

Analytic Studies Brief

Analysis Examines Recent Projections of Electric Power Demand

Complex and Uncertain Factors Influence Demand for Electric Power

Utility planners and local, state, and federal energy officials need to understand energy supply and demand projections; so do environmental specialists, conservationists, and people who develop new energy technologies.

Our nation depends heavily on electric power in particular for many residential, commercial, and industrial uses; we consumed 29.9 quads of electricity, or 37% of our total primary commercial energy, in 1991. For planning purposes, several groups routinely provide forecasts of electricity demand. These include the North American Electric Reliability

Council, the Energy Information Administration, and the Gas Research Institute, among others.

In the late 1970s, some utility forecasting groups projected that electricity demand would grow at about 6% per year during the next decade. But the actual rate of growth in the 1980s was only about half that amount. So these groups, and the federal government, have reduced their demand growth projections to about 2% per year because actual growth has declined.

A 1993 report by the Analytic Studies Division of the National Renewable

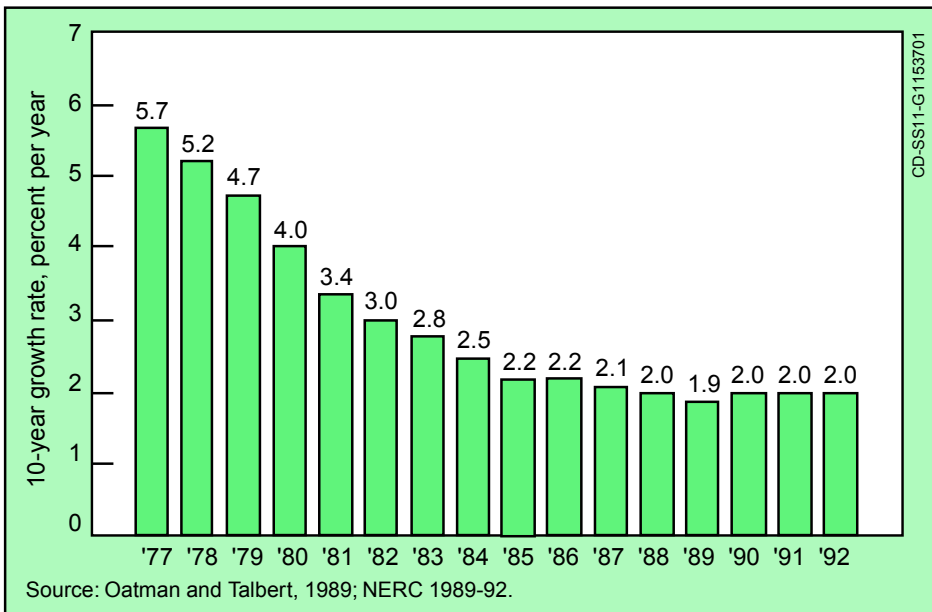
Energy Laboratory (NREL), *Analysis of Recent Projections of Electric Power Demand*, examines some of the reasons for the discrepancies between projected and actual electricity demand during the last 10 years. The report also discusses some of the reasons why utility groups are hesitating to increase current demand projections by more than a small amount.

The analysis suggests that some critical factors bear watching in the next few years; these factors could have a significant impact on the demand for electric power in the 1990s and in the early years of the next century. In fact, they could drive demand noticeably higher than forecasters' current predictions.

Why Were Early Projections Too High?

There are a number of reasons why initial electricity demand forecasts for the 1980s were too high. First, an economic recession apparently resulted in fewer new housing starts than expected and curtailed commercial and industrial expansion, reducing demand growth.

Second, despite the fact that the real price of electricity (in constant dollars) is lower today than it was 30 years ago, conservation measures that started in the 1970s (largely in response to the oil crisis) continued in the 1980s. New energy efficiency standards were established for appliances and heating and cooling equipment, along with improvements in



This graph depicts the annual percentage of growth in electricity demand projected by utilities surveyed by the North American Electric Reliability Council. Until a few years ago, these utilities' demand projections consistently decreased each year. Recently, however, these utilities increased their annual projections in response to the actual demand for electricity exceeding the forecasted demand.

industrial processes and in the energy efficiency of buildings.

In addition, utilities themselves helped to decrease demand by establishing special incentives for participation in energy efficiency programs.

Increases in the self-generation of power among industrial electricity users also had a downward influence on utility-generated electricity use.

Utilities soon responded with lower demand forecasts, partly because they can (and do) experience serious financial losses if they act on demand projections that are too high. For example, if utilities construct new power plants that are ultimately not needed, or do not operate at an acceptable percentage of capacity for several years, the cost can be enormous.

But there can also be penalties for heeding forecasts that are too low. In today's regulatory environment, long lead times are needed to approve and construct new coal-fired and nuclear power plants. If utilities are not ready for increases in demand with greater supply, such as new power plants, will electricity consumers be left out in the cold?

How Can We Plan for Tomorrow?

Changes in the economy, in regulations, and in consumers' behavior complicated the forecasting picture in the 1980s. And new laws could

make the situation even more complex and uncertain in the 1990s and beyond. These are forces that could drive electricity needs above or below projected amounts.

One important factor in forecasting supplies will be the effect of the Clean Air Act Amendments of 1990 on power generation. Some fossil-fuel power plants, for example, may have to be retired if they cannot be modified readily or economically to comply with more strict air quality standards. This uncertainty about supply needs to be considered, as well as the uncertainty about demand.

Another important piece of legislation is the Energy Policy Act of 1992. Most forecasts have not explicitly incorporated its provisions, many of which are intended to enhance the competitiveness of energy efficiency.

On the other hand, forecasts for the early 1990s may not reflect the increased demand that could result from stable or declining electricity prices. The economics of conventional electric power could cause consumers to regard energy efficiency and conservation as no longer necessary. Current forecasts probably do not take into account the new demand that could come from the industrial sector as automation increases, or from the transportation sector as clean-air laws hasten the development of electric vehicles.

Groups such as the Gas Research Institute could be watching this situation closely for its effects on the type of fuel that will be used to generate future electric power. A supply option likely to benefit from any move away from new coal-fired power plants is natural gas, which can be used in gas combustion or combined-cycle plants. Such plants meet environmental regulations and can be added quickly.

On the other hand, increased use of natural gas by the utility sector could

place strains on natural gas supply and prices. For example, if, by 2000 or shortly thereafter, growth in electricity demand exceeds the forecast by 1 percentage point, and if gas turbine and combined cycle capacity fills this gap, about an additional 3 trillion cubic feet* of natural gas would be needed-15% of the total now used.

Several renewable energy options, such as photovoltaic systems and wind turbines, could be deployed in increased amounts to add a large amount of new capacity. Their modularity, short construction times, and environmental benefits will make them especially attractive if oil and gas prices begin to rise again.

All these factors merit attention as we approach a new century marked with some uncertainty about energy supply and demand. Current analyses indicate, though, that we have several supply options with which to respond in timely ways to unforeseen increases in U.S. electricity demand.

*1 cubic foot = 2.831685 $\times 10^{-2}$ cubic meters.

Additional Publications

Oatman, E.N., and T.L. Talbert. 1989. *Assessing Supply and Demand Uncertainties*. P-6369. Palo Alto, CA: Electric Power Research Institute.

Swezey, Blair G. 1988. *Review and Analysis of Electricity Supply Market Projections*. SERI/MR-360-3322. Golden, CO: Solar Energy Research Institute (now NREL).

For More Information

Lynn R. Coles
Analytic Studies Division
National Renewable Energy
Laboratory
1617 Cole Boulevard
Golden, Colorado 80401-3393
(303) 275-4699

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