TARGETS

California – 100% renewable power by 2045?

California tends to lead the way among US states, so its adoption of a plan to transform its power industry to all renewables by 2045 is important. Here, S&P Global Ratings' *Michael Ferguson* analyses the state's chances of success.

California was an early adopter of large-scale onshore wind power
Photo: Shutterstock

In September 2018, outgoing Governor Jerry Brown mandated a greener future for America's Golden state. Under this mandate, California will be required to derive all its power from renewable sources by 2045. The move is significant and comes as the Trump administration, by ending the Clean Power Plan and proposing an exit from the Paris Agreement on climate change, has begun to wind down the environmental policies of the previous government.

Yet even the bill's most fervent supporters acknowledge that such a push will bring with it several challenges. First and foremost are the questions of grid reliability and cost. And, amid policy backsliding at the federal level, there are still political hurdles to cross, even with a favourable climate in-state. Substantial challenges, though surmountable, lie ahead.

Gas – the old generation

Nonetheless, California's transition is already well underway. Coal generation has ceased altogether, and the final nuclear power plant, Diablo Canyon, is set to close in 2024. Negative gross power demand growth and an uptick in renewable generation have left gas-fired generation floundering, too. And as California approaches its goal, these trends are likely to continue – further intensifying the struggle for merchant power producers, which will have to make difficult decisions around fossil fuel assets.

Most negatively affected by the mandate will be gas-fired generators, which currently contribute around one-third of California's power generation. In the months leading up to, and then following Governor Brown's announcement, the closure of some older assets was likely moved up, while plans for further additions were scrapped.

Given that by 2045 gas-generation in California may, in effect, become valueless, there is broad consensus that new generation is no longer economically viable. After all, even though the goal is several decades away, these are intended to be long-lived assets.

That said, natural gas is likely to remain a key player as it assists California in its renewable transition, if only as a guarantor of reliability as intermittent renewable generation expands. Any near-term benefit, however, will be fleeting.

Solar and wind – the new generation

Renewables currently contribute 35% to California's grid – far shy of the state's ultimate ambitious target. So while it's clear that solar and wind assets will be among the major beneficiaries, whether they can reliably supply the Californian grid remains to be seen during the coming years.

Solar and wind resources are necessarily intermittent due to their reliance on ever-changing weather conditions. As such, for these assets to reliably meet the grid's capacity, a predicted 200-fold uptick in battery storage could be needed. For the moment, battery storage has its limitations.

It may not simply be a question of battery quantity but one of battery quality, too. Current energy storage solutions suffer from significant energy losses and a limited depth of charge – meaning the grid's renewable capacity would need to be substantially overbuilt to accommodate the intermittency issue.

The pace of renewable proliferation may, therefore, prove dependent on the pace of supportive technological advancements. In California, there is a mandate for battery storage but not to the degree required to aid the mass shift to renewables.

Other questions are yet to be answered. We wait to see how developers will manage aging renewable assets. Will these be replaced with advancing technologies, or simply repowered? In this vein, it isn't yet known whether the state will provide any preferential pricing in favour of newer assets to developers.

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Hydro and geothermal – meeting the generational gap

Replacing gas-fired generation with renewable resources looks likely – barring technological advancements – to prove somewhat unreliable. Therefore, to ensure that the grid's baseload can be consistently met, solar and wind may require some near-term support. Currently poised for the task at hand are hydro and geothermal assets, which are likely to benefit substantially from California's goal.

Hydro and geothermal resources are closer to baseload – making their resource risk far less problematic when compared to solar and wind. They also boast

much longer asset lives – up to 80 years in comparison to solar and wind's 20 years. This means that, while wind and solar will need to be repowered at some point, adding uncertainty to refinancing, hydro and geothermal are likely to just continue their current pattern of capital spending.

That said, the time and cost involved in building new hydro and geothermal assets remains prohibitive. Therefore, we believe that, absent any unforeseen incentives, the benefits are more likely to come in the form of favourable contracts with utilities that will help extend asset lives, rather than new generation.

Financing the next generation

Last comes the challenge of financing further renewable capacity and the supporting technologies. Once we begin to consider the long-term repowerings and asset maintenance, the enormity of the mandate's price tag becomes ever clearer, though we also note that reduced power consumption will offset this to a degree.

So how might California finance its goal? In our view, though solar and wind may have less trouble securing finance, we anticipate that battery storage – on account of its nascency – lacks similar appeal. This may well change, however, as the risks become clear and the estimates more precise. Further, as green bond issuance flourishes, California looks likely to benefit.

While the significance of California's mandate cannot be understated, neither can the political, regulatory and technological hurdles that await. After all, as a bellwether state for environmental policies, it's not unlikely that success in California could be mimicked elsewhere. But with careful navigation and support from a growing market for green investment, California's vision for a more sustainable grid may yet come true. ●

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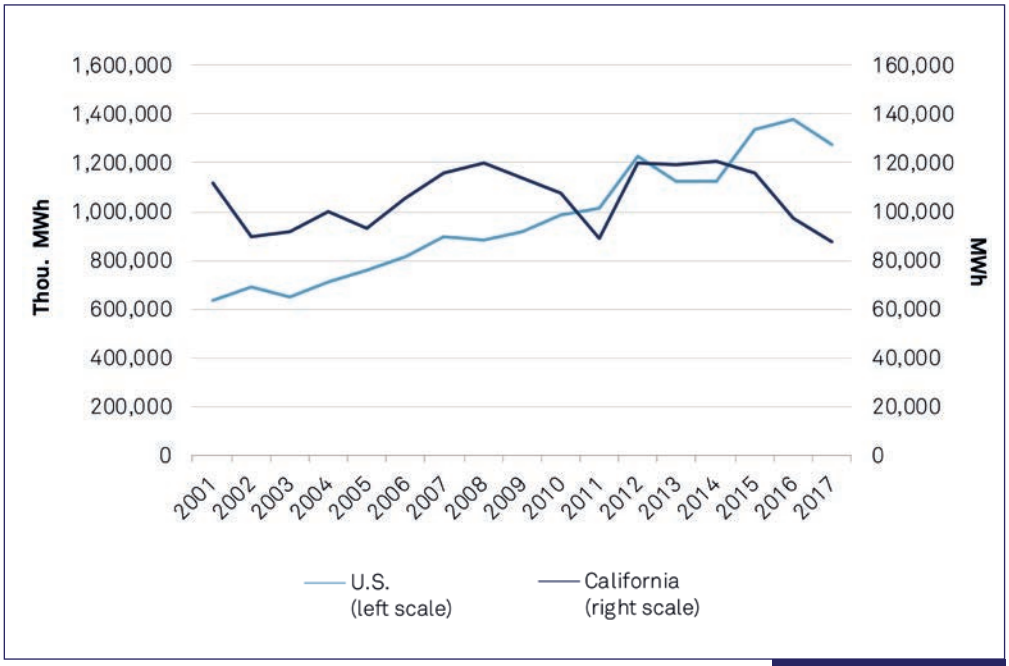

Figure 1. Gas-fired generation in the California and the US

While gas-fired power generation has been rising fairly steadily across the US for many decades, it has declined in recent years in California

Source: S&P Global Ratings