case of non-generating technology demonstrations, be deemed as having broad applicability.
- Technology is not being demonstrated elsewhere, or existing demonstrations are insufficient to adequately assess technology viability.

As with the our recommendations regarding applied research, staff is generally not yet prepared to identify what specific areas or technologies should be targeted under this element of the EPIC program, with one exception related to bioenergy.

As evidenced by Executive Order S-06-06[26] and the ongoing work of the Bioenergy Interagency Working Group, there is substantial interest in expanding the role of bioenergy in meeting state energy demand. Despite substantial technical potential in the state, bioenergy resources remain challenged by a number of factors including relatively high costs relative to other technologies, and permitting and regulatory challenges, particularly impacting onsite power generation using biomass feedstocks in light of local air quality concerns, among other issues.

Given the substantial potential and interest in further developing the state's bioenergy resources, staff believes at least 20% of the EPIC funds allocated to demonstration projects should be dedicated to projects specifically demonstrating pre-commercial technologies or new operational approaches that are closely related to the use of bioenergy feedstocks for electricity generation. The 20% share of demonstration funding is a minimum amount that should be earmarked to support bioenergy demonstration efforts. If there is sufficient demand to support eligible projects beyond this share, the administrator has the discretion to use the demonstration budget accordingly. Based on input from CalFire, California Department of Food and Agriculture, CalRecylce and the California Energy Commission, staff expects demand for bioenergy demonstration projects to be significant and to increase rapidly. The Biomass Working Group has identified more than 20 forest biomass projects that would provide energy and reduce fire risks to energy infrastructure. According to CalRecylce, California will need to develop more than 100 bioenergy facilities to meet the organic waste diversion goals of AB

[26] Signed in August 2006, S-06-06 established two goals: producing a minimum of 20 percent of the state biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050; and meeting 20 percent of the state's renewable generation goals with biopower.

341. And the CDFA-led Biodigester Working Group has identified dozens of dairy digester and co-digestion facilities that would likely seek funding for demonstration and deployment.

As with other demonstration projects, projects focusing on bioenergy resources need to use and showcase technologies and/or operational approaches that have been proven to be technically viable, offer meaningful prospects to enhance the economics of bioenergy within a reasonable timeframe/at reasonable scale, are broadly applicable, and are not already being demonstrated elsewhere.

Table 1: EPIC Funding for Demonstration Activities

Type of Funding	Total Funding Available	Minimum Bioenergy Allocation	Per Project Funding Limits/Matching Requirements
Up-Front Grants	$25 million	$5 million	To be set in the Investment Plan
Production Payment Program	$25 million	$5 million	To be set in the Investment Plan

3.3. Market Support

Market support refers to those programs that seek to enhance the competitive position of certain preferred, commercially proven technologies relative to the incumbent technology. In California, these have largely consisted of targeted rebate programs or procurement mandates imposed on the investor owned utilities, notably the Renewables Portfolio Standard, the California Solar Initiative, and the Self Generation Incentive Program. Additional support has been provided through various federal programs that provide targeted tax incentives as well as loan guarantees and grants, representing billions of dollars in additional market support. Despite funding and other forms of market support provided, there is a significant gap that needs to be supplemented by the EPIC, in part due to the loss of the PGC and also the lack of adequate funding for deployment of new renewable technologies. However, this is likely to vary depending on what market segment is being considered.

In the past, the PGC provided funding that flowed to a number of market support programs administered by the CEC, including the Emerging Renewables Program (ERP), the Existing Renewables Facilities Program (ERFP), and the New Solar Homes Partnership (NSHP). We explore in more detail each of these programs below, how they relate to the market support activities funded from non-PGC sources, and whether these programs should or can be continued using EPIC funds.

Emerging Renewables Program

The ERP has provided approximately $409 million in incentives since 1998 to support the deployment of 127 MW of small wind, solar photovoltaics, and fuel cell systems using renewable fuels through the provision of up-front rebates. The program has been changed several times to accommodate new technologies and new complementary programs, such as the California Solar Initiative (CSI). Currently,

wind facilities up to 50 kW in size may participate in the program, with rebates limited to the first 30 kW. For fuel cells, 30 kW represents the maximum capacity a participating system can be, and additionally, the system must operate using renewable fuels, which the CEC defines as either landfill gas, digester gas, or other gases that meet the definition of an "eligible renewable energy resource" as defined in Public Utilities Code section 399.12(c) with reference to Public Resources Code section 25741(b); or as hydrogen or hydrogen-rich gases derived from a non-fossil fuel or feedstock through the use of power generated by an "eligible renewable energy resource." In addition to the maximum system size limits, participating systems must be sized to primarily offset onsite load.

In November 2011, the CEC adopted program changes and allocated remaining program funds of $20 million. Since November, CEC staff have received approximately 2,000 applications for fuel cell incentives, representing over $60 million in requests and indicating strong market interest. Prior to November 2011, the program had funded just 13 fuel cell projects in its 13-year history.

In many respects, the ERP shares many features with the CPUC's Self Generation Incentive Program (SGIP). Both programs provide rebates to low- or zero-emission technologies sized primarily to offset onsite energy consumption, with the goal of facilitating greater adoption and market transformation. Indeed, the similar intent and purpose of these programs was specifically observed in the CPUC's recent decision (D.11-09-015) modifying SGIP pursuant to Senate Bill 412. The Decision notes that under SGIP, the minimum project size eligible for incentives is 30 kW, a threshold intended to "minimize overlap between the SGIP and the CEC's ERP." The decision goes on to determine that should ERP funding no longer be available, ERP eligible systems will be automatically eligible to participate in SGIP. [27] In this respect, the Commission has already determined that the loss of PGC/ERP funding would create a gap that should be addressed, and furthermore, has already taken the steps to fill that gap.

We will not reevaluate those determinations here, however we do note that although these technologies are eligible for SGIP incentives, the existing SGIP budget remains unchanged and as a result, the inclusion of these technologies under SGIP puts additional demands on the program budget. As noted above, this may be especially important for fuel cell applications that have shown a surge in recent months.

Given this, the CPUC may wish to consider whether incremental funding to support these technologies is warranted given the existing budget levels of SGIP. In addition, programmatic changes may be necessary to ensure the program provides adequate incentives to meet market needs for the smaller system sizes formerly covered by the ERP.

SGIP is specifically funded pursuant to section 379.6(a)(1) of the Public Utilities Code, which states that:

> "the Commission, in consultation with the Energy Commission, may authorize the annual collection of not more than the amount authorized for the self-generation incentive program in the 2008 calendar year, through December 31, 2011. The commission shall require the

[27] D.11-09-015 pp. 24-25.

administration of the program for distributed energy resources originally established pursuant to Chapter 329 of the Statutes of 2000 until January 1, 2016."

Although the CPUC has expanded the eligibility of SGIP to include systems that would otherwise be eligible to participate in the ERP, because this is being done specifically under the auspices of the SGIP, incremental funding would appear to require a Legislative change. Thus, as proposed, this is a zero sum game, with the expanded eligibility increasing the level of competition across eligible technologies. In staff's view, because of the additional demand created by the inclusion of otherwise ERP-eligible technologies on SGIP, the Legislature should consider increasing the Commission's authority to expand the SGIP budget by the amounts commensurate with the funding that would have been available through the ERP had the PGC been reauthorized.

Staff also recommends that, at least initially, the SGIP program cover the technologies previously covered by the ERP, utilize the eligibility requirements for the small wind turbines recently updated by the CEC,[28] and also continue to require third party certification for the newly-included technologies transferring to the SGIP from the ERP.

Existing Renewable Facilities Program

The ERFP supports existing wholesale biomass, solar thermal, and wind generation projects through the provision of production incentives where the level of the incentive is based on the difference between the market price and an administratively set target price, subject to a cap of $.015 per kWh in most cases. The stated purpose of the ERFP is "to allocate state funds to increase the competitiveness of existing (operational on or prior to September 26, 1996) in-state renewable generating facilities. For the purpose of the ERFP, self-sustainability refers to the ability of these facilities to continue operation without public funding by no later than December 31, 2011. The ERFP aims also to secure the environmental, economic and reliability benefits these facilities provide." Over the past several years, the vast majority of funding has gone to support existing biomass facilities.

The ERFP is intended to be a complementary program to the Renewables Portfolio Standard, the broader program that supports the market for wholesale renewable generation statewide through procurement mandates on the state's electric utilities. As a result of this program, the state has established what it believes is the minimum amount of renewables and, in doing so, has created a market for the procurement of those resources where project developers bid against one another and negotiate with the utilities to secure a contract. Through this competitive process the state is, at least in theory, able to procure these resources at least cost. It is unclear why, given the RPS, there is a need to differentially support the ERFP-eligible resources. As noted above in the discussion regarding the rationale for market support, if certain resources are to receive ongoing support, that support needs to be justified on the grounds that those resources provide ratepayer benefits that are not reflected in the market.

[28] See http://www.energy.ca.gov/2011publications/CEC-300-2011-004/CEC-300-2011-004-ED12-CMF.pdf.

However, in staff's view, the case has not yet been clearly made that existing biomass, wind or solar-thermal electric facilities provide electric ratepayer benefits that are additional to those offered by other renewable resources and that are not recognized by the market. While the non-energy benefits of these facilities are well-known, because the source of funding here is electricity ratepayers only, EPIC should be focused on new facilities that provide additional benefits to ratepayers that are not currently recognized by the market.

For this reason, while state support of existing biomass facilities in an ongoing way may be meritorious, it is staff's recommendation that the loss of PGC funding to support continuation of the ERFP program does not create a gap that needs to be filled or addressed through the use of EPIC funding. Perhaps other sources of funding are possible. We do suggest, as described in Section 3.2 above, that bioenergy technology, in particular, is an area that should be supported with technology development and demonstration funds.

Staff also notes that in the past several months, PG&E has filed advice letters seeking modifications to the pricing of a significant number of existing biomass facilities in its service territory. These advice letters appear to, at least over the next several years, obviate the need for additional ratepayer support, to the degree the amendments executed between PG&E and its counterparties provide pricing sufficient to make the projects economic.[29]

New Solar Homes Partnership Program

The NSHP program provides rebates and other types of support specifically to facilitate the deployment of solar energy systems on new residential construction in the three investor-owned electric utility service territories. This program has a goal of deploying 400 MW of behind-the-meter solar on new homes, or slightly more than 13 percent of the overall 3000 MW goal pursuant to Senate Bill 1, through 2016. By statute, the budget for the program was limited to $400 million. To date 13.6 MW has been installed under this program, leaving 386 MW yet to be deployed under the program. An additional 41.44 MW of capacity is under review and/or approved for installation.

Currently, the NSHP is approximately $250 million short of the $400 million needed to fund the program. If monies borrowed from the Renewable Resources Trust Fund (RRTF) by the legislature are repaid[30], this shortfall may be reduced to $150 to $200 million.

[29] See PG&E advice letters 3843-E, 3917-E, 3921-E, 3949-E, 3944-E, 3962-E, and Applications A.11-12-003 and A.11-08-005.

[30] Since 2002, $261 million of Renewable Resources Trust Fund (RRTF) dollars has been borrowed by the Legislature for various purposes, with $241 million of that loaned directly to the General Fund. An additional $50 million of RRTF monies has been appropriated, or transferred, in response to legislation for specific purposes. A total of $141 million has been repaid against the loans taken from the RRTF.

The loss of PGC funding thus creates a sizable gap in the solar market and will compromise the ability of the state to realize the Legislatively-mandated distributed solar generation targets.

Although staff strongly recommends continued funding for the NSHP, the use of EPIC monies to compensate for the loss of the PGC would appear to result in monies being taken away from other distributed solar generation projects/programs under the CSI owing to the overall funding cap established in the enabling statute. Specifically, Public Utilities Code Section 2851(e) states the following:

> (e) In implementing the California Solar Initiative, the commission shall ensure that the total cost over the duration of the program does not exceed three billion three hundred fifty million eight hundred thousand dollars ($3,350,800,000). The financial components of the California Solar Initiative shall consist of the following:
>
> (1) Programs under the supervision of the commission funded by charges collected from customers of San Diego Gas and Electric Company, Southern California Edison Company, and Pacific Gas and Electric Company. The total cost over the duration of these programs shall not exceed two billion one hundred sixty-six million eight hundred thousand dollars ($2,166,800,000) and includes moneys collected directly into a tracking account for support of the California Solar Initiative and moneys collected into other accounts that are used to further the goals of the California Solar Initiative.
>
> (2) Programs adopted, implemented, and financed in the amount of seven hundred eighty-four million dollars ($784,000,000), by charges collected by local publicly owned electric utilities pursuant to Section 387.5. Nothing in this subdivision shall give the commission power and jurisdiction with respect to a local publicly owned electric utility or its customers.
>
> (3) Programs for the installation of solar energy systems on new construction, administered by the State Energy Resources Conservation and Development Commission pursuant to Chapter 8.6 (commencing with Section 25740) of Division 15 of the Public Resources Code, and funded by nonbypassable charges in the amount of four hundred million dollars ($400,000,000), collected from customers of San Diego Gas and Electric Company, Southern California Edison Company, and Pacific Gas and Electric Company pursuant to Article 15 (commencing with Section 399).

Because the new NSHP "[furthers] the goals of the California Solar Initiative," any monies collected via the EPIC and used to supplement funding for this program would appear to count toward the overall spending cap of $2.2 billion, reducing funding for other programmatic activities under the CSI. To remedy this situation, staff recommends that the Legislature augment the spending cap to which the CPUC-jurisdictional component of the CSI is subject by an amount equivalent to the balance of funds that, had the PGC been reauthorized, would have gone to support the NSHP. Alternatively, the statute could be otherwise modified such that funding to support the deployment of solar systems on new homes does not count toward the CSI overall spending cap.

Market Support Summary Recommendations

Based on all of the forgoing (various reasons), staff at this time does not recommend any EPIC monies be dedicated toward market support efforts. In those cases where staff believes the provision of funding would be appropriate, our hands are tied given express statutory limits on the total amounts of funding that can be provided (e.g., in the case of the CSI and SGIP). As noted above, staff believes Legislative action should be taken to address these specific funding needs. With regard to support for existing renewables, given the substantial market opportunities that existing renewable technologies may avail themselves of, staff does not believe there is a case for continuing support for an additional program.

However, going forward, there may be instances where market support is both allowable and appropriate, and we believe the program established should be sufficiently flexible to allow for that possibility. To the degree that it can be shown that certain resources/technologies provide value that is not adequately recognized by the market currently, and/or the technologies that would enable these technologies to become a cost competitive resource, then staff would support the establishment of a market support program to facilitate their deployment. However, at this time, there is not an adequate basis for definitively establishing such a program today.

3.4.Market Facilitation

As described above, the activities that fall under the umbrella of market facilitation encompass a broad range of efforts including program tracking and market research, education and outreach, regulatory assistance/streamlining, and workforce development.

Staff proposes that approximately $15 million be allocated toward market facilitation activities, or roughly 13% of EPIC funding. For each of the elements of market facilitation, we provide more specific recommendations on how the funding should be used below.

Program Tracking and Market Research

California has allocated a significant amount of ratepayer resources toward a variety of programs that seek to transform the energy market and the technologies we rely upon for access to energy services, including the IOUs' energy efficiency programs, as well as programs like the Renewables Portfolio Standard, the California Solar Initiative, and the Self Generation Incentive Program. The ability of policy makers and regulators to understand the efficacy of these efforts hinges, fundamentally, on robust information collection and analysis regarding the state of the market, market trends, both within California and more broadly, as well as program impacts.

Staff envisions that work in the area of market assessment would include:

- Identification of barriers to commercialization of emerging renewable energy technologies. Assessment of trends in technical specifications, warranties, and standards for new renewable energy technologies.
- Opportunities to lower balance of system costs and reduce regulatory and interconnection barriers.

- Updated input assumptions for renewable distributed generation for cost of generation studies, tracking and assessment of renewable energy market and technology trends, cost trends, associated supply-chains, and eligible incentive programs.
- Continued updates of preferred renewable energy development locations in California and opportunities to reduce environmental concerns, including mapping and other technical assistance to identify areas that can accommodate additional renewables, especially locations with low environmental impacts or limited alternative land use.

Additionally, a number of elements that play a key regulatory role in the state's renewable energy program are also at risk as a result of the PGC not being reauthorized. Notably, PGC funds were used to support CEC staff who certify RPS-eligible facilities and verify RPS-eligible energy claims (both for IOUs and publicly owned utilities (POUs). The CEC remains obligated to perform these tasks under the requirements of the 33% RPS law, and they fulfill an important purpose in tracking and assessing progress towards goals.

Tasks in this area include:

- Certifying RPS eligibility of renewable power plants for IOUs
- Verifying eligibility of renewable energy for POUs
- POU plant certification, generation, verification, and procurement compliance.
- Building and photovoltaic standards work.
- Implementing the power source disclosure program.

Though in the past PGC funds were used to support efforts surrounding the POU RPS programs and compliance, with the new EPIC funds, we cannot recommend continued support of these activities, as they do not provide direct benefits to IOU ratepayers, who are the source of the EPIC monies. Thus, the tasks above related to POUs, including "verifying eligibility of renewable energy for POUs" and "POU plant certification, generation, verification, and procurement compliance" should not be included in the tasks funded by EPIC going forward.

For all of the other above purposes, staff believes $5 million of the funding should be allocated to support analytics around the state of the energy market, assessments of policy impacts and opportunities, as well as support for ongoing activities specifically related to the regulatory infrastructure required for the RPS program for IOUs. We recognize that many programs have specific reporting requirements creating a real risk of duplicative effort absent effective coordination by CEC staff.

Education and Outreach

A small amount of past PGC renewables funding in the past (under $1 million per year) was utilized for general education and outreach on the benefits of renewables to consumers. At this time, staff does not recommend that EPIC funding be used to continue such generic education and outreach activities. A number of programmatic initiatives already have significant funding allocations to support program-specific marketing and outreach efforts (e.g., the CSI program has allocated approximately $23 million

toward education and outreach;[31] energy efficiency allocates approximately $216 million over the 2010-2012 program cycle). There does not appear to be a clear and compelling case for additional ratepayer funding for more generic awareness or outreach absent a more comprehensive statewide campaign or initiative.

Local Agency Assistance and Regulatory Streamlining

A key challenge to the achievement of the state's goals, particularly in the context of renewable energy development, is permitting of clean energy production facilities at the federal, state, county and local levels. Renewable facilities, whether small scale systems designed to offset onsite energy needs, or large-scale wholesale generation projects, must go through a variety of permitting processes before they can be built. Given the scale of the state's renewable energy goals, permitting agencies at all levels are facing increasing pressure on their existing resources.

In light of this, staff recommends a significant share of the market facilitation budget should be allocated specifically to identify opportunities as well as fund solutions to streamline permitting processes. Such efforts should prioritize efforts to eliminate key permitting bottlenecks.

Staff recommends funds should be available for use to help cover some, or, where feasible, all of the costs to implement those solutions, either on a pilot, or larger scale basis. One large existing example of this type of activity is the environmental mapping and stakeholder coordination effort being undertaken currently by CEC staff to support the Desert Renewable Energy Conservation Plan (DRECP).

The program administrator should review and evaluate the available information addressing the challenges that local governments face in permitting renewable energy projects, available solutions, and support needed for local governments to implement these solutions, to inform the parameters of the grant program. The available information includes: CEC's Energy Aware Facility Siting and Permitting Guide (2010); CEC Report on Distributed Generation: CEQA Review and Permit Streamlining (CEC 2000); California County Planning Directors' Association Model Solar Energy Facility Permit Streamlining Guide, Model Solar Energy Facility Ordinance and Model Renewable Energy Combining Zone Ordinance (February 2012); results of CEC's Renewable Energy Planning and Permitting Survey (completed January 2012); existing renewable energy permitting ordinances adopted by San Diego, Santa Clara, San Luis Obispo, Yolo, Kern, and other counties (as well as ordinances proposed and under consideration in other counties).

Staff recommends that this area be funded initially at $8 million annually, with the following preliminary targets:

- Grants to assist local authorities, including school districts, county offices of education, and joint powers authorities with updating general and other forms of planning to facilitate permitting of renewable energy facilities that fall under their jurisdiction. This activity is already specifically

[31] See D.11-07-031, Table 3, p. 43.

authorized under ABx1 13 (Perez, Bradford, and Skinner, 2011). Activities taken by local agency grant recipients include, but are not limited to:

  - Assessments of local resources
  - Community outreach
  - Technical and legal land use and general plan policy changes
  - Environmental analyses
  - Development/adoption of renewable energy permitting ordinances
  - Development of programs to mitigate environmental impacts of renewable energy development.

- Grants that assist local authorities to make improvements to their permit approval process for renewable energy projects of all sizes. Activities taken by local agency grant recipients include, but are not limited to:
  - Development of online platforms to receive renewable energy permit submittals, including building permit submittals.
  - Securing technical expertise to restructure and streamline required stages of permit approval.
  - Staff training to increase understanding of renewable energy technologies and to ensure common interpretation of relevant state requirements.
- Grants to develop informative materials to assist local governments with siting renewable energy facilities. Grants would focus on developing new tools and disseminating existing tools to local agencies, as well as transferring knowledge gained from local agency planning grants.
- Grants for technical assistance and training to local governments, school districts, county offices of education, and joint powers authorities to facilitate installation of renewable energy systems.
- State-agency technical assistance for local governments including, but not limited to, training, tools, audits and model resources.

Workforce Development

This is an area that many parties commenting on the OIR pointed out should be a higher priority. There are a number of efforts ongoing to assess and assist with workforce development efforts in the energy area, both for the economic development benefits and for the development of a green economy. Currently many programs contain some aspects of a workforce development emphasis. For example, the CEC provided training and outreach to contractors as part of the NSHP. The CPUC supports workforce development in the low-income aspects of the CSI program. A number of CPUC sponsored energy efficiency efforts also target workforce development.

To help move the workforce development effort forward, staff suggests that the state would benefit from a standardized approach to defining and tracking workforce development efforts. A small amount of EPIC funding, on the order of $2 million per year, would serve to support standardization of reporting across program areas, tracking, and perhaps some assistance with curriculum development for training in the areas supported by EPIC.

3.5. Administrative Costs

Staff recommends that up to 15 percent of EPIC funds be set aside for program administration. This is slightly higher than the share the Commission adopted for program administration in the context of the California Solar Initiative or energy efficiency, which staff views as being of comparable complexity as the program being proposed here. This would equate to a total of $21.3 million annually. This amount does not include the overhead/administrative costs incurred by grant recipients as part of their funded activities or efforts.

In addition, we recommend that no more than 10% of the non-administrative funds, devoted to the specific support areas, be spent on consulting activities that culminate only in publication of reports or issue papers. Occasionally, circumstances do arise where summary papers of experiences from other jurisdictions or theoretical examinations of issues will help support moving a policy or technology forward, but the bulk (90% of the non-administrative 85%) of the EPIC funds should be designed and targeted to be spent on real activities that represent progress on RD&D and not simply reports summarizing issues.

Finally, 0.5% of the funds should be set aside for CPUC policy oversight of this program. In addition, an additional $1 million should be set aside from administrative funds in 2016 to allow the CPUC to hire an independent evaluator of the program, as further described herein.

3.6. Funding Summary

Combining the funding recommendations from all of the above sections results in the funding amounts by area given in Table 2 below, for 2012.

Table 2. Total Recommended EPIC Funding Amounts ($ millions)

Applied Research	$55.0
Demonstration - (Bioenergy minimum of 20%)	$50.0
Market Facilitation - Program Tracking and Market Research	$5.0
Market Facilitation - Regulatory Assistance and Streamlining	$8.0
Market Facilitation - Workforce Development	$2.0
Program Administration	$21.3
Program Oversight	$0.7
Total	**$142.0**

In addition, staff recommends that the EPIC funds be collected through the end of 2020. This is a convenient date because it coincides with many other state-level programmatic goals, including achievement of the 33% renewables portfolio standard requirement and achievement of the greenhouse gas reduction goals required under AB 32. Thus, it should be a logical time to reassess the

need for continuing ratepayer support for the purposes discussed in this proposal.

Finally, staff proposes that the funding amounts given in Table 2 above be readjusted during each three-year investment plan cycle and allowed to increase by no more than the consumer price index for the previous three years, as further determined in the CPUC proceeding adopting each investment plan (as discussed further in Sections 4 and 5 below).

3.7. Fund Shifting

Staff recognizes the need for flexibility to enable the program to adjust to changing circumstances and priorities. To address this, staff recommends that within any investment plan cycle, the administrator have the ability to shift as much as 10% of the budget of any of the funded programmatic area to another funded area.[32] Additionally, in each investment plan, the administrator may propose changes to the allocation of funding across programmatic areas, including proposals to fund new, previously unfunded programmatic areas. In making such a proposal, the administrator should clearly describe the new allocation of funding, as well as provide a clear and thorough explanation regarding why the changed allocation is warranted. To the degree the administrative costs prove to be less than the 15% amount authorized, the administrator may also use remaining monies to further support funding allocated to specific areas up to the spending amounts recommended in the sections above.

3.8. Utility Funding Responsibility

Staff recommends that individual utility responsibility for collection of the EPIC funding should be kept proportional to past PGC collections. Most recent collections in 2011 are given in Table 3 below.

Table 3: Past PGC Collections by Utility ($ millions in 2011)

Utility	2011 RD&D PGC collections	2011 renewables PGC collections	Total 2011 PGC collections	Percentage contribution in 2011
Pacific Gas & Electric	$35.227	$36.836	$72.063	50.1%
San Diego Gas & Electric	$6.210	$6.520	$12.73	8.8%
Southern California Edison	$28.894	$30.271	$59.165	41.1%
Total	$70.331	$73.726	$143.958	100%

Thus, staff recommends that the utility responsibility for funding the EPIC program should be supported by the collections shown in Table 4, escalating every three years as described in Section 3.6.

[32] For example, the Administrator could take up to $5.5 million from the Demonstration programmatic area and add it to the Applied Research Budget, as both of these are funded areas and $5.5 million does not exceed 10% of the budget for Demonstration.

Table 4: Annual Utility Collections Beginning in 2012 to Support EPIC ($ millions)

Utility	Collection Amount	Percentage Contribution
Pacific Gas & Electric	$71.14	50.1%
San Diego Gas & Electric	$12.50	8.8%
Southern California Edison	$58.36	41.1%
Total	$142.00	100%

4. Planning and Implementation Mechanisms and Schedule

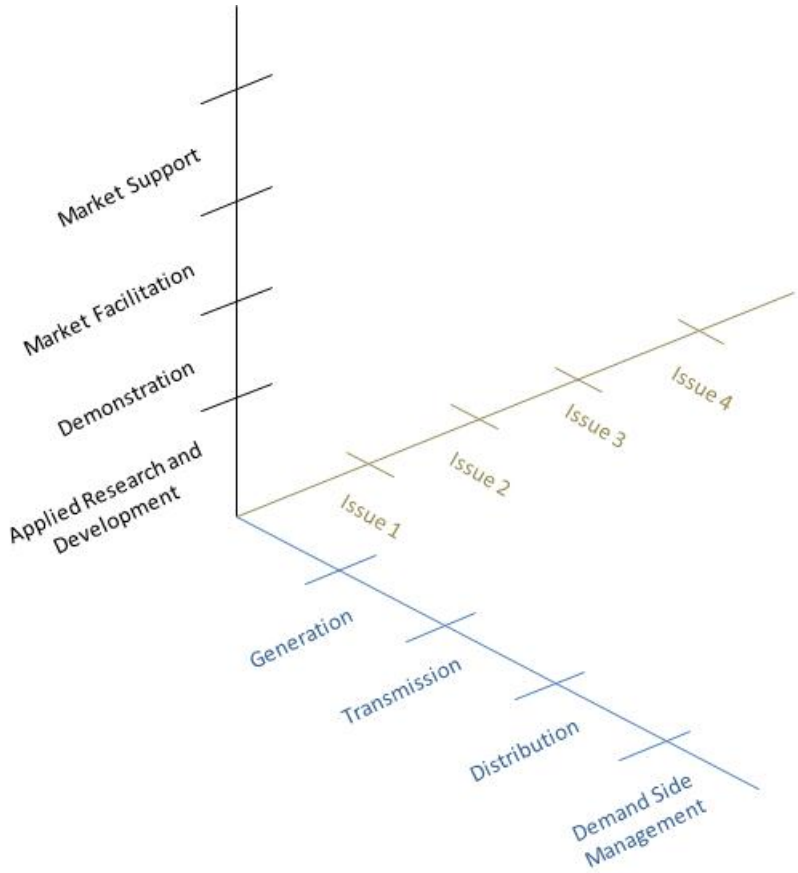
In the previous sections, staff has identified the policy support areas and the total funding amounts we believe should be provided to each of these. Determination of the specific projects that will receive funding will be conducted via the development, and eventual approval by the CPUC, of a triennial investment plan in which the program administrator will, working in close consultation with stakeholders, identify the key issue areas to which funding will be dedicated within each support area.

Although we have prescribed the share and level of total funding flowing to each high level support area, the administrator will have discretion in establishing priorities within those categories in each investment plan. For example, for demonstration activities, the administrator will need to propose what type of demonstration projects it intends to focus on and solicit over the period of time the plan covers.

In describing its proposed funding allocation to more specific areas, the investment plan should map each of the activities back to the overarching support area, and the electricity service value chain element, as well as provide a clear explanation regarding how the proposed activity relates to each value chain element, and how it is consistent with the key principles identified in Section 2.3 above. Schematically, the investment plan can be represented as providing information along three dimensions as shown in Figure 3 below. In this schematic, the “issues” represent more specific categories of support, for example “renewables integration,” “advanced energy storage,” “bioenergy,” etc.

In the interest of maintaining program flexibility, recognizing that the needs and interests of the state and ratepayers may change over time, staff does not offer a prescribed set of issues that should addressed at this time. However, we would expect the investment plan to provide a set of priority issue areas and a justification for those areas that is grounded in the key principles and policy drivers we have identified herein. In addition, given the potential overlap with utility efforts, the investment plan must also explain how the efforts to which it would allocate funding are non-duplicative and/or complementary to utility funded efforts as well as other programs like those implemented by the U.S. Department of Energy to ensure ratepayers receive the greatest value from their investment in these activities.

Figure 3: Investment Plan Mapping Schematic



The investment plan should also describe in detail the evaluation criteria that will be used in providing grants or contracts consistent with the plan once adopted. Those may include, but not necessarily be limited to, screening criteria, scoring criteria, requirements for project descriptions, and requirements that proposals explain how they address the goals or objectives described in each solicitation.

Similarly, the investment plan should identify key metrics against which the program will be evaluated. These metrics should relate to the underlying objectives of the activities and specific funding areas supported using EPIC funds. As described further in Section 5.2, these metrics will play an important role in program evaluation.

Staff proposes that the administrator prepare this investment plan on a triennial basis (i.e., once every three years). Before submitting the plan to the CPUC for approval, the plan should be vetted with key stakeholders as further described below. The feedback provided by these stakeholders, and any other groups established at the discretion of the administrator, and the administrator's responses to those comments, should be documented and included as an attachment to the investment plan ultimately submitted to the Commission for approval.

Once the investment plan is adopted by the CPUC, the CPUC will approve a grant of EPIC funds to the administrator, equal to the amounts in the adopted investment plan for each plan year (minus the annual amounts for the CPUC's oversight costs and minus the amount required for the CPUC's independent evaluation in 2016. The administrator will then select and execute contracts or grants in compliance with the investment plan. Staff proposes the following schedule of activities associated with the proposal and adoption of the investment plans every three years, as detailed in Table 5 below.

Table 5: Suggested Schedule for EPIC Program Approval Activities

Activity	First Triennial Investment Plan (covering 2012-2014)	Second Triennial Investment Plan (covering 2015-2017)	Third Triennial Investment Plan (covering 2018-2020)
Administrator holds scoping workshops	July 2012	January 2014	January 2017
Administrator proposes Investment Plan to stakeholders	September 2012	March 2014	March 2017
Administrator submits Investment Plan to CPUC	November 2012	May 2014	May 2017
CPUC proceeding	December - March 2013	June 2014- December 2014	June 2017- December 2017
Decision adopting or modifying Investment Plan	April 2013	January 2015	January 2018
Annual Reports due	February 2014, February 2015	February 2016, February 2017	February 2018, February 2019

5. Governance for EPIC

5.1. Definitions

To support the program activities described above will require a different governance structure than was previously defined by the statutory requirements of the PGC. Unlike the PGC, which was specifically authorized by law and subject to specific statutory requirements, the EPIC program was established and will be funded under the auspices of the CPUC's general electricity regulatory authority. Thus, the CPUC retains ultimate responsibility and oversight for the EPIC program and the ratepayer funds expended to further the program's goals. To help make the proposed roles and responsibilities for various entities clear, we distinguish between two different sets of responsibilities: 1) policy and program oversight and 2) administration.

By "policy and program oversight," we mean activities typically performed by the CPUC where ratepayer funds are expended for public interest purposes. For example, the CPUC retains ultimate policy

oversight in the areas of energy efficiency, demand response, renewables, and general procurement of electricity. The CPUC typically exerts it policy and program oversight in the form of formal decisions adopted by the full Commission, except in some instances where oversight is specifically delegated to one commissioner or to staff.

By contrast, "administration" in all of these areas is performed by entities specifically designated by the CPUC and subject to the rules and limitations set forth by the CPUC. For example, energy efficiency programs are administered by the IOUs, as is the CSI program, except in the territory of San Diego Gas & Electric, where the California Center for Sustainable Energy administers the CSI program there. For CSI RD&D, the CPUC has specifically hired an administrator for the program that is a private consulting firm with experience administering grants. Thus, many types of entities may be administrators, but in the case of EPIC, only the CPUC will play the role of policy and program oversight.

5.2. Governance and Policy Oversight

In confirming that the CPUC will retain the policy and program oversight for EPIC, staff suggests some specific parameters that the CPUC should set for the EPIC program. As described above, we anticipate that the CPUC will receive, review, and adopt an investment plan every three years. We expect the investment plan will propose, at a minimum, the following elements:

- The amount of funds to be devoted to particular program areas as described above (including applied research, technology demonstration, market support, and market facilitation).
- Policy justification for the funding allocation proposed.
- The type of funding mechanisms (grant, loan, pay-for-output, etc.) to be used for each program area.
- Eligibility criteria for award of funds in particular areas.
- Any suggested limitations for funding (per-project, per-awardee, matching funding requirements, etc.).
- Other eligibility requirements (technology, program area, etc.)
- Summary of stakeholder comments received and response to them.

Staff proposes that the CPUC would then adopt these specific parameters, and any others relevant, in its consideration of the investment plan via a proceeding process every three years. To inform its consideration of the investment plan, the CPUC would consider the input of stakeholders, as well as annual reports prepared by the administrator, as described in more detail below.

Staff generally recommends that the EPIC investment plans be evaluated against metrics designated around the objectives of the program. The metrics should be tangible, quantifiable, and measurable. These metrics, when combined with periodic program evaluations and annual reporting, will help refine programs, increase program effectiveness, identify ineffective program elements, and develop credible evidence that communicates the value of the program to stakeholders. Recommended metrics should include:

- Quantification of estimated benefits to ratepayers and to the state, such as:
  - The potential energy and cost savings
  - Job creation
  - Economic benefits
  - Environmental benefits
  - Other benefits
- Identification of barriers or issues resolved that prevented widespread deployment of technology or strategy. Examples include collecting baseline data, developing tools and methods, and research to overcome or address energy related environmental barriers that could impact meeting state energy policy goals, and streamline permitting processes for renewable energy technologies.
- Effectiveness of information dissemination. To determine whether information about a technology or strategy has reached target audiences, by tracking quantity of research outputs and the extent to which research is cited in other publications.
- Adoption of technology, strategy, and research data by others including utility rebate programs, codes and standards, and other entities in the marketplace (e.g., residential, commercial, industrial sectors, government).
- Funding support from venture capitalists or others for EPIC funded research on technology or strategies.

Finally, CPUC staff should be required to hire an evaluator during 2016 to conduct an independent assessment of the effectiveness of the EPIC program to date and provide recommendations for improvement. Information from this independent evaluation can be used to inform adoption of the third investment plan, for 2018 through 2020. A reasonable amount of funds, up to approximately $1 million, should be set aside from administrative funds during 2016 to be reimbursed directly to the CPUC by the utilities, for the purpose of hiring a consultant to conduct this independent review. Another evaluation may be warranted at the end of 2020 or in 2019, in order to inform regulatory or Legislative discussion about whether the EPIC program should continue or be modified or replaced at that time.

5.3. Administration

The administrator of the EPIC program will have control over the day-today operation of the program, operating under the parameters above, and any others, set by the CPUC. The administrator is responsible for the following types of activities:

- proposing the investment plan parameters every three years and operating under the previous set authorized by the CPUC
- awarding funds to specific entities according to the criteria established by the CPUC
- handling disbursement of funds
- collecting data and information about program successes and failures
- submitting an annual report as set forth further below.

Staff recommends that the CEC is the appropriate entity to administer the EPIC program. We make this recommendation for similar reasons that the CPUC selected the CEC to administer the natural gas RD&D program in D.04-08-010.

- The CEC's central mission is the development and support of state energy policy.
- Administration of "public interest" energy RD&D by the CEC achieves administrative efficiencies and synergies, by having a single organization administer both the electric and natural gas RD&D programs.
- Administration of energy RD&D by a state agency is preferable to administration by private entities, including the utilities, who may have potential conflicts of interest.
- The CEC also has considerable experience administering similar efforts due to its experience with the PIER program.

In addition, the CEC has broad authority related to state energy policy separate and apart from its previous authority to conduct the PIER program and renewable energy programs with PGC funding. Several statutes date back to the creation of the CEC and were used to fund RD&D activities prior to the PIER program. The CEC can follow any requirements set by the CPUC with regard to the EPIC program within the below broad statutory parameters. Below are some statutory authority related to CEC administration of EPIC monies.

Public Resources Code Section 25216(c) states:

> "In addition to other duties specified in this division, the commission shall do all of the following:
>
> (c) Carry out, or cause to be carried out, under contract or other arrangements, research and development into alternative sources of energy, improvements in energy generation, transmission, and siting, fuel substitution, and other topics related to energy supply, demand, public safety, ecology, and conservation which are of particular statewide importance."

Public Resources Code Section 25401 states:

> "The commission shall continuously carry out studies, research projects, data collection, and other activities required to assess the nature, extent, and distribution of energy resources to meet the needs of the state, including but not limited to, fossil fuels and solar, nuclear, and geothermal energy resources. It shall also carry out studies, technical assessments, research projects, and data collection directed to reducing wasteful, inefficient, unnecessary, or uneconomic uses of energy, including, but not limited to, all of the following:
>
> a) Pricing of electricity and other forms of energy.
> b) Improved building design and insulation.
> c) Restriction of promotional activities designed to increase the use of electrical energy by consumers.
> d) Improved appliance efficiency.
> e) Advances in power generation and transmission technology.

f) Comparisons in the efficiencies of alternative methods of energy utilization.

The commission shall survey pursuant to this section all forms of energy on which to base its recommendations to the Governor and Legislature for elimination of waste or increases in efficiency for sources or uses of energy. The commission shall transmit to the Governor and the Legislature, as part of the biennial report specified in Section 25309, recommendations for state policy and actions for the orderly development of all potential sources of energy to meet the state's needs, including, but not limited to, fossil fuels and solar, nuclear, and geothermal energy resources, and to reduce wasteful and inefficient uses of energy."

General authority for assessment of public interest energy strategies, including renewable energy, is provided in section 25305 of the Public Resources Code:

"The commission shall rely upon forecasting and assessments performed in accordance with Sections 25301 to 25304, inclusive, as the basis for analyzing the success of and developing policy recommendations for public interest energy strategies. Public interest energy strategies include, but are not limited to, achieving energy efficiency and energy conservation; implementing load management; pursuing research, development, demonstration, and commercialization of new technologies; promoting renewable generation technologies; reducing statewide greenhouse gas emissions and addressing the impacts of climate change on California; stimulating California's energy-related business activities to contribute to the state's economy; and protecting and enhancing the environment. Additional assessments to address public interest energy strategies shall include, but are not limited to, all of the following:

(a) Identification of emerging trends in energy efficiency in the residential, commercial, industrial, agricultural, and transportation sectors of the state's economy, including, but not limited to, evaluation of additional achievable energy efficiency measures and technologies. Identification of policies that would permit fuller realization of the potential for energy efficiency, either through direct programmatic actions or facilitation of the market.

(b) Identification of emerging trends in the renewable energy industry. In addition, the commission shall evaluate progress in ensuring the operation of existing facilities, and the development of new and emerging, in-state renewable resources.

(c) Identification of emerging trends in energy research, development, and demonstration activities that advance science or technology to produce public benefits.

(d) Identification of progress in reducing statewide greenhouse gas emissions and addressing the effects of climate change on California."

These same statutes provide the CEC broad authority to continue implementing programs that foster the development and continued operation of renewable energy projects as "alternative sources of energy."

In addition, the following statutes provide the Energy Commission continuing authority over renewable energy matters that is separate and apart from the Energy Commission's authority to implement the renewable energy programs pursuant to Public Resources Code sections 25740– 25751 and Public Utilities Code section 399.8.

Public Utilities Code section 399.11 directs the Energy Commission and the CPUC to implement the 33 percent RPS under SBX1-2. Specifically, Section 399.11 (a) provides:

> "(a) In order to attain a target of generating 20 percent of total retail sales of electricity in California from eligible renewable energy resources by December 31, 2013, and 33 percent by December 31, 2020, it is the intent of the Legislature that the commission [CPUC] and the Energy Commission implement the California Renewables Portfolio Standard Program described in this article.
>
> In order to implement the RPS, Public Utilities Code section 399.25 directs the Energy Commission to certify eligible renewable energy resources, design and implement an accounting system to verify compliance with the RPS by retail sellers of electricity and POUs, to establish a system for tracking and verifying renewable energy credits (RECs), and to certify, for the purposes of a retail seller's compliance with the RPS, the eligibility of RECs associated with eligible renewable energy resources procured by a POU."

Public Utilities Code section 399.30 (n) also directs the Energy Commission to adopt regulations specifying procedures for the enforcement of RPS procurement obligations on POUs.

Public Resources Code sections 25780 – 25784 directs the Energy Commission to establish statewide eligibility criteria for ratepayer-funded incentive programs for solar energy systems under SB 1 (Statutes of 2006, Chapter 132). This authority, along with Public Utilities Code section 2851(e)(3) and Public Resources Code section 25744.5, authorizes the Energy Commission to implement the New Solar Homes Partnership program.

Public Resources Code section 25783 directs the Energy Commission to 1) publish educational materials designed to demonstrate how builders may incorporate solar energy systems during construction, 2) develop and publish estimated annual electrical generation and savings for solar energy systems, 3) provide assistance to builders and contractors, including technical workshops, training, educational materials, and related research, 4) conduct random audits of solar energy systems to evaluate their operational performance, and 5) in consultation with the CPUC, evaluate the costs and benefits of having an increase number of operational solar energy systems as a party of the electrical system.

Lastly, Public Utilities Code sections 398.1 – 398.5 directs the Energy Commission to develop rules and procedures for a power source disclosure program to ensure retail suppliers of electricity disclose to consumers accurate, reliable, and simple to understand information on the sources of energy that are used to provide electric services. The law requires retail suppliers of electricity to disclose fuel source information to consumers about the electricity being sold, using a format developed by the Energy

Commission. The law also requires electricity generators that report meter data to a system operator to report generation, fuel type and fuel consumption data to system operators on a quarterly basis.

An additional consideration is the fact that the CEC has hired and retained high-level and knowledgeable staff to conduct research and renewables programs, which over the past decade have been funded by the PGC. It makes little sense to allow that expertise to migrate and have to recreate it elsewhere in another institution. Retaining program staff also allows continuity between past efforts and future EPIC-funded approaches, and minimizes disruption and uncertainty in the energy industry, especially among entities that routinely conduct research and/or demonstration activities.

For all these reasons, the CEC is the logical choice to administer the EPIC funds for the above-stated purposes, as well as those laid out in this proposal. This recommendation should not be interpreted to mean a recommendation for "status quo" PIER or renewable energy program administration, however. During the debate about continuation of the PGC funding over the past year or so, several areas were identified that may warrant change from the past processes used under PIER. Those suggestions are detailed further below.

Administrative Costs

Many stakeholders have raised concerns about the potential for excessive administrative costs paid under the previous PIER and some renewables program. To minimize concerns in this area, we have already suggested a limit of 15% on the administrative costs for the EPIC program. Administrative and overhead costs paid under the grants funded by EPIC funds (i.e. those administrative and overhead costs incurred by a grant or funding recipient associated with their funded activities), do not count toward this administrative cost limit, though the administrator should strive to minimize these administrative and overhead costs in contracts.

Intellectual Property Issues

Program changes from previous PIER experience related to intellectual property rights need to be re-examined based on input from key stakeholders and program participants. While there is agreement about the need for changes, opinions differ on whether the previous royalty provisions help or hinder efforts to obtain private sector financing for successful research projects, in particular. Since one of the goals of a "public interest" program is to assist in development and commercializing new technologies, the level of repayment required could have unintended consequences.

The previous approach used called for two types of repayment:

- Payment of two times the amount of state funding, received within two years of the end of a research agreement, or
- Payment of 1.5 percent of total sales over 15 years from the first sale of a successful research project or technology.

Only one previous PIER grant recipient chose the first option, and several entities complained that the level of repayment under the second option was too high and deters participation. A variation on the

second option is to cap the total amount of repayment at 1.5 to 2 times the amount of funding received, coupled with a longer time period for repayment. Regardless of the requirements, the following basic principles should be kept in mind.

Intellectual Property Goals

Intellectual property (IP) refers to products of the mind that the law protects, such as copyrights, trademarks, and patents. The treatment of IP rights under a research, development, and demonstration (RD&D) program will impact its success. Correctly handling IP rights encourages participants in RD&D programs and advances the commercialization of new technologies. Incorrectly handling IP can have the opposite, negative impact on an RD&D program. To ensure EPIC is successful in this regard, staff suggests that IP rights under the EPIC RD&D program should advance the following three goals:

a. Provide tangible benefits to the ratepayers who pay for the RD&D.

b. Foster and not hinder the commercialization of new technologies, including advances in existing technologies.

c. Advance the collective knowledge of energy RD&D.

Benefits to Contributing Ratepayers

The Public Utilities Commission derives authority to raise rates for the Electricity Program Investment Charge (EPIC) for RD&D in part under Public Utilities Code Sections 740 and 740.1. Section 740.1(a) states that RD&D projects: "should offer a reasonable probability of providing benefits to ratepayers."

Fostering Commercialization of New Technologies

One of the basic benchmarks of any RD&D program is whether it results in new, commercially successful technology. IP rights play a significant role in commercialization. For example, IP rights that inappropriately share ownership or make proprietary information public would prevent the commercialization of new technologies. An entity would no longer have a competitive advantage, and thus impetus, for developing new technology. Instead, IP rights must create the framework leading to commercialization.

Advancing the Collective Knowledge of RD&D

Although it is important that IP rights lead to the commercialization of new technologies, IP rights must also allow the sharing of new scientific knowledge. Contributing to the world's scientific knowledge allows further advances to occur. It is also prevents duplication of efforts by others, which preserves RD&D funds for new efforts.

IP Rights under EPIC

To achieve the three goals above, the IP rights under the Electricity Program Investment Charge (EPIC) should be structured as follows:

Each EPIC RD&D project needs to identify:

a. The IP that it will create in the form of new technology, advances in existing technology, or advances in scientific knowledge.

b. How the new IP will benefit the contributing ratepayers.

In general, the rights of IP developed under EPIC should be held by the entity developing it. Such entities are usually in the best position to commercialize the new technology, and it is not the state's role to create programs that compete with private companies.

IP derived from general energy research that is geared towards new knowledge rather than product development should be put in the public domain, through publication of a final project report that is available on the program administrator's website. This advances science and prevents other entities from performing duplicative research.

Careful consideration should be given whether EPIC should seek to have recipients of its funds pay royalties on products developed. Royalties are payments of a portion of the proceeds derived from commercial sales. Although in theory it seems logical that if a recipient of EPIC funds develops a commercially successful product, then the ratepayers contributing to EPIC should benefit from the profits, the practical aspect of royalties requires cautious consideration:

a. Requiring royalty payments could prevent some entities from applying to EPIC.

b. Royalties can create lengthy entanglements with entities after projects end (e.g., monitoring, enforcement, and maintaining records).

Royalties can hinder follow on funding from venture capitalists, which do not like to fund projects with existing repayment obligations. This conflicts with the goal of commercializing new technologies. For these reasons, we do not recommend requiring EPIC funding recipients to pay royalties to ratepayers for the IP they develop and subsequently commercialize or otherwise profit from.

Stakeholder Consultation

There seems to be no disagreement among any parties that any expenditure of EPIC ratepayer funds for public interest purposes would benefit from stakeholder input from a wide variety of viewpoints, including industry, government, non-governmental organizations, academia, utilities, and others.

The key questions about obtaining stakeholder input are related to structural issues such as: whether there should be a formal committee or whether a less structured format should be used; who should convene the stakeholders, and how the advice received from stakeholders should be handled. In seeking stakeholder input, the Commission will not be delegating any decisionmaking. Furthermore, based on the Commission's experience with complex procedural requirements that often come into play with the establishment of formal advisory bodies, we do not suggest that option.

Instead, staff recommends that the administrator be required to conduct scoping workshops and consult with key stakeholders to provide strategic and technical advice and feedback on the triennial investment plan and its implementation, and any other aspects of the program. More specifically, staff recommends that the administrator consult stakeholders by convening periodically, no less than twice a year, workshops or meetings to allow stakeholders to give input and the benefit of their expertise to the administrator about the various areas of investment. In addition, the administrator may, if it wishes, informally meet with stakeholders. The exact structure and nature of the workshops, and any meetings, should be determined by the administrator.

While workshops and meetings should be widely noticed and open to the public, there are certain key stakeholders with whom we wish to ensure that the administrator consults. They are:

- Members of the Legislature, to the extent that their participation is not incompatible with their Legislative positions.
- Government, including state and local agency representatives.
- Utilities
- Investors
- California Independent System Operator (CAISO)
- Consumer groups
- Environmental organizations
- Academics

Staff from the state energy and environmental agencies should also be invited and participate in the stakeholder workshops and meetings, as needed.

As part of each submission of an investment plan to the CPUC, the administrator should summarize the feedback provided by stakeholders and the administrator's detailed responses to each comment. Where several commenters make the same point, the administrator should summarize the point made and submit one combined response. To the extent the administrator receives stakeholder comments and feedback in between investment plan submissions that are directed at aspects of its current plan administration, rather than at the creation of an investment plan, the administrator should keep a record of those comments, and, to the extent relevant, summarize and comment on them when it submits its next proposed investment plan to the Commission. This process will allow the CPUC to thoroughly consider input from the stakeholders in its decision-making and oversight process.

Workshops and meetings of the stakeholders should be widely noticed and open to the public. The exact structure and nature of the meetings and workshops should be determined by the administrator.

Staff also suggests that the administrator be authorized to convene stakeholders for other purposes, as desired, to help improve the design and implementation of the investment plan.

5.4.Funding Flow

The costs authorized under the EPIC program are utility costs and revenues, subject to the oversight of the CPUC. These revenues and costs will be recorded in the EPIC balancing accounts of each utility. Experience this year with natural gas RD&D funding for energy efficiency sensitizes us to the need to protect these utility funds, as much as possible, from the possibility of diverting them to help balance the state budget. Thus, since these are ratepayer funds that should be utilized to fund activities that benefit ratepayers, our objective is to hold them in utility accounts, to the extent possible, so that they may be expended for the purposes for which they were collected.

To minimize the risk of repurposing of the funds that will be administered by the CEC, we propose two alternative models for parties' consideration and comment. These options recognize that the CEC does not have the funding to advance tens of millions of dollars in payments to contractors and grantees and then rely upon repayment from the utilities.

1) **Monthly or Quarterly Cash Flow.** Under this option, the utilities would periodically remit funds to a CEC account which would be managed by the CEC, as administrator, and used to pay obligations under the EPIC program. Under this option, at any given point in time, some funding would be held in state accounts and available to be taken for purposes other than the EPIC program. However, by making the payments be monthly or quarterly, inflow of funds would be designed roughly to cover cash flow needs for the period selected, such that there is not a large build-up of utility ratepayer funds in a state account.

2) **Payment When Funds are Encumbered.** Under this option, the utilities would forward funds to CEC accounts when the CEC encumbers them in a contract or grant, meaning once the contract or grant is executed. Transferring funds that are already encumbered minimizes risk to the funds, since transfers in the past for budget purposes have typically been limited to unencumbered funds.

These two options are not mutually exclusive. For example, option 1 could be used for the CEC's administrative and staffing costs, while Option 2 could be used for grants or contract expenditures. This proposal invites comments from parties on the best approach to this problem.

6. Utility Applied Research and Technology Demonstration (or Deployment) Activities

The IOUs currently administer a set of ratepayer-funded applied research and demonstration projects authorized by the CPUC across various proceedings including General Rate Cases, policy proceedings related to specific programmatic areas (e.g. energy efficiency, demand response, California Solar Initiative, smart grid, etc.), and individual applications. In requesting funding for applied research and demonstration activities, the three IOUs have relied on Sec. 740.1 as a justification for ratepayer

funding.[33] The CPUC has historically allowed flexibility among the IOUs to determine RD&D program scope, size, and structure, subject to the limitation that RD&D cost recovery is "restricted to endeavors that meet the criteria for permissible RD&D projects as stated in Pub. Util. Code Sec. 740.1."[34] The annual applied research and demonstration budgets for PG&E, SCE, and SDG&E in GRCs are approximately $2.80 million, $2.14 million, and $2.81 million, respectively.

However, this is relatively small compared to the amounts the utilities have been authorized to spend on applied research and technology demonstration in total, including approvals for spending on such activities outside of their GRCs. In recent years, substantial amount of applied research and demonstration funding has been authorized by the CPUC in programmatic efforts to implement the "loading order" and related policy efforts.

In the area of energy efficiency, the IOUs have a combined budget of approximately $48 million from 2010 to 2012 for a Statewide Emerging Technologies Program.[35] For demand response, the IOUs have a combined RD&D budget of approximately $14 million for years 2009 to 2011. To support the CSI, and consistent with Public Utilities Code Section 2851(c)(1), the CPUC has allocated $50 million toward CSI-related RD&D, of which $24 million has been authorized through two solicitations.[36] To support federal Smart Grid policy, the CPUC has also authorized $26 million of ratepayer co-funding toward PG&E's Compressed Air Energy Storage feasibility study,[37] and $24 million of co-funding for SCE's Tehachapi Wind Energy Storage demonstration facility.[38] Lastly, The CPUC has authorized SCE to co-fund two carbon capture and storage demonstration projects, up to $34.6 million in total.[39]

The CPUC currently lacks a centralized system or programmatic structure to review and track ratepayer-funded applied research and demonstration projects. The absence of a more centralized approach makes tracking and coordination of applied research and demonstration difficult, greatly increasing the risk of duplicative efforts and missed opportunities to effectively leverage existing and/or ongoing research and demonstration activities. Staff believes that the CPUC and ratepayers could be better served by consolidating the budget review process for all utility RD&D in one procedural vehicle.

A more consolidated budget review process for all utility RD&D activities would provide the CPUC and the public more visibility into ratepayer-funded projects and results; invite better public participation in prioritizing and setting programmatic areas; and facilitate broader market acceptance and adoption of

[33] PG&E GRC A.09-12-020 Exhibit PG&E-3, Prepared Testimony of Carl D. Speck, page 21-16; SCE GRC A.07-11-011 Opening Brief, footnote 442, page 77; SDG&E GRC A.10-12-005 Exhibit SDG&E-15-R, Revised Prepared Testimony of Kathleen H. Córdova, page KHC-57, line 23-25.
[34] D.09-03-025, at 78.
[35] With the expiration of the PGC in January, 2012, this amount will be funded entirely through the Procurement Energy Efficiency Balancing Account pursuant to D.11-12-038.
[36] See CalSolarResearch website at http://www.calsolarresearch.org/About-CSI-RDD/.
[37] See D.10-01-025.
[38] See Resolution E-4355.
[39] See D.08-04-038 and D.09-12-014.

viable new technologies. The transparency this affords may allow a more effective vehicle for researchers, emerging technology developers, public interest advocates, utilities and market participants to propose new ideas; cross-pollinate project results; and encourage broader acceptance of viable new technologies into the energy market space.

To address these concerns, staff proposes that rather than seek authority for applied research and technology demonstration activities across multiple proceedings, the IOUs move toward a framework that parallels the approach we are taking with the EPIC-funded applied research and demonstration program elements described above.

Specifically, every three years, on the same schedule as for the EPIC program described above, each IOU should submit an investment plan via application, to be consolidated with the EPIC investment plan consideration, identifying the applied research and technology demonstration and deployment projects they wish to undertake and the total and project specific budget amounts they are seeking, along with a clear justification for how the proposed projects or activities are consistent with Sec. 740.1, as well as the other key principles identified above in section 2.1 of this staff proposal.

As with the EPIC investment plan, the IOUs' plans should be developed with substantial stakeholder input and feedback and seek to limit duplicative efforts, in particular by effectively coordinating efforts with those being pursued by the other utilities as well as the activities being undertaken under the EPIC program. Staff would recommend an approach that is essentially the same as that proposed for the EPIC investment plan, whereby there is an opportunity for the utility plans to be reviewed by the same stakeholders from whom the CEC will be soliciting feedback on the EPIC investment plan, with a summary of the input and comments received from these stakeholders included along with the utility investment plans when they are filed. In addition to proposing new applied research and demonstration projects and funding levels, the utilities should prepare annual RD&D reports on the same schedule as the EPIC program reports to provide the CPUC with detailed information regarding ongoing applied research and demonstration efforts. This report should include expenditures to date by project, and an overview of progress and results. In addition, in 2016, staff recommends that the CPUC contract with an independent evaluator, to assess program success and identify areas for improvement prior to approval of the third investment plan through 2020. The evaluator should provide its independent report based on pre-determined metrics developed by CPUC staff with input from stakeholders.

As a general matter, staff believes this approach should be the primary, if not exclusive, vehicle by which the IOUs would propose new applied research and demonstration activities going forward, rather than the highly disaggregated approach that has been used to date. The intent is not necessarily to increase or decrease the amount of utility expenditures on RD&D efforts, but rather to ensure coordination between utility and EPIC-funded efforts, supporting one comprehensive statewide strategy for energy-related RDD&D efforts.

Preliminarily, staff proposes that the utilities be authorized to spend no more than $40 million annually on any activities that fall into the definitions in Section 2 of this proposal related to applied research

and/or technology demonstration and deployment. Staff suggests that this budget limitation be exclusive of the efforts and funding associated with energy efficiency emerging technologies. We suggest this exception not because the energy efficiency emerging technology efforts should not be coordinated with all of the other activities we describe in this staff proposal, but rather because those energy efficiency emerging technology efforts are already well coordinated and integrated within the energy efficiency policy space, including CEC and IOU efforts related to codes and standards. Funding and programs related to areas other than energy efficiency do not appear well-coordinated and are not well integrated with the CEC's existing and potential future efforts, as described herein.

Using the same percentage allocation by utility as suggested under Section 3.8 above with regard to EPIC program funding, Table 6 below gives the maximum budget that would available to each utility on an annual basis for purposes other than energy efficiency emerging technologies. This funding would not be part of the EPIC funding described above, but would be funded separately via the distribution portion of the revenues of the electric utilities. As such, due to competitive concerns correctly raised by, among others, community choice aggregation advocates, funding should be prohibited from being used to support generation technologies, and limited to activities related to the electric grid, over which the electric utilities have monopoly control. Alternatively, the utilities could propose to fund any generation-related applied research and/or technology demonstration out of their generation revenues.

Table 6: Suggested Utility Annual Budgets for Applied Research and Technology Demonstration (exclusive of and in addition to funding for energy efficiency emerging technologies)

Utility	Budget Amount	Percentage Contribution
Pacific Gas & Electric	$20.04	50.1%
San Diego Gas & Electric	$3.52	8.8%
Southern California Edison	$16.44	41.1%
Total	$40.00	100%