Sept. 26, 2018

California's Moon Shot—Carbon Neutral by 2045

". . . we're launching our own damn satellite."[1]

By now you may have heard that Gov. Jerry Brown recently signed **The 100 Percent Clean Energy Act of 2018** (SB 100) into law and issued **Executive Order B-55-18** to Achieve Carbon Neutrality ("Executive Order"). Taken together, both SB 100 and the Executive Order set California—the world's fifth-largest economy—on a course to achieve some unprecedented goals, including:

- Obtain 60 percent of retail electricity from renewable sources by Dec. 31, 2030 (SB 100);
- Obtain 100 percent of retail electricity from either eligible renewable resources or "zero carbon" energy resources by Dec. 31, 2045 (SB 100); and
- Achieve carbon neutrality by Dec. 31, 2045, and achieve and maintain net negative greenhouse gas (GHG) emissions thereafter (Executive Order).

With SB 100's passage, California joins Hawaii as the states with the most aggressive goals to decarbonize their electrical grid.

SB 100 and the Executive Order build on existing law and previous orders, further accelerating the pace of California's efforts to address climate change. For example, SB 100 advances California's previous goal to obtain 50 percent renewable electricity by 2030, now requiring the state's investor-owned and local utilities to achieve that goal by Dec. 31, 2026. And the Executive Order extends Executive Order S-3-05, issued by Gov. Schwarzenegger in 2005, which previously set a goal of reducing GHG emissions to 80 percent below 1990 levels by 2050.

While the impacts of SB 100 and the Executive Order will be wide-reaching and will play out over many years, two members of our Sacramento lobbying team, Rosanna Carvacho and Teresa Cooke, and renewable energy and bioenergy attorney Ryan Waterman detail below some of the anticipated implications.

What impacts will a mandate to obtain 60 percent renewable energy by 2030 have in California?

Energy storage and load shaping, as well as a diversity of energy development and procurement strategies, will be in high demand to ensure a resilient, cost-effective and reliable electricity supply. Expect continuing efforts in the California Legislature to (1) regionalize the grid, (2) centralize electricity procurement, (3) ramp up energy storage, and (4) incentivize additional zero carbon electricity sources.[2]

[1] Gov. Brown's closing remarks at the Global Climate Summit, Sept. 14, 2018, announcing plans to launch a satellite to track greenhouse gas emissions in cooperation with a private satellite company, funded by private donors.
[2] http://www.caiso.com/about/Pages/OurBusiness/Default.aspx.

1. Grid Regionalization

California's energy market is a complex network and local electricity grids are interconnected to form larger networks for reliability and commercial purposes. The California Independent Systems Operator (CAISO) manages the flow of electricity for approximately 80 percent of California and a small part of Nevada's electric grid.

The idea of grid regionalization has been around for a few years and would expand California's energy market to include other western states. Proponents claim that it would allow for additional reliability and help California meet its renewable goals, while providing a market for any surplus renewable energy.

Beginning last year, the legislature considered AB 813 (Holden) and, had it passed, AB 813 would have facilitated the expansion of the CAISO to include other balancing authorities across 14 western states.

It is unclear whether grid regionalization will remain a high priority for the next governor as it was for Gov. Brown. Nevertheless, we expect advocates both within and outside the Legislature to continue to push for this change.

2. Centralized Electricity Procurement

As we have seen California's energy market transform with the continued expansion of Community Choice Aggregators (CCAs), the role of California's three investor-owned utilities (IOUs) have and continue to change. Over the past few years, it has been discussed that, in the future, the IOUs will provide electrical transmission but will no longer procure electricity or serve as the interface with California consumers.

AB 893 (Garcia) did not pass the Legislature this year, but would have been the first step toward creating a centralized procurement entity responsible for purchasing power and the distribution of resources on behalf of all ratepayers. AB 893, among other provisions, would have required the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) to provide the Legislature with a joint assessment of options to create a statewide central procurement entity.

While AB 893 was unsuccessful, we expect centralized electricity procurement to continue to be part of the larger energy discussion in Sacramento as the state increases its reliance on renewable energy and the energy marketplace continues to change.

3. Increased Energy Storage

An increase in renewable energy production in California creates a challenge for grid stability due

to the intermittency of renewable power. Energy storage is viewed as an important piece of the move to integrate more renewables into the grid. For example, pumped storage provides the largest source of California's utility scale storage capacity and more projects are under consideration.[3]

On the market side, battery prices are steadily dropping, helping increase utility scale project feasibility. At the same time, in 2017 and 2018 we saw nearly a dozen pieces of legislation related to energy storage. The state's three IOUs are required to buy no less than 1,325 megawatts of storage by 2020, and, like California's incremental approach to renewables, we expect to see continuing incremental growth in storage over the next decade.[4]

4. Additional Electricity Sources, Including Offshore Wind and Bioenergy

Other promising solutions for the intermittency of solar and onshore wind, and lack of energy storage to mitigate cloudy days and windless afternoons, are offshore wind and bioenergy.

With a capacity factor reaching more than 50 percent on average and greatest output in the evenings as solar production drops off while demand skyrockets, offshore wind shows incredible promise. Common in Europe and growing on the East Coast (**a 30MW project off Rhode Island marked the first U.S. farm in 2016** and leases off of New York, Massachusetts, New Jersey, Delaware, Maryland, Virginia and North Carolina), the industry is working in close collaboration with the California Energy Commission on potential Central Coast and North Coast projects. While years away from breaking "water," California regulators are looking at offshore wind as a promising component in the state's energy mix.

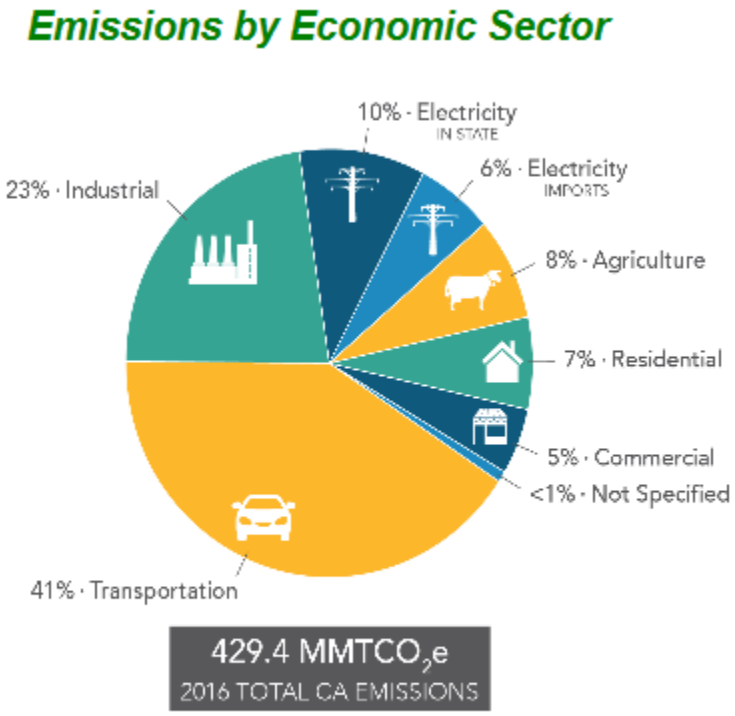
Bioenergy is also likely to play a role in yielding a steady fuel supply for dispatchable generation, with many different applications that can be put into play. Energy from biomass like forest and agricultural waste can reduce black carbon emissions (one the most damaging climate pollutants) from wildfires and controlled burns, while providing baseload power. Energy from biogas generated from dairy waste, wastewater treatment and diverted organic waste (like food waste that would otherwise go to a landfill) cuts methane emissions and can provide flexible generation power. Both biomass and biogas can also provide a renewable source of hydrogen for fuel cells.

What impacts would carbon neutrality by 2045 have?

As the state continues to reduce GHG emissions economy-wide, anticipate widespread electrification throughout the economy. As of 2017, a little over half of in-state electricity production came from carbon-free sources, including large hydro, small hydro, solar, wind, geothermal, biomass and nuclear, and overall electricity production only accounts for

[3] https://www.energy.gov/eere/water/pumped-storage-hydropower
[4] http://www.energy.ca.gov/renewables/tracking_progress/documents/energy_storage.pdf

approximately 16 percent of the state's GHG emissions.[5,6] It should be noted, however, that approximately 9 percent of this carbon-free production is attributed to nuclear power at Diablo Canyon, which is set for decommissioning in 2025.[7]



This move to electrify will put pressure on entities trying to meet California's renewable energy mandate. As state law requires ever-increasing percentages of electricity from renewables and works to drastically cut GHG emissions across the board, larger and larger sections of the economy will electrify, especially in the transportation sector, which is currently the single largest source of GHG emissions.

Also look for accelerating investment in buildings to reduce energy demand and GHG emissions. Commercial Property Assessed Clean Energy (C-PACE) is one example of financing available to achieve GHG emission reductions from the built environment.

[5] See California Air Resources Board. 2018 Edition of the GHG Emission Inventory (July 11, 2018), available at https://www.arb.ca.gov/cc/inventory/data/data.htm
[6] http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html
[7] https://psmag.com/environment/can-california-be-carbon-neutral-by-2045

What does going net negative for GHG emissions look like?

Going net negative means carbon capture and sequestration. A World Resources Institute post recently summarized six alternatives to remove GHGs from the atmosphere, including (1) forests, (2) farms, (3) bioenergy with carbon capture and storage, (4) direct air capture, (5) sea water capture, and (6) enhanced weathering, to bond atmospheric carbon with minerals.[8]

Notably, the Executive Order does not pick a methodology; it just sets the goal. It also does not exclude the possibility that California may try to reduce GHG emissions outside the state in order to balance and then push its GHG emissions account into net negative territory.

Rosanna L. Carvacho
Shareholder
rcarvacho@bhfs.com
916.594.9714

Teresa A. Cooke
Policy Advisor
tcooke@bhfs.com
916.594.9715

Ryan Waterman
Shareholder
rwaterman@bhfs.com
619.702.7569

Rosanna Carvacho is a shareholder in Sacramento, having worked in and around California politics for over 15 years.

Teresa Cooke has been lobbying on California energy issues for the past decade.

Ryan Waterman is a shareholder in San Diego and represents renewable energy and bioenergy developers throughout the state.

[8] See World Resources Institute, "6 Ways to Remove Carbon Pollution from the Sky" (Sept. 10, 2018), available at https://www.wri.org/blog/2018/09/6-ways-remove-carbon-pollution-sky