

Sandia National Laboratories & Forest City Enterprises

Partnering for a Secure, Sustainable Energy Future

Worldwide electricity demand increases every day. In the United States alone, this demand is projected to increase by 14% by 2035, thus taxing an already fully loaded electricity transmission grid.

Vision

To enhance the nation's security and prosperity through sustainable, transformative approaches to our most challenging energy, climate, and infrastructure problems.

To meet the challenge of ever-increasing demand, grid managers everywhere must evaluate and apply new technologies that enhance the grid's transmission capacity and also its ability to report back detailed information on its current status and health.

Analyzing emerging energy systems and potential solutions provides valuable information to evolve the current electric grid into a smart grid.

Renewable energy sources, such as solar and wind, coupled with smart grid and microgrid technologies, energy storage, and energy efficiency are viable options to address this problem. However, integrating these technologies requires both fully understanding operational challenges and establishing a return on investment. To address these challenges, Sandia National Laboratories and Forest City Enterprises embarked on a cooperative research and development agreement in April

2009 to advance research and provide real-world test beds to investigate technologies and integration issues at several Forest City planned communities, including Mesa del Sol. This community's close proximity to Sandia technical resources and its new infrastructure make it an ideal testing ground.

Forest City Enterprises embraces the principle of sustainability as one of its core values. Over the last decade, the company has developed an internal road map that guides new projects toward designs that



The Mesa Del Sol Aperture Center is located in Albuquerque, New Mexico. Photo courtesy of Jon Anderson Architecture.

decrease carbon output, reduce waste, conserve natural resources, and reduce energy usage. Sandia's interest in sustainability includes

- diversifying the country's energy mix;
- reducing dependence on foreign petroleum;
- reducing greenhouse gas (GHG) emissions and other environmental impacts;
- creating a more flexible, more reliable, and higher-capacity U.S. energy infrastructure; and
- improving the efficiency and productivity of existing energy systems.

Together, our partnership is working with industry to research and demonstrate emerging energy technologies that will promote sustainable energy use. Like many of Forest City's other developments, Mesa del Sol provides the opportunity for industry to test its products and concepts in a real-world environment. We have ongoing evaluations of photovoltaics (PV), battery storage systems,

and the inverter technology that ties them together. Sandia's technical expertise in energy sustainability will guide industry's efforts.

An important element of the partnership is

Microgrid

A small-scale version of a traditional centralized electrical grid; implemented at a local level & taking advantage of locally generated power sources (photovoltaics, small wind, biomass, small hydro, combined heat and power, and energy-storage). A microgrid can be tied to the larger grid, yet retains the ability to independently supply energy in the event the larger grid experiences power interruptions or price fluctuations.

Sandia's energy showcase located at Aperture Center in Mesa del Sol. Two of the primary objectives of the energy showcase are to illustrate various projects that the partnership is undertaking and educate the public about the importance of sustainable energy technologies in America's energy future. Sandia and Forest City are working on

many collaborative projects aimed at making the transition to a clean, secure, sustainable, energy future. These include projects at Mesa del Sol, such as battery storage and PV analysis, solar forecasting, small-scale fuel cells, and the Japanese NEDO Microgrid Demonstration.

Likewise, Sandia and Forest City are working on solar and demand-reduction technologies in communities in Hawaii

- building several zero-energy homes (net energy),
- completing spray foam (insulation) analysis,
- building a Solar America Showcase project, and
- increasing solar (PV) power generation at several locations across the islands.

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