California Energy Commission
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2013 integrated Energy Policy Report
(2013 IEPR)

) Docket No. 13-IEP-1D
) WORKSHOP 8/19/2013
) RE: Evaluation of Electricity
) System Needs in 2030

Comments submitted by e-mail to: docket@energy.ca.gov

Comments of Sierra Club California

Sierra Club California respectfully submits these comments in response to the 8/19/13 California Energy Commission workshop regarding the Evaluation of Electricity System Needs in 2030.

Introduction

Climate science today underscores the need for tangible and rapid action to reduce greenhouse gas emissions to avoid the worst climate disruption scenarios. Specifically, climate change is occurring faster and producing more severe impacts than forecast when The Global Warming Solutions Act (AB 32) was signed into law in 2006.

Cal/EPA's recent report, *Indicators of Climate change in California*, August 2013 in the Executive Summary states:

> "Finally, many of the indicators reveal evidence of the already discernible impacts of climate change, highlighting the urgency for the state, local government and others to undertake mitigation and adaptation strategies."

This year, the earth's atmosphere reached 400 parts per million (PPM) of CO2. The CO2 content in the atmosphere is not only increasing but it is doing so at a faster rate per year. This dictates a heightened sense of urgency for the state to accelerate its rate of reducing greenhouse gas (GHG) emissions both in the current period through 2020 and thereafter.

When we consider the costs that the effects of climate change are causing today and forecast to cause in the future to our property, economy and health, the necessary increased mitigation measures will be cost effective compared to the alternative of not doing as much as possible as soon as possible. (See *California Climate Risk and Response* - November 2008 Next 10).

The importance to the nation and the world of California's leadership in reducing greenhouse gas emissions cannot be overstated. President Obama's recently announced Climate Action Plan will be developing many new programs at the federal level. As has happened in the past, the federal government will look to California for its expertise and experience. And recently, Governor Brown's efforts to establish a partnership with China (the world's largest emitter of CO2) to more aggressively address climate change and pollution look promising. The more rapidly that California develops, implements and shows success for more effective GHG reduction strategies, programs, incentives, plans and technologies, the more rapidly our nation and the world has the opportunity to implement these.

A recent document signed by more than 510 scientists from throughout the world (entitled *Scientific Consensus on Maintaining Humanity's Life Support Systems in the 21St Century – Information for Policy Makers*, published May 21, 2013, available from the Governors Home Web Page (http://gov.ca.gov/home.php via a link by clicking "Climate Change Consensus Statement") or directly at:

http://mahb.stanford.edu/wp-content/uploads/2013/05/Consensus-Statement.pdf states:

> "Earth is rapidly approaching a tipping point. Human impacts are causing alarming levels of harm to our planet. As scientists who study the interaction of people with the rest of the biosphere using a wide range of approaches, we agree that the evidence that humans are damaging their ecological life-support systems is overwhelming.
>
> "We further agree that, based on the best scientific evidence available, human quality of life will suffer substantial degradation by the year 2050 if we continue on our current path. ….
>
> "By the time today's children reach middle age, it is extremely likely that Earth's life-support systems, critical for human prosperity and existence, will be irretrievably damaged by the magnitude, global extent, and combination of these human-caused environmental stressors**, unless we take concrete, immediate actions** [emphasis added] to ensure a sustainable, high-quality future."

We are out of time to take our time. We must accelerate all the good work that has been started. The CEC has a responsibility to develop and send new proposed GHG target reduction goal recommendations, programs and policies to achieve them to the Governor and legislature for action.

Recommendation 1 – IEPR Report to document increased rate of climate change and need to move more quickly. The 2013 IEPR Report should include a section clearly recognizing and documenting the updated science that highlights the more rapidly changing climate and its more severe impacts. The report should state that if the objective of AB 32 was to reduce GHG emissions sufficiently quickly and deeply to mitigate the worst potential impacts of climate change, based on this new scientific evidence, the state needs to take even more urgent action to reduce GHG emissions more quickly than currently planned and required by law and regulation. Further, the report should state that the Governor, Legislature and energy agencies should set higher GHG reduction targets and with an accelerated timeline.

Recommendation 2 – State needs to set a higher RPS target (60-80%) for 2030 by no later than 2015. The current RPS at 33% is well on the way to being achieved and will probably be exceeded by 2020. The Executive Order calling for an 80% reduction of GHG compared to 1990 levels by 2050 would call for an RPS target of about 50% in 2030 if one just calculates a linear extrapolation from 2020 to 2050. However, such a target is now clearly grossly insufficient and the end objective of 80% reductions by 2050 is simply too little too late.

The GHG reduction performance we have seen in the electricity sector provides strong evidence concerning the ability of the state to set new, higher targets. A 60% Renewable Portfolio Standard (RPS) by 2030 is pragmatically achievable and should be the minimal goal set for the

electricity sector. Indeed, there is strong evidence that an RPS goal of 80% by 2030 is necessary and achievable..

In 2008, California was at 13% RPS and as of the end of 2012, it was at 20%. The renewable energy portion of the electricity portfolio grew by 7% in only 4 years. This is equivalent to growth of 1.75% a year or 17.5% in 10 years.

The state's GHG reduction momentum is greater today than it was while the above progress was made from 2008 to 2012 which should support a more rapid future increase in the RPS. This momentum is fueled by many positive factors including:

a. New supportive programs such as the 33% RPS program, Renewable Auction Mechanism (RAM), Expanded Feed-in Tariffs (FITs), expanded Net Electricity Metering cap, etc.
b. New supportive policies such as improved interconnection processes, simpler standard contracts for many programs, the soon to be released storage ruling, etc.
c. Advances in the development of the smart grid as required under SB 17.
d. Lower costs of renewables, including dramatic drops in prices of solar and modest drop in wind prices. The Commission and other research entities are forecasting continued further reductions in the cost of solar and wind. Possible breakthrough technological advances especially in solar over the next 5 to10 years could produce further dramatic cost reductions.
e. Technical advances, including new concentrating solar projects utilizing solar thermal storage that now can have a 60% capacity factor making them much easier to integrate, advances in storage and battery technology, smart inverters with storage, etc.
f. A large group of experienced project developers and a surplus of supply of renewable equipment to meet growing demand.
g. Supportive policies through many government entities including, , city and county specific programs; commitments by private corporations, military bases in California, and California schools and universities to improve energy efficiency and implementation of renewables; the state governments commitment for its owned facilities and properties and Community Choice Aggregation (CCA)programs.
h. Improved availability of financing and the implementation of improved financing structures such as the leased solar model, on-bill repayment, commercial Property Assessed Clean Energy (PACE), etc.

Further, it's important that a new RPS target for 2030 be established in law or regulation as soon as possible – i.e. by no later than 2015. Utilities have already largely contracted for renewable generation that will achieve 33% and without a new higher RPS, we could lose the momentum already established and developers, financiers, etc., in the industry could leave the state to the detriment of our GHG reduction goals, economic stimulus, jobs, etc. We need to speed up GHG reductions and the industry needs long-term policy certainty to remain viable. As Professor of Public Policy at UC Berkeley, Lee Friedman stated in his presentation at the 8/19/13 CEC workshop, "The California Legislature should act soon to create more certainty about the magnitude of GHG reductions that will be required 2020-2030".

In sum, increasing the rate of implementation of renewables in the future to an RPS of at least 60% by 2030 is a very reasonable assumption - even an expectation. If the state actually reaches an RPS of 40% in 2020, increasing it to 60% in 2030 would be a 20% increase—a growth rate already achieved. The commission should actively consider a goal of 80% by 2030 if we are to avert the worst effects of climate change and make its recommendations to the Governor and legislature for their adoption.

Recommendation 3 – Accelerate integration planning and implementation

Probably the single most discussed obstacle to increasing the RPS is the challenge of integrating more intermittent renewables. We have all seen the "Duck" charts showing the increased evening ramp approaching 10,000 MW statewide as more and more renewable energy – especially solar - is installed. However the real problem is that these charts do not then show how this ramp can be reduced and managed with well-considered new integration strategies including storage. This is evidence that while the problem has been defined, insufficient effort has been devoted to addressing the problem thus far.

Ideally in an integrated energy plan, the necessary infrastructure and integration capability should be implemented in parallel with or even somewhat before the new generation is implemented. In California, implementation of intermittent renewables is pushing integration capability. We don't need to slow this down, but we do need to speed up the level of investment, research and implementation in integration.

Integrating more intermittent renewables without increasing GHG emissions will not be easy but it is a solvable technical engineering problem. The ultimate solution will be a combination of many strategies – several of which were included in the discussion at the workshop including:

- Improved forecasting of intermittent output
- More frequent scheduling of resources
- Creating regional imbalance markets
- Facilitating participation of demand-side resources in load-following markets
- Requiring the implementation of smart inverters with new renewables using standards similar to what Germany is already using and further combined with local storage.
- Seeking to better diversify the renewable portfolio by incentivizing generation technologies that are not so intermittent and may be dispatchable such as more geothermal, small hydro, CSP with molten salt storage, wave and tidal generation, etc.
- Developing storage technologies and deployment strategies
    - Battery storage of different types and deployed in different ways for optimal performance.
    - More appropriately sited pumped hydro storage; upgrading existing pumped hydro; re-turbining existing hydro
    - Using hydro resources from the California State Water Project as a more dispatchable resource.
    - Compressed air energy storage.

The commission should make recommendations on how integration solutions can be accelerated. Some possible suggestions here are:

1. The commission could provide a utility research data exchange program where utilities share the results of their research, pilots, etc. This could accelerate information sharing, collaboration, reductions in re-inventing wheels and more rapid cost effective progress.
2. The CPUC in the implementation of the SB 17 ruling could require more focus on requesting the utilities to demonstrate real progress in demonstrating the successful implementation of integration infrastructure. Now that the massive deployment of smart meters is essentially complete, the utilities are and can now focus on these critical components of developing their smart grid capabilities to better support integration.
3. The commission could seek additional funding for grants on integration to expand the scope and pace of the excellent grant-funded research it is already supporting in this area.
4. In future IEPR annual updates, the commission could ban the future presentation of duck charts unless accompanied with the solutions to meeting evening ramps that turn these charts closer to 'halibut' or flat charts where the ramps have been successfully smoothed with the newly proven strategies that the presenters have been working on.
5. The utilities have a responsibility to accelerate their research, design, engineering, testing and implementation efforts to first develop integration strategies and then begin implementing them in a timely way to support increased renewables. This may require more investment of financial and human resources to focus on this critical area.
6. The DOE and NREL just announced the opening of a new integration test facility in Golden, CO called the Energy System Integration Facility. It is a new user facility for testing utility-scale renewable energy grid integration that can be used by utilities and other stakeholders. Perhaps this is a facility that would be helpful to the California utilities. Alternatively, the utilities could develop and/or expand their own integration laboratories and simulation capabilities to optimize the combination of solutions that can produce the best, most reliable and cost effective integration architectures.
7. In developing proposed solutions, the IOUs and CAISO should be first focused on what works and then on what current and future costs might be. Continually saying that storage is "too expensive" can stop more effective and timely research on how to best use storage. (The effects of GHG emissions on society are both very expensive and potentially irreversible.) As with solar PV, and many other technologies, the costs are likely to come down greatly once commercially deployed and volumes pick up. We may have a premium to pay in the short term to get this going but once it does, costs will come down. The soon to be released CPUC storage proceeding ruling should greatly help us really get started.

In nearly all the presentations at this and other workshops this year, the utilities are all looking to gas-fired generation for the vast majority of integration without presenting any seriously researched alternatives. The commission and CPUC should require the presentation of alternatives before ever approving any new gas plants. This is especially true for gas plants "needed" many years out by which time the uncertainty that may exist today should be resolved.

Recommendation 4 – Minimize use of gas to generate electricity

By definition, in order to reduce GHG emissions, the state must stop the growth of and then reduce the use of natural gas to generate electricity. As some processes that currently rely on

fossil fuels (such as water and space heating, transportation and industrial heating) become electrified, lowering the GHG emissions from electricity become even more critical.
Yet, some utilities are continuing to propose natural gas fired generation for "baseload" generation while nearly all are proposing the need for peaker plants for integration purposes.

One example is LADWP. LADWP deserves credit for increasing its RPS from 3% in 2003 to 20% in 2010. We should also appreciate the dramatic change required by it in replacing 70% of its generation over the next 15 years, significantly driven by termination of its coal contracts and the need to replace OTC generation. Such significant change creates not only new cost challenges but increased risk. Having said that, it is proposing repowering all of its 9 generation units in its three OTC plants with new gas-fired plants mostly for integration purposes. Sixout of the 9 units (the Harbor Units 1, 2 & 5 and Hayes Units 8, 9 and 10) don't need to be started to be addressed until 2020 with OTC compliance dates in 2029.

The commission should require LADWP to explore alternative methods of integration and ancillary system needs before approving gas-fired repowering of those plants. There are several years between now and when these plants need to be approved and construction begun. During that time, we will all have a better understanding of the status of newly installed distributed generation for local capacity needs, status of demand response systems, any appropriate transmission upgrade capabilities, alternative integration strategies, the costs, benefits of these alternatives and could then seriously consider non-gas solutions. One of the problems of picking a gas-fired solution today for so many years out it that it could stop the consideration of other even more viable, non-gas solutions. A better approach would be for LADWP to define its system requirements but work on exploring and presenting all available options before developing recommendations. How do we know non-gas alternatives won't work and be cost effective when they have not been developed or presented?

In the workshop presentation by Jimmy Nelson on the Switch Model, one of his stated assumptions was that natural gas must be phased out between 2030 and 2050 in order to meet the 80% reduction of GHG by 2050 objective. If these new gas plants are built, what will their economic life time be? With such low utilization over a potentially short number of years, what will the cost / KWH of generation be and wouldn't there be less expensive solutions that are non-GHG producing?

Similar questions and assumptions apply to other requests from other utilities to build new or repower old gas fired plants with gas.

Recommendation 5 – Explore a new utility business model
Commissioners McAllister and Weisenmiller both mentioned in one of the recent workshops the criticality of the Energy Agencies and other stakeholders considering addressing the Utility Business Model. Sierra Club fully supports this proposed effort. The electricity grid architecture is going through dramatic and fundamental change. The current business model will not support this new model. The incentives are all wrong. The services of the future that the utilities will be providing should be determined and then a new business model developed to align the financial and other incentives so that what is good for society is also good for the IOUs and so that they can maximize their success by providing what is in the best interest of society in the new

paradigm. As we are going through our current transformation, all too often, what is good for society is at odds with the incentives of the utilities. It sets up tactical disagreements between stakeholders because the utilities and society have conflicting incentives and objectives. The utilities should be incented to serve more energy efficiency, more distributed generation, better integration, higher reliability, etc. They will be providing the highly flexible and automated grid infrastructure and integration services.

This analysis should also include looking at the role of CAISO vs. the utilities along a number of dimensions.

Recommendation 6 – Key Assumptions
At the workshop, David Vidaver from the Energy Commission requested input on key assumptions that should be considered for the 2020-2030 time period.

In addition to all the comments above, we offer the following suggested assumptions.

Political Assumptions

1. According to this year's Public Policy Institute of California (PPIC) Statewide survey press release (July 2013 Californians and the Environment):
   > "SAN FRANCISCO, July 31, 2013—a record-high majority of Californians say state government should act right away to reduce greenhouse gas emissions, rather than wait until the economy and job situation improve. This is among the key findings of a statewide survey released today by the Public Policy Institute of California (PPIC)."
2. Climate change is worsening and this is being well documented by scientific research and reports. More scientists and scientific reports are advocating for or at least pointing out that climate change could be catastrophic unless strong actions are taken very soon.
3. Legislators in the future will be increasingly pressured by their constituents to take more effective action to combat climate change sooner even if it means somewhat higher electricity rates and/or taxes because the economic costs of climate caused damage, mitigation costs and negative impacts on health and the economy are even more costly.
4. The impact of all of this will be multifactorial but one of the most significant will be an RPS of 80% by 2030.

Technical / Economic Assumptions

1. Storage costs will come down dramatically over the next 5-8 years. Last year the DOE funded a $122 million comprehensive new research program called the Joint Center for Energy Storage Research (JCESR: http://www.jcesr.org/) This project is a collaborative effort including 4 of the National Energy Labs, four universities and several leading industrial companies with leading research, development and manufacturing expertise in batteries. This Manhattan like project's goal is to develop a battery that is five times as energy dense as today's batteries at 1/5 the cost and available in 5 years. The batteries are intended to be used primarily for grid storage and EV batteries. Billions of dollars are also being invested in Germany and around the world in battery research.
2. Solar systems will begin to be sold with smart inverters, reactive power, power management systems and storage. This will greatly reduce ramps, ancillary services and

integration of ramps otherwise needed from the utilities and will increase the penetration potential on distribution circuits while requiring less DG upgrades. (We note that SCE is currently refusing to connect residential rooftop solar systems under the NEM program with storage, a bad policy that needs to be reversed immediately. http://www.kcet.org/news/rewire/commentary/is-sce-attacking-home-power-storage.html)

3. Increased Microgrids for individual residences, companies, military installations and many businesses will fundamentally change the necessary service from utilities.
4. Assume no nuclear (San Luis Obispo is not relicensed or closes early based on costs of operation, fuel storage and disposal costs, seismic issues, radiation leak risk, terrorist risk, insurance costs, operating costs, technical risk cost vulnerability, etc.) and we will need to replace nuclear with renewables in order to keep GHG emissions down.
5. In order to meet increasing GHG reduction targets, there will be an increased focus on reducing the use of natural gas for water and space heating. This will be through a combination of solar thermal heating, geothermal and air source heat pumps and electrical heat. All of these will cause an increase in electricity demand and will assume that the electric grid is continuing to become quickly greener.
6. Cheaper EV batteries, combined with significant fuel cost savings from electrical fuel vs. gasoline/diesel will cause a dramatic increase in the % mix of pluggable cars and light trucks vs. internal combustion engine vehicles within 5-8 years especially in California. Improved battery range and ubiquitous charging infrastructure will incent a high percent of Battery electric vehicles (BEVs) vs. Pluggable hybrid electric vehicles (PHEVs). This will have the impact of increasing electricity demand although most of this will come at low use hours at night incentivized by special EV time of use (TOU) tariffs and smart chargers. The dramatic increase in BEVs will provide a significant source of battery storage to help manage the grid in vehicle to grid (V2G) systems.

Sierra Club California appreciates the opportunity to offer these comments and suggestions.

Sincerely,

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Volunteer Lead on 2013 Integrated Energy Policy Report