Economic Impacts of
The Davis-Besse Nuclear Power Station

An Analysis by the Nuclear Energy Institute

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NUCLEAR ENERGY INSTITUTE

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Contents

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Executive Summary

The Davis-Besse Nuclear Power Station (Davis-Besse), located in Oak Harbor, Ohio, has been a vital part of the region's energy portfolio, providing 100 percent carbon-free electricity since it began commercial operation in 1978. In addition to the reliable, emission-free electricity that the station generates and the jobs and economic stimulus it provides, the plant's involvement in the local communities makes Davis-Besse a significant economic contributor to the region and Ohio.

Davis-Besse's operation supports 5,300 jobs in Ohio.

To quantify the employment and economic impacts of this facility, the Nuclear Energy Institute (NEI) conducted an independent analysis. Based on data provided by FirstEnergy (Davis-Besse's operator) on employment, operating expenditures and tax payments, NEI conducted the analysis using a nationally recognized model to estimate the facility's economic impacts on the local and state economies. Regional Economic Models, Inc. (REMI), developed the Policy Insight Plus (PI+) economic impact modeling system, which is the methodology employed in this analysis. (See section 6 of this report for more information on the REMI methodology.)

Key Findings

Davis-Besse's operation supports:

Davis-Besse prevents emissions of 7.1 million metric tons of carbon dioxide annually, approximately the same amount of carbon dioxide released by more than 1.4 million cars each year.

Thousands of jobs. Davis-Besse employs about 700 people directly and stimulates another 2,500 jobs in Ottawa County. This direct employment leads to more than 2,100 additional jobs in other industries in Ohio for a total of 5,300 jobs (including the plant) throughout the state.

Clean electricity for Ohio. Davis-Besse generates about six percent of Ohio's electricity. Emission-free electricity from Davis-Besse prevents the release of 7.1 million metric tons of carbon dioxide annually, approximately the same amount of carbon dioxide released by more than 1.4 million cars each year. For perspective, Ohio's electric sector emits more than 100 million metric tons of carbon dioxide annually.

Reliability benefits. During full-power operation, Davis-Besse provides 894 megawatts of around-the-clock electricity to Ohio homes and businesses. In 2013, the station operated at more than 98 percent of capacity, which is above the industry average and significantly higher than 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.

Balanced portfolio of electricity options. Nuclear energy produces approximately 12 percent of Ohio's electricity, and Davis-Besse plays an

important role in maintaining a balanced electric portfolio in Ohio. Ohio's electricity supply consists primarily of coal, natural gas and nuclear energy.

Economic stimulus. Davis-Besse's operation generates $805 million of annual economic output in Ottawa County and $1.1 billion statewide. Over the expected remaining life of the station, from 2015 to 2037, Davis-Besse is estimated to generate nearly $30 billion in economic output to the state of Ohio. This study finds that for every dollar of output from Davis-Besse, the local economy produces $1.66 and the state economy produces $2.25. Further, the station's operation contributes nearly $700 million to Ohio's gross state product each year.

Davis-Besse's operation results in $162 million in tax revenue each year to the local, state and federal governments.

Tax impacts. The Davis-Besse facility is one of the largest taxpayers in Ottawa County, contributing more than $20 million in local taxes. When calculating the total tax impact (direct and secondary), the plant's operation results in $162 million in tax revenue each year to the local, state and federal governments.

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

In addition to quantifying Davis-Besse's economic impacts, this analysis modeled the adverse effects to Ottawa County and the state if Davis-Besse were to permanently shut down. The results show that Davis-Besse is integral to the local and state economies. Since nuclear plants are often 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 on surrounding communities.

This analysis found that the output losses each year to Ottawa County from Davis-Besse's closure would reach as high as $1.0 billion and the rest of Ohio would lose another $500 million. The number of jobs lost peaks at 4,400 in Ottawa County, and another 3,300 throughout the rest of Ohio, for a total job loss of 7,700. Losses would reverberate for decades after the plant is shut down, and host communities may never fully recover.

Section 1

Background and Generation History

Davis-Besse Nuclear Power Station

First date of commercial operation
1978

Location
Situated on Lake Erie, 35 miles east of Toledo

License Expiration Year[1]
2017

Reactor Type
Pressurized water

Total Electrical Capacity (Megawatts)
894

The Davis-Besse Nuclear Power Station was named after the chairmen of two companies that originally owned the plant: former Cleveland Electric Illuminating Chairman John K. Davis and former Toledo Edison Chairman Ralph M. Besse. The station is located on a 954-acre site of which 730 acres form the Navarre Marsh wetlands.

Reliable Electricity Generation

Davis-Besse operated at a capacity factor of about 98 percent in 2013, above the industry average. Capacity factor, a measure of electricity production efficiency, is the ratio of actual electricity generated to the maximum possible electric generation during the year.

Hundreds of Local Jobs

Davis-Besse employs about 700 full-time workers and is one of the largest and highest-paying employers in Ottawa County. The annual payroll is more than $60 million (excluding benefits). Most jobs at nuclear power plants require technical training and are typically among the highest-paying jobs in the area. Nationwide, nuclear energy jobs pay 36 percent more than average salaries in a plant's local area.

Safe and Clean for the Environment

Nuclear energy 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, Davis-Besse's operation prevented the emission of 7.1 million metric tons of carbon dioxide,[2] about the same amount released by more than 1.4 million cars each year. Overall, Ohio's electric sector emits more than 100 million metric tons of carbon dioxide annually. Davis-Besse also prevents the emissions of more than 6,200 tons of nitrogen oxide, equivalent to that released by nearly 325,000 cars, and 17,000 tons of sulfur dioxide. Sulfur dioxide and nitrogen oxide are precursors to acid rain and urban smog.

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[1] *FirstEnergy applied for a renewed license in 2010, which would allow the station to operate until 2037.*

[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.*

Section 2
Benefits for the Local and State Economies

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

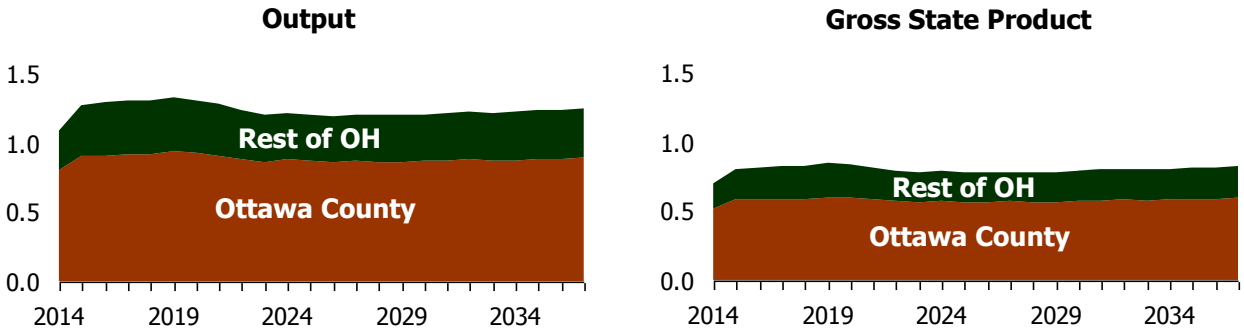
The economic impacts of Davis-Besse consist of direct and secondary impacts. The main variables used to analyze these impacts are:

Output
The direct output is the value of power produced by Davis-Besse. 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 region.

Employment
The direct employment is the number of jobs at Davis-Besse. Secondary employment is the number of jobs in the other industries as a result of Davis-Besse's operation.

Gross State Product
Gross state product (GSP) is the value of goods and services produced by labor and property at Davis-Besse—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.

Figure 2.0
Davis-Besse's Total Output and Gross State Product Contribution to Ottawa County and Ohio *(in 2014 billions of dollars)**



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

Local and State Comprehensive Economic Effects

The direct output value of Davis-Besse is estimated to be nearly $500 million in 2014 (the value of the electricity produced), with a total economic output impact on Ottawa County of more than $800 million. In other words, for every dollar of output from Davis-Besse, the local county produced $1.66.

Figure 2.0 (previous page) shows the value of Davis-Besse's output impact and contributions to GSP on Ottawa County and the rest of Ohio. The contributions extend to the end of Davis-Besse's 60-year operating period in 2037 using electricity price forecast data from the Energy Information Administration. Davis -Besse is licensed to operate to 2017 and has applied to the Nuclear Regulatory Commission to operate for another 20 years.

Table 2.0
Davis-Besse's Estimated Total Output on Ohio's Sectors in 2014
(output in millions of 2014 dollars)

Sector Description	Ottawa County	Rest of Ohio	Total
Utilities	$528	$2	$530
Construction	$77	$28	$105
Retail Trade	$49	$23	$72
Other Services, except Public Administration	$49	$21	$70
Health Care and Social Assistance	$12	$43	$55
Manufacturing	$8	$45	$53
Mining (various commodities)	$43	$4	$47
Finance and Insurance	$10	$25	$35
Real Estate and Rental and Leasing	$3	$22	$25
Professional, Scientific, and Technical Services	$5	$20	$25
Wholesale Trade	$6	$11	$17
Accommodation and Food Services	$8	$6	$14
Administrative and Waste Management Services	$1	$11	$12
Information	$1	$9	$10
State and Local Government	$4	$4	$8
Transportation and Warehousing	$1	$6	$7
Management of Companies and Enterprises	$0	$5	$5
Arts, Entertainment, and Recreation	$0	$3	$3
Educational Services	$0	$1	$1
Total	**$805**	**$289**	**$1,094**

Davis-Besse's total output (direct and secondary) on the Ohio economy was more than $1.0 billion. For every dollar of output from the station, the Ohio economy produced $2.25. Further, Davis-Besse's total output contributes about $700 million to Ohio's gross state product each year.

Davis-Besse's largest impact in Ottawa County and Ohio is on the utilities sector. The next greatest impacts to Ottawa County and Ohio are to the construction sector followed by retail trade. Other sectors that benefit from Davis-Besse's operation include services, health care, manufacturing and mining of various commodities. A full depiction of the sectors that benefit from the facility is in Table 2.0 (previous page).

Davis-Besse's output also stimulates the state's labor income and employment. The plant employs about 700 people in permanent jobs. These jobs stimulate nearly 4,600 additional jobs in Ottawa County and Ohio. Table 2.2 on the following page details the quantity and types of jobs that Davis-Besse supports. Workers at the station are included in the occupation categories in the table.

Economic Stimulus Through Taxes

Davis-Besse's operation resulted in a total tax impact of $162 million to local, state and federal governments. The station pays more than $20 million in local taxes each year to support local schools, police and fire departments, and other important public services. As a result, FirstEnergy is Ottawa County's largest taxpayer. This is the direct impact. There also are secondary impacts, because Davis-Besse's expenditures increase economic activity, leading to additional income and value creation and, therefore, to higher tax revenue.

Table 2.1
Estimated Total Tax Impacts of Davis-Besse in 2014
*(in 2014 millions of dollars)**

Plant	State and Local	Federal	Total
Davis-Besse	$37.5	$124.2	$161.7

** Calculated based on a percentage of gross state product.*

Davis-Besse's impact on the local and state economies is substantial. By producing affordable, reliable electricity, the plant is a hub of economic activity for Ottawa County and a boost to the Ohio economy. Table 2.3 below provides the multipliers and summarizes the total effects for the Ottawa and Ohio economies.

Table 2.2
Davis-Besse Supports Direct and Secondary Jobs

Occupation	Ottawa County	Rest of Ohio	Total
Construction	830	246	1,076
Retail Trade	668	281	949
Other Services, except Public Administration	635	306	941
Health Care and Social Assistance	206	400	606
Utilities	343	3	346
Accommodation and Food Services	139	97	236
Finance and Insurance	89	105	194
Professional, Scientific, and Technical Services	38	152	190
Administrative and Waste Management Services	37	144	181
Other	181	389	570
Total	**3,166**	**2,123**	**5,289**

Table 2.3
Davis-Besse's Impact on the Local and State Economies in 2014
(dollars in 2014 millions)

Description	Direct	Secondary	Total	Multiplier
Ottawa County				
Output	$485.2	$320.8	$805.0	1.66
Employment	700	2,469	3,166	4.53
Gross State Product			$520.0	
Ohio				
Output	$485.2	$607.8	$1,094.0	2.25
Employment	700	4,587	5,289	7.55
Gross State Product			$694.0	

Section 3

Economic Impacts of Davis-Besse's Retirement

Perhaps the best 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 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 and replacing the power from fossil -fuel plants. Moreover, when San Onofre was operating, there was virtually no spread in wholesale electricity costs between southern and northern California. When the plants 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 some of the highest retail electricity rates in the country.

In the first year after retirement, the lost output in Ohio is $1.3 billion. The losses increase each year until Year 3, when the lost output peaks at $1.5 billion for the state.

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

As discussed in Section 2, the operation of Davis-Besse creates significant economic benefits for Ohio and beyond. In this section, the REMI model measures the long-term impact on the Ottawa County and Ohio economies if the Davis-Besse station were to permanently shut down. The economic impacts of the shutdown are analyzed out to 20 years.

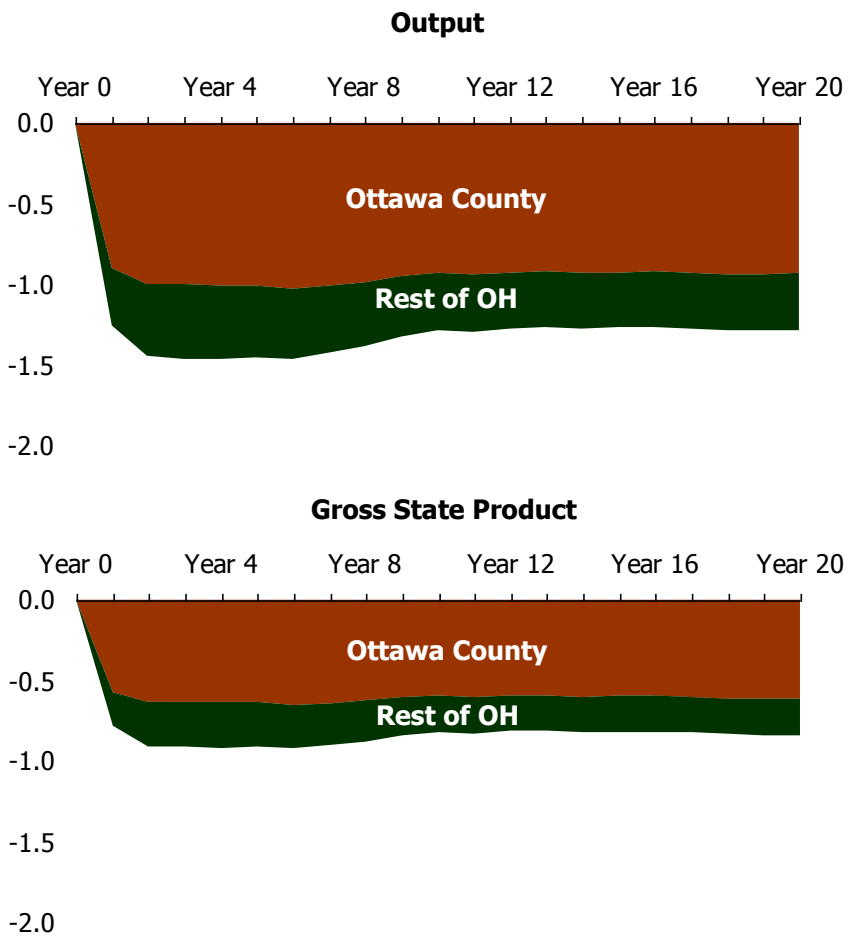
Local and State Comprehensive Economic Losses

When a productive facility ceases operations, the economic loss affects local, state and national areas for decades. Figure 3.0 shows the value of Davis-Besse's lost output and lost gross state product for 20 years after retirement.

In Year 1, the lost output in Ohio would be $1.3 billion. The losses increase each year until Year 3, when the lost output peaks at $1.5 billion for the state. Over that period, the Ottawa County and Ohio economies shrink because of lost output that cascades across virtually all sectors, taking years to filter completely through the economy.

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.

Figure 3.0
Davis-Besse's Lost Output and Lost Gross State Product in Ottawa County and Ohio *(in 2014 billions of dollars)*



In the county as a whole, the shutdown primarily affects the utilities sector, followed by construction and the state and local governments, then by retail trade and manufacturing.

In Ohio, the third largest impact, behind construction, is on state and local governments because of a loss in tax revenue. Further, about 1,100 jobs would be lost at the state and local government levels.

A full depiction of the sectors affected by Davis-Besse's shutdown is in Table 3.0, which shows the lost output in Year 3 when the losses are at their highest in Ohio.

Figure 3.1 shows the number of direct and secondary jobs lost in Ottawa County and Ohio. While the number of direct jobs lost remains flat, the number of secondary jobs lost increases during the first three years. This is because it would take three years before Davis-Besse's lost output filters through the local and state economies.

Table 3.0
Peak Lost Output to Ohio's Sectors in Year 3 After Davis-Besse's Closure
(in 2014 millions of dollars)

Sector Description	Ottawa County	Rest of Ohio	Total
Utilities	-$553	-$4	-$557
Construction	-$140	-$68	-$208
State and Local Government	-$91	-$34	-$125
Retail Trade	-$55	-$35	-$90
Manufacturing	-$10	-$63	-$73
Health Care and Social Assistance	-$12	-$53	-$65
Mining (various commodities)	-$57	-$6	-$63
Other Services, except Public Administration	-$20	-$24	-$44
Information	-$4	-$38	-$42
Finance and Insurance	-$26	-$15	-$41
Professional, Scientific, and Technical Services	-$8	-$32	-$40
Real Estate and Rental and Leasing	-$9	-$29	-$38
Wholesale Trade	-$6	-$17	-$23
Accommodation and Food Services	-$10	-$10	-$20
Administrative and Waste Management Services	$0	-$15	-$15
Transportation and Warehousing	-$2	-$8	-$10
Management of Companies and Enterprises	$0	-$6	-$6
Arts, Entertainment, and Recreation	$0	-$3	-$3
Educational Services	$0	-$2	-$2
Total	**-$1,003**	**-$462**	**-$1,465**

Figure 3.1 (next page) displays the population migration out of Ohio that would occur if the facility were to close. By Year 20, about 8,600 people would move out of the state. Table 3.1 shows the number and types of jobs that would be lost if Davis-Besse retires. In Year 3, nearly 4,400 jobs would be lost in Ottawa County and another 3,300 in the rest of Ohio for a total job loss of about 7,700.

Figure 3.1
Shutdown-Related Job Losses in Ottawa County and Ohio

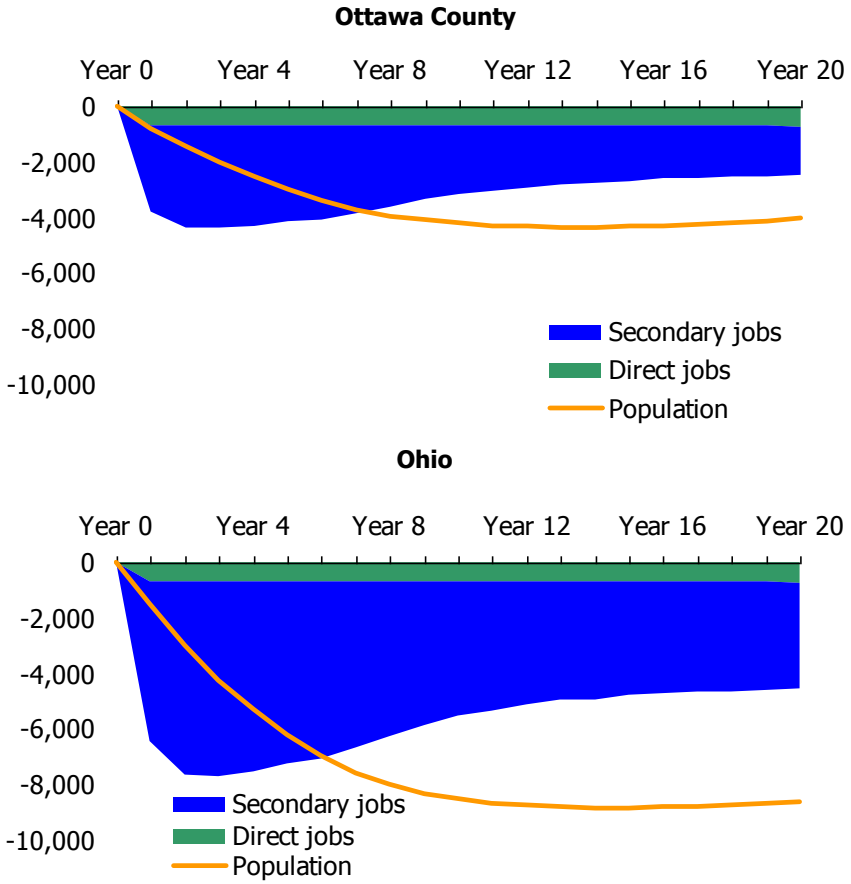


Table 3.1
Peak Direct and Secondary Jobs Lost in Year 3 After Davis-Besse's Closure

Occupation	Ottawa County	Rest of Ohio	Total
Construction	-1,477	-569	-2,046
Retail Trade	-712	-410	-1,122
State and Local	-807	-274	-1,081
Health Care and Social Assistance	-207	-492	-699
Other Services, except Public Administration	-292	-342	-634
Utilities	-336	-5	-341
Accommodation and Food Services	-167	-168	-335
Professional, Scientific, and Technical Services	-62	-217	-279
Administrative and Waste Management Services	-39	-201	-240
Other	-295	-627	-922
Total	**-4,394**	**-3,305**	**-7,699**

Section 4

Community Leadership and Environmental Protection

Beyond the valuable jobs, taxes and revenues provided to Ohio by operation of the Davis-Besse Nuclear Power Station, the plant and its employees have a strong commitment to investing in the community. Davis-Besse maintains a philosophy that "the greater good is better business," and to that end, the site works with community leaders to help further civic, economic and social priorities while building trust and goodwill.

Davis-Besse employees have a proud history of volunteering and charitable giving in the communities surrounding the plant. The results of these investments are rich educational, environmental and social programs that make the communities around Davis-Besse ideal places to live and work.

Contributions & Sponsorships

At Davis-Besse, community involvement is a priority as well as a way of life. Employees believe in fostering strong, vibrant communities and are active and engaged in numerous community efforts.

Davis-Besse and its employees are longtime supporters of United Way. The premise of United Way – leveraging the generous contributions of thousands of people to make the biggest impact for those in need – helps ensure the safety and health of the communities surrounding the plant. Over the last five years, Davis-Besse employees have generously donated nearly $300,000 to United Way agencies in Northwest Ohio. In addition, the company's FirstEnergy Foundation has contributed approximately $950,000 to United Way of Greater Toledo since 2010.

The company is also a proud supporter of Harvest for Hunger, the second largest cooperative food drive in the nation. Its mission is to collect food and funds for local food pantries. Cash contributions are used to purchase the most needed food items. Each dollar or food item collected remains in the donor's community. Since 2010, Davis-Besse employees have donated nearly $95,000 to the agency.

Site employees have continued the fight against hunger by generously donating each holiday season to 16 food pantries serving Northwest Ohio. Over the course of five years, the holiday collection has raised more than $20,000, which is distributed evenly among the agencies.

Many Davis-Besse employees are life-long residents of the area with a strong sense of community service. The Oak Harbor Apple Festival, Genoa Homecoming celebration and Port Clinton Walleye Festival all are supported by a large number of Davis-Besse volunteers who help plan and serve visitors at

these well-attended events.

Through the Davis-Besse Employee Association, site employees hold annual events to raise funds for a number of organizations, including Susan G. Komen, Wounded Warriors and The Fisher House Foundation. In addition, the Employee Association spearheaded a special fundraising effort in 2011 to support ISOH/IMPACT, a community-based organization that provided assistance to families whose homes were damaged by a tornado.

For the past several years, Davis-Besse's Women in Nuclear chapter has supported the Ottawa County Helping Hand Toy Drive each December to make the holidays brighter for families in need. Site employees have collected more than 1,000 toys for the effort, a collaboration between The Salvation Army, Toys for Tots and the Ottawa County Holiday Bureau. Davis-Besse's support doesn't stop with just the toy donation; employees volunteer their time to assist families as they make their toy selections and man a gift wrapping station at the distribution site.

Recognizing that the country's youth are the future leaders, entrepreneurs and stewards of business and industry, Davis-Besse invests heavily in educational outreach.

The Davis-Besse chapter of North American Young Generation in Nuclear (NAYGN) has raised more than $1,500 through chili cook-offs and other events and invested proceeds at DonorsChoose.org. This online charity allows public school teachers to post their classroom project requests – anything from pencils to microscopes – and donors select the projects they want to fund. Through this program, Davis-Besse NA-YGN has funded six projects, including space exploration kits for elementary school students; laboratory measuring devices, an electric burner and disposable aprons to teach students about matter; and Samsung Galaxy tablets and cases for a technology program.

Davis-Besse NAYGN also hosts an annual Charity Golf Outing and fundraiser for the Ability Center of Ottawa County, an organization that helps people with disabilities live, work and socialize within a fully accessible community. Over the past two years, these events have raised nearly $9,000 for the Center. NAYGN welcomes Ability Center members to the site each year as part of its Summer Leadership Program and holds a practice career fair to help young adults as they consider career possibilities.

To enhance safety and response to emergencies in communities around the plant, Davis-Besse has in place grant agreements with the Ottawa, Lucas, Erie and Sandusky County Emergency management Agencies totaling approximately $319,000 annually. In addition, the site contributes a $225,000 annual grant to maintain the county public safety radio system used by Ottawa County Fire and Emergency Medical Services, law enforcement and schools.

Pursuit of Education

Recognizing that the country's youth are the future leaders, entrepreneurs and stewards of business and industry, Davis-Besse invests heavily in educational outreach. In addition to showcasing the nuclear industry's mission of safe,

clean and reliable power generation, the plant's outreach programs encourage career development in a wide variety of science, technology, engineering and math (STEM) disciplines.

Since 1998, Davis-Besse employees have been involved with the Boy Scouts of America, assisting scouts pursuing the Nuclear Science Merit Badge. As part of this program, more than 2,400 Boy Scouts from troops across Ohio and Michigan have visited the plant for day-long seminars taught by Davis-Besse employees. The scouts experience demonstrations of the plant's control room simulator, learn about using protective gear and radiation survey meters, study different types of atomic particles and effects of radiation, hear about security at the plant and discuss career opportunities in nuclear science.

Davis-Besse's NAYGN chapter is actively involved in educational outreach, both to students and teachers. In 2014 alone, the chapter has hosted site tours for students from The Ohio State University, University of Toledo, and a number of civic organizations. The group also launched a pilot job-shadow program for high school students in spring 2014, in which local students were able to spend time with different work groups including engineering and maintenance.

Davis-Besse NAYGN also promotes career development through participation in the Bowling Green State University "STEM in the Park" event. The free, annual event features interactive displays and activities to engage nearly 4,000 young students and their parents. The Davis-Besse display featured activities including generation of electricity by cranking a wheel, operation of a steam turbine, and dressing as a radiation worker.

To encourage career planning in older students, Davis-Besse NAYGN works with the Ottawa County Improvement Corporation (OCIC) to host a county-wide career fair for 9th-grade students. More than 500 students attended the inaugural event in 2014. Davis-Besse NAYGN members remain active on the OCIC business development council and are assisting local schools in creating a new career planning program for students statewide that meets new Ohio education requirements.

Supporting the important role of teachers, Davis-Besse NAYGN also sponsors an annual "Teach the Teacher" event at the site. The well-attended professional development day features lessons in many aspects of nuclear power as well as power generation information. More than 150 educators, from as far away as Cincinnati, have attended the event since its inception. In 2014, educators from The Ohio State University and University of Toledo Lake Erie Center also participated, and each attending teacher was provided with enough material to complete a DC motor construction project with 30 students, courtesy of Davis-Besse NAYGN.

Environmental Stewardship

Davis-Besse and its employees continually strive to protect the environment

and remain good stewards of our natural resources. The site has made significant investments in support of environmental protection efforts, and its employees share both a commitment to and accountability for achieving excellence in environmental performance.

The Navarre Marsh at the Davis-Besse Nuclear Power Station occupies about 730 acres of wetlands bordered by Lake Erie and the Toussaint River and is home to a variety of wildlife, including deer, coyotes, fox, bald eagles, ducks, geese, hawks, owls, heron, egrets, rabbits, squirrels, muskrats, mink, snakes and turtles. This marsh is part of a larger area once known as the Great Black Swamp, which stretched from Detroit, Michigan, to Vermilion, Ohio.

The Navarre Marsh at the Davis-Besse Nuclear Power Station occupies about 730 acres of wetlands bordered by Lake Erie and the Toussaint River and is home to a variety of wildlife, including deer, coyotes, fox, bald eagles, ducks, geese, hawks, owls, heron, egrets, rabbits, squirrels, muskrats, mink, snakes and turtles.

Davis-Besse owns the marsh and, in conjunction with the U.S. Fish and Wildlife Service, operates it as part of the Ottawa National Wildlife Refuge. The marsh is divided into three parts by a series of dikes and banks, and there are three types of wetlands in the area: freshwater marsh, swamp forest and wet meadow. This diversity provides food, shelter and nesting. Davis-Besse employees help maintain roads and dikes on the marsh property, as well as provide security.

The Navarre Marsh is important for many migratory birds because it serves as a stopping point along two major flyways. Seasonal water levels are controlled to promote plant growth and support bird populations. Davis-Besse workers use electric pumps to lower the marsh pools after spring migrations to promote vegetation throughout the summer. In early fall, the water levels are increased to accommodate southward migrations. The birds arrive at the marsh to rest and to feed on a variety of food such as millet, smartweed and nutgrass before continuing on their long journey.

Operating out of the Navarre Marsh is the Black Swamp Bird Observatory, a nationally recognized avian research group that has worked at the site for more than 20 years. The volunteer group studies neo-tropical species that use the beach for both spring and fall migrations. The birds are captured in nets, measured, weighed, banded and recorded at the Bird Banding Research Station – one of the largest banding facilities east of the Mississippi River – before being released back into the environment. Among the species identified at the site are American Bald Eagles, American Redstarts, Black-and-White Warblers, Northern Waterthrush, Swainson's Warbler, and Black-Billed Cuckoo.

Davis-Besse has been, and will continue to be involved in projects like these as well as other programs with groups such as:

- The Ottawa National Wildlife Refuge
- The Ohio Division of Wildlife
- Ducks Unlimited
- Pheasants Forever
- The Ottawa Soil and Conservation District

Section 5

Davis-Besse and the U.S. Nuclear Energy Industry

The Davis-Besse Nuclear Power Station plays a vital role in helping Ottawa County and the state as a whole meet their 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 Ohio, nuclear energy generates approximately 12 percent of the state's electricity, and Davis-Besse alone generated almost eight billion kilowatt-hours of 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. Davis-Besse's performance has met or exceeded the industry average for many years.

Nuclear Energy's Value Proposition

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 the period of extreme 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 in a diverse energy portfolio.

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

Renewable energy, 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 any cap-and-trade 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 opportunity, 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 are heavily dependent on market fuel prices—nuclear plants' fuel costs are relatively stable, making consumers' electric bills 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 is one of the safest industrial working environments in the nation. Through rigorous training of plant workers and increased communication and cooperation among nuclear plants and federal, state and local regulating bodies, the industry is keeping the nation's 99 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 systems.) 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 increasing 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 plants in Maryland in 2000. As of January 2015, 75 reactors had received license extensions, and operators of 25 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 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 nearly halfway through their construction programs. These projects employ more than 5,000 workers each now that construction is peaking. 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 Davis-Besse Nuclear Power Station.

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:

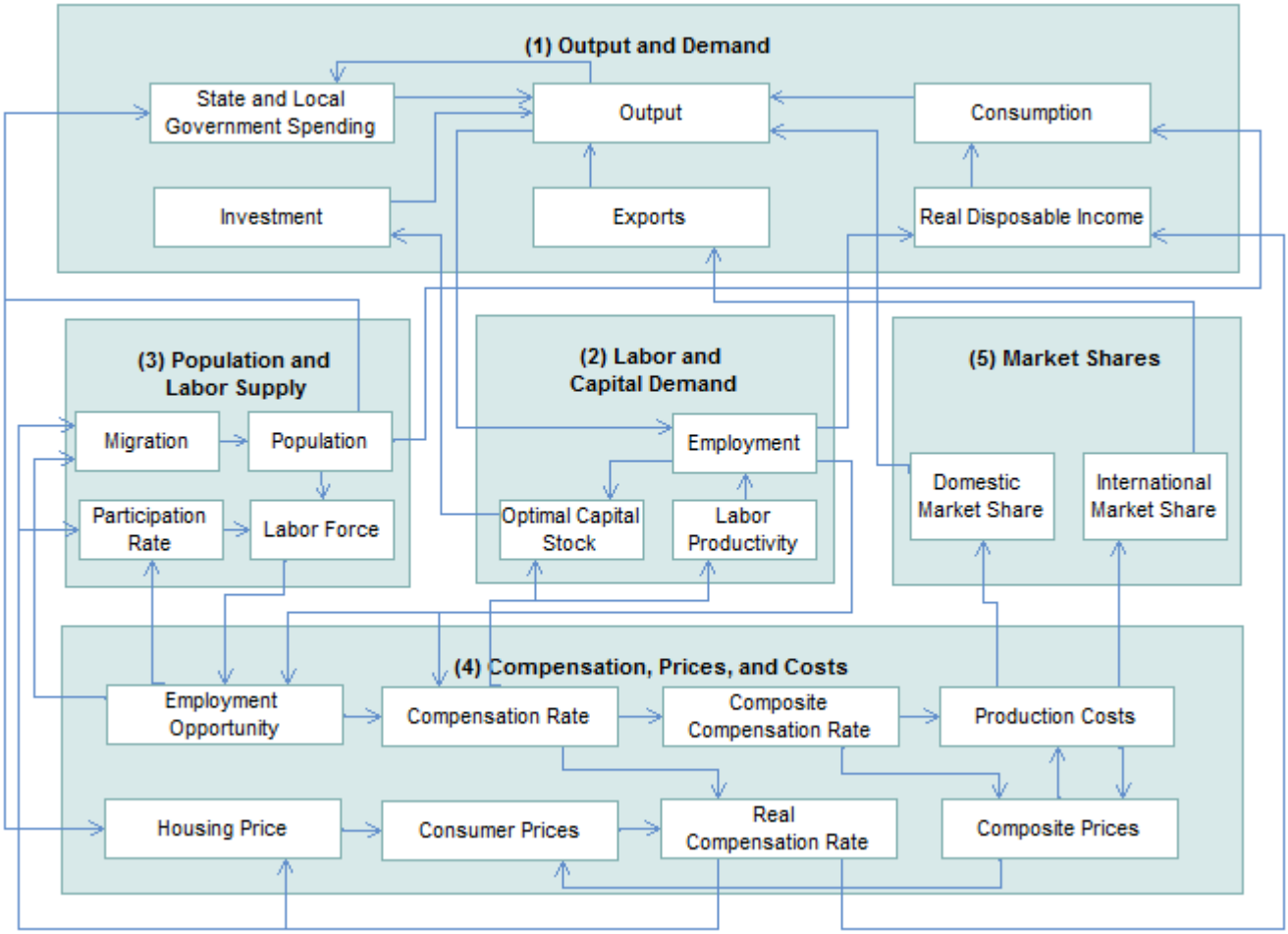
1. Input/output tabulation (IO)—IO models, sometimes called "social accounting matrices" (SAM), quantify the interrelation of industries and households in a computational sense. It models the flow of goods between firms in supply-chains, wages paid to households, and final consumption by households, government and the international market. These channels create the "multiplier" effect of $1 going further 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 2014, the estimated total economic impacts (direct and secondary) to Ohio from Davis-Besse's operation are $1.1 billion in output and $700 million in gross state product. The operation of the Davis-Besse station and its secondary effects account for 3,200 jobs in Ottawa County and 2,100 jobs throughout the rest of Ohio. Over the remaining expected life of the station, Davis-Besse is estimated to generate nearly $30 billion in economic output in the state of Ohio.

The station's economic benefits—on taxes and through wages and purchases of supplies and services—are considerable. In addition, plant employees further stimulate the local economy by purchasing goods and services from businesses around the area, supporting many small businesses throughout the region. The plant is one of the largest taxpayers in the county where it is located (Ottawa).

The facility generated nearly eight billion kilowatt-hours of emission-free electricity in 2013, enough to serve the yearly needs for 700 thousand homes. This low-cost, reliable electricity helped keep electricity prices in check in Ohio.

The Davis-Besse Nuclear Power Station is a leader economically, fiscally, environmentally and socially within Ohio and has far-reaching economic impacts across America.