Advancion®
Energy Storage

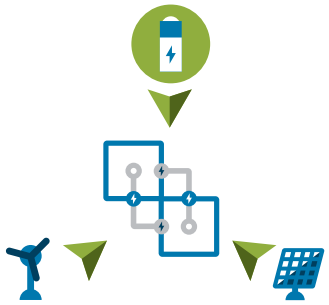
ADVANCION® APPLICATION STUDY

Energy Storage & Renewables for a Cleaner, Unbreakable Grid

AES' Advancion platform is the leading battery-based energy storage solution for the integration of renewable sources of energy. Providing critical grid services and firm capacity, energy storage creates a flexible grid that enhances the value of renewables for utilities that are both starting to develop their renewable portfolio or have extensive assets in operation.

THE APPLICATION

Pairing renewable energy with battery based energy storage



When paired with renewables, energy storage leverages a cost-effective renewable source to provide clean electricity when it's needed most.

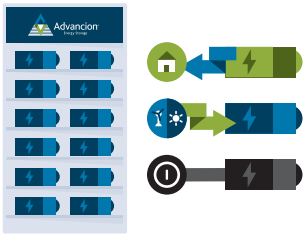
THE CHALLENGE

During periods of non-production from renewable sources of energy, a reliable, clean and affordable energy source is needed.

Energy storage can charge using the most cost-effective resource and be ready for dispatch at any second, providing firm and affordable energy and grid services.

THE SOLUTION

AES Advancion 4 energy storage.



Advancion's nodal architecture is modular, scalable, and can be built to any size, from 1000 MW down to 100 kW. Able to perform multiple services including frequency regulation, peak power and ramp smoothing, it is the ideal tool for pairing with renewables.

AES
we are the energy

THE CHALLENGE IN RESOURCE PLANNING

Renewable energy has surged to become the fastest growing source of electricity in the United States today[1]. Globally, two-thirds of new power investments through 2040 are projected to be wind and solar[2]. That shift is transforming the grid as we know it, providing fast-growing amounts of low-cost clean energy and decarbonizing the grid.

Utilities have been seeking the best way to integrate these renewable sources of energy, while simultaneously retaining the high reliability and efficiency of the electric grid that has become customary. Traditional sources of energy have kept pace with the changing energy landscape by increasing their operating range and decreasing their response times. However, the energy network is far more efficient when these generating assets are allowed to keep a more stable and predictable operating profile.

THE SOLUTION: AES ADVANCION ENERGY STORAGE

AES' Advancion solution is the leading based battery based energy storage solution for the integration of renewables. It can be built to any size, from 100's of MW to 100kW, and can vary in duration from 30 minutes to several hours. It can be easily sited in dense urban areas, without producing emissions or noise, and without the need for water.

Advancion provides services at grid level, such as frequency regulation, firm capacity and peak power, to maintain a reliable and flexible grid. It can also be paired directly with renewables to shift energy to high consumption hours, smooth renewable generation output and even create a fully dispatchable renewable resource. This compliment relieves the need to build new traditional generation assets and enables current assets to operate more efficiently.

PREDICTABILITY AND RELIABILITY IN RENEWABLE GENERATION

A common misconception is that fossil fuel-burning power plants are the only option available to provide power when renewable energy sources aren't producing. But we know that just isn't true. Working with both grid-scale and distributed renewable resources, energy storage serves that same function, providing firm, predictable blocks of clean energy as economically as traditional methods of generation.

Southern California Edison (SCE), for example, selected AES to build a 100 MW energy storage array that will be a cost-effective flexible capacity resource. Batteries, like the ones used in SCE's array, are charged using electricity from the most cost-effective source to provide reliable capacity during peak demand and other grid services.

DISPATCHABLE SOLAR IS MORE AFFORDABLE THAN FOSSIEL FUEL

The phrase "most cost-effective source" is key here. A fossil fuel power plant providing peak demand is tied to a specific set of fuels to operate, whereas energy storage uses grid energy from different sources for its "fuel." When paired with solar, energy storage leverages a cost-effective renewable source to provide clean electricity when it's needed.

In recent days, solar energy prices have broken the $30/MWh barrier – in an auction in Chile, solar PV was contracted at $29/MWh[3]. At that price, solar energy is cheaper than natural gas as a fuel source, and solar prices continue to fall. Looking at the difference in variable costs for each resource, a solar-powered energy storage array can prove more cost-effective than a fossil plant providing for peak electricity needs.

Natural gas today (even at record-low prices) costs around $3/MMBTU. When used as fuel in a typical peaking power plant, the electricity produced costs $39/MWh, after accounting for the conversion efficiency of a gas turbine and operating costs of the plant.

However, electricity from an energy storage array using solar energy at $29/MWh costs $37/MWh, assuming roundtrip efficiency and variable O&M costs for the storage array. Additionally, the solar+storage price won't change when natural gas prices move back to $6/MMBTU and utilities would have to pay $69/MWh for energy from a peaking plant.

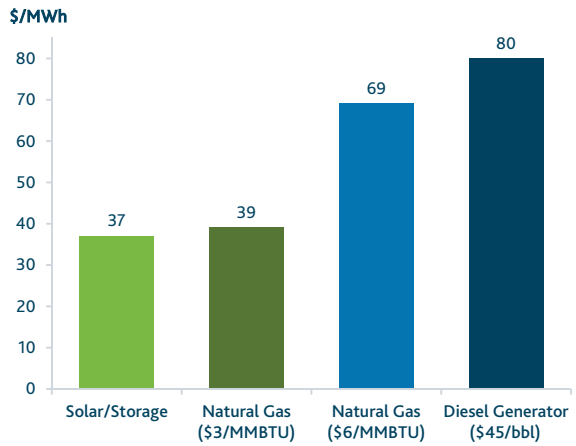
The contrast is even greater comparing solar+storage to the cost of electricity from diesel, a primary fuel source for islands where penetration of renewables is growing rapidly. At $45/barrel, the variable cost of electricity from diesel is over $80/MWh, making firm energy from solar+storage a clear choice.

POWERFUL BENEFITS BEYOND FUEL COSTS

Energy storage offers utilities a powerful tool for their portfolios as they procure increasingly more of their energy from renewable sources. As we've seen, on-demand power from a storage array using solar as fuel offers cost-effective, flexible clean energy for peak power needs, without the added uncertainty of natural gas prices.

With Advancion, utilities can leverage the declining costs of batteries to create a cost-effective solution for firm renewable capacity and grid stability needs. Advancion's nodal architecture allows for gradual capacity expansion as the renewable portfolio grows over time. What forward-thinking utilities are discovering is that using battery energy storage as a complement is enabling them to more efficiently integrate renewable energy into their portfolios. With a grid that incorporates storage and renewables, utilities will be increasingly better positioned to deliver clean, reliable, and affordable electricity to their customers.

Fig. 1: DISPATCHABLE ENERGY COSTS: FOSSIL FUEL VS SOLAR/STORAGE



[1]http://www.eia.gov/todayinenergy/detail.php?id=25492
[2]http://www.seia.org/sites/default/files/resources/BNEF-NEO2015_Executive-summary.pdf
[3]http://www.renewableenergyworld.com/articles/2016/08/solar-sold-in-chile-at-lowest-ever-half-price-of-coal.html