Net-Zero Buildings and Distributed Generation Forcing New Business Models

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Apart from the subject matter, the intriguing connection is the linking of net energy metering, zero net energy, and distributed energy with twenty-first century business models. The report is intended to evaluate the potential implications for the utility and its customers of a future business environment characterized by high levels of customer energy efficiency, zero-net-energy buildings, and distributed generation (DG) by utility customers.

GAME-CHANGER

The topic is loaded with politically charged implications, mostly surrounding the appropriate balance between renewable energy and conservation versus traditional fossil energy resources. Even with a “green energy” bias, the cost and benefits of different energy delivery models largely dictate the ultimate “best” solution. However, cost and benefits shift over time, as new technologies are developed and adopted by energy consumers. And the trend is clear—highly efficient buildings and distributed generation are prevailing. Thus, what does that mean for the utility of the future?

The key questions addressed by the RMI report include the following:

- How will increased penetration of distributed resources affect cost and value for the utility and its customers?
- How could rate structures be modified to enable sustainable, fair, and efficient development of distributed resources?
- How might the utility business model change?
- What innovative energy services could be provided by the utility in conjunction with distributed resources and what is the value of these services to all customers?

Interestingly, the industry is not waiting for the answers. Several builders already offer net-zero-energy-consumption building options. For example, recently profiled in Scientific American, Denver-based Oakwood Homes offers a net-zero home model selling for less than $200,000. The four-bedroom home features rooftop solar panels, a high-efficiency tankless water heater, super-insulated windows, and airtight construction.

At least a dozen other U.S. commercial homebuilders have begun to offer net-zero residences. The Los Angeles-based company KB Home recently introduced a net-zero option for its houses in parts of Florida, Texas, Colorado and California. Another company, Nexus EnergyHomes, is building 59 duplex units in Frederick, Md., and 14 additional houses near the Chesapeake Bay. The duplexes are about 1,700 square feet—
the same size as Oakwood’s homes—and sell for $275,000 and up.

Another report, by Pike Research, suggests that the worldwide revenue from zero-energy buildings will grow rapidly over the next two decades, reaching almost $690 billion by 2020 and nearly $1.3 trillion by 2035. Following the surge in LEED and other green building certifications worldwide over the last few years, zero-energy building has emerged as the ‘holy grail’ in green building design,” says research analyst Eric Bloom. “Technically, zero-energy building design is feasible for many building types in many regions, but concerns about the upfront cost continue to impede it in the market.”

How much does it cost? For the average homeowner, the answer can be measured by the number of years of energy savings needed to pay back the cost difference between a regular home and a net-zero home. In its marketing literature, Oakwood Homes suggests that with the additional cost of about $9,000, the homeowner will see an annual average of $750 in energy savings, an annual return on investment of 8.3 percent. Given those numbers, the homeowner can expect to see a full return on his or her investment in about 12 years.

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Often, building standards and codes are created to mandate efficient construction. For example, the Pike report points out that a number of countries and regions have already established long-term targets and regulations requiring zero energy building construction that will come into effect over the coming years, some as soon as 2016. These stringent regulations will accelerate adoption around the world, causing the industry to undergo a significant transformation in the coming years.

When net-zero building standards are legislatively mandated, the question of cost is handled a bit differently. Regulators and commissions focus on policies, standards, and rates required to achieve efficiency goals. The EPA website explains that “A state’s Public Utility Commission, in setting appropriately designed electric and natural gas rates, can support clean DG projects and remove unintended barriers, while also providing appropriate cost recovery for utility services on which consumers depend.”

The foundational premise underlying regulation is the need to limit earnings, usually by mandating a fair rate of return on invested capital. However, regulators are also in a position to enforce energy policy and shape the industry consistent with federal and state legislative goals. In many cases, concerns about the environment, reliability, national security, or other energy policies are more important than earnings or least-cost energy choices.

One of the core missions of a public utility commission in a regulated state is to make determinations regarding cost recovery for capital expenditures, including the cost of capital (i.e., a financial return on shareholders’ investment) and the capital itself (return of shareholders’ capital over time). Because energy suppliers are paid largely according to the amount of electricity they sell, net-zero building standards and distributed generation can have serious consequences on cost recovery and the return of shareholders’ capital over time. This idea was recently discussed by senior executives at Duke Energy.

PREVENTING A DEATH SPIRAL

As more and more customers adopt conservation and distributed generation technologies, fewer and fewer customers are paying the fixed capital recovery charge. Those remaining have to pay incrementally more, which makes conservation and distributed generation more appealing, driving more and more customers to adopt these technologies.

What Can Utilities Do?

Utilities are investing in deregulated business units. For example, Duke Energy Renewables, part of Duke Energy’s Commercial Businesses, is a leader in developing innovative wind and solar energy generation projects for customers throughout the United States. The company’s growing portfolio of commercial renewable assets includes 15 wind farms and 14 solar farms in operation in nine states, totaling more than 1,700 megawatts in electric-generating capacity.

Customers away from traditional utility supply, and so on, until the traditional utility no longer exists, a scenario known as a “death spiral.”

Thus, we have the intriguing part of the title that leads this story—“Adapting Electric Utility Business Models For The 21st Century.” It seems that the net-zero ideal and distributed generation technologies are forcing utilities to rethink business models. This trend also means adapting to new technologies and ideas that are driving energy delivery away from the traditional centralized utility paradigm.

What are utilities doing to help prevent the death spiral? First, they are proposing rates that assure capital recovery of stranded assets. A stranded asset describes an asset that has become obsolete, but the costs and return on capital have not been recovered through rates. For a regulated utility, stranded assets may have resulted from decisions made by the utility’s regulators or required by regulators as a condition of continued service. The cost is usually recovered in the utility’s rates. Regulators are exploring specific rate designs to both encourage investment in alternative energy models and provide cost recovery of utility capital investment. Some of the specific rate issues related to distributed generation include standby rates, backup rates, exit fees, and natural gas rates for combined heat and power (CHP).

Second, many utilities are additionally seeking decoupling provisions that specifically allow the utility to profit if the provision provides overall systemwide benefits and reduced sales volumes, thus making the utility indifferent to selling less product and improving the ability of conservation and distributed generation to operate within the utility environment. The bottom line is that these utilities see value in the move to conservation and renewable distributed energy and are proactively asking to participate in these markets, rather than the backward-looking view of reacting to lost sales, and the slow decay of the traditional rate base.

Third, forward-looking utilities are diversifying into unregulated businesses positioned to supply energy services to those moving away from the centralized utility. For example, deregulated subsidiaries are doing the following:

- Investing in photovoltaic, storage, and large wind infrastructure projects
- Exploring combined storage and renewable services for the residential and commercial customer

What Can States Do?

States are employing new strategies to avoid undue barriers and to provide a reasonable rate structure that balances appropriate cost recovery for utilities with the societal benefits of renewable and combined heat and power (CHP) projects. Some of these approaches include the following:

- States are evaluating new rate designs to “decouple” utility profits from sales volume. Alternative rate structures, such as performance-based rates, would remove the disincentive for utilities to support clean DG projects.
- States are attempting to ensure that rates are based on accurate measurement of the costs and benefits of clean DG. For example, California has funded a study that investigates the effects of DG on the performance of an electric power transmission and distribution system. The study reveals a methodology to quantify the potential benefits of these projects.
- States may wish to explore ways to ensure that the benefits of clean DG that can accrue to the electricity grid (e.g., increased system capacity, potential deferral of transmission and distribution investment, reduced system losses, improved stability from reactive power and voltage support) are reflected in rates.


- Aggregating load response to participate in the ISO demand bidding programs
- Developing Smart Grid applications and services to leverage new data opportunities

In short, these business models assure that the utility will continue to grow—either through traditional energy delivery or through distributed renewable energy services.

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