A TALE OF TWO SMART GRIDS

BOULDER AND FORT COLLINS REFLECT ON AMBITIOUS UTILITY PROJECTS MEANT TO SAVE ENERGY

BY NORA CALEY

THE CITY OF BOULDER HAS LONG BEEN KNOWN for its collective environmental consciousness and high concentration of capital, both intellectual and financial. It’s also been justly characterized as retaining a palpable ’60s idealism, one that’s often applied pragmatically to problem-solving in business and civic areas. These qualities have combined to help make Boulder the birthplace of hundreds of entrepreneurial successes and stirring innovations.

And so when Xcel Energy announced in 2007 that Boulder would be the site of a pilot energy-efficiency program dubbed SmartGridCity, it seemed there could be no better match, and news of the project generated great expectations and fanfare.

So much for great expectations. Maybe sometime in the future, SmartGridCity will be hailed as a bold first step in electricity-grid management and the quest for citywide energy efficiency. For now, the project will have to deal with being known mostly for its cost overruns, upset customers and ongoing hearings with the Colorado Public Utilities Commission (PUC).

“I think the biggest failing in the project is not having clear expectations from the community and from the company before we started,” says Jonathan Koehn, regional sustainability coordinator for the city of Boulder. Still, he says, “I commend Xcel for forward thinking with regard to the smart grid and, hopefully they learned something valuable from the process they can take away.”

Meanwhile about 50 miles north, another smart-grid effort has been under way—one much smaller in scope than SmartGridCity and less burdened by the weight of lofty expectations and widespread publicity. The project in Fort Collins, dubbed FortZED, was heralded by organizers as an important success, but was largely ignored outside the city limits.

Both projects offer lessons about updating a transmission system that figure to benefit other municipalities in the future. As such, they warrant a closer look.

XCEL BUILDS A PILOT

Minneapolis-based Xcel Energy announced in 2007 it would launch its SmartGridCity in Boulder. According to the project’s website, SmartGridCity is a pilot that would provide residents with energy-management and conservation tools, and would help the utility determine the most effective technology for delivering power. The new technologies would include smart meters and a broadband communications system.
LES SONS IN UTILITIES

The project sounded like a good idea at the time, says Koehn, Boulder's regional sustainability coordinator. He says Xcel Energy proposed the project when Boulder was deciding whether to renew its franchise agreement with the utility.

"Xcel brought the smart-grid project to the city as a great option to really explore ways to reduce our demand, give the community a choice about how and when we are using energy, and they had great concepts around using more renewables. These are things we got excited about as a community."

Even better, Koehn remembers, was that Xcel had indicated SmartGridCity would not cost anything for "ratepayers," the term utilities use instead of customers. "Really, it was going to be a pilot project funded by their private investors," he says. The utility also had partners, which it called the Smart Grid Consortium, that included consulting groups and technology firms such as Accenture, CURRENT Group, GridPoint, OSIsoft, Schweitzer Engineering Laboratories, SmartSynch and Ventyx.

The project began in 2008. Xcel Energy automated three distribution substations, four computer-monitored power feeders, and 23 feeders. The company also installed fiber optic cable and 4,600 residential and small-business transformers. There is also a grid-state monitoring system to proactively reduce outages.

Xcel Energy also installed smart meters in 23,000 residential customers’ homes. The devices would help the utility view ratepayers’ electricity usage in 15-minute increments, instead of the traditional once-a-month taken by a meter reader. The company soon learned a lesson: Some ratepayers were not interested in helping the utility get a more accurate reading of how much electricity they were using. They wanted home energy management (HEM), a different technology that, while related to smart grid efforts, is more of a consumer-centric tool. HEM helps ratepayers remotely view their energy usage and perform tasks such as turning down major appliances during certain times of the day.

That’s not what ratepayers got in Boulder. "What we thought was going to come first was the consumer interface with the smart grid," Koehn says. "But what came first was the utility side of the smart grid. Instead Xcel built feeders and substations."

But that’s what SmartGridCity was about, says Jonathan Adelman, director of retail market strategy for Xcel Energy. "We were testing and evaluating a broad span of various technologies," he says. "That allowed us to evaluate the distribution equipment we installed, and how that will affect advanced metering as well as customers with traditional meters."

In addition to people’s disappointment over smart meters, SmartGridCity soon ran into other problems. Some partners dropped out, and costs began to increase. In its original filing with the PUC, Xcel Energy had estimated the project would cost $15.3 million. In later filings the utility offered various cost estimates that went as high as $44.8 million.

"Our original estimate of $15.3 million was based on the best information of limited smart-grid installations and knowledge available from our technology partners at the time," says Michelle Abugaya, a spokesperson for Xcel Energy. "We experienced increased costs associated with the new technologies being implemented and installed and shared the burden of these increased costs with our technology partners. We also experienced higher construction costs associated with the installation of the fiber optic communications network."

Xcel Energy hoped to share the burden of these increased costs with more than just its technology partners. In 2010 and 2011 filings with the PUC, Xcel asked for full cost recovery from ratepayers, which means the ability to be reimbursed for the project by billing customers of Public Service Company of Colorado, the local Xcel subsidiary. Xcel Energy, which earned a profit of more than $755 million in 2010 and $841 million in 2011, requested $44.5 million in cost recovery.

Other entities, including the Colorado Office of Consumer Counsel (OCC), Climax Molybdenum Co. and CF&I Steel, filed responses asking the CPUC not to grant Xcel the full $44.5 million in cost
recovery. They argued that the findings of the SmartGridCity project would benefit other customers in Xcel Energy’s eight-state region, so Colorado ratepayers should not be the ones to pay for this research. The OCC argued that cost recovery should be limited to $27.9 million, the amount Xcel Energy had quoted in a 2009 filing.

The PUC granted Xcel Energy some cost recovery and gave the utility an assignment. “We will cap the recoverable investment at $27.9 million unless and until the Company demonstrates to our satisfaction that it has completed the unfinished aspects of the SGC project,” the PUC wrote in its decision in January 2011. The PUC also wrote, “this Commission believes that the Company needs to re-boot the SGC project and restore some of the promise this concept originally held. If the Company demonstrates in a future application that the SGC project has a coherent and valuable future, we may allow the Company to recover the balance of the investment disallowed in this case.”

Bill Levis, consumer counsel in the Office of Consumer Counsel, part of the Colorado Department of Regulatory Agencies, notes that the word “re-boot” is a little unclear. “My take on that is Xcel had to do something different than what they had done before. The question is whether they have done that. We would argue they did not,” he says. The OCC is preparing a response and was to file it on June 8.

The OCC got involved, Levis says, because its job is to represent the interests of residential, small business, and agricultural energy and telecommunications consumers. The OCC’s 11-member board reports on patterns of complaints from consumers about energy issues such as service interruptions or rate increases. “They asked for $15.3 million, then $27.9 million, then $44.5 million, and we had to say, ‘Wait a minute, you’ve got to stop this at some point,’” he says.

Meanwhile Xcel hired the Denver-based sustainability consulting firm MetaVu to write a report analyzing 60 value propositions of SmartGridCity. The analysis is complete, and a PUC hearing is scheduled for August 1 and 2. Adelman is confident the company will recoup the costs. “The commission deemed our investment prudent but wanted to see the accumulation of work before the release of the final one-third of project costs,” he says.

FORTZED ZEROS IN

In Fort Collins, a group consisting of Colorado Clean Energy Cluster, Fort Collins Utilities, and UniverCity Connections formed FortZED, a series of initiatives to create a net Zero Energy District. The district, encompassing part of downtown plus Colorado State University’s main campus, would produce as much energy as it used. The project partnered with technology companies such as Spirae, Bremcle Group and Woodward, and others such as New Belgium Brewing.

“FortZED is many things,” says Steve Catanach, light and power manager for the city of Fort Collins. “It’s a project, it’s a broad-based goal, and it’s an opportunity for the community to move technologies and ideas forward.” Fort Collins Utilities is the city-owned utility.

The first demonstration, a peak load management project, was the “jumpstart” to FortZED and took more than two years to complete. The goal was to show whether the city could reduce peak load, or the maximum amount of power consumption during a certain time, by 20 to 30 percent, while integrating distributed energy from solar panels and biogas. The jumpstart cost about $11 million and was paid for by the corporate partners plus a $6.3 million Renewable and Distribution System Integration (RDSI) grant from the U.S. Department of Energy.

The final demonstration of this jumpstart took place in the summer 2011 in four periods of two to three weeks. “Our job was to work with Fort Collins utilities’ end users to find which assets they could shift in terms of demand response that met their economic needs, their sound requirements and thermal comfort,” explains Judy Dorsey, president of the Bremcle Group, an environmental consulting firm in Fort Collins.

Craig Skinner, plant engineer with New Belgium Brewing, one of the demonstration sites, says the experiment was a success. “We were able to demonstrate the possibility to control peak load at the substation level,” Skinner says. New Belgium added 200 kilowatts of solar energy from a photovoltaic array, plus a 500-kilowatt biogas generator, for the demonstration.

The demonstration likely will have some long-term effects. “The whole idea of cutting down on peak load is not to have to buy giant equipment to supply so much energy,” explains Judy Gates, staff engineer for Woodward Inc., which supplied controls for the jumpstart. “Much of your electricity bill is paying for that capital equipment in case everyone’s air conditioning is on at once. They have to have enough to meet peak demand.”

Sunil Cherian, president of Spirae, which also supplied controls, says the demonstration was a success on two fronts. “From the technology demonstration perspective, we met the criteria,” he says. “More importantly the project pulled all the stakeholders together. We had our ups and downs, but the team came together.”

NEXT STEPS AND LESSONS LEARNED

FortZED was different from SmartGridCity. Drew Bolin, CEO of Colorado Clean Energy Cluster, a nonprofit economic development organization, says the Fort Collins effort was a grass-roots project, while the Boulder effort was a project by an investor-owned utility. “FortZED was very bottom up and organic, and Boulder was more top down,” he says.
There is a fallacy in the whole smart-grid world about people saving money. There is a lot of miscommunication and misunderstanding around what smart grid means. People do think their rates will go down because of smart grid.

Todd Pistorese, OSIsoft, an Xcel partner on SmartGridCity

FortZED was also a much smaller scope project than SmartGridCity. Many residents of Fort Collins did not know anything was happening with their grid. The demonstration was limited to four commercial sites, and ratepayers were not asked to foot the bill for new technology.

The big difference, though, might be the smart meters. Fort Collins Utilities hasn’t started its smart-meter project yet. Catanach says the city plans to deploy 65,000 electric and 34,000 water meters by mid-2013. Fort Collins Utilities, and presumably other utilities, can probably learn much from the Boulder experience. One lesson is not to have residents pay for smart meters. The electric meters in Fort Collins are part of a DOE Smart Grid Investment Grant through American Recovery and Reinvestment Act (ARRA) funding.

Catanach says smart meters’ other controversy is privacy, and Fort Collins ratepayers will have the option of letting the utility take daily meter readings, instead of every 15 minutes, to cut back on fears of Big Brother monitoring electrical usage.

Industry experts say when smart meters get consumer pushback, part of the problem is a general misunderstanding among ratepayers. “There is a fallacy in the whole smart-grid world about people saving money,” says Todd Pistorese, industry principal for power and utilities for OSIsoft. “There is a lot of miscommunication and misunderstanding around what smart grid means. People do think their rates will go down because of smart grid.” Xcel uses OSIsoft’s PI System to collect and analyze data.

Meanwhile Xcel Energy does not plan to expand the SmartGridCity project. “We set out to evaluate different ideas and we have decided not to move forward with a variety of ideas,” Adelman says. “We are continuing to look at things like voltage optimization.” The utility is working on pilots including pricing plans in which ratepayers pay more for using energy during peak hours, a plug-in vehicle study with Toyota and the National Renewable Energy Laboratory (NREL), and installing HEM devices in households in Westminster, Centennial and Boulder.

Adelman maintains that SmartGridCity is a success. “Our effort was not just to install advanced meters, but really to evaluate the interaction of new technology and how they would interface together,” he says. “The power quality and our ability to respond to outages has improved. I don’t think we have had one power quality complaint in a couple of years in SmartGridCity.”

The City of Boulder also got some feedback from IBM, which in 2011 named Boulder one of 24 cities to receive a grant as part of IBM’s Smarter Cities Challenge. The grant was in the form of technical expertise. In May 2011 six IBM executives worked in the city of Boulder for three weeks, then made recommendations about SmartGridCity to the city manager and other stakeholders. Among the findings: The project does provide significant value to Boulder, but the utility and the city did not communicate these benefits to residents.

“While these developments have improved transmission stability and reduced operating costs (among other benefits), the SGC project does not provide direct, visible customer value,” Adelman says. “SGC was advertised as providing customers with significant benefits including in-home real-time information access. This is not present in system functionality today. This mismatch in expectations has been a source of friction between the utility, the city and its citizens,” the report indicated.

Last November citizens voted for and passed ballot measure 2C, which allows the city of Boulder to examine the feasibility of creating a municipal electrical utility. “It’s not a done deal,” Koehn says. “We have set out a course on making sure it is financially feasible, and we have to go through appraising and valuing the system we would purchase. We need to know what we would be actually purchasing and what is the value of that.”