ELECTRICITY CAPACITY: STRESSED OVER THE NEXT DECADE

Will We Have Enough to Meet Consumer Needs?

The ability of the United States to meet the electricity needs of American consumers reliably and at an affordable cost is seriously at risk. Even assuming large investments in efficiency, electricity demand will continue to grow to meet the needs of 45 million new Americans by 2020 with 30 million more expected, totaling 75 million, by 2030. Without the near-term ability to build coal-based plants and with the unavailability of new nuclear plants, much of the new capacity -- even with substantial new renewable capacity investments – will have to be fueled by natural gas that will come increasingly from off-shore sources. To complicate matters more, the current electric transmission system (the basic power delivery system) is not adequate to handle the new demands. And, the United States now faces the globalization of demand for electricity infrastructure components, causing scarcity and high prices exactly when the United States needs to invest in both new capacity and efficiency infrastructure. These forces are major challenges facing the electricity industry today – challenges we face *before* the nation has put in place regulations or law to lower carbon emissions.

Electricity Demand Continues to Grow

Even after revising projections in anticipation of a shrinking economy, the Energy Information Administration (EIA) still projects electricity needs will grow nationally 1.1 percent a year from 2006 through 2020, for a 17 percent increase requiring 118,000 megawatts (MW) of new generating capacity. EIA estimates demand will grow 30 percent by 2030, requiring a total of 264,000 new megawatts, unless extraordinary efficiency measures are adopted. This magnitude of increase is roughly analogous to adding 4 more California's, 21 more Minnesota's, 2.5 more Texas' or 13 more Kentucky's.

Among electric cooperative consumers, demand growth is projected at about double the national average. Why the difference? Often, co-ops serve energy-intensive agricultural sites. And, as the population grows and baby boomers retire, people are moving to exurban and rural areas where co-ops serve.

Demand growth has real potential to stretch our electricity system to its limits. An October 2007 study by the North American Electric Reliability Corporation (NERC), the nation's official reliability monitor, found U.S. electricity usage is projected to grow twice as fast as committed resources[1]. In some regions, demand will soon outstrip capacity unless new generation and transmission are added.

[1] A "committed resource" is existing, under construction, or planned generation capacity the utility owns or has a firm contract for and for which has a firm transmission capability to meet peak demand.

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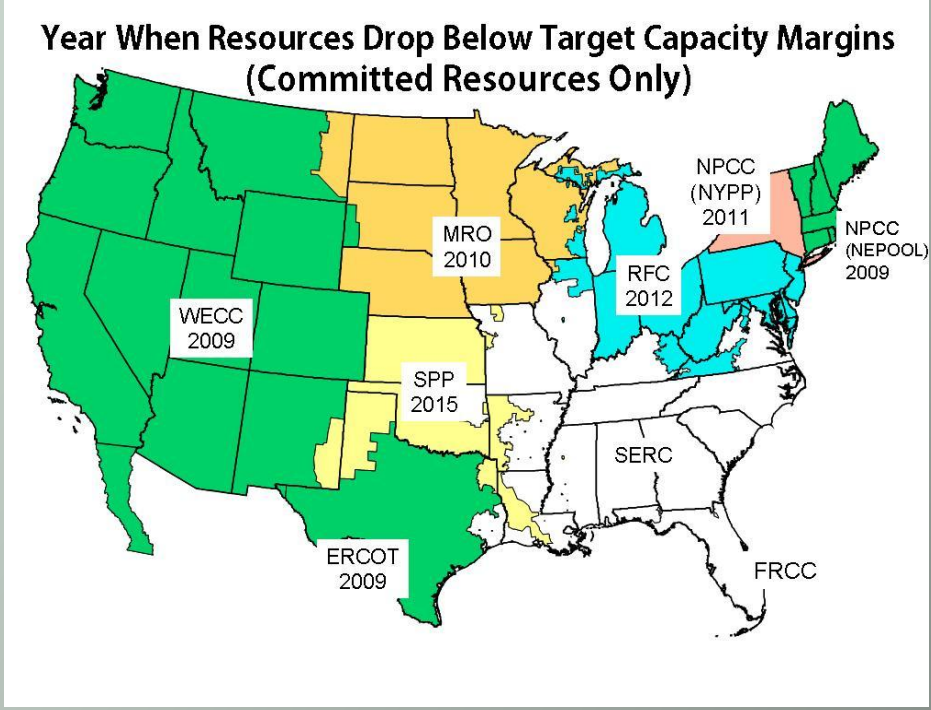
The map identifies the years when a region/subregion drops below target capacity margin levels required to meet peak demand using committed resources. Those region/subregions not identified are not projected to drop below their target margin levels in the next decade.



What's behind these overall statistics? Standard and Poor's reports that annual household consumption has risen 8 percent in the last decade to 11,093 kilowatt hours in 2006 versus 10,275 in 1996, despite efficiency gains in appliances and other household items.

The U.S. "Electricity Fuel Independence" is Eroding due to Increasing Need for Baseload Natural Gas Generation.

For decades, the United States has relied on abundant domestic fuels to provide electric power. Currently, the electricity generation mix is 49 percent coal, 19 percent nuclear, 22 percent natural gas, 6 percent hydro, 2 percent petroleum and 2.5 percent non-hydro renewable. The electricity sector's "electricity independence" has helped the economy and shielded consumers from economic shocks, like those being experienced now in the oil-dependent transportation sector.

Why is our fuel independence eroding in the electricity sector? The key reasons are a set of factors pushing electricity generation in the United States to the use of natural gas.

1. Soaring Natural Gas Demand will be Met by International Markets

Natural gas has many important applications across our economy, as a home heating fuel and an integral part of industrial processes. Natural gas also is the default baseload electricity fuel when coal and nuclear aren't available. Electric baseload generation fueled by natural gas is poised to rise sharply over the next decade because it produces less than one-half the greenhouse gas emissions of traditional coal plants. The slow pace of nuclear generation construction, which is currently the other primary source of baseload generation capacity, adds to the forces shifting electricity generation capacity to natural gas. Gas is also the primary generation used to balance out wind's intermittency because gas units can be fired up quickly when the wind slows or stops.

Natural gas use in 2007 jumped 6.5 percent led by the 10.5 percent growth in the electricity sector. All future projections show that the United States will have to buy much more natural gas on the world market because we are outstripping our current available supply.

Nearly all experts say America no longer has enough domestic natural gas to support its current growth needs. Canada, our largest international exporter, is lowering its export projections because it needs the gas for its own growth. This will likely leave the U.S. dependent on imported Liquefied Natural Gas (LNG) to meet electricity demand over the next decade. Unfortunately, the largest natural gas reserves are located overseas, in some of the world's most politically unstable areas.

Increasing dependence on natural gas will fundamentally shift the energy picture for the United States and create new economic strains. The U.S. will have to compete for gas in the volatile global market. Rising and volatile natural gas costs will hit electricity bills immediately. These costs will be magnified in electricity markets where the price of the gas is already setting the hourly price of electricity - even that produced from other lower cost fuel sources.

2. Energy Efficiency Measures are Needed but Are Not Enough

Many successful efficiency and conservation programs are currently available. Technology advances, aggressive consumer education, mandated standards for new buildings, upgraded electricity delivery systems and upfront spending to lower electricity usage for moderate and lower income groups must be pursued now in order for efficiency to significantly impact demand reduction in the future. Investments in efficiency can reduce the need for new electricity generating capacity but these investments require spending by consumers, utilities and government to purchase efficient products and build efficient infrastructure.

The question is how much new electricity capacity can be reduced by efficiency investments. Even if annual growth could be brought down to 0.75 percent a year, which the Electricity Policy Research Institute (EPRI) believes is possible with major efficiency technology investments, new electricity capacity spending will be needed in addition to efficiency spending. This is because the next decade will require spending to meet current generation needs *plus* substantial spending to improve efficiency in order to lower electricity capacity needs in the future.

The need for immediate spending on efficiency to lower longer term electricity needs sets up political obstacles. For example, builders resist efficiency mandates because they do not want to add to the price of their products with more costly efficiency upgrades. At a time when private and government budgets are being strained, it will require major policy leadership to justify spending money now to hold down electric capacity needs in the future. The economic stress of efficiency costs in the short term will be exacerbated as electricity costs rise when carbon costs are layered into electricity prices.

No group will feel this more acutely than low-income and moderate income families and households. But given today's economy, many consumers are more conservative with their disposable income and may be less inclined to invest in new appliances or weatherization measures. This is especially true for low-income families; whose homes likely need these measures the most. If efficiency investments in the homes of moderate and low-income groups are neglected, electricity costs will go up for these households and the primary reductions in electricity usage from these groups will come from a decline in the quality of life that electricity offers such as heat and hot water, air conditioning and even internet connectivity.

3. Growing Opposition to Coal Removes a Major Generation Option

America has more coal reserves than any other nation, with reserves projected to last more than 200 years. More than any other fuel, coal has been responsible for the low cost and solid reliability of our electricity supply. But because coal is carbon-intensive, baseload coal-fired power plants – even the most commercially advanced ones – are being blocked. As of March 2008, the Sierra Club claims to have stopped construction of 63 coal power plants, with 15 more on the target list. According to all credible sources, the carbon capture and sequestration technology will not be ready for commercial until 2020 at the very earliest – and that date could slip if deep investments in research, development and testing are not made.

4. New Nuclear Plants Can't Help Meet Electricity Demand by 2020

The Electric Power Research Institute estimates four new plants will need to come on line each year from 2015 to 2020 for nuclear power to make its contribution to meeting electricity needs and reducing carbon emissions to 1990 levels by 2030. This projection will not be met. The new fleet of baseload nuclear plants is progressing slowly, with virtually none expected to come online before 2020. These new plants also face opposition and substantial financial risks. In some cases, cost estimates for proposed plants match or exceed the entire value of the utilities proposing to build them. A 30-year U.S. hiatus from the business has resulted in suppliers, industry expertise and workforce being largely located overseas.

Still, these plants are needed as soon as possible to achieve the triple goals of reliable and affordable power and reduced greenhouse gas emissions. In order to move past the many bottlenecks, policymakers must recognize: a) the need for innovative funding which minimizes risks; and b) that safe, on-site waste storage and reprocessing are possible for the next century until long-term storage is available.

5. Even Increasing Renewable Energy Supplies Can't Meet Electricity Demand by 2020

The small amount of renewable generation in the current electricity fuel portfolio is welcome and needed. Including hydropower, renewable generation is 8 percent of the overall portfolio. Non-hydro renewable generation (primarily bio-mass and wind, with smaller contributions from solar and geothermal) is only 2.5 percent of the overall portfolio, up from 2.2 percent in 1995.

The growth percentages in non-hydro renewables are positive developments, but create misperceptions. Polls show that many mistakenly believe that renewable energy alone can satisfy increased demand for power and that currently non-hydro renewable energy is a large percentage of the nation's electricity generation. Even wind generation, the primary source of recent renewable energy additions, is a tiny fraction of overall U.S. generation – 0.6 percent in 2006 and an estimated 0.8 percent in 2007.

Like all electricity power sources, renewable energy generation growth faces large hurdles in the next decade. Without large federal subsidies, investment virtually stops. Transmission capacity is inadequate to deliver renewable power from remote areas where renewable resources are located to the population centers where power is needed. Construction costs, especially for wind, are rising rapidly and there are bottlenecks for equipment delivery – current wait times exceed two years. Since wind and solar are intermittent resources, current projects are only commercially viable where conventional resources, usually gas, are sufficient to back them up. Finally, public opposition to siting projects, such as offshore wind farms and farms on public land, has stopped many renewable developments.

Significant New Transmission Must be Built

Electric transmission, the "interstate highway" system of lines carrying electrons across regions, is not adequate for future needs. Long lead times are required for major transmission development and siting. Lagging investment in transmission resources has been an ongoing concern for many years. More investment is required as each peak season puts more and more strain on the transmission system. NERC says although several key transmission projects were completed in 2007, significant investment is still required in many areas of North America. In addition, new transmission projects continue to face opposition. Where regions are running out of generation supply, it is very difficult to transmit power from regions with extra power.

> "A recent NERC survey of industry professionals ranked aging infrastructure and limited new construction as the *number one challenge to reliability*, both the likelihood of occurrence and severity."

International Competition Is Making New U.S. Electricity Capacity Investments Expensive

Globalization has created in other countries, especially in Asia, a high demand for the same quality of life that electricity has brought to the United States and Europe. The United States now competes with the rest of the world for the building components of new electricity capacity from raw materials like concrete, components such as copper wire to nuclear power expertise. This competition and scarcity is raising costs for meeting electricity supply and demand. Prices are up on all kinds of equipment, from gas turbines, nuclear reactors, wind turbines and efficiency infrastructure equipment.

For example, China added 90,000 MW of capacity in 2006 alone. By comparison, in the 1990s, the U.S. built 200,000 MW in largely speculative gas peaking generation in anticipation of the volatile prices and market profits Enron-type marketers hoped restructuring would bring. Even then, U.S. generator investors did not face the kind of costs that are now a reality.