California Energy Commission
DOCKETED
13-IEP-1D
TN 71952
SEP 05 2013

STATE OF CALIFORNIA
BEFORE THE CALIFORNIA ENERGY COMMISSION

In the matter of:	)	Docket No. 13-IEP-1D
	)	
2013 Integrated Energy Policy Report (2013 IEPR)	)	COMMENTS RE: Evaluation of Electricity System Needs in 2030
	)	
	)	September 5, 2013

Comments of the Sacramento Municipal Utility District (SMUD) on Electricity System Needs in 2030 Pursuant to the August 19th Workshop

Thank you for the opportunity to provide comments on the prospective needs of the electricity system in 2030, presuming some degree of additional low-carbon procurement on the path to achieving an 80% reduction in greenhouse gas emissions by 2050. This is clearly an important and timely topic for analysis as we move closer to achieving the state's expected renewable and low-carbon targets for 2020. However, it is currently not clear whether the state needs to establish additional targets or mandates beyond those 2020 programs, prior to understanding some of the results of research about reliable system integration of low-carbon resources.

SMUD supports an examination of post-2020 goals and potential policies as part of the 2013 IEPR. SMUD recognizes the imperative of reducing greenhouse gas emissions substantially over time. As a customer-owned utility, SMUD has a responsibility to protect our customers' long-term interests by avoiding their physical and financial exposure to climate change (in addition to the primary goal of protecting their short-term interests by ensuring delivery of affordable, reliable and clean electricity). To this end, the SMUD Board of Directors has adopted a 2050 goal for carbon emissions associated with serving our customer-owners with retail electric power service that aims to reduce these emissions to 10% of 1990 levels by 2050. This goal is consistent with Executive Order S-3-05 issued by Governor Arnold Schwarzenegger in 2005.

SMUD comments below on five aspects of post-2020 energy system needs in the context of pursuing long-term GHG reduction goals.

A. SMUD General Comments On 2030 Electricity System Needs

Achieving SMUD's 2050 GHG goal will require additional investment in and development of low-carbon resources, including energy efficiency and renewable or other low-carbon generation sources beyond the 2020 33% renewables portfolio standard (RPS) level. At this time, however, SMUD advocates going slow on any

intermediate target or RPS mandate, as there are many questions and ongoing research regarding how renewables and other policies interact within the current electricity structure.

Thus far, the significant changes currently occurring in the electricity system, largely driven by state policies but also by technological advancement, have been manageable but have raised some questions about how future state policies may affect management of the electricity system. Electricity is not just a service provided via a market structure, but involves physical constraints and requirements that must be considered as the system undergoes these significant changes. Important questions need to be addressed about how intermittent resources such as wind and solar provide power to the grid differently from the perspective of basic physics than traditional steam or gas turbine generators. Inertia and electromagnetic field flow issues with these new resources must be better understood with large scale development.

SMUD believes the state should pause before imposing new mandates or types of incentive programs, until interactions among current policies are explored, and important questions are researched and answered. Much of this work is ongoing, but is not ready to point clearly to higher, short-term goals. Among some of the technical and policy questions to be answered first are:

- How can demand response resources be best developed to contribute to the fast regulation services and other system changes needed for intermittent renewable development in large scale? How much potential for this is available, and how cost-effective is it? How can demand-side stakeholders – customers in particular – be induced to contribute to this effort?

- How can storage resources be best developed to contribute meaningfully to the fast regulation services and other system changes needed for intermittent renewable development in large scale? Where are storage resources best developed in the grid – centrally or distributed? What storage technologies are available and cost-effective? How are storage costs changing over time?

- How can new, flexible, thermal engines, turbines, boilers, and combined cycles be best developed to contribute to the fast regulation services and other system changes needed for intermittent renewable development in large scale? What capabilities does the existing fleet of such resources have for this purpose? How can these resources be developed or run with renewable fuels to best reduce GHG emissions?

- Can the state's goals for electric vehicles be best developed to contribute to the fast regulation services and other system changes needed for intermittent renewable development in large scale? How can energy efficiency contribute to this goal? When should EVs be available for optimal assistance to the grid and integration efforts?

- How can energy efficiency, peak shifting efforts, and potential general electrification efforts (for GHG reduction) be targeted to alter the shape of load to affect the need for these services? How will achievement of these goals affect post-2020 load growth?

- With the dramatic potential for distributed generation and significant reduction in solar costs, how can the grid be planned and developed to accommodate two-way flows of field, and to take advantage of the potential benefits of these resources? How should Smart Grid investments be targeted to assist in a transition to an electricity grid different than that built in the absence of these technologies? How are customers increasingly investing in their own part of the electricity grid best included in a coordinated effort to keep the system robust and reliable?

B. Electrification As A Potential Source Of Overall GHG Reductions

SMUD is a strong supporter of electric vehicles and other transportation sector electrification as a powerful tool to reduce GHG emissions in the state, along with criteria pollutants that derive from the state's current mix of mobile emission sources. Current evaluations of the 2050 goal established by Governor Schwarzenegger suggest that achieving that goal may require not just substantial electrification of the transportation sector, but also electrification of most other distributed fossil fuel use, while continuing to de-carbonize the electric power sector. The August 19th workshop included a presentation of analysis regarding the 2050 goal by the California Council on Science and Technology (CCST). CCST found in their California's Energy Future study, published in 2011 (and presented at the workshop), that one path for achieving the 2050 goals included electrifying approximately 70% of natural gas space and water heating in buildings. A recent study by the consulting firm E3 included a pathway with largely the same amount of electrification.

Such a transition of building infrastructure and appliances will take time, as well as changes in state building code policy and carbon policies to recognize and encourage activities that help enable this long-term market transformation. SMUD has been exploring some initial steps for electrification of our customers' fossil fuel use, where cost-effectiveness is becoming favorable due to technology enhancements. Technological and cost improvements in areas such as heat-pump water heaters make electric technology worth considering in comparison to more conventional natural gas alternatives, in addition to other technologies with zero or very low GHG emissions, such as solar water heating technologies. Heat pumps take advantage of the latent energy in the air, water or earth, and with technological improvements are thermodynamically reasonable in comparison to heating derived from combustion.

In the near term, SMUD believes that the most potential for emission reductions from electrification is in the growing electric transportation sector. However, state policy must provide regulatory certainty to get automakers, utilities, and other stakeholders to invest in these emission reductions over time. Should electric vehicle incentive programs be stopped too soon, or be implemented in a manner where consumer incentives are

uncertain from day to day, automakers and consumers will be significantly less committed to the nascent market. In addition, since utilities will see an increased carbon burden from electrification, that will clearly be more than offset by carbon reductions in the transportation fuel and distributed fuel sectors, ARB must find a way to administratively provide allowances to electric distribution utilities to cover this policy-driven, GHG-reducing, load growth.

C. Biomethane And Other Biofuels Contribution To Long-Term Goals

SMUD believes that, in addition to electrification, bioenergy resources are essential in the long run to achieve the state's GHG reduction goals. This is not necessarily an alternative to the "electrification" pathway described above, but rather a complementary resource aimed at those aspects of our societal energy use that cannot be easily or cost-effectively electrified. For example, biomethane put into the existing pipeline infrastructure and designated for use in local power plants provides GHG free, renewable, and dispatchable power to serve system needs, while utilizing existing infrastructure that would otherwise be underused as we move toward the 2050 GHG target. There is a clear need for this kind of renewable power, in addition to the intermittent solar and wind resources that are currently prominent in procurement solicitations, in order preserve reliability and reduce costs at higher renewable levels. The State has a Bioenergy Working Group and a goal established by executive order that targets a continuous 20% portion of renewable generation from bioenergy.

There are challenges, however. In the past, development of in-state bioenergy resources for electricity generation has been negatively affected by state policies related to natural gas pipeline use and on-site emissions. In the short run, some of these challenges related to development of in-state bioenergy resources are in part being addressed by regulatory efforts pursuant to AB 1900. However, at the same time, the state has moved to effectively constrain further development of out-of-state bioenergy use for electricity generation, through the enactment of AB 2196. The Bioenergy Working Group should continue to address the barriers in place to further development and use of bioenergy resources.

Examples of policies and research to overcome barriers to greater use of bioenergy in the State include the following:

- Possible recognition of the differences of distributed generation using biofuels rather than conventional fossil fuels, to ease permitting of these renewable facilities. Distributed generation using biofuels can reduce or avoid GHG emissions, reduce or avoid local water and odor impacts, and reduce or avoid emissions from the alternative of flaring these fuels when naturally produced.

- Research into the overall impacts within the state of the use of the extensive natural gas infrastructure to deliver biomethane through transmission pipelines while following the protocols of the natural gas pipeline delivery structure. Current restrictions on the use of out-of-state pipeline biomethane are not well-founded in research that backs up the reasoning behind the restrictions.

- Use green-pricing type programs to enable natural gas consumers to voluntarily target their energy dollars for designated use of pipeline bioenergy at their homes and businesses. Larger, non-core customers can already do this, to some extent, by procuring their own fuel supplies, thereby reducing their GHG contributions and contributing to the state's GHG goals. Smaller consumers should be given a related choice.

- In the long run, research into the development of more kinds of biologically derived fuels through artificial photosynthesis may provide alternative pathways for more extensive use of unconventional fuels that act to mitigate GHG impacts. Artificial photosynthesis would remove CO^2 from the air to create liquid or gaseous fuels for use in conventional power plants and vehicles, so combusting these fuels would be essentially GHG-neutral.

D. Demand Response As A Potential Source Of Integration Services

Some presenters at the August 19th workshop discussed the need, at some time, to move away from using natural gas power plants as a mechanism for integrating intermittent renewable generation, in order to meet the state's long-term GHG goals. While SMUD believes that these conventional flexible resources still need to be included as options for system reliability, SMUD believes that demand response will eventually be a logical and potentially prominent substitute for construction of new natural gas power plants to provide integration services.

Today, demand response is being explored with more and more of a focus on ancillary grid services and renewable integration services rather than load reduction or even peak load contributions. Originally, demand response was investigated and implemented as another resource for meeting system peak demand on hot summer afternoons, with programs that reduced customer load when triggered by signals from system operators. Today, demand response is also being examined for providing ancillary services such as regulation, ramping, and intermittent renewable integration.

SMUD has made substantial progress in transforming the electricity grid in our service territory to a "smart grid," with automated metering infrastructure, distribution circuit automation, and back office systems to make use of substantially increased information about how the grid is operating on a minute-to-minute basis. SMUD is piloting demand response programs and time-differentiated rate structures aimed at learning the potential for these types of resources to provide critical services to meet minute-to-minute system needs and help to increase the efficiency of the system overall, thereby reducing GHG emissions.

While demand response is not primarily focused on "load reduction" in the same manner as energy efficiency programs, SMUD expects that the smart grid will save energy through better matching of customer needs and system deliveries (for example, the expansion of conservation voltage reduction programs). Providing customers with better information about their energy usage and enabling time of use rate structures will

also tend to reduce energy usage overall, in addition to those times when system peak demands are high.

There has also been examination of the potential for the growing number of electric vehicles and other electric transportation sources to provide vehicle to grid services – in effect demand response. SMUD agrees that there is long-run potential in this area that should be explored. A few pilot projects to learn about this potential have begun around the country. There are also vehicle-to-home and vehicle-to-workplace potential benefits, and these latter may end up being pursued and realized before vehicle-to-grid structures, laying the groundwork for the broader services. It should be clear, however, that a significant demand response contribution from electric transportation requires a significant penetration of electric vehicles.

For the promise of demand response from electric transportation to be realized in the long run, SMUD recommends two near-term strategies. First, the state must provide the regulatory certainty needed at this stage in the market to foster growth through demand from consumers. Incentive programs for these vehicles must be robust enough and well-funded enough to avoid a "start, then stop" program structure, and should contain a well-thought out plan to change incentives gradually in response to market demands. Second, the state must establish a clear policy to address the GHG impacts on electricity fuel providers of significantly growing electricity demand for transportation use. The increases in GHG in the electricity sector are more than offset by decreases in the transportation sector, and state policy should recognize this benefit with additional allocation of allowances to the electricity sector.

E. Understanding Conventional Methane's Use

Some presenters at the August 19th workshop discussed the need, in order to preserve the path toward the state's long-term GHG goals, to eventually move away from using fossil natural gas at new, flexible power plants as a mechanism for integrating intermittent renewable resources. SMUD believes that these resources should continue to be considered as viable options to provide these services. Flexible natural gas power plants are a key technology at present for keeping energy costs low and providing necessary ramping and integration services for the electricity system, and it will take some time to understand whether, and by how much, alternatives such as demand response can fulfill these needs.

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Thank you again for the opportunity to comment.

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