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SANTA BARBARA • SANTA CRUZ

UCLA INSTITUTE OF THE ENVIRONMENT AND SUSTAINABILITY
LA KRETZ HALL, SUITE 300
619 CHARLES E. YOUNG DR. EAST
BOX 951496
LOS ANGELES, CA 90095-1496

PHONE: 310-825-5008
FAX: 310-825-9663

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Comments on the proposed EPIC investment plan Docket # 12-EPIC-01

The following comments are a summary of the remarks I made at the EPIC hearing in Los Angeles on August 9th, 2012. I have also included a few additional remarks. These remarks are both about improving the scope of research topics, better defining the issues, and developing relevant research questions. As the process of public comment goes forward, I will be happy to be involved and continue to engage with the shaping of the plan.

Ratepayer Benefits

Ratepayer benefits are not explicitly defined in Decision 12-05-037 May 24, 2012. They seem to imply monetary benefits as there is reference to the reduction of costs.

- The program administrators should consider health benefits. This would include reduction in criteria pollutants as well as greenhouse gas emissions.
- The program administrators should consider ability to pay. Not all ratepayers either use the same amount of electricity, nor have the same ability to pay. Thus ratepayers who use more electricity per capita and are more affluent, are different than low power consumers, or low income consumers. Some thought should be given to these differences and their relationship to ratepayer impacts when implementing new programs. Some customers may have a greater ability to pay than others thus could help finance changes.
- Ratepayer benefits may also include indirect benefits such as job creation, energy reduction in employment sectors that make those employment sectors more competitive. Programs to incentivize or assist businesses to use less energy may cost the public more in rates, but improve the economy.
- Program administrators should consider whether investments should be made in energy efficiency technologies and/or approaches that reduce absolute energy use. There is clear evidence in many sectors that merely improving the efficiency of energy use (e.g. better designed machines or light bulbs) do not reduce absolute energy consumption. Is the program aimed at reducing the overall energy load of the state, or increasing energy generation capacity, but with different types of technologies (like solar), and coupled with more efficient appliances, machinery and the like. Perhaps both approaches need to be explored in the EPIC investment plan.

These issues are not addressed under the current approach to ratepayer benefits in the EPIC program. They will require research to address. They will provide the foundation for success, or failure of this investment.

Applied Research and Development

Applied research and development is a broad category for which evaluation criteria are still lacking. It seems to be defined as "clean" energy technologies, a category that requires clear definition. In developing this definition, we recommend that program adminstrators:

- Establish criteria that include life cycle assessment of cradle to grave effects. This would include the materials used to manufacture the technology (including water), the energy necessary to manufacture the technology and in the supply chain to transport that technology. Its installation and use should be examined as well, especially if it is displacing an existing technology that will need to be disposed of.
- Ensure that employment impacts of clean energy technologies are included in funded projects or research.
- Ensure health impact assessment of the technologies are part of any funded project or research program.

Clean energy technologies are often either not defined, or narrowly defined which can lead to unintended consequences. Funded research should address the need for better definition – indeed understanding – of what clean technologies are, or are not, and include investigation on life cycle of technologies, and potential unintended consequences. For example, silicon chip manufacturing has been touted as a clean technology but has had significant impacts on water quality and on worker health.

Zero Net Energy Buildings and Communities

There is no clear and consistent definition of zero net energy buildings and communities or agreed upon methodology to apply for determining ZNE. The EPIC program administrators should both develop criteria and fund research to

- Establish criteria for ZNE.
    - Does ZNE only concern electricity used in the building and community?
    - Are there any unintended consequences of ZNE in encouraging new construction over rebuilding, repurposing or renovating existing buildings? For example, conducting the life cycle analysis of materials and energy use of new construction in contrast to rehabilitation of existing buildings whose use could be intensified. Another way to approach this question would be to contrast in-fill with rehabilitation with new ZNE construction.
- Conduct life cycle assessments of ZNE buildings and communities in contrast to existing buildings and communities.
- Consider transportation and other infrastructure in evaluating ZNE buildings and neighborhoods and their actual impacts on the environment and energy loads. This would include the generation of GHGs in transportation, for example, or the need for additional water resources for new construction. We recommend full life cycle analysis be utilized.
- Conduct analysis of how to minimize the total cost of ZNE through education of building occupants (i.e. investing in education as a means of reducing the "engineering costs" of ZNE—which may generate behavior change that persists even when occupants relocate)
- Consider the environmental equity impact of ZNE including affordability and access. There are equity issues lurking behind this initiative in terms of where ZNE will be deployed, who will be living or have access to ZNE buildings, the affordability of ZNE and so forth.

Some of the same issues arise as for clean energy technologies. There needs to be a better understanding whether ZNE is really ZNE – how – and for whom.

Demand Side Storage

Demand side storage remains in its technological infancy. With increased calls for distributed generation, and large-scale solar generation, storage is a critical factor for success. In cities, storage raises a suite of land use-related questions. The EPIC program should consider addressing the following:

- What are the zoning implications for demand side storage?
- How much space will be needed?
- Will storage be at a neighborhood or larger scale?
- Who will manage the storage?
- Will the storage systems be interconnected?
- How will they be sized?

Urban-scale demand side storage research should be closely coupled with land use and community analysis as well as with electric vehicle research. Here too there can be equity considerations about which communities host storage facilities and which communities benefit from the storage capacity. Further, residents may be concerned about the safety of storage technologies and there will need to be extensive education and outreach about this technology. Funding needs to be included for the human side of demand side storage.

Demand Response

Demand response implies change in demand – behavioral change – though the language is not explicit. Without behavior change, in conjunction with new technologies, there is risk of failure. The EPIC program should:

- Research residential energy behavior and correlate to building size, age, location, building materials and socio-demographic profile of customer.
- Research business energy behavior by sector, size of company, wage levels, energy use and business ownership.
- Research energy use in public services like wastewater and water treatment to determine averages and leaders. Costs should be examined as well. This will help determine how to create new programs that will be successful at the municipal level.

It is only by understanding consumers that the proper demand response programs can be created. Again, the program administrators should consider the differences between energy efficiency and reducing absolute energy use or need for energy in the state, to evaluate demand response approaches.

Environmental and Public Health Impacts

This issue was partially addressed above through life cycle impacts. Environmental and health impacts however, imply a suite of considerations that involve placing applied science and technology and its marketing in a larger context, including land development, GHG emissions, equity, and open space. EPIC administrators should consider the funding of:

- Granular studies of current energy consumption patterns by land use type, building age, location, size and construction materials, socio-demographic factors, climate zone and geographical location are needed to understand the market for new technologies and their potential impacts on the state's people and its environmental resources.
- This research should be coupled with GHG inventories and the analysis of criteria pollutants to depict current environmental conditions to evaluate future changes.
- Research should be conducted on the potential growth inducing impacts of new technologies or ZNE buildings and neighborhoods, impacts on water supplies, demand and infrastructure, and the need for new infrastructure.

Additional Comments

The EPIC program and funding activities should include funding policy analysis of ratepayer benefits by researchers. This analysis should be conducted along side each of the programs and their implementation. Ratepayers are diverse across the state, thus benefits may not be the same for each type of ratepayer, nor every part of the state.

- While the program does include an independent evaluation at the end of the funding (for best results evaluators are involved from the beginning of a program, not just at the end), such an evaluator is insufficient. There needs to be systematic analysis of potential overlaps in the program, and inconsistencies and differences among goals enumerated in the PUC Ratepayer Benefits. Tradeoffs among them and their comparative benefit to rate payers should be analyzed. It will not be the evaluator's job to determine whether there inconsistencies and incompatibilities. This determination, however, is essential to program success and should ideally be undertaken at the outset.
- Research should be funded to develop baselines of energy use across the major metropolitan areas of the state to evaluate and measure change over time. The flows analyzed would include: electricity, natural gas, other petroleum, transportation fuels, VMT, water and solid waste. These flows would be overlaid with pertinent socio-demographic, land use and climate variables to identify patterns. Policy-makers could use these findings to identify energy smart communities. This work will be important to guide where investments will have the biggest impacts, and/or where they are most urgent, given the state's current population and the state of its metropolitan areas.

We are happy to provide suggestions for specific research topics and programs to implement these comments.

Stephanie Pincetl, PhD
Adjunct Professor: spincetl@ioes.ucla.edu
Director Center for Sustainable Urban Systems
Institute of the Environment
UCLA
w: 310.825.2434
c: 310.245.2339
spincetl@ioes.ucla.edu
LaKretz Hall, Suite 300
619 Charles E. Young Dr. East
Los Angeles, CA. 90095-1496