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Old, new demands tax New York's power grid

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When Dave Kaspersin thought there was something wrong with his office power connection, he went out and did something about it.

Kaspersin, who lives in Greece and runs a recording studio and Web development company there, said parts of the distribution system, including sections of Greece, suffer from chronically low voltage. Several years ago, for example, air conditioning at his Dewey Avenue recording studio would shut off because of low voltage, Kaspersin said, forcing him to cancel recording sessions.

Whether it's to plug in a vacuum cleaner or to recharge an iPod, to light a farmer's early morning milking or to keep a cooling unit running in a corner store in the city, we all depend on the power grid.

That massive network, which includes all the lines and transmission equipment between the power plants and your home, has some catching up to do to serve an Internet age of high-definition videos and high-tech gadgets. Not to mention the nascent electric car market.

Yet many of us take the grid, and its suppliers, for granted. If we think about the electricity supply at all, it's when we get our monthly bill — New York has the third highest residential electric rates in America — or when the lights dim, as in Kaspersin's case.

Kaspersin worked for Rochester Gas and Electric Corp. for 26 years as an electrician and foreman of a high-voltage test crew, so he knew the right kinds of questions to ask. Since he left the company in 1994, he's been something of a critic. His particular bugaboo is voltage, or the electrical force that drives current. He claims it had been inadequate since Energy East Corp. bought RG&E in 2002.

Mark Lynch President of RG&E and sister company New York State Electric and Gas Corp.: "As we go through this year and next year I think we're going to start developing...how we want to approach some of the modernization of what I'll call increasing the intelligence not only of the transmission system we have but also the underlying distribution system and out to the retail consumer with the metering side as well."

That's when his voltage problems reached the point where he complained. After some lobbying, Kaspersin said, RG&E installed a regulator bank to maintain the voltage in the system near his studio.

"Without the regulator bank, we'd be out of business," said Kaspersin. "(All the power companies) have been ignoring the grid for years and years. ... They don't want to spend the money."

RG&E spokesman Robert Bergin disputed that there are chronic problems with low voltage, but he said difficulties such as Kaspersin's do crop up and are dealt with as soon as possible.

"We're committed to investing in this system," Bergin said. "The demands on the electric system are different than they were even eight years ago."

Issues old and new

The grid. It is what *National Geographic*, in its July issue, called the world's biggest machine. There are three different parts of it in North America. That portion known as the Eastern Interconnect includes New York — where the very first pieces of the nation's grid were built 128 years ago in Manhattan at Thomas Edison's direction. The father of America's electric industry remains on the minds of grid managers these days.

"If Alexander Graham Bell came back to life today, he wouldn't recognize the telecommunications industry. If Thomas Edison came back to life today and he looked at the electric grid he invented 100 years ago, he would recognize it. He could probably fix it," said Robert B. Catell, a former chairman of National Grid U.S. who now chairs the New York State Smart Grid Consortium. "I tell it as a joke. People don't really laugh."

New and old issues continue to vex the state's grid managers: Growth. Maintenance. Storms. Weather, trees and vegetation. Consumer demand. New gadgets that demand more power.

RG&E, like its sister company, New York State Electric and Gas Corp., is only a small part of the international power grid, the one that caught our collective attention when, on Aug. 14, 2003, cascading failures in Ohio caused outages from there through Ontario all the way to the Big Apple. Almost 90 percent of New York state residents, including many in Rochester, lost power.

Years after that worrisome 2003 blackout, problems continue, albeit on a less dramatic scale.

And while RG&E has its detractors when the lights go out, the electricity-delivery company gets high marks from the state PSC for reliability.

But what can make the grid better, more efficient, cheaper and smarter?

Managing the grid

On a hot, muggy afternoon in July, Stephen G. Whitley was in his Albany office monitoring both the cost and distribution of power.

Jennifer Indovina CEO of Tenrehte Technologies Inc. of Irondequoit: "Some of the backlash (against smart meters) was because while they were trying to educate consumers, they were also increasing their variable prices. ...There was no savings at the end of it."

Whitley is the CEO of the New York Independent System Operator, and it's his job to help manage the state's power grid. The NYISO, a nonprofit agency with a \$144 million budget, also manages the bid systems that companies use to sell and buy electricity for the New York market.

"Our job is to keep the lights on, and to make sure we're bringing in the lowest-cost power," said Whitley.

On that day, the state grid was being taxed by the heat, as consumers and businesses turned on their appliances, machines and, especially, air conditioners. The average price at that hour, reflecting high demand, was about \$90 per megawatt hour, almost double the average 2009 price.

New York City alone was using 9,800 megawatts of electricity, equal to more than 25 percent of the state's basic generating capacity of 37,416 megawatts.

Dumber closer to home

At this statewide level is where the grid is perhaps smartest. Whitley said the bulk power system that NYISO monitors is very smart and very sophisticated. At any instant, NYISO, from a control room in Albany, monitors the delicate balance between generation and load over 10,900 miles of high-voltage transmission lines.

But as the grid gets closer to homes, it becomes dumber. For example, your electric company has no idea when you lose power at home.

"We really are dependent on people calling in," said Mark Lynch, president of RG&E and NYSEG. "Right now the distribution system is not intelligent enough to know where each outage is."

Officials such as Whitley and Lynch said that of all the major service sectors, such as telecommunications, the electricity leviathan known as the grid has been slowest to modernize.

Mike Townsend, a Perinton lawyer who serves as chairman of the New York Power Authority, said his state agency owns a portion of the grid, including about 25 percent of the state's large transmission lines, and the large hydropower generators at Niagara Falls and on the St. Lawrence River.

Yet a century after a generator was put to work near the falls, the authority still has old problems.

"On hot days, we cancel everybody's vacation and we gear up for demand," said Townsend.

The capital-intensive industry also dislikes costly changes. Townsend said some authority equipment is 60 years old. But change is inevitable, state officials agree.

A smarter grid?

In recognition of the need to replace equipment and improve distribution, the NYISO plans to spend \$75 million — from federal stimulus funding and power company sources — on phasor measurement units, or PMUs, to provide real-time monitoring.

The use of PMUs allows the NYISO and utility companies to notice power-distribution anomalies. Had that equipment been in place in August 2003, New York likely could have avoided the blackout, Whitley said.

Lynch said RG&E and NYSEG also plan to spend \$1.2 billion on capital improvements through 2013, which easily covers more than 10 percent of their equipment, including aging transformers.

Mike Townsend Chairman of the New York Power Authority: "What the smart grid really intends over the next 10 or 15 years is to bring that digital infrastructure revolution to the electrical industry. And one of the problems with the smart grid is it requires a tremendous cost right now."

Robert D. Kump, CEO of Iberdrola USA, the parent company of both RG&E and NYSEG, said the two utilities, like many other power companies across the nation, have aging infrastructure. Over the next decade, the reinvestment to address such concerns as those of Kaspersin will be "huge," Kump said. Also challenging RG&E, NYSEG and other companies since 2008 has been the economic downturn, Kump said, slowing capital spending.

Still, experts say the grid managers have done well.

"If you look at the reliability of the electric grid, it's pretty damned reliable," Catell said. "In order for the electric grid to serve the needs of business in the future and be able to integrate renewable energy, and to give the customer the information he needs, you're going to have to go to a smart grid."

That term — "smart grid" — is very much in vogue these days, though it means different things to different people.

On one level it refers to modernization of the maze of transmission lines that connect power plants to end-users.

On a different level it means a grid that's flexible enough to coordinate the input from thousands of wind and solar generators, and the output to millions of electric cars quietly recharging overnight in their garages and driveways.

On yet another — and perhaps most controversial — level, "smart grid" means an interactive system in which customers can manage their own electricity usage while utilities are able to charge higher rates at times of peak demand.

Advanced metering

The benefit of advanced metering infrastructure is that larger systems can communicate with appliances and other electrical devices in a home. And consumers can set the system to turn devices on or off at certain times or when the cost reaches a certain level, and may be able to control them remotely. Smart meters often are accompanied by variable electric rates, meaning consumers could save money — or spend more — depending on how they manage their use.

Lynch said consumers will accept the new meters if they "see there's going to be a benefit," and that acceptance won't come easily. "They're futuristic. They're things that are going to have to come over time," he said.

Smarter use of the grid, by consumers and utilities interacting with each other in new ways, could mean less coal and natural gas burned, more efficient use of power by businesses and homes, and a grid that communicates better with its owners when it needs repairs or maintenance.

Lynch said RG&E and NYSEG hope to learn from a very large smart-meter project that a sister company is undertaking in Maine.

Whitley has no hesitation in endorsing a smart-grid future that also involves consumers.

"I believe it will save millions of dollars by doing this," said Whitley.

Catell said New York officials appear to be wary in light of complaints in California, where some consumers claim their bills rose sharply after smart meters were installed.

"At the end of the day, there's going to be a cost associated with upgrading the grid. Consumers usually wind up paying, so we need to demonstrate the money is being spent efficiently, and to quantify the benefits."

Cost, hope and debate

The future will involve spending, and new laws and regulations.

The past has already given us deregulation of the power grid players.

Kenneth Clapp, a NYISO spokesman, said that over the past decade, deregulation and restructuring of electricity markets "have built a more reliable electric system ... Consumers have benefited through prices that are lower than they might have been otherwise."

Still, New York's average annual wholesale cost of electricity shot up to \$95.31 per megawatt hour in 2008. It fell to \$48.63 when both the recession and the commodities bust appeared.

Even then, New York still has the third highest retail electricity rates in the nation. That's because New York power plants depend on more expensive natural gas and oil for about 30 percent of production, said Clapp.

New York's 2009 cost to consumers was 15.66 cents per kilowatt hour, compared with the national average of 9.89 cents, according to the National Mining Association.

A smart grid could theoretically help New York consumers cope and decrease their bills, informing them of the best times to run laundry machines and dishwashers.

Tenrehte Technologies Inc. of Irondequoit is among the small companies already providing innovation. Jennifer Indovina, Tenrehte's CEO, said her company makes a smart wireless device people can use to monitor their power usage.

The product, "the Picowatt," allows users to control electricity usage remotely via smart phones or

computers. It was selected the best "green" product out of 5,000 nominees at the prestigious Consumer Electronics Show in Las Vegas earlier this year.

The device, which will retail for \$100, is like a smart meter in that it will provide consumers with usage data, but it allows a user to control appliances and other energy-sucking equipment — which many smart meters don't.

Noting that smart meters have been rejected by the public in some places, Indovina said "some of the backlash ... was because while they were trying to educate consumers, they were also increasing their variable prices. People started using more power and there was no savings at the end of it."

Lynch said RG&E would develop a smart-meter strategy over the next two years.

It all squares with the PSC's cautious approach. The utility regulator recently announced it was seeking public comment on smart-grid development and said it would be years before modernization would be finished.

Even then, there will be debate about the technology. Not everyone is comfortable with giving utilities the power to reach into your home during peak times and dial down your major appliances.

According to Whitley, the NYISO already does that on a larger scale, and on a voluntary basis, with major industrial users of power. The result is that on very hot days, private businesses idle power-hungry equipment to help the grid manage through the worst hours.

Similar voluntary changes in electric usage by consumers are possible with pricing and environmental incentives, Lynch said.

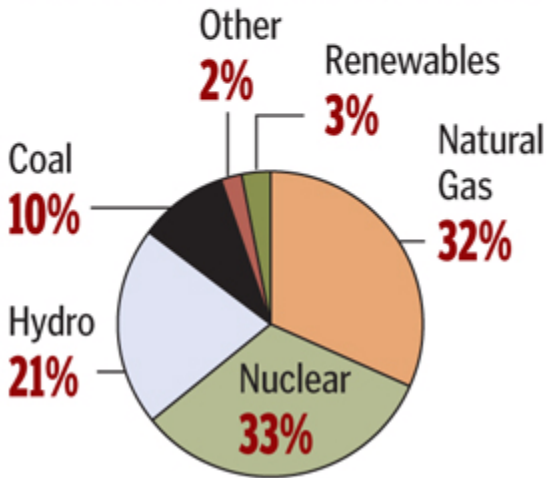
And yet some worry.

"We have a big challenge in front of us," Catell said. "Electricity is not like telecommunications. The electric system keeps the lights on, keeps the TV on, keeps the beer cold in the refrigerator. Getting the customers engaged in the electric supply, to me, is a big challenge."

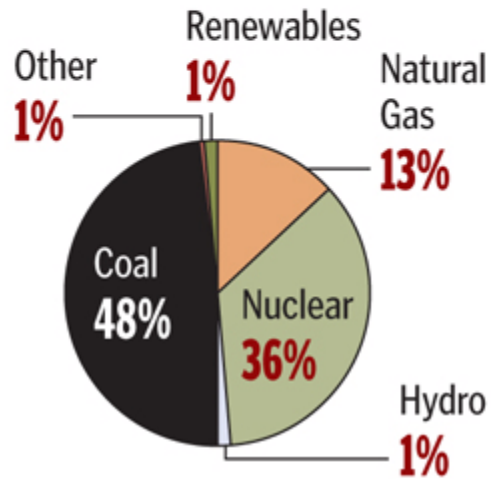
Where we get our power

New York gets much of its electricity from natural gas generators, making New York's electricity pricier. Average sources of generation in four states:

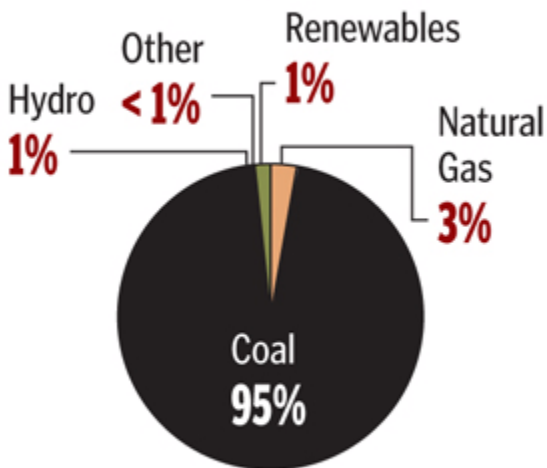
New York (ranked 3rd highest prices)



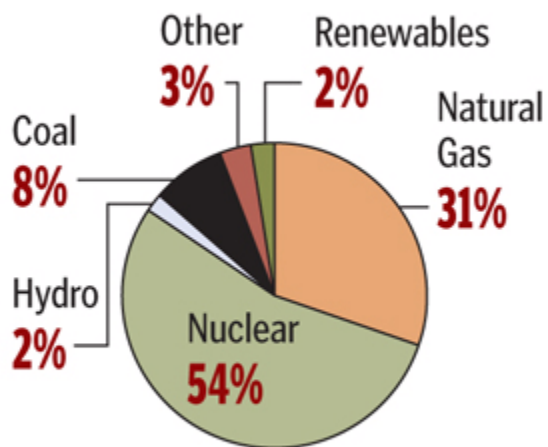
Pennsylvania (18th highest)



Indiana (36th highest)



Connecticut (2nd highest)



NOTE: Percentages do not add up to 100 due to rounding. "Other" includes sources such as oil and "renewables" include sources such as wind turbines.

SOURCE: National Mining Association

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