

The Impact of Exelon's Nuclear Fleet on the Illinois Economy

An Analysis by the Nuclear Energy Institute

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Executive Summary

Nearly 28,000 jobs in Illinois are a result of Exelon's nuclear operations.

Exelon Corp. owns and operates six nuclear energy facilities (11 reactors) in Illinois:

Braidwood Generating Station in Will County (two reactors)
Byron Generating Station in Ogle County (two reactors)
Clinton Power Station in DeWitt County (one reactor)
Dresden Generating Station in Grundy County (two reactors)
LaSalle County Generating Station in LaSalle County (two reactors)
Quad Cities Generating Station in Rock Island County (two reactors)

Exelon Nuclear, a business unit of Exelon Corp., manages the company's nuclear business at its Cantera corporate offices in Warrenville, Illinois, in DuPage County.

The six nuclear facilities and Exelon's headquarters have been an integral part of the region's clean energy portfolio and economic fabric since the 1970s. In addition to the reliable, emission-free electricity that the plants generate and the jobs and economic stimulus they provide, the company's involvement in its local communities makes them significant economic contributors to Illinois and the Midwest.

To quantify the employment and economic impact of these facilities, the Nuclear Energy Institute (NEI) conducted an independent analysis. Based on data provided by Exelon Nuclear on employment, operating expenditures, revenues and tax payments, NEI conducted the analysis using a nationally recognized model to estimate the facilities' economic impacts on the Illinois economy. Regional Economic Models, Inc. (REMI) developed the Policy Insight Plus (PI+) economic impact modeling system, the methodology employed in this analysis. (See section 6 of this report for more information on the REMI methodology.)

Exelon's Illinois nuclear plants are estimated to generate \$8.9 billion of total economic output annually.

Key Findings

Exelon's Illinois nuclear operations support:

Thousands of high-skilled jobs. Exelon employs 5,900 people at its nuclear energy facilities in Illinois. This direct employment creates about 21,700 additional jobs in other industries in the state. A total of nearly 28,000 jobs in Illinois are a result of Exelon's nuclear operations.

Economic stimulus. Exelon's Illinois nuclear plants are estimated to generate \$8.9 billion of total economic output annually, which contributes \$6.0 billion to Illinois' gross state product each year. This study finds that for every dollar of output from Exelon's Illinois facilities, the state economy produces \$1.65.

Exelon's nuclear headquarters and the operations of the 11 reactors result in a total tax impact of approximately \$1.4 billion to the local, state and federal governments each year.

Without the carbon-free electricity produced by these nuclear plants, an additional 80 million metric tons of carbon dioxide would be released annually, the equivalent of the emissions from more than 15 million cars each year.

Tax impacts. Exelon's nuclear facilities in Illinois are estimated to contribute about \$290 million in state and local taxes, and nearly \$1.1 billion in federal taxes each year.

Clean electricity for Illinois. The six nuclear facilities generate about 48 percent of Illinois' electricity and about 90 percent of the state's carbon-free electricity. Without the carbon-free electricity produced by these nuclear plants, an additional 80 million metric tons of carbon dioxide would be released annually, the equivalent of the emissions from more than 15 million cars each year. For perspective, Illinois' electric sector emits more than 94 million tons of carbon dioxide annually. Without the nuclear plants, CO₂ emissions associated with Illinois' electric sector could double.

Reliability leaders. During full-power operations, the 11 reactors provide 11,541 megawatts of around-the-clock electricity for Illinois homes and businesses. Over the last 10 years, the facilities have operated at 96 percent of capacity, which is above the industry average and significantly higher than all other forms of electric generation. This reliable production helps offset the potentially severe price volatility of other energy sources (e.g., natural gas) and the intermittency of renewable electricity sources. Nuclear energy provides reliable electricity to businesses and consumers and helps prevent power disruptions which could lead to lost economic output, higher business costs, potential loss of jobs, and losses to consumers.

Balanced portfolio of electricity options. Nuclear energy produces 48 percent of Illinois' electricity, and the 11 nuclear reactors play an important role in maintaining a balanced electric portfolio in the state.

Community and environmental leadership. Exelon is a corporate leader in its neighboring communities, supporting education initiatives, environmental and conservation projects, and numerous charitable organizations.

In addition to quantifying the economic impacts of the Exelon Illinois fleet, this analysis modeled the adverse effects to the state if the Byron, Clinton and Quad Cities plants shut down prematurely in 2016. A combination of economic and policy factors has created potentially fatal economic headwinds for these three plants. The results show that Byron, Clinton and Quad Cities are integral to the local and state economies. Since nuclear plants often are the largest, or one of the largest, employers in the regions in which they operate, the loss of a nuclear power plant has lasting, negative economic ramifications.

If Byron, Clinton and Quad Cities close prematurely this analysis found that the initial output losses to Illinois would be \$3.6 billion. The output losses would increase annually and, by 2030, reach \$4.8 billion. The number of direct and secondary jobs lost peaks in the fifth year after the plants close: 13,300 jobs lost in Illinois. Losses would reverberate for decades after the premature plant closures, and host communities may never fully recover.

Section 1

Background and Generation History



Braidwood Generating Station

First dates of operation
 Braidwood 1 - 1988
 Braidwood 2 - 1988

Location
 60 miles southwest of Chicago

License Expiration Years
 Braidwood 1 - 2026
 Braidwood 2 - 2027

Reactor Types
 Pressurized water

Total Electrical Capacity (Megawatts)
 Braidwood 1 - 1,178
 Braidwood 2 - 1,152

Reliable Electricity Generation

Exelon's 11 nuclear reactors have operated at capacity factors above the industry average for more than a decade. In 2013, the 11 reactors operated at an average capacity factor of 95.9 percent. Capacity factor, a measure of electricity production efficiency, is the ratio of actual electricity generated to the maximum possible electric generation during the year.

Illinois ranked first in the nation in 2013 in both generating capacity and net electricity generation from nuclear power. Generation from the state's nuclear power plants accounted for over 12 percent of the nation's nuclear power.

Exelon's nuclear plants in Illinois generated nearly 100 million megawatt-hours of electricity in 2013—about 48 percent of the electricity generated in the state that year. The 11 reactors provide enough electricity for more than seven million people year-round, or 10.5 million households if all of the electricity went to the residential sector.

In addition to providing abundant electricity, the 11 reactors generate low-cost electricity, which helps keep retail prices for customers 20 percent lower than the U.S. average. In 2012, Illinois customers paid eight cents per kilowatt-hour for electricity compared to the U.S. average of ten cents per kilowatt-hour.¹



Byron Generating Station

First dates of operation
 Byron 1 - 1985
 Byron 2 - 1987

Location
 17 miles southwest of Rockford

License Expiration Years
 Byron 1 - 2024
 Byron 2 - 2026

Reactor Types
 Pressurized water

Total Electrical Capacity (Megawatts)
 Byron 1 - 1,164
 Byron 2 - 1,136

Thousands of High-Skilled, Well-Paying Local Jobs

The Exelon nuclear plants provide affordable electricity to Illinois and a large number of well-paying jobs in their host counties. The six Exelon Nuclear facilities and nuclear headquarters in Illinois (Braidwood, Byron, Clinton, Dresden, LaSalle, Quad Cities and Cantera) employ about 5,900 people full-time in Illinois. On average, approximately 30 percent of the workers at each of the Exelon facilities in Illinois live in the host county of the facility at which they are employed. The Exelon plants also employ many people from nearby counties. Approximately 65 percent of the workers at each of the Exelon facilities live within a three-county radius of each site.

Jobs provided by the nuclear facilities typically pay more than most jobs in the area. Full-time employees of the Exelon facilities in Illinois earned, on average, about \$105,300 in 2012 (excluding benefits). Exelon workers re-

¹ Source: Energy Information Administration



Clinton Power Station

First date of operation
1987

Location
Six miles east of Clinton

License Expiration Year
2026

Reactor Type
Boiling water

Total Electrical Capacity (Megawatts)
1,065

siding in the host counties of their respective facilities earn more than twice the average earnings of other workers in those counties.

Safe and Clean for the Environment

Nuclear facilities generate large amounts of electricity without emitting greenhouse gases. State and federal policymakers recognize nuclear energy as an essential source of safe, reliable electricity that meets both our environmental needs and the state's demand for electricity.

In 2013, the 11 reactors prevented the release of 79.8 million metric tons of carbon dioxide,² about the same amount released by 15 million cars each year. Overall, Illinois' electric sector emits more than 94 million tons of carbon dioxide annually. The 11 reactors also prevent the emission of more than 74,000 tons of nitrogen oxide, equivalent to that released by nearly four million cars, and 176,000 tons of sulfur dioxide. Sulfur dioxide and nitrogen oxide are precursors to acid rain and urban smog.



Dresden Generating Station

First dates of operation
Dresden 2 - 1970
Dresden 3 - 1971

Location
Nine miles east of Morris

License Expiration Years
Dresden 2 - 2029
Dresden 3 - 2031

Reactor Types
Boiling water

Total Electrical Capacity (Megawatts)
Dresden 2 - 867
Dresden 3 - 867

² Emissions prevented are calculated using regional fossil fuel emission rates from the U.S. Environmental Protection Agency and plant generation data from the U.S. Energy Information Administration.



LaSalle County Generating Station

First dates of operation

LaSalle County 1 - 1982
 LaSalle County 2 - 1984

Location

60 miles southwest of Chicago

License Expiration Years

LaSalle County 1 - 2022
 LaSalle County 2 - 2023

Reactor Types

Boiling water

Total Electrical Capacity (Megawatts)

LaSalle County 1 - 1,118
 LaSalle County 2 - 1,120



Quad Cities Generating Station

First dates of operation

Quad Cities 1 - 1972
 Quad Cities 2 - 1972

Location

20 miles northeast of Moline

License Expiration Years

Quad Cities 1 - 2032
 Quad Cities 2 - 2032

Reactor Types

Boiling water

Total Electrical Capacity (Megawatts)

Quad Cities 1 - 908
 Quad Cities 2 - 911

Section 2 Economic Impacts to Illinois

NEI used the REMI PI+ model to analyze economic and expenditure data provided by the plants to develop estimates of their economic benefits (more information on REMI can be found in Section 6).

The economic impacts of the Braidwood, Byron, Clinton, Dresden, LaSalle and Quad Cities facilities as well as Exelon’s headquarters consist of direct and secondary impacts. The main variables used to analyze these impacts are:

Output

The direct output is the value of power produced by the Exelon facilities. The secondary output is the result of how the direct output alters subsequent outputs among industries and how those employed at the facilities influence the demand for goods and services within the community.

Labor Income

The direct labor income is the workers’ earnings at the Exelon facilities. The secondary labor income is the workers’ earnings in the other industries as a result of Exelon’s facilities.

Employment

The direct employment is the number of jobs at the Exelon facilities. Secondary employment is the number of jobs in the other industries as a result of Exelon’s facilities.

Gross State Product

Gross state product is the value of goods and services produced by labor and property at the Exelon facilities—e.g., sales minus intermediate goods. In the REMI model, electricity is the final good from a nuclear plant. Intermediate goods are the components purchased to make that electricity.

Substantial Economic Drivers

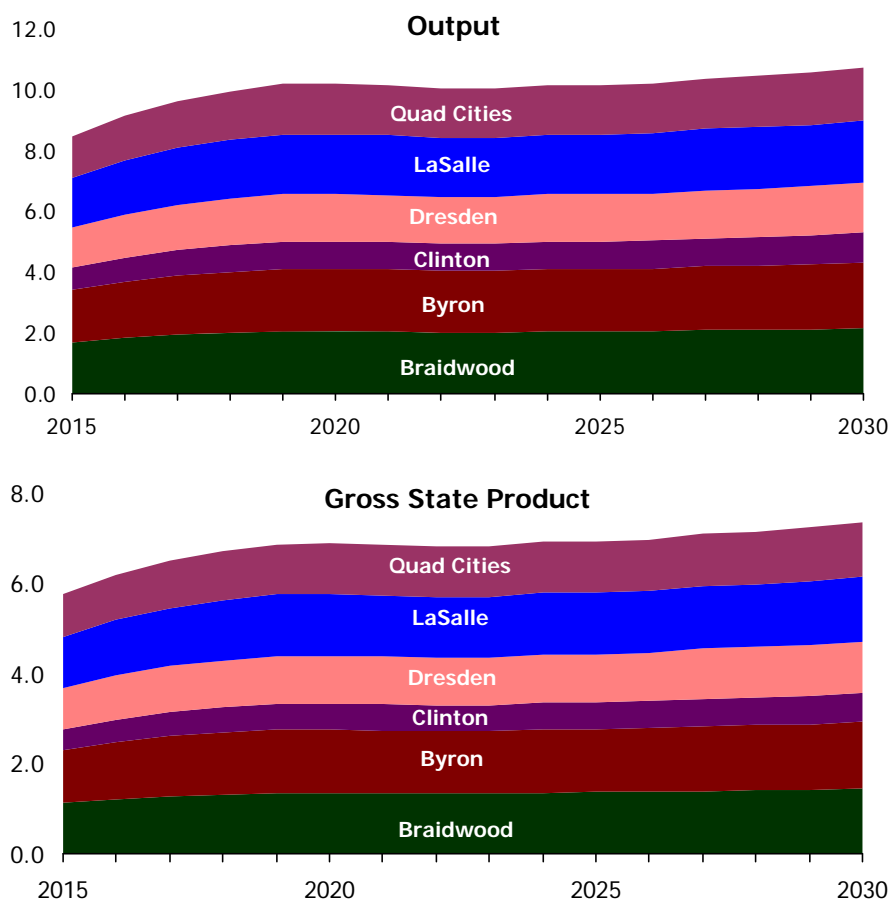
The direct output in 2015 of the Exelon facilities is estimated to total \$5.4 billion (the value of the electricity produced at the plants and the cost to run Exelon's nuclear headquarters), with a total economic output on the state of \$8.9 billion. In other words, for every dollar of output, the state economy produced \$1.65. By 2030, the total economic output is estimated to increase to \$11.4 billion.

In 2015, Exelon's nuclear output in Illinois is estimated to contribute \$6.0 billion to Illinois' gross state product (GSP) and, by 2030, the GSP increases to \$7.8 billion.

Exelon's total economic output on the state of Illinois in 2015 is estimated to be \$8.9 billion and grow to an estimated \$11.4 billion by 2030.

Figure 2.0 shows the value of Exelon's total output and contributions to GSP through 2030, using electricity price forecast data from the Energy Information Administration.

Figure 2.0
Exelon Plants' Total Output and Gross State Product Contribution to Illinois (dollars in 2014 billions)*



* Regional electricity price forecasts based on the Energy Information Administration's Annual Energy Outlook 2014.

The eleven reactors' largest impacts are on the utilities sector. Their next greatest impact in Illinois is on the construction sector followed by the professional, scientific and technical sector, due to the volume of specialized services required to operate and maintain a nuclear power plant. Other sectors that benefit from the plants' operations in Illinois include manufacturing, finance and insurance, health care, retail trade, and managing companies and enterprises.

A full depiction of the sectors in Illinois that benefit from the facilities is in Table 2.0 below.

Table 2.0
Exelon's Estimated Total Output on Illinois' Economic Sectors in 2015
(in millions of 2014 dollars)

Sector Description	Braidwood	Byron	Clinton	Dresden	LaSalle	Quad Cities	HQ	Total
Utilities	1,109	1,095	445	826	1,065	866	3	5,409
Construction	185	175	66	139	187	149	37	938
Professional, Scientific, and Technical Services	80	120	48	70	79	78	26	501
Manufacturing	63	65	25	52	62	53	23	343
Real Estate and Rental and Leasing	44	45	21	36	44	38	28	256
Finance and Insurance	36	38	19	31	36	32	31	223
Retail Trade	37	38	19	31	36	33	23	217
Management of Companies and Enterprises	5	5	2	4	5	4	169	194
Health Care and Social Assistance	31	33	17	27	31	28	22	189
Wholesale Trade	18	19	9	15	18	16	10	105
Information	18	19	8	14	17	15	14	105
State and local government	13	14	6	11	14	11	10	79
Administrative and Waste Management Services	13	15	6	11	13	12	8	78
Other Services, except Public Administration	11	12	6	9	11	10	8	67
Accommodation and Food Services	11	11	5	9	10	9	7	62
Mining	12	12	5	9	12	10	1	61
Transportation and Warehousing	9	9	4	7	11	7	3	50
Arts, Entertainment, and Recreation	3	3	1	2	3	2	3	17
Educational Services	2	2	1	2	2	2	1	12
Total	1,700	1,730	713	1,305	1,656	1,375	427	8,906

Job Diversity and Creation

Exelon's output also stimulates the state's labor income and employment. Exelon's plants and nuclear headquarters in Warrenville, Illinois employ 5,900 people in permanent jobs. These jobs stimulate another 21,700 additional jobs in other sectors in the state.

Table 2.1 details the numbers and types of jobs that Exelon is estimated to support in 2015. Exelon's workers are included in the occupation categories in the table. As the table shows, about 27 percent of the jobs are construction and 13 percent are utility workers. About 11 percent are professional, scientific and technical workers and another nine percent are retail trade workers. Six percent are workers who provide health care and social assistance and two percent of the jobs (595) are state and local government workers (not shown separately in the table).

Table 2.1
Exelon's Estimated Support in Direct and Secondary Jobs in Illinois in 2015

Occupation	Braidwood	Byron	Clinton	Dresden	LaSalle	Quad Cities	HQ	Total
Construction	1,474	1,394	523	1,110	1,486	1,189	290	7,466
Utilities	944	914	302	715	886	747	3	4,511
Professional, Scientific, and Technical Services	492	730	295	427	484	474	154	3,056
Retail Trade	436	448	221	365	423	384	267	2,544
Health Care and Social Assistance	291	305	159	251	285	262	201	1,754
Other Services, except Public Administration	201	210	107	171	196	179	145	1,209
Administrative and Waste Management Services	169	191	83	139	170	153	110	1,015
Accommodation and Food Services	153	159	75	122	150	130	107	896
Finance and Insurance	123	129	66	103	121	108	108	758
Manufacturing	139	139	56	112	136	117	43	742
Other	499	525	229	408	510	431	1,001	3,603
Total	4,921	5,144	2,116	3,923	4,847	4,174	2,429	27,554

Economic Stimulus Through Taxes

Exelon's nuclear headquarters and the operations of the 11 reactors resulted in a total tax impact of \$1.4 billion to the local, state and federal governments. This includes the direct impact and secondary impacts, because plant expenditures increase economic activity, leading to additional income and value creation and, therefore, to additional tax revenue from other sectors.

Exelon's impacts on the state economy are substantial. In addition to the \$6.0 billion in gross state product, the company is estimated to generate nearly \$300 million in taxes from the plants and their activities for Illinois and its local governments. See Table 2.2 below.

Large Multiplier Effects

By producing affordable, reliable electricity, Exelon's nuclear operations are hubs of economic activity for Illinois and a boost to the national economy. Table 2.3 (next page) provides the multipliers and summarizes the total effects from each plant and headquarters. The multipliers show that for every dollar of output generated, the plants and headquarters stimulate between \$1.58 and \$3.01 in economic output in the state.

The plants and headquarters also stimulate a tremendous quantity of jobs. For every direct job, two to five additional jobs are created.

Table 2.2
Estimated Total Tax Impacts of Exelon's Plants in 2015
*(in 2014 millions of dollars)**

Facility	State and Local	Federal	Total
Braidwood	54	201	255
Byron	56	209	266
Clinton	22	83	105
Dresden	43	161	205
LaSalle	45	169	214
Quad Cities	55	204	259
HQ	13	50	63
Total Taxes	289	1,078	1,367

* Calculated based on a percentage of gross state product.

Table 2.3
Exelon's Impacts on the Illinois Economy in 2015 (dollars in 2014 billions)

Facility / Description	Direct	Secondary	Total	Multiplier
Braidwood				
Output	\$1.08	\$0.62	\$1.70	1.58
Labor Income	\$0.13	\$0.24	\$0.37	2.84
Employment	898	4,023	4,921	5.48
Gross State Product			\$1.13	
Byron				
Output	\$1.06	\$0.67	\$1.73	1.63
Labor Income	\$0.13	\$0.27	\$0.39	3.11
Employment	880	4,264	5,144	5.84
Gross State Product			\$1.17	
Clinton				
Output	\$0.43	\$0.28	\$0.71	1.65
Labor Income	\$0.10	\$0.10	\$0.20	2.04
Employment	711	1,405	2,116	2.98
Gross State Product			\$0.46	
Dresden				
Output	\$0.80	\$0.50	\$1.30	1.63
Labor Income	\$0.13	\$0.19	\$0.32	2.49
Employment	915	3,008	3,923	4.29
Gross State Product			\$0.90	
LaSalle				
Output	\$1.03	\$0.62	\$1.66	1.60
Labor Income	\$0.12	\$0.24	\$0.37	2.97
Employment	875	3,971	4,847	5.54
Gross State Product			\$1.14	
Quad Cities				
Output	\$0.84	\$0.54	\$1.38	1.64
Labor Income	\$0.13	\$0.21	\$0.33	2.60
Employment	909	3,265	4,174	4.59
Gross State Product			\$0.94	
Headquarters				
Output	\$0.14	\$0.29	\$0.43	3.01
Labor Income	\$0.14	\$0.12	\$0.26	1.84
Employment	708	1,721	2,429	3.43
Gross State Product			\$0.28	
Total				
Output	\$5.39	\$3.52	\$8.91	1.65
Labor Income	\$0.88	\$1.37	\$2.24	2.56
Employment	5,896	21,658	27,554	4.67
Gross State Product			\$6.02	

Section 3

Economic Impacts of Byron, Clinton and Quad Cities' Retirement

One way to appreciate the value of a nuclear power plant is to examine what happens when it is gone. When the Kewaunee facility in Wisconsin closed prematurely in 2013, Kewaunee County lost 15 percent of its employment and 30 percent of its revenue—not to mention 556 megawatts of reliable, affordable electricity. In California, 1,500 jobs were lost when two reactors at the San Onofre nuclear facility were closed. Recent analysis shows that California's carbon dioxide emissions increased by more than 35 percent, due in large part to the closure of the two reactors. Moreover, when San Onofre was operating, there was virtually no difference in wholesale electricity costs between southern and northern California. When the plant shut down in 2012, the spread between prices in the two regions increased to approximately \$7 per megawatt-hour. In 2013, the spread widened further—to about \$10/MWh. It is expected to remain at that level for the rest of the decade. This is significant for a state that already pays one of the highest retail electricity rates in the country.

Illinois' gross state product shrinks by \$2.5 billion in 2016 to \$3.3 billion in 2030 because of lost output that cascades across virtually all sectors.

California will replace the lost electricity from San Onofre primarily with new natural gas-fired power plants, renewable resources, and imports from out of state. Customers are expected to pay billions of dollars to replace electricity generation at San Onofre.

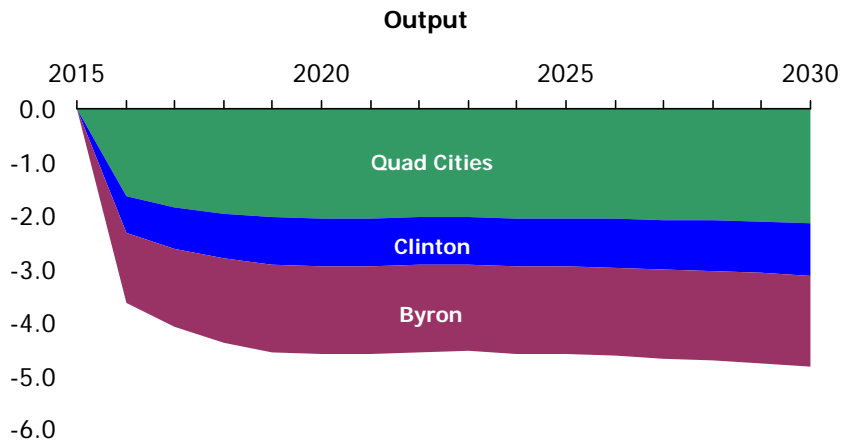
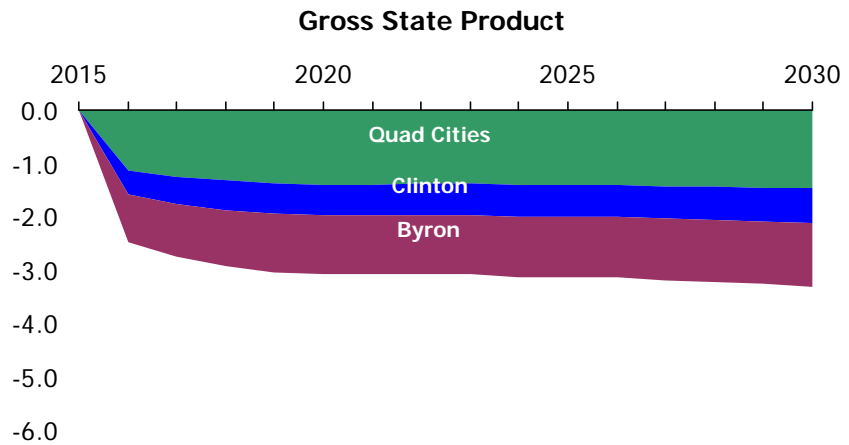
As discussed in Section 2, the operations of Byron, Clinton and Quad Cities create significant economic benefits for Illinois and beyond. These three plants are at significant risk of premature retirement because of a perfect storm of economic challenges - sluggish economy, historically low natural gas prices, and the unintended consequences of current energy policies. The REMI model measures the long-term impact to the Illinois economy if Byron, Clinton and Quad Cities are shut down prematurely.

State Comprehensive Economic Loss

When a productive facility ceases operations, the economic loss affects local, state and national areas for decades. Figure 3.0 on page 14 shows the value of Byron, Clinton and Quad Cities' lost output and lost gross state product if the plants were to shut down in 2016 (the year selected for the study).

In the first year, the lost direct output in Illinois would be \$2.4 billion and the lost secondary output would be another \$1.2 billion. The losses increase each year thereafter and reach \$2.8 billion in lost direct output and another \$2.2 billion in lost secondary output in Illinois by 2030. Over that period, Illinois' gross state product shrinks by \$2.5 billion in 2016 to \$3.3 billion in 2030 because of lost output that cascades across virtually all sectors.

Figure 3.0
Byron, Clinton and Quad Cities' Total Lost Output and Gross State Product in Illinois (in 2014 billions of dollars)



The net output losses to Illinois in 2020 from retiring Byron, Clinton and Quad Cities would be \$2.0 billion.

A nuclear power plant shutdown has a greater economic impact than its operation. The impacts shown in this section are larger than those in Section 2 primarily because of the migration of workers and families away from the area in search of new jobs.

A full depiction of the sectors affected by Byron, Clinton and Quad Cities' shutdown is in Table 3.0 on page 15, which shows the lost output in the fifth year (2020) when job losses peak in Illinois. The lost direct output from the three plants is estimated to be \$2.6 billion and the lost secondary output is estimated to be \$2.0 billion in 2020.

In Illinois, the shutdowns primarily affect the utilities sector. Assuming the electricity production will be replaced, the net impact losses on Illinois is approximately equal to the lost secondary output figure on an annual basis. For example, in 2020 the net impact lost would be \$2.0 billion in output.

Table 3.0
Lost Output to Affected Sectors in Year 5 (2020) After Byron, Clinton and Quad Cities' Closure (In 2014 millions of dollars)

Sector Description	Byron	Clinton	Quad Cities	Total
Construction	-225	-90	-192	-507
Professional, Scientific, and Technical Services	-159	-67	-108	-334
Manufacturing	-83	-35	-68	-186
Real Estate and Rental and Leasing	-63	-29	-53	-145
Retail Trade	-54	-27	-46	-127
Finance and Insurance	-41	-21	-34	-96
Health Care and Social Assistance	-40	-21	-34	-95
Utilities	-38	-16	-30	-84
State and local government	-35	-14	-28	-77
Information	-27	-12	-22	-61
Other	-116	-55	-96	-267
Total Lost Secondary Output	-881	-387	-711	-1,979
Lost Direct Output (Utilities sector)	-1,181	-503	-934	-2,618
Total Lost Output	-2,062	-890	-1,645	-4,597

Figure 3.1 on page 16 shows the number of direct and secondary jobs lost in Illinois after Byron, Clinton and Quad Cities' retirement. The number of direct jobs lost at the plants is 2,500. While the number of direct jobs lost remains flat, the number of secondary jobs lost increases during the first five years. This is because it would take several years before the lost output from Byron, Clinton and Quad Cities filters completely through the local and state economies.

If Byron, Clinton and Quad Cities shut down, by 2020, job losses in the state would peak at 13,300.

Figure 3.1 also displays the population migration out of the state that would occur if the facilities were to close. By 2030, about 17,000 people are estimated to move out of the state. Further, even though the number of job losses stabilizes after four years of the plants' shutdown, the number of people migrating continues to increase. It's not until 2040 (25 years after the plants retire) that population migration stabilizes around the plants and in Illinois. Since Byron, Clinton and Quad Cities are one of the larger employers in their host counties, it can be reasonably assumed that thousands of people also would migrate out of those counties to other parts of the state.

Table 3.1 on page 16 shows the number and types of jobs that would be lost if Byron, Clinton and Quad Cities close. In Year 1 (2016), more than 9,000 jobs would be lost in Illinois, including plant employees. In Year 5 (2020), job losses in the state would peak at 13,300.

Figure 3.1
Premature Shutdown-Related Job Losses in Illinois

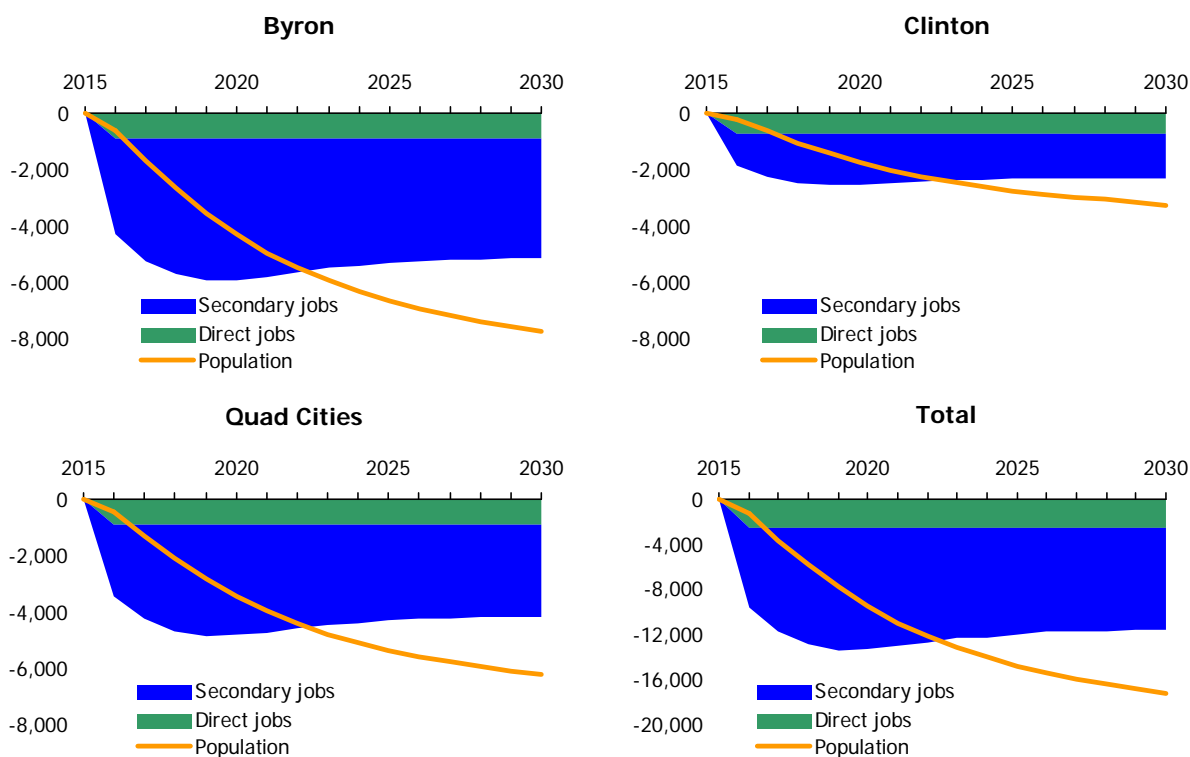


Table 3.1
Peak Direct and Secondary Jobs Lost in Year 5 (2020)
After Byron, Clinton and Quad Cities' Closure

Occupation	Byron	Clinton	Quad Cities	Total
Construction	-1,605	-644	-1,366	-3,615
Utilities	-868	-301	-709	-1,878
Professional, Scientific, and Technical Services	-889	-377	-604	-1,870
Retail Trade	-547	-271	-466	-1,284
Health Care and Social Assistance	-358	-189	-306	-853
Administrative and Waste Management Services	-237	-105	-192	-534
Other Services, except Public Administration	-220	-116	-188	-524
Accommodation and Food Services	-224	-105	-183	-512
Manufacturing	-145	-61	-123	-329
Real Estate and Rental and Leasing	-130	-60	-109	-299
Other	-729	-326	-596	-1,651
Total	-5,952	-2,555	-4,842	-13,349

Section 4

Community Leadership and Environmental Protection

In addition to the economic benefits that Exelon Nuclear contributes to Illinois in the form of jobs, income and taxes, the company and its employees contribute to local communities in many other beneficial ways.

Exelon Nuclear has a strong tradition of community involvement that helps to strengthen and enrich the communities where it operates. Each of Exelon's nuclear plants has a community outreach program designed to build trust, support, and general goodwill with plant neighbors, community leaders, and elected officials.

Exelon's Illinois nuclear plants strengthen Illinois communities through charitable contributions for community organizations and initiatives, educational programs that teach and promote the benefits of nuclear energy, environmental programs that improve the quality of the environment, and civic engagement activities that build trust and goodwill.

Exelon Nuclear has a strong tradition of community involvement that helps to strengthen and enrich the communities where it operates.

Contributions & Sponsorships

The purpose of Exelon Nuclear's site contributions programs is to improve the quality of life in the communities it serves. Each of Exelon's Illinois nuclear sites contributes to local causes that support community development, education, the arts, the environment, recreation, and health and safety. Exelon and its nuclear employees contribute more than \$1,800,000 to more than 400 vital community organizations and initiatives, including the United Way.

Braidwood Generating Station's annual team bass fishing tournament, Fishing for a Cure, raises money for a new local charity selected each year by employees. Since 2002, the event has raised more than \$365,000 for local charities, which have included food pantries and tornado disaster relief victims in Diamond and Coal City.

In the neighboring community of Godley, Exelon donated \$11.5 million to build a municipal water system in 2006. The donation helped the village resolve a long-standing water quality problem caused by shallow wells in the community that had been infiltrated by non-industrial pollutants.

Byron Generating Station donated \$30,000 to the Ogle County Sheriff's Department to purchase an emergency response vehicle and tactical weaponry and gear. The county uses the vehicle to transport county law enforcement and emergency response personnel during emergencies.

A \$15,000 donation from the station allowed the Byron Public Library to construct a permanent 800-square-foot energy exhibit that educates patrons about green energy, recycling and energy conservation.

Clinton Power Station, in DeWitt County, supports military veteran organizations in its local communities, including the local American Legion Post, AMVETS Post, VFW, and VFW Ladies Auxiliary Post, through both monetary donations and volunteer time. Additionally, station employees raised more than \$41,000 for the Wounded Warrior Project through site raffles, fundraising events and employee donations. Clinton employees also raised nearly \$28,000 to build a new kitchen and provide new appliances for a senior center in the city of Clinton.

Dresden Generating Station donated \$25,000 to the Forest Preserve District of Will County in 2008 to furnish a state-of-the-art classroom at the Four Rivers Environmental Education Center.

The station also helped provide a safe place to play for children at the South Wilmington Elementary School with a contribution of \$15,000 for the school to replace 50-year-old playground equipment.

LaSalle County Generating Station is a signature sponsor of the United Way of Eastern LaSalle County's Labor of Love and has donated \$135,000 to the event since 2003. Labor of Love is a one-day home improvement blitz. Each year, more than one hundred Exelon volunteers use donated materials to paint, clean and repair the homes of elderly, disabled and low-income homeowners. To date, Exelon has renovated 57 homes.

In the City of Streator, LaSalle Station partnered with the Streator Substance Abuse Coalition and donated \$7,000 to purchase a drug dog for the police department. The canine is trained to identify all types of drugs, assist in traffic stops and conduct searches in schools. The Streator Police Department is one of the only police departments in the area with a trained drug dog.

Quad Cities Generating Station is a major sponsor of the Fulton Community Holiday Dinner, donating funds to purchase the ingredients to make the meals. Each year, community volunteers serve and deliver more than 500 meals to people in need in the area.

Quad Cities Station has been the major sponsor of four local library summer reading programs in Cordova, Erie, Hillsdale and Port Byron, contributing \$50,000 to the program in total over the past decade. More than 500 children participate annually in the local reading programs.

Exelon Nuclear employees take pride in being an integral part of the communities they serve. Exelon makes it easy for employees to volunteer in both company-sponsored and personal volunteer service activities by allowing employees to volunteer on company time. The company also recognizes employees who volunteer by awarding grants to an organization of their choice based on the number of hours the employee has volunteered. In 2013, Exelon Nuclear employees logged 5,194 volunteer hours.

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Pursuit of Education

Exelon Nuclear's educational program takes nuclear's message of safe, clean, and reliable operations on the road to a broad audience of school children, teachers, civic organizations, and the general public.

For example, the company's Gabby Green program reaches more than 11,000 school-age children and teachers in Illinois each year, teaching them about electricity, conservation and green energy sources – such as solar, wind, hydro and nuclear power.

Similarly, the Nuclear 101 program gives hundreds of teachers an opportunity to learn about nuclear energy and provides them with materials they can use in their classrooms to educate their students.

To further foster students' interest in education, Exelon's Illinois plants award more than \$15,000 in scholarships each year to high school students in surrounding communities who plan to pursue a science, technology, engineering or math degree.

In the broader community, the plants hold open house-style community information events at their sites for the general public. These events give the general public a close look at the plant and provide them with detailed information on specific issues like plant safety, security, taxes, and dry cask storage.

Environmental Stewardship

Behind Exelon Nuclear's commitment to continuously improve its environmental performance is the environmental management system (EMS). This is a set of processes and practices focused on reducing environmental impacts, complying with environmental laws and regulations, and providing a greener and healthier environment. Exelon Nuclear's EMS is based on the international standard, ISO 14001, which lets customers know they can trust that the company is actively minimizing the environmental impacts of its processes, products, and services. All Exelon Nuclear facilities have ISO 14001 certifications.

Exelon Illinois nuclear plants go above and beyond federal and state environmental compliance commitments to enhance and protect the environment with programs that have improved water quality and the health of habitats for fish, birds and other wildlife.

- Since 2007, Braidwood Station has teamed with the Illinois Department of Natural Resources (IDNR) and three local bass clubs (American Bass Anglers, Bass PAC and NBAA) to purchase and deploy artificial habitats at Braidwood Lake. This effort combined with the IDNR annual restocking of 60,000 four-inch fingerling largemouth bass has enhanced the Braidwood Lake fishery. The habitat units are designed to provide multiple benefits to largemouth bass at various stages in their life – from acting as a nursery habitat for young fish to providing feeding sites for larger, older bass. To

date, 675 habitat units have been deployed at a cost of \$40,000.

- Byron Station donated \$43,000 to help Hoo Haven build an aquatic wing at its rehabilitation center, which supports the rescue and rehabilitation of birds, ground, and aquatic animals. The donation also allowed the center to purchase a van equipped to transport injured animals. At the site, employees on the environmental stewardship team installed nest boxes for bluebirds, wood ducks and owls to provide a habitat for local birds that were in need of nesting areas.
- Clinton Lake, not only serves as a cooling source for Clinton Power Station, but also as a recreation area for fishing, boating, swimming, and other water-related activities. The station spends \$12,000 each year to restock the lake with bass and crappie. Working with the IDNR in 2008, the station rebuilt a fish pond near the lake where fish can grow over the summer before being released into Clinton Lake in the fall. The project, which cost more than \$20,000, helps ensure Clinton Lake has a healthy fish population. In 2013, the station stocked the lake with 50,000 bass/walleye and 134,000 crappies.
- Employees at Dresden Station have worked with the IDNR to build and install more than 60 artificial nesting areas for osprey and purple martins on the site property. These birds have been absent from the area since the 1970s.
- LaSalle Lake, which acts as a cooling lake for LaSalle County Generating Station, supports a diverse fish population, provides vital habitat for birds, and serves as a recreation area for fishing and boating. The station's on-site fish hatchery raises and stocks the lake with a variety of warm and cool water fish species, including largemouth and smallmouth bass, blue catfish, striped bass, bluegill and red sunfish.
- Like Dresden Station, LaSalle also built artificial nesting areas for osprey, which use the lake for feeding. Migratory birds such as white pelicans, great blue herons, and other species also use the lake for feeding and as a stopover habitat.
- Quad Cities Station is home to the only private fish hatchery on the Mississippi River, which it operates in partnership with Southern Illinois University. The facility had raised and stocked the Mississippi River and other local water bodies with more than 7 million fingerling walleye, 600,000 fingerling hybrid striped bass, and nearly 75,000 yearling hybrid striped bass since the hatchery began operation.

All six Illinois sites have been recognized with Wildlife Habitat Council's Wildlife at Work certifications, and Clinton Station has an additional Corporate Lands for Learning certification.

Section 5

Exelon and the U.S. Nuclear Energy Industry

Exelon's nuclear power plants play a vital role in helping Illinois meet its demand for affordable, reliable and sustainable energy.

In 2013, electricity production from U.S. nuclear power plants was about 790 billion kilowatt-hours—nearly 20 percent of America's electricity supply. In Illinois, the 11 reactors generated approximately 48 percent of the state's electricity.

Over the past 20 years, America's nuclear power plants have increased output and improved performance significantly. Since 1990, the industry has increased total output equivalent to that of 26 large power plants, when in fact only five new reactors have come on line.

U.S. nuclear power plants achieved an industry-leading performance capacity factor of 91 percent in 2013, while producing electricity at one of the lowest costs of any fuel source used to generate electricity.

The Value of Nuclear Energy

Nuclear energy's role in the nation's electricity portfolio was especially valuable during the 2014 winter, when record-cold temperatures gripped the United States and other sources of electricity were forced off the grid. Nuclear power plants nationwide operated at an average capacity factor of 96 percent during a period of extremely cold temperatures. During that time, supply volatility drove natural gas prices in many markets to record highs and much of that gas was diverted from use in the electric sector so that it could be used for home heating.

Some of America's electricity markets, however, are structured in ways that place some nuclear energy facilities at risk of premature retirement, despite excellent operations. It is imperative that policymakers and markets appropriately recognize the full strategic value of nuclear energy to a diverse energy portfolio.

The value starts with the safe and reliable production of large quantities of electricity around the clock.

Renewable energy, while an emerging part of the energy mix, is intermittent (the sun doesn't always shine and the wind doesn't always blow when generation is needed) and therefore unreliable; natural gas-fired generation depends on fuel being available (both physically and at a reasonable price); and on-site coal piles can freeze. One of nuclear energy's key benefits is the availability of low-cost fuel and the ability to produce electricity under virtually all weather conditions. Nuclear power plants also provide clean-air compliance value. In

Based on more than 50 years of experience, the nuclear industry is one of the safest industrial working environments in the nation.

any emissions trading system, nuclear energy reduces the compliance burden that would otherwise fall on carbon-emitting generating capacity.

Nuclear plants provide voltage support to the grid, helping to maintain grid stability. They have portfolio value, contributing to fuel and technology diversity. And they provide tremendous local and regional economic development opportunities, including large numbers of high-paying jobs and significant contributions to the local and state tax base.

Affordable Energy for Consumers

In addition to increasing electricity production at existing nuclear energy facilities, power from these facilities is affordable for consumers. Compared to the cost of electricity produced using fossil fuels—which is heavily dependent on fuel prices—nuclear plant fuel prices are relatively stable, making costs to consumers more predictable. Uranium fuel is only about one-third of the production cost of nuclear energy, while fuel costs make up 78 percent to 88 percent of coal-fired and natural gas production costs.

Emphasis on Safety

Safety is the highest priority for the nuclear energy industry. Based on more than 50 years of experience, the industry provides one of the safest industrial working environments in the nation. Through rigorous training of plant workers and frequent communication and cooperation among nuclear plants and federal, state and local regulators, the industry is keeping the nation's 100 nuclear plants safe for their communities and the environment.

The U.S. Nuclear Regulatory Commission (NRC) provides independent federal oversight of the industry and tracks data on the number of “significant events” at each nuclear plant. (A significant event is any occurrence that challenges a plant’s safety system.) The average number of significant events per reactor declined from 0.45 per year in 1990 to 0.06 in 2012, illustrating the emphasis on safety throughout the nuclear industry.

General worker safety is also excellent at nuclear power plants—far safer than in the manufacturing sector. U.S. Bureau of Labor Statistics data show that, in 2012, nuclear energy facilities achieved an incidence rate of 0.4 per 200,000 work hours, compared to 2.8 for fossil-fuel power plants, 3.1 for electric utilities and 3.9 for the manufacturing industry.

Industry Trends: License Renewal and New Plants

The excellent economic and safety performance of U.S. nuclear power plants has demonstrated the value of nuclear energy to the electric industry, the financial community and policymakers. This is evidenced by the number of facilities seeking license renewals from the NRC.

Originally licensed to operate for 40 years, nuclear energy facilities can operate safely for longer. The NRC granted the first 20-year license renewal to the Calvert Cliffs plant in Maryland in 2000. As of September 2014, 73 reactors had received license extensions, and operators of 30 additional reactors either had submitted applications or announced that they will seek renewal. License renewal is an attractive alternative to building new electric capacity because of nuclear energy's low production costs and the return on investment provided by extending a plant's operational life.

Besides relicensing nuclear plants, energy companies also are building new, advanced-design reactors. Georgia Power and South Carolina Electric & Gas are building two advanced reactors each, near Augusta, Ga., and Columbia, S.C. These facilities are halfway through the construction program and will employ more than 5,000 workers each during the peak of construction. In addition, Tennessee Valley Authority is completing construction of the Watts Bar 2 reactor in Tennessee.

Section 6

Economic Impact Analysis Methodology

This analysis uses the REMI model to estimate the economic and fiscal impacts of the Exelon Illinois nuclear power plants.

Regional Economic Models, Inc. (REMI)

REMI is a modeling firm specializing in services related to economic impacts and policy analysis, headquartered in Amherst, Mass. It provides software, support services, and issue-based expertise and consulting in almost every state, the District of Columbia, and other countries in North America, Europe, Latin America, the Middle East and Asia.

The REMI model has two main purposes: forecasting and analysis of alternatives. All models have a “baseline” forecast of the future of a regional economy at the county level. Using “policy variables,” in REMI terminology, provides scenarios based on different situations. The ability to model policy variables makes it a powerful tool for conveying the economic “story” behind policy. The model translates various considerations into understandable concepts like GDP and jobs.

REMI relies on data from public sources, including the Bureau of Economic Analysis, Bureau of Labor Statistics, Energy Information Administration and the Census Bureau. Forecasts for future macroeconomic conditions in REMI come from a combination of resources, including the Research Seminar in Quantitative Economics at the University of Michigan and the Bureau of Labor Statistics. These sources serve as the main framework for the software model needed to perform simulations.

Policy Insight Plus (PI+)

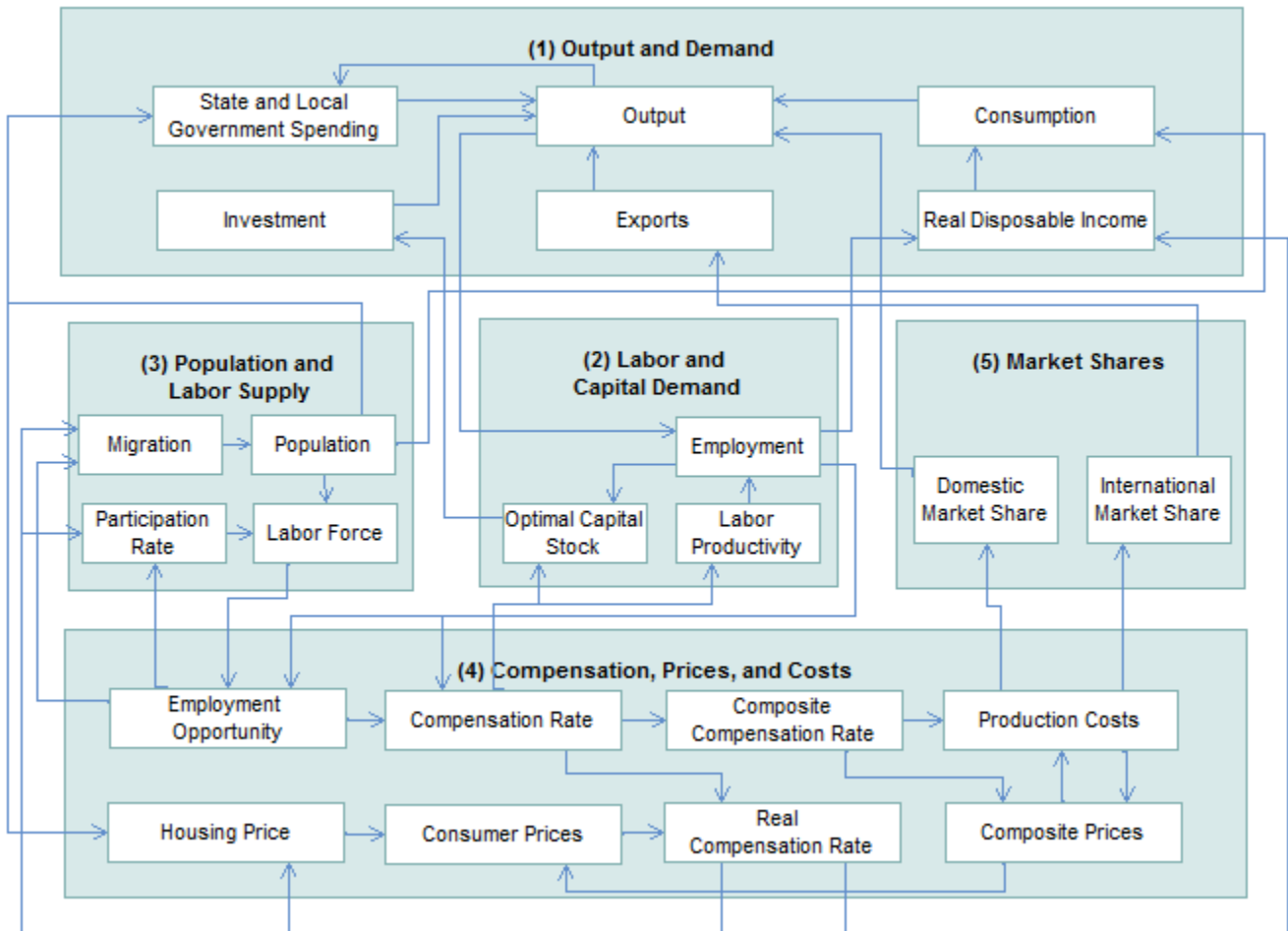
REMI's PI+ is a computerized, multiregional, dynamic model of the states or other sub-national units of the United States economy. PI+ relies on four quantitative methodologies to guide its approach to economic modeling:

1. Input/output tabulation (IO)—IO models, sometimes called “social accounting matrices” (SAM), quantify the interrelation of industries and households in a computational sense. It models the flow of goods between firms in supply-chains, wages paid to households, and final consumption by households, government and the international market. These channels create the “multiplier” effect of \$1 going farther than when accounting for its echoing.
2. Computable general equilibrium (CGE)—CGE modeling adds market concepts to the IO structure. This includes how those structures evolve over time and how they respond to alternative policies. CGE incorporates concepts on markets for labor, housing, consumer goods, imports and the importance of competitiveness to fostering economic growth over time.

Changing one of these will influence the others—for instance, a new knife factory would improve the labor market and then bring it to a head by increasing migration into the area, driving housing and rent prices higher, and inducing the market to create a new subdivision to return to “market clearing” conditions.

3. Econometrics—REMI uses statistical parameters and historical data to populate the numbers inside the IO and CGE portions. The estimation of the different parameters, elasticity terms and figures gives the strength of various responses. It also gives the “time-lags” from the beginning of a policy to the point where markets have had a chance to clear.
4. New economic geography—Economic geography provides REMI a sense of economies of scale and agglomeration. This is the quantification of the strength of clusters in an area and their influence on productivity. One example would include the technology and research industries in Seattle. The labor in the area specializes to serve firms like Amazon and Microsoft and, thus, their long-term productivity grows more quickly than that of smaller regions with no proclivity towards software development (such as Helena, Mont.). The same is true on the manufacturing side with physical inputs, such as with the supply-chain for Boeing and Paccar in Washington in the production of transportation equipment. Final assembly will have a close relationship and a high degree of proximity to its suppliers of parts, repairs, transportation and other professional services, which show up in clusters in the state.

Figure 6.0



This diagram represents the structure and linkages of the regional economy in PI+. Each rectangle is a discrete, quantifiable concept or rate, and each arrow represents an equation linking the two of them. Some are complex econometric relationships, such as the one for migrant, while some are rather simple, such as the one for labor force, which is the population times the participation rate. The change of one relationship causes a change throughout the rest of the structure because different parts move and react to incentives at different points. At the top, Block 1 represents the macroeconomic whole of a region with final demand and final production concepts behind GDP, such as consumption, investments, net exports and government spending. Block 2 forms the “business perspective”: An amount of sales orders arrive from Block 1, and firms maximize profits by minimizing costs when making optimal decisions about hiring (labor) and investment (capital). Block 3 is a full demographic model. It has births and deaths, migration within the United States to labor market conditions, and international immigration. It interacts with Block 1 through consumer and government spending levels and Block 4 through labor supply. Block 4 is the CGE portion of the model, where markets for housing, consumer goods, labor and business inputs interact. Block 5 is a quantification of competitiveness. It is literally regional purchase coefficients (RPCs) in modeling and proportional terms, which show the ability of a region to keep imports away while exporting its goods to other places and nations.

Conclusion

In 2015, the total economic impact (direct and secondary) to Illinois from Exelon's eleven reactors is estimated to be \$8.9 billion in output and nearly 28,000 jobs. The plants' economic benefits—on taxes and through wages and purchases of supplies and services—are considerable. In addition, plant employees stimulate the local economies by purchasing goods and services from businesses in the area, supporting many small businesses throughout the region.

The facilities generated nearly 100 billion kilowatt-hours of carbon-free electricity in 2013, enough to serve the yearly needs for more than seven million people year-round, or 10.5 million households if all of the electricity went to the residential sector. This low-cost, reliable electricity helped keep retail electricity prices in Illinois 20 percent lower than the U.S. average.

In addition to quantifying the positive economic impacts of the Exelon Illinois fleet, this analysis showed that the Byron, Clinton and Quad Cities plants are integral to the local and state economies. The loss of the three nuclear power plants has lasting, negative economic ramifications. Losses would reverberate for decades after the plants shut down, and host communities may never fully recover.

Exelon's nuclear power stations in Illinois are leaders economically, fiscally, environmentally and socially within the state and have far-reaching, positive economic impacts across the United States.



