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## KEMA sees opportunities for storage applications in high-penetration renewables

### New report expands understanding of load balancing requirements in California

BURLINGTON, Mass., (June 23, 2010) – KEMA ([www.kema.com](http://www.kema.com)) released results of a highly collaborative research effort to model the effect of high-penetrations renewables on intra-hour system operations of the California Independent System Operator (the ISO) control area. The findings are part of KEMA's [report](#), "*Research Evaluation of Wind Generation, Solar Generation, and Storage Impact on the California Grid*," sponsored by the California Energy Commission's Public Interest Energy Research (PIER) Program. The information from this project contributes to PIER's Renewable Energy Technologies Program.

KEMA worked closely with the ISO to assess the impacts of high-penetration [renewables](#) and examine how grid-connected [electricity storage](#) might be used to accommodate the effects of renewables on the system. The [integration](#) of renewable energy resources into the electricity grid has been intensively studied for its effects on energy costs, energy markets, and grid stability. These studies all conclude that the variability and high-ramping characteristics of renewable generation create operational issues. However, there have been few efforts to precisely quantify these effects with a highly dynamic model that simulates system performance on a time scale of one second or less, compared to a one-hour basis that is typical in production cost simulations.

The report analyzes the effect of increasing renewable energy generation on California's electricity system and assesses and quantifies the system's ability to keep generation and energy consumption (load) in balance under different renewable generation scenarios. In particular, KEMA assessed four key elements necessary for integrating large amounts of renewable generation on California's power system. KEMA concluded that accommodating 33 percent renewable generation by 2020 will require major alterations to system operations. KEMA also noted that California may need between 3,000 and 5,000 or more megawatts (MW) of conventional (fossil-fuel-powered or hydroelectric) generation to meet load and planning reserve requirements.

The study examines the relative benefit of deploying fast response electricity storage versus utilizing conventional generation to regulate and balance load requirements. KEMA's study concludes that 30 to 50 MW storage device is as effective as a 100 MW combustion turbine used for regulation purposes, given the use of storage-specific control algorithms developed by KEMA. The prospective benefits to California from the development of fast electricity storage resources for use in system regulation, balancing, and renewable ramping mitigation are significant including:

- Management of large renewable energy ramping and management of increased minute-to-minute volatility without degrading system performance and risking interconnection reliability
- Reduced procurement of very large amounts of regulation, balancing, and reserves from conventional generators, which may be either very expensive or infeasible
- Avoidance of keeping combustion turbines on at minimum or midpoint power levels to support regulation and load following, thereby avoiding greenhouse gas emissions and potential cost savings

The KEMA "*Research Evaluation of Wind Generation, Solar Generation, and Storage Impact on the California Grid*" report can be found at: [http://www.energy.ca.gov/research/new\\_reports.html](http://www.energy.ca.gov/research/new_reports.html)



#### About KEMA

Founded in 1927, KEMA is a global provider of business and technical consulting, operational support, measurement and inspection, testing and certification for the energy and utility industry. With world headquarters in Arnhem, the Netherlands, KEMA employs more than 1,600 professionals globally with offices and representatives in more than 20 countries. KEMA's US subsidiary, KEMA Inc. is headquartered in Burlington, Mass. and serves energy clients throughout the Americas and Caribbean.

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