Moving to New Regulatory Frameworks that Leverage Market Forces to Maximize Societal Uptake of Energy Efficiency

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ABSTRACT

Significant change is needed to mitigate climate change impacts of electricity use. Among the many changes required is a paradigm shift in core strategies used by publicly funded energy-efficiency portfolios, and in the regulatory framework.

Drawing from the California context, the paper shows that the current measure-focused energy savings endeavor is increasingly less tenable and facing diminishing returns under current policies. Gone are the days when specific efficiency measures applied to large energy end-uses save most of the energy. Instead, we see an increasing need to seek savings from a variety of smaller end-uses and measures; making it harder to provide cost-effective incentives that produce large energy savings. However, a new opportunity is arising in the form of increasing interest by various market actors in adopting or selling bundled energy efficiency products and services that reduce carbon footprints. Shifting public funding from measure incentives to leveraging the actions of private market actors, governments and others can reduce IOU and participant risk and correspondingly increase the acceptance of energy saving products and services. This will deepen and broaden adoption of energy efficiency required if we are to mitigate climate change impacts significantly. New regulatory frameworks, policies and procedures must be developed to enable energy efficiency portfolio administrators and implementers to engage in market leveraging efforts. This paper will introduce some initial efforts by PG&E utility to expand our mitigation capabilities, such as participation in the Sustainable Communities program. The paper will also propose new paradigms for the regulatory framework, and for the portfolio administration and implementation of publicly funded energy efficiency programs.

Introduction

Society faces an unparalleled environmental challenge that will require deep changes to the core provision of energy services and products. This paper uses California as a showcase of key issues affecting the energy efficiency market that need to be resolved to achieve GHG (Assembly Bill 32 or "AB32") targets for 2020 and 2050.

Although significant investments and energy savings have taken place in the last 30 years or more in moving forward energy efficiency in California, the US and the World, PG&E and all entities charged with achieving energy efficiency have yet to fully tap all cost-effective opportunities to mitigate global climate change. The value of energy efficiency is increasingly being discussed as a cornerstone of electric sector development, as a mitigation against high oil prices, grid instability, transmission constraints, and climate change impacts. Yet implementing such a vision is proving difficult, with skeptics viewing energy efficiency as providing a negligible contribution to electricity demand reduction and its associated environmental benefits.

In order to significantly expand the contribution of energy efficiency beyond the status quo to fully capture its potential contribution to curb electricity demand with its associated cost

and environmental impacts, there is a need to think outside of the box leaving behind the tendencies to apply energy efficiency 'solutions' in a manner compartmentalized by measure, project, program and fuel type to venture into mostly uncharted territory. The current timing is unique, building upon the lessons learned of the implementation of all the DSM programs since the 1970s, including its downfall during the unbundling and restructuring of the power sector and a period when the price of oil was hovering at around $ 20/bbl. With current oil prices hovering at around $ 120/bbl, the ongoing conflicts to ensure access to fossil fuel resources, and the further implications brought upon by the recognition of climate change, we are in a unique period to expand energy efficiency initiatives into a 21st century model that integrates the contributions that can be made across programs and jurisdictions to create synergistic solutions. This will require developing policies and protocols on how to attribute savings to enable non-traditional and supplemental types of publicly funded offerings to foster this outside-the-box thinking among stakeholders to fully implement all options; not just the business-as-usual ones.

Updating the Regulatory Framework is Crucial

Regulation of the publicly funded energy efficiency effort is aligned with a world long gone where publicly funded energy efficiency and renewable energy sources were the only producers of energy efficiency. Similarly, assessments of energy efficiency program impact correspond to the existing regulatory perspective, based on earlier program types, in which programs are the sole providers of energy efficiency; attribution at the energy-efficiency measure, project and/or program level is readily and cost-effectively derived and relatively "tight" program savings estimates result (Friedmann 2006, 2007).

In the emerging energy efficiency and renewable marketplace, in which innovation, design, funding and implementation is the result of intended and unintended synergies between various market actors, existing requirements for program design and evaluation are not sufficiently aligned to capture energy savings, estimate program contributions to savings, or provide adequate price signals for program performance.

Policy makers, entrepreneurs, academics, NGOs, and the public at large no longer see energy efficiency and renewable energy as 'alternative energy'; rather, they see that there are no other alternatives for contending with increasingly more severe impacts of energy use for the following reasons:

- Availability of supply at costs society can bear for fossil fuels. With oil hovering around 120 $/bbl, natural gas again moving above $9/MBtu. The imported oil bill for the USA is around 525 B$ to the USA's trade deficit.
- Increasing awareness of the military costs incurred by the USA to defend access to oil and gas, and the socio-political and environmental impacts of being so dependent of foreign sources of energy
- Increasing evidence of accelerated and larger than expected impacts from global climate change and its anthropogenic causes

Key opportunities that result from strong support and growth in the use of renewable energy sources and energy efficiency are:

- More sustainable societies, incurring less costs from dependence on ever more expensive non-renewable supply and misuse of resources
- Higher employment at better wages
- New business opportunities that can also lead to export revenue**.**

The Current Regulatory Construct Limits Portfolio Offerings and Societal Benefits

California IOUs are implementing a 2.1 Billion dollar effort in 2006-2008 to promote energy efficiency among their customers seeking to save about 2 GW of power. This is part of a broader mandate from the CPUC that includes renewable energy, low income energy efficiency programs, demand response and self-generation options to help minimize the costs of providing electricity and help mitigate the power sector greenhouse gas emissions. This effort is part of the Energy Action Plan developed by state regulatory and planning bodies that put energy efficiency as first in the loading order for providing society with the services garnered from electricity. The following list shows other key CPUC decisions that affect IOU energy efficiency offerings:

- The CPUC set very aggressive energy efficiency goals for the 2006 to 2008 period as well as the 2004 to 2013. These goals seek to cut in half the growth in electric demand. They were based on a series of energy efficiency potential studies carried out under IOU oversight in 2001 to 2002. The goals seek to garner the "achievable potential" estimated in those studies. Subsequent studies completed in 2006 showed a significant reduction in the available "achievable potential" yet the CPUC has yet to adjust the goals downward acknowledging these were stretch goals whose attainment was crucial in helping meet the State's goals for greenhouse-gas reductions. The latest analysis on remaining potential (completed in 2008) will require further updating to incorporate the latest avoided costs, NOFR, effective useful life, and incremental measure costs, and any policy changes before realistic goals for the energy efficiency programs can be set to 2020. In order to provide timely results for the California Air Resources Board, interim goals will be set in 2008 that will be revised every three years going forth.
- The CPUC required the IOUs' portfolio to include at least 20% of the budget by Third Party Implementers (TPI). Another fraction was set aside for Local Government Partnerships (LGP). Most of the TPIs and LGPs were new and/or had not been carefully evaluated before having their earlier 2004-05 contracts extended.
- The CPUC decided that they would only count savings of projects implemented and paid by the end of 2008 towards the IOU goal, and that projects that were in the pipeline in 2005 would not count towards the goal if they were implemented in the 2006-2008 period.
- Addressing environmentalists' calls for a "level playing field" for energy efficiency vis-à-vis supply options, the CPUC agreed to develop a shareholder incentive mechanism to reward the IOUs for reaching savings goals for the 2006 to 2008 time period. However, a decision on the reward mechanism was delayed, and as a result the California utilities faced additional risk due to uncertainty regarding the reward mechanism. In late 2007 the CPUC decided that the IOUs would face penalties if their performance for all three years or any given year was less than 65% of the goal, and would get a portion of the net benefits to society if they exceeded 85% of the goal. This decision, putting in place a

reward mechanism well after the programs were set and with insufficient time to make program corrections responsive to the reward mechanism.

- The CPUC decided that the goal would be based on "net", not "gross" savings. Net savings would be determined by adjusting gross savings estimates by a multitude of correction factors. The most controversial of these is the "Net-to-Gross" (NTG) factor. The CPUC decided to apply only the "net-of-free-riders" (NOFR) component of the NTG; though allowing evaluators to attempt to quantify "participant spillover" if expected to be large and quantifiable. To monitor the IOU effort, the CPUC has recently started over 72 million dollars of EM&V contracts guided by an evaluation framework and an Evaluation Protocol (TecMarket Works 2005, 2006).

By setting stretch goals and limiting what is counted as gross and net savings, the CPUC has led to an IOU strategy whereby most of the 2006-07 goals were pursued via a strong push of "deemed", cost-effective mass market measures (mostly CFLS and T8s). This strategy for the first two years allowed PG&E to meet (pending ex-post evaluation results) the 2006-2007 yearly and cumulative goals while allowing the longer lead-time projects typical of large commercial and/or industrial facilities to be implemented; seeking these for the majority of the 2008 period. The entire portfolio is also focused mostly on promoting widgets, as there is less controversy and risk about the savings per widget. What was not sought after significantly was engaging in partnerships with market actors who were promoting such widgets (e.g., Wal-Mart's goal of selling 100 million CFLs nationwide in 2007). Given the current CPUC rules, it was likely that such partnerships would be considered as likely to have happened anyways, with no savings attributed to the IOU portfolio effort.

Although this current scheme is producing enormous savings (with claimed savings of about 2.5 TWh/year and 600 MW), it is not enough. It is reducing demand growth to about half of what was forecasted, but still not reducing ultimate energy use, which is what is needed to help mitigate significantly climate change.

As we move forth into 2008 and beyond, given the current accounting rules for savings, the IOUs will be hard pressed to continue to get credit for savings at the levels achieved in 2006-07. For example, CFLs have been about ½ of the entire portfolio savings in those two years (about 500 GWh per year.). CFLs are becoming more ubiquitous both in a multitude of markets, stores, and in homes. Although about 1/3 of California homes have yet to purchase one CFL, by the end of 2005 over 17% of homes had 15 or more CFLs. The NOFR is likely eroding rapidly as CFLs become saturated among early and mainstream adopters. The NOFR will only improve if programs somehow manage to get the 1/3 of homes that have yet to try CFLs to do so, and the other 2/3 of homes, to stop getting rebates for them. This would require a very targeted and expensive to administer, program design. An alternative is to continue with the current design which provides upstream incentives to manufacturers and vendors; seeking to make CFLs available, affordable, accessible to all Californians; and couples these incentives with media campaigns to enhance awareness about today's CFLs being significantly better than those in the past. Yet the falling NOFR makes a continued upstream program a very risky one to pursue. Worse, it may limit the use of CFLs as a "poster-child" to instill cognitive changes that result in customers increased interest in adopting other energy efficient products and services.

Another option for significantly increasing the depth and breadth of the energy efficiency uptake requires a paradigm shift on how savings are attributed to the IOU-led portfolio; to enable

a very different set of programs to evolve. Under this paradigm, the IOU-led portfolio would seek to partner with all market actors, government agencies, etc.

Indeed as a start in this direction towards more in-depth and significant changes towards reduced fossil fuel energy use, the CPUC leadership has proposed the "Big-Bold Energy Efficiency Strategies" (BBEES) whose goals are zero net energy new homes by 2020, zero net energy new commercial buildings by 2030 and significantly more efficient HVAC. Yet these three BBEES are not enough for combating global climate change (GCC.) Residential new construction is responsible for less than 6% of the energy used by this sector. Together with commercial new construction and HVAC these three arenas for BBEES may represent at best ¼ of the electric energy use; or less than 5% of California GHG emissions. Much more is needed to happen immediately if we are to significantly reduce California's GHG emissions.

Getting on the GHG Bandwagon

To truly overhaul how California society uses electricity with support from the IOU portfolio will require changing significantly the rules of how savings are attributed to the portfolio of efforts. The IOU led portfolio should become the "oil" in the "machinery" of the emerging energy efficiency and renewable energy markets, rather than continue to try to be the "machinery" that is the mainstay of increased energy efficiency uptake by customers.

Let us consider the example of "sustainable communities". Truly sustainable communities would seek to be resource efficient across a wide swath of resources, and not just focus on end-use electric and/or gas efficiency (DiStefano 2006, Lebot et al 2004, Rudin 2000). Therefore, it would not suffice to have zero-net-energy homes (ZEH), which is the current focus of the residential BBEES of the CPUC. Indeed, such a policy would seek to have mixed-use communities, with homes and commercial establishments interspersed, so as to minimize the need for vehicular transport. The homes would be compact (preferably multi-story) to further enable residents to walk everywhere. An objective could be to educate and convince consumers to accept home sized at about 300 ft2 per person common about 20 years ago rather than the almost 900 ft2/person we have now (Harris et al 2006). This would also reduce the materials used in the construction of the community. It would also make these communities residents more likely to stay, as homeownership would be higher (even at costs of $500/ft2) as these smaller, more efficient to operate and maintain homes would be more affordable, and given the density, would make it easier for older folk (as we all age) to continue to live there and walk rather than be dependent on others for transportation. Yet the BBEES only focuses on trying to put sufficient solar PVs on a home's roof, together with a highly energy efficient building shell and appliances, to minimize the electric requirements of the home on the electric system. This later vision works easier with the current IOU portfolio offerings; but does not provide the levels of savings that will meet AB32 goals. The current rules would make it very difficult for the IOUs to engage with land-use planners, cities/counties, developers, builders, and government development folks to build a more truly sustainable community.

Another problem that needs to be resolved concerns how to attribute to current program goals for IOU efforts that have long-term impacts and/or long-lag times for savings. The CPUC tried to address this issue by allowing the IOUs to "reserve" future customer public goods charge funds for projects that would only be implemented in a future three-year cycle. The experience with Codes and Standards advocacy by the IOUs can provide some early lessons on how to proceed.

It is imperative that we begin to elaborate new metrics and definitions on what and how we will count savings and attribute these to specific portfolio offerings. The CPUC needs to work on developing a new evaluation scheme that not only allows, but enables the IOU-led portfolio to pursue the broader and much more sustainable options for society. Some ideas are offered in the next section to stimulate thought to develop these or others more fully and get them implemented.

Bringing EM&V to the XXI Century

If we fail to upgrade EM&V to the current context where customers are bombarded with calls to use energy efficiently, it will become less and less relevant and more of an obstacle to sound use of public resources to promote energy efficiency (Friedmann 2006, Friedmann 2007). Given the current context, insisting on attribution of savings to specific widgets, programs or even portfolio implementers for shareholder incentives and implementer payments is erroneous and increasingly harder to do (Reed et al 2006). Indeed, some recent research attempting to attribute savings to specific programs where 90-10 confidence ranges were included clearly show how difficult the entire EM&V attribution is becoming when focused on bottom-up approaches, based on NOFR. In California, a recent report found that the 90-10 confidence estimate for savings had a range of +- 21% the mean value.[1] (SBW Consulting and Research Into Action Inc., 2008). In Massachusetts, where NTG is used for attribution (without counting non-participant spillover); comparison versus Michigan led to a NTG of around 2.5 +- 50%. In NYSERDA, results were similarly inconclusive (Saxonis 2007). It is time to look at alternative ways to evaluate the savings and attribute these to specific portfolio components (Barnes 2007, Fagan et al 2007, Hall et al 2005, Keating et al 2007).

California's current effort to evaluate savings for the 2006-08 portfolio set aside 6% of the entire portfolio budget for impact evaluation work and another 2% for formative work for a total of almost 170 M $. About 72 M$ were contracted in late 2007 for the initial impact work under 13 multi-million dollar contracts, employing about 1100 evaluators. This effort is a bottom-up, protocol driven and focused on NOFR.

Our concern is that given the current context and the level of effort being done, evaluation's future may be seriously compromised. Key problems with the current enterprise are:

- Focus on NOFR will seriously underestimate true savings and make programs with large spillover effects (both immediate and delayed) less attractive to program implementers.
- Expected range of possible savings at a 90-10 confidence level will probably make most of the results very hard to use for final determination of shareholder savings incentives. This will lead to a political solution behind closed doors, and a generalized feeling that the impact evaluation work was not worth the effort. The focus on NOFR draws resources away from pursuing and developing other alternative evaluation paradigms; e.g., focusing on better understanding the evolution of the EE marketplace. We need to test, develop and deploy these alternate methods soon as possible to be able to use these in both the planning of the 2009 and beyond programs, and the evaluation of these programs' results.

[1] The draft final version had an uncertainty bound of +- 119 percent. A new method was used that resulted in this smaller uncertainty bound.

- We need a significant increase in resources to better understand the markets we are trying to influence. Tried and tested technologies and messages are not aligned with the current context. This reduces the effectiveness of our business-as-usual EE efforts and worse, does not align these with the opportunities afforded by the current GCC-focused, greening ambiance.

Conclusions

A new paradigm is needed for the energy efficiency portfolio to capture the levels of energy savings that are needed to forestall unbearable climate change impacts. Under this paradigm, social funds are used to "oil" the "machinery" rather than seek to be the "machinery" that enhances societal uptake of energy efficiency.

This new paradigm will require a similar adjustment of the regulatory rules and procedures that govern the utility-led energy-efficiency promoting portfolios. Key will be changing how gross savings are attributed to the portfolio effort. Indeed, society would be better served by focusing on gross savings to assess the success of the portfolio (as is done in other jurisdictions—e.g., NW), and use more in-depth studies to help program implementers enhance their successes. More focus is needed on tracking total energy use to better estimate overall impact of the energy efficiency (and other efforts) at addressing Global Climate Change.

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