



INFORMATIONAL HEARING OF THE SENATE SELECT COMMITTEE ON CLIMATE
CHANGE & AB32 IMPLEMENTATION

**Scaling our Clean Energy Future with Grid Storage, Electric
Vehicles, and Alternative Fuels**

Tuesday, October 25, 2016
UCLA School of Law, Room 1314
10:00 a.m.

BACKGROUND INFORMATION

Introduction

In this informational hearing, the topic of scaling cleaning energy technology will be discussed. Specifically, the hearing will focus on three important areas: (1) energy storage for the grid, (2) energy storage for transportation, and (3) alternative fuels.

The format of the hearing is a roundtable discussion, meant to encourage conversation, problem-solving, and transparency. The Committee's hope is that the hearing will allow participants to identify new opportunities to build bridges between the private sector and the state; to raise and think through difficult questions facing their business or organization; and, ultimately, to foster new relationships in a field that requires collaboration and teamwork. At the end of this background information document, is a list of questions all participants were asked to contemplate before coming to the hearing.

Overview of California's climate policies

California has long led the nation in environmental legislation aimed at combating climate change. Over the last 20 years, California has developed a series of policies to address its carbon footprint and associated pollution, including legislation on clean car standards, renewable energy procurement requirements, performance standards for baseload electricity generation, coordinated transportation and land use planning, and a host of other efforts. While a comprehensive review of California's climate policies is beyond the scope of this document, a brief overview of relevant policies is provided here.

Policies to reduce greenhouse gas emissions

In 2005, Governor Schwarzenegger issued Executive Order S-3-05 that established a series of GHG emission reduction targets for California, including reducing emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. AB 32 (Nuñez/Pavley), Chapter 488, Statutes of 2006, among other provisions, codified the executive order by requiring GHG emissions limits equivalent to 1990 levels to be achieved by 2020.

In 2015, Governor Brown strengthened GHG emission reductions further by issuing Executive Order B-30-15, establishing a statewide goal to reduce GHG emissions 40 percent below 1990 levels by 2030. This target was codified into law by SB 32 (Pavley) Chapter 249, Statutes of 2016.

California's renewable energy goals

In addition to GHG emissions targets, California has adopted policies to require greater use of renewable energy to meet the energy needs of the state's grid. California's Renewable Portfolio Standard (RPS) was originally established in 2002 with SB 1078 (Sher), Chapter 516, Statutes of 2002, which required 20 percent renewable energy by 2017. The 20 percent mandate was accelerated in 2006 by SB 107 (Simitian), Chapter 464, Statutes of 2006, which mandated the target be met by 2010. The renewable energy target was increased in SB X1-2 (Simitian), Chapter 1, Statutes of 2011, to 33 percent renewable energy by 2020.

More recently, SB 350 (De León, Chapter 547, Statutes of 2015), put into law a requirement to serve 50 percent of California's electricity use with renewable resources by 2030.

Energy storage technologies for the grid

California has been a dynamic force for transitioning to sustainable, renewable energy sources. As this transition accelerates, one major challenge for renewable energy is the fact that energy production from renewable sources does not always align with demand for energy from the grid. Tremendous advances in energy storage technology offers a possible solution to better coordinate energy production with demand. This technology harnesses energy generated by the sun during the day, wind gusts late in the afternoon, and energy from sources across the

West. It stores it when consumption is low and puts it back onto the grid when needed at peak demand times or to compensate for unanticipated changes in renewable energy output. By incorporating more storage capacity in the grid, more renewable energy resources can be integrated into the grid.

The state has taken action to advance energy storage, including the passage of AB 2514 (Skinner), Chapter 469, Statutes of 2010, and the resulting California Public Utilities Commission (CPUC) decision for energy storage procurement targets for each of the Investor Owned Utilities (IOUs) totaling 1,325 MW to be completed by the end of 2020 and implemented by 2024. Additionally, the CPUC provides funding programs including Permanent Load Shifting and the Self Generation Incentive Program that provide incentives for adoption of customer-side energy storage. The California Energy Commission (CEC) funds research to further the effectiveness of energy storage as a viable grid resource through the Electric Program Investment Charge (EPIC).

Recent events have called attention to the need for greater energy storage capacity to provide reliable energy to the Los Angeles region. In October 2015, a massive natural gas leak was detected at a well in the Aliso Canyon natural gas storage facility. In response to the leak, Governor Brown issued an emergency proclamation that prohibited injections of natural gas into the facility until the leak is stopped and a comprehensive review of well safety is conducted. The proclamation was strengthened by SB 380 (Pavley), Chapter 14, Statutes of 2016, which codified the moratorium on natural gas injections until all wells are tested for leaks. It also requires that before any well can be used to resume injections, it is tested for its structural integrity and be certified as safe, and that any well that has not been fully tested and certified must be temporarily plugged and isolated from the facility. Because the facility provides natural gas to power plants in the region, concerns were raised about energy reliability in the region during the periods of peak energy demand (i.e., middle of summer and winter). To address the energy reliability concerns, large, utility-scale battery storage networks are being installed that can provide energy to the Los Angeles region and reduce the need to burn natural gas at the power plants.

Energy storage for transportation

California has enacted a wide range of policies and regulations that ensure automakers research, develop, and market electric vehicles. A few policies are highlighted here.

The Zero Emission Vehicle (ZEV) program requires automakers to sell electric cars and trucks in California based on the automaker's overall sales within the state. The goal of the program is to spur research, development and commercialization of electric vehicles (EVs), which generate fewer GHG emissions. Vehicles that are classified as ZEVs include plug-in hybrid vehicles, battery electric vehicles, and hydrogen fuel cell vehicles. Under the program, the Air Resources Board has established a minimum of 1.5 million ZEV sales in California by 2025. Automakers earn credits by selling zero emission cars and trucks, which can be sold to other automakers to meet their ZEV requirements.

The state, through the ARB and other agencies, has several incentive programs (e.g., Clean Vehicle Rebate Project, Public Fleet Pilot Project) that provide rebates for the purchase of new, eligible zero-emission and plug-in hybrid vehicles, including passenger cars, buses, and light-duty vehicles.

Alternative fuels

Alternative fuels are a category of fuels that are derived entirely or in part from non-fossil fuel sources. Alternative fuels can be made from a variety of sources, including animal fats and vegetable oils (e.g., biodiesel), crops and inedible agricultural waste (e.g., ethanol), and as a byproduct from the decomposition of organic matter (e.g., renewable natural gas). Other examples include hydrogen fuel cell vehicles, propane vehicles, and plug-in electric vehicles.

The state has made a commitment to support and accelerate the development of alternative transportation fuels through the improvement and commercialization of existing and emerging alternative fuel vehicles and infrastructure. A few important policies and programs are highlighted here. Also, several programs mentioned in the previous section are included in the state's overall alternative fuel efforts (e.g., ZEV regulation).

The CEC and ARB developed and adopted the State Alternative Fuels Plan of 2007 (pursuant to AB 1007 (Pavley), Chapter 371, Statutes of 2005). The Plan set goals of reducing petroleum dependence by 15 percent by 2020 and increasing alternative fuels use by 26 percent by 2022.

AB 118 (Nuñez), Chapter 750, Statutes of 2007, created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). The statute, subsequently amended by AB 109 (Nuñez), Chapter 313, Statutes of 2008 and AB 8 (Perea), Chapter 401, Statutes of 2013 authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. A range of projects are eligible for grants, loans, and other financial measures, including projects that develop and improve alternative and renewable low-carbon fuels, optimize alternative and renewable fuels for existing and developing engine technologies, expand fuel infrastructure, and retrofit medium- and heavy-duty on-road vehicle fleets.

The ARB administers the Air Quality Improvement Program (AQIP), which is the companion program to the CEC's ARFVTP. AQIP provided up to \$40 million per year through 2015 for clean vehicle and equipment projects that reduce criteria pollutants and GHG emissions.

The Low Carbon Fuel Standard (LCFS) was established in 2007 pursuant to Governor Schwarzenegger's Executive Order S-01-07 and AB 32 (Nuñez/Pavley). It uses a market-based cap and trade approach to lowering the GHG emissions from petroleum-based transportation fuels like reformulated gasoline and diesel. The LCFS requires producers of petroleum-based fuels to reduce the carbon intensity of their products, beginning with a quarter of a percent in 2011 culminating in a 10 percent total reduction in 2020. Petroleum importers, refiners and wholesalers can either develop their own low carbon fuel products, or buy LCFS credits from

other companies that develop and sell low carbon alternative fuels, such as biofuels, electricity, natural gas or hydrogen.

Concluding remarks and questions for discussion

As the state moves towards wider adoption and implementation of clean energy technologies, numerous technological, financial, and regulatory issues must be carefully considered. To facilitate a collaborative discussion among private and public sector stakeholders, participants were asked to consider the questions below.

Clean energy technology:

- What is the current status of your technology, or the technology your business utilizes?
- How do the current costs of storage or fuels compare with the market alternative (e.g., battery storage vs. existing grid power)?
- On what timeline are costs expected to come down, and with what kind of scale?
- Should the market expect new innovation in this technology, and if so, what kind?

Scaling up the technology:

- What are the key challenges to commercialization?
- If the technology your business utilizes is already commercialized, what hurdles remain in regard to mass consumer adoption?
- What infrastructure constraints exist in the market?
- Are there financial barriers preventing scalability?

The role of government:

- What is the best role of government in encouraging further development of your technology?
- In California, specifically, which agencies are best situated to positively impact your business and its technology?
- What regulatory requirements or administrative red tape exists? How should the administration minimize these barriers?
- What role do incentives play in the competitiveness of clean energy industries?