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Proven Long-Duration Electricity Storage for the Los Angeles Basin

Additional submitted attachment is included below.

Proven Long-Duration Electricity Storage for the Los Angeles Basin

Submitted by Edward G. Cazalet, MegaWatt Storage Farms, Inc.

Thank you for this opportunity to present a new alternative to respond to the Aliso Canyon situation.

Long-duration electricity storage combined with solar (rooftop and large-scale) deployed in the LA Basin should be considered as a major alternative to natural gas power plant generation in the LA Basin. The risks of over dependence of the LA basin on natural gas power generation are now evident as a result for the Aliso Canyon gas leak. The risks include other gas storage and pipeline gas risks and the important safety and health risks.

Solar is rapidly dropping in cost, as is battery storage. An example of proven, economic, long-duration battery storage is a 300 MWH battery in Japan (see attachment).

This 300 MWH battery was delivered in 6 months from an order. One of these 300 MWH capacity batteries can be delivered in the LA Basin within 6 months from an order (perhaps by the start of 2017). Additional batteries can be delivered at an average rate of 1000 MWH of storage capacity per year for many years.

Together with other solutions, large scale solar + storage can increase the resiliency of LA Basin power supplies, reduce GHG emissions, and reduce health and safety risks at costs that are competitive with natural gas based generation.

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Kyushu Electric Power Co., Inc.'s new 300,000-kilowatt-hour NAS storage array, supplied by NGK Insulators, Ltd., helps balance supply and demand amid Kyushu's surging growth in solar generation. (NAS photo courtesy of Kyushu Electric)

NAS Batteries—Making Renewables More Renewable

Fulfilling the potential of renewable energy sources will depend heavily on ensuring steady output. Large-capacity storage batteries hedge power grids against the output fluctuations inherent to wind and solar generation. Thus are power industry eyes worldwide focused this month on a massive new battery installation in Japan's Fukuoka Prefecture.

The new battery installation, supplied through Mitsubishi Electric Corporation, is at Kyushu Electric's Buzen Power Station. Its storage capacity, at 300,000 kilowatt-hours (kWh), is enough to serve 30,000 households. At the heart of the installation are sodium-sulfur (NaS) batteries supplied by NGK Insulators. NGK is the world's only commercial supplier of NaS batteries, which the company markets under the brand name NAS®.

NGK, established in 1919, is a leading supplier of electrical insulators, ceramic substrates for automotive catalytic converters, and ceramic components and equipment for the electronics industry, as well as grid-scale storage batteries. It began developing NAS batteries in

cooperation with Tokyo Electric Power Co., Inc., in 1984 and began marketing the batteries, which incorporate leading-edge NGK expertise in ceramics, commercially in 2002.

Compelling Advantages

Heading the list of NAS advantages are long discharge time, six hours and more, and long life, rated at 15 years. The batteries' advantages also include high energy density and high charge-discharge efficiency. NAS batteries are economical, too, since their principal materials—sodium, sulfur, and ceramic—are plentiful and inexpensive.

NGK's new container configuration allows for deploying NAS batteries quickly and easily to accommodate the rapid growth in renewable power generation. That was especially important to Kyushu Electric, which was racing to keep up with surging growth in solar generation in Kyushu. And the power utility's huge, 300,000 kWh installation was in place just six months after NGK received the order.

A Prototype for California

NGK delivered the first NAS system outside Japan in 2006: an installation at an American Electric Power site in West Virginia for storing power during off-peak hours. The global array of NAS

installations has since grown rapidly as users have adopted the systems for diverse needs.

Interest in NAS technology is especially keen in California. The legislature there has passed legislation that calls for securing 50% of the state's electric power from renewables by 2030. That will result in occasional over-generation, since wind and solar generating facilities, unlike thermal power plants, cannot modulate their output.

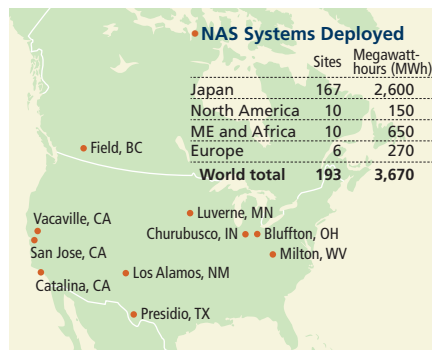
California will require massive storage capacity to keep the power generated at times of excess capacity from going to waste. And the state's three largest utilities face a legal mandate to add 1.3 gigawatts of storage capacity by 2020. Kyushu's evolving power mix is analogous to California's. So Kyushu Electric's new storage installation could well be a harbinger of things to come in the Golden State.

Exciting Prospects

The global market for stationary storage batteries presently centers on installations for providing short-term discharge of up to about two hours. Demand for long-term discharge capacity is poised to burgeon, however, as renewable power generation continues to grow and as users discover in NAS batteries an economical solution to their storage needs.

NGK is the world leader in storage battery installations for long-term discharge. It will continue to build on that leadership by promoting its NAS batteries in their easy-to-assemble container configuration.

NAS storage solutions
Optimizing the future of energy



NAS batteries store nearly 3,700 MWh (530 MW) of power at more than 190 sites worldwide, including 10 sites in North America.