






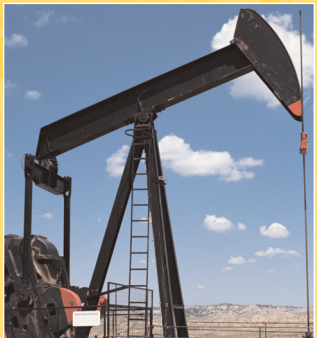

A GOVERNOR'S GUIDE TO ENERGY ASSURANCE

Roles and Responsibilities For Ensuring a Robust, Secure and Reliable Energy Infrastructure

NGA Center for BEST PRACTICES

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ISBN: 1-55877-406-8

A GOVERNOR'S GUIDE TO ENERGY ASSURANCE

ROLES AND RESPONSIBILITIES FOR ENSURING A ROBUST, SECURE AND RELIABLE ENERGY INFRASTRUCTURE

Preface

Energy Assurance: The ongoing and collaborative effort among federal, state, and local governments and the private sector to ensure a robust, secure, and reliable energy infrastructure.[1]

The production facilities, transportation networks, and distribution infrastructure that comprise the nation's energy sector represent a key economic asset for the United States. The total energy produced in the United States in 2000 had an estimated value of $185 billion.[2] At the same time, that infrastructure represents a significant national vulnerability. The U.S. economy and the lifestyles of all Americans depend heavily on the availability of a strong, resilient, and responsive energy infrastructure. The blackout that struck much of the northeastern United States and parts of Canada in August 2003 vividly illustrated that vulnerability: an investigation into the cause of the blackout estimated the economic cost to the United States alone at between $4 billion and $10 billion.[3]

The nation's diffuse energy infrastructure—with many pipelines and transmission lines running through sparsely populated areas and electricity substations sited in remote areas—makes the industry susceptible to sabotage by international terrorists, loosely organized home-grown movements, lone-wolf extremists, and common thieves and vandals. Documents discovered in Afghanistan and elsewhere since the September 11, 2001 terrorist attacks indicate that al Qaeda has targeted energy infrastructure, particularly nuclear power plants and oil and gas infrastructure in the United States and Saudi Arabia, as part of a campaign to disrupt the U.S. economy and inflict mass casualties. Attacks on pipelines and efforts to bring down towers supporting transmission lines continue to occur. But as recent history has shown, the more common culprits in energy-related emergencies are technical failures and natural disasters.

As the heads of their states, governors ultimately are responsible for preparing for and responding to energy emergencies within their borders. However, governors' ability to ensure the security of the energy sector, which is largely privately owned, is limited by a lack of regulatory and statutory authority. Though the private energy industry is primarily responsible for ensuring its own security, there are a number of steps governors can take to ensure their states are well positioned to respond to electrical blackouts, oil and gas shortages, and other energy-related crises.

The *Governor's Guide to Energy Assurance* provides governors and other state officials with an overview of the nation's energy sector and its general vulnerabilities; a discussion of the roles and responsibilities of state and federal governments and the private sector in planning for and responding to energy emergencies; and recommendations, based on state experiences, for ensuring a robust supply of energy and effectively responding to energy disruptions.

The guide was written by National Governors Association Homeland Security and Technology Senior Policy Analyst Christopher Logan with assistance from Energy and Natural Resources Program Manager Kara Colton and Senior Policy Analyst Chloe Cromarty. The author also would like to acknowledge the assistance of Delta Star, Inc.; ExxonMobil Corporation; and Southern Corporation. The final product benefited from expert review by the U.S. Department of Energy, the National Association of State Energy Officials, and the North American Electricity Reliability Council. The National Governor's Association's Center for Best Practices gratefully acknowledges the financial support of the Department of Energy's Office of Electricity Delivery and Energy Reliability.

Executive Summary

The U.S. energy industry generates hundreds of billions of dollars in economic activity every year. It is the engine that drives all other sectors of the economy and supports the lifestyles of all Americans. It is also vulnerable—to terrorist attack, vandalism, technological failure, and natural disaster.

Since the Sept. 11, 2001 terrorist attacks and, more recently, the devastating hurricanes that pummeled the Gulf Coast in 2005, governors throughout the country have focused on developing robust plans and procedures for ensuring the security of the energy infrastructure in their states and responding effectively to energy emergencies. They are, however, fundamentally limited in their ability to ensure the security of the privately owned infrastructure that comprises the energy sector. Regulatory and statutory authority is limited at the state level, and the private sector remains largely responsible for ensuring its own security.

Nonetheless, governors can take a number of steps to ensure their states are well positioned to respond to electrical blackouts, oil and gas shortages, and other energy-related crises. These include working with all levels of government—federal, state, and local—to monitor emerging crises and put in place effective response strategies; partnering with the private sector to ensure necessary steps are taken to limit the impact of any energy emergency and quickly recover when crises do occur; and ensuring the plans and procedures state governments will use when the lights go out or the oil stops flowing are up to date, well-tested, and robust.

Effective practices have been identified in several states across the spectrum of energy assurance, from preparedness to response and recovery. They include the following:

Preparedness/Mitigation

- **Conduct Periodic Infrastructure Assessments.** Governors should ensure a full inventory of all energy-related infrastructures in their states is developed and regularly updated.
- **Invest in Infrastructure.** Governors should ensure the state's energy infrastructure is robust and reliable. Strategies for increasing reliability include investing state money to build additional energy infrastructure in a state and region. The **North Dakota Transmission Authority**, for example, was created to plan, finance, and construct new electrical transmission facilities, and the **Wyoming Infrastructure Authority** is charged with developing the state's electric transmission infrastructure as part of an effort to diversify the Wyoming economy.
- **Build Effective Relationships.** Governors should foster effective relationships within their states and with neighboring states. This includes developing strong working partnerships among agencies with responsibilities related to energy security and assurance—including representatives of the state energy office, homeland security structure, and emergency management agency—and working with neighboring states to bolster the performance and resilience of the energy infrastructure. **California**, **Nevada**, **Utah**, and **Wyoming** are jointly developing and funding a new interstate transmission line, the Frontier Line, to improve the resiliency of the electricity infrastructure in those states.
- **Update Energy Assurance Plans.** Governors should ensure state energy assurance plans reflect the new threats of terrorism and sabotage. Many energy assurance plans were written before the September 11, 2001 terrorist attacks and focused mainly on natural disasters and technological failures. Governors should be aware of security and assurance guidelines published by the National Association of State Energy Officials and the North American Electric Reliability Council.
- **Develop Coordinated Risk Communications Plans.** Governors should develop plans to keep the public well informed during and after a disaster or attack that affects a state's energy supply. Avoiding panic and gaining the public's cooperation is a vital part of any response and recovery effort.
- **Exercise Plans and Procedures.** Governors should ensure the state exercises and tests energy emergency plans. Pre-event planning is essential to an efficient emergency response, but any plan will be insufficient if it does not address gaps and erroneous assumptions that can only be identified through regular training and exercises.

Executive Summary

Response

- **Monitor Conditions.** Governors should begin monitoring the condition of the state's energy infrastructure and supplies early in a potential crisis to determine the appropriate steps to take as a situation unfolds.
- **Communicate with the Public.** Governors should serve as the focal point for communicating with the public, providing information regarding supplies and outages, spelling out the state's strategies for responding to energy emergencies, and offering suggestions for how the public can reduce their energy usage.
- **Reduce Energy Demand.** Early in an energy crisis, governors should request that the public voluntarily reduce the consumption of energy—by cutting back on driving, turning off lights and appliances, and shifting energy usage to off-peak hours. When appropriate, governors also should require state-owned facilities to reduce consumption by curbing the use of air conditioning and heating systems, closing nonessential facilities, limiting nonessential travel, and allowing flexible work schedules or telecommuting.
- **Declare a State of Energy Emergency.** Governors should consider whether an energy supply disruption is significant enough to merit an emergency declaration. By declaring a state of emergency, governors can implement measures that would otherwise be unavailable to them. These include strategies to increase the supply of petroleum, such as lifting restrictions on the number of hours fuel truck drivers can be on the road or allowing the use of gasoline that does not meet local clean air requirements; implementing state programs to oversee the production and allocation of energy; and deploying the National Guard to maintain order and provide security.
- **Request Federal Assistance.** Governors should call on the federal government to assist when necessary. The federal government can provide financial assistance, help in coordinating resupply efforts, monitor national or regional energy supply conditions, and provide waivers for federal regulations that could inhibit the state's ability to respond quickly and efficiently.

Recovery

- **Facilitate Resupply.** Governors should work with private industry to coordinate resupply efforts by monitoring conditions inside and outside the state, obtaining transportation and pollution-control waivers, implementing supplementary purchase contracts, and ensuring essential facilities such as hospitals, water treatment plants, and supermarkets are a high priority for restoration. Governors should work closely with state utilities to identify their needs. After Hurricane Ivan in October 2004, **Florida** petroleum dealers told the state they needed 100,000 gallons of distillate per day to run emergency generators. State officials then worked with **Louisiana** and **Texas** to secure rail shipments totaling one million gallons of diesel fuel.
- **Assess Infrastructure.** In the aftermath of an energy emergency, governors should conduct a full assessment of their state's energy infrastructure, working with local jurisdictions, the federal departments of Energy and Homeland Security, the Nuclear Regulatory Commission, and the private sector.
- **Conduct After-Action and Lessons Learned Analyses.** Governors should convene working groups of those affected by the energy emergency, including utilities, industry, energy suppliers, local officials, and the public to assess what worked well and what did not and identify where improvements need to be made. Based on the conclusions of those after-action and lessons-learned analyses, governors should ensure state plans and procedures are updated to reflect recommended changes.

The Nation's Energy Infrastructure: An Overview 1

The nation's energy infrastructure is a combination of complex, often interconnected facilities and networks that include refineries, power plants, and other production facilities; transmission networks such as high-capacity electricity transmission lines, petroleum and natural gas pipelines, ocean-going tankers, barges, rail cars, and long-haul trucks; and distribution networks comprised of electrical substations, transformers and distribution lines, oil and gas pipelines, storage facilities, and retail service stations. The infrastructure also includes supervisory control and data acquisition (SCADA) computer systems that control, direct, and detect failures in energy networks. Each component of the energy industry has unique characteristics—and unique vulnerabilities.

Electricity

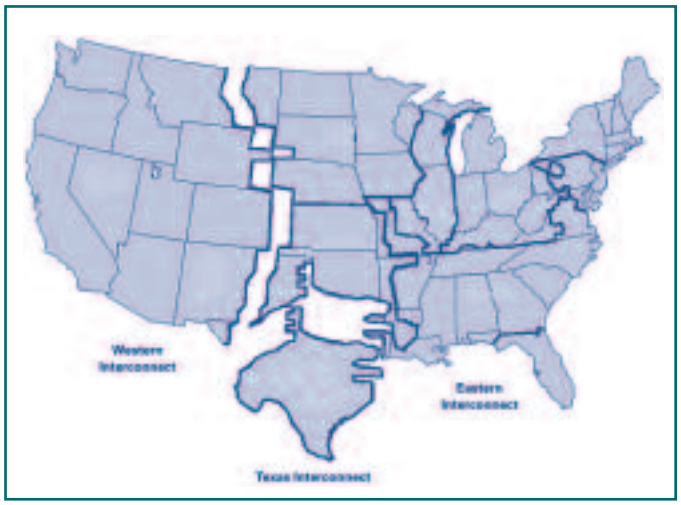
Generating Capacity. Electricity in the United States is generated by approximately 17,000 utility and nonutility owned power plants operating in every state. The total "nameplate" capacity of those plants—that is, the maximum amount of electricity they could generate in an ideal environment—is approximately 980 million kilowatts. In 2004, the most recent year for which full-year data is available, those plants generated nearly 3,900 billion kilowatt hours (kWh) of electricity, including 184 billion kWh from facilities that generate both power and heat.

Coal is the largest fuel component of the nation's electricity generating industry, accounting for 53 percent of the fuel used to generate electricity in 2003. Other fuels, and the percentage of electricity they generated in 2004, include:

- nuclear—20 percent;
- natural gas—18 percent;
- water (hydro)—7 percent;
- oil—3 percent; and
- geothermal and other renewable fuels—3 percent.[4]

Transmission and Distribution. In addition to generating plants, the U.S. portion of the power system includes more than 150,000 miles of high-voltage transmission lines,[5] which carry electricity at 230 kilovolts (kV), 345 kV, 500 kV, or 765 kV; more than 100,000[6] transformers that regulate voltage levels as electricity moves on and off the transmission system; thousands of substations and switching stations; hundreds of thousands of miles of distribution lines; and millions of electricity customers, such as households, industries, businesses, schools, and hospitals.

"The Grid." The nation's power sector is not one integrated network of generating plants, transmission lines, transformers, and distribution systems. Rather, it is comprised of three distinct grids, or "interconnections." The Eastern Interconnection covers the eastern two-thirds of the country and Canada from Saskatchewan to the Atlantic Ocean. The Western Interconnection includes the western United States and the Canadian provinces of Alberta and British Columbia and a portion of the Mexican state of Baja California. The Texas Interconnection includes most of the state of Texas. There are a few, small direct-current links among the three interconnections, but they are otherwise electrically independent.[7]



Office of Electricity Delivery and Energy Reliability, Distributed Energy Program. (Washington, D.C.: U.S. Department of Energy).

Oil and Gas

Production. As of January 2005, proven U.S. petroleum reserves totaled an estimated 21.9 billion barrels and were concentrated in Alaska, California, Louisiana, and Texas. About 500,000 wells pull that oil from the ground, although most wells in the United States are rated as "stripper" wells, meaning they produce just a few hundred barrels of oil each day. In 2003, the United States produced roughly 5.7 million barrels per day (bbl/d) of crude oil and 2.1 million bbl/d of natural gas liquids and other liquids.[8] During the first 10 months of 2004, the

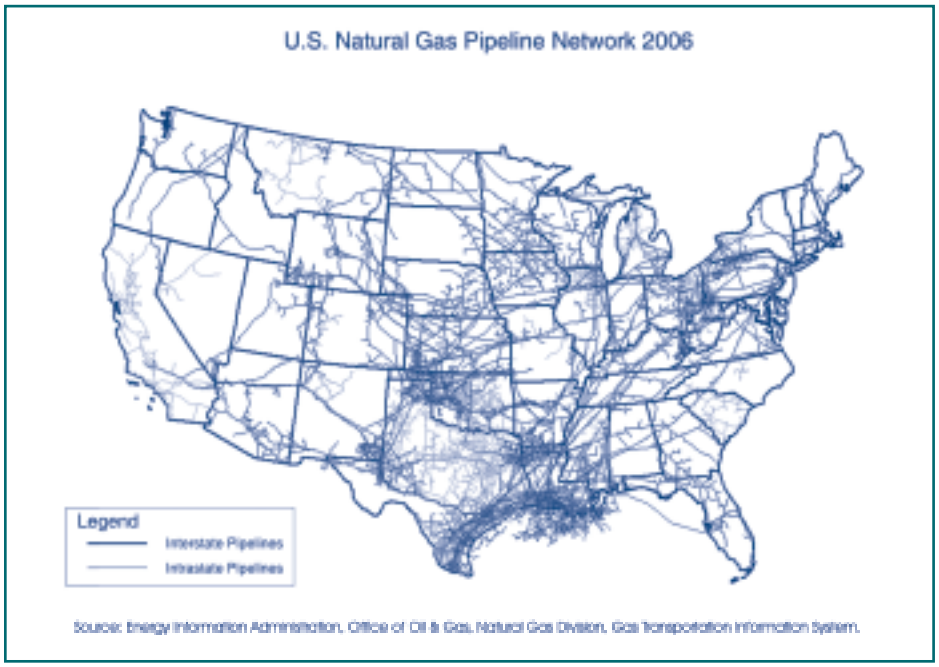
United States imported an additional 11.8 million bbl/d of both crude and refined oil—nearly 58 percent of the total U.S. oil demand.[9] Approximately 149 petroleum refineries, with a total refining capacity of about 17.4 billion bbl/day, operated in the United States in January 2006. This includes the capacity of refineries still recovering from damage caused during the 2005 hurricane season.

Distribution. Crude oil is transported to refineries via tanker or pipeline, while refined products such as gasoline, diesel, heating oil, and jet fuel generally are transported from refineries to terminals in local markets via pipeline. Tanker trucks then transport the products the relatively short distances between the terminals and businesses, homes, or airports. Rail cars and barges also are used to move a significant amount of products. Nearly all of the natural gas in the United States is moved via pipeline, with the exception of imported stocks that arrive in tankers in a liquid state and are then regasified and entered into the pipeline system.

The nation has more than 1.5 million miles[10] of oil and gas transmission and distribution pipelines carrying crude oil, refined petroleum products, and natural gas from shipping terminals and refineries to production facilities and distribution points across the United States. The natural gas infrastructure also includes approximately 400 underground gas storage facilities, operated by 127 separate companies.[11] The petroleum supply system includes the storage facilities, terminals, delivery trucks, pipelines, rail cars, service stations, and other facilities that provide the link between producers, distributors, retailers, and consumers.

SCADA

Every component of the energy industry, to one degree or another, depends on computer and telecommunications networks for command and control of operations. For example, these networks monitor the flow and pressure of liquids in pipelines, regulate and monitor the amount of electricity on high-voltage transmission lines, and are used to operate refineries and electricity generating plants, including nuclear power plants.



The Nature of the Threat 2

Managing the vulnerability of energy infrastructure is a necessary element of our national security, economic well-being, and environmental protection. Based on the level of vulnerability and risk, measures should be taken to detect, prevent, control, and manage the consequences of terrorism directed toward energy infrastructure.

—National Governors Association[12]

Electricity Vulnerabilities

The electricity system in the United States is vulnerable to a variety of threats, both natural and manmade. Short-term, localized disruptions to electrical power are common in some parts of the country, generally due to seasonal electrical, wind, and ice storms. However, sabotage is also a threat.

The Federal Bureau of Investigation arrested suspected eco-terrorists in December 2005 in connection with the toppling of a Bonneville Power Administration transmission tower near Bend, Oregon, in 1999. Two years earlier, a 62-year-old Spokane, Washington, man turned himself into police in Sacramento after the FBI issued a warrant for his arrest on charges of removing bolts from the footings of high-voltage transmission towers owned by utility systems in the western United States. In October 2004, two bolts were removed from a transmission tower in Milwaukee, causing the tower to fall on a rail line and knocking out power to about 17,000 customers for several hours.

Beyond those limited attacks, experts warn switching systems that control electrical substations could be vulnerable to sabotage and, if damaged, are expensive and difficult to replace. Any disruption to key switching stations during peak use times, such as in the summer, could cause a significant strain on an entire interconnect. Should a number of critical switching stations come off line, entire segments of the grid could be affected for weeks.[13]

In fact, significant terrorist attacks against electrical systems are common in other parts of the world. In Colombia, for example, the electrical grid is a favorite target of the Revolutionary Armed Forces of Colombia (FARC). Shortly before the country's May 2006 presidential elections, a FARC bombing of the electrical grid serving the port city of Buenaventura left the city in darkness for days.

In the United States, storms, natural disasters, and technological failures are more common causes of widespread outages. The most memorable recent example of a widespread outage occurred on August 14, 2003. Shortly after 4:00 p.m., a power failure that began in Ohio rippled quickly eastward, crossing large portions of the northeast United States and eastern Canada, eventually affecting 50 million people and 61,800 megawatts of electrical load in eight states and one Canadian province. While power to the majority of customers was restored in less than 30 hours, in some parts of the affected states the lights did not come back on for four days and parts of Ontario, Canada, experienced rolling blackouts for more than a week. Estimates of the total costs to the United States range from $4 billion to $10 billion, including lost income to workers and investors, extra costs to governments for overtime and emergency services, direct costs to affected utilities, and costs associated with lost or spoiled commodities. The Canadian government estimated the blackout caused a 0.7 percent drop in gross domestic production for the month—a net loss of 18.9 million work hours—and economic damages to manufacturing shipments of $2.3 billion.[14]

The binational U.S.-Canada Power System Outage Task Force, formed to investigate the outage, concluded a number of factors contributed to the blackout. Overall, the task force reported, the blackout "was caused by deficiencies in specific practices, equipment, and human decisions by various organizations that affected conditions and outcomes that afternoon… [D]efficiencies in corporate policies, lack of adherence to industry policies, and inadequate management of reactive power and voltage caused the blackout."[15]

The 238-page task force final report, published in April 2004, included 47 recommendations addressing institutional reliability issues; supporting and strengthening industry compliance and reliability programs; and improving the physical and cyber security of the North American Bulk Power System and the Canadian nuclear power sector.[16]

Petroleum Vulnerabilities

On December 15, 2004, Osama bin Laden declared in an audio recording that the West was paying far too little for oil and exhorted his followers to attack oil facilities in an effort to drive the price of oil to $100 a barrel. Islamic terrorists had already targeted oil interests in the Gulf region. In May 2004, al Qaeda operatives launched an assault against the hub of the Saudi Arabian oil industry, Khobar, killing 22 foreign oil workers. In October 2002, the French supertanker Limburg, carrying 158,000 tons of crude, was rammed by a small, explosives-laden boat off the coast of Yemen. The Limburg burst into flames and leaked approximately 90,000 barrels of oil into the Gulf of Aden. One crew member was killed and 12 others were injured. Terrorism, mixed with the geopolitical underpinnings of bin Laden's global fight against the West, is therefore a very real threat to the petroleum industry.

In the United States, that terrorist threat has yet to manifest itself. Mother Nature, on the other hand, is another story.

In the autumn of 2004 and 2005, a series of major hurricanes bombarded the Gulf Coast of the United States, significantly degrading the nation's petroleum production and refining capacity. Hurricane Ivan disrupted drilling operations in the Gulf of Mexico in September 2004, causing a loss of more than 29 million barrels of oil production through early November of that year. Damage to offshore platforms and other infrastructure in the Gulf caused ongoing supply disruptions that reduced federal off-shore Gulf of Mexico output by more than one-half, from more than 1 million bpd on September 14, 2004 to 450,000 bbl/d in October. Yet within six months, production rates had reached 96 percent of pre-Ivan levels.

The damage wrought by Hurricane Ivan was eclipsed by the devastation inflicted in August and September 2005, first by Hurricane Katrina, then by Hurricane Rita. Two days before slamming into Plaquemines Parish, Louisiana, on August 29, Hurricane Katrina—then a powerful Category 4 storm with sustained winds of 131 to 155 miles per hour—pounded the offshore energy infrastructure, forcing the evacuation of 615 of the 819 manned oil platforms in the Gulf of Mexico and reducing Gulf oil production by more than one-third.[17]

By the time Hurricane Rita made landfall along the Texas-Louisiana border on September 24, more than 190 oil and gas drilling rigs had been set adrift or sunk. Virtually all oil and gas production operations came to a standstill as Hurricane Rita crossed the Gulf. The federal government called the combined damage of the two storms "the most significant blow to the U.S. petroleum and natural gas industries in recent memory."[18]

In November 2005, two months after the storms had passed, nearly 53 percent of normal daily Gulf of Mexico oil production, and an estimated 47 percent of natural gas production, remained off-line. According to the U.S. Energy Information Administration, in November 2005 it appeared "unlikely that anything close to complete recovery will occur before the end of the second quarter of 2006."

Refineries also suffered, although to a much lesser degree than well production. In 2004, Hurricane Ivan forced the closure of eight refineries, representing approximately 13 percent of total U.S. refining capacity[19], but most were able to restart within days. Hurricane Katrina shut down or reduced operations at most refineries along the Gulf Coast. Rita had a similar effect, although by mid-November 2005, refining operations on the Gulf Coast had reached about 90 percent of total capacity. At the end of January 2006, two refineries in the region remained completely shut down as a result of Hurricanes Katrina and Rita.[20]

Pipeline Vulnerabilities

The United States has more than 1.5 million miles of oil and gas transmission and distribution pipelines that carry crude oil, refined petroleum products, and natural gas from shipping terminals and refineries to production facilities and distribution points nationwide. Because of the network's size, it is vulnerable to damage by weather and attacks by vandals, saboteurs, or terrorists. Pipelines can be physically damaged with explosives or firearms. Flows can be disrupted and product can be lost. In addition, attacks can be launched against the computer control systems that regulate the flow of products through the lines.

Attacks and threats against pipelines have been reported throughout the world and in the United States. In 1999, for example, police in Vancouver arrested a man planning to attack the trans-Alaska pipeline with high explosives. He reportedly was seeking to maximize his profits in oil futures. In late 2001, a man shot holes in the trans-Alaska pipeline with a high-powered rifle, forcing a two-day shutdown and causing significant economic and ecological damage. That same year, federal officials

discovered computer hackers in the Middle East had infiltrated secure Web sites in the United States detailing information about local energy infrastructure. Oil pipelines also have been targeted and damaged by insurgents in Iraq and thieves in Nigeria.

In this country, nature has been the main perpetrator of the damage suffered by pipeline systems. Some of the most significant damage to the oil infrastructure in the Gulf of Mexico during the 2004 and 2005 hurricane season involved pipelines that were dislodged or ripped open by drifting off-shore rigs or buried by mud and sediment. Technological failure takes a toll, too. In July 2006, British Petroleum discovered severe corrosion in a pipeline system feeding crude oil from the company's Prudhoe Bay, Alaska, oilfields into the 800-mile Alyeska Trans-Alaska Pipeline System. BP immediately shut down its Prudhoe Bay field, the nation's largest, cutting domestic petroleum supplies by 8 percent.

The expansiveness and vulnerability of the nation's pipeline networks requires a mix of prioritization, preparedness, and assurance. Pipeline operators, for example, focus their attention on particularly vulnerable areas, including control centers, major pipeline junctions, river crossings, and storage tanks. By gathering intelligence on potential threats, hardening facilities, ensuring adequate surveillance and monitoring, and ensuring a rapid and coordinated law enforcement response to stop attacks once they are underway, the threat can be pushed to areas where the consequences of an attack would be more confined and more manageable.

Nuclear Power Plant Vulnerabilities

The 103 operating commercial nuclear power reactors in the United States comprise approximately 20 percent of the nation's electricity production capacity. Because of the nuclear fuel they use to create electricity and the waste they generate, nuclear plants present unique security risks.

The potential for widespread contamination and mass casualties if a nuclear reactor containment structure is breached creates an obvious target for terrorists intent on inflicting maximum physical, economic, and psychological damage on the United States. On-site cooling pools for spent nuclear fuel offer another potential target, as do storage casks of spent fuel rods and other waste materials—both in above-ground storage facilities and during transport to off-site storage, disposal, or treatment facilities.

The Nuclear Regulatory Commission (NRC) is responsible for ensuring the security of the nation's fleet of privately owned nuclear power plants. It mandates that plant operators maintain security systems and procedures to meet a minimum threat level—known as the "design basis threat"—as well as emergency response plans to deal with accidents and other incidents. The NRC tests those security plans and procedures in periodic mock attacks on the plants and requires frequent exercises of each plant's emergency response plans.

SCADA Vulnerabilities

As early as 1997, the President's Commission on Critical Infrastructure Protection warned that cyber attacks were a growing point of vulnerability in the nation's critical infrastructures. According to one report, 70 percent of the attacks on SCADA systems since 2001 originated outside the targeted organization, up from 31 percent of the incidents recorded between 1980 and 2001.

The Government Accountability Office reports that several factors have contributed to the escalation of risks specific to computerized control systems: the adoption of standardized technologies with known vulnerabilities; the interconnection of control systems with other networks; insecure remote connections; and the widespread availability of technical information about control systems.[21]

In 2003, the North American Electric Reliability Council (NERC) issued temporary cyber-security standards, which the bulk electric system owners and operators voluntarily adopted pending the development of final standards. The effort to publish those final rules was complicated by the far-reaching effect of the new standards, which will cover a much greater segment of the industry than the interim rules, affecting power plants, some distribution utilities, substations, and any other facility connected directly to the bulk electric system. The interim standard affected only transmission grid operators and control system coordinators. NERC approved the final standards in May 2006.[22]

Interdependencies

The nation's energy infrastructure is a complex system of interdependent sectors. The natural gas pipelines that feed gas-fired electric power plants, for example, require electricity to operate

the computer systems and the pumps that keep the gas pressurized and moving. Refineries that produce fuel oil, propane, and gasoline require electricity to operate, as do the service stations that deliver gasoline to consumers.

The energy sector, in turn, is part of a massive, interconnected system of systems that comprise the nation's critical infrastructures and key assets. For example, water and sewage treatment plants cannot operate without electricity, nor can most subway systems in large cities. Transportation systems—planes, trains, trucks, and automobiles—depend on the availability of refining capacity and the pipelines and distribution networks that make diesel and gasoline available. Those refineries depend on the highway systems, rail lines, and waterways over which crude and refined products travel. Computer systems that control much of the nation's infrastructure are vulnerable to attacks from hackers and breaches in the fiber-optic and telecommunication lines that carry data throughout the nation and the world. The banking system, credit card processing facilities, and ATM machines also depend on telecommunications systems and a steady supply of electricity.

Prolonged disruptions in any one segment of the energy sector ultimately will have cascading effects throughout the sector and, over time, throughout the entire economy.

The Governors' Role in Energy Assurance 3

Governors have direct constitutional and legal responsibility for the protection and safety of their citizens.

—National Governors Association[23]

Government at all levels will be involved in responding to disasters, attacks, and other incidents that affect the nation's energy supplies. The energy industry will be responsible for repairing damaged infrastructure and restoring services, but federal agencies and state and local government will play important, and sometimes overlapping, roles in coordinating the response, gathering and sharing intelligence and information, communicating with key players and the public, and conducting criminal investigations, after-action reviews, and vulnerability assessments. Table 1 (pp. 10–11) provides a detailed breakdown of the roles and responsibilities of federal, state, and local government agencies and the private sector.

As they do for any emergency or disaster, governors and state officials should develop plans for managing severe energy supply disruptions by focusing on three broad areas: preparedness and mitigation, response, and recovery. While specific actions will be determined by the exact nature of the event or circumstances, the chart on this page and the following checklists provide some basic guidance for the strategies governors may use in preparing for, responding to, and recovering from energy crises.

Preparedness and Mitigation

Preparing for energy shortages involves a combination of sound planning and active measures to bolster a state's energy infrastructure. Effective preparedness planning improves the ability of a state's energy sector to weather threats, can shorten the duration of outages, and enchances the state's ability to quickly recover from energy supply shortages.

As part of an energy preparedness strategy, governors should:

✓ **Conduct infrastructure assessments.** Governors should ensure a full appraisal of all energy-related infrastructure in their states is conducted and regularly updated. State officials should work with local jurisdictions and the Department of Energy, the Department of Homeland Security, the Nuclear Regulatory Commission, regional electric reliability organizations, and the private sector to identify and assess the vulnerabilities of all energy-related assets in the state.

✓ **Make or facilitate infrastructure investments.** By investing in a robust and reliable energy infrastructure both internally and regionally, states can avoid or limit the impact of energy supply disruptions. Several states have taken steps to improve the electrical transmission infrastructure inside their borders. In **North Dakota**, Gov. John Hoeven recently created a new agency to plan, finance, construct, develop, and if necessary acquire and operate electrical transmission facilities. The North Dakota Transmission Authority is authorized to

- make grants and loans;
- establish reasonable fees, rates, tariffs, and other charges;
- obtain permits and acquire rights of way;
- identify, plan, prioritize, and propose electric transmission corridors; and
- create and execute interest rate exchange contracts.

Governors' Role in Energy Assurance

Governors should:

- identify lead state agencies for the energy sector;
- ensure that the lead agencies assess the energy sector's vulnerabilities;
- work closely with the lead agencies to develop and implement protection plans;
- coordinate with lead agencies and industry to develop warning notification systems and conduct public awareness campaigns;
- direct the lead agencies to partner with the private sector to develop and implement innovative infrastructure assurance strategies; and
- coordinate with the lead federal agencies for this category as required.

—A Governor's Guide to Emergency Management Vol. 2: Homeland Security

In **Wyoming**, Gov. Dave Freudenthal created the Wyoming Infrastructure Authority to diversify and grow the state's economy through the development of the state's electric transmission infrastructure. As in North Dakota, the authority is responsible for planning, financing, building, maintaining, operating, and acquiring electric transmission and related facilities. State law empowers the authority to:

- issue up to $1 billion in bonds to finance new transmission lines to support new generation facilities;
- own and operate lines in instances where private investment is not offered;
- enter into partnerships with public or private entities to build and upgrade transmission lines; and
- establish and charge fees for the use of its facilities in consultation with the public service commission and other related government entities.

✓ **Develop regional strategies.** Governors can work regionally to develop new transmission capacity that will improve the performance of the existing infrastructure and improve energy assurance for participating states. **California** Gov. Arnold Schwarzenegger, **Nevada** Gov. Kenny Guinn, **Utah** Gov. Jon Huntsman, and **Wyoming** Gov. Dave Freudenthal have signed a memorandum of understanding (MOU) to create and site a new interstate electric transmission line. The "Frontier Line" would originate in Wyoming and have terminal connections in California, Nevada, and Utah. The line would carry power generated by conventional fuels and renewable resources at a projected cost of between $296 million and $1.7 billion.

Twelve Midwestern governors have agreed to work together and with the premier of Manitoba, Canada, to promote electric transmission investment and cooperate on permitting and siting interstate and international electric transmission lines. The governors of **Illinois**, **Indiana**, **Iowa**, **Kansas**, **Michigan**, **Minnesota**, **Missouri**, **Nebraska**, **North Dakota**, **Ohio**, **South Dakota**, and **Wisconsin** and the premier of Manitoba have agreed to:

- make additional investments in the electric transmission grid when they are needed and in the public interest;
- coordinate efforts to improve the evaluation and processing of permit applications for electric transmission lines that cross state and national boundaries; and
- promote legislation that gives states' permitting and siting authorities the power to work with other governmental permitting and siting authorities on activities regarding proposed electric transmission lines and consider state and regional needs when evaluating proposed transmission lines.

✓ **Build effective relationships.** Officials with responsibilities related to energy security and assurance—including representatives of the state energy office, homeland security structure, and emergency management agency—must be involved in planning efforts relating to homeland security in general and energy security specifically. Governors should ensure those state offices and agencies have working relationships with each other and with the state's energy-related industries.

During the 2004 hurricane season, **Florida's** electricity restoration efforts benefited from established mutual assistance relationships among investor-owned, cooperative; and municipal utilities; the state's Public Service Commission; and other state agencies. The PSC had representatives at the state emergency operations center and, at the request of electric utilities, quickly coordinated with the state Department of Transportation to reopen roads and allow out-of-state work crews to enter after each storm.

✓ **Update energy assurance plans.** Many state energy assurance plans were developed before the September 11, 2001 terrorist attacks and may not fully address new and emerging threats of terrorism and sabotage. Governors should direct state energy officials to review their respective assurance plans to confirm that they take into account those threats and incorporate the lessons learned from the August 2003 Northeast blackout. The State Energy Program, which funnels Energy Department grants to states and state energy offices, now requires states to prepare energy emergency plans as a condition of that funding. Governors also should be aware that NERC and the National Association of State Energy Officials (NASEO) have issued guidelines for state energy security and assurance planning.

- **NASEO Energy Assurance Guidelines**
  NASEO published State Energy Assurance Guidelines in June 2004 and updated them in November 2005. The guidelines aim to help states develop energy assurance plans and address "the state's overall role in energy assurance, including organizing and building response mechanisms, coordinating with stakeholders, operating within the federal emergency support function structure, planning response

strategies, profiling energy use and vulnerability, and identifying fuel-related response measures."[25]

While the guidelines provide a measure for comparing and improving state energy assurance plans, they "cannot substitute for the effort required to assemble state-specific information, address state-specific organizational and strategic needs, and plan for events that may affect public welfare and supply."[26]

- **NERC Security Guidelines**
  Security guidelines prepared by NERC for the electricity sector offer approaches and considerations for vulnerability and risk assessment, threat response capability, emergency management, continuity of business processes, communications, physical security, information technology and cyber security, employment screening, and sensitive information protection.

The guidelines are designed to help electricity providers periodically reevaluate their plans, procedures, and protocols for responding to a broad spectrum of threats, particularly those associated with terrorism. As noted elsewhere in this report, the Energy Policy Act of 2005 authorizes the creation of an electric reliability organization with the statutory authority to enforce compliance with reliability standards. NERC was named to fill that role by the Federal Energy Regulatory Commission in 2006.

✓ Develop coordinated risk communications plans. Containing panic during and after a disaster or attack that affects a state's energy supply is a vital part of response and recovery efforts. States should develop risk communication protocols that clearly define roles and responsibilities of state agencies in working with the press and communicating directly with the public.

Officials believe that during the four major hurricanes that crossed **Florida** in the fall of 2004, communications with the public were effective largely because the governor and state officials had planned their response well in advance of the storms. State agencies coordinated at the emergency operations center with local and federal government agencies and with private-sector emergency operations centers and offices. According to a review of the state's response, the "key to this success was the high level of responsibility accepted by both the public and private sectors. The governor of Florida gave clear guidance requiring the highest level of coordination and cooperation. The federal government provided needed expertise and assistance. The private sector provided its expertise and managed its human resources."[27] The State Energy Office also worked with the petroleum industry to coordinate its response, keep stakeholders informed, help find and expedite the purchase of external supplies, obtain government waivers, and inform the public about the availability of gasoline and other fuels.

✓ Exercise Plans and Procedures. Though pre-event planning is essential to an efficient emergency response, plans will prove insufficient if they are not amended to address gaps and erroneous assumptions identified through regular training and exercises. This is true for energy plans as well as plans related to mass casualty events, terrorist attacks, or disease outbreaks.

Energy-related exercises should be conducted within the state, but regional exercises also are particularly useful for energy response planning because of the cross-border, interdependent nature of the nation's energy supply systems.

DOE's Office of Electricity Delivery and Energy Reliability, in collaboration with national organizations such as the National Governors Association, has sponsored a series of regional energy assurance tabletop exercises for states. The meetings simulate energy emergency scenarios to facilitate discussions on how states would react and respond. The scenarios illustrate the sector, geographic, and jurisdictional interdependencies of a region's energy infrastructure and identify and test organizational overlaps and dependencies, state energy assurance/emergency management plans, communication procedures, and policy responses.

✓ Coordinate with the private sector. Governors should work closely with the private sector to develop emergency response and risk communication plans for incidents affecting privately owned systems or infrastructure. Forging a trust-based relationship between emergency response officials and the private sector is essential to ensuring effective security preparations, including accurate vulnerability assessments and the integration of private-sector emergency response plans with those of government agencies.

Several federal initiatives are formalizing public-private partnerships. The National Infrastructure Protection Plan (NIPP), released by the Department of Homeland Security in 2006, details the development of a structure for collaborating among

the private sector, state governments, and federal agencies. The backbone of the NIPP is a network of industry-specific Sector Coordinating Councils and related Government Coordinating Councils through which representatives from the private sector and government will share information, collaborate, and develop strategies for protecting critical infrastructure. The various councils are coordinated through the Partnership for Critical Infrastructure Security, composed of representatives of each of the sector coordinating councils; and the NIPP Senior Leadership Council, composed of representatives of each Government Coordinating Council.

A separate partnership organization, The Infrastructure Security Partnership (TISP), was formed to promote collaboration within government and industry to improve the resilience of the nation's critical infrastructure against natural and man-made disasters. TISP members include state, local, and federal agencies; national organizations; academics; and representatives of the design, construction, operation, and maintenance communities.

Table 1: Energy Emergency Roles and Responsibilities

Sector	Threat	State and Local	Federal	Industry
Electric	• Natural Events with Local Outages (Winter and Summer Storms, etc.) • Natural Disasters with Widespread Outages (Hurricanes, Tornados, Large Ice Storms, etc.) • Technical Failures (Grid Overloads, Local Transformer Failure, etc.) • Terrorism/Sabotage	• First Response to Emergencies • Monitor Conditions • Implement Energy Emergency Management Plans • Communicate with the Public • Request Reductions in Consumption • Mandate Reductions by State Agencies • Consult on Restoration Priorities • Declare State of Emergency • Consult on Restoration Priorities • Facilitate Restoration Efforts through Regulatory Waivers, Debris Removal, etc. • Request Federal Assistance/Waivers • Oversee Industry Cost-Recovery Efforts • Assess Infrastructure • Conduct After-Action Studies • Investigate Criminal/Terrorist Activity	• Share Information • Facilitate Government-Industry Communication • Monitor Conditions • Implement National Response Plan • Assist in Damage Assessments • Assist with Location and Transportation of Repair Crews and Equipment • Prioritize Placement of Emergency Generators/Transformers • Consult on Restoration Priorities • Facilitate Post-Disaster Re-inspection of Facilities • Provide Driver Hour/Weight/Pollution Control Waivers • Investigate Criminal/Terrorist Activity	• Monitor Conditions • Provide Facility Security • Develop and Exercise Emergency Response Plans • Communicate with Ratepayers, Government Agencies • Conduct Damage Assessments • Manage All Aspects of Repair and Restoration Operations • Request Government Assistance/Waivers • Share Information with Industry/Government • Enact Mutual Aid Agreements

Sector	Threat	State and Local	Federal	Industry
Oil and Gas	• Natural Events with Local Refinery/Pipeline Outages (Winter and Summer Storms, etc.) • Natural Disasters with Widespread Outages (Hurricanes, Tornados, Large Ice Storms, etc.) • Technical Failures (Equipment Failure, etc.) • Terrorism/Sabotage	Do All of the Above and: • Provide Facility Security • Use Supplementary Purchase Contracts • Enact Mutual Aid Agreements	Do All of the Above and: • Provide Jones Act Waivers • Implement National Response Plan	Do All of the Above
Nuclear Power	• Technical Failures (Equipment Failure, etc.) • Spent Fuel/Waste Accidents • Terrorism/Sabotage	• Exercise Emergency Response Plans • Declare State of Emergency • Implement Evacuation/ Shelter in Place Plans • Communicate with the Public • Communicate with Federal Government • Coordinate Resource Allocation • Provide Facility Security (National Guard)	• Monitor Situation • Communicate with Industry, State and Local Government • Implement National Response Plan • Provide Technical Assistance • Provide Financial Assistance • Provide Environmental Monitoring • Provide Public Health Monitoring	• Develop Emergency Response Plans • Provide Training to Plant Employees • Develop Mutual Aid Agreements with Local Agencies • Implement Emergency Response Plans • Manage Repair/Recovery Efforts • Coordinate with State/Federal Agencies • Communicate with the Public • Provide Facility Security (Private) • Provide Environmental Monitoring
SCADA	• Technical Failures • Hacking Attacks • Terrorism/Sabotage	• Monitor Network Status • Communicate with Federal Government • Communicate with Private Sector • Develop Emergency Response Plans • Implement Emergency Response Plans	• Monitor Network Status • Monitor Outside "Hacking" Attacks • Monitor Attempted Electronic Incursions • Develop CyberSecurity Protocols • Communicate with Private Sector • Communicate with State/Local Government • Implement National Response Plan	• Provide Network Security • Monitor Attempted Electronic Incursions • Develop Response/Recovery Plans • Implement Response/Recovery Plans • Communicate with Industry • Communicate with State/Federal Agencies

In addition, Information Sharing and Analysis Centers (ISACs) have been established for a number of industries, including the electricity sector and the oil and gas sector. The ISACs are used to share information on threats and planning among industry members; state, local, and federal agencies; and other industries. NERC operates the Electricity Sector ISAC and provides daily infrastructure reports from the Department of Homeland Security; advisories, alerts, and notices from federal agencies; and information on security standards and guidelines.

States also should consider developing direct relationships with industries in their states. ExxonMobil, for example, maintains close working relationships with each state where the company has a large industrial presence. Company officials have met with state officials in at least one state to discuss their security efforts and the threats they are and are not capable of managing on their own.

Direct relationships with the energy infrastructure owners and operators in a state are important for many reasons, but coordination of effort during the response to a disaster is essential. During the 2004 hurricane season, Florida utilities sent representatives to state and local government EOCs. Other utility officials were available by telephone or other communication systems. Emerging problems were solved at the local level by officials who felt empowered to make critical decisions and then report what they had accomplished.[28]

✓ Initiate demand response programs. Strategies aimed at reducing electricity demand and load during peak periods, known broadly as demand response programs, are emerging as a popular way to address system reliability problems and adapt to market conditions.

Demand response programs rely on a variety of financial incentives to encourage consumers to use less electricity. They have proved effective in addressing seasonal supply shortages and reliability. **California** is considered a leader in the use of demand response strategies, which the state successfully used to temper the electricity crises that plagued the state in 2000 and 2001. During the 2001 crisis, for example, "the state averaged a 10 percent cut in peak demand during the summer months (with a record reduction of 14 percent in June). … No rolling blackouts occurred in 2001, despite the rather dire forecasts that had been made prior to the onset of the spring and summer peak demand periods."[29] Like California, **New York**, and particularly the densely populated area around New York City, also has faced supply shortages and has a comprehensive, well-established set of demand response programs.

It should be noted, however, that New York's demand response program had no effect during the August 2003 blackout, when electricity simply stopped flowing in the entire northeastern United States. As one recent analysis noted, "the exact contribution of demand response to alleviate emergency supply conditions will vary from case to case."[30] Nonetheless, demand response programs can be used to avoid widespread outages in some circumstances.

✓ Arrange supplementary purchase contracts. Governors can work with electric utilities and gas and oil distributors in advance of an energy crisis to develop agreements to purchase additional power or electrical transmission services, natural gas, and petroleum. These supplementary contracts can be put into effect when normal supplies are limited.

Response

The state's primary role in responding to energy crises or emergencies is one of coordination and communication. In severe emergencies, additional roles such as providing logistical support, security forces, and financial resources may be required. The following checklist provides a basic guide to the actions governors can take during an energy crisis.

✓ Monitor conditions. Governors should begin monitoring the condition of the state's energy infrastructure and supplies early in a potential crisis. By working closely with the energy industry, the state energy office, regional transmission organizations, independent system operators, and the federal government, governors can determine the appropriate steps to take as a situation unfolds. Monitoring the condition of the energy infrastructure also enables the governor to provide accurate and up-to-date information to the public.

✓ Communicate with the public. Governors will be the focal point for communicating with the public, providing information regarding supplies and outages, and spelling out the state's strategies for responding to energy emergencies.

✓ Request reductions in demand. Early in an energy crisis, governors can ask the public to reduce the consumption of energy and shift consumption to off-peak hours voluntarily.

Governors can promote the use of public transportation, carpooling, telecommuting, and flexible work schedules, and encourage fuel-intensive industries to moderate consumption.

✓ **Mandate reductions at state facilities.** Governors can require state-owned facilities to reduce consumption by turning off, or reducing the settings of, air conditioning and heating systems. Non-essential facilities can be temporarily closed or operate on reduced hours. Non-essential travel can be prohibited. Governors also can consider allowing state employees to work flexible schedules or telecommute if those actions will result in a net reduction in energy use.

✓ **Declare a state of energy emergency.** By declaring a state of emergency, governors gain access to a series of measures that would otherwise be unavailable. Governors' emergency powers vary by statute from state to state, but some examples of the authority afforded to governors during emergencies include:

- Lifting state limits on the number of hours truck drivers can be on the road to allow fuel, replacement parts, and repair crews to reach areas affected by energy outages more quickly. Because federal rules also regulate the number of hours truck drivers can be on the road in any 24-hour period, state action should be coordinated with requests for waivers of those federal regulations.
- Waiving state fuel formulation and other pollution-control regulations to allow for the use of gasoline and other fuels that do not meet state clean air requirements. Again, federal regulations also apply in this area, so governors should coordinate their decisions with requests for waivers of federal Clean Air Act regulations.
- Implementing state programs, controls, standards, priorities, and quotas for the production, allocation, conservation, and consumption of energy.
- Establishing and implementing regional programs and agreements to coordinate with the federal government and other states.
- Deploying the National Guard to maintain order and provide security for fuel delivery trucks and fueling stations.

✓ **Request federal assistance.** Severe curtailments in energy supplies can overwhelm state resources. The federal government can provide financial assistance, help coordinate resupply efforts, and assist with monitoring national or regional energy supply conditions. Governors also can request that federal agencies waive regulations that could inhibit the state's ability to respond to an energy emergency. Applicable regulations include:

- Transportation regulations that limit the number of hours truck drivers can be behind the wheel during any 24-hour period and limit the gross vehicle weight of tankers and other trucks.
- Pollution control regulations that prohibit the use of certain fuel formulations during particular seasons or in specific parts of the country. Limited waivers allowing the use of different fuel formulations increase supplies.
- Cabotage laws, such as the Jones Act, which require domestically owned vessels to provide transportation of goods among domestic ports. Jones Act waivers increase the number of vessels available to transport petroleum from Gulf Coast refineries to ports on the East or West coasts.

✓ **Use of alternative energy systems.** Alternative energy systems should be considered as a component of energy emergency planning. Mobile renewable energy systems that provide emergency power can be vital in some circumstances, and the integration of alternative energy sources into the energy sector can contribute to a more robust and resilient system that is less reliant on one fuel source and therefore less susceptible to supply shortages.

Recovery

Governors can influence the rapid recovery from an energy supply crises by coordinating the efforts of state and federal agencies and industry and ensuring appropriate lessons are learned—not just identified—and incorporated into state energy assurance plans.

Among the steps governors can take to aid in the recovery from energy emergencies are:

✓ **Facilitate resupply**. Governors can work with private industry to coordinate resupply efforts by monitoring conditions inside and outside the state. Again, the use of transportation and pollution-control waivers and supplementary purchase contracts can be useful in rapidly recovering from supply shortages.

✓ **Assist in restoring energy.** Although electric utilities develop and implement their own power restoration priority lists, governors can work with the utilities to ensure essential facilities have high priority and restoration programs are consistent. Governors can assist in the restoration process by providing logistical support, security for restoration crews, and debris removal along key roadways or rail lines.

Florida officials worked with state utilities to identify urgent needs during the response to the 2004 hurricanes. After Hurricane Ivan (the third of the four major hurricanes to hit the state between August and October 2004), Florida petroleum dealers estimated the state needed 100,000 gallons of distillate per day to fuel emergency generators. The State Energy Office helped obtain 1 million gallons of diesel via rail from Texas and Louisiana.[31]

✓ **Assess infrastructure.** Following an energy emergency, governors should ensure a full assessment of the state's energy infrastructure is conducted. As in the preparedness phase, state officials should identify and assess the vulnerabilities of all energy-related assets in the state and, particularly after an event or emergency, develop a thorough understanding of their operational capacities. State officials should work with local jurisdictions and with the Department of Energy, the Department of Homeland Security, the Nuclear Regulatory Commission, regional electric reliability organizations, regional transmission organizations, independent system operators, and the private sector to conduct the assessments.

✓ **Conduct after-action and lessons learned analyses.** Governors should convene working groups of those affected by the energy emergency—including utilities, industry, energy suppliers, local officials and the public—to assess what did and did not work well and identify where improvements need to be made.

✓ **Update plans and procedures.** Based on the conclusions of the after-action and lessons-learned analyses, governors should ensure state plans and procedures are updated to reflect recommended changes.

✓ **Exercise plans and procedures.** As in the preparedness phase, regular training and exercises are essential to identify gaps and erroneous assumptions in state energy assurance plans.

The Federal Response 4

Because the nation's pipelines, transmission lines, and distribution networks cross state borders, and outages and supply shortages rarely are confined to the political borders of a state, the federal government has a significant role in preparing the nation for energy crises and responding when emergencies occur. State planning efforts should be conducted in the context of that federal role.

The foundation of the federal government's response to large-scale incidents, including terrorist attacks, technology failures, or natural disasters, is a series of homeland security presidential directives (HSPD) issued since the September 11, 2001 terrorist attacks.

Three of those directives are directly applicable to energy assurance: HSPD 5: Management of Domestic Incidents; HSPD 7: Critical Infrastructure Identification, Prioritization and Protection; and HSPD 8: National Preparedness.

HSPD 5: Management of Domestic Incidents. Under HSPD 5 the secretary of Homeland Security is designated as the lead federal official for domestic incident management and is responsible for "coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies."[32] HSPD-5 also directs the Department of Homeland Security to develop the National Response Plan (NRP) and the National Incident Management System (NIMS) (see box, this page).

The National Response Plan, published in December 2004, establishes a comprehensive all-hazards approach to domestic incident prevention, preparedness, response, and recovery. The NRP includes 15 emergency support function (ESF) annexes that identify the federal departments and agencies whose planning, support, and resource capabilities would be brought to bear in specific incidents. Emergency Support Function #12 (ESF-12) addresses incidents involving the nation's energy infrastructure and "is intended to restore damaged energy systems and components during a potential or actual Incident of National Significance."[33]

Under ESF-12, the U.S. Department of Energy serves as the primary response agency for energy emergencies and establishes "policies and procedures regarding preparedness for and prevention of attacks to U.S. energy sources and response and recovery due to shortages and disruptions in the supply and delivery of

National Response Plan (NRP)

- Establishes a comprehensive all-hazards approach to domestic incident prevention, preparedness, response, and recovery.
- Provides a framework for federal interaction with state, local, and tribal governments; the private sector; and non-governmental organizations for the purpose of prevention, preparedness, response, and recovery activities.
- Establishes roles and responsibilities, details resources and capabilities, and spells out operational processes and protocols.
- Is based on best-practices and procedures from the fields of homeland security, law enforcement, emergency management, hazardous materials response, fire suppression, public works, public health, emergency medical services, and worker health and safety.
- Serves as the foundation for the development of detailed supplemental plans and procedures to implement federal incident management activities for specific types of incidents.
- Includes 15 "emergency support function (ESF)" annexes that include the federal departments and agencies whose planning, support, and resource capabilities would be brought to bear in a specific incident of national significance.

National Incident Management System (NIMS)

- Provides a nationwide template for incident management, allowing federal, state, local, and tribal governments and the private sector to cooperate effectively in preventing, preparing for, responding to, and recovering from domestic incidents, regardless of their cause, size or complexity.
- Is based on best practices of first responders and emergency management agencies across the country.
- Is designed to maximize the efficiency of all aspects of incident management, including exercises, qualification and certification, communications, training, public affairs, equipment, and post-event evaluation.

electricity, oil, natural gas, and other forms of energy and fuels that impact or threaten to impact large populations in the United States."[34]

The Concept of Operations section of ESF-12 notes that energy facility owners are responsible for restoration of normal operations, but the federal government will provide appropriate assistance to ensure the timely restoration of those operations. In addition, the federal government will:

- advise federal, state, local, and tribal authorities on priorities for energy restoration, assistance, and supply;
- assist industry, state, local, and tribal authorities with requests for emergency response actions related to the nation's energy supply; and
- provide energy supply information and guidance on the conservation and efficient use of energy to federal, state, local, and tribal governments, and the public.

HSPD 7: Critical Infrastructure Identification, Prioritization and Protection. HSPD 7 establishes a national policy for federal departments and agencies to identify, prioritize, and protect the nation's critical infrastructure. The directive designates the Energy Department as the federal Sector-Specific Agency for the energy sector, including the production, refining, storage, and distribution of oil and gas and electric power except for commercial nuclear power plants, which are assigned to the Nuclear Regulatory Commission.

Under HSPD 7, the Energy Department is responsible for:

- collaborating with all relevant federal agencies, state and local governments, and the private sector, including key persons and entities in the energy industry;
- conducting or facilitating vulnerability assessments for the sector; and
- encouraging risk management strategies to protect against or mitigate the effects of attacks against critical infrastructure and key resources.

DOE also is required to collaborate with the private sector to develop information-sharing and analysis mechanisms and work with industry to identify, prioritize, and coordinate the protection of critical infrastructure and key resources. The department facilitates the sharing of information about physical and cyber threats, vulnerabilities, incidents, potential protective measures, and best practices.[35]

DOE's Office of Electricity Delivery and Energy Reliability takes a primary role in responding to energy emergencies and is the Emergency Support Function-12 (Energy) lead office under the National Response Plan. Its responsibilities include:

- deploying technical experts to disaster areas;
- assisting in damage assessments of energy infrastructure;
- assisting in locating and transporting repair crews, repair equipment, and spare parts for energy assets;
- working with other federal agencies to prioritize the placement of emergency generators and coordinate their removal;
- facilitating communications with and within the energy industry;
- consulting with energy industry representatives to advise federal, state, and local authorities on priorities for energy restoration, assistance, and supply; and
- facilitating the re-inspection of energy systems following a disaster.

National Infrastructure Protection Plan. HSPD 7 requires the Department of Homeland Security to produce a comprehensive, integrated national plan for critical infrastructure and key resource protection that outlines national goals, objectives, milestones, and key initiatives. In accordance with that directive, DHS published a National Infrastructure Protection Plan (NIPP) in June 2006. The NIPP and supporting sector-specific plans describe processes to:

- set security goals;
- identify assets;
- assess risk;
- establish priorities;
- implement protective programs;
- measure effectiveness; and
- provide feedback for continuous improvement.

To date, sector-specific plans detailing the application of the NIPP framework across the energy sector and other critical sectors had not been published. However, they were expected to be completed by the end of 2006.

HSPD 8: National Preparedness. HSPD 8 required the development of an all-hazards National Preparedness Goal that establishes "measurable readiness priorities and targets that appropriately balance the potential threat and magnitude of terrorist attacks, major disasters, and other emergencies with the resources required to prevent, respond to, and recover from them."[36] The goal also includes readiness metrics, standards for preparedness assessments, and a process for assessing the nation's readiness to respond to major events, particularly terrorist attacks.

Federal Emergency Management Agency (FEMA). The Federal Emergency Management Agency (FEMA) is in charge of preparing the nation for all natural and man-made hazards and leading federal response and recovery efforts following any national incident. The agency provides training to first responders; administers preparedness, mitigation, and recovery grant programs; and manages the National Flood Insurance Program.

Assistance programs for states and localities affected by emergencies and disasters are provided under the authority of the federal Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Stafford Act requires the President declare a state of emergency or disaster before FEMA resources and financial assistance can be made available. The amount and type of assistance differs depending on the type of declaration: an emergency declaration results in significantly more limited federal assistance than a disaster declaration.

5 Regulations and Oversight

Although the statutory authority for security measures at energy facilities is limited at the local, state, and federal levels, governments at all levels share some regulatory jurisdiction over various aspects of the energy sector. Those regulatory functions are outlined in Table 2 (p. 19). Despite the limited regulatory options for mandating security measures in the private energy sector, governments at all levels do have a variety of tools available to bolster the resiliency of the industry.

In its 2004 report, "State Energy Assurance Guidelines," NASEO noted that "electric and gas utilities are generally required to have up-to-date emergency response and power restoration plans. These plans may or may not have to be filed with a public authority; but almost universally they are required for licensing to operate."[37] In addition, NASEO said regulations designed to address concerns such as pipeline safety and delivery reliability can be used to improve energy assurance. State public utility commissions, for example, could include operational security requirements as a condition of issuing operating licenses for entities regulated by the state.

The Congressional Budget Office, in a recent report on critical infrastructure protection,[38] outlined three broad approaches governments can take to affect the behavior of the private sector:

- enact new regulations, taxes, or penalties to raise the cost of not taking steps to improve security;
- underwrite the cost of reducing risks and possible losses by financing private sector security enhancements; and
- provide better information for making security-related decisions, for example, by providing additional information on the risks of attack, potential losses from attacks, and opportunities for reducing risks.

Federal Agencies

At the federal level, the U.S. Department of Energy, the Federal Energy Regulatory Commission, the Nuclear Regulatory Commission, and the Department of Homeland Security have jurisdiction over the safety and security of the nation's infrastructure and play active roles in responding to national and regional energy emergencies.

Federal Energy Regulatory Commission (FERC). FERC is an independent federal agency charged with regulating the interstate transmission and sale of electricity, natural gas, and oil. FERC also has jurisdiction over proposals to build liquefied natural gas terminals and interstate pipelines and applications for licensing of hydropower projects. The Energy Policy Act of 2005 gave FERC additional responsibilities for ensuring the reliability of energy supplies in the United States, including promoting the development of a robust energy infrastructure by expediting the development of energy infrastructure projects, encouraging investment in energy infrastructure, addressing landowner and environmental concerns fairly, and protecting the reliability, security, and safety of the nation's energy infrastructure.[39]

U.S. Department of Energy (DOE). In June 2005, Secretary of Energy Samuel Bodman merged the former DOE Office of Electric Transmission and Distribution with the former DOE Office of Energy Assurance to form the new Office of Electricity Delivery & Energy Reliability (OE), charged with leading the nation's effort to modernize the electricity grid, enhance security and reliability of the energy infrastructure, and facilitate a rapid recovery from disruptions to energy supply.

OE is a significant resource for states, providing expertise and guidance in:

- monitoring major energy systems;
- identifying and assessing the impacts of energy disruptions;
- identifying mitigation measures to improve the energy distribution system and enhance supply reliability;
- promoting technology development and emergency response tools;
- elevating public awareness by promoting education and training;
- coordinating federal government emergency preparedness and critical infrastructure protection efforts; and
- providing damage assessments and restoration information to state officials.

OE also offers a number of programs and services to states in the area of energy assurance and security.

Table 2: Federal, State and Local Jurisdiction Over Energy Security

Function	Local	State	Federal
Nuclear power plant oversight.	X (For emergency response.)	X (For emergency response.)	X (NRC)
Ongoing guarding of energy facilities.	X	X	
Freedom of Information requests.	X	X	X
Awareness of energy system vulnerabilities.	X	X	X (DOE)
Pipeline safety.	X	X	X
Retail electricity products and fuel diversity.	X (For municipally owned utilities; for government purchases.)	X (Through utility commissions, portfolio standards, incentives, funding, and state purchases.)	X (Through tax incentives and federal government purchases.)
Energy system planning.	X	X	X
Siting certification.	X (In home rule states.)	X	X (For interstate pipelines only.)
Emergency management and response.	X	X	X
First response to emergency.	X		
Oversight of energy security costs.	X (For municipal utilities.)	X (Through utility commissions under statutory authority.)	X (For FERC jurisdictional costs.)

Source: National Conference of State Legislatures, 2003

State Energy Assurance Plan Development. OE supports the development of state energy assurance plans, which are required by law. OE works with the National Association of State Energy Officials (NASEO) to develop model plans and guidance for states in areas such as emergency preparedness, security, and critical infrastructure protection.

Energy Emergency Simulation. OE engages with state energy officials to conduct energy security exercises. In June 2004, for example, NGA and other national organizations partnered with the former Office of Energy Assurance to conduct the Dark Sun tabletop exercise at Camp Dawson, West Virginia Officials from all levels of government were brought together to simulate a number of energy security scenarios and participate in an energy assurance planning workshop.

Energy Emergency Assurance Coordinators (EEAC) System. The Office of Energy Assurance created the EEAC to provide a communications tool through which state-level energy personnel can address energy emergencies and share information about energy supply disruptions. The web-portal based system provides cleared individuals with access to a restricted Web site, database, and list serve, and offers contact information for state and federal officials. The EEAC increases federal and state communications during energy crises and allows for more coordinated, informed decision-making.

Nuclear Regulatory Commission (NRC). The NRC is an independent federal agency whose primary mission is to protect the public and the environment from the damaging effects of radiation from nuclear reactors, materials, and waste facilities. The agency also licenses and regulates those facilities, the materials they use, and the waste they generate. The agency's security programs are focused on regulating licensees' accounting systems for certain nuclear materials and ensuring licensees have adequate security programs and plans for dealing with threats, thefts. and sabotage.

U.S. Department of Homeland Security (DHS). The U.S. Department of Homeland Security is responsible for the development of a comprehensive, integrated national infrastructure protection plan that includes national goals, objectives, milestones, and key initiatives. The National Infrastructure Protection Plan (NIPP), published in June 2006, emphasizes coordination with federal, state, territorial, tribal, local, and private sector partners. It also designates a "Sector-Specific Agency" (SSA) to lead infrastructure protection efforts in 13 critical sectors. In the area of energy, the SSA is the Department of Energy.

State Agencies

State Energy Offices. State energy offices have a significant role in researching, demonstrating, and deploying emerging energy technologies in the states. They play a lead role in promoting energy-related economic development, minimizing the environmental impact of growth, and crafting energy solutions that address their citizens' needs while advancing the nation's energy security. During energy emergencies, state energy offices advise governors and other state officials on potential response strategies, help energy providers and consumers mitigate supply disruptions, and coordinate state, local, and regional responses.

State Regulatory Utility Commissions. Through their respective regulatory utility commissions, states oversee intrastate retail transmission, distribution, and the sale of electricity and gas within a state. The commissions also can mandate activities by regulated entities to ensure adequate preparation for energy emergencies.

In **Florida**, for example, the state Public Service Commission (PSC) requires each investor-owned utility to collect funds to cover storm-related operations and maintenance. Progress Energy Florida collects approximately $6 million annually for those purposes. Even those reserves, however, proved inadequate during the 2004 hurricane season, when four major storms hit the state. Although each utility had amassed significant reserves by August of that year, they fell short of the total cumulative cost of service restoration and repair because the storms exacted an enormous toll on the transmission and distribution systems across Florida. Most utilities have since filed petitions with the PSC for approval to recover storm-related costs.[40]

Local Governments

At the local level, municipalities in many states have jurisdiction over the siting of generating plants, substations, pipelines, and distribution lines. In other states, however, that authority lies with the state's public utility commission or public service commission.

Industry Organizations

Independent System Operators/Regional Transmission Organizations. ISO/RTOs are independent organizations established to control access to electric transmission lines in a region or across several systems, independent of the owners of the facilities that generate the electricity. Although they serve in some cases as wholesale marketplaces for generated electricity, their primary role and responsibility is to ensure the reliability of the power system over which they have authority.

Regional Reliability Organizations. In the absence of direct governmental regulation of the security and reliability of the nation's electricity networks, the power industry formed regional councils to develop system-wide operating and planning standards to ensure the reliability of the three electric transmission interconnections. The eight regional reliability councils collectively comprise the North American Electric Reliability Council (NERC), formed in 1968 as a voluntary self-regulating organization for the electric industry that relies on peer pressure and the mutual self-interest of its members to establish and enforce compliance with reliability standards.

As a result of deregulation and competition in the electric utility industry, NERC's voluntary compliance regime is proving insufficient, as illustrated by the August 2003 blackout in the Northeast. In response, the Energy Policy Act of 2005 authorizes the creation of an electric reliability organization (ERO) with the statutory authority to enforce bulk electric system reliability standards. NERC, which had promoted such a mandatory system for many years, was named by FERC in July 2006 to serve as that electric reliability organization. FERC will continue to provide oversight and regulatory backup of the organization in the United States.

The legislation establishing the enforcement mechanism and the ERO stipulates:

> The reliability legislation reserves to the states matters related to the local distribution system. The legislation states it does not pre-empt any authority of a state to take action regarding the safety, adequacy, and reliability of electric service within that state, so long as the state's action is not inconsistent with a reliability standard. The section allows the State of **New York** to establish rules resulting in greater reliability within that state, as long as that action does not result in lesser reliability outside the state than is provided by the reliability standards. Upon application by the ERO or another affected party, FERC may determine whether a state action is inconsistent with a reliability standard and may stay the state action pending the determination.[41]

Conclusion

Ensuring the security of our nation's energy infrastructure is a vital component of a robust national homeland security strategy. The effects of a coordinated attack on any aspect of the U.S. energy infrastructure could have dramatic effects, potentially endangering human life and costing key industries and governments at all levels billions of dollars. Securing these assets must be a priority for states.

In the event of an energy supply disruption, the matrix of authorities, response roles, and regulatory oversight shared by governments at the federal, state, and local levels provides significant leverage to affect the resiliency of the nation's energy infrastructure.

As chief executives of their states, governors are ultimately responsible for protecting their residents from harm. In coordination with their homeland security advisors, state energy officials, emergency management officials, federal agencies, and the private sector, governors should develop and implement strategic plans designed to prevent, prepare for, respond to, and recover from disruptions to the energy supply. Energy security must be a component of any comprehensive state homeland security strategic plan.

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