

January 18, 2011

Hon. Alex Padilla
Senator, 20th District
Room 4038, State Capitol
Sacramento, California 95814

Dear Senator Padilla:

In January 2012, authority to collect a so-called “public goods charge” to fund the electricity portion of the Public Interest Energy Research (PIER) program at the State Energy Resources Conservation and Development Commission (CEC) will automatically expire or “sunset” unless extended through legislative action. Given these circumstances, you requested in an August 12, 2010 letter, and in subsequent conversations with your staff, that we conduct an independent review of the PIER program to determine if it is operating successfully, if the program should be reauthorized and, if so, if modifications are warranted. As part of our evaluation of the program, we address three main questions:

- Is there a continued state role for a public interest energy research program in the state today?
- If so, are the current statutory parameters guiding the eligible use of PIER funds and thus the program’s focus still appropriate? If not, what should the program’s focus be?
- Assuming program continuation, is the current process for allocating funds via the CEC the one that is best suited to achieve statutory objectives of the PIER program, including the creation of tangible electricity ratepayer benefits?

In our analysis that follows, we provide a brief background of the development of the PIER program; discuss current public and private energy research efforts, including those of PIER; describe a fundamental problem in the current structure of the program; and, finally, propose three options for the Legislature to consider in order to improve California’s approach to publicly directed energy research.

Our Bottom Line. Our analysis supports three major findings. First, in evaluating the current program, we find that the CEC has not demonstrated that there has been a substantial payoff to date from the state’s investment of more than \$700 million in ratepayer funds. We find that the CEC has generally funded projects in line with the broad categories of eligible investments that are set out in statute (such as promoting “energy efficiency” and “demand response” strategies). However, state law establishes several goals for the PIER program, including the creation of tangible ratepayer benefits. While some particular PIER-sponsored research projects have served

these goals, CEC has not demonstrated that the majority of the projects allocated PIER funding by CEC has produced similar benefits.

Second, we find that the legislative and regulatory enactment of several new ambitious energy policy objectives has created an energy landscape that differs greatly from the one that existed in 1996, when the PIER program was created. In order to help address technological barriers which may prevent attainment of these state goals, we find that there is a role for the state to continue to support public interest energy research beyond the 2012 sunset date.

Third, if the Legislature decides that there should be a continuing state role in this area of research, we find that improvements could be made to the implementation of this role, including by tightening funding eligibility parameters and changing the process by which research funding is allocated.

Methodology. In crafting our response, we discussed these matters in detail with a number of entities throughout the energy research community, including the CEC, California Public Utilities Commission (CPUC), California Independent System Operator (CAISO), and other regulatory bodies and policy makers. We also contacted investor owned utilities (IOUs), publicly owned utilities (POUs), and other experts in the energy sector, including national research institutes and agencies in other states. In addition, we consulted PIER reports, past program analyses, and studies which looked at the state of energy research today.

BACKGROUND

Electricity Research Prior to Deregulation. Prior to deregulation of the state's electricity markets in 1996, most electricity research was driven by utilities themselves and coordinated through the Electric Power Research Institute (EPRI). The EPRI is a national research institute founded in 1973 following U.S. Senate hearings which brought attention to the lack of funding for research and development in the electricity industry. Through EPRI, utilities around the country were able to pool research resources in order to advance technological development and understanding in the area of electricity generation, delivery, and use. During this time, California's IOUs were allowed to recover costs associated with this research activity through the rate-making process at the CPUC.

AB 1890 Established Public Goods Charge on IOU Ratepayers to Fund PIER. In 1996, California moved toward a deregulated electricity market through the passage of the Electric Utility Industry Restructuring Act (Chapter 854, Statutes of 1996 [AB 1890, Brulte]), widely referred to as AB 1890. At the time, it was widely believed that, under a newly deregulated system, IOUs would have an incentive to cut costs as much as possible, and would thus limit spending on research. State policy makers, however, wanted to ensure the continuation of electricity research that was in the "public interest"—including research that results in system-wide improvements that would benefit ratepayers across the state.

In order to address this concern, policy makers included in AB 1890 a provision which authorized the collection of a surcharge on IOU electricity bills in order to fund, among other purposes, a public interest energy research, development, and deployment program. This surcharge is commonly referred to as a public goods charge. The CEC was given the

administrative authority under PIER to provide grants for research to develop, and help bring to market, energy technologies that benefit the environment, provide greater system reliability, lower system costs, and provide other tangible benefits to California electric utility customers.

As we noted earlier, before the enactment of AB 1890, IOUs had been allowed to recover research costs through the CPUC's rate-making process. After the law was enacted, the CPUC decided administratively to eliminate most rate recovery of IOU research and development budgets. This action was based on CPUC's concern that allowing IOUs to incur and recover such costs in the rates charged to electricity consumers would give them a competitive advantage in a newly deregulated market. The actions taken by the CPUC do not prevent IOUs from conducting their own public interest energy research outside of PIER, so long as those costs are paid by an IOU's shareholders rather than from ratepayer-generated funds.

POUs Fund Their Own Research Programs, Outside of PIER. Although funding for PIER is derived solely from the public goods charge levied on California's IOU ratepayers, POUs are nonetheless required under statute to levy a public goods charge on their ratepayers in order to fund similar programs. The charge levied on POU ratepayers is required by statute to be commensurate with the amount paid by IOU ratepayers.

Funding Level for PIER Established in Statute. Assembly Bill 1890 mandated that PIER receive no less than \$62.5 million annually from the public goods charge levied on IOU ratepayers. In addition, Chapter 932, Statutes of 2000 (AB 1002, R. Wright), established an additional surcharge on natural gas ratepayers in order to fund natural gas public interest research at an annual level of \$24 million. In total, PIER now receives \$86.5 million annually. The electricity portion of the public goods charge is scheduled to sunset in January 2012. The natural gas charge would continue indefinitely.

Focus of PIER Program Established in Statute. Statute provides various funding criteria to guide CEC's allocation of PIER funds and to focus the program's activities. For example, Chapter 512, Statutes of 2006 (SB 1250, Perata), requires that the program focus on five major areas: (1) advanced electricity generation (such innovations as systems that recycle heat from power systems to produce electricity), (2) climate change and the environment, (3) energy efficiency and demand response strategies (the latter referring to mechanisms that serve to reduce customer demand for energy), (4) renewable energy, and (5) transmission and distribution of power. Earlier legislation, Chapter 91, Statutes of 2005 (SB 76, Budget and Fiscal Review Committee), had already expanded the scope of the PIER program to include a sixth category—for transportation-related research.

Statute requires that the CEC ensure that PIER funding decisions align with the state's energy "loading order"—a term used to define all state energy priorities. The loading order requires that the state's energy policies focus on meeting energy demands in the following order: (1) increases in energy efficiency and demand response strategies, (2) development of renewable and distributed generation resources, and (3) generation of clean fossil-fueled electricity.

THE CEC'S IMPLEMENTATION OF PIER RAISES ISSUES

What Has the State Received From Its Investment in PIER? Since the program's inception, PIER has funded nearly \$700 million in public interest research and development. While the amount invested by the state in these activities is easy to track, it is by no means clear that the investment has resulted in a payoff to the state's electricity ratepayers who provided these resources.

While the CEC has estimated that the program has resulted in billions of dollars in savings to ratepayers, we believe that there are serious problems with the way the CEC has calculated these benefits. In its calculations, CEC attributes to the PIER program the entirety of the substantial ratepayer savings that have resulted from the state's adoption of energy-related building and appliance standards. While it is true that some of the research used to develop these standards has been fostered by PIER, our analysis indicates that it is not reasonable to directly attribute all resulting cost savings to PIER. For example, CEC is implicitly counting as a benefit from PIER savings from some tighter building and appliance standards adopted as early as the 1970s, long before PIER ever existed. It is fair to attribute some credit to the PIER program, in that some changes were made to these energy efficiency standards as the result of PIER-supported research. In addition, CEC has been able to document how the PIER program has helped to bring to market such innovations as floor cooling technology and cool roofing. But CEC's calculations of benefits to ratepayers often overstate the impact of these changes, in our view.

This does not necessarily lead to the conclusion that continued state investment in public interest energy research is unwarranted. As we discuss later in this analysis, we find that there is a need for a continued state role in this research area to assist the state in meeting its energy goals. We also find that there is the potential for a much larger payoff from the program if it were refocused and various other program improvements adopted.

PIER Has Funded a Broad Spectrum of Research—Perhaps Too Broad. A broad array of research has been funded over time under PIER within each of the six allowable investment categories discussed earlier. The PIER-funded research projects we have reviewed generally fit within these allowable categories. However, some projects appear to have only a tenuous connection to the subject of energy. For example, just within the climate change and environment area, PIER has funded research on such varied topics as deforestation in California, groundwater recharge, the potential impact of climate change on bird distribution, and salmon habitat restoration.

Our analysis raises questions as to whether the range of research is so broad and unfocused that it is hindering the potential benefit of the PIER program. Fragmenting the research into so many directions reduces the likelihood, in our view, that this research is being translated into changes in the electricity marketplace that are benefiting consumers or the public at large.

All Statutory Goals of PIER Not Being Met. The statute that created PIER establishes various goals for the program which were intended to guide the allocation of PIER funds. Specifically, statute provides that the general goal of the program is "to develop, and help bring to market, energy technologies that provide increased environmental benefits, greater system reliability, and lower system costs, *and* (emphasis added) that provide tangible benefits to

electric utility customers.” In nearly all cases, it is clear that the projects selected for funding are in line with some of these goals. However, based on our review, it appears that not all of these goals are being met by each particular project that has been allocated funding, as the law creating PIER requires. This particularly appears to be the case for the climate change/environmental category. For example, while researching the potential impact of climate change on the distribution of birds may have scientific merit, it is doubtful that it will lead to tangible electricity ratepayer benefits as required under the PIER statute.

Other Issues. Other issues have been brought to our attention concerning the current framework and implementation of the PIER program. First, the public nature of the program (and thus the need to ensure transparency throughout the application review period) has resulted in what is inherently a lengthy application process. We have been advised that this has discouraged potential researchers from participating in the program.

A second issue concerns who owns the rights to the results of research that has been funded with both public and private funds, as is typically the case for PIER-funded projects. This issue is currently resolved through negotiations on a case-by-case basis between the public and private funders and ultimately is a decision left to the administrative discretion of the CEC. The question of proprietary rights appears to be discouraging some parties from participating in the program.

A third issue concerns the efficiency of having multiple public interest energy research programs in the state—one operated by CEC under PIER, as well as the additional internal research programs operated by each POU. It is likely that this arrangement results in unnecessary and additional administrative costs for the administration of these programs. Also, this situation could result in a lack of coordination of this research, and increases the risk of duplicative research efforts.

IS THERE A CONTINUED STATE ROLE FOR ENERGY RESEARCH?

Meeting State Energy Goals Will Require Research Breakthroughs. Since the PIER program was created, many aspects of the California energy sector have changed. The 2000-01 energy crisis in California, new state policies to require increased generation of electricity from renewable energy sources, and other policy changes have created a new energy landscape that looks much different than the one in existence in 1996. State legislation is driving the need for technological change and research to achieve breakthroughs in the energy area.

For example, Chapter 469, Statutes of 2010 (AB 2514, Skinner), authorized the CPUC to determine targets for IOUs to develop storage capacity for electricity. While some forms of energy storage, such as hydroelectricity, have been in existence for decades, other forms of storage will still require technological breakthroughs in order to make their integration into the grid cost-effective.

The goal of increasing California’s access to renewable sources of energy—one of the state’s primary energy priorities—is also driving the need for technological change and research. Due to the intermittent nature and relative unpredictability of wind and solar resources, there are numerous engineering challenges to integrating these renewable energy sources into the electrical grid in a cost-effective way without jeopardizing the reliability of energy delivery

systems. Technological breakthroughs will be needed, for example, to improve the ability of electrical system operators to accurately forecast the availability of renewable resources in order to better integrate them into the grid.

Other areas of legislative interest are so-called “smart grid” technologies and demand response systems which are intended to reduce consumers’ energy demand. While demand response is equal to energy efficiency as the state’s first priority in the loading order, energy engineers indicate that more research is needed in order to advance these technologies beyond prototypes.

IOUs Now Have Much Greater Incentive to Invest in Public Interest Energy Research. Changed circumstances since the passage of AB 1890 have opened the door for the Legislature to consider new approaches to funding public interest energy research. Because of the state’s various energy-related mandates, the IOUs now have a much greater incentive to invest in research in order to meet the state’s energy goals. The IOUs face significant fiscal penalties if they do not meet various energy mandates and targets.

A Continued State Role in Energy Research Makes Sense. Given the circumstances discussed above, we believe that meeting the state’s energy goals will require continued investment by both the public sector (including the state) as well as the private sector. We are not in a position to determine how much state funding should appropriately be committed to these purposes. This is an important policy decision for the Legislature to make should it decide to continue the state’s role in a publicly directed energy research program. However, should the Legislature choose to reauthorize the PIER program in some form, we recommend that improvements be made to the process for allocating funds for such a program.

In the section that follows, we discuss three potential approaches for reforming the state’s role in energy research. Each approach is designed to make the state’s investment role more strategic. Regardless of the particular approach taken, we recommend that any legislation to reauthorize a state-supported research program sunset the program after a determined period of time—perhaps five years—and provide for a periodic evaluation of the results of the research program. The latter will help the Legislature ensure that its policy direction for the program is being followed and its goals for the program are being met as cost-effectively as possible.

INVESTMENTS IN RESEARCH SHOULD BE MORE STRATEGIC

The Legislature Has Options to Maximize Publicly Directed Energy Research Investments. Earlier, we identified some key problems with the current PIER program—namely, the program’s lack of focus and its weak strategic tie to the state’s current energy goals. We have also identified some options for the Legislature to address these problems. Each of these options has policy tradeoffs, which we discuss below.

An important policy issue for the Legislature to consider is how much flexibility and control to give to the IOUs to make research investment decisions and what level of governmental involvement in the process is deemed appropriate. The options we present below are not mutually exclusive. Rather, a hybrid approach could be taken that includes elements from different options, depending upon the Legislature’s desired policy goals.

Option One—Continue PIER Program Under CEC With a Tighter Focus

As we discussed previously, research projects which received funding through PIER may not always meet all of the original statutory criteria for the program. To address this concern, the Legislature may wish to consider requiring a more strategic focus for the program based on its current priorities, emphasizing research that will specifically address the current technological barriers to achieving the state's current energy goals. As noted earlier, the climate change/environmental category, in particular, appears to have been very broadly interpreted by CEC in its research investment decisions. The Legislature thus might consider providing greater policy direction regarding what type of research is eligible for funding under this category. Alternatively, the Legislature might even consider eliminating the climate change category in recognition of the fact that most of the state's current energy policy has been developed with an eye toward climate change mitigation and reducing greenhouse gas emissions. Such an action would recognize that investments that serve to meet the state's energy goals directly also move the state closer to meeting its climate change goals as well.

As part of this option, the Legislature may wish to consider transferring public goods charge revenues collected by POUs for research purposes to the PIER fund. This approach would respond to concerns about the inefficiency and lack of coordination from creating multiple separate public interest energy research programs across the state.

This option would maintain the institutional knowledge that has been built at CEC for the operation of such a research program. It would also maintain the existing opportunities the Legislature has for oversight through budgetary and policy review of CEC activities. However, there is a tradeoff with this option. By continuing to rely so heavily on the CEC, rather than electricity providers, in making research investment decisions, this approach potentially misses an opportunity to focus the program on cost-effective investments that would be more likely to maximize the benefits to ratepayers. In our view, cost-effective investments are more likely to occur under a process that gives utilities that must be concerned about their "bottom line" more of a voice in such decisions.

Option Two—Allow IOU Rate Recovery of Public Interest Research

As discussed previously, most utility-sponsored research was conducted internally or through EPRI. This is no longer the case because the CPUC began to generally prohibit IOUs from recovering their research and development costs through rates. Because the IOUs have a greater incentive today to invest in research that is aligned with the public interest of pursuing the state's energy goals, the Legislature could consider the approach of (1) not reauthorizing the collection of the public goods charge to fund public interest research and (2) allowing IOUs to recover their costs for this type of research through rates. Statute could still provide parameters for the type of public interest research for which this rate recovery would apply.

This option has some advantages. It would provide the IOUs with flexibility in making research investments that may lead to the state achieving its energy goals more cost-effectively. Additionally, since "public" funds would no longer be involved, there would no longer be uncertainty over who would have the rights to research outcomes.

There is a potential tradeoff with this option, however. In effect, the option makes the CPUC the sole arbiter on behalf of the state of IOU research investments. The role of the CEC in such research decisions would end, resulting in the loss of its institutional expertise in informing these decisions. While the CPUC would gain significant authority over the level of investment that could be mandated upon the IOUs, the Legislature would probably end up with less control and oversight over such a revised research program. The Legislature could partly address this concern by enacting statutory parameters to guide the rate recovery process and to ensure that the type of research receiving such rate recovery is consistent with the Legislature's priorities. The Legislature could also cap the amount of research costs that could be recovered through rates to ensure it maintained control over the program.

Option Three—Create a Public-Private Partnership for Electricity Research

A third option to restructuring public interest energy research is a hybrid approach designed to provide more flexibility than is currently available to the utilities in making research investment decisions while retaining ample public oversight over the process.

Under this option, the Legislature would reauthorize the collection by IOUs of a public goods charge for public interest research purposes. However, as an alternative to the current program structure, funds would remain with the individual utilities rather than being remitted to the PIER fund at the CEC. Similar to the current utility energy efficiency programs that are partially funded from the public goods charge, use of funds would be subject to each utility developing a multiyear investment plan. Rather than being submitted to the CPUC, these research investment plans would be submitted to a newly created coordinating council which would replace the PIER program at the CEC. For example, the Legislature could create a coordinating council composed of representatives from the CEC, CPUC, CAISO, and CPUC's Division of Ratepayer Advocates. It should also include representatives of the POUs and IOUs.

Under this concept, the council would deliberate and agree upon an appropriate research course for the state. Each utility's research focus would subsequently be subject to approval by the coordinating council. Utilities would then develop their own research plans based on these discussions. The council would approve the overall research plans, but decisions about funding particular research projects would be left to the utilities. Because this option involves decision-making about the use of public funds, we would recommend that commission meetings be subject to state laws requiring open and public meetings.

The creation of a new administrative entity under state law raises a number of technical and policy issues for the Legislature to consider. The structure and rules of the coordinating council would require attention in order to ensure that it functioned effectively. In addition to addressing the important issues of the council's membership and its responsibilities, the Legislature could provide its direction in statute on such issues as the requisite number of council meetings annually, voting rules, and guidelines by which research plans would be designed and submitted.

The main advantage of this option is the opportunity for such a council to coordinate research efforts across the state. This would potentially allow for greater sharing of technological innovation among these utilities and greater coordination across the state in the development of new technologies, such as a smart electrical grid. Providing more flexibility to the individual

utilities regarding where to invest research dollars would help to focus funding more strategically on investments that are cost-effective. Finally, eliminating the current PIER program at the CEC would probably expedite decision-making about what research would go forward, since utilities would now be making such funding decisions themselves.

One downside is that this option adds costs for the creation of a new administrative bureaucracy, one which now involves multiple state agencies rather than just the CEC. However, these new costs would likely be more than offset by savings on administrative costs due to the elimination of the PIER program at CEC. The coordinating council, unlike the CEC, would not be making decisions about funding of individual projects, and thus would likely need far fewer staff than CEC requires for PIER.

SUMMARY

In summary, we find that, while the CEC is unable to demonstrate a substantial payoff from the state's investment in the PIER program up to now, it makes sense for the state to have a continued role in facilitating public interest energy research. However, in order to achieve a bigger payoff from the state's investment, improvements are warranted to the process for deciding which research justifies support by the ratepayers. The current process should be revamped to result in more strategic investments that are more likely to serve to address the state's current energy goals and legislative priorities. We offer a number of options for the Legislature to consider in structuring the state's public interest energy research activity going forward.

Should you have questions regarding this information, please feel free to contact Tiffany Roberts at 319-8309 or tiffany.roberts@lao.ca.gov, or Mark Newton at 319-8323 or mark.newton@lao.ca.gov.

Sincerely,

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