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May 23, 2011

Chair Robert Weisenmiller, Presiding Member  
Commissioner Carla Peterman, Presiding Member of Renewables Committee  
Commissioner Karen Douglas, Associate Member  
California Energy Commission  
DOCKETS Office, MS-4  
RE: Docket No. 11-IEP-1G  
1516 Ninth Street  
Sacramento, CA 95814-5512

**DOCKET**

**11-IEP-1G**

DATE May 23 2011

RECD. May 23 2011

SUBJECT: COMMITTEE WORKSHOP ON RENEWABLE, LOCALIZED GENERATION  
(Docket # 11-IEP-1G)

Honorable Chair Weisenmiller and Members of the California Energy Commission:

Thank you for inviting the County of Sonoma to make a presentation about the challenges and opportunities that arise around placement of distributed generation renewable energy on government property. The County of Sonoma and our associated agencies currently have explored, implemented and/or have in development almost every kind of renewable and distributed generation energy supply available. Each type of technology has a place and purpose and the County is proud to be participating in these endeavors.

As you embark upon implementing this impressive goal for 20,000 MW of distributed renewable across the state, the County of Sonoma would be happy to assist in any way. Our County is known for its collaborative and forward thinking strategic partnerships.

Attached is a summary of the County's energy efficiency efforts to date. First, it summarizes all projects in place or anticipated at the County. Next the process of developing our Comprehensive Energy Project for County facilities is detailed followed by a summary of our fuel cell power plant characteristics. Finally, we provide comments on your Draft report, at your invitation, for consideration. If there is any other way we can be of service, please do not hesitate to contact us.

Respectfully,

Julia Donoho, AIA, Esq., LEED AP  
Major Project Architect

## Background –Overview of Energy Efficiency Measures County-wide

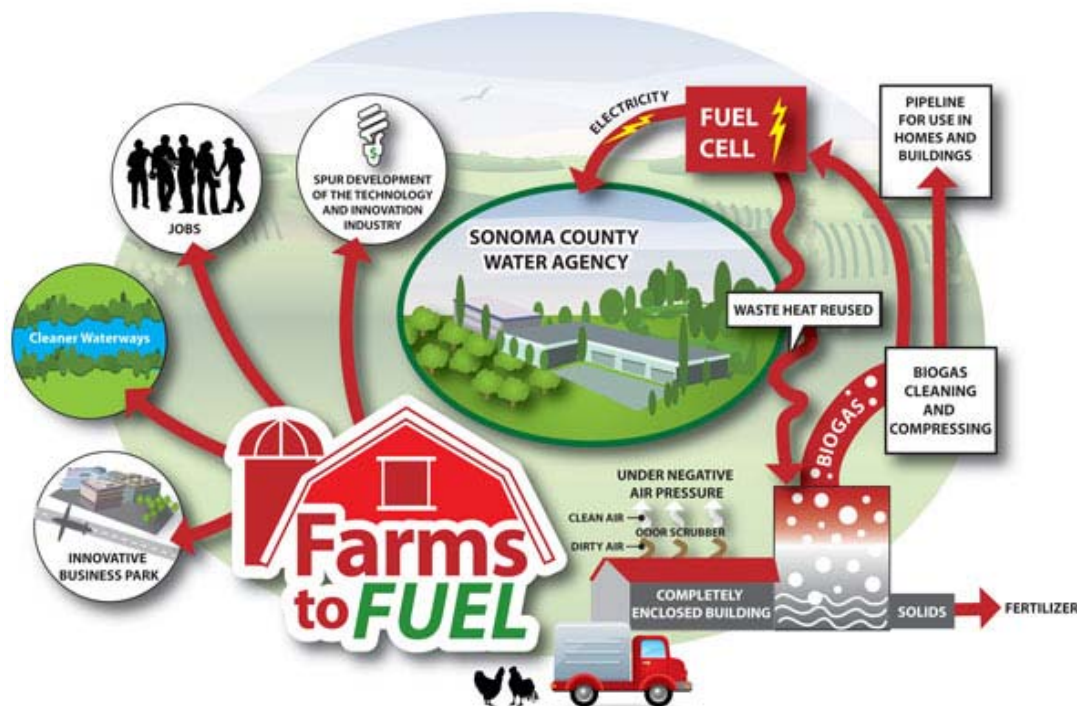
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- County of Sonoma
  - Various 20<sup>th</sup> century efficiency projects –CMP, CW Tank, lights and ballasts, lighting controls, HVAC controls, 12kV loop, increased insulation, and window tinting.
  - 5-6 MW Landfill Gas
  - Local Government Electric Vehicle Partnership – Goal of 1,000 hybrids and EV's
  - 240 hybrids, plug-in hybrids and EV's – Shifting fleet cost to off peak power load
  - Commute reductions, hybrid preferred parking, and new EV charging stations



- 820 MW Solar 2 projects, more planned – CREBS financing primarily, ESCO built
- CEP 38 EEM's 24 buildings – 19M gallons water, 13M kWh electrical saving /year
  - Water conservation measures in detention facilities and public restrooms
  - Lighting retrofits in 20 buildings
  - HVAC retrofits, replacements, and efficiency upgrades various buildings
  - CMP Chiller replacements higher efficiency
  - Additional cooling tower and removal of hot well
  - Higher efficiency boilers
  - 1.4 MW Fuel cell power plant DG with Combined Heat and Power
- 1MW biogas (compost) in development
- 5MW to date and increasing – Sonoma County Energy Independence Program (SCEIP) - Property Assessed Clean Energy program has approved \$53M in applications for assessments for green energy projects on buildings around county. Additional amounts conserved being tabulated.
- Bloom box technology in consideration
- Off bill , ARRA, and QCEB funded projects – air handlers, remote solar, lighting retrofits, water heaters, and airflow management

- Sonoma County Energy Watch (SCEW) - Since its inception in 2009, Sonoma county Energy Watch has helped local businesses, nonprofits, municipalities and special districts save 5,365,000 kWh/yr enough to power 330 homes for a year.
- Sonoma County Water Agency
  - Goal of carbon free water delivery by 2015
  - 22.4MW in development including CCA feasibility
  - 2.2 MW Solar 3 projects – \$15.5M, these projects took advantage of \$4.49M in PG&E rebates
  - 2.64 MW Hydro
  - 32 hybrids and plug-in hybrids
  - Feasibility study – 2 to 5 megawatts (MW) of wave power at each of 3 locations in process, with potential for expansion to over 40 MW at each of the three sites.



- 5.6 MW Biomass – 1.4 MW Fuel Cell project in development
- Geothermal project in development
- SCTA – Regional Climate Protection Authority (RCPA) started
  - Energy Upgrade California – market transformation for building industry
- Fairgrounds
  - 1.36 MW Solar on various facilities (24 Inverters)

## Background – Policy Measures

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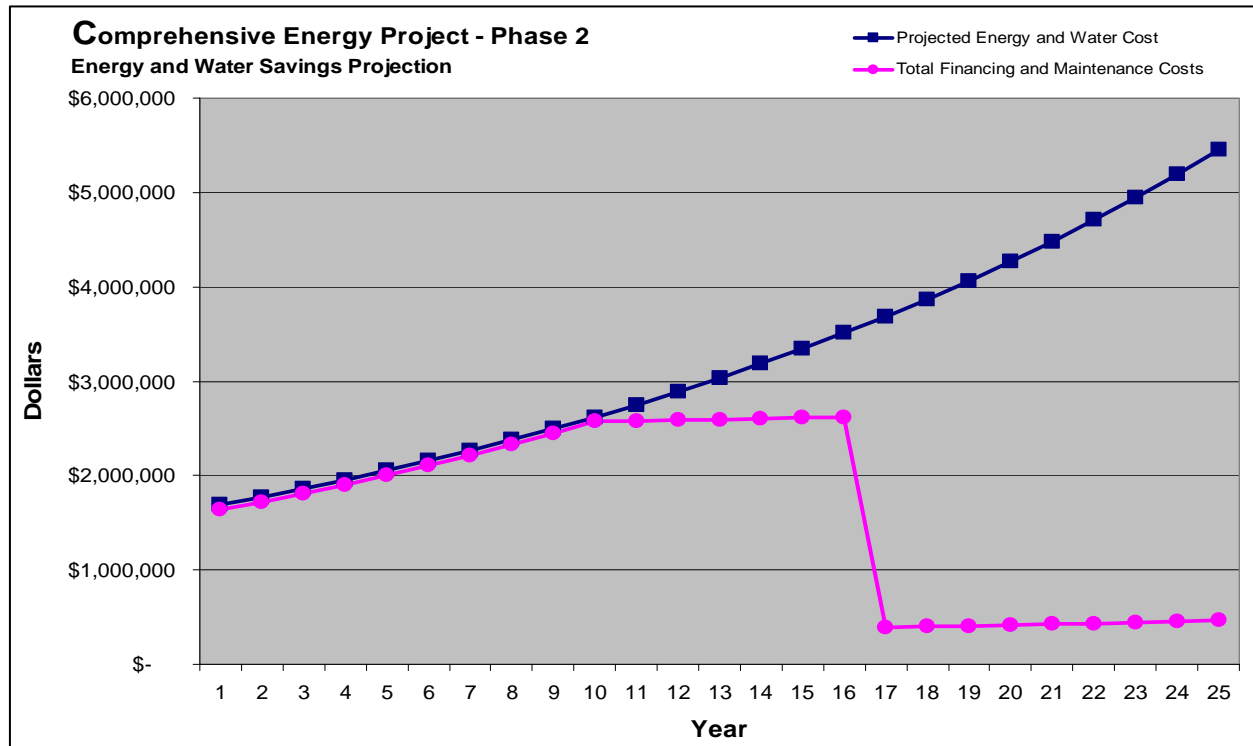
- Permitting and Resource Management
  - Previously required LEED certified for commercial and Build it Green for residential
  - Currently adopted CALGreen Tier 1
  - Preparing for the coming of International Green Construction Code (IGCC)
- 2010 – Green Building Policy for County Owned Facilities
  - LEED certified as minimum goal for all buildings (certification not required)
  - LEED Silver minimum goal for all buildings >10,000 s.f. (submit for certification)
  - LEED Gold minimum goal for all buildings >50,000 s.f. (submit for certification)
  - Maximize green, sustainable and energy efficiency measures to the extent possible (go above and beyond wherever possible)

## Background – Process to develop Comprehensive Energy Project

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- 2002 Report – Orrett
  - Positive Environmental and Financial savings goals
  - GHG reduction targets proposed
  - Buildings – Commute – Fleet identified as three main GHG contributors
  - Landfill gas identified as opportunity, as well as BioMass in rural areas
  - Waste stream diversion – Single stream recycling
  - Cogeneration identified as opportunity for CMP
- 2006 Climate Protection Action Plan for Sonoma County (CPAP) –
  - Buildings – Commute – Fleet GHG footprints defined
  - Various Energy Efficiency Measures (EEM's) suggested
  - Cogeneration 1.2 MW PV proposed
  - Recommend hire Energy Services Company (ESCO)
  - Recommended Energy & Sustainability Division
  - **BOS Resolution GHG Targets exceed AB32 demonstrating leadership in field**
    - 20% below 2000 GHG by 2010
    - 25% below 1990 GHG by 2015
- 2006-2008 – Hired ESCO and Completed Energy Audit Facilities
  - RFP for Design Build ESCO – one year
  - ESCO completed Inventory Grade Audit – one year
  - 101 Energy Efficiency Measures recommended
- 2008-2011 – Comprehensive Energy Project (CEP)
  - Buildings – 38 measures in 24 buildings selected for cost neutrality and payback
  - Comprehensive Energy Project (CEP) Objectives:
    - GHG reduction

- Positive Financial Impact
- Infrastructure Renewal
- EEM's include Cogeneration 1.2 MW Fuel Cell, offsets cost of other projects
- \$22.3M with \$3.5M offset in incentives and grants including SGIP
- \$18.7M financed through Bank of America, Cal Govt. Code §4217.10, financing collateralized against improvements.



- Goal was zero financial impact to General Services budget in first year. Payments escalate along same path as projected energy cost escalation first ten years, then payments fixed for 7 years. Over 25 years useful life of fuel cell \$38M positive financial impact.

### Sonoma County Fuel Cell Characteristics

- Largest fuel cell in California - First article 1.4MW from Fuel Cell Energy
- 1.4 MW distributed generation creates more reliable power for County Center in brown out situation, keeping government functioning smoothly.
- Collocated adjacent to Central Mechanical Plant to provide Combined Heat and Power
- Natural gas provided by utility non-core and subject to curtailment. We are looking for a renewable supply alternative.
- The County received a Self-Generation Incentive Program payment of \$3,000,000 from PGE toward the \$9,763,271 cost



- Prior to installation, the County electric bill \$1.5M annually. After installation, the County gas bill for fuel cell is \$350k annually, which is dramatically less. The county still has to pay for equipment and maintenance, and the County benefits from the heat recovery, so the payback period after the incentive is seven years, offsetting higher payback measures.
- The County load demand is 8-900 kW evening winter, due to the detention facility 24/7 load characteristics. County Center load goes up to 2,500kW summer peak. The fuel cell capacity exceeds our minimum load but does not meet all of our load at peak times.
- AB1613 FIT desired. PGE worked with the County to provide an “uncompensated export” agreement while we are waiting on the Feed in Tariff to become reality. Also, the County is looking at additional load shifting opportunities and opportunities to purchase renewable gas.
- Certified Combined Heat and Power (CHP) per CPUC §2840 Guidelines, Section III
- Currently the County has a net generation output meter at the fuel cell, but no meter at the connection between the 12kV loop to the PGE grid. We are blind as to our load characteristics until we exceed 1.4MW.
- The County has meters on most our buildings but they are not digital. Luckily we have the controls systems in place for most of our buildings to support digital meters. The cost to go digital is about \$25k per building.
- Demand charges are severe if the fuel cell gets taken down briefly during peak demand, even if for just two hours.



### CEC Draft Report comments

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Excellent report – covers many bases, good work. Kudos to Heather Raitt and staff.

Comments in no particular order:

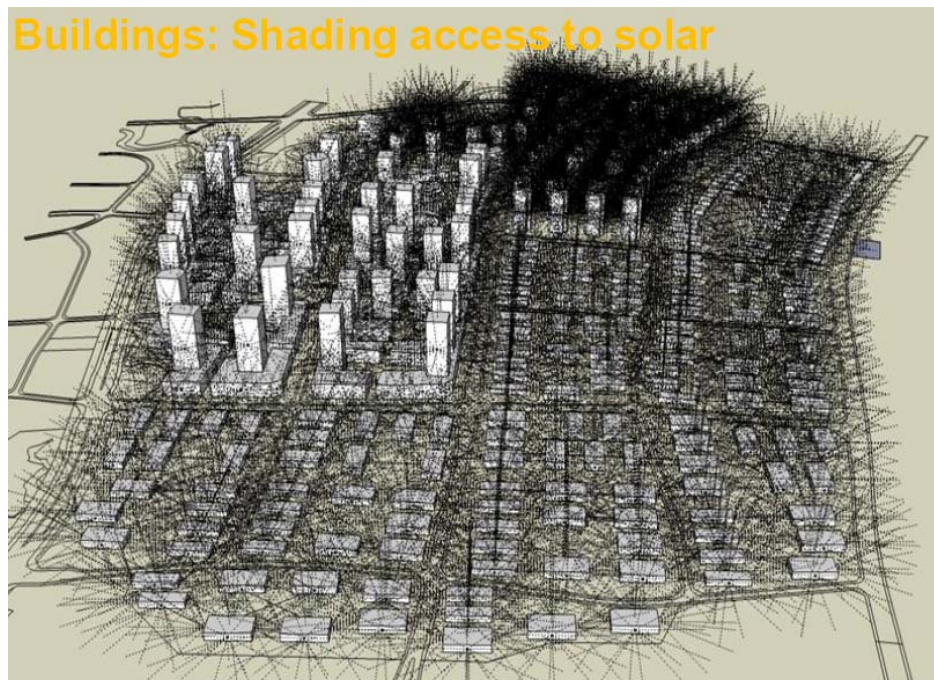
1. Clarify the objective of where/how you want the 20,000 MW of distributed generation delivered – what type of energy, what part of the supply curve i.e. any supply OK, or targeting 9-5 peak, 24/7 continuous, or mix. Also, is it intended to be distributed somewhat evenly all around state, nearest to key load centers, or just wherever it can be built and work effectively? What is the objective – reliability, distribution of supply, meeting peak with renewables, reduced pollution, distributed portfolio of a mix of technologies all around

the state, or all of the above? Mr. Picker pointed out the differences between North and South in policy. Doesn't that lead to different energy strategy north and south? What is the strategy along the demand curve and for location?

2. Within the goal of 20,000 MW is DG the objective or is renewable the objective or only DG renewable? Is there room for partnerships/fraternal projects like fuel cell in a city and Biogas in the forest, Biomass at Coalinga, PV in desert, hydro at rivers and coast? Combining the compactness of fuel cell CHP technology close to load, and the opportunities for biogas where those are greater. In other words, could some projects be less renewable but high DG value when partnered with a project that produces green tag gas? Or could it buy green tag gas?
3. Report seems heavily weighted to PV. Is this intentional? If so – consider
  - a. Manufacturing supply chain. With Europe and US efforts to build solar farms in Sahara and SW American deserts, can this 20,000 MW goal be accomplished with all PV with current manufacturing capacity? What other major DG or PV efforts are underway in other parts of the world that will impact manufacturing of PV?
  - b. Enormity of environmental impact. Per your report, Solar is 5-9 acres per MW. To achieve just the 12,000 MW target requires essentially a solar farm occupying an area of land equivalent of the City of Sacramento. That is a huge environmental impact, even if spread around the state. Fuel cells in comparison require 1/20 acre per MW. That is one square mile to meet all of the target.
  - c. PV generally will not meet full building loads of pumps and motors for mechanical systems, though it can definitely address light and plug loads. Generally the square footage of PV needed to feed the full loads of a building exceeds the size of the building footprint or rooftop. PV is great for addressing peak loads on hot sunny days in the right location, but not the best choice for DG in other locations.
  - d. Economics of PV keep it at bay in many instances. Currently payback is farther out than other technologies and you need to implement a mix of technologies to make it pencil out. If it is a requirement then the market will bring the price down, but until then, many PV projects have a very small payback over 25 years.
4. Report seems heavily weighted to PV. Alternative is to suggest varied portfolio or more than one kind of energy supply at a facility – i.e. constant supply mixed with variable supply. Using various technologies increases reliability. Also, PV tends to be a very expensive technology to install, with a more challenging payback picture, compared to other options. Varying the portfolio allows the costs and paybacks of the overall picture to be more balanced.
5. What is the environmental impact and efficiency of having multiple large and small scale projects? Where do you want to encourage certain types of DG and discourage other. Certain locations it is much lower ROI for solar, should the market only drive the choice of

technology? Or if there were a desired portfolio mix in the 20,000 MW target, should that be the same mix for all areas.

6. Rooftop applications – Report refers to rooftop opportunities but roofs are not necessarily the best choice for solar installations.
  - a. Roofs are 3% of construction costs for a building and 50% of lawsuits. Water intrusion from roof leaks causes structural deterioration, damages to interior finishes, and mold problems. Adding solar to roofs exacerbates this problem with increased maintenance activity on the roof, so it must be done carefully.
  - b. Building useful life spans of 50-100 years do not match roofs 20-25 year useful life spans, or solar panels 15-20 year useful life. Adding solar on roofs makes re-roofing difficult especially when the roof installation and solar installation are installed at different times. It is important to coordinate the installation of roofing and solar.
  - c. Roofs are being converted to cool roofs (white PVC roof membranes) per Title 24 prescriptive standards to reduce GHG and heat island effect. Adding solar panels changes the efficiency of spending the extra money on a cool roof if you are just covering it up. At the least the roof and solar should be designed together.
7. Building Integrated Photovoltaics – There are many opportunities for solar on urban building surfaces, including dual wall, solar shading, tubular installation and so forth.



- a. Some buildings in urban areas present greater opportunities on vertical surfaces for curtain wall installations or solar shading applications. Building integrated photovoltaics should be the norm for new and retrofitted facilities. Especially in large cities like San Diego and Los Angeles with lots of sun, there is an excellent opportunity to address peak load with PV. Multi-story buildings and skyscrapers



have much more surface area on the vertical surface. Phil Jones from Cardiff University has done some very interesting sun and shade modeling to show the surface availability for solar in cities, as shown on the above rendering.

- b. Spandrel glass solar panels could be developed for commercial retrofits of building skins. Solar shading could be exterior mounted or interior with clear glass in a dual glazed wall system. Solar skyscrapers have been built and others are in development. Curtainwall Design Consultants provide an industry resource for designing building integrated PV with tubular PV, horizontal sun shades, Solendra, thin film and other new technologies. Colt Industries is providing louvered sunshades, including louvered PV sun shades to control heat gain and generate electricity in buildings.

Suggestion: Revise the report to say “building integrated” on existing buildings.

8. Parking Lot applications – Report refers to parking lot opportunities. Especially in Southern California there are lots of places where parking lot shade structures are highly desirable. And there are a variety of other ground mounted or self-supporting structured opportunities for solar panels, including focused PV’s generating steam to turn turbines. Park structures, recreational facility shade structures, and ground mounted without a secondary function (solar farms) are all part of this class of solar installation. Also, there are lots of concrete wall opportunities in Southern California, not just Cal Trans soundwalls, but also the Corps of Engineers levees along the Los Angeles River or areas like the Sepulveda basin recreational area.

Suggestion: Revise the report to say “ground mounted” or “self-structured”.

9. State Buildings – Is there a State Green Building Policy for State Owned Facilities? New construction policy? Commercial retrofit? The GSA is going to net zero as a goal for all Federal buildings. What goal does the CEC want to suggest for State Owned or Leased Facilities? Should every building have some on-site power generation? Does this apply to new only, or also to existing buildings (commercial retrofits)? If you really would like to address the commercial retrofit market, there will need to be some policy such as ADA requirements and seismic codes that require Owners to upgrade when they remodel.
  - a. Building Codes are rapidly changing in the green/sustainable/energy arena. This year California adopted CALGreen which requires buildings to be designed with energy efficiency and sustainable features. CALGreen mostly only addresses new construction.
  - b. In 2012, the International Code Council is bringing forward the International Green Construction Code (IGCC). The IGCC will require remodeled facilities to be retrofitted to meet the new standards, thus capturing commercial retrofitting into any new projects. Additionally, the IGCC will require a higher level of energy performance such that building envelope as well as building form will have to create a more efficient building. The IGCC will also require a certain amount of any building’s power to be from renewables.)

- c. Buildings in their shape and form and various characteristics can be more energy efficient through a variety of passive solar measures such as hyperinsulation, envelope design, trombe walls, renewable materials, solar orientation, water efficiency, HVAC systems efficiency.
- 10. Detention projects – PV cannot fully address the load characteristics of detention facilities because they have 24/7 ventilation requirements which requires motors running fans, etc. Objective should provide a multiple technology approach to detention facilities. i.e. Fuel cell to cover base load with surface mounted PV for peak daytime loads. Taking up adjacent land for solar farming might be less desirable environmentally, so that a combination of energy strategies to green detention facilities may be considered.
- 11. Groundsource and geothermal energy are not mentioned much in the report. There are lot of opportunities in this area throughout the state. We have lots of geothermal in Sonoma County and various projects underway.
- 12. Permitting – The County fuel cell is certified Ultra Clean by California Air Resources Board, making permitting through CEQA very straightforward. Some DG could take a long time to permit. Clean technology is a valid choice for implementing DG targets especially when they help the financial picture work.
- 13. Storage is the key to managing load supply and demand changes. Not much was said in the report or hearing about this key area. Please stimulate research into storage.

Policy setting – report did not go too far into policy areas for built environment

- 1. Maybe DG should be a required to retrofit all facilities like we retrofitted all masonry facilities with seismic upgrades over a period of years. The type of DG should be determined by site characteristics, but maybe, in most of California, especially southern California, you could require at least some PV on every structure. IGCC will set policy for new and renovated structures – can you get ahead of that and require some Building Integrated Photovoltaic for all projects and retrofits?

## Questions from California Energy Commission

Chair Weisenmiller –

1. Partnerships with Local Government – Sonoma County leads the way in partnerships and collaborations in the energy arena, and is always looking for new ways to further our clean green energy objectives. For example:
  - a. The Local Government Electric Vehicle Partnership which includes the County of Sonoma, the nine cities within the County, Northern Sonoma County Air Pollution Control District, Sonoma County Agricultural Preservation and Open Space District, Sonoma County Transportation Authority, and the Sonoma County Water Agency (SCWA) have been working together to build out an electric vehicle (EV) infrastructure to support mass introduction of EVs in 2011. This effort has united the local government agencies to work together to facilitate public and private EV ownership in the County, with a goal of 1,000 hybrids and EV's in 2011.
  - b. The Sonoma County Energy Watch program is a local government partnership with PG&E that has helped customers save over 5,365,000 kWh/yr.
  - c. Sonoma County Energy Independence Program is a program created by the collaboration of the County of Sonoma and the Sonoma County Water Agency, and is the leading PACE program in the Nation. The CEC has selected SCEIP to create a manual for other jurisdictions to start PACE programs.
  - d. Solar Sonoma is an award winning collaboration of all jurisdictions in our County advocating for solar projects. Solar Sonoma has logged 42MW of solar installations across all types of facilities.
2. Federal Partners. Navy/Marines Energy Efficiency of Renewables (?)
  - a. NA
3. Governor's Office and State Treasurer ask – How do we do Commercial Retrofits?
  - a. Expanding On-Bill financing is key for the small project end of DG spectrum
  - b. PACE programs are exceptional for spreading DG around a community
  - c. Expanding commercial bank financing availability is a necessity to get the building industry moving and using energy projects to grow jobs.
  - d. There is a gap in market – expanding PACE into the commercial market is a good strategy ready to go
4. Governor and Treasurer – High Priority to move along commercial retrofits
  - a. The building codes are already changing. Now we have Cal-Green, soon we will have IGCC. The Cal Green code does not address existing facilities or second tenant improvements. The IGCC will. As the IGCC is finalized, the CEC could interject a voice at the Dallas hearing coming up to ask for even greener options for DG on buildings. More PV or clean energy. Retrofitting, renovating, new construction, etc.
  - b. Alternatively, the CEC could push for building policies that require retrofitting over time, like all masonry buildings had to get seismic strapping within a certain time frame. The CEC could make some state regulations that all buildings need to add PV or DG before some deadline. And then you could have a further out deadline for additional targets, credits for early compliance.

- c. Additionally, the CEC could address the urban planning spectrum. In new projects the CEC could require energy and infrastructure planning integrated with mixed use, transportation connected urbanism. At a retrofit level, the CEC can make Community Choice Aggregations work so that communities can look closely at their energy supply and demand in a wholistic way. Finally the CEC can create incentives for planning that retrofits suburbia into walkable urban centers.

Commissioner Peterman

1. How financed fuel cell/ CEP project

- a. At the County of Sonoma in General we make the energy savings of a project pay for the project – net zero energy also means net zero budgetary impact. Where we cannot get grants or other funds, this is a must. On the Comprehensive Energy Project, we employed a mix of technologies because some DG is less expensive to carry project. We did not achieve all renewable in the mix, but we are not done trying to get some renewable gas supply for our fuel cell. In that project the fuel cell short payback allowed us to accomplish projects that would otherwise not calculate out, but that are already delivering energy savings. It also helped us replace older equipment at the end of its useful life, but at the height of its energy inefficiency, that we did not have capital funds available to change.
- b. At the County of Sonoma we haven't done a PPA. We looked at all the numbers for several solar projects and the financial picture looks better to us if the County owns and maintains the equipment. There is some risk we may be wrong if energy rates drop, but there is greater reward if energy rates go up.
- c. Utility rates. There is some concern that rates are slippery and shifting quickly. Demand charges, peak charges, partial peak, transmission charges. It is all pretty complicated, but there is some concern that the utilities will rush to shift rates all onto the transmission end and this could affect the financial viability of renewable and DG projects. Please keep a watchful eye at this end so there are not so many other charges that the cost of doing renewable becomes infeasible.

Thank you for your time,

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