State of Illinois
Energy Assurance Plan

Publication Date: August 14, 2012

Illinois Department of Commerce and Economic Opportunity
State Energy Office
Table of Contents

Executive Summary ........................................................................................................................................ 4
Introduction and Purpose ............................................................................................................................ 6
   Introduction .................................................................................................................................................. 6
   Purpose .................................................................................................................................................... 6
Section One. Overview of Energy Production, Use, and Disruptions ......................................................... 8
   Summary description of state’s energy use ............................................................................................... 8
   State energy producers ............................................................................................................................. 10
   Historical disruptions ............................................................................................................................... 15
Section Two. Energy Emergencies and Response ..................................................................................... 17
   Legal Authority .......................................................................................................................................... 17
   State agencies and their roles .................................................................................................................... 19
   Coordination of response .......................................................................................................................... 20
   Emergency communication procedures ................................................................................................. 20
   Mutual Aid Networks ............................................................................................................................... 23
   Response and coordination within and between state agencies .............................................................. 24
   Consequences and severities of energy emergencies and rate of recovery ........................................... 28
   Role of State Energy Emergency Assurance Coordinator ...................................................................... 28
   Contacts with private sector ..................................................................................................................... 29
   Management decision process ................................................................................................................ 29
   Responsibility for the identification and assessment of disruptions ...................................................... 31
   Procedures for issuing a declaration ......................................................................................................... 31
   Public information program .................................................................................................................... 31
Section Three. Individual Energy Source Response Plans ...................................................................... 33
   Monitoring system ..................................................................................................................................... 33
   Petroleum (gas, diesel, heating oil, propane, ethanol, etc.) ..................................................................... 35
   Natural gas ................................................................................................................................................ 40
   Electricity and electricity energy sources ................................................................................................. 42
Section Four. Critical Infrastructure Plan ................................................................. 51

State plan for enhancing resiliency and protecting critical infrastructure .................. 51

Acronyms .................................................................................................................. 60

Appendices .............................................................................................................. 62


Appendix 2: Illinois State Tracking Supply Disruption Database ......................... 93

Appendix 3. Contacts for State Energy Assurance (Phone numbers removed for privacy but are available on internal document) ................................................................. 94

Appendix 4. State Energy Fact Sheets ................................................................. 97
Executive Summary

The State Energy Office within the Illinois Department of Commerce and Economic Opportunity is pleased to present this Energy Assurance Plan in cooperation with the Illinois Commerce Commission and the Illinois Emergency Management Agency. The purpose of the plan is to 1) catalog the State of Illinois’ current and historical energy sources and uses; 2) identify potential disruptions to these sources via damage to infrastructure from man-made or natural disasters; 3) identify potential disruptions from unexpected price spikes or loss of supply; 4) estimate the effect these disruptions would have on the state’s citizens; 5) and delineate the ways in which the state can assist in the restoration of the energy supply. All communication with policy makers and government agencies will be through the Illinois Commerce Commission Department of Homeland Security for disaster-related disruptions or the Illinois Department of Commerce and Economic Opportunity’s State Energy Office for supply shortage issues. All communication with the public will be through the Governor’s Office.

This plan will summarize the past, current, and predicted future energy use in the State of Illinois and describe current programs and regulations in place to monitor energy and prepare for and recover from an energy emergency. It will identify and address potential shortcomings in the system and describe the means of overcoming these shortcomings.

The State of Illinois has a robust energy emergency recovery plan. The State Emergency Operations Center (SEOC) has been deemed one of the best in the country. The state’s response to energy emergencies in the past has been efficient and rapid. However, there were indications in the past that the state was not adequately monitoring long-term supply and pricing of the raw materials and sources of energy production as well as petroleum and natural gas infrastructure, transportation, and supply. As a result, the state may have found itself in a reactive position if prices were to suddenly rise above what is affordable for citizens without plans for replacement or conservation. This plan addresses the methods the state has put into place for long term monitoring of energy supplies and responding to natural gas and petroleum shortages.

In addition, the plan addresses the roles and responsibilities of different state agencies, identifies when the state becomes involved in energy disruptions and restoration, describes appropriate communication within the state, between the state and others in the event of a disruption, and identifies available state assistance for energy restoration.

In the State of Illinois, the initial responsibility for responding to energy emergencies falls in the hands of local municipalities and private energy providers. When it is clear that local and private resources are insufficient for timely restoration of energy sources, the state becomes involved. In order to determine when this is appropriate, the state has reviewed previous disruptions and their impact and provided a means for local government, law enforcement, and private energy providers to quickly contact the state to request assistance when appropriate. The Governor will
decide when state assistance is appropriate. The Illinois Emergency Management Agency oversees disaster recovery, and more specifically, the Illinois Commerce Commission oversees recovery from energy disruptions with the assistance of the Illinois Department of Commerce and Economic Opportunity, Illinois Department of Transportation, the Illinois Department of Central Management Services, and the Illinois Department of Corrections. The state agencies involved in energy assurance and disruption response were involved in the development of this plan. The theme that came up repeatedly was the need for effective communication. It is hoped this plan will clearly define the lines of communication both prior to, during and after an energy emergency.

Illinois obtains the majority of its energy from four sources: petroleum for transportation, natural gas for heating, and coal and nuclear power for electricity. The state has generous coal reserves, but most are not accessible or too high in sulfur for use with current regulations so the state must import coal. Most of the natural gas and petroleum is imported into the state also, while Illinois is a net producer of electricity and leads the nation in electricity generated from nuclear facilities. The state is a hub for natural gas and petroleum pipelines and leads the Midwestern U.S. in refining capacity. Thus, the state produces a lot of energy but much of the materials used come from other areas creating vulnerability. The transport of supplies and generated energy requires a large infrastructure which is also vulnerable.

The infrastructure associated with energy in Illinois (pipelines, processing and refining facilities, generating facilities, and transmission lines) is vulnerable to natural and man-made threats. Past disruptions have been dominated by weather-related events, but catastrophic events such as terrorism or a large-scale earthquake are potential threats to energy supplies. Any of a number of threats could lead to electrical blackouts, supply disruptions, or rising petroleum and energy prices. As a result, specific plans to prepare, monitor, and respond quickly to energy emergencies or shortages have been developed. These plans are included in this document.

The intent of this document is to ensure the citizens of Illinois receive the most reliable and affordable energy available while encouraging conservation and a movement toward clean, renewable energy sources. The plan will be a living document with annual updates available on the internet for state citizens and other interested parties. It is noted here that suggestions and input from the public and any interested parties are welcome.
Introduction and Purpose

Introduction

The Illinois Energy Assurance Plan (IEAP) should serve as a guide for how the state will prepare for and respond to energy shortages in the form of short-term sudden disruptions or long-term disruptions caused by shortages in supply or dramatic price increases. The IEAP will be updated and enhanced based on lessons learned from exercises and actual response and recovery operations. Periodic updates to the IEAP will include changes due to lessons learned, new technology, new methods of response, or additional capabilities.

Private energy providers and local governments in the State of Illinois have the capabilities and primary responsibility for response to and recovery from energy supply disruptions. When these capabilities are exceeded, state assistance is available. In addition, the state must prepare for longer energy disruptions caused by scarcity of raw materials, price increases, use of new materials, or alternative sources of energy by state energy providers and consumers. The state also must monitor the energy infrastructure to ensure it remains viable. This plan is the guide for state preparedness, monitoring, response, and recovery operations; it outlines actions in support of local response to and recovery from hazards and state methods for monitoring energy supply, price, and infrastructure. The plan discusses state energy needs, potential disruptions to the energy supply, and the response mechanisms in place at the state level to restore energy if a disruption occurs.

Purpose

The purpose of the IEAP is to provide guidance to state agencies and Illinois citizens on how the state will prepare, monitor, respond to, and recover from disruptions in energy supply and delivery. It incorporates applicable provisions from the Illinois Emergency Operations Plan (IEOP).

The IEAP considers energy supply disruptions that will require a significant state presence. A “significant state presence” is defined as a situation that requires the assistance of state agencies in addition to those that routinely respond to day-to-day contingencies under separate authorities such as the State Police, local government authorities, or private sector energy providers. Those situations requiring only local government or private energy provider response are not addressed in the IEAP.

The IEAP contains assignments for state monitoring, response, and recovery activities related to energy supply disruptions. It, however, is not a regulatory document. It has been developed based on the compilation of various state documents and with the cooperation of state agencies. The plan describes the relationships among the state and federal agencies, local governments, and private energy providers, and among state agencies. The plan provides information on
anticipated actions for state agencies that have energy supply monitoring and restoration responsibilities. Finally, it provides information on the various state response mechanisms, capabilities, and resources available to local governments. It also addresses state agencies, personnel, and methods necessary to monitor long term energy supply and the energy infrastructure.

The plan addresses those emergency support activities necessary for a coordinated state response to a significant disruption in energy supply, regardless of cause. The level of response will be determined by the magnitude of the disruption. The Governor will make the final determination of the level of state response.
Section One. Overview of Energy Production, Use, and Disruptions

Summary description of state’s energy use

Illinois is the fifth most populous state in the U.S and is fifth in energy consumption. Its central location and large population make it a large consumer and transporter of energy. The state used just over 4.4 trillion British thermal units (Btu) of total energy in 2010 (EIA), which is 4% of the US total. At the same time, the state produced just over 2 trillion Btu of energy, making it a net importer of energy. Illinois is also ranked 5th in the country in industrial manufacturing but ranked 29th for per capita energy use, indicating its industrial base may not be energy intensive. The state has limited reserves of petroleum and natural gas and must import these from other states or countries. Illinois also has a large coal reserve (producing 33.7 million short tons in 2009), but much of the coal is currently not mined and is high in sulfur. The state imported 94% of the coal used for electrical generation (37.2 million tons) in 2008. It is, however, a net exporter of electricity with an active nuclear generation industry. Illinois has 11 operating reactors at 6 facilities and ranks 1st in the nation in nuclear electrical generation.

Table 1 indicates the energy sources and total Btu for Illinois in 2010. Twenty-eight percent (up 4% from 2008) of the total energy used in Illinois was from nuclear generated electricity versus the national average of 8.5%. This could be a critical difference in Illinois’ energy portfolio and needs to be taken into account when considering energy assurance and potential disruptions. Nuclear energy is considered by many to be clean and renewable, but the waste removal requirements have made nuclear power controversial. Moreover, Illinois’ plants are aging. Illinois does have a very active monitoring program; and the plants are operating at capacity, which is also increasing with improved efficiencies. The plants are expected to continue operation beyond their current proposed lifespan of 30 years as safety records and rigorous monitoring indicate they can continue to function well within guidelines. Below is summary of information for these major energy sources for Illinois.

Table 1.2010 Illinois Energy Use In Trillions Of Btu (source: US DOEEIA)

<table>
<thead>
<tr>
<th>State</th>
<th>Total Energy</th>
<th>Coal</th>
<th>Natural Gas</th>
<th>Petroleum</th>
<th>Nuclear</th>
<th>Renewable</th>
<th>Interstate Elec. Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trill Btu</td>
<td>4,430</td>
<td>1,069</td>
<td>935</td>
<td>1,230</td>
<td>1,005</td>
<td>191</td>
<td>-493.7</td>
</tr>
<tr>
<td>%</td>
<td>100%</td>
<td>24%</td>
<td>21%</td>
<td>23%</td>
<td>28%</td>
<td>4%</td>
<td>-12%</td>
</tr>
</tbody>
</table>

In 2010, only 4% of Illinois’ energy came from renewable sources (such as wind, solar, hydro-electric, and corn-based ethanol). In August of 2007, the state adopted a renewable energy standard requiring state utilities to produce at least 25% of their energy from renewables (75% to come from wind) and to improve efficiency by 2%. The state must build special considerations
into the electrical grid to support wind power. Electricity from wind is intermittent, but the electrical grid is designed to anticipate needs and provide total energy requirements for all periods. Installing natural gas powered electrical generating facilities to accompany wind operations would make up for intermittent loss of wind power because the generators can fire up quickly and change output to compensate. Unfortunately, the generators can be expensive.

An overview of Illinois’ energy strengths and weaknesses would indicate the state is a major transportation, distribution, and oil refining location and produces a good deal of electricity, but also imports much of the raw materials for energy production (Table 2).

Table 2. Strengths And Weaknesses Of Illinois Energy Supplies

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td></td>
</tr>
<tr>
<td>* Leads the Midwest in refining capacity</td>
<td>* Most of state's petroleum is imported, making state vulnerable to supply disruptions</td>
</tr>
<tr>
<td>* Numerous pipelines run through and terminate in state</td>
<td>* Any disruption in down-stream pipelines effects Illinois production</td>
</tr>
<tr>
<td>* 4 in-state refineries</td>
<td>* Not all of petroleum products produced in state are used here. Refineries do ship out of state</td>
</tr>
<tr>
<td>* Oil comes from Canada and Gulf Coast to Illinois refineries</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
</tr>
<tr>
<td>* Top nuclear electricity producing state in US</td>
<td>* Top energy consuming state due to industry</td>
</tr>
<tr>
<td>* 3rd largest coal reserves in U.S.</td>
<td>* Most of state's coal inaccessible and high in sulfur</td>
</tr>
<tr>
<td>* Leading producer and net exporter of electricity</td>
<td>* Strong reliance on coal and nuclear power (over 95%)</td>
</tr>
<tr>
<td>Natural Gas</td>
<td></td>
</tr>
<tr>
<td>* Major transportation hub for natural gas</td>
<td>* Most natural gas used by state is imported</td>
</tr>
<tr>
<td>* Numerous pipelines run through and end in state</td>
<td>* Any disruption in down-stream pipelines impacts Illinois production</td>
</tr>
<tr>
<td>Renewable</td>
<td></td>
</tr>
<tr>
<td>* Top producer of corn-based ethanol</td>
<td>* Little potential for hydro-electric</td>
</tr>
<tr>
<td>* Potential for wind and solar contributions</td>
<td>* Estimated renewable capacity will not meet state demand</td>
</tr>
</tbody>
</table>
A summary of Illinois’ energy sources, infrastructure, supply, and demand shows an increased use of all energy sources since 1960 (Figure 1). The EIA expects total energy consumption in the U.S. to increase by 15% by 2022. A commensurate increase in Illinois would be expected. With aging nuclear facilities and increasing regulations on coal powered electrical generation the state will need to find new sources of electrical generation.

Figure 1. Total Energy Consumption In Illinois From 1960 To 2010 (In Trillions Of Btu).

The state has developed energy fact sheets for the four major energy sources (electric, natural gas, petroleum and renewables) which it has placed on the internet to promote a better understanding of state energy supplies, production and consumption (Appendix 4).

**State energy producers**

**Electricity**

Four investor-owned public utilities provide electricity to consumers in Illinois. Of these, Ameren Illinois (Ameren) and Commonwealth Edison (ComEd) serve the vast majority of citizens and are the most involved in electricity generation (Table 5). Each company has detailed plans and methods for restoration and often leads the way in emergency efforts which they are required by the public utilities act to share with the Illinois Commerce Commission for review.
Each company communicates well and often with the ICC during energy disruptions, letting the agency know their needs.

The state also has a number of municipal and cooperative electricity providers. There are 25 electrical cooperatives and three power generation and transmission cooperatives in the state. Sixty-four municipalities in Illinois also operate their own electrical utilities. Neither the municipal utilities nor the electrical cooperatives are required to report outages or work with the state in restoration efforts, but both groups have found it to their advantage to do so. These groups have created associations [the Illinois Municipal Utilities Association (IMUA) and the Association of Illinois Electric Cooperatives (AIEC)]. Each of these associations is the state government’s point of contact for individual utilities in the case of disruptions that exceed the utility’s restoration capability. The association then works with the state for restoration, relaying utility needs to the state. This works well in the case of large scale outages and allows the state to have one point of contact for emergencies. Each of these associations also has its own emergency operation plans which they have developed with their members and have shared with the state.

Table 3. Electricity Providers and The Numbers of Their Customers in Illinois in 2010

<table>
<thead>
<tr>
<th>Utility Name</th>
<th>Location in Illinois</th>
<th># of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameren Illinois</td>
<td>Central and southern</td>
<td>1,211,412</td>
</tr>
<tr>
<td>Commonwealth Edison Company</td>
<td>Northern</td>
<td>3,792,295</td>
</tr>
<tr>
<td>Mid-American Energy Company</td>
<td>Northwestern</td>
<td>84,746</td>
</tr>
<tr>
<td>Mt. Carmel Public Utility Company</td>
<td>Southern</td>
<td>5,518</td>
</tr>
</tbody>
</table>

Illinois is split between two of the nine North American Electric Reliability Corporation (NERC) zones, which consist of different electricity transmission and distribution grids: the Reliability First Corporation (RFC) zone and the South East Reliability Corporation (SERC) zone. Except for locations with municipal utilities, Ameren is responsible for distributing and delivering the electricity within the SERC zone and ComEd is responsible for the RFC zone (Figure 3). Likewise, wholesale purchasing and selling of electricity is the responsibility of Midwest Independent Transmission System Operator (MISO) in the SERC zone and of Pennsylvania Jersey Maryland (PJM) in the RFC zone. Many of the state’s electrical generating facilities are owned by sister companies of Ameren and ComEd (all of the nuclear facilities are owned by Exelon, a sister company to ComEd). The Illinois Electric Supplier Act (220 ILCS 30/1) allows for more than one electrical supplier to service any area in Illinois. MISO and PJM each have large scale monitoring facilities and work with the generating facilities to predict the electrical load at different times along the grid and ensure electricity is available.
There were 177 electricity generating plants in Illinois in 2005 according to the USEPA’s eGrid website which were owned by over 100 different companies or municipalities, but many were small diesel or natural gas plants designed to serve a specific location or function as backup. Many smaller natural gas plants were also designed to serve as backups for peak electricity use in the summer. The state’s 6 nuclear plants produced 48% of the electricity for the state. The 20 plants with the greatest megawatt output (all coal or nuclear) generated almost 90% of Illinois’ electricity (Table 6). These plants were owned by six companies, two of which are sister companies to Ameren and ComEd. Each large plant has its own EOP in place for disruptions with nuclear facilities having advanced plans and frequent exercises.

Table 4. List of Top 20 Electrical Generating Plants in Illinois in 2005 with Their Contribution to the Total Electricity Generated

<table>
<thead>
<tr>
<th>Plant primary fuel</th>
<th>Plant annual net</th>
<th>% of State</th>
<th>Cumulative</th>
<th>Plant owner</th>
</tr>
</thead>
</table>

There were 177 electricity generating plants in Illinois in 2005 according to the USEPA’s eGrid website which were owned by over 100 different companies or municipalities, but many were small diesel or natural gas plants designed to serve a specific location or function as backup. Many smaller natural gas plants were also designed to serve as backups for peak electricity use in the summer. The state’s 6 nuclear plants produced 48% of the electricity for the state. The 20 plants with the greatest megawatt output (all coal or nuclear) generated almost 90% of Illinois’ electricity (Table 6). These plants were owned by six companies, two of which are sister companies to Ameren and ComEd. Each large plant has its own EOP in place for disruptions with nuclear facilities having advanced plans and frequent exercises.

Table 4. List of Top 20 Electrical Generating Plants in Illinois in 2005 with Their Contribution to the Total Electricity Generated

<table>
<thead>
<tr>
<th>Plant primary fuel</th>
<th>Plant annual net</th>
<th>% of State</th>
<th>Cumulative</th>
<th>Plant owner</th>
</tr>
</thead>
</table>

Figure 3. North American Electric Reliability Zones which Represent Inter-Connected Electrical Infrastructure Regions.
<table>
<thead>
<tr>
<th>Material</th>
<th>Generation (MWh)</th>
<th>Total</th>
<th>% of Total</th>
<th>Name (first)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear material</td>
<td>19,796,383</td>
<td>10.2%</td>
<td>10.2%</td>
<td>Exelon Energy</td>
</tr>
<tr>
<td>Nuclear material</td>
<td>19,119,557</td>
<td>9.8%</td>
<td>20.0%</td>
<td>Exelon Energy</td>
</tr>
<tr>
<td>Nuclear material</td>
<td>18,713,658</td>
<td>9.6%</td>
<td>29.7%</td>
<td>Exelon Energy</td>
</tr>
<tr>
<td>Nuclear material</td>
<td>13,622,453</td>
<td>7.0%</td>
<td>36.7%</td>
<td>Exelon Energy</td>
</tr>
<tr>
<td>Nuclear material</td>
<td>13,318,876</td>
<td>6.9%</td>
<td>43.6%</td>
<td>Exelon Energy</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>12,618,528</td>
<td>6.5%</td>
<td>50.1%</td>
<td>Dynegy Inc</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>9,469,508</td>
<td>4.9%</td>
<td>54.9%</td>
<td>Edison Mission Energy</td>
</tr>
<tr>
<td>Nuclear material</td>
<td>8,692,074</td>
<td>4.5%</td>
<td>59.4%</td>
<td>AmerGen Energy Co LLC</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>7,881,898</td>
<td>4.1%</td>
<td>63.5%</td>
<td>AmerenCIPS</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>7,297,242</td>
<td>3.8%</td>
<td>67.2%</td>
<td>AmerenEnergy Resources</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>6,142,876</td>
<td>3.2%</td>
<td>70.4%</td>
<td>Dominion Energy NUGs</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>5,498,462</td>
<td>2.8%</td>
<td>73.2%</td>
<td>Edison Mission Energy</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>5,288,882</td>
<td>2.7%</td>
<td>75.9%</td>
<td>Edison Mission Energy</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>4,732,059</td>
<td>2.4%</td>
<td>78.4%</td>
<td>Edison Mission Energy</td>
</tr>
<tr>
<td>Bituminous coal</td>
<td>4,450,529</td>
<td>2.3%</td>
<td>80.7%</td>
<td>AmerenEnergy Resources</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>4,393,834</td>
<td>2.3%</td>
<td>82.9%</td>
<td>AmerenEnergy Resources</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>2,965,873</td>
<td>1.5%</td>
<td>84.5%</td>
<td>Edison Mission Energy</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>2,965,398</td>
<td>1.5%</td>
<td>86.0%</td>
<td>Dynegy Inc</td>
</tr>
<tr>
<td>Subbituminous coal</td>
<td>2,934,587</td>
<td>1.5%</td>
<td>87.5%</td>
<td>Dynegy Inc</td>
</tr>
<tr>
<td>Bituminous coal</td>
<td>2,084,104</td>
<td>1.1%</td>
<td>88.6%</td>
<td>City of Springfield</td>
</tr>
</tbody>
</table>

**Petroleum**

Illinois is a major delivery and transportation hub for raw crude oil with four refineries in the state and another just across the border in Indiana (Table 7). Several pipeline companies deliver crude oil to these refineries. The ICC lists 26 pipeline companies certified in Illinois. These include each of the companies that own a refinery plus Enbridge, which provides an ever-increasing amount of Canadian crude and a few other smaller companies. Oil, originating as raw crude, is refined into petroleum products (gasoline, propane, diesel etc) at the refineries; and additional pipelines transport the products to wholesalers, retailers and value-adders. Gasoline is transported to the 25 terminals in Illinois where it is mixed with additives for each gasoline
station and transported via semi-trailer to the stations that are primarily independently owned not owned. Each refinery has extensive plans for emergencies and disruptions. The refineries and pipeline companies are not required to share their EOPs with the state, but have participated in state exercises and shared their reactions to scenarios with the state.

Table 5. List of Illinois Refineries and Their Capacities

<table>
<thead>
<tr>
<th>Company</th>
<th>Nearest City</th>
<th>Barrels per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citgo</td>
<td>Lemont</td>
<td>181,000</td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>Joliet</td>
<td>248,000</td>
</tr>
<tr>
<td>Marathon</td>
<td>Robinson</td>
<td>204,000</td>
</tr>
<tr>
<td>ConocoPhillips</td>
<td>Wood River</td>
<td>306,000</td>
</tr>
<tr>
<td>BP</td>
<td>Whiting, IN</td>
<td>405,000</td>
</tr>
</tbody>
</table>

**Natural Gas**

Nine separate companies are certified to offer natural gas to consumers in Illinois while sixty-four municipalities operate their own natural gas utilities, along with seventeen companies that are listed as alternative gas providers (Table 8). Along with electricity, Ameren is responsible for natural gas distribution and delivery in much of the MISO region of Illinois.

Table 6. Utilities Certified to Sell Retail Natural Gas in Illinois

<table>
<thead>
<tr>
<th>Utility Name</th>
<th>Location in Illinois</th>
<th># of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameren</td>
<td>Central and southern</td>
<td>814,773</td>
</tr>
<tr>
<td>Atmos Energy Corporation</td>
<td>Southern</td>
<td>22,498</td>
</tr>
<tr>
<td>Consumers Gas Company</td>
<td>Southern</td>
<td>5,540</td>
</tr>
<tr>
<td>Illinois Gas Company</td>
<td>Southern</td>
<td>9,723</td>
</tr>
<tr>
<td>Mt. Carmel Public Utility Company</td>
<td>Southern</td>
<td>3,574</td>
</tr>
<tr>
<td>Nicor Gas Company</td>
<td>Northern</td>
<td>158,001</td>
</tr>
<tr>
<td>North Shore Gas Company</td>
<td>Northern</td>
<td>821,902</td>
</tr>
<tr>
<td>Peoples Gas Light and Coke Company</td>
<td>Northern</td>
<td>65,542</td>
</tr>
</tbody>
</table>

Several companies own natural gas pipelines which operate in Illinois. These pipelines must follow the same guidelines with the National Transportation Safety Board for interstate lines and the Illinois Commerce Commission (ICC) for intrastate as petroleum pipelines. All companies offering natural gas in Illinois have EOPs. Nicor, which serves the largest number of customers in Illinois, has EOPs for several scenarios. Nicor and Ameren are active in emergency training
exercises. All companies with natural gas pipelines and facilities in Illinois must file a safety plan with the ICC.

**Historical disruptions**

The largest disruption to the state’s energy supply has been to electricity caused by weather, specifically thunderstorms, tornadoes, heavy winds, and ice storms. The State of Illinois Emergency Operations Plan (IEOP) lists the fifteen primary hazards for the state broken into three categories. The risk is based on historical events and potential threat (natural, technological, and human-caused) (Table 3).

Table 7. A List of the Highest Risk Hazards for the State of Illinois

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Natural</th>
<th>Technological</th>
<th>Human-Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Severe weather</td>
<td>8) Haz-Mat - chemical</td>
<td>11) Terrorist act</td>
<td></td>
</tr>
<tr>
<td>2) Tornado</td>
<td>9) Haz-Mat - radiological</td>
<td>12) Civil disobedience</td>
<td></td>
</tr>
<tr>
<td>3) Flood</td>
<td>10) Dam failure</td>
<td>13) Cyber attack</td>
<td></td>
</tr>
<tr>
<td>4) Drought</td>
<td></td>
<td>14) Agricultural epidemic</td>
<td></td>
</tr>
<tr>
<td>5) Extreme heat</td>
<td></td>
<td>15) Public health epidemic</td>
<td></td>
</tr>
<tr>
<td>6) Severe winter storm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Earthquake</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Illinois Emergency Management Agency (IEMA) has released a State of Illinois Natural Hazard Mitigation Plan (INHMP) that identifies potential natural hazards and vulnerabilities for the state, as well as strategies for mitigating the effects. This plan is comprehensive and lists severe thunderstorms and tornadoes, floods, severe winter storms, drought, extreme heat, and earthquakes as the natural hazards for which the state is at greatest risk. As a component of the plan, previous federal disaster declarations were summarized for the years dating back to 1957. These indicate that flooding has been the most frequent cause of federal disaster declaration with tornadoes and severe thunderstorms (all of which may coincide) also being a concern (Table 4). All of these will affect the electrical infrastructure and transportation of fuel. Extreme heat could tax the electrical system while threatening to reduce output from nuclear facilities which may have to reduce output to ensure cooling ponds do not overheat. Flooding and earthquakes could affect the natural gas and petroleum pipeline distribution network as well as the electrical infrastructure and transportation network. During the 2009 severe storm outbreak in southern Illinois, damage to natural gas pipelines from uprooted trees was significant. Severe storms and tornadoes may also damage renewable resources such as windmills and solar arrays.

**TABLE 8. Lists of Events Associated with Federal Disaster Proclamations Since 1957**
In addition to identifying historical disasters, the INHMP identifies the potential for future disasters in each Illinois county along with the potential severity of that disaster based on historical events. Potential risks based on historical events are listed in Table 5. The northern half of the state was listed as having high potential for severe damage from storms. Those counties along the Mississippi River and Cook County were listed as severe risks for floods.

Table 9. Risk levels for potential hazards based on past events (from INHMP)

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Number of Historic Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0-12 (green)</td>
</tr>
<tr>
<td>Guarded</td>
<td>13 to 24 (blue)</td>
</tr>
<tr>
<td>Elevated</td>
<td>25 to 36 (yellow)</td>
</tr>
<tr>
<td>High</td>
<td>37 to 48 (orange)</td>
</tr>
<tr>
<td>Severe</td>
<td>49 to 60 (red)</td>
</tr>
</tbody>
</table>

IEMA has also released a State of Illinois Human-Caused Hazards Mitigation Plan (IHCHMP) which includes the Illinois Technological Hazards Mitigation Plan (ITHMP). The plan addresses a variety of human and technological hazards (Table 3). Those of greatest concern to energy assurance are 1) terrorist acts and dam failure with their effect on infrastructure; 2) public epidemic with its impact on workforce; 3) and cyber threats with their potential damaging effect on the SCADA systems which run electrical components for pipelines, refineries, electrical generating plants, electrical transmitters etc., especially as the use of smart grids for electricity which rely on software becomes more prevalent.

The IHCHMP lists the threat of terrorism as high in all counties in Illinois. The risk of all other human-induced and technological hazards is elevated in most counties, but high in the counties around Chicago and severe in Cook County (Chicago). The risk of all human-caused and technological threats is listed as severe in Cook County because of the dense infrastructure and population in Chicago.
Section Two. Energy Emergencies and Response

Legal Authority

Emergency Response

Authority for emergency response in the state of Illinois is enacted in the Illinois Emergency Management Agency Act (20 ILCS 3305/6(2)b,c and 7 (11)). This act authorizes the Governor to 1) create the Illinois Emergency Management Agency (IEMA) and emergency management programs within appropriate state political subdivisions, 2) appoint the director of IEMA, 3) have general direction and control of IEMA, 4) provide for the rendering of mutual aid in the case of a disaster, 5) provide funds for disaster recovery, 6) declare a disaster which gives the governor emergency powers including:

- Suspend any regulations which could delay disaster response
- Access and utilize all available state resources toward disaster recovery
- Transfer duties of state agencies and personnel toward disaster recovery
- Acquire personal property or property to be used in disaster recovery (with compensation). This is relevant to energy assurance as gasoline, generators and other energy supplies or generating equipment can be accessed
- Recommend evacuation
- Control routes to and from disasters and access to disaster sites
- Control sales of alcoholic beverages, firearms and combustibles.
- Make provisions for emergency housing
- Control, restrict and regulate the sale of food, fuel and other commodity items. *This is obviously relevant to energy assurance also as the Governor can use quotas and fix the price of transportation fuels and other energy-related items.*
- Governor is commander and chief of all state militia.
- Prohibit increases in the prices of goods and services. *This too is relevant to energy assurance as the Governor can ensure fuel prices remain stable during a disaster.*

The act defines a disaster as “an occurrence or threat of widespread or severe damage, injury or loss of life or property resulting from any natural or technological cause including…critical shortages of essential fuels and energy…”. What constitutes “critical shortages of essential fuels and energy” will be interpreted by the Governor and his office, but it is hoped information in this plan and generated by the supply disruption tracking plan will assist in this decision.

Also within the act are well defined guidelines for IEMA and local and regional emergency management entities. A requirement of the act is the development of the Illinois Emergency Operations Plan (IEOP) which defines state agency responsibilities in response to a disaster. The requirement for IEMA to exercise the plan is also in the act.
The Disaster Relief Act (15 ILCS 30/0.01) defines how the Governor appropriates funds during a disaster and works with the federal government, if appropriate, to obtain federal disaster relief.

The state does have weight limitations for vehicles under Illinois Compiled Statutes 625 ILCS 5 Illinois Vehicle Code. Section 15-111 but these load limits are waived for utility vehicles “when operated by a public utility when transporting equipment required for emergency repair of public utility facilities…”. Section 15-301 does give the Illinois Department of Transportation (IDOT) the authority to issue permits allowing vehicles to be above the weight limit. IDOT does issue these permits in situations in which equipment is required for disasters.

The Illinois Vehicle Code also covers the maximum number of hours a driver may operate a vehicle (per day (15 hours) per 7 day period (70 hours)) under section 18b-106.1. These are above the requirements of the Federal Motor Carrier Safety Administration (FMSCA) for interstate transport. IDOT can also offer waivers for driver hour overages during an emergency, and the Governor can also waive the state limitations in times of emergency.

Electrical and Natural Gas Utilities

The Illinois Public Utilities Act ((220 ILCS 5) is the primary source of regulation for utilities in the state. The act was written to try to ensure state citizens received reliable, affordable electricity and natural gas. The act created the Illinois Commerce Commission (ICC). The commission has supervision over the state’s public utilities, reviewing the utility’s general condition, rates, generating plants etc. The commission reviews the security policy of each utility, ensures they practice at least one exercise a year and that electrical utilities maintain North American Electric Reliability Council (NERC) security standards. The public utilities act contains language requiring the ICC to maintain staff that can aid the public utilities with “electronic trespass enforcement” which would be the equivalent to cyber-security issues. The act gives the ICC authority to file an action in circuit court if a utility is in violation of any Illinois law which the utility must answer within 20 days and be penalized if found guilty by the court. The ICC also has authority under the act to investigate, hold hearings and issue orders against utilities if they may be in violation of the terms of the public utility act or consumer protection laws.

220 ILCS 15 Gas Storage Act, 220 ILCS 20 Illinois Gas Pipeline Safety Act and 220 ILCS 25 Gas Transmission Facilities Act are the primary regulations regarding the storage and transportation of natural gas in Illinois. The gas storage act deals mainly with the safe, cost-effective storage of natural gas and the rights of the natural gas companies to purchase and alter property for that use. The pipeline safety act gives authority to ICC to develop safety guidelines for intrastate pipelines, requires gas companies provide plans to the ICC on their safety guidelines for pipeline facilities and the pipelines themselves, and gives the ICC the authority to convene court hearings if they find a plan is inadequate. The ICC has chosen to follow federal
gas pipeline safety act “Natural Gas Pipeline Safety Act of 1968” for their safety requirements. The act also requires pipeline companies to report all accidents associated with pipelines and facilities to the ICC and gives the commission the right to request civil penalties if safety guidelines are not followed. The act also states that the public utilities act applies to pipelines and facilities.

**Petroleum**

Illinois does not directly regulate the petroleum industry, and therefore, the regulations regarding this industry are more limited. However, various laws are in place to protect public safety including **Titles XVI - Petroleum Underground Storage Tanks** and **VI-C - Oil Spill Response** under the **415 ILCS 5 Environmental Protection Act** which require anyone owning facilities, a tank or a pipeline which results in a leak to report the leak to the Illinois Environmental Protection Agency, thereby ensuring the state will be notified if a large leak which, beyond the risk to life and the environment, could impact supply, should occur.

Illinois does have an alternative fuels act (Illinois Alternate Fuels Act. - 415 ILCS 120) which does require the IL EPA to promote the use of alternative fuels for transportation (ethanol, biodiesel, electric vehicles, ride sharing) including funding to support these efforts from fees from commercial vehicle users.

**State agencies and their roles**

The Illinois Emergency Management Agency (IEMA) coordinates the state’s overall emergency management program by working with local governments, state agencies, political subdivisions of the state, private organizations, and the federal government. IEMA coordinates when appropriate, with the Federal Emergency Management Agency (FEMA) and other federal agencies to provide disaster assistance following major disasters. IEMA provides emergency response operations related to communications, notification, incident command, and emergency response support to local governments. IEMA has divided the state into eleven regions (Figure 2). Each region has a coordinator who responds to local government requests for assistance during an energy emergency. The regional coordinators reach out to the state IEMA office when the resources required for the response are beyond those the region or local governments can provide.
Coordinating of response

Emergency communication procedures
The Governor’s Office determines the level of state response to any human-caused or natural disaster affecting the people of the State of Illinois. The IEMA Director, reporting to the Governor, manages and coordinates state operation, in accordance with the National Incident Management System (NIMS). The personnel, facilities, and equipment for responding to a disaster will be located in the State Incident Response Center (SIRC). The IEMA director is
responsible for activating the SIRC. Guidelines for emergency response and recovery operations are described in detail in the Illinois Emergency Operations Plan (IEOP) which includes the Illinois Disaster Management System (IDMS) (Figure 4). Guidelines specific to energy sector emergency response can be found in “Emergency Support Function (ESF) 12 – Energy” of the IEOP. The ICC is listed as the primary agency responsible for energy sector restoration after a disruption in the ESF-12.

Figure 4. Illinois disaster management system unified area command organization (from the Illinois Emergency operations plan)
The State Emergency Operations Center (SEOC) is located in Springfield, Illinois and consists of a large operations facility with state-of-the-art equipment (computers, communications, etc.) in which representatives from state, private, and federal entities report and coordinate recovery efforts. IEMA activates the SEOC in state emergency situations. Within the SEOC is the State Incident Response Center (SIRC), the room where various government agency personnel gather, communicate, and monitor emergency response efforts during SEOC activation. Also within the SEOC are the Radiological Emergency Assessment Center (REAC), the State Terrorism and Intelligence Center (STIC), and the Communications Center. Only certain partners within the SEOC may be activated if an emergency only affects these segments. An IEMA spokesperson for public relations (Public Information Officer (PIO)) also reports to the SEOC when a disaster is declared and has support staff to handle communications with the public and policy makers.

The following are communication procedures outlined in the IEOP for initiating the Unified Area Command (UAC) for field operations, the SIRC, and the SEOC once the Governor has approved state involvement in an energy disruption recovery effort.

- The State UAC will coordinate field (operational/tactical) response activities.
- A UAC may be established for any level of emergency requiring a state field presence; however, the location, activities, and scope will vary according to the parameters of the occurrence.
- IEMA will activate the SEOC. Agencies will send representatives to the SEOC as requested.
- IEMA will provide mission assignments and tasks.
- State Agency Duty Officers/SIRC Liaisons will be notified in accordance with IEMA Communications Center procedures. Agencies are responsible for internal notification of personnel.
- Each activated Emergency Support Function Annex (energy is Annex 12) will send representatives to the SIRC and/or UAC, as appropriate, to coordinate state response to the disaster or emergency. The SEOC representative from ICC will be notified for energy sector concerns. If it is not warranted, the energy annex will not be activated and ICC will not be contacted.
- Agencies will execute mission assignments and provide technical assistance as required. State agencies will provide personnel for the SEOC, UAC, and other response and recovery duties when requested.
- IEMA will notify all Primary Agencies of the existence of or potential for a disaster.

Affected local governments are responsible for identifying and communicating response priorities and state resource requirements to the SIRC or through the UAC if it is activated. Through these plans, local governments shall access and utilize all available resources to protect against and cope with an energy disruption. When local governments determine that available resources are not adequate to respond to an energy disruption, they may request assistance from
the state through the IEMA 24 hour-a-day emergency communication center in Springfield. Requests may also come through the IEMA Regional Coordinators. Local governments will have most likely communicated with and requested assistance from private energy providers prior to contacting the state. Energy sector entities such as utilities also may contact the ICC Energy Emergency Coordinator directly if the disruption appears significant, crosses multiple local jurisdictions, and will most likely require immediate state assistance.

The IEMA Director or designee(s) also maintains a constant liaison with the federal government, state agencies, disaster relief organizations, and other states' disaster agencies. A FEMA Operational Liaison(s) in the SIRC will provide the principal means of coordination between the SIRC and FEMA Region V.

**Mutual Aid Networks**

The Emergency Management Assistance Compact (EMAC) was established in 2006. EMAC allows the State of Illinois to provide or receive mutual aid if requested by or from another state and establishes procedures for reciprocity, reimbursement, workers' compensation, and other considerations.

Illinois has formed the Mutual Aid Response Network (MARN), which allows critical components of government to unite with the private sector for a deployment clearinghouse of resources needed during emergency response and recovery. MARN is designed to act as a force multiplier between the private sector and law enforcement/public safety to mitigate the impact of critical incidents, including natural disasters and acts of terrorism. The clearinghouses contain resources available from the private sector through Memorandums of Understanding (MOUs) and include reimbursement and terms of use for equipment. The MARN and private utilities often provide equipment, such as transformers, to each other as needed during an emergency. The government will bring to bear those resources such as state responders, police powers, and certain types of sensitive information to strike a balance of equal yet contrasting roles in this partnership. The MARN program emphasizes proactive preparedness, safety, and security through this clearinghouse of existing resources for statewide response.

The state also has three other mutual aid networks which can be called upon in an energy emergency to assist in restoration efforts. These include the Mutual Aid Box Alarm System – Illinois (MABAS-IL) which provides firefighters and equipment to areas in need from a disaster or to fill in gaps left by firefighters leaving their municipality to support disaster response; Illinois Law Enforcement Alarm System (ILEAS) which is the police equivalent to MABAS-IL; and the Illinois Public Works Mutual Aid Network (IPWMAN) which is a mutual aid network of municipal public works including utilities that share equipment and personnel in times of
disaster. Municipalities can contact any of these three organizations for support in restoration efforts.

In October 2011, the Illinois Emergency Management Agency (IEMA) launched a public-private initiative that will strengthen coordination between the state and the private sector during disasters. The Business Emergency Operations Center (BEOC) will enhance communication between the private sector and state emergency management personnel to improve preparedness, response and recovery efforts for major disasters.

The BEOC is an emerging concept in public-private working alliances across the nation as states recognize the integral role that private sector entities play in homeland security and emergency management. The BEOC provides an opportunity to strengthen community resilience and overall preparedness through an integrated emergency operations center approach.

The purpose of the BEOC is not to obtain goods and services, but to harness information available through the private sector and coordinate it with response and recovery actions developed in the SIRC. This collaborative effort among sectors will also improve pre-event planning and preparedness, which ultimately improves response and recovery. Sectors currently represented in the BEOC include: agriculture and food; retail; energy; information technology; postal and shipping; bank and finance; communications; transportation systems; chemical; manufacturing; healthcare and public health; water; security; small business; facilities; and service industry.

The BEOC was activated for the first time during the state’s earthquake exercise in November 2011. The scenario of this three-day functional exercise was a 7.7 earthquake in southern Illinois along the New Madrid fault line. The BEOC was staffed by more than 50 private industry representatives, with virtual participation from companies that chose to operate from their in-house crisis management centers.

Response and coordination within and between state agencies
State disaster response operations in the SIRC and in the field are conducted in accordance with the National Incident Management System (NIMS). The IEMA Director is responsible for the overall coordination of response and recovery programs through the implementation of the IEOP as directed by the Governor. The IEMA Director or designee(s) also maintains a constant liaison with the federal government, state agencies, disaster relief organizations, and other states' disaster agencies. The ICC Energy Emergency Assurance Coordinator (EEAC) is responsible for coordinating energy restoration after a disruption and can work directly with local EOCs and private energy providers to assist with restoration efforts. All requests for resources or restoration to the EEAC from other government agencies are coordinated through IEMA using the WebEOC format and forms.

24
IEMA personnel coordinate the collection of disaster intelligence from state agencies, through the SIRC and UAC. The SIRC is the strategic coordination and management facility for all state response activities for a given emergency. State agency support will be coordinated via the emergency support function annex structure in accordance with the IDMS and NIMS. Implementation of portions of the SEOC and execution of initial actions could occur prior to a Gubernatorial Proclamation of a disaster. State agency Duty Officers and SIRC Liaisons will be notified in accordance with IEMA Communications Center SOPs.

During energy disruptions, the state only steps in when the extent of the restoration is beyond the capacity of local municipalities and private sector emergency response efforts. The IEOP identifies the state agencies responsible for and actions required for the response to energy disruptions from disasters under the guidance of the Illinois Emergency Management Agency Act (20 ILCS 3305(6)(2)b,c and 7 (11)). The Illinois Commerce Commission has been identified in the IEOP as the agency responsible for the restoration of energy to state citizens after an emergency. The ICC’s Department of Homeland Security has been tasked with these responsibilities within the ICC. The ICC typically works closely with public utilities, municipal utilities, electrical cooperatives and private energy providers to restore energy resources, coordinating with other state agencies and ensuring the private sector has everything the state can provide to restore energy effectively and safely. The ICC also regulates utilities and intra-state natural gas pipeline safety. For long term monitoring of energy supply, the State Energy Office (SEO) within the Department of Commerce and Economic Opportunity (DCEO) monitors the prices, available supplies, and forecasts for the raw materials the state uses.

While the ICC is the primary state entity responsible for the restoration of energy after a disaster, the Illinois Department of Commerce and Economic Opportunity (DCEO), the Illinois Department of Transportation (IDOT), Illinois Department of Central Management Services (CMS) and the Illinois Department of Corrections (IDOC) take on secondary responsibility roles. DCEO monitors supplies and pricing, IDOT provides the equipment for removal of debris and road repair, CMS supports IEMA in the procurement of equipment and supplies (including transportation fuels), and IDOC provides manpower for debris removal. Long-term recovery is coordinated with state and federal agencies in accordance with their statutory authorities or, if significant enough, through special task forces established by state and federal officials.

Monthly teleconferences are held between the ICC Department of Homeland Security Representative in charge of energy restoration and energy providers in Illinois to go over any issues, discuss monthly events, and to see if there are any ways the state can help prevent energy disruptions. The ICC Representative has a contact list for all the groups (see Appendix 4) and can contact them quickly in the case of a disruption.

IEMA supervises all emergency response efforts for the State of Illinois according to the IEOP. A section of the IEOP is devoted to the restoration of energy supplies and infrastructure after an
emergency. The Energy Section of the IEOP was added as emergency support function number 12 (ESF-12). According to ESF-12, the ICC is the primary state agency responsible for energy restoration after an emergency, along with the Illinois Department of Transportation (IDOT), the Illinois Department of Central Management Services (CMS), the Illinois Department of Corrections (IDOC) and the Illinois Department of Commerce and Economic Opportunity. IDOT provides the equipment for cleanup and energy restoration and driver hour and maximum weight waivers for utilities requiring personnel to work beyond typical shifts or to carry heavy loads to disaster sites. CMS provides IEMA assistance in procuring supplies and equipment for cleanup and restoration missions, and which provides the labor required for cleanup after a disaster with secondary roles and responsibilities (Figure 5). As of the writing of this version of the EAP, efforts are underway to include DCEO with the secondary role of energy supply and infrastructure tracking and situational awareness. In order for this to be approved and included as an official role for DCEO, it must be approved as an official component of the IEOP and ESF-12. The state is currently pursuing the necessary steps for this to occur. In the meantime, a seat within the SIRC has been provided for DCEO’s energy assurance engineer.

CMS establishes master contracts with the private sector for critical equipment and goods such as generators and fuel. These contracts are established before the disaster and allow the state to access these items quickly during an emergency. They also are typically priced below retail since the state makes an effort to obtain volume purchasing. Municipalities can also have access to these items through joint purchasing contracts established by the state. Any purchasing CMS performs in support of energy restoration must be approved through IEMA by that agency’s Finance Officer. CMS has signed contracts with gasoline terminals and gasoline and diesel transportation trucks. In an emergency, CMS can contact these groups and request trucks to transport fuel from these terminals to disaster affected areas to provide fuel for state, local, and private sector disaster responders.
According to the IEOP, the utilities will have first responsibility when restoring electrical and natural gas disruptions. The plan stipulates that the ICC will coordinate with federal, state, and municipal agencies to determine prioritization of energy restorations. ICC, according to the plan, will coordinate damage assessments. The plan notes that the ICC does not have direct authority over municipal utilities and electrical cooperatives but is still expected to supervise their recovery efforts. In past emergencies, the associations for each (IMUA and IECA) have served as go-betweens for the ICC and individual municipal and cooperative utilities affected by disruptions. The associations received aid requests from the utilities and then passed these to ICC for assistance. In discussions with the Illinois Municipal Utilities Association (IMUA) and the Illinois Electrical Cooperatives Association (IECA), both groups indicated that this has happened in past operational emergencies, and they plan to continue to cooperate with ICC as both groups benefit.

The Illinois SEOC holds monthly meetings during which the ICC representative for emergency management is allowed to address any concerns regarding energy assurance. Other state agencies discuss any situations or concerns they may have. CMS, IDOT, DCEO and IDOC have representatives at the table, and the National Weather Service typically gives forecasts for
potential weather concerns, reviews weather events from the previous month, and describes responses to those events. IEMA supervises the meeting and also reviews any points of concern, such as impending exercises and situations in the next month that may or will require activation of the SEOC (such as large public events).

Consequences and severities of energy emergencies and rate of recovery
DCEO’s Energy Assurance Engineer (EAE) will track the severities and consequences of energy emergencies by reviewing previous emergencies and documenting new emergencies as they occur. The state’s tracking process spreadsheet is used for this purpose (see Appendix 2). A critical question is “At what point does the state become involved?” Local municipalities and utilities can usually recover from smaller emergencies without requiring state assistance. A survey of previous emergencies that required state involvement shows when and at what level the state typically becomes involved; this serves as a guide for future emergencies. A component of the tracking sheet is the rate of recovery for each disruption. The ICC requires utilities to keep extensive records of reliability and post annual self-assessments, as well as provide their own assessments. These reports also address plans the utilities have to improve service. The OE-417 is a document required by the DOE to be filled out when an electrical outage affects a certain number of consumers. Results from OE-417 reports for Illinois utilities have also been logged by the State Energy Office for the past ten years. The State Energy Office has also reviewed historic events where prices and/or supply of raw materials used to produce energy have been at critical levels to try to determine cause and better assist with monitoring for future events.

Role of State Energy Emergency Assurance Coordinator
Within ICC, the Energy Emergency Coordinator (EEAC) or his or her representatives work within the SEOC for energy restoration. His or her role in restoration of energy is primarily to work with the private sector (utilities, pipeline companies, etc.) and ensure they have what they need to restore energy supply. This includes the energy supply required to restore energy (such as diesel for trucks) and long-term plans to restore the infrastructure itself. The Emergency Assurance Coordinator can contact the appropriate state agency representatives at the SEOC (such as the National Guard) to obtain manpower or generators, IDOT to get trucks and equipment for debris removal, CMS to obtain IEMA funds for equipment or supplies, and IDOC to obtain the work force for debris removal. Other tasks performed by the EEAC during an energy emergency include obtaining driver hour or vehicle weight waivers from IDOT for utility and propane truck drivers for additional hours or vehicle weights on the road to deliver propane to rural users in need or to restore electrical infrastructure and obtaining fuel mix waivers from
the Illinois or United States Environmental Protection Agency for situations when gasoline blend changes may seriously impact supply and pricing during energy emergencies.

Contacts with private sector
As stated, the ICC EEAC works with the private sector for energy restoration after a disruption. His or her role is to coordinate with the private sector to determine what state assistance they require and to serve as a communication conduit between the state, state agencies, and the private sector to ensure continuity and consistency. The representative has a list of contacts for all private sector entities in Illinois responsible for energy supply and/or delivery and restoration (see Appendix 4). Private sector energy providers make requests directly to the EEAC regardless of the need in order to avoid confusion. The EEAC will then pass on that request, if appropriate, to another agency.

Management decision process
Whenever there is an energy disruption, the IEMA Communications Center is contacted, whether it is a downed power line or a hazardous material spill from a pipeline. Usually contact is made by an IEMA Regional Coordinator who had been contacted originally by a local emergency response coordinator. The Center will contact the IEMA Director who, if the emergency is energy related, would contact the EEAC. They would make a joint decision, based on experience and guidelines, as to whether the emergency is significant enough for state involvement. Often, the private sector may contact the EEAC to first announce an energy emergency such as downed power lines. But if the private sector restorer is not aware of the situation, the EEAC will contact the entity responsible for restoration of service to ascertain the situation and determine if state assistance is appropriate and necessary. The EEAC then has the authority to 1) take no further action, but monitor the situation for changes, 2) make direct contact with other state agencies or contacts to arrange assistance, or 3) contact IEMA and suggest an activation of the SEOC when the event seems severe. The reaction to a typical energy disruption is as follows (Figure 6): the energy provider is either contacted by the state, local, or their own monitoring system that there is an energy disruption. The provider then assesses the situation and determines if additional assistance is needed. If needed, the energy provider contacts the local government EOC and/or the state EOC (based on severity). When local government becomes involved, the same assessment is made. When the state becomes involved, the Governor is informed and a decision is made. The state may contact FEMA in cases where the disruption is beyond the state’s resources. There is some flexibility in these situations, but the correct person needs to be contacted at each step for the next level to be accessed. For instance, in the case of a disruption that is going to obviously require state assistance due to its severity, the energy provider may
contact the state directly – rather than going through the local government first – to ensure a rapid response.

FIGURE 6. Steps in Decision to Involve State in Restoration of Energy Disruption

In the case of long-term supply disruptions, the DCEO State Energy Office (SEO) will use the guidelines established in the supply disruption tracking plan (Appendix 1) to monitor energy pricing and supply for potential cost spikes or supply shortages. If there appears to be an impending issue, the Energy Assurance Engineer (EAE) will contact the ICC EEAC who will work with IEMA to determine if the Governor’s office should be briefed on the situation. If the situation requires state intervention, the three agencies (DCEO, ICC and IEMA) will work with the Governor’s Office to make the appropriate state actions to correct the situation (conservation, price freezing, curtailment, alternative sources, etc.).
Responsibility for the identification and assessment of disruptions
For the purpose of this document the state will separate energy disruptions into two categories: emergency disruptions caused by a disaster in which normally functioning infrastructure is rendered ineffective and energy can no longer be distributed to consumers; and long-term supply disruptions in which the price or availability of raw materials for energy has become an issue for normal, affordable delivery.

Typically, in the situation of emergency energy disruptions, first responders, such as firemen, police, or energy providers themselves, are the first to identify the problem. Both will report the situation to local emergency response or the IEMA hotline, which then reports it to the ICC liaison at the SEOC (Energy Emergency Assurance Coordinator or EEAC). The EEAC will then confirm the extent of the emergency with the private sector entity and the local municipality EOC responsible. Local governments have primary responsibility for response and recovery. The state will only become involved if the situation requires resources beyond those the local government and private sector can provide. The EEAC will work with IEMA and the local EOC to make this decision. The final decision on state commitment of resources, if required, is made by the Governor’s Office.

In the case of long-term supply disruptions, the State Energy Assurance Engineer with the DCEO State Energy Office is responsible for monitoring costs and availability of raw materials and energy. The office will use the guidelines established in the Supply Disruption Tracking Plan to monitor energy supply and costs. During an energy emergency which requires SEOC activation, the Energy Assurance Engineer will assist the EEAC in understanding energy supply, infrastructure, and location of resources.

Procedures for issuing a declaration
The Governor’s Office is responsible for issuing an emergency declaration, but typically does not do so without IEMA first suggesting it. In the case of an energy disruption, the ICC EEAC will work with IEMA and the Governor’s Office to determine if a declaration is required. The final decision will rest with the Governor. IEMA’s role is to inform the Governor of the extent of the damage based on reports from local EOCs, at the scene law enforcement, private sector partners, and regional IEMA coordinators.

Public information program
The SIRC and SEOC include staff from IEMA, the primary agencies, and other support agencies as required. They provide strategic and operational coordination for SIRC response activities as well as activities in the field. The SIRC serves as a central source of information on the status of state response activities and helps disseminate information to the Governor, the public, the
General Assembly, Congress, and the media. A Public Information Officer (PIO) will be on duty at the SIRC when activation occurs. This person reports to the Governor’s PIO who is responsible for deciding who in the public, private, and government sectors to contact with what information. No one else from the SEOC or state government besides the Governor or a designated PIO should be issuing statements or be contacted during a disruption.
Section Three. Individual Energy Source Response Plans

Monitoring system

The three primary components of the monitoring system for the State of Illinois are field identification of energy disruptions, analysis of disruption predictions, and geospatial monitoring. They encompass all four of the state’s major energy sources (petroleum, natural gas, electricity, and renewables).

Field identification
Disruptions to energy supplies, especially those from damage to infrastructure, are often discovered by first responders (police or fire), local EOC personnel, or personnel from the energy provider. IEMA provides training for all local EOC personnel and law enforcement on how to identify, report, and respond to energy disruptions. For instance, once turned off, natural gas pipelines should only be turned back on by a trained representative of a gas utility; and, of course, electrical wiring should never be touched unless by those trained to understand and handle the equipment.

Local EOC, first responders, and energy provider personnel are also trained on the proper communication steps to take when an energy disruption is discovered. Criteria for when the state must be contacted in the case of a pipeline leak or a power outage and information on who to contact and how to make that contact is provided. The IEMA Communication Center has a 1-800 number that is manned 24 hours a day for reporting energy emergencies and requesting information.

Analysis of disruption predictions
Analysis focuses primarily on monitoring and preparing for energy price increases or supply shortages, a function for which the State Energy Office is responsible. The State Energy Assurance Engineer has access to a number of free and subscription sources listed in the supply disruption tracking plan, as well as a list of contacts (see Appendix 4) within the industry who have agreed to be available to the state if the office should have any questions or concerns. These contacts’ livelihoods depend on an accurate assessment of energy prices and understand that the state requires this information in times of emergency for restoration efforts.
**Geospatial assessments**

The state is in the process of determining the most appropriate geographic information system and layers for monitoring energy infrastructure. The State Energy Office is working with IEMA GIS Specialists who will use the infrastructure layers in exercises and modeling to predict damage and run more realistic scenarios, as well as use the data during actual emergencies to better understand possible outages, areas of impact, and potential damage so they can assist the ICC, IDOT, DCEO and IDOC in restoration efforts. The State Energy Office has worked with DHS Earth and iCAV (Figure 7), but these programs do not allow modeling to predict extent and damage, while other GIS programs do. The state should be releasing the GIS database for use by SEOC personnel in the spring of 2013.

Figure 7. Example of iCAv layers for Chicago, Illinois
Petroleum (gas, diesel, heating oil, propane, ethanol, etc.)

*Description of location, capacity and throughput of infrastructure*

Up until the early 1970s, Illinois was fifth in the nation in petroleum production. It has since tapered off, and in 2010 the state was ranked 14th, producing only 759,000 barrels while consuming 254 million barrels a year (4.8 billion gallons of gasoline). As a result, the state imports the vast majority of its petroleum, most of which now comes from Canada through the Enbridge Pipeline.

Petroleum transported into Illinois comes almost exclusively from pipelines. There are two primary types of petroleum pipelines: those that transport the crude oil to facilities where it can be refined into useable products such as gasoline, diesel, propane, and heating oil (refineries), and those that transport the finished product to distribution facilities. A pipeline could be used for both, but this is rare and requires special cleaning. Illinois has a number of petroleum pipelines coming into and out of the state. There are two areas in the state where a number of pipelines converge: in the southern part of the state near Patoka where a large crude oil storage farm exists and is used by multiple companies and along the Illinois border near St. Louis, Missouri (Figure 8). Disasters affecting pipeline flow in these areas could seriously reduce petroleum supplies. Pipeline companies must adhere to National Transportation Safety Board (NTSB) safety guidelines.

Figure 8. Locations Of Major Petroleum Pipelines In Us And Illinois
Petroleum spills are considered hazardous waste, and as such, must be reported to the IEMA Communications Center. Also, the oil spill response section of the Illinois Environmental Protection Act requires anyone owning facilities, a tank or a pipeline which results in a leak to report the leak to the Illinois Environmental Protection Agency. Once a pipeline is shut down for repair or because of a leak it must be re-inspected before it can be turned back on. The Pipeline and Hazardous Materials Safety Administration of the US Department of Transportation must inspect the line before it can be used again. Many, but not all, pipelines have automated pressure valves that detect and report when pressure climbs or descends rapidly indicating a potential spill or pressure build up allowing the company to rapidly locate and repair a leak, but a large leak could impact supply and pipeline leaks often lead to gasoline price increases. It is important for the DCEO Energy Assurance Engineer to be notified of leaks and start monitoring the gasoline prices for spikes which, if significant enough, could be reported to the Governor. On July 24, 2012, the Governor of Michigan, Rick Snyder, declared an energy emergency and waived driver hour limits after a leak in Wisconsin led to a shortage in supply in the upper peninsula of the state.

Illinois has 4 petroleum refineries which process on average 939,000 barrels of oil a day plus a 5th facility just across the state line in Whiting, Indiana, which produces 405,000 barrels a day. The Conoco Phillips Refinery near Wood River produces the most at 306,000 barrels a day. The Marathon, Conoco, and BP refineries provide most of the fuel for the state of Illinois. While the media persistently mentions that no new refineries have been built in the U.S. in recent years, refining capacity is in excellent shape and always improving to meet demand. Illinois refinery capacity has actually been above demand recently because of reduced gasoline use during the economic downturn.

95% of the state’s gas stations are independently owned. Gasoline goes from the refinery as a “raw” gasoline product (no additives) to a terminal where it is mixed to a gas station’s specification. Even though a gas station may be affiliated with Shell or BP, the gas may come from any refinery: it is the additives mixed at the terminal that make it “BP” or “Shell” gasoline. The refineries in the state are using more and more heavy crude from Canada which is now the nation’s number one oil provider. Ninety percent of Illinois oil now comes from Canada. Any new state regulations on Canadian crude could impact Illinois petroleum supply. The Conoco Phillips refinery has just added the facilities to take Canadian heavy crude, so all four state refineries can now process that oil. Changes to state regulations regarding this oil type would increase gasoline prices.

As mentioned, the state is transected by a number of petroleum pipelines. Disruption to one pipeline may increase prices and reduce supply, but petroleum for pipelines can often be rerouted. If a shortage from the Gulf (where oil comes in from foreign countries) or Canada occurs, the refineries can compensate to some extent by sending petroleum originating from another location to that pipeline. The biggest concern with petroleum disruption for Illinois is
electrical outages from hurricanes in the Gulf because electricity is needed to pump the petroleum from the Gulf states to Illinois. Most shortages from refinery capacity interruptions or pipeline leaks will be temporary, but a large-scale disaster or multiple problems could result in longer term price hikes. It is important that the energy assurance engineer have the contacts for the refineries available to call quickly to determine capacity and issues at all four refineries and multiple pipelines if one has a problem to ensure re-routes can address the problem.

The state can occasionally help the petroleum industry by providing waivers for gasoline mixes. Large metropolitan areas require different mixes (especially in summer). In the case of a hurricane or a downed refinery, not enough fuel can be mixed for the requirements of the metropolitan areas. The Illinois Petroleum Council (IPC) has served the Illinois refineries in the same capacity as IMUA or IECA has the electrical utilities, by contacting the EPA to request a waiver for multiple refineries. These waivers require the Governor’s signature and are only signed during a justifiable petroleum shortage. The DCEO State Energy Office will work proactively with IPC to have the proper communication channels in place to expedite future waiver requests when appropriate.

**State emergency response plan**

CMS has contracts in place with several petroleum product terminals and with several gasoline and diesel transportation firms. In an emergency, if transportation fuel is not available at the site of the event, CMS SIRC personnel will contact these contractors and request trucks be sent to key locations identified by the Incident Commander. The trucks will serve as re-fueling stations for state, local, and private sector disaster responders. CMS can also provide state gasoline credit cards that can be shared with state personnel (and the private sector in emergencies) and has access to which gasoline stations are open during a disaster event. IDOT also has fuel in storage in case of shortages for their vehicles which they could also share in an emergency event.

**Monitoring supply and demand**

Being so closely associated with the price of gasoline, petroleum prices and supply are closely monitored and discussed on a daily basis by major media outlets. Price per barrel is often listed on news programs, and changes in the price of gasoline are commonly listed on websites such as gasbuddy.com. Sudden increases in the price of gasoline may be a sign that oil supplies have gone down or the potential for disruption exists as this market reacts quickly.

Illinois leads the Midwest in refining petroleum into products (gasoline, diesel, propane, heating oil). The state had an oil reserve of 54 million barrels in 2008. This amount varies by year and is monitored by the energy assurance engineer.
The DOE Energy Information Administration (EIA) has data on many different components of petroleum supply, sales, and sources including a petroleum status report, pricing reports for gasoline, diesel, heating oil, and propane, and an import report. The EIA publishes a report on first sales of petroleum products directly into states which could be useful in calibrating new supplies of petroleum coming directly to the state. The EIA also publishes a report on petroleum wholesale and retail prices at the state level. Petroleum inventory and production is also monitored and reported by EIA at the state and regional level. All of these reports may be used to monitor current supply and use and predict changes in supply and pricing which could be indicative of supply or future shortages. The American Petroleum Institute also provides a number of sources of information regarding petroleum supplies, gasoline prices, and imports.

Of course, as is the case with other energy supplies, contact with industry is essential. Existing industry contacts such as the Illinois Petroleum Council and the refineries themselves should be contacted by the energy assurance engineer if a disruption seems to be looming.

Understanding the impacts of weather on heating oil and propane sales and prices and understanding peak gasoline use periods can also help when monitoring demand for petroleum products. Long cold spells may lower heating oil supplies and peak summer vacation and holiday travel periods may lower gasoline supplies. When combined with a disruption, the effect from these situations on energy assurance will be more extreme.

The EIA publishes a list of operable refineries that can be used to determine where oil is being converted to gasoline, diesel, propane, and heating oil. Oil pipeline information is available from iCAV and DHS Earth (Figure 7). Illinois is a major transportation hub for crude oil. Several crude oil pipelines terminate in Illinois making this a point of concern for disruptions to petroleum supplies not only in Illinois but surrounding states.

**State efforts to reduce consumption and provide alternate energy sources**

Illinois, often first or second nationally in corn and soybean production, is a good location for the production of corn ethanol and soy bio-diesel. Current ethanol production in Illinois is greater than 860 million gallons per year. Plants often keep ethanol in storage at the facility. Illinois River Energy, for example, reports keeping 300,000 gallons of ethanol in reserve at all times. The Governor of Illinois has the authority to suspend the blend wall (the percent of ethanol to be added to gasoline) in times of emergency, allowing for more ethanol to be used in replacement of gasoline for fuel. Use of increased blends of ethanol can offset the use of conventional gasoline. In the event of a petroleum product supply emergency, Illinois could request a fuel waiver from EPA to temporarily grant approval of statewide use of E15 (15% ethanol blend) for us in all conventional vehicles. (The blend is currently at 10% for most Illinois gasoline.) This could make ethanol a viable alternative to gasoline in times of emergency, but the U.S. EPA would
also have to approve, and the ability of car engines to handle the fuel would have to be understood. Also, ethanol, while stored at the production facility, may already be committed to customers, making it difficult for the state to access. The state is considering encouraging the development and deployment of blender pump infrastructure to allow widespread distribution of E15, E20, E30, E40, and E85. Currently only 6 percent of the 4,400 retail fueling stations in Illinois are E85 stations, and only 2 have blender pumps.

The state also encourages citizens to voluntarily reduce gasoline consumption by using public transportation, bicycling, or car pooling. IDOT has a webpage dedicated to bicycle use, safety, and routes and has funding for the development of bicycle routes; it also has a webpage promoting and encouraging the use of Amtrak. The Governor has created a webpage for people to connect for carpooling to work. The state has incentives for electric vehicles for car sharing organizations and alternative fuel vehicle and alternative fuel rebates as part of the Illinois Green Fleets Program. IDOT has conserved fuel in the past during high gasoline prices by reducing the number of times they mow interstate and state highway right of ways.

**Legislative actions to assist in restoration, supply and pricing**

**Driver hour waivers**
IDOT is responsible for issuing driver hour waivers for propane and petroleum truck drivers during inclement weather to ensure rural residential customers receive propane for heating fuel and gasoline stations receive fuel. The waiver must be approved by the Governor. The National Propane Gas Association posts the current status of driver hour waivers in each state. Waivers are often granted in the winter. The State Energy Office will assist IDOT and the Governor’s office in understanding propane supplies, petroleum supplies, weather, and the need to allow the waivers.

**Fuel specification waivers**
The U.S. EPA can grant fuel waivers in a gasoline or diesel supply emergency. Two areas in Illinois have requirements for reformulated gasoline (RFG): the Chicago area and the Metro-East (near St Louis) area. In emergency situations, the U.S. EPA has the authority to grant waivers for the RFG requirement and allow the use of conventional gasoline instead. U.S. EPA can also consider, on a case-by-case basis, allowing higher blends of corn ethanol or higher sulfur diesel fuel. In both cases, engine warranties and life-time will impact the consideration of granting such a waiver. EPA’s Office of Enforcement and Compliance Assurance (OECA) should be contacted in this case at (303) 312-7153.
During this process, the Illinois EPA serves as an advisor to the U.S. EPA and the OECA. Therefore, in any emergency situation, the Illinois EPA should be contacted. Ultimately fuel waivers are granted by the U.S. EPA. In the case of an RFG waiver by the U.S. EPA, the Illinois EPA’s volatility standards for Metro East will still need to be waived. However, this standard is expected to be discontinued.

Finally, in case of a fuel waiver, Jonelle Brent with Illinois Department of Agriculture, Weights, and Measures Department (217) 785-8300 will need to be contacted as her office ensures that all fuels meet the stated blending limits. The Illinois Department of Agriculture will be in close contact with the Illinois EPA in case of an emergency situation.

The state has legislation in place that requires state agencies to purchase Flex Fuel Vehicles (FFVs); additionally FFVs account for more than 300,000 registered vehicles in state. FFVs can use higher blends of ethanol (up to 85%).

Finally, if a disaster is declared, the Governor does have the right to 1) freeze prices of petroleum products to prevent rapid increases in a shortage 2) prosecute price gouging if proven 3) acquire petroleum products to be used in an emergency from private sector providers. While it is hoped these never have to happen, it is critical the energy assurance engineer understand supply, potential impact of disruptions and price increases to best inform the Governor.

Natural gas

Description of location, capacity, and throughput of natural gas infrastructure

Only 51 operating natural gas wells produce natural gas in Illinois, but the state is a major transportation hub for the natural gas supply moving through North America. Major natural gas pipeline systems from the U.S. Gulf Coast, U.S. midcontinent regions, and western Canada converge at the Chicago Hub and the ANR Joliet Hub. From there, natural gas is transported to consumption markets in the Midwest and Northeast. In June 2009, a section of the eastern leg of the Rockies Express Pipeline system from Colorado and Wyoming began delivering additional natural gas supplies to Illinois increasing supply further. To meet peak demand during the winter, Illinois stores natural gas in natural aquifers and depleted oil or natural gas reservoirs. Underground natural gas storage capacity in Illinois is second only to that of Michigan. The residential sector leads natural gas consumption in Illinois, with more than four-fifths of Illinois households relying on the fuel as their primary energy source for home heating.

ICC is responsible for monitoring intrastate natural gas pipelines following federal guidelines closely. ICC is only contacted by the pipeline company if there is a leak, rather than a disruption, and then only when leak is significant. Also, ICC only monitors natural gas. The federal government monitors petroleum and other hazardous liquids. Intrastate pipelines cannot
be turned back on until inspected by ICC and require inspection from the U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHMSA). If there is a shut-down because of an earthquake or other possible damage, the pipeline cannot be used again until ICC or PHMSA signs off on it. In the case of a disruption or a shortage, the utility decides which customers to shut off. Typically, businesses are shut off first. ICC and PHMSA do have the authority to issue an emergency special permit to get a pipeline turned back on without inspection, but this requires both to sign. All pipeline regulations came from federal regulations put into place in 1970. Each year amendments to the 1970 act are added based on incidents with a death and/or property damage exceeding $50,000. Pipeline operators are responsible for keeping records of pipeline distribution, age, materials transported, etc. Older pipelines are galvanized iron and steel. Newer pipelines are PVC and more resilient. Most pipelines have PSI meters and automated monitoring. ICC and PHMSA perform reliability studies on pipelines and occasionally shut them down if they are below standards.

The utilities own storage facilities and store natural gas at the beginning of each winter, but they do not own the supply coming into the state in pipelines, most of which is committed to East Coast states. It would be difficult for Illinois utilities to gain access to that natural gas. A common mis-conception for natural gas pipelines is that flow slows down in the summer. According to the natural gas companies, flow is pretty steady throughout the year, as summer months are used to replenish storage for winter.

**Monitoring supply and demand**

The natural gas market is more difficult to monitor than petroleum. However, there are some helpful tools available. The EIA publishes a [monthly report on natural gas inventories and deliveries](https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&f=INTM) to industrial, commercial, and residential customers, on withdrawals from underground storage, and on pricing. This information is compared to previous years and 4-month averages and can be used to identify trends in price and use. Also, according to the National Association of State Energy Officials (NASEO) Energy Assurance Guidelines, we can monitor changes in natural gas supply by looking at two other indicators: spot and contract prices and curtailment notices. Efforts are made to obtain information on each of these as well from the state’s natural gas providers. Curtailment, which involve requests by the natural gas supplier to reduce use, are very rare. If sent, they are usually sent to large users such as industry as opposed to homeowners. Over 80% of the state’s households rely on natural gas for home heating, and home heating is the primary use of natural gas in Illinois. Weather will also need to be watched as long-term cold spells may reduce supplies. To meet peak demand in the winter, the state stores natural gas in natural aquifers and depleted oil and natural gas reservoirs, but a disruption in a pipeline or accidental release of this gas could cause a shortage. While the State Energy Assurance Engineer monitors weather daily for a variety of reasons, s/he will watch specifically for a prolonged cold spell late in the winter when supplies may be low and then work with the
natural gas companies to suggest reduced use to the public to avoid curtailment requests. If utilities and analysis indicate supplies are getting low, the state may request that citizens reduce use. This will be done via a press release from the Governor’s office.

The ICC publishes an annual report that lists the natural gas providers in the state of Illinois (11 as of 2009) and divides it by region and lists costs to consumers. Contacts exist with the natural gas industry personnel for each of these 11 companies and they are usually more than happy to share information on supplies and in-state demand.

The previously mentioned ICC report offers information on companies that distribute and sell natural gas by region in the state of Illinois. Natural gas pipelines, similar to petroleum pipelines are also available for viewing from iCAV. Similar to petroleum, Illinois is a major transportation hub for natural gas. Several natural gas pipeline systems converge at Chicago including systems from the Gulf Coast, western Canada, and just starting in 2009, a pipeline from Colorado and Wyoming.

Electricity and electricity energy sources

Infrastructure description

Between large coal reserves and an active nuclear generating industry, Illinois seems to have ample materials for electricity generation. However, although the state’s estimated recoverable coal reserves represent more than one-tenth of the U.S. total, only a small fraction of those reserves are located at producing mines. Illinois does not rank among the nation’s top coal producers, due in part to unfavorable geologic conditions and surface development, such as towns and roads and in part to the fact that Illinois high-sulfur coal is less attractive to electric utilities than western low-sulfur coals. Illinois delivers more than one-half of its coal output to other states, including Indiana, Tennessee, Florida, and Missouri. Illinois also receives coal from other states, particularly Wyoming, and uses that coal to generate electricity. Most of this coal is shipped into the state via rail. Much of the coal leaving the state is sent via rail or barges down the Mississippi River.

In addition, many coal plants could be closing down when new environmental regulations go into place in 2015. Right now, two coal generating plants in Chicago owned by Midwest Generation are planned for closure constituting just under 1,000 megawatts production. Two other older coal plants could be closed down also by the company as well. Both of these are also in Chicago. This is a very small percentage of the overall production but other plants could lead to increased electricity prices. Midwest Generation is building a new plant in Chicago, and several new plants are proposed in Illinois which will meet the stricter guidelines along with several smaller natural gas plants, but the energy assurance engineer should monitor sites like SourceWatch to estimate the number of megawatts leaving and entering production. If plant
closing reduce the overall available electricity or require more expensive fuels, the cost of electricity could go up. This is being predicted for the 2015 closings by some analysts, as other states will also be closing plants and electricity can be sold across state lines. Also, a combination of plant closings and an emergency may lead to brownouts or blackouts if the grid cannot meet demand.

Currently, Illinois is one of the top electricity-generating states in the nation and a leading net exporter of electricity to other states. Coal and nuclear power generate over 95% of the electricity in Illinois, with a near even split between the two fuels. With 11 operating reactors at 6 nuclear power plants, Illinois ranks first among the states in nuclear generation and generates more than one-tenth of all the nuclear power in the United States. The growth of the Illinois nuclear industry is due largely to state government initiatives, which began encouraging nuclear power development in the 1950s. One issue is that most of these plants were designed to operate for 30 years and were built in the 1970s. However, IEMA and the state take rigorous steps to ensure the nuclear power generating facilities stay safe. This is an active 24/7/365 operation with a control room at State Emergency Operations Center that constantly monitors all the plants. They also train three times a year with various disaster scenarios. The nuclear plants all run at 100% capacity year-round. There are no plans for additional plants to be built, but these plants consistently increase capacity and efficiency. Despite their 30-year life span, the plants have been applying for and receiving extensions based on their safety record and continuous infrastructure updates and monitoring.

Besides concerns over radiation, nuclear plants must monitor the temperature of their cooling lakes; if they rise over a certain temperature in summer months, the facility has to cut back production to avoid fish kills. This rarely happens, but could be monitored and predicted with weather data. An additional problem is that when the grid is shut off, the nuclear facility has to shut off and then restart. It cannot function separately from the grid as it would have no place to send generated electricity, and the backup diesel power generation is insufficient to power the plant. Nuclear facilities have no “black start” capabilities.

Wholesale electricity marketers such as PJM and MISO sell the electricity to utilities such as ComEd and Ameren which then distribute the electricity to businesses and residences. These companies monitor the electric grid (generating plants, transmission lines, etc.) very carefully to ensure electricity keeps flowing without interruption. The monitoring system uses multiple control rooms that watch the grid for problems and let the utility companies know what needs to be repaired. They call the generating plants and tell them what capacity to operate at each day and make infrastructure improvement and resiliency plans each year, which they submit to the utilities and which generally are implemented. They monitor the price of supplies such as coal and natural gas, including monitoring days of supply and long-term use, as well as monitoring and modeling weather to anticipate increases in demand. These companies try to manage the electricity generated with consumer needs. Generating electricity that is not used cost the
companies money so they try to anticipate needs and generate accordingly. They have assured energy assurance personnel that the grid in Illinois has built in redundancy and strong resiliency, but have also told the state they will contact state personnel if the load challenges capacity. They put out annual reports that summarize this information which are available to the state and public. Finally, these companies have detailed cyber-security plans in place.

The state has limited control over electricity rates. They can control the price utilities charge to transport electricity and natural gas and to maintain the infrastructure (wires and pipes, which are less than half the cost to the consumer), but they do not control the cost of the energy itself. The state cannot tell utilities to build new generating facilities. Essentially, the state cannot regulate the cost of electricity or the amount that is generated in Illinois. For municipalities that handle their own electricity, the state has even less control. If the wholesale distributors were to increase prices the only alternative consumers would have would be to reduce use. However, NERC and FERC could get involved, and the state could work with the wholesalers and utilities to find ways to reduce costs.

In August 2007, Illinois adopted a statewide renewable energy standard requiring the state’s utilities to produce at least 25% of their power from renewable sources by 2025. 75% of the electricity used to meet the renewable standard must come from wind; other eligible sources include solar, biomass, and existing hydroelectric power. The law also includes an energy efficiency portfolio standard that requires utilities to implement cost-effective energy efficiency measures to reduce electric usage by 2% by 2015.

**Monitoring supply and demand**
All electrical sales are reported to the EIA including sales of electricity generated from renewable energy at the state level for biomass, wind, geothermal, and solar by state. The site also gives information on sources for electricity generation by state, which allows the tracking of use of specific energy sources (such as coal and natural gas) and the monitoring for reduced supplies of the raw materials for electrical generation. The EIA publishes a quarterly coal price and inventory report which allows monitoring of coal supplies, availability, and use, including the number of in-state days of supply. Illinois has large coal reserves, but the coal is high in sulfur and must be mixed before combustion with low sulfur coal from the western U.S. (primarily Wyoming) to meet regulations.

Other data provided by EIA for electricity supply includes an annual inventory of power plants in the United States. While the publication has been discontinued, it contains historical data on electrical generation by state and by energy source for gas, coal, petroleum, and hydroelectric.

The U.S. EPA’s Emissions and Generation Resource Integrated Database (eGRID) also produces a database which contains all electricity generating plants, their net generation of energy by
source by year (coal, nuclear, biomass etc.), and the plant’s location including latitude and longitude coordinates which will allow for input into a geographic information system for mapping purposes. Transmission lines, power stations, and other electrical grid information are available for viewing on the iCAV and DHS Earth sites as well.

Other useful information for tracking potential electricity demand includes weather information, available online from a number of sources. Long-term forecasts of high summer or low winter temperatures may indicate increases in demand.

Specific to Illinois, the ICC publishes reports on electrical sales by year broken out by company, price, and user (retailer, commercial, public, etc.) for the state. The data is divided by region and could give insight into regional use and demand.

Because such a high percentage of Illinois’ electrical energy is produced using nuclear power, this will require special attention. Neither the source of nuclear power generation nor its price is expected to be an issue, but other factors, such as reactor failure or terrorism need to be considered. Illinois has 6 nuclear facilities with 11 reactors.

**State efforts to reduce consumption, alternate energy sources for natural gas and electricity**

**Renewables**

The two primary components of Illinois’s renewable energy portfolio are electricity, from wind and solar power, and bio-fuels for transportation from ethanol (primarily from corn) and biodiesel (primarily from soybeans). EIA reports minimal use of hydro-electricity in Illinois. Table 1 indicates that in 2010, just over 4% of the state’s total energy was provided by renewable sources for electricity, and, in 2007, 1,438 megawatts were generated from renewables. Illinois’ renewable energy standard requires the state’s utilities produce 25% of their electricity from renewable sources by 2025. Much of this is expected to come from wind.

The site www.windpoweringamerica.gov offers information on potential wind power generation in Illinois. This site estimates close to 250,000 megawatts of electricity could be generated from wind energy in Illinois. The American Wind Energy Association shows current wind projects by state, county, and even by project with megawatt potential for each project.

**Combined heat and power**

Combined Heat and Power (CHP) systems have the capability, under certain configurations, to continue to safely operate and provide electric service to a facility during emergency situations (extended electric utility outages). In Illinois there are currently 138 CHP systems operating with
a total installed capacity of 1,360 MW (see Table 9 below). The US Department of Energy estimates that the total CHP potential for the state is between 3,000 MW and 8,000 MW from fossil fuel sources. The Midwest Clean Technology Application Center estimates that an additional 3,000 MW could come from agricultural sources (farm digesters, corn stover gasifiers integrated with CHP systems). The majority of the CHP systems installed in Illinois are equipped with black start capabilities and synchronous generators, which allows the CHP system to serve the facilities’ load in case the electricity grid de-energizes.

TABLE 9. Installed CHP Systems in Illinois

<table>
<thead>
<tr>
<th>A.E. Staley Manufacturing Co.</th>
<th>John Deere Harvester Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archer Daniels Midland Company</td>
<td>Kelly-Springfield Tire Company</td>
</tr>
<tr>
<td>BP Amoco Chemicals Company</td>
<td>M&amp;M Mars, Inc.</td>
</tr>
<tr>
<td>Brookfield Zoo</td>
<td>Museum of Science &amp; Industry</td>
</tr>
<tr>
<td>Caterpillar Manufacturing</td>
<td>Quaker Oats Company</td>
</tr>
<tr>
<td>Equity Office Properties</td>
<td>Shell Oil Company</td>
</tr>
<tr>
<td>Evanston Township</td>
<td>U.S. Navy, U.S. Army</td>
</tr>
<tr>
<td>ExxonMobil Corp</td>
<td>US Steel</td>
</tr>
<tr>
<td>Fleishmann Kurt Matt Co.</td>
<td>Warner-Lambert Company</td>
</tr>
<tr>
<td>General Mills, Inc.</td>
<td>Wells Manufacturing Co.</td>
</tr>
<tr>
<td>Goose Island Brewery</td>
<td>Colleges/Universities (17)</td>
</tr>
<tr>
<td>Hunter Haven Dairy</td>
<td>Hospitals (12)</td>
</tr>
<tr>
<td>Ingersoll Milling Co.</td>
<td>Schools (21)</td>
</tr>
<tr>
<td>IRE Ethanol Plant</td>
<td>Wastewater Treatment Plants (7)</td>
</tr>
</tbody>
</table>

The diversity of the fuel sources for CHP systems in Illinois is illustrated in Figure 8 below. As can be seen, either a natural gas or coal shortage would only affect a portion of the installed capacity, allowing the remainder to operate.
The Midwest Clean Technology Application Center closely monitors the supply diversity from CHP and total CHP potential for the State of Illinois.

Reduced use
There are several programs the state has developed to encourage consumers to reduce energy usage and cut energy costs for household or business. Below are some of the programs designed to help consumers reduce energy use and costs by eliminating energy loss and increase efficiency.

- Ameren Illinois Act On Energy
- Anybody Can Serve
- Center for Neighborhood Technologies
- ComEd - Home Savings
- Illinois Home Weatherization Assistance Program
- KeepCool.Illinois.gov
- KeepWarm.Illinois.gov
**Smart grid role**

Smart grid technology encompasses a number of mechanisms that allow for better monitoring and delivering of electricity. Unlike natural gas or petroleum products, electricity cannot be stored effectively in any large quantities. This requires electricity providers to produce the maximum amount of potential electricity which may be required at any given time to avoid brown-outs or blackouts. The smart grid 1) allows utilities to continuously monitor for outages and identify problems before they lead to outages, 2) allows for a feedback loop between electricity generators and consumers to allow (to some extent) electrical generation to be increased or decreased based on demand, 3) better allows for the implementation of wind and solar power which, because of their intermittent contributions, offer new problems to a grid which is used to continuous electrical flows.

The ICC has developed a [Statewide Smart Grid Collaborative Report](#) which addresses the potential for smart grid technologies in Illinois. Two important components of the smart grid identified in the report were 1) smart meters for residential customers, allowing customized delivery of electricity based on use and providing the utility detailed usage data to monitor and respond to; and 2) synchro phasers, which allow continuous measurements of electrical flow along the grid for wholesalers to measure, monitor, and adjust output from generating facilities.

Recently, the Illinois legislature passed HB 3036, allowing Ameren Illinois and CommonWealth Edison (ComEd) to implement smart grid technology for their portions of the Illinois electrical power grid. The bill, which had a previous version vetoed by the Governor, was somewhat controversial as some saw it increasing electrical costs to consumers without assured cost savings. It also went around the traditional method of rate increases occurring through the ICC by asking for a flat increase to consumer utility bills to be directly implemented by the legislature.

ComEd has begun their $2.6 billion upgrade to the electrical grid they estimate will take 10 years to implement. An analysis performed by an independent firm for ComEd estimates the cost savings from the advance metering initiative (AMI) component of their smart grid upgrade would provide $2.8 billion in savings over 20 years and improve electrical reliability (the AMI component of ComEd’s smart grid plans is estimated to cost $1.8 billion). According to ComEd, half of the cost is going to upgrade the physical components of their electrical system (new wiring, transformers, etc) that spans northern Illinois (Figure 10). The other half is going toward the communications network that will be required in order for the smart grid to communicate detailed information regarding consumer use and the health of the electrical grid. The cost to consumers is $3 a month.
Ameren’s plans for smart grid upgrades include sensors placed along critical sections of the transmission grid to monitor conditions and prevent disturbances elsewhere from cascading into Ameren territories (Figure 11). It will also assist in the incorporation of wind and solar power. Ameren’s sub-stations will be upgraded to allow remote operation of switches and monitoring for outages, that would allow the utility to switch to alternative power sources and avoid outages. Ameren will put monitors in place at the distribution grid level to allow for remote switching to alternative power sources and to switch the flow of power to avoid damaged areas.

Figure 11. Ameren Electrical Services Territory In Illinois
**Cyber-security**

All Illinois electrical wholesale (PJM and MISO) and utilities (Ameren and ComEd) have been required by the Illinois Public Utilities Act to provide to the ICC a plan for cyber-security. ICC has information technology personnel who specialize in cyber-security issues review the plans and work with the utilities. These personnel are available to work with the SEOC if there is a breach. If ICC feels the plan of any utility or electricity wholesaler is not sufficient to protect the public safety, they can request the utility enhance measures. The plans closely follow NERC Critical Infrastructure Protection (CIP) Guidelines as NERC has also asked for similar plans and does exercise these plans. NERC has established a number of [CIP standards](#) that address cyber-security, and utility and wholesaler plans closely follow and address each standard. Standards and sub-standard 2 thru 9 specifically address cyber-security. Critical components of the NERC standards that ICC emphasized were the development of more than one security perimeter (multi-layered security protections), and the identification and vulnerability assessment of critical assets (control centers). All Illinois utilities and wholesalers run their own exercises to test their systems.

A primary concern identified with smart grid technology is that by nature, the communication between the grid and the utility opens new vulnerabilities. Others may be able to access these communication pathways and cause areas of the grid to shut down or switch electricity routes, causing overloads. Multiple vendors are involved in the development of all components (hardware and software at control room and in field). Ameren and ComEd were required to submit detailed cyber-security plans for approval to ICC for the recently passed smart grid plans and are working closely with vendors to ensure these pathways are secure, compatible, and reliable. Each utility is requiring vendors to meet the NERC CIP standards. NERC has also been performing cyber-security exercises with Illinois wholesalers and utilities.

A major issue associated with cyber-security and the petroleum, natural gas and pipeline industries is the impact a cyber-attack could have on the SCADA systems which run much of the automated processes. Discussions with the Illinois industries have led to assurances that most SCADA devices are in closed environments and most control rooms have no access to the internet making a cyber-attack very difficult. Personnel from many of the energy sector companies in Illinois have met with the state regarding cyber-security and reporting breaches. While they are not required to do so, most companies have told the state, they will report any issues.
Section Four. Critical Infrastructure Plan

State plan for enhancing resiliency and protecting critical infrastructure

The Illinois Emergency Management Agency (IEMA) is the state agency for coordinating disaster and emergency preparedness. The IEMA, through the Illinois Terrorism Task Force (ITTF), develops and implements the state's homeland security strategy and administers federal preparedness funding. The Illinois Private Sector Alliance Project (PSAP) was launched in 2007 to integrate the business and nongovernmental sectors with government efforts in preventing, responding to, and recovering from catastrophic events. The PSAP exists under the ITTF and consists of two programs: the Infrastructure Security Awareness (ISA) Program and the Mutual Aid Response and Resource Network (MAR2N). The State of Illinois does not have a state-level critical infrastructure plan in place at this time but is investigating ways to develop one.

For the purposes of energy assurance, the state was divided into each IEMA region and its energy infrastructure (natural gas and petroleum pipelines, electrical transmission lines, refinery locations, electrical generating plants, wind farms) was mapped. The following is a breakdown of each region and the associated critical energy infrastructure. This plan has been disseminated to each IEMA Regional Coordinator, the Illinois Terrorism Task Force, and the Illinois State Police to assist them in their efforts to protect and respond to impacts to these infrastructure components.
**IEMA Region Two** encompasses counties in northwestern Illinois. Major cities include Moline and Rock Island (Quad Cities area). The primary infrastructure concerns for this region include 9 wind farms, 2 nuclear electrical generating facilities along the Mississippi River, intersecting high voltage electrical wires, and petroleum and natural gas pipelines which feed large metropolitan areas like Chicago. There are no refineries in the region. Major concerns for the region include severe storms and flooding. Wind farms can withstand very high winds, and the area is not at high risk for earthquakes, but the high number of wind farms means they should be considered when disasters occur. Wind farms may also interfere with radiation fallout should a nuclear accident occur. The location of wind farms in relation to the plume direction should be considered.

Figure 12. IEMA Region 2
**IEMA Region 3** includes the counties that surround the Chicago area (collar counties). Cities in this region include Joliet, Kankakee, and Dekalb. The ExxonMobil Refinery in Joliet operates in this region. Two natural gas pipeline hubs are also in the region near the refinery. Two nuclear electrical generation plants are also in this region, and a number of high powered transmission lines run through the region. Any land-based fuels brought into Chicago (unless from Wisconsin) go through this region. Its natural gas service is from Nicor, and its electrical service is with ComEd. The region is densely populated. It is not at risk for earthquakes, but severe storms in summer and winter and possible terrorist activities are threats.

**Figure 13. IEMA Region 3**
IEMA Region 4 includes Chicago’s Cook County, along with Lake County to the north and DuPage County to the west. It’s serviced by Nicor and People’s Gas for natural gas and ComEd for electricity. While the region does not have any nuclear facilities or refineries, the large number of residents and high requirements for energy make infrastructure leading into this region critical to protect. The region is at risk for winter and summer storms and terrorism.

Figure 14. IEMA Region 4
**IEMA Region 6** is in the west central part of the state. Major cities include Peoria, Quincy, and Springfield. The region is at risk for flooding, as the Illinois and Mississippi rivers confluence here. Ameren provides electricity and natural gas for the majority of this region although Nicor serves some counties along the Mississippi River, and Springfield’s utilities are municipally run. The region has no refineries or nuclear facilities, but like other regions in the state, it has a number of high voltage power lines which run through the region some of which intersect here.

Figure 15. IEMA Region 6
**IEMA Region 7** covers the east central part of the state. Major cities include Bloomington, Champaign, and Decatur. There are no refineries in this region, and 1 nuclear facility at Clinton. The region has several wind farms, and a number of high voltage electrical lines transect the region as well. It is primarily serviced by Ameren for electricity and natural gas. The region is not particularly at risk for flooding or earthquakes; the main risk is severe storms.

Figure 16. IEMA Region 7
**IEMA Region 8** includes the southwestern part of Illinois surrounding St Louis. A 306,000 bbl/day ConocoPhillips refinery is in the region near Wood River. Several petroleum pipelines converge at this location. There are no nuclear electrical generating facilities or wind farms. The region is vulnerable to flooding and would take impact from a New Madrid earthquake.

Figure 17. IEMA Region 8
**IEMA Region 9** covers the southeastern part of the state. Major cities include Marion, Charleston, and Effingham. One refinery, owned by Marathon Petroleum Company (215,000 bbl/day) is located in the region near Robinson. A number of petroleum pipelines intersect in this region. The region is home to a major crude oil storage tank farm located near Patoka where several companies hold crude oil. Impacts to this tank farm could significantly impact fuel supply and pricing. There are no nuclear electrical generating facilities or wind farms, but a number of high powered transmission lines run through the northwestern half of the region.

Figure 18. IEMA Region 9
**IEMA Region 11** includes the fifteen counties on the southern end of Illinois. The region does not have refineries, nuclear electrical generating facilities, or wind farms. It is not heavily populated but is the IEMA region most at risk of earthquake. It has had a number of strong storms including tornadoes, ice storms, and strong thunderstorms that many have referred to as inland hurricanes because of the strong winds.

Figure 19. IEMA Region 11
Acronyms

CMS - Illinois Central Management Services
ComEd - Commonwealth Edison
DCEO - Department of Commerce and Economic Opportunity
EAE - State of Illinois Energy Assurance Engineer
EEAC - Emergency Energy Assurance Coordinator
EOP - Emergency Operation Plan
ERC - Emergency Response Center
FEMA - Federal Emergency Management Agency
ICC - Illinois Commerce Commission
IDOC - Illinois Department of Corrections
IDOT - Illinois Department of Transportation
IERG - Illinois Energy Reference Guide
IECA - Illinois Electrical Cooperatives Association
IEMA - Illinois Emergency Management Agency
IHCHMP - Illinois Human-Caused Hazard Mitigation Plan
IMUA - Illinois Municipal Utilities Association
INHMP - Illinois Natural Hazard Mitigation Plan
ISA - Infrastructure Security Awareness
ITHMP - Illinois Technological Hazards Mitigation Plan
ITTF - Illinois Terrorism Task Force
MAR2N - Mutual Aid Response and Resource Network
NERC - North American Electric Reliability Corporation
PHMSA - Pipeline Hazardous Materials Safety Administration
RFC- Reliability First Corporation
SEO- State Energy Office
SEOC- State Emergency Operations Center
SERC South East Reliability Corporation
SIRC- State Incident Response Center
UAC- Unified Area Command
Appendices

Appendix 1. State of Illinois Energy Supply Disruption Tracking Process

State of Illinois

Energy Supply Disruption Tracking Process

Illinois Department of Commerce and Economic Opportunity

State Energy Office

August 2010

Updated August 2012
State of Illinois Energy Supply Disruption and Response Tracking Process Plan

I. Introduction and Overview:

As a component of the State of Illinois Energy Reference Guide, the following document outlines a process for tracking the duration, response, restoration, and recovery time of energy supply disruption events (Supply Disruption Tracking Process (SDTP)). The document will serve as an introduction to the more encompassing State of Illinois Energy Reference Guide by indicating the data used and people responsible for the decisions required for successful energy assurance at the Illinois state level. Effective tracking of the state’s energy supply and potential disruptions will require participation by a number of state and local agencies as well as the private sector, and a thorough understanding of the state’s energy requirements, uses, supplies, demand and potential disruptions, along with the severity and recovery time from those disruptions. Illinois has its own unique energy profile with a mix of nuclear and coal powered electricity and a growing ethanol industry which require a unique plan for tracking potential disruptions and remediation efforts for energy restoration.

This document will outline a proposed supply and disruption tracking process understanding that the process will evolve and change over time as the Energy Reference Guide is defined and implemented, and state agencies and private entities identify their roles. It should be understood that all sources of information, responsible parties and other Energy Reference Guide components will not be documented here, only the proposed methods to develop this information. The actual information and plan to execute will be covered in the state’s Energy Reference Guide which will grow, in part, from this document. However, this document will attempt to define the method proposed to track disruptions and will also identify potential gaps that currently exist either in data, personnel, the knowledge base or within the state agencies to meet all the requirements to thoroughly map and track energy disruptions to the state of Illinois, and will define the required communication to ensure disruptions are discovered, restored and communicated to policy makers and the public in the most efficient, accurate and timely manner.

We propose four steps to developing the disruption tracking and restoration process. These include: 1) Defining the state’s current energy sources, supply and demand 2) Defining and understanding the state’s infrastructure for delivery to users 3) Understanding and cataloging potential disruptions to the state’s energy supply along with the risk of these disruptions occurring and the potential damage to supply from each 4) Developing a management plan for the discovery, reporting, communication and restoration of energy disruptions within the state.
II. Energy Portfolio of Illinois

The first step in the process for tracking energy supply disruptions is defining the energy profile of the state of Illinois. In other words, what forms of energy are currently used and also an examination of what energy sources may be used in the future by the state, the projected demand for this energy, defining the supply of these sources, current and future, and the infrastructure for transporting that energy.

This assessment will be performed using available literature and statistics such as those available from the Illinois Commerce Commission, the U.S Department of Energy’s (DOE) Energy Information Administration’s (EIA) Statistics and the US Environmental Protection Agency’s Emissions and Generation Resource Integrated Database (eGRID) for example. It’s understood that the primary sources of energy for Illinois, like most states, include petroleum for transportation, natural gas for heating and coal and nuclear power for electricity, but Illinois also has the capacity to generate wind energy (Figure 1) and is generating large amounts of ethanol from in-state produced corn. A complete energy profile will examine all current and potential energy uses including future renewable energy production. In addition to the energy profile, the report should indicate the available supply of the materials required to produce this energy (petroleum, natural gas or coal for example), typically reported in days of supply, which will be critical to understanding the effect a disruption would have on the energy available to affected areas and will identify the infrastructure (pipelines, refineries, transmission lines etc.) required to transport the energy to needed locations.

![Wind Resources and Transmission Lines](image-url)
The second step in the development of a tracking plan for supply disruptions is to catalog the infrastructure associated with these energy sources. Where is energy produced in the state, where does energy and/or raw materials required to produce the energy enter the state, where in the state is it transported and how and where is it finally used? Much of this information can be found using the Department of Homeland Security’s Integrated Common Analytical Viewer (iCAV) and DHS Earth. These systems display much of the state’s energy infrastructure in a geo-spatial format similar to a map and can also model potential disruptions. Other sources of information for the state’s energy infrastructure may include geographic information system (GIS) layers from other sources, maps available from private sector participants such as electrical companies, natural gas companies and petroleum companies and information from federal and state agencies.

Along with an understanding of the infrastructure, the system should also account for the demographics of the state. Locations with a large population and/or large industrial base are obviously going to require more energy. Rural farming communities, predominant in Illinois, have different energy profiles than large cities such as requirements for large amounts of natural gas during the fall for drying corn, but much lower energy demand during most of the year. Areas with growing populations could be taxing the energy infrastructure in their area. Much of this information is going to be intuitive based on the existing infrastructure, but including this information, which will be available from the US Census Bureau and other sources, most likely also in map format, when making decisions on disruption impacts, could assist the state in understanding the severity of the disruption on population and the economy (Figure 2).
Overall Energy Portfolio

Cataloging energy sources and supplies in the state of Illinois is going to begin with identifying the private companies that provide these services to the state. The Illinois Commerce Commission has this information available for the electricity, natural gas and petroleum industries. Once all of the energy providers for the state of Illinois have been identified, each will be contacted and asked to contribute information they have on their historical, current and projected supplies for their given energy source. The Illinois Commerce Commission will be contacted for information on these sources. Good communication with the private industry providers of energy to the state is critical to the success of tracking energy and disruptions.

To understand and quantify energy supply, there are some general publications available that identify supplies for multiple energy sources including the Energy Assurance Daily which is a publication of the EIA that discusses major developments in the electricity, petroleum and natural gas industries which could reduce supply. The EIA also puts out information on total
energy use including annual energy consumption by source for each state. Table one indicates the energy sources and total British thermal units (Btu) for Illinois in 2008. Twenty-four percent of the total energy used in Illinois was from nuclear generated electricity versus the national average of 8.5%. This could be a critical difference in Illinois’ energy portfolio which needs to be taken into account when considering energy assurance and potential disruptions. Below is summary of information for these major energy sources for Illinois.

Table 1. 2008 Illinois Energy Use in Trillions of Btu

<table>
<thead>
<tr>
<th>State</th>
<th>Total Energy</th>
<th>Coal</th>
<th>Natural Gas</th>
<th>Petroleum</th>
<th>Nuclear</th>
<th>Renewable</th>
<th>Interstate Elec. Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trill Btu</td>
<td>4,430</td>
<td>1,069</td>
<td>935</td>
<td>1,230</td>
<td>1,005</td>
<td>191</td>
<td>-493.7</td>
</tr>
<tr>
<td>%</td>
<td>100%</td>
<td>24%</td>
<td>21%</td>
<td>23%</td>
<td>28%</td>
<td>4%</td>
<td>-12%</td>
</tr>
</tbody>
</table>

As mentioned, much of the information regarding infrastructure is available using iCAV which was developed by the Department of Homeland Security. ICAV has over 400 infrastructure data layers that can be viewed in a geospatial (map) format online. ICAV also provides information on population densities and weather which can be viewed to estimate potential impact of weather events on given infrastructure and population densities, and can have customized input that can be distributed to users. The Illinois Commerce Commission also publishes an annual report on the availability of electrical and natural gas by geographic area in Illinois. An overview of Illinois’ energy strengths and weaknesses would indicate the state is a major transportation, distribution and oil refining location and produces a good deal of electricity but also imports much of the sources for energy production (Table 2).
Table 2. Strengths and Weaknesses of Illinois Energy Supplies

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Petroleum</strong></td>
<td>* Leads the Midwest in refining capacity</td>
</tr>
<tr>
<td>* Petroleum</td>
<td>numerous pipelines run through and terminate in state</td>
</tr>
<tr>
<td>* 4 in-state refineries</td>
<td>* Oil coming from Canada and Gulf Coast to IL refineries</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>* Top nuclear electricity producing state in US</td>
</tr>
<tr>
<td>* 3rd largest coal reserve in US</td>
<td>* Most of state's coal inaccessible and high in sulfur</td>
</tr>
<tr>
<td>* Leading producer and net exporter of electricity</td>
<td>* Strong reliance on coal and nuclear (Over 95%)</td>
</tr>
<tr>
<td><strong>Natural Gas</strong></td>
<td>* Major transportation hub for natural gas</td>
</tr>
<tr>
<td>* Numerous pipelines run and end in state</td>
<td>* Any disruption in down-stream pipelines impacts Illinois production</td>
</tr>
<tr>
<td><strong>Renewable</strong></td>
<td>* Top producer of corn-based ethanol</td>
</tr>
<tr>
<td>* Potential for wind and solar contributions</td>
<td>* Estimated renewable capacity will not meet state demand</td>
</tr>
</tbody>
</table>

**Petroleum**

Being so closely associated with the price of gasoline, petroleum prices and supply are closely monitored and discussed on a daily basis by major media outlets. Price per barrel is often listed on news programs, and changes in the price of gasoline are commonly listed on websites such as gasbuddy.com. Sudden increases in the price of gasoline may be a sign that oil supplies have gone down or the potential for disruption exists as this market reacts quickly. Illinois has four petroleum refineries, two of which are in the Chicago area and leads the Midwest in refining
petroleum into products (gasoline, diesel, propane, heating oil). The state had an oil reserve of 54 million barrels in 2008. This amount varies by year and should be monitored.

The EIA has data on many different components of petroleum supply, sales and sources including a petroleum status report, pricing reports for gasoline, diesel, heating oil and propane and an import report. The EIA publishes a report on first sales of petroleum products directly into states which could be useful in calibrating new supplies of petroleum coming directly to the state. The EIA also publishes a report on petroleum wholesale and retail prices at the state level. Petroleum inventory and production is also monitored and reported by EIA at the state and regional level. All of these reports may be used to monitor current supply and use, and predict changes in supply and pricing which could be indicative of supply or future shortages. The American Petroleum Institute also provides a number of sources of information regarding petroleum supplies, gasoline prices and imports.

Of course, as in the case with other energy supplies, contact with industry is essential. Existing industry contacts will be gathered from current state employees such as those with the Illinois Commerce Commission and will be logged within the Illinois tracking database. These companies will be contacted as part of the Energy Reference Guide and asked for methods they use and may be willing to share to monitor use, supply, demand and trends.

Understanding the effects of weather on heating oil and propane sales and prices, and understanding peak gasoline use periods can also help when monitoring demand for petroleum products. Long cold spells may lower heating oil supplies and peak summer vacation and holiday travel periods may lower gasoline supplies. Also, during certain times of year, gas blends are changed. This can also impact supply and pricing and needs to be understood. When combined with a disruption, the effect from these situations on energy assurance will be more extreme.

The EIA publishes a list of operable refineries which can be used to determine where oil is being converted to gasoline, diesel, propane and heating oil. Oil pipeline information is available from iCAV and DHS Earth (Figure 3). Illinois is a major transportation hub for crude oil. Several crude oil pipelines terminate in Illinois making this a point of concern for disruptions to petroleum supplies not only in Illinois but surrounding states.

Figure 3. DHS Earth Screen Capture of Oil and Gas Infrastructure in and around Chicago, IL
Natural Gas

The natural gas market should be more difficult to monitor than petroleum. However, there are some tools available that can be helpful. The EIA publishes a monthly report on natural gas inventories and deliveries to industrial, commercial and residential customers, withdrawals from underground storage and pricing. This information is compared to previous years and 4-month averages and can be used to identify trends in price and use. Also, according to the National Association of State Energy Officials (NASEO) Energy Assurance Guidelines, two other indicators of changes in natural gas supply are spot and contract prices and curtailment notices. Efforts will be made to obtain information on each of these as well from the state’s natural gas providers. Eighty percent of the state’s households rely on natural gas for home heating. This is the primary use of natural gas in Illinois. Weather will also need to be watched. Long-term cold
spells may reduce supplies. To meet peak demand in the winter, the state stores natural gas in natural aquifers and depleted oil and natural gas reservoirs, but a disruption in a pipeline or accidental release of this gas could cause a shortage.

The ICC publishes an annual report that lists the natural gas providers in the state of Illinois (11 as of 2009), breaks it out by region and lists costs to consumers. Contacts will also be made with the natural gas industry personnel for each of these 11 companies to determine if they are acquiring and can share information on supplies and in-state demand.

The previously mentioned Illinois Commerce Commission report offers information on companies that distribute and sell natural gas by region in the state of Illinois. Natural gas pipelines, similar to petroleum pipelines are also available from iCAV. Similar to petroleum, Illinois is a major transportation hub for natural gas. Several natural gas pipeline systems converge at Chicago including systems from the Gulf Coast, western Canada and just starting in 2009, a pipeline from Colorado and Wyoming.

**Electricity**

Ameren and Commonwealth Edison are the primary providers of electrical energy in the state of Illinois with MidAmerican and Mount Carmel providing small supplies. Each company will be contacted and information requested regarding their energy sources and supply of these sources. However, many federal government sources of information are also available for electricity. All electrical sales are reported to the EIA including sales of electricity generated from renewable energy at the state level for biomass, wind, geothermal and solar by state. The site also gives information on sources for electricity generation by state which will allow the tracking of the use of specific sources such as coal and natural gas, and the monitoring for reduced supplies of these raw materials for electrical generation, according to the site, coal and nuclear account for over 95% of the state’s electricity generation. Also published by the EIA is a quarterly coal price and inventory report which will allow monitoring of coal supplies, availability and use including the number of in-state days of supply. Illinois has large coal reserves, but the coal is high in sulfur and must be mixed with low sulfur coal from the western US (primarily Wyoming) before combustion to meet regulations.

Other data provided by EIA for electricity supply includes an annual inventory of power plants in the United States which has been discontinued but contains historical data on electrical generation by state and by energy source for gas, coal, petroleum and hydroelectric.

The USEPA’s Emissions and Generation Resource Integrated Database (eGRID) also produces a database which contains all electricity generating plants, their net generation of energy by source by year (coal, nuclear, biomass etc.), and the plant’s location including latitude and longitude.
coordinates which will allow for input into a geographic information system for mapping purposes.

Other useful information for tracking potential demand for electricity includes weather information, which is available online from a number of sources. Temperature and long term forecasts of elevated summer or cold winter temperatures may indicate increases in demand.

Specific to Illinois, the Illinois Commerce Commission publishes reports on electrical sales by year broken out by company, price and user (retailer, commercial, public etc.) for the state. The data is broken out by region and could give insight into use and demand by region.

Because such a high percentage of Illinois’ electrical energy is produced using nuclear power, this will require special attention. The source for nuclear power generation is not expected to be an issue nor price for this source, but other factors, such as reactor failure or terrorism need to be considered. Illinois has six nuclear facilities with eleven reactors.

The location of power plants and their energy sources in the state of Illinois is available from the USEPA’s eGRID website including latitude and longitude information for entry into a geographic information system. Transmission lines, power stations and other electrical grid information are available for viewing on the iCAV and DHS Earth sites as well (Figure 4).

Figure 4. DHS Earth Screen Capture of Electrical Infrastructure for Springfield, Illinois
Renewable Energy

The two primary components of Illinois’ renewable energy portfolio are electricity from wind and solar and bio-fuels for transportation from ethanol (primarily from corn) and bio-diesel (primarily from soybeans). EIA reports minimal use of hydro-electricity in Illinois. Table one indicated that in 2008, just over 4% of the state’s total energy was provided by renewable sources for electricity, and that 1,438 megawatts were generated from renewables in 2007. Illinois’ renewable energy standard requires the state’s utilities to be producing 25% of their electricity from renewable sources by 2025. Much of this is expected to come from wind.

Illinois being a large corn and soybean production state (often first or second in production nationally) makes it a good location for the production of corn ethanol and soy bio-diesel. Current ethanol production in Illinois is greater than 860 million gallons per year (Figure 5). Plants often keep ethanol in storage at the facility. Illinois River Energy, for example, reports keeping 300,000 gallons of ethanol in reserve at all times. The Governor of Illinois has the authority to suspend the blend wall in times of emergency (allowing for more ethanol to be used in replacement of gasoline for fuel). This could make ethanol a viable alternative to gasoline in times of emergency if supply is cut off.
Figure 5. Ethanol production by state in 2009.

The site, www.windpoweringamerica.gov offers information on potential wind power generation in Illinois. This site estimates close to 250,000 megawatts of electricity could be generated from wind energy in Illinois. The American Wind Energy Association shows current wind projects by state, county and even by project with megawatt potential for each project.

Summary

A summary of Illinois’ energy sources, infrastructure, supply and demand shows an increasing use of all energy sources since 1960 (Figure 6). With a diverse energy portfolio, including electricity generated from in-state sources of coal and nuclear energy, together with renewable energy from ethanol and bio-diesel and the potential for wind generation, Illinois has the potential to generate a good deal of, but not entirely all of the in-state energy supplies.
Therefore, energy is going to be required from out of state and non-renewable sources which are anticipated to be in shorter supply. The state has an advantageous infrastructure, however, being one of the largest electricity generating states in the country with a typical surplus, and several natural gas and oil pipelines run through and terminate in Illinois, especially in Chicago with two oil refineries and a large natural gas hub. However, these same advantages increase the likelihood that a disruption of energy in Illinois could have effects not only in the state but potentially several other states as well increasing the importance of energy supply and disruption tracking in Illinois.

Figure 6. Energy consumption (trillions of BTU) in Illinois since 1960 shows an increasing trend.

III. Energy Supply Disruptions

Along with understanding the state’s energy profile, and the infrastructure required to support this energy use, a complete catalog of potential disruptions to this energy supply needs to be thoroughly documented. Understanding the multiple types of disruptions is critical to understanding how to prepare for them. Also, understanding the severity of each of these impacts is critical. Smaller scale power outages from storms can be corrected by private utilities
and small price changes can be adjusted for, but large scale disruptions are going to require state assistance in a number of ways.

Identification of historical interruptions in energy supply is a start for understanding future disruptions. This information should be available from a number of federal and state sources. Private companies who have in the past or currently provide energy to the state of Illinois will also be contacted and sources for this information requested. An additional question to answer will be if these disruptions could occur or are as likely to occur with the current infrastructure. A 1939 power outage may be less likely to occur with the current electrical infrastructure. In addition, however, the process should include the cataloging of potential future disasters which may not have a historical basis such as terrorist attacks, cyber-threats and huge energy price hikes. Sources available from the Department of Homeland Security and other security agencies may be valuable for determining types and likelihood of future energy disruptions.

Once the severity and frequency of historical disruptions and the potential for future disruptions are cataloged, a database of disruptions (see addendum two) will be developed and additional information regarding state agency and private entities responsible for response and contacts within these organizations, severity and historical time to repair from similar disruptions (if available). The use of iCAV and other GIS tools may be able to predict the effect from different disruption scenarios. These tools will be developed also. One source for disasters that may effect energy infrastructure is the Department of Homeland Security’s (DHS) Federal Disaster Declarations page which lists previous federally declared disasters by state and effected counties. This site also includes information on types of potential disasters. The DHS also publishes a daily infrastructure report which lists any new changes to national infrastructure.

**Petroleum**

The source and volumes of crude oil supply used by regional refineries may be found in the EIA Petroleum Supply Monthly. This information is needed to estimate the extent to which refiners may need to shift supplies if any given source of crude oil is disrupted.

**Natural Gas**

NGFast is a tool develop by the DOE’s Argonne National Laboratory to quickly model the impact of disruptions in natural gas pipelines. The US Government Accountability Office published a report which outlines potential natural gas disruptions and their effect. Disruptions can occur from damage to a pipeline but also from price changes and higher demand.

**Electricity**
Ameren and Commonwealth Edison, the two major electrical utilities providers for Illinois offer outage information on their websites including a map that shows specific locations for outages. The Electric Emergency Incident and Disturbance Report provides information on electric emergency incidents and disturbances. The Department of Energy uses the information to fulfill its overall national security and other energy emergency management responsibilities, as well as for analytical purposes. The US DOE’s Office of Electricity Delivery and Energy Reliability has a number of publications on their website that discuss emergency situations, emergency preparedness and emergency response which could be useful in developing information on previous and proposed disruptions. Unlike other sources of energy, electricity cannot be stored, it must be used upon generation. However, raw materials such as coal can be stored. Disruptions in coal delivery from railroad or barge issues could reduce the generation of electricity or move generation to more expensive sources such as natural gas.

**Renewable Energy**

Significant weather events may destroy solar panels, or power lines connecting renewable energy sources such as windmills or the windmills themselves. Feasibility studies have been performed on the equipment, but extreme weather events will impact these structures and should not be ruled out. Weather data should be monitored, potentially even automated for conditions with potential for destruction of windmills or solar panels. Also, to a lesser extent, long periods of low winds or cloud cover may affect the amount of energy available from these sources. If the state begins to rely more heavily on these sources for electricity generation, these disruptions in supply need to be considered. Likewise, reductions in corn yield or soybean production from off-weather years could reduce the supply of ethanol and bio-diesel. Sites that predict corn and soybean yield need to also be monitored such as the USDA’s National Agricultural Statistics Service.

**Risk Assessment**

Once a comprehensive list of historical and potential disruptions has been developed, a risk assessment will be developed for each disruption scenario. A weighted scale will be applied with a score for each possible negative outcome that could result from the disruption. Industry input will be solicited. Disruptions will be categorized from low impact and low risk to high impact and high risk (Figure 7). Based on a consensus by the various state agencies involved in the energy assurance decision making process, levels of risk and corresponding activities will be established. A decision on when the state will become involved will be made and documented in a Supply Disruption Tracking Database. Considerations for impact will include population affected, potential length of disruption, effect on industry and the economy and impact to state
security. Considerations for risk include determining the likelihood of the event based on prevention measures in place, replacement sources and previous occurrences of the event. For instance, a loss of electricity to 5,000 people after a thunderstorm would be high risk but low impact so the state would most likely not be involved. However, a power outage involving multiple cities would most likely require action by state and local government. Guidelines will be established and published online and in pamphlet form for use by all involved parties identifying potential disruptions, the proposed risk and impact of these disruptions and when, potentially the state would become involved.

![Figure 7. Simple Description of Risk and Impact Assessment for Different Disruptions](image)

Figure 7. Simple Description of Risk and Impact Assessment for Different Disruptions
IV. Implementation of a Supply Disruption Tracking Process

Management Decision Process

The final step in the disruption and restoration tracking process will be the development of a management decision process for each energy source and each potential disruption for that energy source. The person responsible for monitoring the supply and/or disruption within the state of Illinois government and private sector will be identified. If a person cannot be currently identified, this gap will be notated, and efforts will be made by the state to put a person in place. Also, in the management plan will be a list of the largest consumers that will need to be contacted in case of a disruption to their location.

Situational Awareness

Once the appropriate individual or group of individuals is identified for monitoring for supply disruptions, situational awareness will be developed through a series of events. A list of sources will be developed and automated email will be sent to this person with either web page links or results from these web pages so they can quickly access the information necessary to monitor the energy supply for longer term disruptions from price and supply changes. For instance, the state agency personnel responsible for monitoring for petroleum supply disruptions will receive weekly and daily emails that access web pages containing gas prices, oil prices and other sources of information on supplies. If feasible in the state budget, this person will quickly compile a weekly report to be submitted to the State Energy Officer. The person will also be trained in situational awareness, energy supply disruption tracking, the use of iCAV and other infrastructure related software and communication of these events to ensure they are prepared to monitor for and respond to energy supply disruptions for their energy source. The state of Illinois has not made a decision on whether one individual and/or agency will be responsible for monitoring and responding to disruptions or if it will be people from multiple state agencies based on the source being monitored. This decision will be made before the completion of the Energy Reference Guide and any training exercises.

There will be four stages associated with supply disruption tracking. These stages are taken directly from the Michigan Supply Disruption Tracking Plan as the state Of Illinois was allowed to review this document and found these stages to capture the modes of awareness for energy supply disruption tracking quite well. These stages include 1) monitoring for a disruption 2) elevated risk 3) Event triggered 4) Recovery and lessons learned.

Monitoring for a disruption: Using the information sources and automated emails described above, the person or persons responsible for monitoring the supply, demand and infrastructure for each energy source (petroleum, natural gas, electricity, ethanol) will review this data and
using their training, monitor for changes which are indicative of reductions in supply, increases in demand or a failure in the infrastructure. Using the supply disruption tracking database risk assessment, the analyst should be able to understand when a change warrants state involvement and what that involvement should be. This person will be responsible for a weekly or monthly report to the State Energy Office.

**Elevated Risk:** It should be understood, that there will be times when a developing circumstance warrants heightened analysis of supply, demand or infrastructure but not direct state involvement; a developing hurricane, a crisis in the Middle-east, a heightened DHS security level or an extended heat wave are examples of these situations. In these situations, the analyst will spend additional time monitoring for changes specific to the identified risk and send daily reports to the energy office. Additional analysts may also be involved.

**Event Triggered:** A disruption in energy supply can be sudden, as when a pipeline breaks, or occur after a period of elevated risk such as a hurricane hitting the US Gulf Coast and disrupting petroleum supply (see reporting a disruption below). When an event is triggered, the analyst will begin full time monitoring. Once the extent of the event is determined to be at the level justifying state involvement, the analyst will contact the State Energy Office. The State Energy Office will then make the decision as to who additional is contacted. For instance, the Illinois Emergency Management Agency and the Governor’s office may be contacted along with private energy providers, federal government agencies as appropriate and local authorities that may be effected by the disruption. See below section for further instructions on communications with media and policy makers.

**Recovery and Lessons Learned:** Once a significant event has occurred, the state will assist the private energy providers as necessary for the restoration of services. Communicate with the providers and federal agencies to determine if alternative energy sources or infrastructure needs to be diverted (for instance state reserves of oil or emergency reserves of ethanol after a crude oil pipeline disruption). After energy supply is restored, the state analyst and energy office will compile a report which defines the disruption, determines any steps that may have averted the supply and any restoration services which could have been performed better and provide this report to the governor’s office and the private energy providers.

**Reporting a Disruption**

A clear pathway for reporting of disruptions from private entities, emergency management personnel, first responders and others who first discover the disruption to the necessary state agency personnel and private entity personnel who will then contact additional support will also be identified (Figure 8). The management decision process will also include a set of criteria by which disruptions are validated and a clear set of recommendations for actions based on the
energy source, the disruption and the severity of the disruption. Again, if a disruption is not too severe, the private sector will be responsible for restoration.

Figure 8. Within-state Communication Pathway for Energy Disruption Restoration

Communications during a Disruption

The final phase of the management decision process will regard communication to and from policy makers and the media. A person or persons from multiple agencies will be identified in the plan. This person(s) will be responsible for all communication with the media and/or policy makers regarding the release of information, request for assistance etc. in regards to the disruption. The management decision process will be posted on the internet clearly identifying the appropriate contacts for given scenarios and their contact information (addendum 3). The appropriate private industry representatives will be provided with the list and encouraged to notify the appropriate analyst to report a disruption and indicate restoration plans.
V. Example Supply Disruption Tracking Scenarios

Scenario One: Crude Oil Pipeline Disruption

In this scenario, a crude oil pipeline delivering oil to a Chicago refinery is disrupted. This is a sudden disruption. There were no events leading up to the disruption that would have indicated its occurrence. The situation goes from standard monitoring to event triggered (Figure 9). The event is reported from the company that operates the pipeline to the appropriate state official. The company estimates the disruption is going to reduce the production of petroleum products by 20% for several weeks while the pipeline is repaired, not only to the state of Illinois but to surrounding states. The first question the analyst asks is the impact great enough for state involvement. If not, the analyst will monitor the situation in an elevated risk mode until the pipeline is restored or disruptions become more severe. If it is decided, the impact of the situation warrants state involvement, the State Energy Office will be notified. The Energy Office will then decide whether the media and policy makers need to be notified. If it is decided, communication is appropriate, the Office will contact the appropriate representative of the governor’s office, the Illinois Emergency Management Office and the private company involved in the disruption for an emergency conference call. During the call, decisions will be made upon a further review, as to whether the media should be contacted and whether the state should offer resources and/or energy supplies to mediate the situation such as releasing state oil reserves or asking the ethanol industry for emergency supplies of ethanol. If nothing else, actions such as these from the state may alter public perception of the severity of the event and make the public feel that the state is doing something to help.

Figure 9. Flow chart for decisions associated with supply tracking from oil pipeline disruption
Scenario Two: Hurricane in Gulf of Mexico Disrupts

Under this scenario, prolonged monitoring will be required as a hurricane will be entering the Gulf of Mexico. Gulf oil wells will shut down production as a hurricane approaches disrupting supplies of crude oil to the state of Illinois and causing a real supply interruption or at a minimum increasing gasoline prices from a perceived disruption. State monitoring and effective communication can help alleviate citizen and policy maker concerns. The analyst will begin the process by monitoring for signs of a hurricane developing in the Gulf or moving in to the Gulf from the Atlantic. Many weather websites such as Weather Underground and the Weather Channel monitor tropical weather and the development and modeled trajectory of storms. Once a tropical depression has been identified and has moved in to the Gulf causing wells to stop production, the analyst will begin to monitor petroleum supplies for the number of days of supply and communicate with private sector providers of petroleum to the state. The analyst will also monitor commercial sites such as gasbuddy.com to determine if gas prices are going up around the state. If the storm intensifies and appears to threaten long term production, the analyst will notify the state energy office. The state energy office will then monitor the situation and make a decision on when to contact the media and the governor’s office. A quick press release to the media notifying that the state is prepared to release oil reserves and monitor for unnecessary price increases by gas stations may allay concerns by citizens and keep gas prices down while the situation is monitored. If there is damage to oil wells in the Gulf significant enough to disrupt long-term supplies and impact days of supply, the state energy office and governor’s office will determine the appropriate steps at the appropriate times to help control the situation.

Addendum One: Information Sources

Ongoing Monitoring (Supply, Demand and Infrastructure)

All Sources

DHS iCAV infrastructure GIS connection site

http://www.dhs.gov/files/programs/gc_1217445858859.shtm

EIA Energy Assurance Daily

http://www.oe.netl.doe.gov/ead.aspx

EIA – Illinois Energy Profile

http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=IL

EIA – Short Term Energy Outlook

http://www.eia.doe.gov/emeu/steo/pub/contents.html?featureclicked=1&

EIA – Annual Energy Outlook

http://www.eia.doe.gov/oiaf/aeo/index.html

EIA – International Energy Outlook

http://www.eia.doe.gov/oiaf/ieo/index.html

Electric

Electric Power Monthly Use Report

http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

DOE Quarterly Coal Report

http://www.eia.doe.gov/cneaf/coal/quarterly/qcr_sum.html

US EPA eGRID electrical grid information website

http://cfpub.epa.gov/egridweb/
EIA – Illinois’ Electricity Profile
http://www.eia.doe.gov/cneaf/electricity/st_profiles/illinois.html

EIA – OE 417 Major Electric Disturbances & Unusual Occurrences YTD (Table B.1)
http://www.eia.doe.gov/cneaf/electricity/epm/tableb1.html

NERC Electric Sector Threat Advisory Level

NERC Awareness Bulletins
http://www.nerc.com/page.php?cid=6|69|313

Petroleum

EIA Petroleum Publications Website
http://tonto.eia.doe.gov/dnav/pet/pet_pub_publist.asp

American Petroleum Institute Statistics Page
http://www.api.org/statistics/

AAA Fuel Gauge Report
http://www.fuelgugereport.com/

Natural Gas

EIA Natural Gas Monthly Report

Illinois Commerce Commission Annual Report on Natural Gas Use and Companies
http://www.icc.illinois.gov/reports/Results.aspx?t=1

Illinois Commerce Commission Annual Report on Natural Gas Prices
http://www.icc.illinois.gov/publicutility/salesstatistics.aspx?t=g
NYMEX Henry-Hub Natural Gas Price
http://www.oilenergy.com/1gnymex.htm

Henry Hub Gas Futures & City Gate Physical Gas Prices
http://www.enerfax.com

Renewable
EIA State Renewable Energy Profiles
Biorefinery locations
http://www.ethanolrfa.org/bio-refinery-locations/
Potential Electricity Generation from Wind Map
http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=il
Current Wind Energy Project
http://www.awea.org/projects/

Emerging Potential Event
All Sources
DOE – OE ISER Report Energy Assurance Daily (EAD)
http://www.oe.netl.doe.gov/ead.aspx
EIA – State Energy Data System: Illinois
http://www.eia.gov/state/state_energy_profiles.cfm?sid=IL
Energy Assurance Guidelines, Volume 3.1
http://www.naseo.org/eaguidelines/
Geographic Information System (GIS) – iCAV & DHS Earth

https://icav.dhs.gov/

https://icav.dhs.gov/dhsearth/

NOAA National Weather Service Heating & Cooling Degree Days

http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html

Hurricane Information – Bureau of Ocean Energy Management, Regulation, & Enforcement


National Tropical Storm and Hurricane Warnings

www.wunderground.com/tropical

Electric

FERC Midwest Electric Power Markets

http://www.ferc.gov/market-oversight/mkt-electric/midwest.asp

NERC Alerts

http://www.nerc.com/page.php?cid=5|63

NERC Energy Emergency Alerts

http://www.nerc.com/page.php?cid=5|65

NERC Reliability Assessments


NERC System Performance Indicators


NERC Annual System Disruption Reports


EIA – Electric Power Flash
EIA – Electric Power Monthly

EIA – Electric Power Annual

EIA – Wholesale Market Data

EIA – Coal Fuel Data

Reports:

1. Coal News & Markets
2. Weekly Coal Production
3. Weekly Nymex
4. Monthly Energy Review, Coal
5. Quarterly Coal Report
6. Quarterly Coal Distribution
7. Annual Coal Report
8. Annual Coal Distribution
9. Annual Energy Review, Coal

Analysis:

1. U.S. Coal Supply & Demand
2. Coal Production in the US
3. Coal Transportation Information
4. Contract vs Spot Market Prices

EIA – Generation Capacity & Plant Availability (Power Plant Inventory in the United States)

High-Impact, Very Low Probability Risks

FERC Coal Shipment Origins by Supply Basin by State
Petroleum

American Petroleum Institute

http://www.api.org/statistics/supplydemand/index.cfm

Gasbuddy.com

www.GasBuddy.com

EIA - General Petroleum Publications Homepage

http://www.eia.doe.gov/dnav/pet/pet_pub_publist.asp

EIA - This Week in Petroleum

http://www.eia.doe.gov/oog/info/twip/twip.asp

EIA - Petroleum Navigator - Home page

http://www.eia.doe.gov/dnav/pet/pet_sum_top.asp

EIA - Weekly Petroleum Status Report


EIA - US Weekly Gasoline Prices by Region

http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_home_page.html

EIA - Weekly Retail On-Highway Diesel Prices

http://www.eia.doe.gov/oog/info/wohd/diesel.asp

EIA - Gasoline & Diesel Fuel Update

http://www.eia.doe.gov/oog/info/gdu/gasdiesel.asp

EIA - Market Assessment of Planned Refinery Outages

EIA - Company Level Imports
http://www.eia.doe.gov/oil_gas/petroleum/data_publications/company_level_imports/cli.html

EIA - Petroleum Marketing Monthly
http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pm.html

EIA - Petroleum Supply Monthly
http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html

EIA - Prime Supplier Report

EIA - Heating Oil & Propane Update
http://www.eia.doe.gov/oog/info/hopu/hopu.asp

EIA - Refinery Capacity Report
http://www.eia.doe.gov/oil_gas/petroleum/data_publications/refinery_capacity_data/refcapacity.html

Event Triggered
Same as above, plus:

All Sources

DOE Emergency Situation Reports

DHS Open Source Energy Sector Report
http://www.dhs.gov/files/programs/editorial_0542.shtm
Electric
Illinois Commerce Commission Annual Report on Electricity Reliability in the State
http://www.icc.illinois.gov/electricity/electricreliability.aspx
Ameren Electrical Outage Map
https://www2.ameren.com/outage/outagemap.aspx?state=IL
MISO & PJM updates & Locational Marginal Pricing Information
DOE – OE 417 Form (Electric Disturbance Event) (Table B.1)
http://www.eia.doe.gov/cneaf/electricity/epm/tableb1.html
EIA Federal Electrical Emergency
http://www.eia.doe.gov/cneaf/electricity/page/disturb_events.html

Petroleum
Minerals Management Service Updates (gulf disruption events)

Natural Gas
Minerals Management Service Updates (gulf disruption events)

All Sources
Coordinate with utility companies
Disruptions

Petroleum

http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_monthly/psm.html

Natural Gas

Natural gas disturbance modeling software from Argonne


GAO Natural gas pipeline safety report to Congress


Electric

DOE Electric Disturbance Events Report


Federal Electric Event Emergency Alert and Incident Report

http://www.eia.doe.gov/cneaf/electricity/page/disturb_events.html

DOE emergency situations report for electricity


Renewables

Yields and Crop Predictions for Corn and Soybeans

http://www.nass.usda.gov/
### Appendix 2: Illinois State Tracking Supply Disruption Database

#### Illinois Energy Supply Disruption Tracking Database

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Type</th>
<th>Duration</th>
<th>Areas Impacted</th>
<th># of Customers Impacted</th>
<th>Companies Impacted</th>
<th>State Agencies Involved</th>
<th>Private Sector Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEO Contacted?</th>
<th>Media Contacted?</th>
<th>Governors Office Contacted?</th>
<th>State Resources Used (what)?</th>
<th>Actions Taken</th>
<th>Impact of Actions</th>
<th>Lessons Learned</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

93
Appendix 3. Contacts for State Energy Assurance (Phone numbers removed for privacy but are available on internal document)

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Affiliation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquino</td>
<td>Reynaldo</td>
<td>Chicago Dept. of Environment</td>
<td>local government</td>
</tr>
<tr>
<td>Arendt</td>
<td>Michael</td>
<td>Integrys (Peoples Gas)</td>
<td>Industry-natural gas</td>
</tr>
<tr>
<td>Bensko</td>
<td>Robert</td>
<td>Illinois Commerce Commission</td>
<td>state government- emergency management</td>
</tr>
<tr>
<td>Borgia</td>
<td>Kevin</td>
<td>Illinois Wind Energy Association</td>
<td>industry- renewables- wind</td>
</tr>
<tr>
<td>Boss</td>
<td>Terry</td>
<td>Interstate Natural Gas Association of America</td>
<td>industry- natural gas</td>
</tr>
<tr>
<td>Bronson</td>
<td>Ted</td>
<td>Power Equipment Associates</td>
<td>industry- renewables- CHP</td>
</tr>
<tr>
<td>Burk</td>
<td>Darin</td>
<td>Illinois Commerce Commission</td>
<td>state government- monitoring</td>
</tr>
<tr>
<td>Carnduff</td>
<td>Brad</td>
<td>Illinois State Police</td>
<td>State government- first responders</td>
</tr>
<tr>
<td>Chittim</td>
<td>Ron</td>
<td>American Petroleum Institute</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Claude</td>
<td>Beth</td>
<td>Enbridge Energy Co.</td>
<td>industry- petroleum pipeline</td>
</tr>
<tr>
<td>Cobau</td>
<td>Ed</td>
<td>IMUA</td>
<td>industry- electric</td>
</tr>
<tr>
<td>Coleman</td>
<td>Terry</td>
<td>Shell Pipeline Company</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Colarelli</td>
<td>Peter</td>
<td>Citgo</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Conzelmann</td>
<td>Guenter</td>
<td>Argonne/Infrastructure Center</td>
<td>federal government- infrastructure</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>Ken</td>
<td>UIC ERC</td>
<td>UIC</td>
</tr>
<tr>
<td>Corr</td>
<td>Valerie</td>
<td>BP Whiting Refinery</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Cummins</td>
<td>Bill</td>
<td>DHS Infrastructure Protection</td>
<td>federal government- infrastructure</td>
</tr>
<tr>
<td>Defenbaugh</td>
<td>Ray</td>
<td>Illinois Renewable Fuels Association</td>
<td>industry- renewables- biofuels</td>
</tr>
<tr>
<td>Deppolder</td>
<td>Dwain</td>
<td>City of Peoria Fire Dept</td>
<td>local government</td>
</tr>
<tr>
<td>Dougherty</td>
<td>Laurie</td>
<td>Illinois Section AWWA</td>
<td>industry- user</td>
</tr>
<tr>
<td>Doris</td>
<td>Mark</td>
<td>Marathon Petroleum</td>
<td>Industry=emergency response</td>
</tr>
<tr>
<td>Dragoo</td>
<td>Darryl</td>
<td>IEMA</td>
<td>state government- emergency management</td>
</tr>
<tr>
<td>Dwyer</td>
<td>Martin</td>
<td>IEMA</td>
<td>state government- emergency management</td>
</tr>
<tr>
<td>Eichholz</td>
<td>Dan</td>
<td>Illinois Petroleum Council</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Fairow</td>
<td>Jana</td>
<td>IEMA</td>
<td>state government- emergency management</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Organization</td>
<td>Industry/Role</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------</td>
<td>----------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Fleschie</td>
<td>Bill</td>
<td>Illinois Petroleum Marketers Association</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Fox</td>
<td>Daniel</td>
<td>NICOR</td>
<td>industry- natural gas</td>
</tr>
<tr>
<td>Frazier</td>
<td>Barry</td>
<td>Center Ethanol</td>
<td>industry- biofuels</td>
</tr>
<tr>
<td>Fridgen</td>
<td>Jon</td>
<td>Monsanto</td>
<td>industry- biofuels</td>
</tr>
<tr>
<td>Griffin</td>
<td>John</td>
<td>API</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Griffis</td>
<td>Carl</td>
<td>PHMSA Central Region Office</td>
<td>federal government- infrastructure</td>
</tr>
<tr>
<td>Haas</td>
<td>Rick</td>
<td>Conoco Phillips Wood River Refinery</td>
<td>Industry-petroleum</td>
</tr>
<tr>
<td>Haley</td>
<td>Tim</td>
<td>Marathon Oil</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Halting</td>
<td>Judd</td>
<td>Patriot Ethanol</td>
<td>industry- biofuels</td>
</tr>
<tr>
<td>Helhowski</td>
<td>Jim</td>
<td>Enbridge/Vector</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Hoots</td>
<td>Diane</td>
<td>Illinois Central Management Services</td>
<td>State government- emergency management</td>
</tr>
<tr>
<td>Isbell</td>
<td>Chris</td>
<td>County Engineer, Stephenson County</td>
<td>state government- first responders</td>
</tr>
<tr>
<td>Johnson</td>
<td>Hilary</td>
<td>Witt Associates</td>
<td>industry- plan preparers</td>
</tr>
<tr>
<td>Kadansky</td>
<td>Richard</td>
<td>Marathon Petroleum</td>
<td>industry- petroleum</td>
</tr>
<tr>
<td>Kauerauf</td>
<td>Don</td>
<td>IEAMA</td>
<td>State government- emergency management</td>
</tr>
<tr>
<td>Kenel</td>
<td>Mike</td>
<td>state of Michigan PUC</td>
<td>state government- other</td>
</tr>
<tr>
<td>Korty</td>
<td>Tom</td>
<td>IDOT</td>
<td>State government- emergency management</td>
</tr>
<tr>
<td>Lippert</td>
<td>Alice</td>
<td>US Department of Energy</td>
<td>federal government- supervising</td>
</tr>
<tr>
<td>Lloyd</td>
<td>Byron</td>
<td>DCEO</td>
<td>state government</td>
</tr>
<tr>
<td>Marek</td>
<td>Norm</td>
<td>DCEO</td>
<td>state government- renewables</td>
</tr>
<tr>
<td>Martino</td>
<td>Maggie</td>
<td>Tri-county Regional Planning Commission</td>
<td>local government</td>
</tr>
<tr>
<td>Marx</td>
<td>Michael</td>
<td>Ameren</td>
<td>industry- electric</td>
</tr>
<tr>
<td>Mathias</td>
<td>Richard</td>
<td>PJM</td>
<td>industry- electric</td>
</tr>
<tr>
<td>McAvoy</td>
<td>Mick</td>
<td>Illinois Law Enforcement Alarm System</td>
<td>state government- first responders</td>
</tr>
<tr>
<td>Moore</td>
<td>Kristy</td>
<td>Renewable Fuels Association</td>
<td>industry- renewables- biofuels</td>
</tr>
<tr>
<td>Mueller</td>
<td>Steffen</td>
<td>UIC ERC</td>
<td>UIC</td>
</tr>
<tr>
<td>Naillon</td>
<td>Dean</td>
<td>Integrys Energy Services</td>
<td>industry- natural gas</td>
</tr>
<tr>
<td>Nania</td>
<td>John</td>
<td>Nania Energy</td>
<td>industry- natural gas</td>
</tr>
<tr>
<td>Narilwala</td>
<td>Rajiv</td>
<td>IL DCEO</td>
<td>State government-energy assurance engineer</td>
</tr>
<tr>
<td>Osgood</td>
<td>Robert</td>
<td>Commonwealth Edison</td>
<td>industry- electric</td>
</tr>
<tr>
<td>Pillon</td>
<td>Jeff</td>
<td>NASEO</td>
<td>federal government- supervising</td>
</tr>
<tr>
<td>Plant</td>
<td>Robert</td>
<td>Commonwealth Edison</td>
<td>industry- electric</td>
</tr>
<tr>
<td>Name</td>
<td>Title/Position</td>
<td>Industry</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td>Puracchio</td>
<td>Thomas</td>
<td>Integrys (Peoples Gas)</td>
<td></td>
</tr>
<tr>
<td>Raburn</td>
<td>Janice</td>
<td>BP Products</td>
<td></td>
</tr>
<tr>
<td>Reardon</td>
<td>Jay</td>
<td>CEO MABAS-IL</td>
<td></td>
</tr>
<tr>
<td>Richardson</td>
<td>Joe</td>
<td>Enbridge Pipeline</td>
<td></td>
</tr>
<tr>
<td>Rybarczyk</td>
<td>Ron</td>
<td>BP Oil</td>
<td></td>
</tr>
<tr>
<td>Samsa</td>
<td>Michael</td>
<td>Argonne/Infrastructure Center</td>
<td></td>
</tr>
<tr>
<td>Schlicher</td>
<td>Martha</td>
<td>Monsanto Bioenergy</td>
<td></td>
</tr>
<tr>
<td>Scott</td>
<td>Don</td>
<td>National Biodiesel Board</td>
<td></td>
</tr>
<tr>
<td>Shaff</td>
<td>Nick</td>
<td>Midwest Energy Inc</td>
<td></td>
</tr>
<tr>
<td>Simpson</td>
<td>Tricia</td>
<td>Exxon Mobil Joliet Refinery</td>
<td></td>
</tr>
<tr>
<td>Smith</td>
<td>Keith</td>
<td>Shell Pipeline Company</td>
<td></td>
</tr>
<tr>
<td>Smith</td>
<td>Paul</td>
<td>IEMA</td>
<td></td>
</tr>
<tr>
<td>Snedic</td>
<td>Ron</td>
<td>Gas Technology Institute</td>
<td></td>
</tr>
<tr>
<td>Strutz</td>
<td>Jim</td>
<td>Springfield City Water</td>
<td></td>
</tr>
<tr>
<td>Sykuta</td>
<td>David</td>
<td>Illinois Petroleum Council</td>
<td></td>
</tr>
<tr>
<td>Talaber</td>
<td>Leah</td>
<td>Argonne/Infrastructure Center</td>
<td></td>
</tr>
<tr>
<td>Thompson</td>
<td>Trenton</td>
<td>IEMA</td>
<td></td>
</tr>
<tr>
<td>Ulanday</td>
<td>Fred</td>
<td>People's Gas</td>
<td></td>
</tr>
<tr>
<td>Voiles</td>
<td>Jackie</td>
<td>Ameren Illinois</td>
<td></td>
</tr>
<tr>
<td>Walas</td>
<td>Fred</td>
<td>Marathon Petroleum</td>
<td></td>
</tr>
<tr>
<td>Watson</td>
<td>Ryan</td>
<td>US Department of Energy</td>
<td></td>
</tr>
<tr>
<td>Winnie</td>
<td>Harold</td>
<td>PHMSA Central Region Office</td>
<td></td>
</tr>
<tr>
<td>Woodin</td>
<td>Dale</td>
<td>American Hospital Association</td>
<td></td>
</tr>
<tr>
<td>Wolf</td>
<td>Tom</td>
<td>Illinois Chamber of Commerce</td>
<td></td>
</tr>
<tr>
<td>Wulfkuhle</td>
<td>Gus</td>
<td>FEMA Region 5</td>
<td></td>
</tr>
<tr>
<td>Weiss</td>
<td>Greg</td>
<td>Ameren</td>
<td></td>
</tr>
</tbody>
</table>

Industry- natural gas
Industry- petroleum
industry- first responders
Industry- petroleum pipelines
industry- petroleum
industry- renewables- biofuels
industry- renewables- biofuels
industry- natural gas
industry- petroleum
Industry- petroleum pipelines
state government- emergency management
industry- natural gas
industry- user
industry- petroleum
federal government- infrastructure
State government- emergency management
industry- natural gas
industry- electric
Industry- petroleum
federal government- supervising
federal government- infrastructure
state government- users
federal government- emergency management
industry-electric
Appendix 4. State Energy Fact Sheets

State of Illinois Energy Fact Sheet | Electricity

Production and Consumption
- Illinois exports generated excess electricity to other states.
- Illinois ranks first in the country in nuclear generated electricity (24% of the energy used in Illinois is from nuclear generated electricity).
- Illinois has large coal reserves but their use is limited by high sulfur content (the state imported 94% of the coal it used in 2008 for electrical generation).
- Over 95% of the state's electricity is generated by coal or nuclear.
- Electricity generated from wind and solar is intermittent while traditionally generated electricity is continuous.
Natural gas fired power plants can be used in conjunction with smart grid technology to compensate for these changes.

Utility | Location | Customers
--- | --- | ---
Ameren Illinois | Central and Southern | 1,197,805
Commonwealth Edison Co. | Northern | 3,801,999
Mid-American Energy Co. | Northwestern | 84,677
Mt. Carmel Public Utility Co. | Southern | 5,489

Investor-owned electrical utilities in Illinois and the number of their customers

Locations of Nuclear Power Generating Facilities in Illinois

<table>
<thead>
<tr>
<th>Primary Fuel Source</th>
<th># of Facilities</th>
<th>Plant Annual Generation (MWh)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>6</td>
<td>93,263,000</td>
<td>48.04%</td>
</tr>
<tr>
<td>Sub-bituminous Coal</td>
<td>17</td>
<td>79,400,000</td>
<td>40.90%</td>
</tr>
<tr>
<td>Bituminous Coal</td>
<td>13</td>
<td>13,300,000</td>
<td>6.85%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>71</td>
<td>7,084,000</td>
<td>3.65%</td>
</tr>
<tr>
<td>Landfill Gas</td>
<td>24</td>
<td>636,000</td>
<td>0.33%</td>
</tr>
<tr>
<td>Process Gas</td>
<td>1</td>
<td>151,000</td>
<td>0.08%</td>
</tr>
<tr>
<td>Wind</td>
<td>2</td>
<td>141,000</td>
<td>0.07%</td>
</tr>
<tr>
<td>Water</td>
<td>6</td>
<td>76,000</td>
<td>0.04%</td>
</tr>
<tr>
<td>Distillate/Diesel Oil</td>
<td>34</td>
<td>64,000</td>
<td>0.03%</td>
</tr>
<tr>
<td>Digester Gas</td>
<td>3</td>
<td>40,000</td>
<td>0.02%</td>
</tr>
<tr>
<td>Totals</td>
<td>177</td>
<td>194,155,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

State of Illinois Energy Assurance Workshop
April 11, 2012
State of Illinois Energy Fact Sheet | Natural Gas

- Illinois uses 939,970 million cubic feet (mcf) of natural gas annually (3.9% of US total)
- Illinois is second to only Michigan in underground storage capacity of natural gas (almost 1 million mcf)
- Only about 2% of Illinois’ electricity is generated from natural gas
- More than 80% of Illinois homes are heated with natural gas
- The only natural gas market centers (hubs) in the midwest for interstate pipelines are found in Illinois (Chicago and Joliet)
- Illinois is 27th in natural gas production in the US producing 1,203 mcf in 2010
- Small natural gas fired electrical generating plants can be used to compensate for the intermittent nature of wind generated electricity or for peak usage times.

<table>
<thead>
<tr>
<th>Utility Name</th>
<th>Location in Illinois</th>
<th># of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameren</td>
<td>Central and south</td>
<td>814,773</td>
</tr>
<tr>
<td>Atmos Energy Corporation</td>
<td>South</td>
<td>22,498</td>
</tr>
<tr>
<td>Consumers Gas Company</td>
<td>South</td>
<td>5,540</td>
</tr>
<tr>
<td>Illinois Gas Company</td>
<td>South</td>
<td>9,723</td>
</tr>
<tr>
<td>Mt. Carmel Public Utility Company</td>
<td>South</td>
<td>3,574</td>
</tr>
<tr>
<td>Nicor Gas Company</td>
<td>Northern</td>
<td>2,172,724</td>
</tr>
<tr>
<td>North Shore Gas Company</td>
<td>Northern</td>
<td>158,001</td>
</tr>
<tr>
<td>Peoples Gas Light and Coke Company</td>
<td>Northern</td>
<td>821,902</td>
</tr>
<tr>
<td>MidAmerican Energy Company</td>
<td>Northern</td>
<td>65,542</td>
</tr>
</tbody>
</table>
Illinois has a standard to produce 25% of energy consumed by the state from renewable sources by 2025. Seventy-five percent of this needs to come from wind.

- The current net summer capacity for Illinois wind generated electricity is 4.4% of the total used in the state.
- Illinois is 4th in the country in wind-farm capacity.
- Illinois generates enough wind energy to power over 1,000,000 homes.
- All of Illinois' wind farms are north of Springfield.
- An often overlooked source of re-usable energy is Combined Heat and Power (CHP) which re-uses heat generated in by buildings or industrial processes to create electricity.
- CHP could produce 3,000 to 8,000 megawatts of electricity in the state with an additional 3,000 from agricultural sources.
- Illinois produces over 1.284 million gallons of ethanol a year (replacing almost 100 million tanks of gasoline).
- Illinois is third behind Iowa and Nebraska in ethanol production.
State of Illinois Energy Fact Sheet | Petroleum

- Illinois is 14th in petroleum production in the US (was 5th up until the early 1970s)
- State refineries process about 917,600 barrels a day while the state consumes just under 700,000 barrels
- The majority of oil wells in Illinois produce about 1.5 barrels a day (equivalent to 63 gallons of gasoline)
- The state imports the vast majority of its petroleum from Canada.
- Petroleum is transported to Illinois exclusively from pipelines.
- Ninety-five percent of Illinois gas stations are privately owned.
- Biggest threat to Illinois oil supply is electricity outages in Gulf which will stop pumping of oil.

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Barrels Per Calendar Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lemont Refinery</td>
<td>Citgo</td>
<td>167,000</td>
</tr>
<tr>
<td>Joliet Refinery</td>
<td>ExxonMobil</td>
<td>238,600</td>
</tr>
<tr>
<td>Robinson Refinery</td>
<td>Marathon Petroleum</td>
<td>206,000</td>
</tr>
<tr>
<td>Wood River Refinery</td>
<td>ConocoPhillips</td>
<td>306,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>917,600</strong></td>
</tr>
</tbody>
</table>