KEEPING THE LIGHTS ON

Serious challenges face policymakers and utilities as they try to keep electricity supply stable and affordable.

You open the door, reach in to turn on the light and nothing happens. Or imagine you can't drink water from the faucet because the water treatment plants don't have enough power to operate effectively. What if you turned on the TV and nothing happened.

These scenarios are common in developing nations. But even though uncommon here, they do happen. Just ask one of the millions of Americans who experienced the 2003 Northeast blackout. A series of failures in the electrical grid on Aug. 14 of that year cut power to more than 50 million people in eight U.S. states and Canada for up to two days. The event contributed to the deaths of 11 people and cost an estimated \$6 billion.

The failure also got the attention of policymakers concerned about the nation's electrical system and its ability to supply reliable power.

"The incident should be taken for what it truly was—a huge wake-up call," says Maryland Delegate Sally Jameson, a member of the Public Utilities Subcommittee of the Economic Matters Committee.

That temporary but critical failure highlights a deeper problem in much of the United States—an aging grid and growing demand for power. Retooling the electrical grid into a network that interacts with consumers and integrates solar, wind and other renewable energy sources is no small task. Much of it was built before the age of microprocessors.

"Energy is a priority for legislators across the country, but we're all dealing with dif-

Glen Andersen tracks energy issues for NCSL. Keith Hay is the director of NCSL 's Energy Program.



ferent variables and constraints," says Georgia Senator Don Balfour, presidentof the National Conference of State Legislatures. "We need to raise awareness of some of the challenges and opportunities we will face in the not-so-distant future. Not being able to turn on a light is not an option. Unfortunately, it could be a reality if we don't take a good look at the current state of energy sup-



DELEGATE SALLY JAMESON MARYLAND

ply and plan accordingly."

There is also the issue of who will pay the billions it will cost. The country is facing a significant increase in demand for power in the next 25 years, however, and improving the grid is a crucial part of meeting that need.

These are the challenges to building an energy system that will keep the lights on in the 21st century.



SENATOR DON BALFOUR GEORGIA

TASK FORCE STUDYING ENERGY SUPPLY

With states facing critical questions about how to build a sound energy future, NCSL President Senator Don Balfour created the Task Force on Energy Supply.

The panel is seeking input from experts across the country on the question of what actions states can take to create secure, stable energy supplies that also meet other goals. The 16 member task force has met twice in the past few months and has plans for additional meetings this spring to finalize its work.

"I've asked the NCSL Energy Supply Task Force to take a look at the current state of affairs and come up with principles states can employ when trying to determine how they are going to keep the lights on in the future," Balfour says. "The challenge is striking the right balance for each individual state given constraints on financing options and the overall deterioration of the infrastructure."

The task force will issue a report with the results of its findings in July at the annual NCSL Legislative Summit.

-Melissa Savage, NCSL

GENERATING POWER

This chart shows the role in electric power production played by coal, natural gas, nuclear power, hydroelectric, renewable and other sources.



COST ISN'T EVERYTHING

Coal, nuclear energy and natural gas supply almost 90 percent of electricity in the United States. The use of renewable resources now accounts for 10 percent of that power. Nonhydropower sources such as wind and solar contribute about 3 percent of those renewable resources.

The mix is quite different in each state, however. Some rely heavily on natural gas, others on coal, and still others on nuclear energy or hydropower. The way state officials plan for future energy needs will depend on their current mix and available resources.

The appetite for large flat-screen TVs, game consoles, computers and other electronics, along with a growing population are major reasons behind increasing electricity demand. The country will need about 22 percent more electricity—three time more than the state of California currently consumes by 2035, according to the latest estimates by the federal Energy Information Administration. The question facing the states is how to meet the demand.

Traditionally, utilities built power plants that supplied the cheapest electricity to deal with increased demand, and that often meant using coal. Now, states, consumers and investors are placing more importance on how energy development affects the economy, the environment and energy security. State policies, such as renewable electricity standards and incentives for new nuclear plants, reflect this changing emphasis.

It's no longer a matter of just keeping the

lights on. Energy policies and choices are now linked to such issues as reducing greenhouse gas emissions or creating green jobs. As a result, states have moved away from the traditional approach of investing in the cheapest way to generate electricity and are diversifying their energy supply.

Some states have considered economic interests and have turned to wind and solar to create jobs and spur economic development. For example, the desire to bring in more renewable energy related jobs was a major force behind the creation of Michigan's renewable electricity standard. State officials, however, are also considering future costs of energy and reducing the impact of volatility of energy prices. The challenge is deciding on the mix of resources that will best suit their needs.

TRYING TO EVOLVE

Since coal generates nearly half of the nation's electricity and the United States has an abundant supply, it is likely to play a critical role in many states. Pressures to "clean up coal" are driving federal, state and industry investment to ensure coal will continue to supply power while protecting the environment.

The federal government is actively promoting carbon dioxide capture and sequestration from coal power plants through investments in research and pilot projects. The federal stimulus package included \$3.4 billion for carbon capture research, and previous commitments are paying for efforts such as the Futuregen demonstration project in Illinois. American Electric's Mountaineer Power Plant in West Virginia already

WHEN THE WIND DOESN'T BLOW



The intermittent nature of wind and sunshine can present a challenge to energy production, unlike coal and nuclear plants that produce a steady supply of electricity.

Despite their variability, large amounts of these alternative fuels can be integrated into the current energy mix at a relatively low cost, although this depends on the size of the electricity market where these renewable resources are located.

The electrical grid already adjusts to variations in electricity demand and production at different times of day and different seasons. Backup plants are ready to go in case of transmission or power plant failures. As wind and solar energy fluctuates during the day, this built in capability allows the current power plants to adjust output and adapt to fluctuations. This requires planning and foresight, and depends on the type of fuel that the region uses.

Markets that rely more on natural gas are better equipped to absorb renewable electricity sources, since these plants, unlike coal or nuclear, can be adjusted quickly to meet the extra variations created by wind and sun. Iowa, for example, is part of a larger electricity market that includes nearby states. It has been able to integrate the large amount of wind it produces at relatively low cost, as have states such as Minnesota and Texas. While all three states have aggressively increased wind production in the last 5 years—with Minnesota near 10 percent Iowa near 18, and Texas at 6 percent— electricity prices actually have declined in Iowa, and the additional wind and transmission lines in Texas are also expected to decrease prices according to the Texas Public Utility Commission.

Some renewable sources, unlike wind and solar, can provide states with constant baseload power. These include geothermal energy, derived from the heat of the earth; biomass energy, which comes from burning plant material or municipal solid waste; and hydropower, which comes from water flowing through turbines. is operating the world's first carbon-and-capture project. There, a small portion of the gas emitted by the plant is run through carbon capture technology and the resulting liquid CO2 is injected deep into the Earth.

Nuclear energy, which produces one-fifth of the country's electricity, is receiving increased interest and investment at the federal and state levels. A number of states plan to build new nuclear plants in the coming decades, driven in part by a need to meet growing energy demand without increasing greenhouse gas emissions. The resurgence of nuclear energy was punctuated by President Obama's announcement in February, pledging \$8.3 billion in loan guarantees for the first nuclear power plants in 30 years, with more commitments on the way.

Although nuclear waste continues to be a concern, new reactor technologies and policies are being developed with the hope of addressing the challenge of waste disposal. Now that Yucca Mountain is off the table as a long-term nuclear waste disposal site, a new federal blue-ribbon commission is studying alternatives, such as continuing on-site storage, reprocessing, and other options and technologies.

ROLE OF RENEWABLES

The United States produces 10 percent of its electricity from renewable energy, two-thirds of that from hydropower. While the amount of renewable energy seems low compared to other sources, its importance is increasing. The U.S. Department of Energy reports renewable energy will provide nearly half the nation's electricity growth through 2035, assuming existing state and federal incentives continue.

The United States has vast resources of wind, solar, geothermal, biomass and wave energy—enough to supply more power than the country ever is likely to need. The challenge lies in tapping that energy at a reasonable cost. Producing electricity from many renewable energy sources is often more expensive than getting it from coal or natural gas plants. Solar power, depending on where it is located, may cost between 14 and 23 cents per kilowatt-hour or more. The average cost for electricity, however, is just under 10 cents per kilowatt-hour.

"People forget that any new generation built today will be the most expensive electricity in the market place regardless of technology," says Washington House Speaker Pro Tempore Jeff Morris. "Capital costs for renewables can be more expensive but renewable resources will not have the volatility that commodity fueled generation has."

Some forms—wind energy, biomass and geothermal energy—are competitive with energy prices in many parts of the country. Solar may catch up soon, since some industry experts expect solar energy to



HOUSE SPEAKER PRO TEM JEFF MORRIS

WASHINGTON

compete with conventional power by 2015, particularly in the sunnier regions of the country.

Wind is one of the fastest growing renewable technologies because it is often the least costly, cheaper than new natural gas plants in some states. Wind power now produces about 2 percent of the nation's electricity, producing five times more than just five years ago.

The nation also now generates eight times more solar energy than it did five years ago. Solar installations are likely to double in 2010, boosted by federal stimulus money.

Renewable energy is still in its infancy when compared to fossil fuel and nuclear energy. Like all new technologies, it is expected to become less expensive as the technology matures and enters mass production.

To create the demand that will push the development of renewable energy technologies and make them more competitive, states are adopting policies such as renewable electricity standards that require utilities to produce a percentage of their energy from renewable sources. So far, 29 states have adopted these standards. Most have set a target date, usually 15 percent to 25 percent by 2020 or 2025.

Renewable energy policies "are the right recipe to grow many of the new jobs in the energy sector," Morris says. "Policies favoring new energy technologies are one reason you see a state like Washington, with the 24th best wind resource in the United States, ranked fifth in wind electricity production."

GETTING FROM HERE TO THERE

Many of the best renewable energy resources, like the sunniest and windiest places, unfortunately lie far from where energy is needed. Using this power will require construction of long transmission lines.

The lines that carry electricity are critical to ensuring the reliability and security of the nation's electricity supply. The rise in demand and the development of new energy sources is putting pressure on the existing transmission system, which will require upgrades and new lines to maintain reliability. The lack of investment over the past few decades has created an outdated and overloaded grid, which reduces reliability and prevents efficient distribution, leading to higher costs.

"Just like highways, if transmission is congested or under-built, resources are wasted, electricity is more expensive and economic growth is stunted," says Phillip Moller, commissioner at the Federal Energy Regulatory Commission.

Energy experts, including those in state and federal governments, are concerned transmission capacity will not be adequate to meet the demands of the coming decades.

The federal government has put \$60 million into supporting transmission planning for the country's transmission networks. It aims to promote long-term analysis while helping states, utilities and others prepare the grid for future energy demand, renewable energy sources and new energy management technologies.

"What we need in this country are literally thousands of new miles of electric transmission to bolster reliability, reduce electricity prices and empower domestic clean renewable energy," says Moeller.

New lines face numerous obstacles, in part because the electric grid is made up of independently owned and operated power plants and transmission lines. Sorting out who customers, energy developers and investors should pay how much is one of the most controversial issues in the way of building new lines.

"Often, there is an established need for a transmission line crossing state lines, but the problem is deciding how much the consumers in various states have to pay for the infrastructure," says Moeller.

Siting lines also presents challenges, given that many new lines will need to pass through many states to meet growth requirements. Each state and local government must agree on where the lines will be placed, which often results in contentious hearings, debates and stalemates. In Colorado, for example, a \$165 million transmission line is stalled while an administrative law judge hears complaints from the owner of a 171,000-acre ranch who doesn't want the line crossing his land. Going around the ranch would add tens of millions of dollars to the cost, which means higher



prices for ratepayers.

Getting approval for new projects has always been a challenge, but the spread of residential development across the nation has increased the probability of facing "notin-my-backyard" protests from homeowners. Shrinking natural habitat areas that are offlimits present additional roadblocks.

There also is a Catch-22 in the effort to provide access to remote renewable energy sources. Transmission companies won't construct new lines without assurance that power generation facilities will be built. Renewable energy developers won't commit to new projects without the promise of transmission lines.

Despite these obstacles, planners and policymakers believe building a 21st century transmission system is critical and they must find ways around these hurdles.

States play a critical role in ensuring that their statutes and policies provide a fair and open process when considering new transmission lines. Since the process has bogged down in so many states over where the lines should run and who should pay for them, however, Congress is considering proposals that give the federal government more power in the process. Under these proposals, the Federal Energy Regulatory Commission would have greater authority to site transmission lines if states block lines that can benefit a wider region.

Georgia's Balfour says state lawmakers need to take note.

"We have to be aware of the aging infrastructure," he says. "Even if we have enough supply to keep the lights on, if we can't get the energy where it needs to go, the lights won't go on."

CHECK OUT more about the energy's future energy needs at www.ncsl.org/magazine.