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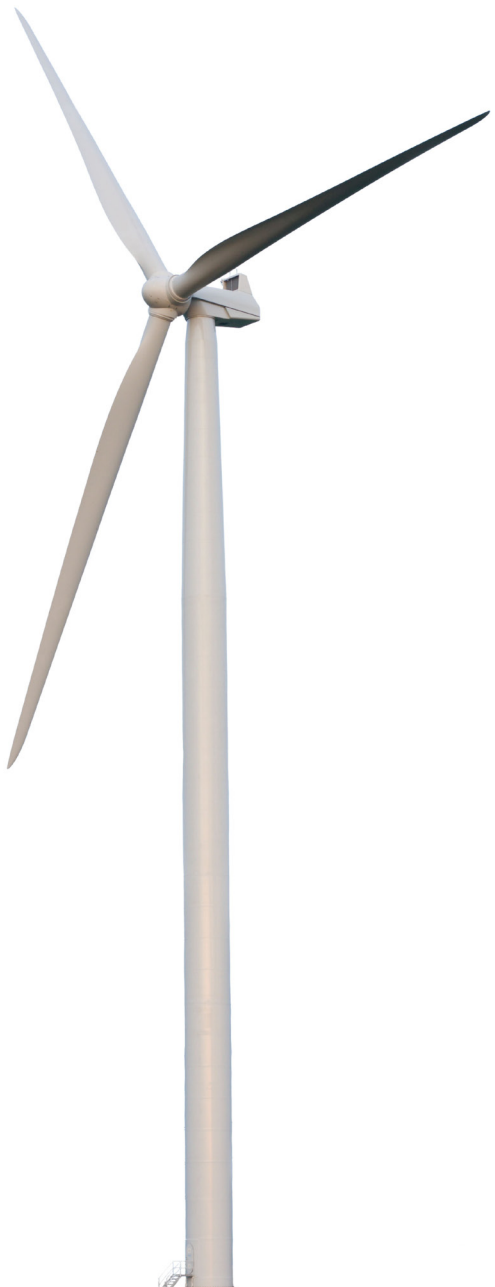
The realities of designing energy markets
For a low carbon future



Deloitte Center for Energy Solutions

Energy providers throughout the U.S. are grappling with the need to prepare for a future with new technologies and consumer preferences, as well as the need to reduce carbon emissions. The state of California has been in the vanguard in its attempts to promote distributed renewable generation and regulate the use of renewable energy and low carbon solutions in its energy markets. Examples include Assembly Bill 32, the 2006 act designed to reduce greenhouse gas emissions, and 2002 legislation creating the Renewables Portfolio Standard, requiring utilities to increase energy from renewable sources to 33% of their portfolio by 2020.

At a recent Deloitte Center for Energy Solutions presentation and discussion in San Diego, speakers discussed these and other issues that will affect California's ability to create and sustain the energy markets it needs in the future. Holly Smithson, President and COO of CleanTECH San Diego and Marlene Motyka, U.S. Alternative Energy Leader, Principal, Deloitte Financial Advisory Services LLP, welcomed and introduced the session's three distinguished speakers: Timothy Alan Simon, California Public Utilities Commissioner, Thomas R. Brill, Director of Strategic Planning and New Products and Services at San Diego Gas and Electric Company, and Dr. Dale Nesbitt, Founder of MarketPoint, Deloitte MarketPoint LLC. The speakers provided thought-provoking insights into California's present-day energy situation and how regulators, legislators and utility industry participants should consider market-based solutions to move effectively toward a low carbon future.

Serving ratepayers while preparing for the energy future

A view from the regulatory front

A California Public Utilities Commissioner since 2007, Timothy Simon is at the epicenter of the wide range of stakeholders—politicians, regulators, industry players, ratepayers, and environmentalists—many wanting a voice in shaping California's energy future. While hastening to remind the audience that his remarks were an expression of his own opinions and not the opinions of the Public Utilities Commission, Simon presented a wide-ranging overview of the complexities involved in his decision-making.

Shale gas is a "Game Changer"

Describing himself as "an old fossil guy," Simon discussed at length the opportunity presented by North America's resurgent fossil fuel production, and particularly by the country's newly abundant supply of natural gas. "I push for renewables," said Simon. "However, the U.S. is now #2 in the world in oil production. We also have the largest reserves of gas and coal, and those reserves offer a high-quality opportunity for the clean tech community and for achieving better geopolitical balance in the world." Simon described the "game-changing" role domestically produced shale gas is playing in shaping the country's energy future. "Shale gas is going to continue to play a major role in the cleaner energy portfolio, and that has not been a part of the dialogue to the degree that it should be," he noted.

With corporations developing promising hybrid technologies that leverage the power density of fossil sources with renewable technologies, Simon argued against shutting the door on fossil fuels. "If the goal is to lower carbon emissions, we should not be religious about how we arrive at that goal," he said. "If the leading solution is to rely on a renewable source of energy but use fossil technology as well, the commission should be taking a close look at that solution."

Protecting and enhancing the grid

Commissioners should tackle the issue of determining access to the grid and providing reliable, peak-period service while at the same time promoting investment in the future, with possibilities of new demands on the grid such as electric vehicles. Simon believes that it is a positive development that residents are now are able to take an ownership role of the energy grid. "The grid is no longer a one-way but a multi-dimensional system, with opportunities for families to self-generate," he says. However, Simon doubts that the current practice of utilities paying retail prices for energy that is being imported into the grid is sustainable.

As new technologies are introduced into the system and rates are set, the commission should balance the trade-off between serving current ratepayers and investing for the future. "I have to make sure I am not 'platinum-plating' the system," notes Simon. At the same time, the grid should prepare for and take advantage of new technologies. That includes providing a rate of return for investors in those technologies. "I do believe we will have to re-evaluate depreciation and accelerated depreciation rates around the planned obsolescence of various technologies," he said. "We have to get that depreciation right, as well as getting right the appropriate rate of return for investors in those kinds of plays."

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– Timothy Simon

Data privacy: Concerns throwing a wrench into the system

Simon discussed the issue of data privacy at length. Data and organizations' ability to collect and analyze that data has become increasingly critical to the energy marketplace. Simon feels that privacy concerns, particularly around the installation of smart meters and the potential for politicization of the privacy issue, bring with them the danger of disrupting progress toward energy solutions. While customers may be concerned that companies utilizing energy use data want to violate their personal privacy, "what companies really want to know is what is going on the in the overall market," said Simon. "They want to understand load shifts, and generators want to understand consumption patterns so they can make determinations about deliveries. That information can have a significant beneficial impact on consumers and the rates they pay." Simon noted that the retention of data, as opposed to the dissemination of that information, generally benefits the incumbent company and the prices they are able to charge. Unfortunately, Simon does not think the controversy is going away. "I only see the privacy issue getting more contentious, as new technologies and the ability to transmit information in real time become available," he said.

The challenges ahead

While data privacy issues will continue to fuel debate at the Commission, Simon sees the two biggest challenges ahead as effectively promoting energy efficiency and dealing with providing acceptable yield to investors in new technologies. "Those together will present the biggest challenges to the commission in the next decade," he said. While the ability to reduce aggregate demand by introducing efficiencies has only started, customers want to see their rates go down when they invest in energy efficiency. "They still want to use the grid, so the big issue is how to incentivize behaviors that reduce energy use and still support the larger system. That is the big question, and it is a very complex problem," he said. At the same time, business is already leaving the system in California, moving to self-generation and other sources. Simon feels that some type of surcharge for ratepayers, to help facilitate system maintenance while dealing with departing load, may make sense in the future. "Our commission should consider looking at how we are socializing the cost of providing energy on demand," he concluded.

Energy solutions for the future

An Urgent Need for Price Transparency

Tom Brill oversees new products and services at San Diego Gas & Electric Company (SDG&E), but during his remarks he addressed the larger picture: the future energy market that California is trying to create, where consumers will have many choices. The big question is how to get there. While the California legislature has passed a number of statutes trying to move toward the energy future, including the requirement that utilities have 33% of their energy portfolio supplied by renewable sources by 2020, utilities' business models and the regulatory framework around their operations were designed for energy technologies of the past. "We are regulated for fossil fuel sources, generated hundreds of miles from customers, transported very long ways and designed for electricity moving in one direction through the system," said Brill.

"If we convert our rate design to one where consumers get paid for providing ancillary services to the grid, we could create an effective grid from end to end—an effective infrastructure that operates on a least-cost basis dispatching energy anywhere in the system when and where it is needed."

– Thomas Brill

Another key issue for utilities is that as customers are encouraged and empowered to provide an increasing portion of the energy value chain for themselves, they will still require service from utilities to help confirm that electricity will be there when they turn on the lights. For the distributed solar market and other new technologies to thrive and grow, utility rate design should be updated to provide accurate, unbundled price signals for the services utilities actually provide their customers.

In California right now, the state's net energy metering initiative allows customers generating solar energy off the grid to receive a financial credit for the power that is generated. Under SDG&E's tiered rate structure, customers using net energy metering avoid paying the infrastructure costs of grid support while still using those services. That shifts the costs onto non-net energy metering customers. Brill views the net energy metering system as a symptom of the fundamental problem. "Our problem is not rooftop solar or net energy metering," he said. "Our problem is that our business model and rate design are all structured for technologies we used in the past century. Accurate price signals are what are needed. We need to be able to charge customers for the services they receive."

Accurate pricing allowing true cost recovery is not only required for serving peak demand and maintaining infrastructure; it is required to support innovation. Brill singled out the issue of storage to illustrate how the lack of accurate pricing can stifle a promising new market's development. "Right now, residential solar customers receive storage services for free," he said. "If a business is in the storage industry and wants to be able to sell distributed storage to residential customers, they do not have a market. We in California are therefore stifling innovation in the storage market." In another instance, utilities are not compensated for the money they spend to fix power quality issues, a direct results of converters used with solar power that do not facilitate sufficient power quality, threatening equipment with voltage spikes. "Smart inverters are available right now," said Brill. "However, Net Energy Metering customers are only compensated for high kW/h output, and installing these inverters improves power quality but reduces kW/h output. That lack of unbundled price signals for the power quality services these customers receive is distorting rates and stifling innovation in smart inverter technologies."

Once pricing issues are addressed, Brill sees a future where utilities will work in a manner similar to smartphones, providing a platform that will allow third parties to customize services for customers. Those customers in turn will have the opportunity to customize the electricity they receive, the way they consume it, and the emissions that come from it. Unbundling prices will empower third parties to develop new energy applications, a sustainable and competitive market structure, wide scale solar deployment and advanced energy sources in the future.

Bringing economic fundamentals into the mix

Price Matters

"If you look at the fossil fuel markets, real gas prices are at a 20-year low and oil prices are moderate. That is because of the transparency of those markets. We can do that with clean energy as well."

– Dr. Dale Nesbitt

Dr. Dale Nesbitt, the designer of market modeling methods that have been utilized throughout the energy industry and around the world, speculated in his remarks on where California might be headed in the next 15 years under the realities of new regulatory requirements. He stressed the importance of fully understanding the economic fundamentals of requirements such as those in Assembly Bill 32, that seeks to lower carbon emissions in the state, and the Renewable Fuels Standard requiring utilities to have 33% of their energy portfolio made up by renewable fuels by 2020. "The question is, what will these requirements do to market prices?" asked Nesbitt. He noted that out of all the California energy-related laws that have been introduced, not one has been designed to reduce prices. "Price matters," said Nesbitt. "We will see price discovery come to this state."

Nesbitt noted that while residents are being given incentives to produce their own power with solar credits, businesses are leaving the state of California. He argued that businesses fundamentally do not want to generate their own electricity; they want access to reliable supplies of electricity and gas at the lowest possible price. Industries supplying power into the market also require a reasonable rate of return, but should consider deal in California with a regulatory bias against sufficient cost recovery. "California and other states seem to be allergic to real-time pricing," said Nesbitt. "If you look at the fossil fuel markets, real gas prices are at a 20-year low and oil prices are moderate. That is because of the transparency of those markets. We can do that with clean energy as well."

Nesbitt also used the natural gas market as an example of how transparent pricing can promote efficient development and use of storage in the clean tech world. "If you look at monthly gas demand over the last ten years, what do you see?" asked Nesbitt. "Peak usage of 90 bcf/day and off-peak demand of 45 bcf/day. What do you see for supply, including imports? Flat as a pancake, at 65 bcf/day." Users "store" natural gas through forward contracts so that they can prepare for the price of peak usage.

The load factor, according to Nesbitt, should be the "god we worship" in the energy world, because when producers run at full capacity, they enhance the capital value of their investment. "This is a problem with a lot of clean tech companies," said Nesbitt. "There are not a lot of high capacity factor units." Nesbitt challenged the audience to name any energy investment, from nuclear power plants to space heaters, and divide the capital cost by the annual throughput, in millions of btu's per year. Space heaters, and other end-use investments, turn out to be highly capital-intensive energy investments. "The most inefficient use of capital is located downstream; the most efficient use is upstream," said Nesbitt. "This is why load management and direct load control are so difficult; all the capital is concentrated in end use." Nesbitt described California's energy system as therefore resembling "a 10-pound dog wagging a 99-pound tail."

While pointing out the issues with California's current energy policies, Nesbitt remains a huge advocate of clean technologies and their future place within the energy supply portfolio. "I am an over-the-top advocate for cap and trade," he said. Nesbitt pointed to the results of the first Bush Administration's efforts to reduce sulfur dioxide emissions, or "acid rain." "We are now at 30% of sulfur dioxide output compared to where we were when the program began," Nesbitt said. "Why? Because the reduction program was a market-driven system that effectively priced the externality." Cap and trade could potentially do the same thing, but only if emissions permits are auctioned off, rather than assigned, Nesbitt believes. "You should consider auctioning them, allowing the market to deliver the true and correct price," he said. "That is the key to properly valuing the externality."

With so many intertwining facets and far-reaching implications, speakers concluded by emphasizing that energy security cannot be achieved through solitary action. Even a nation such as the United States, which is endowed with both resource abundance and military might, cannot afford to go it alone. Energy security, in other words, does not hinge upon supply independence. More accurately, it depends upon supply and demand interdependence—among nations, energy industry participants, and stakeholders in the public and private sectors. Speakers further agreed that balancing these interdependencies will require an across-the-board national energy strategy that includes a long-term implementation roadmap and the tenacity to implement it.

Deploying market solutions to achieve a low carbon future

The speakers in San Diego represented very different stakeholders in the energy supply world, but they all agreed that accurate, transparent pricing mechanisms are a required tool for reaching the low carbon energy future California both wants and needs. New technologies will continue to move California and the country toward a bright and sustainable energy future, which will arrive soonest and at the lowest cost with a competitive, market-based system.

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