

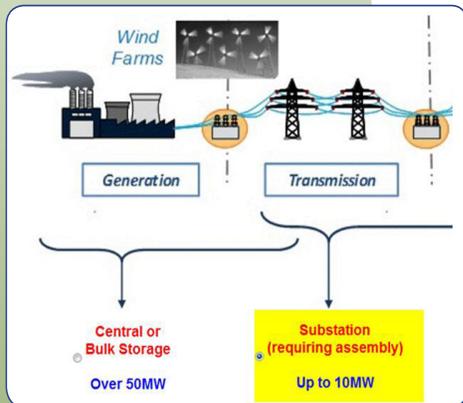
ES-Select Evaluates Energy Storage Technology

To inform decision makers about the value of energy storage technologies, Sandia National Laboratories partnered with DNV KEMA to enhance their ES-Select software and make it available free of charge to the electric power community.

Uncertainty with New Technology

As the U.S. electricity grid experiences the effects of aging infrastructure and increasing demands for energy, new technologies may be necessary to economically meet future grid demands. However, adopting new technology is difficult when decision makers do not understand the new technology and do not know how it compares to alternatives.

Energy storage technologies show great promise for improving the grid's operations. However, as a relatively nascent area of technology, decision makers generally do not know how to evaluate them. Determining their value and conducting comparisons amongst the technologies is a complicated and time-consuming task given the significant variation in different technologies with regard to deliverable power, discharge time and costs.

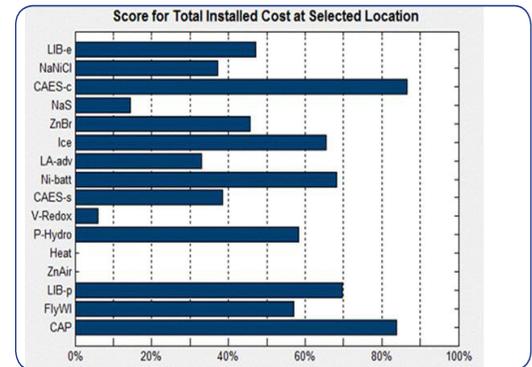


ES-Select allows the selection of five distinct applications for the evaluation of energy storage systems.

Improving DNV KEMA's ES-Select Software

To inform decision makers about the value of energy storage technologies and how they compare to one another, Sandia National Laboratories partnered with DNV KEMA to enhance its Energy Storage (ES)-Select software. ES-Select quickly and accurately evaluates energy storage technologies by aggregating relevant characteristics into a single, high-level decision-support tool. The high-level analysis produced by ES-Select allows non-expert users to understand and accurately compare the costs and benefits of various energy storage technologies. Then, users can determine whether further detailed, site-specific analysis is needed using other tools.

A variety of current energy storage technologies including flywheels, compressed air, pumped hydrothermal storage and six types of batteries are available for analysis. ES-Select helps determine the lowest cost and best-performing of these technologies to serve a particular application. Whether integrating flywheel systems for ancillary services or advanced carbon lead-acid batteries for transmission and distribution improvement, ES-Select helps users understand how a technology's characteristics will meet the needs of



ES-Select assigns scores for different technologies to meet application, location, maturity, and cost requirements based on the selected application. This allows the user to easily evaluate a broad range of options for possible investment.

their application, while also considering its benefits and costs. Specific details are limited as ES-Select is intended for high-level analysis and does not allow the user to make many changes in the default setup, for example, technology and application characteristics are built in. It is not intended to identify limitations of technologies, rather to provide a comparison. Based on the analysis provided by the tool, more detailed analysis employing other methods can be conducted. These would account for specific details of the application, ranging from technical and performance requirements to energy prices, and compare energy storage to other alternative technologies. This poises users to make smart, data driven decisions to best serve grid needs.

Making Evaluations Easy and Accessible

By partnering with KEMA to enhance ES-Select and make it available free of charge to the electric power community, Sandia is making energy storage evaluations easier and more accessible. Rather than making decisions based on a single factor such as capital cost, ES-Select helps ensure that further analyses are performed when energy storage can potentially provide economic service to an application. By removing uncertainty and hesitation associated with new technology adoption, ES-Select plays a key role in helping to address grid issues by providing the first step to determine the technologies that can economically address these issues, both now and in the future.

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