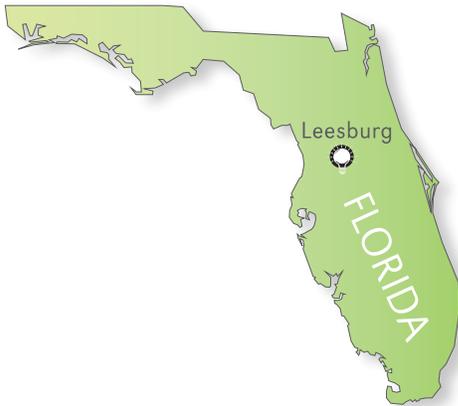


The Leesburg Smart Grid



Nestled among the more than 1,000 lakes that serve as Lake County's namesake, Leesburg, Fla., is the county's oldest city, founded in 1857. Today, Leesburg exemplifies the complex nature that is coming to define the new face of America — a past rich in history and tradition, a future founded on innovation and progressive vision. And nowhere is this more evident than in the Leesburg Electric Department and their smart grid plan.

RISING COSTS

The city of Leesburg, unlike many other communities in the nation, is fortunate to have its own local municipal utility. This allows Leesburg a good deal of latitude on how tariffs are constructed and what incentives are offered to residents. However, the Leesburg municipal utility is dependent on a larger organization for wholesale power supply, the Florida Municipal Power Agency (FMPA). Leesburg is a member of FMPA's All Requirements Project (ARP.)

Over the past seven years, city managers and residents in Leesburg watched as the price of electricity steadily climbed. The mounting increases led to an inflection point in September 2008, when Leesburg's residential electricity rates rose to become the fourth highest in the state of Florida.

THE HEART OF THE PROBLEM

In 2007, Leesburg's new utility management team identified that the main cause of the steady increase in electricity rates could be linked to the demand charges FMPA billed Leesburg. Upon close inspection, utility managers discovered that from 2006 to 2010 the average monthly FMPA "demand rate" billed to Leesburg increased significantly from \$12.27 to \$19.30 per kilowatt (kW.)

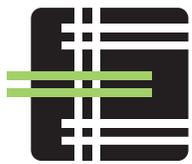
Understanding the root of this problem requires comprehending how the city's wholesale electric rates are determined. Each month, FMPA determines its peak demand hour across the 14 ARP member utilities, levying a fee based on each individual municipality's portion of the peak demand. Meanwhile, Leesburg's overall load factor — average load divided by peak load — was below average, due primarily to the heavily residential customer base and lack of significant industrial load. Bottom line: The residents and small businesses of Leesburg were consuming too much of their electricity during what the FMPA was designating as the peak demand hour.

An official "smart grid city" — having won the federal electric grant award — Leesburg and its Electric Department have set a new standard for smart grid deployment. What the citrus industry was to Leesburg in the 20th century, the smart grid industry may be in the 21st.

The Leesburg Electric Department will soon begin the largest advancement in their 84-year history as they provide all 23,000 of their customers with state-of-the-art technology to conserve electricity and to lower their utility bills. This is what consumers have been waiting for — smart grid deployments that have a specific and measurable outcome and pay for themselves. In other words, no rate increase required.

But to understand how far the city of Leesburg and its Electric Department has come calls for a look back at their very first step on the path toward smart grid development and perfect power. In the beginning, there was a determined electric director looking to reduce the cost of electricity. The mission may have been simple, but the path to success required a great deal of creativity, tenacity and resolve.





What this meant for customers was a demand charge averaging about \$20/kW/month. This equates to about \$80 per month, or 30 percent of a residential bill. For larger customers, this can be more than \$10,000 a month.

Reducing Leesburg's peak monthly demand presented two unique problems. One, in a city with a peak demand that regularly exceeded 100 MW, how could electricity use be curtailed enough to have a meaningful impact on the bottom line? Second, how could utility managers advise residents and businesses to reduce electricity usage during the appropriate time of day when FMPA was experiencing a system-wide peak demand hour?

A MAN ON A MISSION

Among the retirement communities, golf clubs and, of course, lakes, sits a small industrial park — home to Leesburg's Electric Department. In an office immediately off the lobby, buried behind stacks of reports, diagrams and other remnants of trees past, sits Paul Kalv, electric director for the city and vice chairman of FMPA.

Part sun-tanned raconteur, with a habit of enlivening even the most mundane discussion on power outages or grid security with anecdote and enthusiasm, Kalv has introduced dramatic changes in how Leesburg manages its electric grid.

With more than 42 years of experience in the utility industry, including the past 19 years with municipal electric utilities, Kalv has served as Leesburg's utility director since 2006. In this role, Kalv has taken it upon himself on behalf of Leesburg customers to lead the charge in rectifying the city's rising electricity rates.

“Due to our rising supply costs, we knew we needed to develop a better business model and get our customers involved in helping us reduce those costs,” said Kalv. “Leesburg's electric utility, as well as any utility, is the conduit that provides the need when the customer flips the switch to turn the power on. It was our objective to reduce our power supply costs and engage our customers moving forward.”

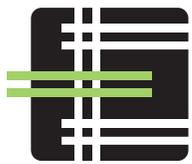
THE GENESIS OF A SOLUTION

But what could be done? As a member of the FMPA, Leesburg's electric utility is forbidden from installing any of its own generation assets to offset its load. In addition, because of the structure of the long-term contracts, seeking new, cheaper sources of electricity was also out of the question. Alas, the best and only way to drive down costs was to reduce electricity use during the timeframe when the FMPA was calculating its peak demand each month. All that was needed was a means to execute this.

After an exhaustive analysis of electricity usage patterns over the past few years, Kalv built his own model of electricity demand for Leesburg. Becoming an electricity soothsayer of sorts, he got better and better at forecasting when Leesburg would reach its peak demand each month as well as when FMPA would determine the system-wide peak demand. Armed with this information, he had the answer to one of the two questions he needed to answer — *when* to reduce electricity usage — but what remained to be illuminated was the *how*.

The concept was first tested with a low-risk/low-reward strategy by implementing conservation voltage reduction during the hours of the month that could be a potential peak hour; the utility saved just over \$34,000 by reducing the demand 1.7 megawatts (MW.) After achieving savings of more than \$200,000 by reducing demand during five of the first six months the trial was in effect, Leesburg's team was ready to expand the project.

Kalv knew that a number of his larger electric customers had back-up generation onsite. As with all backup generation, the systems are only as good as the regular maintenance and testing regimen in place. And Leesburg had eight of its own



emergency generators located at critical municipal infrastructure locations, including water and wastewater plants, the electric operations center, police station and City Hall.

Kalv identified two large electric customers that had backup generators: a popular supermarket chain and the Leesburg Regional Medical Center (LRMC). He contemplated the potential of these two customers, together with the eight Leesburg generators, scheduling the exercising of their generators during the hours believed to be a potential peak hour, generally 5 to 10 hours per month. Thus, Kalv's demand response program was born.

Kalv met with supermarket and LRMC representatives and offered to share the savings accrued by avoiding the demand charge, and they agreed to execute his demand response idea. As a result, the total demand for Leesburg was reduced in the process.

"We saw obvious dollars to be saved for us as well as the community," said David Taylor, operations manager for Central Florida Health Alliance, which oversees LRMC.

"2004 and 2005 were active hurricane years in Florida and we have over 700 locations," said the energy manager of the supermarket chain. "During that time, we threw away tens of millions of dollars worth of product due to hurricanes. In an attempt to resolve this problem, we looked to partner with utilities and I was very excited when Paul approached me about doing this on a municipal level."

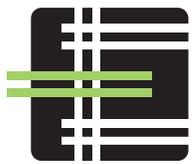
It was apparent that Kalv identified the solution that the energy manager was looking for. After determining the initial success of the pilot demand response program, Kalv expanded the program offering other businesses a 50/50 split of Leesburg's wholesale demand cost savings.

"My objective is to have the lowest residential rate and comparable commercial rates in the state of Florida and have the highest margin," said Kalv.

THE A+ RESULTS

To date, Leesburg and participating businesses have saved more than \$2.8 million in wholesale power supply costs. And as of May 2011, they achieved savings for an impressive 18 consecutive months. The supermarket chain and the LRMC began to receive regular checks for their half of the savings — amounting to \$213,000 as of May 2011 — while Kalv was able to create a new source of funding for Leesburg to pursue other energy efficiency and reliability projects on behalf of the entire community, such as their U.S. Department of Energy-sponsored Smart Grid Investment Project. Prior to implementing Kalv's demand response and power loss reduction program, Leesburg has had a B+ bond rating from the three reporting agencies. In the last two years, as a result of the demand response program and other operational improvements, Leesburg's bond ratings have steadily rose from B+ to A- and from A- to A, before reaching their current rating of A+.

Furthermore, Leesburg's Smart Grid project will have a significant Volt/VAR optimization element and several additional commercial customers are considering the opportunity to subscribe to the Load Reduction Credit Rider. It took Leesburg 14 months to save the first \$1 million, seven additional months to save \$2 million and, at this rate, it appears that \$3 million in savings will be reached in the next six months.



Kurt Yeager, executive director of Galvin Electricity Initiative, said the city's proposed electrical grid upgrades and improvements should serve as an example to other cities for not only improving the city's electrical grid, but also bringing down the cost of electricity for customers.

“This project is not about the technology, the city or its utility – it's all about helping our customers,” said Kalv.

FURTHERING THE SUCCESS: A CONSUMER-CENTRIC VISION

Kalv realized that the shared demand charge savings could be expanded to include residential customers and that the savings would pay for smart meters, which are needed to verify the demand reduction during the FMPA peak demand period. Seeking ways to increase savings and eliminate waste, Leesburg pursued a \$19.5 million Smart Grid Investment Grant and was awarded a 50 percent grant of \$9.7 million from the Department of Energy to develop a smarter grid, including Home Area Network energy management initiatives, numerous AMI technology elements, Distribution Automation elements to improve the reliability and resiliency of the distribution grid, and Cyber Security. With this funding, the city will strive to make its electric utility more efficient and dependable while helping customers to lower their energy demands and power bills.

For the improvements, the city plans to provide its 23,000 customers with high-tech electricity meters that will allow them to participate in the demand reduction shared savings program, as well as analyze and eventually scale back usage. Kalv and his team recently selected their top-ranked “AMI and Related Technologies” vendor based on an evaluation of the proposals submitted, as well as a three-day, scripted, onsite demonstration of the proposed AMI technology's capabilities by each of the four shortlisted proposal vendors. The project will ultimately allow customers to adjust the times they use high-load appliances by giving them real-time data to control their electric costs throughout the month rather than waiting until the utility bill arrives in the mail.

Leesburg also will install close to 4,000 energy management systems that allow customers to program when they operate their electrical appliances such as air conditioners and water heaters. The hope is to reduce overall power use and to operate appliances mostly during off-peak hours.

Many utilities have one basic rate to charge residential customers for electric use. The new smart grid improvements will allow Leesburg to develop different billing rates for on- and off-peak electricity usage, which would reward customers with lower bills when they switch from peak usage hours and reduce the cost of buying power from big energy plants.

The city's proposed smart grid upgrade will also make Leesburg's electric grid more reliable overall, allowing for fewer power outages and the ability to quickly identify and isolate any electricity problems. The installation of home meters is scheduled for deployment before summer 2012.

With Leesburg's already successful demand response program, coupled with the funding for future smart grid projects, Leesburg has the means and the resources to execute a revamping of their previously underperforming and customer cash-depleting electric system. With leaders such as Paul Kalv and FMPA, Leesburg serves as an example of a city that has begun paving the way for smart grid advances to empower consumers within the state of Florida, as well as the nation.



The Galvin Electricity Initiative would like to thank the following individuals for participating in interviews for this case study:

Paul Kalv, Leesburg Utility Director

Patrick Paris, Energy Manager at supermarket chain (name of store withheld)

David Taylor, Operations Manager for Central Florida Health Alliance

The Galvin Electricity Initiative was launched by former Motorola CEO Robert W. Galvin to transform our electric power system into one that is reliable, efficient, secure and clean, and meets the needs of 21st century consumers. In 2011, the Initiative continues to spark a migration toward a consumer-driven electric power system that is based on quality leadership. The goal is to promote grid modernization through policy reform and the development of Perfect Power smart microgrids that place top priority on serving consumers and businesses with reliable, high-quality, clean power. For more information about the Galvin Electricity Initiative, visit www.galvinpower.org, “like” the Initiative on Facebook (www.facebook.com/galvinpower) and follow the Initiative on Twitter at <http://twitter.com/perfectpower>.