US power demand growth uncertain

Climate legislation has become a constant uncertainty in the calculus of US power plant investment, while a now less rosy demand outlook has pulled the rug out from under developers' feet. And on top of a slow economic recovery is the growing role played by energy efficiency and demand side management. Demand for electricity is expected to grow overall, but in some US regions that growth may be marginal. **Elisa Wood**

Beauty is in the eye of the beholder, even when it comes to energy efficiency. The resource is widely seen as a cheap way to lower greenhouse gas emissions and reduce consumer electricity costs. "What's not to like?" is a phrase often used by its proponents. Quite a lot, if you are a power plant developer. Greater end-user efficiency means fewer new power plants, and at a time when power plant developers already face a slump in demand brought on by the economic slowdown.

Moreover, energy efficiency has become the favored child of political leaders. US President Barack Obama has frequently touted efficiency as a jobs creator, even in his State of the Union address, a rare forum for such specificity about energy policy. Jon Wellinghoff, Federal Energy Regulatory Commission chairman, has made clear his fondness for efficiency and clean energy, saying his interest stems from wanting to save consumers money through creating markets made more efficient by consumers' participation in energy efficiency and demand response.

The Obama administration is backing its rhetoric with $20-$26 billion in spending, part of a massive new infusion of money into the sector. Several states have also ramped up budgets targeted at efficiency. New York alone plans to spend $922 million through 2011 on efficiency programs.

Massachusetts surpassed California in pledging to make the highest contribution to efficiency programs on a per capita basis, about $2.2 billion over three years. Both of these states have the advantage of raising money through allowance auction sales from the country's only mandatory carbon dioxide cap-and-trade program, the Regional Greenhouse Gas Initiative. Effective in ten states, RGGI has already channeled $319 million into state efficiency programs.

Per capita consumption at 40-year low

Current low demand for power is the sum of an ailing economy and efficiency measures. But it is difficult to discern exactly how much each contributes. On a per capita basis, the level of all energy used per person has declined to its lowest point since 1968, according to the US Energy Information Administration's Annual Energy Outlook 2010, released in May.

The US can expect a slight uptick in per person energy use as the economy improves, but it is only temporary. Per capita consumption is likely to decline again in 2013, and the EIA points to new efficiency standards for vehicles and lighting as the cause. By 2035, the EIA expects average energy use per capita to be 293 million Btu/person, down from today's 310 million Btu/person.

However, gross energy use does grow, albeit by only 0.5% per year for a total 14% from 2008 to 2035. This is because the nation's population should expand by 0.9% per year over this period. The economy, by contrast, is expected to grow by 2.4% per year, five times faster than energy consumption. The EIA attributes the divergence to improved energy intensity (the amount of energy consumed per dollar of GDP), itself a product of greater energy efficiency and a shift in the US economy toward the service sector.

By contrast, the North American Electric Reliability Corporation, which maintains bulk power reliability, lays most of the blame for reduced consumption on the economic slowdown. Its 2009 long-term assessment shows a lower summer peak over nine years than did its 2008 assessment. The US demand forecast is 4% below last year's and Canada's forecast is down 2%. NERC says that demand-side management caused 20% of the difference between the two assessments, while the economy was responsible for 80%. Still, NERC expects new efficiency programs to reduce North America's summer peak demand in 2018 by about 20 GW, a full year's growth. Demand response should cut a further 38 GW.

The affect of efficiency will vary by location. A few regions account for much of the 20 GW in lower peak usage brought on by efficiency. Florida, the US Northeast and southeastern Canada show the biggest drop in peak demand. In fact, it is not until 2015 that these regions reach consumption levels NERC had previously predicted for 2010. At the same time, some areas of North America will continue to see record peak demand growth, such as Texas, the US Southeast and parts of the US Southwest. North America will see an increase in overall electric demand, but that growth will occur more slowly over nine years than NERC previously predicted.

Negawatts versus megawatts

Interest in energy efficiency is expanding because of generous government incentives, as well as targeted policies. Energy efficiency is placed head-to-head against new power plants in filling resource needs in some states. Rhode Island, Massachusetts and Maine are among those that have rules that treat efficiency as a

'first fuel.' Regulators in these states require utilities to secure all cost-effective energy efficiency options before buying power or building generation plant. In a similar vein, ISO New England allows efficiency projects to bid in its forward capacity market auction. The efficiency projects vie against generation for capacity payments.

Other states have created efficiency requirements within their renewable portfolio standards. They not only require that a certain percentage of demand be met with renewable energy, but also that a certain percentage be offset by energy efficiency. In some cases these standards are aggressive. New York has set a standard to reduce usage 15% by 2015. Massachusetts is attempting to meet at least 25% of its electric load by 2020 with demand resources that include energy efficiency, load management, demand response, and behind-the-meter generation.

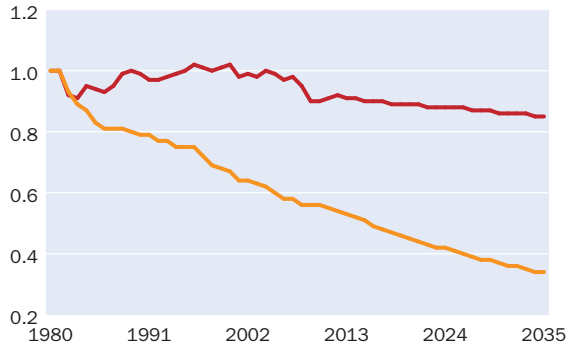
The stealthy semiconductor

The American Council for an Energy-Efficient Economy argues that energy efficiency initiatives have already had a significant impact on new power plant construction – in an almost inadvertent way. Computers are not bought with the intention that they save energy, but they have done just that, according to ACEEE's report, *Semiconductor Technology: The Potential to Revolutionize US Energy Productivity*. It requires less energy to move an electron than a person, and technologies that use semiconductors increasingly allow us to remain in place while the electron travels. Rather than getting on a plane to attend a meeting in another part of the world, people teleconference. Or they work at home rather than drive a car into an urban area.

Rather than focusing on how much energy the semiconductor saves, we tend to focus on how much it uses, in what ACEEE calls "the high tech energy paradox." The organization attempts to overcome this paradox by quantifying the energy saved through lifestyle and technology changes, from telecommuting to automating electric load management of industrial processes. About 3.9 million households had at least one member telecommuting in 2006, saving about 840 million gallons of gasoline that year, according to ACEEE. Telework Research Network puts the number of people who telecommuted at least one day per week in 2006 at 12.4 million and at up to 20 to 30 million today, but defines a telecommuter broadly as the self-employed or with home businesses, in addition to people employed by a company but working at home.

In 2006 alone the US used 775 billion kWh less than it would have if it operated in a 1976-style pre-semiconductor way. Extrapolating from that, ACEEE calculates that the US would be using 20% more electricity if semiconductors had never come into play. As a result, it appears the semiconductor averted the construction of 180 power plants over the last three decades and could eliminate the need for nearly 300 more by 2030, according to the report.

US average energy us per person declines



Source: EIA Annual Energy Outlook 2010

Growing appetite

However, technology is only partly responsible for gains in energy efficiency, according to Sandy Williams, a partner with law firm Foley & Lardner, who specializes in energy regulation and transactions and has worked in the energy arena since 1972. Industry changes going back four decades moved the industry toward more price volatility, which in turn led to the perception that power plant investment is a risky venture. This increased government and investor appetite for energy efficiency, he argues.

The trend stems from the realization that energy prices are elastic, which emerged during the oil embargo of the 1970s and was underscored with the nuclear cost overruns of the 1980s. It became even more apparent during the rise and fall of the Independent Power Producer in the late 1990s. During that period, the IPP industry based its rapid expansion on forecasts by respectable organizations that predicated a "hockey stick rise" in electricity prices, he said.

But events conspired against prices rising as quickly as expected, and IPP companies found themselves overextended. As large power developers went bankrupt or came close, investors became aware how much the power sector had changed since the days when regulated utilities guaranteed returns on development. Awake to the risk, Wall Street became more edgy about investing in power plants. But without new generation, how would the nation meet new electric demand? "Now we have the table set for the impact of conservation," Williams said.

Adding to today's economic dilemma is that power plants are built not just to meet new electric demand, but to replace aging power plants with cleaner and often more expensive sources of generation. So from an economic perspective this may mean replacing an older plant with a book value of $100 million with a new plant that costs $1.5 billion, said Williams.

As if that is not enough to unnerve financial investors, distributed generation also threatens the economics of central power plants. Investors are worried that if they build a plant, it could be displaced by distributed generation before the plant's useful life ends. "So the landscape now is in response to an environment in which avoidance of the use of electricity is not only political, but also driven by economics," Williams says.

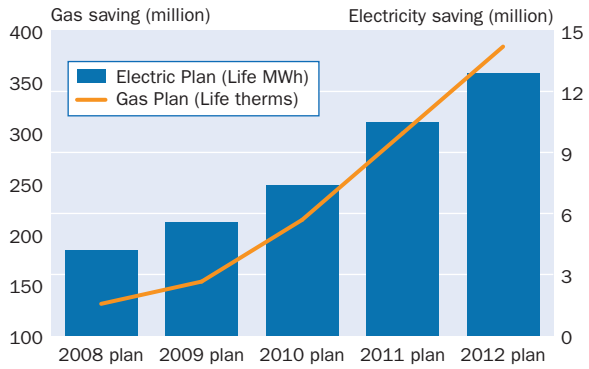
New strategies for owners

The last couple of years have not been easy for developers of fossil fuel power plants, given decreased demand, increased emphasis on efficiency and renewables, and tight credit markets. The industry has reacted to this harsh environment by curtailing development plans and idling plants. Events in the spring of 2010 indicate that a lack of demand continues to haunt the US power industry.

American Electric Power announced plans to idle 10 coal-fired units totaling 1,925 MW because of a 5.8% drop in demand and little hope of a turnaround for several years. Public Service Enterprise Group said in its first-quarter 2010 earnings report that it is likely to shift investment toward its regulated operations after reporting losses in its merchant markets, owing to oversupply. Florida Power & Light in May said its Turkey Point 6 & 7 nuclear projects probably will not begin operation until 2022-2023, in part because demand slipped in the company's 10-year forecast, a result of the economic slowdown and energy efficiency. The company had originally sought a 2018-2020 start up.

Meanwhile, major players have sought to improve their position through mergers and new partnerships that give them greater scale, geographic diversity and more expertise. In April, Mirant and RRI Energy agreed to an all-stock merger to form a new company that will own almost 24,700 MW of capacity. In addition, Calpine initiated plans to buy Conectiv Energy's 4,490 MW fleet of fossil plants in the PJM Interconnection. Texas-based Panda Energy, which built the nation's two largest merchant gas-fired plants, has also formed an alliance with utility giant Consolidated Edison to capture the renewable energy opportunities emerging in the Northeast, where Con Edison is located.

Lifetime Savings from Massachusetts Electric and Gas Efficiency Plans (2008 -2012)



Source: Massachusetts Department of Energy Resources, Energy Efficiency in Massachusetts: Our First Fuel

Pick your place

Not all the news is bad for power developers. They point out that even if the overall numbers indicate a slowdown in demand, niches still exist where power is needed, particularly where populations are growing or wind farms need back up power. Some states still offer both the prospect of increases in demand and an inviting regulatory climate, according to Roy Palk, an attorney with law firm LeClairRyan, who advises clients on project development.

If those states also happen to have aggressive energy efficiency goals, developers are undeterred. Power plants are sited based on long-term forecasts and predicted energy savings are rolled into the forecast. If the forecast still shows a need for generation after efficiency is factored in, a new power plant is in order. "I don't think efficiency within a state has much bearing on plant siting. You have to have certain elements to site a power plant – permitted land, access to transmission, access to fuel and access to a market," Palk said. "After efficiency is factored into the planning model, then the opportunity exists for the power plant developer. It [efficiency] is only a competitor up to a certain point."

Others say the industry's outlook could change quickly. Today's forecasts may indicate little need for new power, but the fact is such predictions in the past have been wrong. Just a few years ago, FERC was sounding the alarm bells that the state of Connecticut faced congestion and possible rolling blackouts unless it increased its power capacity. The state responded quickly with new infrastructure. Then the economy slumped, leaving Connecticut with capacity aplenty.

The reverse could also come to pass. If the economy picks up pace faster than expected, states could get caught short if they do not plan for enough new power, said Angela O'Connor, president of the New England Power Generators Association.

Economic growth, she says, cannot be served by energy efficiency alone. Indeed, NERC acknowledges how tricky it is to peg the need for new power: "The pace and shape of economic recovery will dramatically influence actual load growth across North America over the ten-year period. Largely unpredictable economic conditions result in a degree of uncertainty in 2009 demand forecasts that is not typically seen in periods of more stable economic activity."

Consumer behavior is also a variable. Utilities and government agencies may offer efficiency programs, but businesses and homeowners may not respond. Such is

the case in New York City where only a "paltry number" of small businesses are taking advantage of generous efficiency incentives, in part because they think the technologies are faddish, according to a report by the Center for an Urban Future.

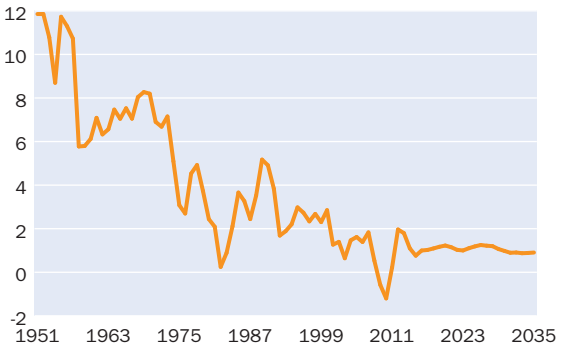
Most importantly, even though electric demand may not be what it was a few years ago when the economy was booming, it is still rising, albeit more slowly. While the EIA expects overall energy use per capita to decline, it still forecasts an average rise of 1.0% a year in electricity demand over the next 25 years. This increase is far short of the 9.8%/yr growth the nation saw in the 1950s, but is still a respectable increase, growing from 3,873 billion kWh in 2008 to 5,021 billion KWh in 2035.

The commercial sector shows strongest demand growth, 42%, followed by the residential sector with 24%, caused by a rise in population and disposable income, as well as the migration of US residents from colder to warmer climates that require more air conditioning. Growing use of televisions, computers and other electric gadgets also account for the rise, as well as several miscellaneous products that use power. Electricity, which made up 41% of total residential energy consumption in 2008, rises to 48% in 2035.

"In the past there have often been efforts to meet all load growth with energy efficiency. Technology frequently can't make up all that difference. People will always continue to build new houses in certain areas. Air conditioners will continue to turn on when it is 110 degrees. For the most part, energy efficiency programs don't net out that new growth," said Wayne Morton, Panda Energy's vice president, market planning and transmission.

Morton's premise is supported by the EIA, which says that our increased use of appliances, coupled with an increase in home size, so far has offset efficiency savings. The US may not be as power hungry as it once was, but it still has an appetite. Both the federal and state governments are pushing efficiency programs to satisfy demand. But energy consuming technologies abound to counter energy savings. Power plant developers will still have a job to do serving the balance.

Rate of US electricity demand growth, 1950-2035 (%, 3-year moving average)



Source: EIA Annual Energy Outlook 2010