Trends in America

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ELECTRICITY TRANSMISSION

Nearly 50 million people were left without power in 2003 after untrimmed tree branches obstructing electricity transmission lines near Cleveland, Ohio, caused a blackout in seven U.S. states and one Canadian province. It was the largest blackout in U.S. history and totaled $6 billion in economic costs, according to the U.S. Department of Energy.

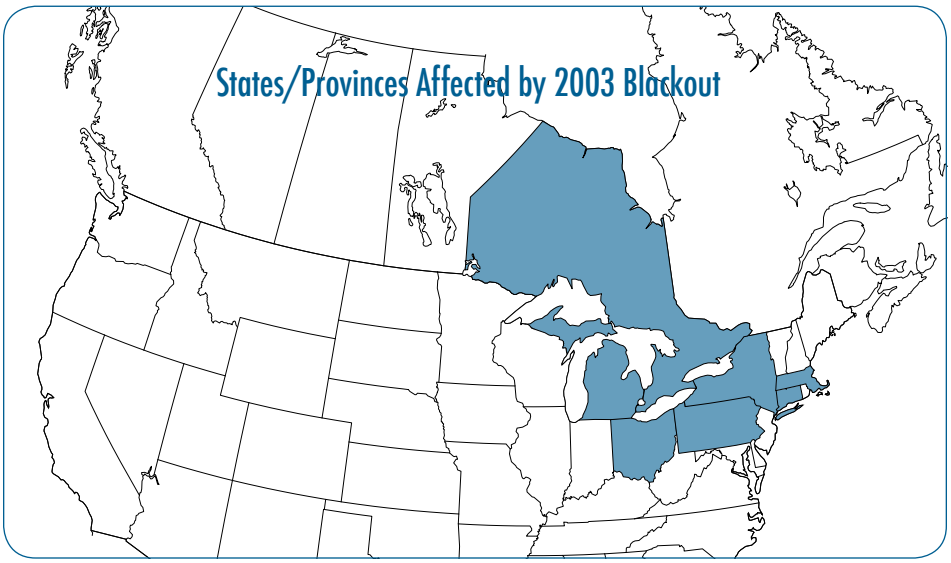
In fact, a 2005 study by the Department of Energy found the U.S. loses an average of $80 billion each year as a result of blackouts. Seventy percent of transmission lines in the U.S. are at least 25 years old and upgrades to the country's grids are becoming increasingly necessary. The task will not be cheap; the Edison Electric Institute estimates upgrading the nation's grid will cost approximately $85 billion over the next 10 years, and while this cost has traditionally been shouldered by utility companies, many are reluctant to invest in such upgrades and are turning to states in search of funding.

Many expect the problem to get worse. The United States uses more electricity than any other nation on Earth, accounting for approximately 23 percent of global consumption, according to the latest data from the *CIA World Fact Book*. The U.S. population has nearly doubled over the past 60 years, according to Census Bureau figures, and is expected to grow another 30 percent by 2050. The complications surrounding rising demand for electricity are intensified by the need to more fully integrate renewable energy sources into the existing grid, which requires construction of new lines.

These facts combined spell trouble for the U.S. electricity grid. As the U.S. population increases and more people enter into the grid, the infrastructure that supplies states with electricity becomes more stressed.

The challenge for states will be balancing how to coordinate transmission across state boundaries with cost-effectiveness and reliability, and balancing energy efficiency with a growing reliance on renewable energy sources. States will have to do this while working within their role as established by federal rules. Proposed solutions include:

- Coordinating transmission using regional transmission organizations and independent system operators—usually nonprofits that aid in managing electricity generation in specific regions or areas;
- Building and siting new power lines;
- Adopting energy efficiency strategies and conservation technology such as demand response management, which allows customers to monitor and decrease the amount of energy they use,.
- Distributed generation, which involves combined heat and power generation and reduces the need for transmission lines, and;
- Introducing smart grid technology that uses automated, self-operating and self-correcting systems to make electricity more efficient, reliable and safe.



The States Respond

Coordinating Transmission

The country is divided into three transmission grids: the Western Interconnection, Eastern Interconnection and Electric Reliability Council of Texas. These transmission grids incorporate parts of Canada and Mexico, and sometimes cut

through states. For example, Montana, South Dakota, New Mexico and Texas are served by both the Eastern and Western grids, which creates complications in transferring electricity from one part of the state to the other. Special transmission devices are required to transfer energy between grids, but are only installed in limited locations due to the high cost of the technology. However, connecting the three grids would allow the transfer of electric power in response to demand and would ease stress on overloaded lines and generators.

Regional transmission organizations (RTOs) and independent system operators (ISOs) aid in the management and control of electricity transmission over large areas. They ensure that supply and demand for electricity stay balanced, and that power is generated accordingly. There are various regional transmission organizations and independent system operators across the country, including the Midwest Independent Transmission System Operator, ISO New England Inc., PJM Interconnection and the California Independent System Operator. Continued development of these organizations can help alleviate some of the transmission burden; however, additional actions such as facilitation of the line siting process and energy efficiency improvements are still needed.

Building Power Lines

The complexities of constructing new transmission lines can pose additional problems: Siting and constructing new power lines is quickly becoming a contentious issue. The 2005 Energy Policy Act grants the U.S. Secretary of Energy the authority to conduct national electric congestion studies and, if necessary, to designate transmission corridors as part of the National Interest Electric Transmission Corridor for new transmission lines. Such action would trump states' siting responsibilities—states have traditionally determined where lines are located—and allow construction of new lines in areas where electricity demand and population are particularly high. This federal action would pressure states to grant permits for utilities to build new lines. States have resisted new line construction because new lines are viewed as unnecessary, ugly and thought to diminish quality of life. Local opposition is particularly high, but the Department of Energy claims new lines are necessary to prevent future blackouts.

In October 2007, the Department of Energy designated two new routes for transmission lines: the Mid-Atlantic and the Southwest Area National Interest Electric Transmission Corridors. The Mid-Atlantic corridor encompasses all of New Jersey, Delaware and the District of Columbia, most of Maryland, and large sections of New York, Ohio, Pennsylvania, Virginia and West Virginia. The Southwest corridor covers seven counties in southern California and three in Arizona. The Department of Energy denied formal requests to reconsider the lines, saying the requests were meritless. The department also cited its National Electric Transmission Congestion Study as evidence of the urgent need for these corridors. This has spurred resentment in states that believe their territory is being exploited for federal priorities.

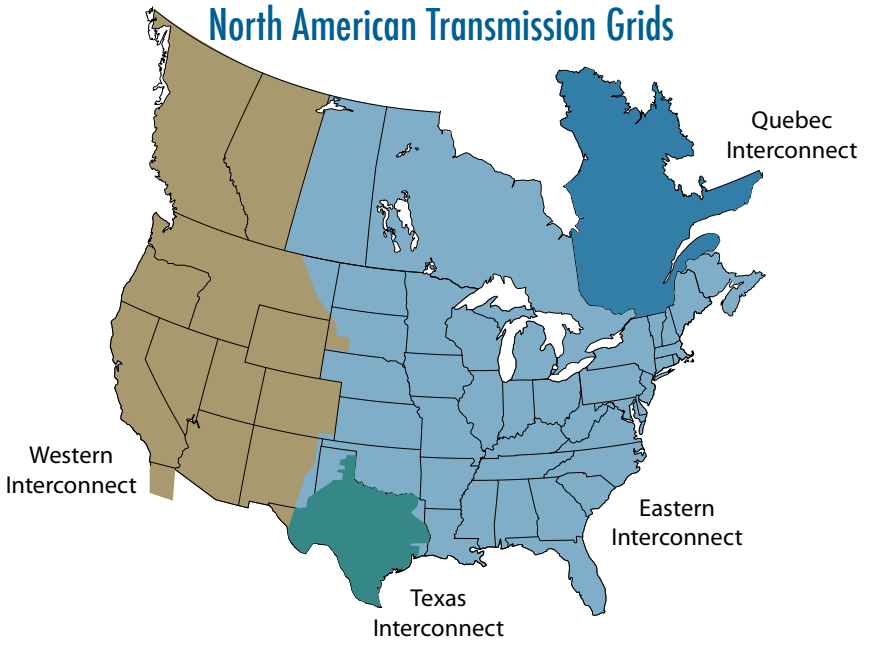
Facilitating the Siting Process

Despite rules surrounding the National Interest Electric Transmission Corridor, states retain most authority over locating new lines. States can take various proactive steps to facilitate the process of siting new lines, including:

- Assigning responsibility for line approval to a single state entity;
- Facilitating interstate cooperation in the siting process by keeping open lines of communication between like state entities that handle the siting process;
- Identifying ecologically fragile areas and otherwise undesirable pathways for transmission lines ahead of time to prevent backups in the siting process, and pre-determining acceptable siting routes, and
- Establishing clear timelines to complete reviews of new line proposals.

These steps can help ensure transmission lines are sited in areas where they are most needed and that best fit states' unique needs.

North American Transmission Grids



Source: North American Electric Reliability Council

Energy Conservation

But the problem can't be solved simply by building new power lines. As population grows and energy demand rises, efficiency will play an important role in balancing supply and demand. Various conservation methods and technologies are being borne from the need to compensate for increased demand and population growth. Demand response management—which gives customers the ability to adapt their electricity consumption to price signals, incentives or directions from grid operators—is a promising trend. Under demand response scenarios, electric companies would install meters in homes that allow customers to monitor how much electricity they use and the rate that is being charged.

State and local governments are taking steps to be more proactive in energy efficiency. Some states are joining forces in promoting demand response management. Six states—Connecticut, Maine, Massachusetts, Vermont, Rhode Island and New Hampshire—formed the New England Demand Response Initiative in 2002 to develop a coordinated set of demand response programs in these states. The initiative was a broad coalition of public and private decision-makers as well as the region's independent service operator. The six states' public utilities commissions, as well as the region's state environmental regulators, participated in the initiative with the ultimate goal of creating a power system that is more environmentally friendly, more competitive and more reliable. The New England Demand Response Initiative's final report, published in 2003, included 38 major recommendations for incorporating demand response into retail and wholesale markets. Similar programs are underway in the Mid-Atlantic and the Pacific Northwest.

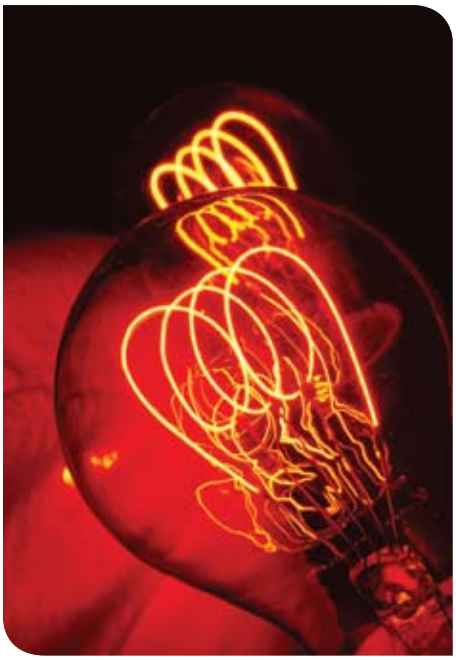
States can also promote energy efficiency and demand response management through incentive programs. California's Public Utilities Commission, for example, allotted approximately $2.1 billion to promote energy efficiency for the three-year period from 2006 to 2008. Around $200 million was allotted for program evaluation, and the remaining funds are divided among California's four major utility companies who use them to implement efficiency programs. Central to the many programs are incentives and rebates for installing energy efficient appliances and equipment in homes and businesses. California raises money for these programs in part through a 1 percent public benefits charge that is either embedded in electricity rates or appears as a separate charge on customers' utility bills.

A key to the success of demand-response programs is electric rate decoupling. Decoupling rates involves separating the rates utilities charge from the actual sales they make, essentially meaning that their profits would be constant and not reliant on the amount of energy used. This provides an incentive for utilities to invest in energy efficiency, because when increased electricity usage does not translate to increased profit for utility companies, utilities are likely to put more effort into conserving energy. Decoupling is implemented or under consideration in several states including California, New York, Oregon, Washington and Idaho.

Distributed Generation

Another way states can conserve energy is through distributed generation (also known as cogeneration) Distributed generation is a process whereby onsite power is generated using various fuel sources such as natural gas, biomass, biogas, coal, waste heat or oil. The heat that is produced in electricity generation, which is lost in traditional generation, is captured and used to heat onsite structures. Distributed generation has the capability to produce onsite or near-site generation, thus reducing the need for transmission lines.

A handful of states currently offer incentives to promote distributed power generation. Connecticut offers property tax exemptions and Oregon offers tax incentives for businesses that employ cogeneration technology. Wisconsin offers incentives for businesses that have biomass cofired combined heat and power installations. If these types of programs catch on, and power is increasingly generated near its final destination, the need for more transmission lines could become less urgent.



The Smart Grid

Another possibility for alleviating transmission woes is the proposed smart grid. The smart grid would use in-home technology such as smart meters that allow customers to monitor their electricity consumption, alongside technology installed at transmission substations, to track and adjust customer utility usage in order to reduce costs to the consumer and promote energy efficiency. Dallas-based Oncor Electric Delivery Company LLC recently committed to purchase 3 million smart meters from Swiss-based Landis+Gyr Holdings, and plans to install the meters in local homes and small businesses.

Another characteristic of a smart grid is the ability to detect emerging transmission interruptions and utilize self-healing circuits to quickly fix the problem, rather than relying on repairmen to do the job manually. The Federal Energy Regulatory Commission is planning to create a national smart grid. Grid 2030, as it would be called, would include the U.S. and parts of Canada in a fully-automated power delivery system that would ensure two-way flows of information between power generation plants and in-home appliances and everywhere in between. Essentially appliances would respond to periods of low and high demand. During peak hours, certain appliances may turn off for a minute every few minutes to save power. The end goal is to have a system that requires minimal human oversight, is self-operating and self-correcting. A fully functioning smart grid could help address many of the problems the states face with regard to transmission. But presently, the path to that end remains an abstract one.

The Future

The struggle over transmission infrastructure will likely continue. If the federal government continues to designate whole states as potential sites for high-voltage transmission lines and refuses to hear states' complaints, states will be faced with the challenge of counterbalancing federal leverage in determining how, when and where new transmission lines are installed. Interstate cooperation has the potential to combat some of this federal regulatory power. But the key to the future will be finding a way to balance energy conservation and efficiency with transboundary cooperation, cost-effectiveness and reliability. States can work together to find new and innovative ways to cope with rising energy demand through independent service operators and regional transmission organizations. Incentive programs that promote efficiency provide additional hope. As renewable energy becomes more attractive and necessary, it will add another dimension to the equation.

–Gabe Swain is a research assistant at The Council of State Governments.

Additional Resources:

- *Electricity Transmission: A Primer,* a report prepared by the National Council on Energy Policy–available online at *http://www.raponline.org/Pubs/ELECTRICITYTRANSMISSION.pdf*
- *Assessment of Demand Response & Advanced Metering,* a staff report from FERC–available online at *http://www.ferc.gov/legal/staff-reports/demand-response.pdf*
- *Electricity Restructuring:* Key Challenges Remain, a publication of the US Government Accountability Office–available online at *http://www.gao.gov/new.items/d06237.pdf*
- *National Electric Transmission Congestion Study,* submitted to the Federal Registry on October 5, 2007 (Federal Registry volume 72, number 193–available *online at http://www.access.gpo.gov/su_docs/fedreg/a071005c.html*
- *Dimensions of Demand response: Capturing Customer Based Resources in New England's Power Systems and Markets*–available online at *http://nedri.raabassociates.org/*
- Edison Electric Institute–*www. eei.org*