

**Life After the Closure California's San Onofre Nuclear Generation Station: Challenges & Opportunities
Interview with Chair Robert B. Weisenmiller & Keith Martin, Partner, Chadbourne & Parke**

Transcript

California faces serious challenges maintaining reliable electric service to over 6 million people who live in the area from San Diego to Los Angeles after Southern California Edison decided to close the San Onofre nuclear power plant permanently in the summer 2013. The plant was 2,246 megawatts. Another 5,068 megawatts of coastal power plants that use seawater for cooling will also have to close over the period 2017 through 2021. The state is trying simultaneously to reduce greenhouse gas emissions to 1990 levels by 2020. Demand for electricity in southern California is growing by about 400 megawatts a year.

Robert Weisenmiller, chairman of the California Energy Commission, the agency charging with planning, talked about what he sees ahead during an Infocast webinar in January. The moderator was Keith Martin with Chadbourne in Washington.

MR. MARTIN: What role does the California Energy Commission play in the power sector in California?

DR. WEISENMILLER: The CEC was established 40 years ago. One of the many things we do is power plant siting for any thermal facility in California that is over 50 megawatts. We also are responsible for determining what qualifies as renewable energy in addition to verifying eligible generation and reviewing what the municipal utilities are doing for renewable procurement. We are the premier planning agency for the state, so we have a long history in demand forecasting. We also handle energy efficiency, which includes building and appliance standards. These standards are part of the reason why California's energy use is relatively low. We also do research and development for both gas and electricity, and we are responsible for helping to develop clean vehicles and alternative fuels. Finally, we do contingency and emergency planning for energy.

I first met Governor Jerry Brown during the Arab oil embargo in the 1970's during an earlier tour as head of policy development at the commission. We were trying to figure out what the situation was going to be at the gasoline pumps the next day.

MR. MARTIN: Suppose you decide, as part of your contingency planning for the power sector, that more capacity is needed? How are your recommendations implemented?

DR. WEISENMILLER: Most of the new power would have to come from utility solicitations. The procurement process is directed by the California Public Utilities Commission. In the past, we have sometimes also used executive orders requiring an expedited signing process. The more conventional approach is to ask the CPUC to move forward with procurement.

MR. MARTIN: The San Onofre nuclear generating station -- SONGS for short -- is midway between Los Angeles and San Diego.

DR. WEISENMILLER: It was 2,246 megawatts. It used to produce at a very high capacity factor, at 80% or 90%. That was a lot of energy relative to the rest of the system, and it also provided over 1,100 MVARs of reactive power support. It provided energy for 1.4 million homes.

MVAR is a measure of reactive power. It is like the pressure that pushes water through the water mains. SONGS was unique in that it helped not just with generation, but also with the transmission system. You have to be able to move the power from power plants to people's houses. The southern California grid was built around the assumption that SONGS would remain in operation. We will need to replace the reactive power.

MR. MARTIN: What percentage of electricity in the LA Basin and San Diego did SONGS supply?

DR. WEISENMILLER: About 16%.

MR. MARTIN: SONGS had been largely idle for the two years before the decision to shut it down, and the region managed to get by without it. Why was the shutdown a big deal?

DR. WEISENMILLER: We were lucky the last two summers. We may not always be as lucky. The only generating units in Orange County are SONGS and a gas-fired power plant in Huntington Beach.

Huntington Beach has also had to be shut down as the pollution offsets that permitted it to remain in operation were retired. We had to work very hard with the California Air Resources Board and others to bring the Huntington Beach plant back up in that first summer to provide some reactive power in Orange County. Last year, since the pollution offsets had moved to an emissions project at Walnut Creek, we had to convert Huntington Beach into a synchronous condenser. That is like a motor that is providing reactive power, but it is pulling electricity into the grid as opposed to a turbine that combusts gas to push electricity to the grid. The synchronous condenser unit is still operating and is critical for the reactive power.

We also took the opportunity to rewire some of the transmission system. Southern California Edison has done a couple upgrades to enhance reliability, such as installing Static VAR Compensators at some of the major substations in Orange County, and we have had to resort to "flex alerts," where we run messages on TV and radio telling people to conserve electricity.

We have been lucky so far. The first summer without SONGS was relatively cool, although San Diego Gas & Electric came within about 50 megawatts of its peak. This year has been even milder. Northern California has more of a chance of hitting its peak, but in southern California, it has been more like 1-in-2 year. When we are looking at contingency planning, we plan for a 1-in-10 year. We have been lucky not to have had an extended heat wave or fires near a transmission line. We have been working steadily in the meantime to enhance our capabilities.

Coastal Power Plants

MR. MARTIN: You have another 5,068 megawatts of power plants along the California coast that use seawater for once-through cooling and that are also expected to have to shut down. Over what time period will they close?

DR. WEISENMILLER: The next big unit we are looking at shutting down is a 946-megawatt facility in San Diego in 2017. A lot more will close in 2021. We may be forced to adjust the timetable.

MR. MARTIN: Will these shutdowns add to the difficulties in southern California or are most of the plants farther up the coast?

DR. WEISENMILLER: Some of the units are in the south and will certainly affect things. There is a proposal to repower and modernize Huntington Beach, which is a key facility for both power and voltage support. There are some in the LA Basin, and other potential retirements are all the way up the coast. The Los Angeles Department of Water and Power is in the process of repowering some units in the LA Basin. Unless repowered, all such plants will have to be shut down by 2021 under federal and California regulations.

MR. MARTIN: The figure 5,068 megawatts is somewhat illusory. Don't the plants operate for the most part at really low capacity factors?

DR. WEISENMILLER: The plants are old. Encino is a good example; the first units were built in 1959. The most recent units are from 1973. They tend to be steam boilers. They tend to have relatively long startup times of anywhere from 17 to 24 hours. That means that if you think you may need the power, you have to leave the unit running. They are relatively inefficient when you look at their heat rates, and they are dirty from an air quality perspective. There is a lot of logic in trying to repower to use more modern technology. They only really come in handy if it is midnight and you suddenly lose a transmission line, they can pick up the lost capacity within a half hour if they are left on and operating.

Reducing Emissions

MR. MARTIN: What percentage of California generation is from fossil fuels?

DR. WEISENMILLER: California has a rich resource mix. Without SONGS, we still have about 10% nuclear power between Diablo and Palo Verde. We have hydro, assuming that it is a wet year, of around 10%. We have around 22% renewables, and that is increasing. The remaining 58% is gas. If it is colder and wetter than expected, then the gas units operate less and, if it is drier or hotter, or if there is an outage of a major power plant, then they operate more.

MR. MARTIN: Are cap and trade and the renewable portfolio standard the principal levers California is using to reduce greenhouse gas emissions?

DR. WEISENMILLER: Our immediate goal is to return to a 1990 level of greenhouse gas emissions by 2020. The electric utility sector accounts for about 20% of total greenhouse gas emissions. We are using energy efficiency, renewables and cap and trade to reduce emissions.

MR. MARTIN: California has set a goal of 33% renewables by 2020. The state is at about 22% renewables currently. It is expected to reach 25% by 2016. Will it have any trouble, given current trends in natural gas prices, reaching 33% within the next seven years?

DR. WEISENMILLER: Not really.

One issue with renewables procurements is the percentage of projects that are awarded power contracts but never get built. The procurements to date put us on a track to hit the 33% target assuming a 40% failure rate.

The actual failure rate is well below 40%. One of the things my siting people do is look at the status of all projects in terms of how many have been permitted and what is under construction. Most of the permitted projects are being built.

MR. MARTIN: Do you know the actual failure rate?

DR. WEISENMILLER: It is probably in the 10% to 20% range, but exact number is hard to pin down, and it varies by technology. What we see is someone signs a power contract and eventually someone with much deeper pockets comes in, takes over the project company and does what it takes to complete the project. For example, a number of solar thermal projects have switched to photovoltaic. The projects and power contracts change hands. The renewable energy eventually gets delivered.

MR. MARTIN: You made the point at a conference in June that the state RPS target will be less significant to future renewable energy development in California than climate change.

DR. WEISENMILLER: Even without SONGS, we are pretty comfortable that we will reach the 2020 targets for both renewables and greenhouse gas emissions.

There are some executive orders from Governor Brown and Governor Schwarzenegger setting 2050 emissions targets, but our feeling is that 2050 is too far away to do accurate forecasting. It is more productive to focus on 2030, come up with a plan and make progress. We are counting on three trends to reduce emissions. One is a shift to electric vehicles. The governor wants to see 1.5 million electric vehicles in California by 2025. Transport accounts for 40% of our greenhouse gas emissions. We can't reach our goals by reducing emissions solely in the power sector.

It is also important to improve energy efficiency in existing buildings. We have very strict standards for new buildings, and we have another round taking effect in July that will be 25% lower than our previous standards.

MR. MARTIN: Does the 33% target for renewable energy by 2020 count output from rooftop solar or does it count output only from utility-scale facilities?

DR. WEISENMILLER: It potentially counts rooftop indirectly and directly. Rooftop solar reduces retail sales in turn lowers that amount of renewable credits needs to meet the RPS, as well as systems could aggregate and sell the credits to the utilities for the RPS, however they are not worth as much value as an in-state wholesale generator. With that said, our strategy is to use every possible lever to reduce greenhouse gas emissions. We are looking at energy efficiency, transportation and grid efficiency. We have rung a lot of emissions out of the California system and are now starting to push the boundaries. We are looking next at electric rates and operational issues to achieve greater reductions.

MR. MARTIN: The governor's goal of 1.5 million electric cars by 2025 should increase electricity demand and mean that the state RPS target of 33% is 33% of a larger figure. Are there any projections of how much additional renewable capacity will be needed by 2025 as a consequence of the electric cars?

MR. WEISENMILLER: When we forecast demand, we project out for 12 years, so we include electric vehicles, distributed generation, the economy and the changing demographics in California. We have goals for zero-emissions vehicles. Some could be electric; some could be fuel cells or advanced biofuels. At this point, it seems like electric vehicles are winning, but 12 years from now, the field will probably be more wide open. Then you have to consider how much change in vehicle mix there will be in southern California versus northern California. The air quality issues in Los Angeles are so severe that air quality will force more rapid change in the south.

Electric vehicles are expected to add around 5,500 GWh of electricity use statewide in 2024, and that adds up to about 200 megawatts of additional capacity needed. You also have to take into account the capacity factor and whether people will charge during on-peak or off-peak hours. Until this year, we were really focused on trying to do off-peak charging. However, given that we have so much solar being built, we may need to encourage people to charge between noon and 3 p.m.

Need for Additional Capacity

MR. MARTIN: The state as a whole is not short on capacity. It has a 20% reserve margin for a 1-in-10 weather event. The issue really is the transmission system in the LA Basin and in San Diego. The grid is not configured to import electricity to the area that was served by SONGS. You said the grid also needs to replace the voltage support that it received from SONGS.

DR. WEISENMILLER: Location really matters because you have a load pocket. We have a tendency to think of energy and capacity when we really need to look at other things as well. One is contingency response. We also need reactive power. It is not just how do we keep the lights on, but how we find power with the right characteristics.

We are very focused on Orange County and San Diego. Orange County was served by SONGS and Huntington Beach and, as you move away from those areas, the capabilities to provide support drop off. The California ISO does very detailed power flow modeling that allows us to ramp up certain facilities to best serve areas in need, but location will be a paramount consideration for new facilities. Any new project must really be in San Diego or Orange County.

MR. MARTIN: Besides the immediate need in Orange County, what other opportunities do you see for power development in the LA Basin and San Diego?

DR. WEISENMILLER: San Diego and the LA Basin have seen 400 megawatts a year in load growth at a time when we are expecting retirements. SONGS is gone. Some El Segundo units have been retired or repowered. Other units will retire either because of once-through cooling or their economics. We are losing about 12,000 megawatts in nameplate capacity (includes load growth), but we only need to replace about 7,600 megawatts (includes energy efficiency). We do not need to replace all of the older units.

From a contingency planning basis, there are some pretty significant time points. The Encino project has to be retired or replaced in 2017, and that is 946 megawatts. Around 2021, another 3,800 megawatts in the LA Basin will be retired. We have talked to the water board about adjusting some of the deadlines if we have to, but these are very old and inefficient plants. We have a new transmission line, Sycamore-Peñasquitos, which we are hoping to bring on line in 2016.

The 7,600 megawatts are a combination of conventional and unconventional units, and some projects to replace them have already been authorized.

MR. MARTIN: That is 7,600 megawatts over what time period?

DR. WEISENMILLER: By 2022. We are also looking at transmission options. If we could find the right transmission option that could allow greater sharing between the LA Basin and San Diego, it would reduce the need for new generating capacity.

MR. MARTIN: There are three different estimates for the additional generating capacity needed to serve the LA Basin and San Diego. Yours is 7,600 megawatts over the next four years. That is a 5.5% increase in current generating capacity, but the California ISO has a different estimate, and SDG&E and Southern California Edison have yet another estimate. Why such a range in views, from 1,800 to 4,300 megawatts by the two utilities at the low end to your estimate of 7,600 megawatts?

DR. WEISENMILLER: It is good to put things in context. The figure 7,600 megawatts was a consensus figure among the staffs of three agencies, the California Public Utilities Commission, the California Energy Commission and the California ISO, with input from Edison and SDG&E. We took into account the potential effects of government policies, not just of our agencies but also the California Air Resources Board, the Water Board and the South Coast Air Quality Management District. We came up with a draft plan, but the next step is specific proceedings at each of the agencies, followed next summer by another look at the numbers.

In the meantime, the CPUC has been moving ahead with procurements. A number of bids came into Edison in December 2013 for providing power under a procurement the CPUC authorized when the assumption was still that SONGS would resume operating.

The CPUC took testimony recently from the CAISO and others about what the needs are without SONGS. We are saying about 3,000 megawatts in the short term. Edison and SDG&E have asked for at least another 500 megawatts each as part of the SONGS replacement. The CPUC draft decision might be out in the next month or two.

Meanwhile, the CAISO is in the midst of a transmission planning process. Transmission proposals will be submitted at the end of the month. They could conceivably reduce the 7,600 megawatts by 1,000 megawatts.

MR. MARTIN: The 500 megawatts each for Edison and SDG&E is capacity that the utilities would build and own themselves?

DR. WEISENMILLER: Each of the three investor-owned utilities will be asking for bids for a build-own-transfer project. Each will be asking for bids not only to build generating facilities, but also new transmission lines. Three or four bids have been submitted to build the Sycamore-Peñasquitos line. We expect proposals from Edison and SDG&E to build transmission, and we expect competing bids from independents. The utilities have also expressed interest in energy storage.

MR. MARTIN: The staffs of the three agencies recommended that half the 7,600 megawatts of additional capacity should come from preferred resources. Preferred resources are energy efficiency, demand response, renewable energy, combined heat and power and storage. The hierarchy after preferred resources is transmission and then conventional power plants. You said many of these megawatts are already in the works. The net additional capacity needed over the next four years, after backing out projects that are already in the works, is probably well under 6,000 megawatts, right?

DR. WEISENMILLER: Yes. A difficulty with the preferred resources on offer is they are not as targeted as needed. We really need to get retrofits in Orange County. The preferred resources need to provide not just energy or reduced demand, but also provide some of the other characteristics.

MR. MARTIN: The need could be a lot less if new transmission lines are built to allow additional electricity to be imported.

DR. WEISENMILLER: Edison and SDG&E were pretty creative at coming up with transmission options. The options are more illustrative of what is possible than of what will actually be built. If we can find a better way to shift power back and forth between the LA Basin and San Diego, we will reduce the amount of new generation needed. Building a high-voltage line through southern California is a daunting challenge. It would take at least eight years. One of the most interesting ideas is for an offshore cable. The undersea cable would be a way to do something more quickly.

SDG&E has proposed a high-voltage DC line from Imperial Valley to SONGS. It is trying to use the existing high-voltage infrastructure rather than build a new AC line. Edison has come up with some proposals that strengthen the grid within the Los Angeles area. There are a lot of proposals. Transmission lines will provide us a way to reduce the need for conventional generation, but they are very tough to site and permit. We are waiting next for a CAISO evaluation of the relative costs and benefits from some of these options.

Rooftop Solar

MR. MARTIN: Rooftop solar is very popular in California. I read that 72% of all new capacity added in the US in October was solar. California added 1,000 megawatts of rooftop solar in each of the last two years, and the pace is accelerating. How much of the capacity needs in the LA Basin and San Diego are expected to be met with rooftop solar?

DR. WEISENMILLER: Our forecast is that installed rooftop capacity will more or less triple in southern California by 2024. The rapid expansion is creating tension with the regulated utilities. The CPUC is starting proceedings to look at net metering and rate design issues. Rooftop solar does not yet provide some of the attributes we are looking for, so it is not the sole solution. One form of reactive power that we are trying to push is smart inverters that would help provide ancillary services. However, before announcing such a standard, we need to make sure California is relatively in sync with the rest of the country. We have well over 100,000 new solar applications. A lot of those are for distributed solar installations of less than 20 megawatts. We have an explosion of development on the photovoltaic side, and the economics have come down in a phenomenal fashion.

MR. MARTIN: Under California rules, out-of-state renewable energy suppliers are at a disadvantage. Why is that, and does disadvantage extend more generally to all types of out-of-state supply?

DR. WEISENMILLER: When the legislature established the 33% RPS goal, it expressed a strong preference for relying on suppliers who are directly connected to a California balancing authority. Californians are willing to pay more for electricity from renewable sources, but they also want the economic benefits to inure to California. I am often approached by out-of-state suppliers who say they can help us reach the 33% target, but existing power contracts will already take us well past 33%.

The issue becomes how out-of-state generators fit into the next stage of expansion. The next stage will be driven by the need for emissions reductions. When it comes to emissions, more regional solutions are better.

MR. MARTIN: So the existing impediment for out-of-state suppliers does not apply to electricity from gas-fired power plants, just from renewables?

DR. WEISENMILLER: Right, and it is a complicated structure. There are some regional transactions, but the split for renewable procurement is around 70% in-state and 30% out-of-state, which is similar to the overall split between in-state and out-of-state generation.

MR. MARTIN: What effect is the need for capacity in the LA Basin and San Diego likely to have on wholesale power prices?

MR. WEISENMILLER: The US Energy Information Administration is expecting some increase in wholesale power prices in California. The drought had some impact and gas prices have ups and downs, but all else being equal, you would think that not having SONGS would tend to push prices up. However, the counterweight is that we have a lot of very new, very efficient combined-cycle plants running at around a 45% capacity factor. It is a very competitive market, and that forces everyone to figure out ways to keep costs low. Natural gas drives marginal electricity prices in California and, ignoring brief aberrations, gas prices have been remarkably low for a while.

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