

THE ENERGY SECTOR IN ILLINOIS

Getting Down and Dirty on Clean Energy Opportunities in Illinois



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Introduction

Affordable energy is crucial to a thriving economy. As Illinois leads the Midwest in both population density and economic activity, it is vital for the state to promote energy policies that support both the regional economy and the environment. Illinois needs to develop effective long-term energy strategies to ensure low prices for residents and businesses and, as a result, a stable economy in the future. These policies should address the state's energy production deficit, the impact of increased regulations on coal as a sustainable future energy source, and the state's potential for renewable energy.

Energy Production

In 2013, Illinois consumed 4.1 percent of the country's total energy, yet produced only 3.1 percent (Figure 1). To encourage future economic growth, the state should strive to produce as much energy as it consumes. When the supply of energy meets the demand from Illinois consumers and businesses, the state becomes energy independent. As shown in Figure 1, Illinois' share of the country's population, civilian labor force, and gross domestic product are fairly consistent with its share of energy consumption. The state's consumption per capita ranks 25th, yet total consumption ranks 4th. This indicates that while Illinois residents are not consuming an excessive amount of energy, the state is as a whole. Illinois ranks 9th in total energy production, again demonstrating that the state requires additional energy production to match its consumption. Investment in new energy sources and new technologies should be considered to make-up this energy shortage.

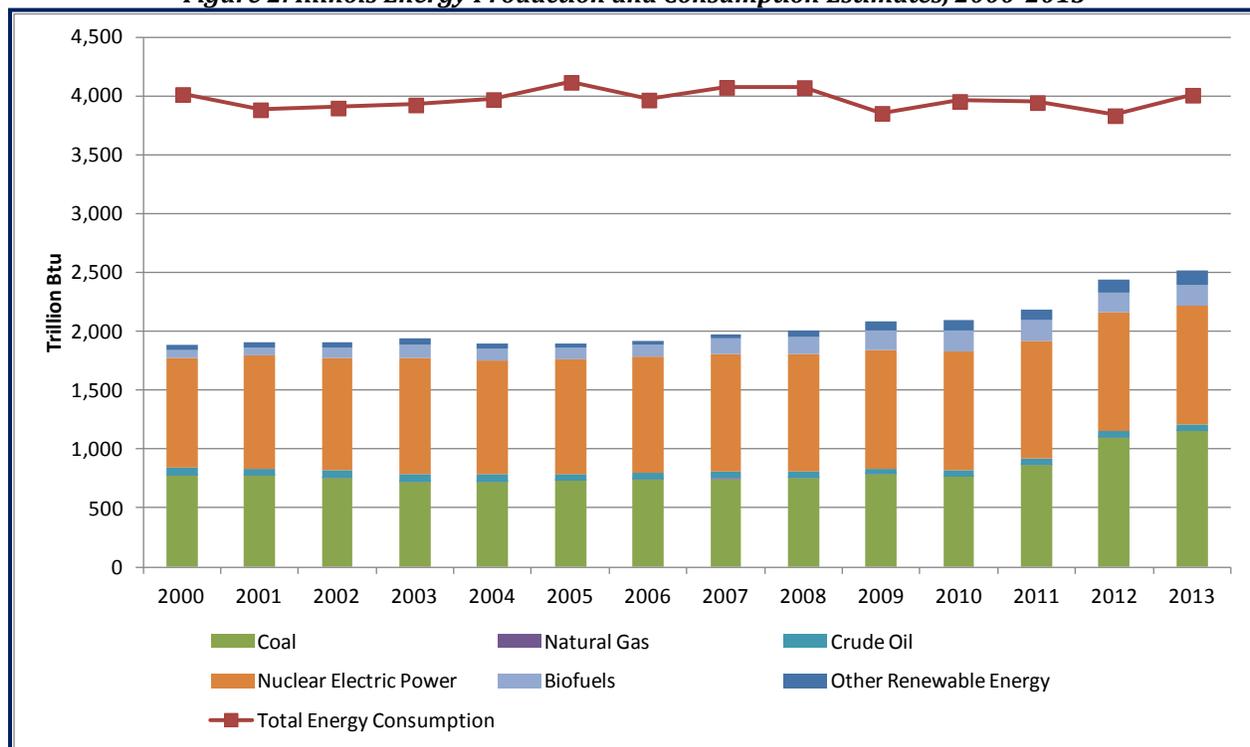
Figure 1: Illinois' Demographic, Economic, and Energy Indicators

Demography	Illinois	Share of U.S. / Rank	Period
Population	12.9 million	4.0% / 5	2014
Civilian Labor Force	6.6 million	4.2%	Feb-16
Economy			
Gross Domestic Product	\$745.9 billion	4.3% / 5	2014
Vehicle Miles Traveled	105,297 million	3.5%	2013
Land in Farms	26.9 million acres	2.9%	2012
Energy			
Total Energy Production	2,520 trillion Btu	3.1% / 9	2013
<i>Coal</i>	<i>1,150 trillion Btu</i>	<i>5.8%</i>	<i>2013</i>
<i>Nuclear Electric Power</i>	<i>1,015 trillion Btu</i>	<i>12.3%</i>	<i>2013</i>
<i>Biofuels</i>	<i>169 trillion Btu</i>	<i>9.4%</i>	<i>2013</i>
<i>Other Renewable Energy</i>	<i>129 trillion Btu</i>	<i>1.8%</i>	<i>2013</i>
<i>Crude Oil</i>	<i>55 trillion Btu</i>	<i>0.3%</i>	<i>2013</i>
<i>Natural Gas - Marketed</i>	<i>2.9 trillion Btu</i>	<i>0.0%</i>	<i>2013</i>
Total Energy Consumption	4,011 trillion Btu	4.1% / 4	2013
Total Energy Consumption per Capita	311 million Btu	25	2013

Source: Energy Information Administration, U.S. Department of Energy; Federal Highway Administration, U.S. Department of Transportation; U.S. Department of Commerce; U.S. Department of Agriculture

While total energy consumption has hovered around 4,000 Btu (British thermal units) in recent years, average total energy production in Illinois increased by approximately 500 Btu between 2008 and 2013, as shown in Figure 2. This production uptick has helped to increase supply to match the state’s consumption. The increased energy production is largely attributed to increased coal production, but improved renewable energy sources also contributed. It can be expected that as new technologies are developed and renewable energy sources become economically competitive against traditional energy sources, renewable energy will have a larger role in achieving energy independence for the state.

Figure 2: Illinois Energy Production and Consumption Estimates, 2000-2013



Source: Energy Information Administration, U.S. Department of Energy

Coal and nuclear energy make up the largest share of the state’s energy production, at 46 percent and 40 percent, respectively. These sources also contribute a large portion on a national level: Illinois’ coal production accounts for 5.8 percent and nuclear electric power accounts for 12.3 percent of the nation’s production of each resource. These production levels are higher than the state’s 4.3-percent contribution to America’s overall economic output, indicating that Illinois specializes in coal and nuclear power. These rates are consistent with the fact that coal is in abundance in Illinois, as it is present beneath two-thirds of the state and the state’s coal reserves make up approximately one-eighth of the nation’s total at producing mines. Similarly, Illinois leads the nation in nuclear electric power production with its 6 nuclear power plants and its 11 reactors (EIA, 2016).

Despite coal continuing to be one of the state’s energy production superstars, increased federal regulations related to coal-fired emissions will likely negatively impact the future of the energy source. While “clean coal” plants help to address the environmental issues with standard coal plants, costs associated with retrofitting a plant remain prohibitive (Illinois DCEO, 2016; *The New York Times*, 2016). The loss of funding from the Department of Energy for a “clean coal” plant in southern Illinois in 2015 was mainly due to the significant cost of the project (Illinois COGFA, 2016).

Similarly, nuclear power plants are facing potential closures due to inadequate earnings. As a result of the deregulated energy market in the Midwest and Northeast, nuclear power providers are competing to

generate the cheapest electricity against other energy providers that use alternative fuels (*The Economist*, 2015). This, combined with state policies that provide additional support for renewable energy sources, as opposed to carbon-zero energy sources, contributes to a foreboding environment for Illinois’ nuclear energy providers (Spector, 2016). Consequently, two nuclear plants may be forced into early retirement, which requires the state to adapt to reduced energy supplies (Illinois DCEO, 2016). For Illinois to maintain a stable economy in the future, it is imperative that the state begin to develop and implement alternate energy sources as soon as possible, especially renewable energy sources.

Energy Prices

While Illinois ranks fourth in the nation for energy consumption, it ranks 39th in per-capita energy expenditures, indicating that on the whole the state enjoys relatively low energy costs (Figure 3). Figure 3 further summarizes that Illinois’ natural gas and electricity prices are significantly lower than the U.S. average; Illinois ranks 49th and 24th in the nation for residential natural gas and electricity prices, respectively. Furthermore, commercial natural gas prices are 9.3 percent below the national average and electricity prices are 16.0 percent below the national average.

Figure 3: Illinois and U.S. Average Energy Prices

	Illinois	U.S. Average	Percent below U.S. Average	Rank	Period
Natural Gas					
City Gate	\$3.12/thousand cu ft	\$3.44/thousand cu ft	9.30%		Jan-16
Residential	\$5.82/thousand cu ft	\$8.31/thousand cu ft	29.96%	49	Jan-16
Electricity					
Residential	11.42 cents/kWh	12.01 cents/kWh	4.91%	24	Jan-16
Commercial	8.38 cents/kWh	9.98 cents/kWh	16.03%		Jan-16
Industrial	6.31 cents/kWh	6.42 cents/kWh	1.71%		Jan-16

Source: Energy Information Administration, U.S. Department of Energy

In general, lower energy prices are important to the state’s economy because they can contribute to a reduced cost of living for residents and a favorable climate for businesses. While low electricity prices are currently beneficial to Illinois, as previously mentioned, coal will face required changes to adapt to regulations. The price of producing coal is extremely likely to increase, leading to higher costs for the state. Moreover, the cost of future environmental and health issues related to these sources must be considered.

Coal and nuclear power create external costs that should be taken into account on top of the mere consumer cost of energy. For example, Illinois currently ranks 4th in the nation for energy-related carbon dioxide (CO2) emissions. Emissions from burning coal contribute to acid rain, smog, and respiratory illnesses, in addition to dust and water runoff from mining and ash storage that can contribute to polluted water (EIA, 2015a).

Unlike coal, nuclear power plants do not produce any direct emissions harmful to the environment. In fact, nuclear power is currently one of the cleanest sources of energy. Nuclear plants, however, produce radioactive waste that remains dangerous to the public for thousands of years. Nuclear reactors and plants have potentially disastrous safety issues if an uncontrolled nuclear reaction occurs, leading to widespread air and water pollution (EIA, 2015b). The potential environmental and health issues associated with coal production and nuclear power contribute to added costs for Illinois. Given that existing coal and nuclear infrastructure is aging, the larger advantages of investing in alternative, clean energy should be carefully measured against refurbishing or retrofitting existing infrastructure.

Clean Energy

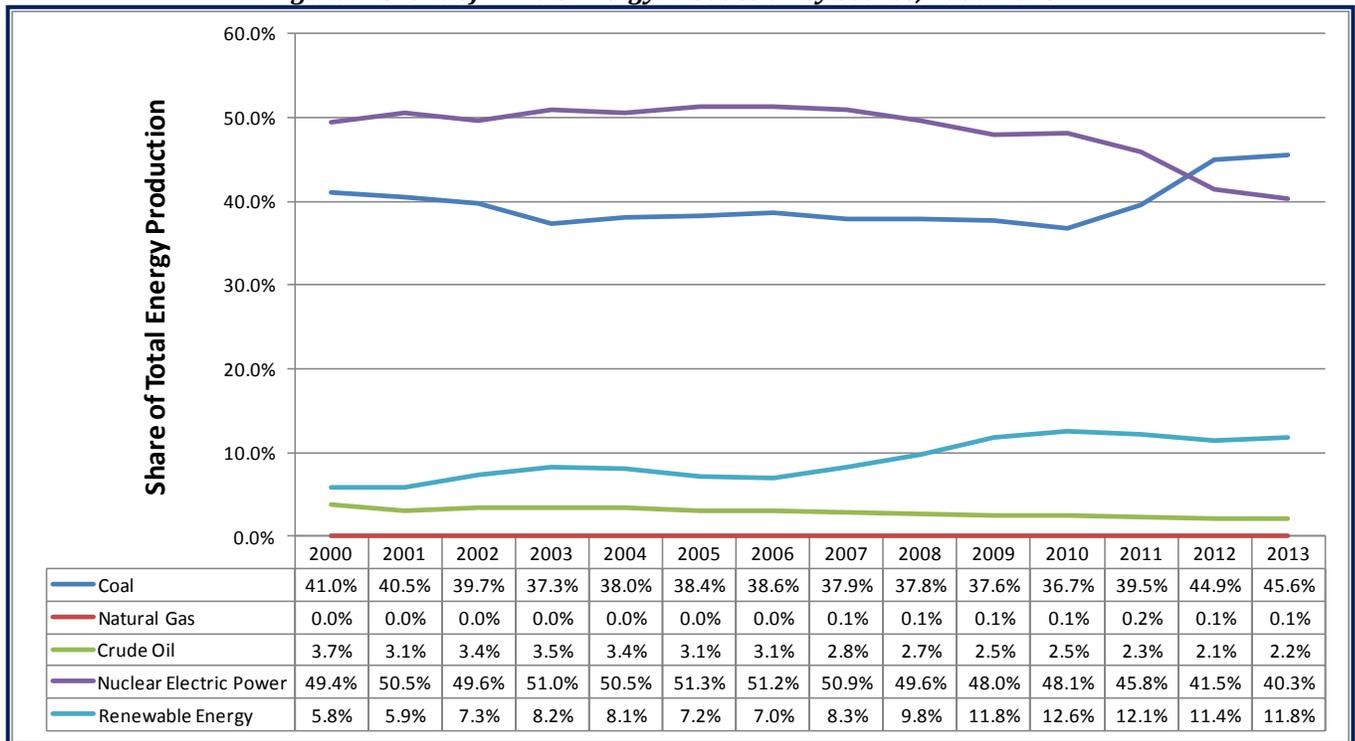
An abundance of coal, existing infrastructure, and low natural gas and electricity prices give Illinois an advantage in maintaining its current energy strategy. However, as these plants continue to age, and additional environmental regulations are enforced, turning to cleaner solutions like wind and solar can aid the state in providing reliable energy solutions for the future.

Renewable energy has taken the stage at both the federal and state level. The federal Clean Power Plan— for which the final rule was released on August 3, 2015— sets specific CO2 emissions targets for each state. The proposed plan is currently under judicial review, however, if it is implemented as it currently stands, Illinois will be required to develop a plan to reduce CO2 emissions from 23 power plants, including 17 coal plants and 6 natural gas combined cycle plants (Illinois DCEO, 2016).

On the state level, the Illinois Power Agency Act, which began in August 2007, created the Renewable Portfolio Standard, requiring electric utilities and retail electricity suppliers to purchase 25 percent of electricity sales from “renewable energy resources” by 2025, with 75 percent coming from wind. These sources includes wind, hydroelectric, biodiesel and other biofuels, biomass, solar thermal facilities, and photovoltaics (Illinois DCEO, 2016).

As shown in Figure 4, since the Illinois Power Agency Act began in 2007, the share of Illinois’ renewable energy production has steadily increased. Specifically, it is the 3rd-largest source of energy production in Illinois and accounted for 11.8 percent of total energy production in 2013, an increase of 4.8 percentage points since 2006.

Figure 4: Share of Illinois Energy Production by Source, 2000-2013



Source: Energy Information Administration, U.S. Department of Energy

Wind serves as the primary renewable energy source in the state. Illinois ranks 5th in the nation for installed wind capacity. Illinois also produces 9.4 percent of the nation’s biofuels and has the 3rd-largest production capacity for both ethanol and biodiesel (EIA, 2016). Additionally, Illinois has the 5th-highest

solar energy resource potential in the nation. The sun intensity in the state is greater than Japan and Germany, which are the two largest solar markets in the world (Illinois Chamber of Commerce, 2016). All of these factors contribute to Illinois being well-positioned to increase its renewable energy production as a viable alternative to traditional sources.

Natural Gas

Similar to renewable energy sources, natural gas energy has the potential to provide economic benefits and certain environmental benefits in Illinois. The share of energy produced from natural gas on the national level has increased in recent years. Between 2007 and 2013 the share of energy production generated by coal declined from almost 50 percent to 37 percent. In the same time frame, energy generation from natural gas increased from 22 percent to 27 percent. This can largely be attributed to low natural gas prices driven by the availability of recent shale production (Union of Concerned Scientists, 2015).

In 2014, Illinois consumed 1,093.5 billion cubic feet of natural gas, yet produced only 2,626 million cubic feet. However, the state is home to more than 12 interstate natural gas pipelines, two natural gas market centers, and 28 natural gas storage fields, making Illinois a major player in natural gas transportation (Illinois DCEO, 2016). Illinois has the opportunity to further contribute to natural gas production with the construction of a \$1 billion natural gas-powered electric generating facility in Grundy County, Illinois. The plant will have a 1,100 MW capacity, making it a midsize generation facility, and will support the state's widespread natural gas consumption (*Morris Herald-News*, 2016).

Due to Illinois' refining capacity and competitive advantage as a hub for fuel transportation, Competitive Power Ventures, Inc. decided to invest in the natural gas-powered facility in Illinois instead of a neighboring state. The project will be an economic boon to the Grundy County community, creating 500 construction jobs and 25 full-time positions at the facility upon project completion. The \$1 billion investment will increase economic activity, create jobs, and result in lower or steady energy prices in Illinois.

Illinois also has the potential to drill for natural gas at the New Albany shale formation in southeast Illinois. This area has rich deposits of natural gas and regulations related to oil and gas drilling have already been approved by state lawmakers. With the recent decline in energy prices, Illinois was unable to take advantage of this untouched resource. If hydraulic fracturing begins in this area, it is projected to create 1,000 drilling jobs per year (Illinois COGFA, 2016).

While the natural gas endeavors can provide economic benefits to local communities, larger environmental issues related to natural gas should also be considered. The emissions from natural gas are significantly cleaner than coal. As an alternative to more coal production, the proposed natural gas facility in Grundy County is a cleaner, more environmentally-friendly way to increase energy production and lower prices in Illinois. However, the extraction, distribution, and storage of natural gas leads to methane leakage, which is a global warming gas 34 times more powerful at trapping heat over a 100-year period than carbon dioxide. The production of natural gas, including hydraulic fracturing, can cause serious public health and environmental risks, including drinking water contamination and air pollution (Union of Concerned Scientists, 2015). It is imperative that Illinois consider these critical environmental repercussions alongside the economic advantages of pursuing hydraulic fracturing.

Conclusion

Affordable energy for Illinois' residents and businesses is crucial to maintaining a stable economy in the future. Illinois' current energy production does not match the state's consumption, and is largely dependent on energy sources that are not sustainable over the long run. As strategies are developed to achieve energy independence and replace aging infrastructure, renewable energy and natural gas should be the primary sources. The state is well-positioned to take advantage of renewable energy sources, and

will develop sustainable, long-term energy sources that provides both economic and environmental benefits.

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