

BEFORE THE
PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Ohio)	
Edison Company, The Cleveland Electric)	
Illuminating Company and The Toledo)	
Edison Company for Authority to Provide)	Case No. 14-1297-EL-SSO
for a Standard Service Offer Pursuant to R.C.)	
4928.143 in the Form of an Electric Security)	
Plan)	

SUPPLEMENTAL DIRECT TESTIMONY OF

SARAH MURLEY

ON BEHALF OF

**OHIO EDISON COMPANY
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
THE TOLEDO EDISON COMPANY**

MAY 4, 2014

1 **INTRODUCTION, PURPOSE, AND SUMMARY OF CONCLUSIONS**

2 **Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.**

3 A. My name is Sarah Murley Brammer. I am a Principal at Applied Economics LLC, an
4 economic consulting firm based in Phoenix, Arizona that specializes in socioeconomic
5 modeling, economic development, and economic and fiscal impact assessment. My
6 business address is 11209 N. Tatum Blvd, Suite 225, Phoenix, Arizona. I have
7 previously sponsored direct testimony in this proceeding.

8 **Q. WHY ARE YOU SPONSORING SUPPLEMENTAL TESTIMONY?**

9 A. I am sponsoring supplemental testimony to address the Attorney Examiner's March 23,
10 2015 Entry asking that parties file supplemental testimony addressing closure of a
11 generating plant and the resulting effect on economic development within the state. In
12 particular, I assessed the impact if the Davis-Besse Nuclear Power Station ("Davis-
13 Besse") and the W.H. Sammis Plant ("Sammis") (collectively, the "Plants") were to
14 close. My testimony has two main points. First, I provide calculations of the economic
15 impact of the Plants using the most recent data for the Plants and IMPLAN multipliers.
16 This information was needed in order to create an "apples to apples" comparison between
17 the economic impact of plant retirement and the economic impact of current operation.
18 Second, I present calculations showing the economic impact which would be lost if the
19 Plants retired.

20 **Q. HOW DID YOU CONDUCT YOUR SUPPLEMENTAL ECONOMIC IMPACT**
21 **ANALYSIS TO DETERMINE THE IMPACT OF SAMMIS RETIRING?**

22 A. I used the same methodology, terms, and input categories previously described in detail
23 in my direct testimony. The only changes were that I used more recent inputs for the
24 Plants and more recent IMPLAN multipliers in order to calculate more accurately the

1 impact of Plant retirement. I also addressed the impact that would be expected if the
2 Plants were to retire.

3 **Q. WHAT DATA INPUTS DID YOU USE TO CALCULATE THE ECONOMIC AND**
4 **REVENUE IMPACT OF THE RETIREMENT OF SAMMIS?**

5 A. Updated data inputs were provided by Ohio Edison Company, The Cleveland Electric
6 Illuminating Company, and The Toledo Edison Company (collectively, the
7 “Companies”). I used these inputs to calculate Sammis’ economic and revenue impact on
8 its surrounding region. These updated inputs include total payroll, number of employees,
9 payments to contractors, property taxes, and a closure schedule.¹ The Sammis economic
10 impact analysis quantifies the impacts on the regional economy that includes Jefferson
11 County (where Sammis is located) and six surrounding counties where the majority of
12 Sammis’ workers reside. The Sammis economic analysis also quantifies the impact of
13 Sammis on the State of Ohio. Sammis employs approximately 342 regular employees
14 with an annual payroll of approximately \$36.0 million and supports an estimated 140
15 full-time equivalent contractors on a seasonal basis during major maintenance projects
16 with an estimated annual payroll of \$11.9 million. In 2015, Sammis will pay
17 approximately \$5.25 million in property taxes.

18 **Q. WHAT ARE THE RESULTS OF YOUR UPDATED ECONOMIC IMPACT**
19 **ANALYSIS FOR SAMMIS?**

20 A. Sammis creates a total economic impact of \$634.1 million in the Ohio economy each
21 year by directly and indirectly supporting an estimated 1,047 jobs with an annual payroll
22 of \$74.2 million. Sammis creates \$602.2 million in economic impact in the regional
23 economy and directly or indirectly supports about 925 jobs with an annual payroll of

¹ See Attachment SM-1, Attachment 1.

\$64.7 million in this region. These figures include direct jobs and payroll at the Sammis plant, as well as additional jobs and payroll at local supplier businesses, and at establishments where employees make purchases. Figure 1 below shows these impacts in more detail.

FIGURE 1
ANNUAL DIRECT AND TOTAL OPERATIONS IMPACT OF
W.H. SAMMIS PLANT
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Sammis Region*	\$535.88	482	\$47.92	\$31.00	132	\$6.13	\$35.30	311	\$10.68	\$602.17	925	\$64.73
State of Ohio	\$535.88	482	\$47.92	\$48.07	166	\$9.74	\$50.11	399	\$16.54	\$634.06	1,047	\$74.20

*Sammis Region includes the following counties: Jefferson OH; Columbiana OH; Belmont OH; Mahoning OH; Brooke WV; Hancock WV; Beaver PA.

The total economic impacts shown in Figure 1 are based on the IMPLAN model and include the impacts of the employees, payroll and output at Sammis, as well as the estimated impacts of regional supplier purchases that are specific to the types of purchases made by the fossil fuel electric power generation industry and employee spending in Ohio. This analysis also shows the impact on the seven county region referenced above and the state.

The resulting output multiplier for the on-going operations of Sammis is 1.12 for the seven county region and 1.18 for the State of Ohio. This means that for every \$1 million of power production by Sammis, an additional \$120,000 in economic activity is generated within the regional economy and \$180,000 in economic activity statewide.

Also, for every direct job retained at Sammis, an additional 0.92 jobs are supported in the surrounding region and 1.17 jobs at businesses throughout the state.²

Q. WHAT ARE THE SUPPLEMENTAL REVENUE IMPACTS CREATED BY SAMMIS?

A. In addition to the economic impacts on private sector businesses in the regional economy, Sammis directly and indirectly supports a total state and local tax revenue impact of approximately \$11.45 million. In 2015, Sammis will pay \$5.25 million in property taxes. Sammis' employees and contractors generate an additional \$6.2 million in revenues to state and local governments through employee income taxes, sales taxes, and property taxes.

Q. HOW DID YOU CALCULATE THE POTENTIAL LOSSES ASSOCIATED WITH SAMMIS' POTENTIAL RETIREMENT?

A. Calculating the impact of plant retirement is similar in many respects to calculating the economic impact created through plant operation. Both cases start by calculating the impact that the plant has on the geographic region at issue by applying the IMPLAN multipliers to information about the plant. To calculate the impact of plant retirement, the change to that economic impact arising from retirement is determined. This may be, but is not necessarily, equal to the economic impact of the plant operations. The impact of plant retirement is quantified through incorporating scheduled reductions in employment and payroll into the IMPLAN model to reflect the realities of retirement in each geographic area.

Q. HAVE YOU CALCULATED THE IMPACT OF SAMMIS' RETIREMENT?

² The output multiplier and the jobs multipliers are not the same since jobs and output value are different units of measure.

A. Yes. I calculated the impact that Sammis' retirement would have on the regional and statewide economies.³ My calculation includes both direct losses and indirect impacts to supplier and consumer businesses. The calculation does not include the likely longer-term impacts that are generally associated with plant closure. For example, there are additional longer term impacts which will occur in the years following the plant closure due to the out-migration of workers to other areas and business closures as the economy adjusts to a reduced level of overall activity. My calculation addresses only the short-term effects of plant closure as the longer term effects are extremely difficult to quantify.

Q. WHAT WOULD BE THE ECONOMIC IMPACT OF THE CLOSURE OF THE SAMMIS PLANT?

A. In the short term, there would be 482 (all employees and contractors) direct jobs lost at the Sammis plant. There would be an additional 565 indirect and induced jobs lost at local businesses in the State of Ohio, with 443 of those jobs being lost in the local area. There would be \$634.1 million in annual lost economic activity in Ohio, of which \$602.2 million would occur in the seven county region surrounding Sammis.

**FIGURE 2
ANNUAL DIRECT AND TOTAL ECONOMIC IMPACT
OF RETIREMENT OF THE W.H. SAMMIS PLANT
(millions of dollars)**

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Regional Impacts												
Immediate Loss	(\$448.26)	(415)	(\$40.86)	(\$25.93)	(110)	(\$5.13)	(\$30.10)	(265)	(\$9.11)	(\$504.29)	(790)	(\$55.10)
Add'l Loss within 3 to 4 months	(\$87.61)	(67)	(\$7.06)	(\$5.07)	(22)	(\$1.00)	(\$5.20)	(46)	(\$1.57)	(\$97.88)	(134)	(\$9.63)
Total Regional Loss	(\$535.88)	(482)	(\$47.92)	(\$31.00)	(132)	(\$6.13)	(\$35.30)	(311)	(\$10.68)	(\$602.17)	(925)	(\$64.73)
State of Ohio Impacts												
Immediate Loss	(\$448.26)	(415)	(\$40.86)	(\$40.21)	(139)	(\$8.15)	(\$42.73)	(340)	(\$14.11)	(\$531.20)	(894)	(\$63.11)
Add'l Loss within 3 to 4 months	(\$87.61)	(67)	(\$7.06)	(\$7.86)	(27)	(\$1.59)	(\$7.38)	(59)	(\$2.44)	(\$102.85)	(153)	(\$11.08)
Total Statewide Loss	(\$535.88)	(482)	(\$47.92)	(\$48.07)	(166)	(\$9.74)	(\$50.11)	(399)	(\$16.54)	(\$634.06)	(1,047)	(\$74.20)

³ See Attachment SM-3.

1 **Q. HAVE YOU ALSO CALCULATED THE TAX REVENUE WHICH WOULD BE**
2 **LOST IF SAMMIS CLOSED?**

3 A. Yes. If Sammis were to close there would be approximately \$4.3 million in annual
4 property tax reductions in Jefferson County, Ohio, and a \$4.6 million reduction in annual
5 state and local income and sales taxes in Ohio related to direct and indirect employees.

6 **Q. YOU MENTIONED THAT YOUR RETIREMENT IMPACT CALCULATION**
7 **DOES NOT INCLUDE LONG TERM IMPACTS. WHAT DOES THAT MEAN IN**
8 **TERMS OF HOW ONE SHOULD VIEW YOUR ESTIMATE OF THE**
9 **RETIREMENT IMPACT?**

10 A. It means that my analysis is conservative. Over the longer term economies and
11 employees adjust to the types of shocks created by the retirement of facilities like the
12 Sammis plant. Although some employees who lose their jobs will seek other jobs within
13 the region, others move out of the region or the state to find suitable employment. As
14 this out-migration occurs, the overall size of the regional economy shrinks. Thus, the
15 negative impact of closing a plant could possibly be higher than the positive impact of the
16 plant's on-going operations. For example, if a Sammis employee moves out of the area
17 to find work their spouse may move with them, thereby also removing the spouse's
18 economic activity. Under this hypothetical, the closure of the Sammis plant leads to the
19 loss of more than 100% of the economic activity at Sammis. My analysis does not take
20 these long-term impacts into account and is therefore as I state above a conservative
21 estimate.

22 **Q. WHAT UPDATED DATA INPUTS DID YOU USE TO CALCULATE THE**
23 **ECONOMIC AND REVENUE IMPACT OF THE RETIREMENT OF DAVIS-**
24 **BESSE?**

1 A. Several updated data inputs were provided by the Companies and used to calculate
2 Davis-Besse's economic and revenue impact on its surrounding economy.⁴ These
3 updated inputs included payroll data, the number of regular employees, the amount of
4 property taxes paid in 2015, and the schedule of reductions in jobs and payroll in the
5 event of plant retirement. Davis-Besse's economic impact analysis includes the impacts
6 on Ottawa County (where Davis-Besse is located) and Ohio as a whole. Davis-Besse has
7 approximately 700 full-time employees with an annual payroll of approximately \$66.44
8 million. In 2015, Davis-Besse will pay approximately \$6.3 million in property taxes.

9 **Q. WHAT ARE THE UPDATED RESULTS OF THE ECONOMIC IMPACT**
10 **ANALYSIS OF DAVIS-BESSE TO DETERMINE THE IMPACT OF DAVIS-**
11 **BESSE RETIRING?**

12 A. Davis-Besse's impact was analyzed in Ottawa County and statewide. In Ottawa County,
13 Davis-Besse generates a total economic impact of \$438.5 million each year, which
14 directly and indirectly supports approximately 1,470 jobs with an annual payroll of \$89.5
15 million. These figures include the jobs and payroll at the plant, plus estimated jobs,
16 payroll and output associated with regional supplier purchases and employee spending.
17 Statewide, the regular operations of Davis-Besse generate an annual economic impact of
18 \$487.5 million, which directly and indirectly supports approximately 1,642 jobs with an
19 annual payroll of \$109.0 million. These impacts are shown in more detail in Figure 3
20 below.

⁴ See Attachment SM-2, Attachment 1.

FIGURE 3
IMPACT OF ON-GOING OPERATIONS
DAVIS-BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County	\$351.20	696	\$66.44	\$14.62	136	\$3.94	\$72.69	638	\$19.13	\$438.51	1,470	\$89.51
State of Ohio	\$351.20	696	\$66.44	\$37.67	202	\$10.33	\$98.65	745	\$32.20	\$487.52	1,642	\$108.97

The economic impacts were calculated using multipliers specific to the current economic base in Ottawa County and Ohio and to the nuclear power generation industry.

The resulting output multiplier for the on-going operations of the nuclear power station is 1.25 for Ottawa County and 1.39 for the State of Ohio. This means that for every \$1 million of power production by Davis-Besse, an additional \$250,000 in economic activity is generated within the Ottawa County's economy and \$390,000 in economic activity statewide. Also, for every direct job retained at Davis-Besse, an additional 1.11 jobs are supported at other businesses in Ottawa County and 1.36 jobs at businesses throughout the state. The multiplier effects are specific to the economy of the geographic areas in this analysis and to nuclear power generation and therefore are different than the multipliers for Sammis.

Q. WHAT ARE REVENUE IMPACTS CREATED BY DAVIS-BESSE?

A. In addition to economic impacts on the private sector economy of the county and the state, Davis-Besse and its employees also directly and indirectly generate state and local taxes estimated at approximately \$11.8 million per year. This includes \$6.3 million in property taxes paid by Davis-Besse and approximately \$5.5 million paid by Davis-Besse's employees through personal income taxes, sales taxes, and property taxes.

Q. DID YOU CALCULATE THE IMPACT OF DAVIS BESSE'S RETIREMENT?

A. Yes. I calculated the impact of Davis Besse's retirement using the same methodology discussed above for the Sammis plant. Just as was the case for Sammis, the retirement of Davis Besse was examined based on reductions in employment and payroll at the plant and using the data inputs described above. Long run impacts, such as employee migration out of the area, were not considered.

Q. WHAT WOULD BE THE ECONOMIC IMPACT OF THE CLOSURE OF DAVIS BESSE?

A. The economic effect of plant closures would be significant. Ohio would lose an estimated 675 direct jobs and 911 indirect and induced jobs at establishments that do business with Davis Besse and its employees. Ohio would also lose \$338.0 million/year in direct output, as well as an additional \$131.2 in indirect and induced output each year. These impacts are shown in more detail in Figure 4 below.

FIGURE 4
ANNUAL DIRECT AND TOTAL ECONOMIC IMPACT
OF SHUT DOWN OF THE DAVIS BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County Impacts												
Loss at One Month	(\$100.92)	(200)	(\$19.09)	(\$4.20)	(39)	(\$1.13)	(\$20.89)	(183)	(\$5.50)	(\$126.01)	(422)	(\$25.72)
Add'l Loss within 6 months	(\$76.19)	(151)	(\$14.42)	(\$3.17)	(30)	(\$0.86)	(\$15.77)	(138)	(\$4.15)	(\$95.14)	(319)	(\$19.42)
Add'l Loss Year 1 to Year 10	(\$160.87)	(324)	(\$30.44)	(\$6.70)	(62)	(\$1.81)	(\$33.30)	(292)	(\$8.76)	(\$200.86)	(679)	(\$41.00)
Total Ottawa County Loss	(\$337.98)	(675)	(\$63.94)	(\$14.07)	(131)	(\$3.79)	(\$69.96)	(614)	(\$18.41)	(\$422.01)	(1,420)	(\$86.14)
State of Ohio Impacts												
Loss at One Month	(\$100.92)	(200)	(\$19.09)	(\$10.83)	(58)	(\$2.97)	(\$28.35)	(214)	(\$9.25)	(\$140.09)	(472)	(\$31.31)
Add'l Loss within 6 months	(\$76.19)	(151)	(\$14.42)	(\$8.17)	(44)	(\$2.24)	(\$21.40)	(162)	(\$6.99)	(\$105.77)	(356)	(\$23.64)
Add'l Loss Year 1 to Year 10	(\$160.87)	(324)	(\$30.44)	(\$17.26)	(92)	(\$4.73)	(\$45.19)	(341)	(\$14.75)	(\$223.31)	(758)	(\$49.92)
Total Statewide Loss	(\$337.98)	(675)	(\$63.94)	(\$36.26)	(194)	(\$9.94)	(\$94.93)	(717)	(\$30.99)	(\$469.17)	(1,586)	(\$104.87)

Q. HAVE YOU ALSO CALCULATED THE TAX REVENUE WHICH WOULD BE LOST IF DAVIS BESSE CLOSED?

A. Yes. If Davis Besse were to close there would be approximately \$6.3 million in annual property tax reductions in Ottawa County, Ohio, and a \$3.9 million reduction in annual state and local income and sales taxes in Ohio related to direct and indirect employees.



APPLIED ECONOMICS

**ECONOMIC AND REVENUE IMPACTS OF
FIRSTENERGY W.H. SAMMIS PLANT**

PREPARED BY:

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MAY 2015

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1.0 Introduction

1.1 Project Description

Applied Economics was retained by FirstEnergy to perform an economic analysis of the W.H. Sammis Plant in Stratton, Ohio. This analysis provides a framework for understanding the economic and revenue impacts that this generating facility creates throughout the region. W. H. Sammis is FirstEnergy's largest coal-fired power plant in Ohio. It has been in operation since 1959 and has the capacity to generate over 2,200 megawatts of electricity. This analysis documents economic and revenue impacts of W.H. Sammis on a tri-state region including the following counties: Jefferson, OH; Columbiana, OH; Mahoning, OH; Belmont, OH; Beaver, PA; Brooke, WV and Hancock, WV, as well as the impact on the State of Ohio. These seven counties represent the region where the majority of the workers at the plant live.

W.H. Sammis is not only a major employer, but also makes a substantial amount of local supplier purchases that support the region's economy. W.H. Sammis directly employs about 340 people with an annual payroll of \$36.0 million. The facility also supports an estimated 140 full-time equivalent contractors on a seasonal basis to assist with major maintenance.

The plant underwent a \$1.8 billion state-of-the-art upgrade of the air quality control systems several years ago. However, coal fired plants are facing strong competition from lower priced natural gas sources. Thus, the future of many coal powered plants is uncertain. The purpose of this study is to quantify not only the jobs and income that are supported by FirstEnergy directly at the W.H. Sammis plant, but also the effect that this plant has on the region and the state in terms of supporting other local businesses.

1.2 Applied Economics Background

Applied Economics LLC is an economic consulting firm, based in Phoenix, Arizona, specializing in economic development, economic and fiscal impact assessment, socioeconomic modeling, urban planning and custom software applications. Applied Economics conducts economic and fiscal impact studies and develops models to measure the effects of a wide variety of activities. These activities include development land use and policy changes, business-driven economic impacts, incentives, and program-driven economic and fiscal impacts. The principals at Applied Economics have worked together for more than twenty years, and are very experienced in working with local and regional planning and development issues.

The information and observations contained in this report are based on our present knowledge of the components of development, and of the current physical, socioeconomic and fiscal conditions of the affected areas. Estimates made in this analysis are based on assumptions about purchasing patterns, current tax policies, and the current economic structure of the region.¹

¹ This analysis is based on the best available information and is intended to aid FirstEnergy in quantifying W.H. Sammis' impacts on the local economy. In no way will Applied Economics LLC be held responsible or have any liability or be subject to damages as a result of this analysis. This report may be used only for the purposes that it was intended.

2.0 Impact Summary

The economic benefits shown here depict the on-going operations of the power plant. Economic impacts measure the effects of economic stimuli, or expenditures, in the local economy. These impacts include direct and indirect jobs, personal income, and economic activity or output that is generated by the nuclear power station. Indirect impacts are the result of the multiplier effect and capture supported supplier and consumer businesses and their employees in the larger region that benefit from the W.H. Sammis plant.

The operations of W.H. Sammis detailed in this analysis provide substantial economic benefits to the region and state. These positive impacts include the following:

Economic Impacts of On-Going Operations

- **On-Going Operations Impacts.** W.H. Sammis creates an annual economic impact of \$602.2 million on the regional economy in Ohio, West Virginia and Pennsylvania each year and an impact of \$634.1 million on the State of Ohio (Figure 1). The operations of the power plant directly and indirectly support over 1,000 jobs and \$74.2 million in annual payroll in Ohio.
- **Jobs and Income.** The facility directly employs about 340 regular employees and 140 contractors with combined annual payroll of \$47.9 million. Through the multiplier effect, an additional 440 jobs and \$16.8 million in payroll are supported annually at other businesses throughout the region. An additional 570 jobs and \$26.3 million in payroll are supported throughout Ohio. These additional jobs and payroll stem from supplier demand created by W.H. Sammis and consumer demand created by its employees and contractors.

Revenue Impacts

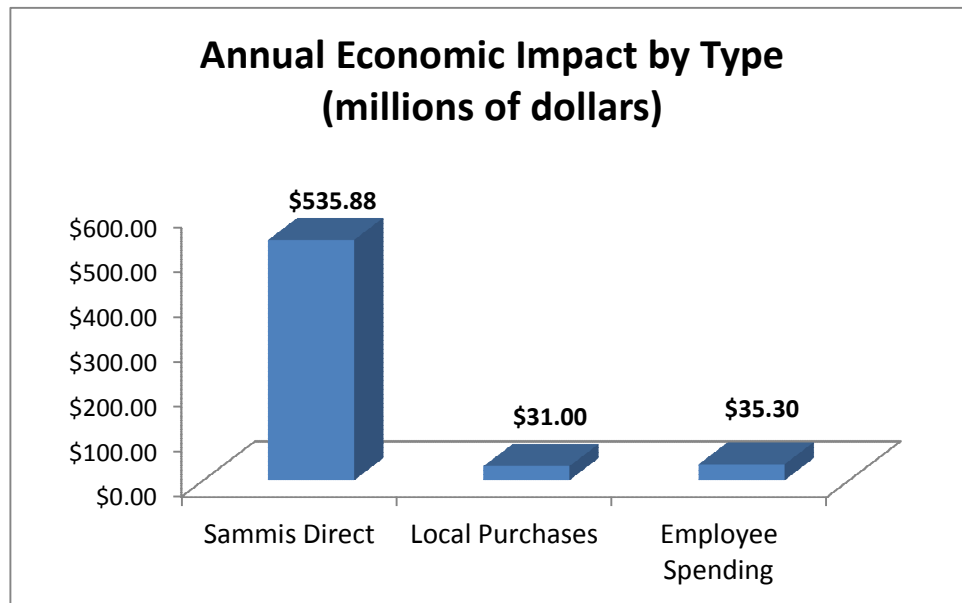
- **Direct Revenue Impacts.** The W.H. Sammis plant is the largest taxpayer in Jefferson County and is expected to generate \$5.2 million in annual property tax revenues to local jurisdictions in 2015.
- **Indirect Revenue Impacts.** Employees and contractors also generate substantial indirect property, sales and income tax revenues in Ohio, Pennsylvania and West Virginia through household spending and property ownership. Indirect state and local revenues from workers are estimated at \$6.2 million per year.

FIGURE 1
SUMMARY OF RESULTS
(Millions of Dollars)

W. H. Sammis Regular Operations	
Direct Employees	342
Annual Payroll	\$36.02
Estimated FTE Contract Employees	140
Annual Labor Income	\$11.90
Annual Economic Impacts on State of Ohio	
Regular Operations	
Total Output	\$634.06
Total Personal Income	\$74.20
Total Jobs	1,047
Annual Direct and Indirect Revenue Impacts	
Direct	
Property	\$5.24
Indirect (Employee Driven)	
Property	\$0.92
Sales	\$1.54
Personal Income	\$3.75

3.0 Economic Impacts

W.H. Sammis has an estimated annual economic impact of \$602.2 million on the regional economy, and \$634.1 million statewide. It directly and indirectly supports over 1,000 jobs and \$74.2 million in annual payroll throughout the state. This includes the impacts of production activity at the plant, as well as the impacts of supplier purchases and employee spending at other local businesses.



Economic impact analysis is a means for identifying the nature of changes in jobs, personal income and business activity that can occur in a given area as a result of an existing or new business. Economic impacts include direct and indirect jobs, personal income, and economic activity or output that is generated by the facility through its operations. Indirect impacts are the result of the multiplier effect, and capture supported supplier and consumer businesses and employees in the seven-county region and the state that benefit from W.H. Sammis. Multiplier effects are a way of representing the larger economic effects on the local economy. In essence, the multiplier effect represents the recycling of local spending that, in turn, creates new business opportunities.

3.1 Direct Impacts

Direct impacts include the direct cost of power generated by W.H. Sammis, as well as employees and payroll at the facility. The facility has about 340 regular employees and an estimated 140 contractors. Their combined annual payroll is estimated at \$47.9 million. Direct output for the plant is estimated at \$535.9 million which represents the cost of the power that is produced including wages, supplies and profits.

3.2 Vendor Purchases

A key component of W.H. Sammis' impact is through its local vendor purchases. Based on the types of supplies typically purchased by electric generating facilities and the suppliers available within the region and the state, it is estimated that the company's vendor purchases create an impact of approximately \$31.0 million per year in the region, and \$48.1 million throughout the State of Ohio. This supports an estimated 170 jobs and \$9.7 million per year in personal income throughout Ohio. An example of some of the typical purchases for fossil-fuel electric generation facilities is shown in Figure 2.

FIGURE 2
TYPICAL SUPPLIER PURCHASES

Coal mining
 Rail transportation
 Maintenance and repair of facilities and structures
 Banking
 Legal services
 Contract labor
 Electric power transmission and distribution
 Wholesale trade
 All other professional and technical services
 Accounting
 Truck transportation
 Data processing
 Business support services
 Architectural, engineering, and related services
 Warehousing and storage
 Water and sewer utilities
 Commercial and industrial machinery and equipment repair

3.3 Employee and Contractor Spending

In addition to impacts from vendor purchases, W.H. Sammis creates economic impacts by virtue of its employees and payroll. An estimated 94 percent of employees live in the seven-county region that forms the basis for the regional impacts shown in this analysis. A sizeable portion of employee payroll is spent at local establishments throughout this area, with additional spending in other parts of the state. The impacts of employee spending are based on typical spending patterns by income level. This household consumption impact accounts for a wide range of products and services that are purchased by a typical household measured against the availability of those products and services within the region and the state.

Approximately 73 percent of the workforce lives in Jefferson and Columbiana Counties, with the remainder living in primarily in Mahoning and Belmont Counties in Ohio, Beaver County in Pennsylvania and Brooke and Hancock Counties in West Virginia (Figure 3). The combined impact of household spending by the 482 regular employees and contractors, plus all of the

local supplier employees, creates an annual employee spending or induced impact of \$35.3 million in the region and \$50.1 million statewide. This employee spending supports an estimated 400 jobs in Ohio (Figure 4).

FIGURE 3
W.H. SAMMIS EMPLOYEES BY COUNTY OF RESIDENCE

Ohio		
Jefferson Ohio	175	44%
Belmont Ohio	21	5%
Columbiana Ohio	113	29%
Mahoning Ohio	13	3%
Other Ohio Counties	10	3%
West Virginia		
Brooke WV	12	3%
Hancock WV	18	5%
Other West Virginia Counties	8	2%
Pennsylvania		
Beaver PA	20	5%
Other Pennsylvania Counties	6	2%
Total	396	100%

FIGURE 4
ECONOMIC IMPACTS OF EMPLOYEE SPENDING

	Direct			Total		
	Employee & Contractor Spending	Jobs	Personal Income	Output	Jobs	Personal Income
Sammis Region*	\$24,625,212	101	\$3,123,068	\$35,295,792	311	\$10,681,788
State of Ohio	\$24,625,212	145	\$5,955,228	\$50,111,625	399	\$16,541,325

Note: Impacts are adjusted for share of employees living in the region.

*Sammis Region includes the following counties: Jefferson OH; Columbiana OH; Belmont OH; Mahoning OH; Brooke WV; Hancock WV; Beaver PA.

3.4 Overall Economic Impacts

The composite operations impact is broken down in terms of direct impacts, indirect impacts (supplier purchases), induced impacts (employee spending) and total impacts. All total, W.H. Sammis creates a total economic impact of \$602.2 million in the surrounding region each year

and \$634.1 million in the State of Ohio, directly and indirectly supporting over 1,000 jobs and \$74.2 million in annual payroll, including jobs and payroll at the plant (Figure 5).

FIGURE 5
ANNUAL DIRECT AND TOTAL OPERATIONS IMPACT OF
W.H. SAMMIS PLANT
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Sammis Region*	\$535.88	482	\$47.92	\$31.00	132	\$6.13	\$35.30	311	\$10.68	\$602.17	925	\$64.73
State of Ohio	\$535.88	482	\$47.92	\$48.07	166	\$9.74	\$50.11	399	\$16.54	\$634.06	1,047	\$74.20

*Sammis Region includes the following counties: Jefferson OH; Columbiana OH; Belmont OH; Mahoning OH; Brooke WV; Hancock WV; Beaver PA.

Direct impacts include the employees, payroll and value of production at the plant. Total jobs include local supplier businesses where W.H. Sammis makes purchases and increases in demand at local establishments where employees shop. These supported local businesses and their employees in turn make additional purchases that are captured in the total impact estimates. The total impact includes both the direct impacts as well as the secondary impacts created by other local businesses and their employees. Additional purchases by both W.H. Sammis and its employees also occur outside the region and are not represented here.

The multipliers used in this analysis are from IMPLAN, a national vendor of economic impact software, and are specific to the seven-county region of Jefferson OH, Mahoning OH, Belmont OH, Columbiana OH, Brooke WV, Hancock WV and Beaver PA. Additional multipliers were used for the State of Ohio. Industry specific multipliers were used for electric power generation and household spending in each geography. On average, the state level output multiplier for the power plant is 1.18. This means that for every \$1 million of power produced by W. H. Sammis, an additional \$180,000 in economic activity is generated in the state's economy. Similarly, for every direct job retained at W. H. Sammis an additional 1.17 jobs are supported at other businesses in the state.

4.0 Revenue Impacts

In addition to creating demand and supporting jobs and payroll in the regional economy, W. H. Sammis also generates substantial local and state tax revenues. Economic impacts represent the benefits to the private economy, while revenue impacts represent the benefits to state and local government. All total, W.H. Sammis generates an estimated \$11.5 million in direct and indirect revenues to local and state governments each year, including property taxes from the power plant facilities.

4.1 Direct Revenues

W.H. Sammis is currently the largest property tax payer in Jefferson County. This year, the plant will generate an estimated \$5.2 million in local property taxes (Figure 6).

FIGURE 6
LOCAL AND STATE REVENUE IMPACTS
W.H. SAMMIS PLANT

	Local Taxes			State Taxes		Local & State Total
	Property	Sales	Income	Sales	Income	
Direct Revenues from W.H. Sammis Plant	\$5,245,000	na	na	na	na	\$5,245,000
Indirect (Employee-Driven) Revenues	\$919,123	\$328,712	\$1,213,194	\$1,215,106	\$2,533,192	\$6,209,328
Ohio region	\$790,021	\$328,712	\$1,175,341	\$1,039,089	\$2,093,547	
Pennsylvania region	\$70,865	\$0	\$37,853	\$70,407	\$116,209	
West Virginia region	\$58,238	\$0	\$0	\$105,610	\$323,436	
Total	\$6,164,123	\$328,712	\$1,213,194	\$1,215,106	\$2,533,192	\$11,454,328

Note: Includes indirect revenues generated by Sammis employees based on county of residence.

*Tri-State Region includes the following counties: Jefferson OH; Columbiana OH; Belmont OH; Mahoning OH; Brooke WV; Hancock WV; Beaver PA.

4.2 Indirect Revenues

W.H. Sammis employees and contractors living in the local area also generate a significant amount of property, sales and income tax revenues. Indirect revenue impacts shown here are for direct employees and contractors as well as indirect employment supported by local supplier purchases and employee spending as shown in the economic impact results. Based on residential assessed value per capita in each county and average local property tax rates, the direct, indirect and induced employees supported by W.H. Sammis could generate an estimated \$919,000 in indirect property tax revenues this year to local jurisdictions within the seven-county region in Ohio, Pennsylvania and West Virginia, including \$790,000 in Ohio.

Based on employee and contractor payroll at W.H. Sammis, as well as indirect personal income from supplier and employee spending, employees could also generate approximately \$329,000 in local sales tax revenues in Ohio counties this year, \$1.0 million in state sales tax revenues in Ohio and about \$180,000 in state sales taxes in West Virginia and Pennsylvania. This estimate assumes that local employees spend approximately 31 percent of their wages on goods that are

subject to sales tax, based on data from the Census Annual Consumer Expenditure Survey. Applying this assumption to personal income of employees, and applying a local or state sales tax rate based on the distribution of employees by place of residence, yields an estimate of sales tax revenues from employee spending.

In terms of state and local income tax, W.H. Sammis employees and local contractors could generate approximately \$1.2 million in local income taxes this year in Ohio and \$2.1 million in state income taxes. Income taxes are based on average income per direct and indirect employee times the appropriate state or local income tax rate. Note that there are no local income taxes in West Virginia, but \$477,000 in state and local income taxes could be generated in Pennsylvania and West Virginia in addition to the amounts shown for Ohio.

5.0 Summary

W.H. Sammis is a significant contributor to the region's economy. It provides high paying jobs with benefits to hundreds of workers and supports the area economy with millions of dollars each year in vendor purchases. In addition, the capital investments associated with this plant result in long term impacts in the form of additional property tax revenues to local governments. Cutbacks at this plant would not only impact FirstEnergy employees at the facility, but also many surrounding businesses that count on demand from purchases by FirstEnergy and its employees.

**ATTACHMENT 1
SAMMIS PLANT INPUT DATA**

2015 Regular Employees	2015 Payroll ¹	Contractors	Contractor Labor Cost	2015 Property Taxes
342	\$36,015,216	140	\$11,900,000	\$5,245,000

¹ Excludes benefits and loadings.



APPLIED ECONOMICS

**ECONOMIC AND REVENUE IMPACTS OF
DAVIS-BESSE NUCLEAR POWER STATION
ON OTTAWA COUNTY
AND THE STATE OF OHIO**

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1.0 Introduction

Purpose of the Study

Applied Economics was retained by FirstEnergy to perform an economic analysis of the Davis-Besse Nuclear Power Station (Davis-Besse). The analysis includes the on-going operations of the plant plus the steam generator placement and re-fueling project that took place in 2014. This project included replacing the steam generator, which is an important component of the pressurized water reactor system, as well as routine outage maintenance and refueling of the reactor.

This analysis is intended to provide a framework for understanding the economic and revenue impacts that this nuclear generating facility creates through its regular operations as well as the impacts of this one-time capital investment. Davis-Besse, located about 35 miles east of Toledo, was the first nuclear plant in Ohio and has been in operation since 1977. It is capable of generating over 900 megawatts of electricity. This analysis documents economic and revenue impacts of the Davis Besse Nuclear Power Station on Ottawa County and on the state as a whole.

Davis-Besse is not only a major employer in the Toledo area, but also makes a substantial amount of local supplier purchases that support the region's economy. Davis-Besse directly employs 696 people with an annual payroll of \$66.4 million. An estimated 2,290 additional local and non-local contractors were employed last year to support regular refueling outages as well as the steam generator placement project.

Applied Economics Background

Applied Economics is an economic consulting firm, based in Phoenix, Arizona, specializing in economic development, economic and fiscal impact assessment, socioeconomic modeling, urban planning and custom software applications. Applied Economics conducts economic and fiscal impact studies and develops models to measure the effects of a wide variety of activities. These activities include development land use and policy changes, business-driven economic impacts, incentives, and program-driven economic and fiscal impacts. The partners at Applied Economics have worked together for more than twenty years, and are very experienced in working with local and regional planning and development issues. Applied Economics was formed in 1995 and specializes in the technical aspects of economic research.

The information and observations contained in this report are based on our present knowledge of the components of development, and of the current physical, socioeconomic and fiscal conditions of the affected areas. Estimates made in this analysis are based on hypothetical assumptions, current tax policies, and the current economic structure of the region.¹

¹ This analysis is based on the best available information and is intended to aid FirstEnergy in quantifying Davis-Besse's impacts on the local economy. The assumptions in the report provided by FirstEnergy are attached hereto as Attachment A. Even if the assumptions outlined in this report were to occur, there will usually be differences between the estimates and the actual results because events and circumstances

2.0 Impact Summary

The economic benefits shown here include the on-going operations of the power plant, as well as the impacts of additional local and non-local contract employees associated with the steam generator replacement and the reactor refueling. Economic impacts measure the effects of economic stimuli, or expenditures, in the local economy. These impacts include direct and indirect jobs, personal income, and economic activity or output that is generated by the nuclear power station. Indirect impacts are the result of the multiplier effect and capture supported supplier and consumer businesses and their employees in Ottawa County and throughout the state that benefit from Davis-Besse.

The operations of Davis-Besse detailed in this analysis provide substantial economic benefits to the county, region and state. These positive impacts include the following:

Economic Impacts of On-Going Operations

- **On-Going Operations Impacts.** Davis-Besse creates an annual economic impact of \$487.5 million on the Ohio economy each year. The operations of the power plant directly and indirectly support an estimated 1,600 jobs and \$109.0 million in annual payroll in Ohio.
- **Jobs and Income.** The facility directly employs 696 employees with an annual payroll of \$66.4 million. Through the multiplier effect, approximately 950 additional jobs and \$42.5 million in payroll are supported annually at other businesses throughout the state. These additional jobs and payroll stem from supplier demand created by Davis-Besse and consumer demand created by its employees.

Impacts of Steam Generator Placement and Refueling Project

- **Overall Economic Impacts.** In 2014, an additional 2,290 contractors with an estimated payroll of \$219.4 million replaced the steam generator and performed routine outage maintenance and reactor re-fueling. These additional employees created a total economic impact of \$862.6 million, which more than doubled the impact of the facility on the state and regional economy in 2014.
- **Supplier Purchases and Employee Spending.** In addition to the 2,290 contract employees, the steam generator placement and refueling project supported an estimated indirect impact on the state of \$171.7 million, along with about 920 additional jobs and \$54.1 million in personal income statewide through local supplier purchases. In addition, the 930 contractors that were from the local area also re-spent a portion of their income at area businesses, creating an induced economic impact on the state of \$132.3 million along with 1,000 jobs and \$43.2

frequently do not occur as expected. In no way will Applied Economics be held responsible or have any liability or be subject to damages as a result of this analysis. This report may be used only for the purposes that it was intended.

million in personal income in Ohio. Combined impacts from local supplier purchases and local contractor spending are estimated at \$304.0 million and are included in the overall economic impacts for the steam generator placement and refueling project.

- **Visitor Impacts.** In addition to spending by local contractors, there were approximately 19,200 visitor nights associated with non-local contractors working on this project that stayed in hotels or rental housing, ate in restaurants and made local retail purchases. These non-local contractors created an economic impact of \$2.9 million through their spending, supporting about 30 jobs in the Toledo region.

Revenue Impacts

- **Direct Revenue Impacts.** The re-fueling project will generate a significant amount of additional property tax revenues in Ottawa County. The project included \$23.6 million in real property improvements and \$429.4 million in new equipment. Annual new property tax revenues from the nuclear power station are estimated at \$2.4 million per year. This is in addition to the \$6.3 million in estimated property taxes from existing facilities in 2015.
- **Indirect Revenue Impacts.** Davis-Besse also generates substantial indirect property, sales and income tax revenues in Ohio through employee spending and property ownership. Indirect state and local revenues from regular employees are estimated at \$5.5 million per year. In addition, the steam generator placement and refueling project generated additional income and sales taxes from local contractors, as well as sales and lodging taxes from visitor expenditures by non-local contractors. Additional state and local revenues from contractors associated with the steam generator placement and refueling project are estimated at \$7.6 million.

FIGURE 2
SUMMARY OF RESULTS
(Millions of Dollars)

Davis-Besse Regular Operations	
Direct Employees	696
Estimated Payroll	\$66.44
Steam Generator Placement & Refueling Project	
Temporary Employees	2,290
Estimated Payroll	\$219.40
Annual Economic Impacts on Ohio	
Regular Operations	
Total Output	\$487.52
Total Personal Income	\$108.97
Total Jobs	1,642
Steam Generator Placement & Refueling Project	
Total Output	\$862.55
Total Personal Income	\$317.73
Total Jobs	4,236
Annual State and Local Revenue Impacts	
Direct	
Property	\$6.27
Indirect-Regular Employees	
Property	\$1.54
Sales	\$0.97
Personal Income	\$3.03
Indirect-Contract Employees	
Sales and Lodging	\$1.91
Personal Income	\$5.73

3.0 Economic Impacts

Operations Impacts

Davis-Besse has an estimated annual economic impact of \$487.5 million on Ohio's economy from its normal operations. It directly and indirectly supports over 1,600 jobs and \$109.0 million in annual payroll throughout the state (Figure 2). This includes the impacts of production activity at Davis-Besse, as well as the impacts of supplier purchases and employee spending at other local businesses.

FIGURE 2
IMPACT OF ON-GOING OPERATIONS
DAVIS-BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County	\$351.20	696	\$66.44	\$14.62	136	\$3.94	\$72.69	638	\$19.13	\$438.51	1,470	\$89.51
State of Ohio	\$351.20	696	\$66.44	\$37.67	202	\$10.33	\$98.65	745	\$32.20	\$487.52	1,642	\$108.97

Economic impact analysis is a means for identifying the nature of changes in jobs, personal income and business activity that can occur in a given area as a result of a project or program. Economic impacts include direct and indirect jobs, personal income, and economic activity or output that is generated by the facility through its operations. Indirect impacts are the result of the multiplier effect, and capture supported supplier and consumer businesses and employees in Ottawa County and throughout Ohio that benefit from Davis-Besse. Multiplier effects are a way of representing the larger economic effects on the local economy. In essence, the multiplier effect represents the recycling of local spending that, in turn, creates new business opportunities.

Direct impacts include the direct value of power generated by Davis-Besse, as well as employees and payroll at the facility. Total jobs include local vendors from whom Davis-Besse makes purchases, as well as local establishments where employees shop. These local vendors and their employees in turn make additional local purchases that are captured in the total impact estimates. The total impact includes both the direct impacts and the secondary impacts created by other local businesses and their employees. Additional purchases by both Davis-Besse and its employees also occur outside the state and are not represented here.

One component of Davis-Besse's impact is through its local vendor purchases. Based on the types of supplies typically purchased by electric generating facilities and the suppliers available locally and within the state, it is estimated that the company's vendor purchases create an impact of approximately \$14.6 million per year in Ottawa County and \$37.7 million statewide. This supports an estimated 200 jobs and \$10.3 million per year in personal income statewide.

In addition to impacts from vendor purchases, Davis-Besse creates economic impacts by virtue of its employees and payroll. A sizeable portion of employee payroll is spent at local establishments throughout the Northern Ohio region, with additional spending elsewhere in the state. The impacts of employee spending are based on typical spending patterns by income level. This household consumption impact accounts for the wide range of products and services that are purchased by a typical household and is measured against the availability of those products and services locally and statewide. Approximately 39 percent of the workforce lives in Ottawa County, with the remainder living in primarily in Sandusky, Wood, Lucas and Erie counties. Davis-Besse's 696 regular employees with a payroll of approximately \$66.4 million, plus all of the local supplier employees, create an annual employee spending or induced impact of \$72.7 million in Ottawa County and \$98.7 million throughout the state. This employee spending supported an estimated 640 local jobs and 750 jobs statewide.

Steam Generator Placement and Refueling Impacts

In addition to the on-going impacts of operations, FirstEnergy made significant capital investments in Davis-Besse to replace the steam generator. At the same time, the plant went through outage maintenance and reactor re-fueling. This resulted in approximately 2,290 additional employees on-site during the project. These 2,290 employees, which included skilled trades as well as engineers and other professionals, had an estimated payroll of \$219.4 million. About 41 percent were from the Northern Ohio region, while the remaining workers were from outside the area.

During the period when this project took place, it created an economic impact of \$732.6 million on Ottawa County and \$863.1 million statewide (Figure 3). This includes the direct impacts or value of improvements to the power station, as well as local supplier purchases and purchases by local and non-local contractors. Although these impacts are non-recurring, they are very significant, and in fact are greater in magnitude than the normal annual impacts of plant operations. In addition to the 2,290 contractors working at Davis-Besse, there were an estimated 1,900 more jobs that were supported at other businesses throughout the state during the refueling project.

FIGURE 3
IMPACT OF STEAM GENERATOR PLACEMENT AND REFUELING PROJECT
DAVIS-BESSE NUCLEAR POWER STATION
(millions of dollars)

Year	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Non-Local Contractor Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County	\$555.68	2,290	\$219.40	\$76.83	852	\$22.14	\$97.48	856	\$25.65	\$2.57	26	\$0.78	\$732.56	4,024	\$267.96
State of Ohio	\$555.68	2,290	\$219.40	\$171.67	916	\$54.14	\$132.28	999	\$43.18	\$3.43	33	\$1.16	\$863.07	4,238	\$317.87

Non-Local Contractor Impacts

Of the total 2,290 contractors, a sizeable portion was from outside the local area. Based on a detailed schedule of the number of non-local contractors that were working on the steam

generator placement and refueling project each week, this translates into 2,737 person-weeks. During this time, these non-local contractors will make expenditures for food, transportation, lodging and retail. Based on current information from the Ohio Division of Travel and Tourism, we are assuming these non-local contractors spent approximately \$82 per day. This is less than the \$110 per person per day average visitor spending for Ohio. Since these contractors are working during the day, it is likely that they spend less on retail and recreation than the average visitor. Thus, daily visitor spending patterns were adjusted to account for this. At \$82 per person per day, the 19,200 visitor nights generated by non-local contractors could translate into estimated spending of \$1.6 million in the local economy during the project period (Figure 4).

FIGURE 4
ESTIMATED NON-LOCAL CONTRACTOR EXPENDITURES

Type of Expenditure	Expenditures	Distribution
Lodging	\$226,894	14%
Food & Beverage	\$538,873	34%
Transportation	\$652,320	42%
Retail	\$152,444	10%
Total Visitor Expenditures	\$1,570,532	100%
Total Visitor Days	19,159	
Average Expenditure per Day	\$82	

Sources: Ohio Division of Travel and Tourism, 2014 (spending patterns);
FirstEnergy Ohio (visitor levels).

*Based on 2,737 person-weeks for non-local contractors between
January 2013 and April 2014.

These visitor expenditures support local jobs and payroll in the hospitality industry. All total, the \$1.6 million in contractor spending creates in a total economic impact of \$2.1 million in Ottawa County and \$2.9 million statewide (Figure 5). This corresponds to about 25 jobs and \$708,000 in personal income at local retail and hospitality establishments in Ottawa County, plus an additional 5 jobs and \$305,000 in personal income in the surrounding region.

FIGURE 5
VISITOR IMPACTS FROM NON-LOCAL CONTRACTORS
DAVIS-BESSE NUCLEAR POWER STATION

	Direct			Total		
	Visitor Spending	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County Impacts	\$1,570,532	20	\$562,726	\$2,139,102	25	\$708,254
Lodging	\$226,894	3	\$90,044	\$308,288	3	\$112,075
Food & Beverage	\$538,873	8	\$163,590	\$704,076	9	\$200,873
Transportation	\$652,320	5	\$232,197	\$903,265	7	\$302,282
Retail	\$152,444	5	\$76,894	\$223,473	5	\$93,024
State of Ohio Impacts	\$1,570,532	21	\$579,132	\$2,906,105	30	\$1,013,495
Lodging	\$226,894	3	\$76,818	\$420,931	4	\$141,184
Food & Beverage	\$538,873	7	\$181,806	\$1,017,503	11	\$333,862
Transportation	\$652,320	6	\$236,516	\$1,163,971	10	\$404,708
Retail	\$152,444	4	\$83,992	\$303,700	5	\$133,741

Overall Economic Impacts

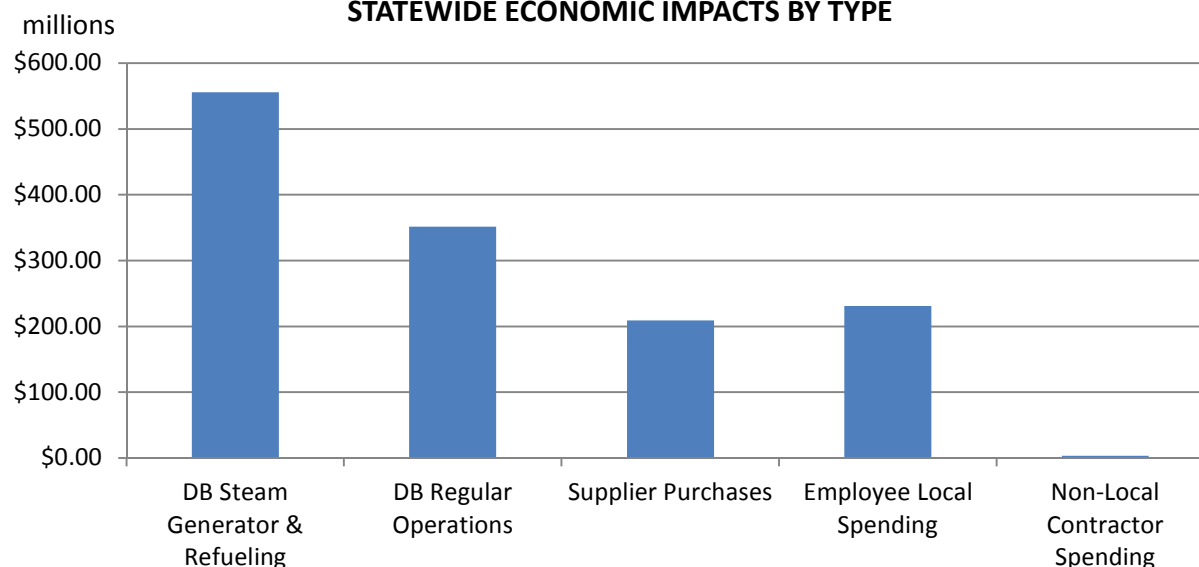
The composite operations impact results presented here are broken down in terms of direct impacts, indirect impacts (supplier purchases), induced impacts (employee spending), non-local contractor spending impacts and total impacts. All total, regular plant operations plus the steam generator placement and refueling project for Davis Besse created a total annual economic impact of \$1.35 billion in Ohio. On an on-going basis, Davis-Besse creates an estimated annual economic impact of \$487.5 million on the state's economy, directly and indirectly supporting about to 1,600 jobs and \$109.0 million in annual payroll, including jobs and payroll at the plant. In 2014, there were \$862.6 million in additional impacts associated with the steam generator placement and refueling project, along with 4,200 jobs and \$317.7 million in personal income statewide.

Direct impacts include the employees, payroll and value of production at the plant. Total jobs include local supplier businesses where Davis-Besse makes purchases; the value of work being performed in the steam generator and refueling project; increases in demand local establishments where employees shop; and lodging, restaurants and retail where non-local contractors spend money. These supported local businesses and their employees in turn make additional local purchases that are captured in the total impact estimates. The total impact includes both the direct impacts and the secondary impacts created by other local businesses and their employees (Figures 6 and 7).

FIGURE 6
COMBINED IMPACT OF REGULAR OPERATIONS AND STEAM GENERATOR PLACEMENT AND REFUELING PROJECT
DAVIS-BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Contractor Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County Impacts															
Regular Operations	\$351.20	696	\$66.44	\$14.62	136	\$3.94	\$72.69	638	\$19.13	\$0.00	0	\$0.00	\$438.51	1,470	\$89.51
Steam Generator Placement & Refueling Project Contractors	\$555.68	2,290	\$219.40	\$76.83	852	\$22.14	\$97.48	856	\$25.65	\$2.14	25	\$0.71	\$732.12	4,022	\$267.90
Total	\$906.88	2,986	\$285.84	\$91.45	988	\$26.08	\$170.17	1,494	\$44.78	\$2.14	25	\$0.71	\$1,170.63	5,493	\$357.41
State of Ohio Impacts															
Regular Operations	\$351.20	696	\$66.44	\$37.67	202	\$10.33	\$98.65	745	\$32.20	\$0.00	0	\$0.00	\$487.52	1,642	\$108.97
Steam Generator Placement & Refueling Project Contractors	\$555.68	2,290	\$219.40	\$171.67	916	\$54.14	\$132.28	999	\$43.18	\$2.91	30	\$1.01	\$862.55	4,236	\$317.73
Total	\$906.88	2,986	\$285.84	\$209.35	1,118	\$64.46	\$230.93	1,743	\$75.38	\$2.91	30	\$1.01	\$1,350.06	5,878	\$426.70

FIGURE 7
STATEWIDE ECONOMIC IMPACTS BY TYPE



The multipliers used in this analysis are from IMPLAN, a national vendor of economic impact software, and are specific to Ottawa County and Ohio. Industry specific multipliers were used for construction, electric power generation, each category of visitor spending and household spending. On average, the state output multiplier for regular operations for the nuclear power station is 1.39. This means that for every \$1 million of power produced by Davis Besse, an additional \$390,000 in economic activity is generated in the state's economy. Similarly, for every direct job created at Davis Besse an additional 1.36 jobs are supported at other businesses in the state.

4.0 Revenue Impacts

In addition to creating demand and supporting jobs and payroll in the regional and state economy, Davis-Besse also generates substantial local and state tax revenues. Economic impacts represent the benefits to the private economy, while revenue impacts represent the benefits to state and local government. The steam generator replacement will result in additional direct property taxes. Davis-Besse also indirectly supports additional revenues through employee and contractor spending, income and property ownership. All total, Davis Besse generates an estimated \$11.8 million in annual direct and indirect revenues to local and state governments on an on-going basis. . The steam generator placement and re-fueling project created and estimated \$10.1 million in additional revenues.

Direct Revenues

Davis-Besse is currently the one of the largest property tax payer in Ottawa County. This year, the plant will generate an estimated \$6.3 million in local property taxes (Figure 8).

**FIGURE 8
LOCAL AND STATE REVENUE IMPACTS
DAVIS-BESSE NUCLEAR POWER STATION**

	Local Taxes			State Taxes		Local & State Total
	Property	Sales	Income	Sales	Income	
Direct Revenues from Davis Besse Plant	\$6,267,547	na	na	na	na	\$6,267,547
Indirect (Employee-Driven) Revenues						
Regular Operations	\$1,537,263	\$176,427	\$986,862	\$795,594	\$2,047,181	\$5,543,326
Total	\$7,804,810	\$176,427	\$986,862	\$795,594	\$2,047,181	\$11,810,873

Indirect Revenues

Davis-Besse employees living in the local area also generate a significant amount of property, sales and income tax revenues. Indirect revenue impacts shown here are only for direct employees and contractors of Davis-Besse. Based on assessed value per capita in Ottawa County and average local property tax rates, the direct employees at Davis-Besse could generate an estimated \$1.5 million in indirect property tax revenues per year.

Based on employee payroll at Davis-Besse, employees also generate approximately \$176,000 in local sales tax revenues and \$796,000 in state sales tax revenues. This estimate assumes that local employees spend approximately 31 percent of their wages on goods that are subject to sales tax, based on data from the Census Annual Consumer Expenditure Survey. Applying this assumption to personal income of employees, and multiplying by the appropriate state and local sales tax rates, yields sales tax revenues from employee spending.

In terms of state and local income tax, Davis-Besse employees generate approximately \$987,000 in local income taxes and \$2.0 million in state taxes. Income taxes are based on

average income per employee of \$95,000 less a \$1,950 standard exemption, times the appropriate state, city or school tax rate. City and school tax rates are based on an average for the region in which employees live.

Revenues from Steam Generator Replacement and Refueling Project

As part of the steam generator replacement, FirstEnergy invested \$23.6 million in real property for a containment access facility, a warehouse, renovation and expansion of the old steam generator storage facility and a new steam generator storage facility. In addition, they purchased new equipment, including the steam generator, valued at \$429.4 million. These investments could generate approximately \$2.4 million in additional property taxes in the county on an on-going basis (Figure 9).²

**FIGURE 9
LOCAL AND STATE REVENUE IMPACTS
STEAM GENERATOR PLACEMENT AND REFUELING PROJECT**

	Local Taxes				State Taxes		Local & State Total
	Property	Sales	Lodging*	Income	Sales	Income	
Direct Revenues from New Capital Investment	\$2,439,563	na	na	na	na	na	\$2,439,563
Indirect (Employee-Driven) Revenues							
Local Contractors	na	\$387,591	\$0	\$891,013	\$1,421,166	\$4,834,283	\$7,534,053
Non-Local Contractors	na	\$18,278	\$11,216	\$0	\$67,021	\$0	\$96,516
Total	\$2,439,563	\$405,869	\$11,216	\$891,013	\$1,488,187	\$4,834,283	\$10,070,132

Note: Includes indirect revenues generated by Davis-Besse employees based on county of residence. Analysis assumes that 41 percent of Steam Generator Placement & Refueling employees are from the local area.

*Includes city and county lodging taxes based on an average rate of 6 percent. Lodging stays for 30 days or more are exempt from tax.

Davis-Besse contractors living in the local area also generate a significant amount of sales and income tax revenues. Based on contractor payroll, personnel associated with the steam generator replacement and refueling generated approximately \$406,000 in local sales tax revenues and \$1.5 million in state sales tax revenues. These local contractors also generated approximately \$891,000 in local income taxes and \$4.8 million in state income taxes.

Included in the figures above are revenues from non-local contractors resulting from their visitor expenditures. Non-local contractors generated an estimated \$18,000 in local sales tax and \$67,000 in state sales taxes on hotel, restaurant, retail and car rental expenditures. In addition, they generated approximately \$11,000 in local lodging taxes based on an estimated \$187,000 in hotel expenditures and on an average county and local lodging tax rate of 6 percent. Note that this excludes stays of more than 30 days which are exempt from lodging tax.³

² Public utility personal property is taxed at 24 percent of market value. For the purpose of this analysis, average depreciation of 50 percent is assumed. Real property is taxed at 35 percent of market value. A tax rate of 40.804 mills was used, consistent with the tax rate at the Davis-Besse site.

³ Stays over 30 days are estimated at 18 percent of total room nights based on projected staffing patterns for non-local contractors.

5.0 Summary

Davis-Besse is a significant contributor to the region's economy. It provides a clean, long-term source of power. It also provides high quality jobs to thousands of workers and supports the local economy with millions of dollars each year in vendor purchases. The steam generator replacement and refueling project generated significant one-time impacts in terms of additional jobs, payroll, spending and taxes that more than doubled the plant's annual impact in 2014. In addition, the capital investments associated with this project will result in long term impacts in the form of additional property tax revenues to local governments.

**ATTACHMENT 1
DAVIS-BESSE INPUT DATA**

On-Going Operations			Steam Generator Placement & Refueling Project			
2015 Regular Employees	2015 Payroll (millions)*	Annual Property Tax	Skilled Trade Contractors (60% local)	Mgmt, Eng, Technical Contractors (20% local)	Oct-April Labor Cost (millions)	Non-Local Person-Weeks
696	\$66.44	\$6.27	1,190	1,100	\$219.40	2,737

* Excludes benefits and loadings.

Property Improvements and Equipment	Cost (millions)
Containment access facility	\$16.40
New warehouse	\$1.30
Old steam generator storage facility (renovations)	\$3.70
New steam generator storage facility	\$2.20
Steam generators, associated equipment & refueling	\$429.40



APPLIED ECONOMICS

**ECONOMIC AND REVENUE IMPACTS OF
THE CLOSURE OF FIRSTENERGY
W.H. SAMMIS PLANT**

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MAY 2015

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1.0 Introduction

1.1 Project Description

Applied Economics was retained by FirstEnergy to perform an economic analysis of the impact of the retirement of the W.H. Sammis Plant in Stratton, Ohio. When a productive utility generation facility ceases operations, the economic loss affects local and state economies for years to come. W. H. Sammis is FirstEnergy's largest coal-fired power plant in Ohio. It has been in operation since 1959 and has the capacity to generate over 2,200 megawatts of electricity.

The majority of plant employees live in a seven county region surrounding the plant which includes the following counties in Ohio, Pennsylvania and West Virginia: Jefferson, OH; Columbiana, OH; Mahoning, OH; Belmont, OH; Beaver, PA; Brooke, WV and Hancock, WV. The primary local impacts would be concentrated in these counties, however the analysis also includes impacts for the State of Ohio.

W.H. Sammis is not only a major employer, but also makes a substantial amount of local supplier purchases that support the regional and state economy. As of 2015, W.H. Sammis directly employs 342 people with an annual payroll of \$36.0 million. As long as Sammis continues to operate all seven units, there would not be any significant change in the number of employees in the future. However, if a decision to close the plant is implemented, all of these jobs would be eliminated in a period of only three to four months. Furthermore, approximately 80 percent of the workforce would be eliminated on day one of the closure implementation. In addition to these direct employees, the plant also employs an estimated 140 contractors each year who perform maintenance during planned outages. The retirement of the plant would also eliminate the need for these contract employees.

Coal fired plants are facing strong competition from lower priced natural gas sources. Thus, the future of many coal powered plants is uncertain. The purpose of this study is to quantify the value of the W.H. Sammis plant and the impact that a plant closure would have on the region and the state.

1.2 Applied Economics Background

Applied Economics LLC is an economic consulting firm, based in Phoenix, Arizona, specializing in economic development, economic and fiscal impact assessment, socioeconomic modeling, urban planning and custom software applications. Applied Economics conducts economic and fiscal impact studies and develops models to measure the effects of a wide variety of activities. These activities include development land use and policy changes, business-driven economic impacts, incentives, and program-driven economic and fiscal impacts. The principals at Applied Economics have worked together for more than twenty years, and are very experienced in working with local and regional planning and development issues.

2.0 Impact Summary

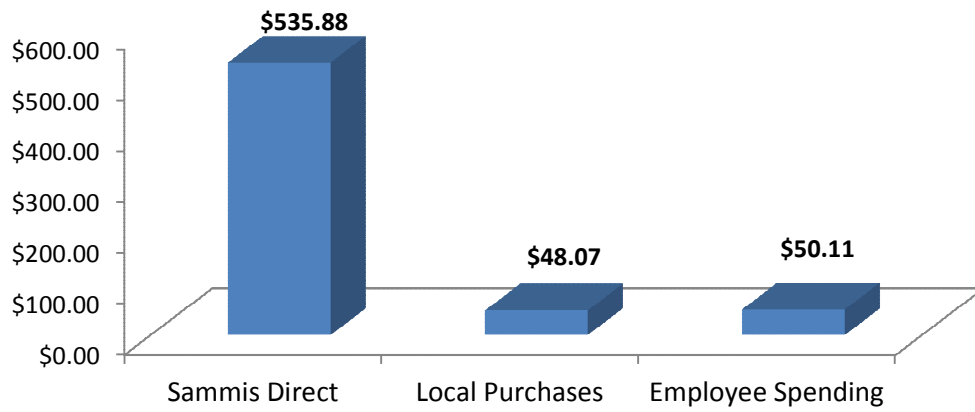
The economic impacts shown here depict the potential losses associated with retirement of the W.H. Sammis plant. Economic impacts measure the effects of gains or losses in expenditures in the local economy. These impacts are quantified in terms of direct and indirect jobs, personal income, and output that is generated by the plant. Indirect impacts are the result of the multiplier effect and capture supported supplier and consumer businesses and their employees in the larger region that would be impacted by the retirement of the W.H. Sammis plant.

For a coal fired power plant, the plant closure occurs over a very short period of time, typically only three to four months. As a result, this creates a significant and immediate economic shock to the local economy. However, there are additional impacts that typically occur over the next several years due to out-migration of workers, as well as business closures, as the economy adjusts to a reduced level of overall activity. This analysis quantifies the short term impacts of retiring the W.H. Sammis plant. The longer term impacts are very difficult to predict in advance, but would add to the estimated losses shown here.

The retirement of the W.H. Sammis plant in Stratton, Ohio could result in the following impacts to the region and the state.

- 482 direct jobs lost at the W.H. Sammis plant including regular employees and contractors;
- 440 indirect jobs lost at local businesses in the region that do business with the plant and its employees, and 570 indirect jobs lost throughout the State of Ohio;
- \$64.7 million in annual lost wages paid to direct and indirect workers in the region, and \$74.2 million in wages throughout Ohio
- \$602.2 million in annual lost economic activity in the region, \$634.1 million statewide
- \$4.3 million in annual property tax reductions in Jefferson County, Ohio based on taxes paid by FirstEnergy
- \$4.6 million reduction in additional annual state and local income and sales taxes in Ohio related to direct and indirect employees

Figure 1
Short Term Economic Losses to the
State of Ohio due to W.H. Sammis Retirement
(millions of dollars)



3.0 Economic Impacts

Economic impact analysis is a means for identifying the nature of changes in jobs, personal income and output that can occur in a given area as a result of a one-time or on-going activity. Economic impacts include direct and indirect jobs, personal income, and output that is generated by the facility through its operations. Indirect impacts are the result of the multiplier effect, and capture supported supplier and consumer businesses and employees in the seven-county region and the state that are impacted by W.H. Sammis. Multiplier effects are a way of representing the larger economic effects on the local economy.

In this case, we are able to measure the loss of jobs, income and output at the W. H. Sammis facility, as well as the estimated loss of local demand created by vendor purchases made by FirstEnergy for the W. H. Sammis facility as well as employee spending. In the short term, unemployed workers would no longer be making the same level of consumer purchases within the local economy. Local economies that experience major job losses such as those that would occur with the retirement of the W.H. Sammis plant are clearly negatively impacted immediately following the closure. As a result of the closure, unemployment rises, employee income and tax revenues decline.

Over the longer term, economies adjust to these types of shocks. People will seek other jobs within the region, or they may be forced to move out of the region to find suitable employment. As this out-migration occurs, the overall size of the regional economy shrinks. Thus, the negative impacts of closing the plant are often estimated to be greater than the positive impacts of the plant's on-going operations. The number of direct jobs lost is fixed and occurs early in the closure process; however the losses of indirect and induced jobs are generally spread out over a multi-year period as the full impact of lost purchases by the plant combined with out-migration of former employees flows through the regional economy. The losses shown in this analysis are very conservative and account for only the short term impacts of the plant closure, not the longer term losses due to out-migration of employees and businesses.

3.1 Direct Impacts

Direct impacts include the output value generated by W.H. Sammis, as well as employees and payroll at the facility. Using the IMPLAN multipliers and the combined payroll for regular employees and contractors, direct output is estimated at \$535.9 million. The facility currently has 342 regular employees with a payroll of \$36.0 million. In addition, there are contractors that are employed throughout the year during scheduled outages. While their number varies from year to year, the average is about 140 contractors with estimated annual labor costs of \$11.9 million.

Ultimately all of these direct impacts would be reduced to zero if a plant closure was implemented. An estimated 275 regular employees and all of the contract employees would lose their jobs on the first day of implementation, and the remaining 67 jobs would be eliminated within three to four months. Operating costs would be significantly reduced during

the three to four month closure period and would then go to zero as the plant retirement is completed.

3.2 Vendor Purchases

A major component of W.H. Sammis' impact on the region and on the state is through its local vendor purchases. Due to the complexities of collecting data on vendor purchases by product type and location from the plant, this analysis relies on IMPLAN assumptions about the types of supplies typically purchased by electric generating facilities and the types of suppliers available within the region. Based on these assumptions, the primary types of suppliers include fuel; facility maintenance and repair; barge, truck and rail transportation; wholesale trade; various professional and technical services; and equipment repair.

It is estimated that the plant's vendor purchases create an annual impact of approximately \$31.0 million per year in the region and \$48.1 million statewide in Ohio. This supports an estimated 170 jobs and \$9.7 million per year in personal income in Ohio and about 130 jobs in the local area. If the plant closed, all of the vendor demand would be eliminated within three to four months, producing a significant loss, particularly to the regional economy. In some cases, vendors would continue to operate at a lower level with other existing customers. However, for other vendors, the loss of sales from W.H. Sammis may force them to close and forego sales from other customers, thereby creating greater losses than those represented by W.H. Sammis vendor impacts.

3.3 Employee and Contractor Spending

In addition to direct impacts and impacts from vendor purchases, W.H. Sammis creates economic impacts by virtue of its employees and payroll. An estimated 94 percent of employees live in the seven-county region that forms the basis for the regional impacts shown in this analysis. If this payroll from regular employees as well as contractors is lost within a three to four month period, it would significantly reduce consumer spending within the region.

Some of these employees would find other jobs within the region, although their spending impacts would no longer be related to FirstEnergy. However, some employees would be forced to leave the region in order to find suitable employment. This is particularly true since the average wages for regular employees are more than \$100,000 per year, and jobs at this wage level within the local area are limited. This out-migration of employees, and potentially other working members of their families, would result in a permanent loss of consumer spending in the regional economy.

The loss of income and related household spending attributed to the approximately 480 regular employees and contractors, plus all of the local supplier employees, creates an annual induced impact of (\$35.3 million) in the region in the short term once the plant is fully retired and (\$50.1 million) throughout the State of Ohio. This employee spending supports an estimated 310 local jobs and about 400 jobs statewide, all of which could be lost in the event that the plant is

retired. Over the longer term, it is likely that the induced impacts would be even greater due to the effects of out-migration.

3.4 Overall Economic Impacts

The overall economic impacts are broken down in terms of direct impacts, indirect impacts (supplier purchases) and induced impacts (employee spending). All total, the retirement of W.H. Sammis would create an economic loss of \$602.2 million in the surrounding region each year, directly and indirectly eliminating about 930 jobs and \$64.7 million in annual payroll, including jobs and payroll at the plant (Figure 2). The impacts to the State of Ohio are even larger, with a projected loss of economic output estimated at \$634.1 million and the loss of over 1,000 jobs.

FIGURE 2
ANNUAL DIRECT AND TOTAL ECONOMIC IMPACT
OF RETIREMENT OF THE W.H. SAMMIS PLANT
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Regional Impacts												
Immediate Loss	(\$448.26)	(415)	(\$40.86)	(\$25.93)	(110)	(\$5.13)	(\$30.10)	(265)	(\$9.11)	(\$504.29)	(790)	(\$55.10)
Add'l Loss within 3 to 4 months	(\$87.61)	(67)	(\$7.06)	(\$5.07)	(22)	(\$1.00)	(\$5.20)	(46)	(\$1.57)	(\$97.88)	(134)	(\$9.63)
Total Regional Loss	(\$535.88)	(482)	(\$47.92)	(\$31.00)	(132)	(\$6.13)	(\$35.30)	(311)	(\$10.68)	(\$602.17)	(925)	(\$64.73)
State of Ohio Impacts												
Immediate Loss	(\$448.26)	(415)	(\$40.86)	(\$40.21)	(139)	(\$8.15)	(\$42.73)	(340)	(\$14.11)	(\$531.20)	(894)	(\$63.11)
Add'l Loss within 3 to 4 months	(\$87.61)	(67)	(\$7.06)	(\$7.86)	(27)	(\$1.59)	(\$7.38)	(59)	(\$2.44)	(\$102.85)	(153)	(\$11.08)
Total Statewide Loss	(\$535.88)	(482)	(\$47.92)	(\$48.07)	(166)	(\$9.74)	(\$50.11)	(399)	(\$16.54)	(\$634.06)	(1,047)	(\$74.20)

The multipliers used in this analysis are from IMPLAN, a national vendor of economic impact software, and are specific to the seven-county region including Jefferson OH, Mahoning OH, Belmont OH, Columbiana OH, Brooke WV, Hancock WV and Beaver PA. Multipliers for the State of Ohio were also used to estimate state level impacts. Industry specific multipliers were used for electric power generation. At the state level, the output multiplier for the power plant is 1.18. This means that for every \$1.0 million of output losses from W. H. Sammis, an additional \$180,000 in economic activity is lost in the state's economy. Similarly, for every direct job lost at W. H. Sammis (including both regular employees and contractors), an additional 1.17 jobs could be lost at other businesses in Ohio. These losses would occur in a very short period of time, within three to four months of the decision to close the facility. This is a conservative estimate and does not take into account the impacts of employee out-migration and vendor business closures that could result over the next several years after the W.H. Sammis plant was retired.

4.0 Revenue Impacts

In addition to the loss of economic output and related jobs and payroll in the regional and state economies related to the retirement of the W.H. Sammis plant, there would also be a loss of state and local tax revenues. Economic impacts represent the losses to the private economy, while revenue impacts represent the losses to state and local government. All total, the retirement of the W.H. Sammis could result in an estimated loss of \$9.6 million in direct and indirect revenues to local and state governments each year, including property taxes from the power plant facilities. This total includes an estimated \$8.9 million in annual direct and indirect losses in Ohio, and \$650,000 in Pennsylvania and West Virginia.

4.1 Direct Revenues

W.H. Sammis is currently the largest property tax payer in Jefferson County. The plant generates an estimated \$5.2 million in annual local property taxes (Figure 3). Following the retirement of the plant, annual taxes could be reduced to only \$945,000 for the real property, and would remain at that level until the buildings were demolished.

**FIGURE 3
LOCAL AND STATE REVENUE IMPACTS
OF RETIREMENT OF THE W.H. SAMMIS PLANT**

	Local Taxes			State Taxes		Local &
	Property	Sales	Income	Sales	Income	State Total
Direct Revenues from W.H. Sammis						
Prior to retirement	\$5,245,000	na	na	na	na	\$5,245,000
Loss due to retirement	(\$4,300,000)	na	na	na	na	(\$4,300,000)
Indirect (Employee-Driven) Revenues						
Prior to retirement	\$919,123	\$328,712	\$1,213,194	\$1,215,106	\$2,533,192	\$6,209,328
Loss due to retirement						
Ohio region	\$0	(\$328,712)	(\$1,175,341)	(\$1,039,089)	(\$2,093,547)	(\$4,636,689)
Pennsylvania region	\$0	\$0	(\$37,853)	(\$70,407)	(\$116,209)	(\$224,469)
West Virginia region	\$0	\$0	\$0	(\$105,610)	(\$323,436)	(\$429,046)
Total Loss Due to Retirement	(\$3,380,877)	(\$328,712)	(\$1,213,194)	(\$1,215,106)	(\$2,533,192)	(\$9,590,204)

Note: Includes indirect revenues generated by Sammis employees based on county of residence. There is no local income tax in West Virginia.

*Tri-State Region includes the following counties: Jefferson OH; Columbiana OH; Belmont OH; Mahoning OH; Brooke WV; Hancock WV; Beaver PA.

4.2 Indirect Revenues

Former W.H. Sammis employees and contractors living in the local area would also generate a loss in tax revenues. Indirect revenue impacts shown here are for direct employees and contractors as well as indirect jobs supported by local supplier purchases and employee spending as shown in the economic impact results. While employee homes would remain on the tax rolls, regardless of whether or not those employees leave the area, there would be an immediate reduction in consumer spending associated with the loss of \$64.7 million in annual direct and indirect payroll in the region.

Based on current employee and contractor payroll at W.H. Sammis, as well as indirect personal income from supplier and employee spending, annual sales tax revenues from employee spending could be reduced by \$329,000 at the local level in Ohio and \$1.0 million at the state level. This estimate assumes that local employees spend approximately 31 percent of their wages on goods that are subject to sales tax, based on data from the Census Annual Consumer Expenditure Survey. Applying this assumption to personal income, and applying a state and local sales tax rate based on the distribution of employees by place of residence, yields an estimate of sales tax revenues from employee spending.

In terms of state and local income taxes, the retirement of the W.H. Sammis facility could result in losses of approximately \$1.2 million in annual local income taxes (of which 97 percent would be in Ohio), plus \$2.1 million in state income taxes in Ohio. There could be an additional loss of \$440,000 in state income tax revenues in surrounding states where employees live. Income taxes are based on average income per direct and indirect employee times the appropriate state or local income tax rate.

5.0 Summary

W.H. Sammis is a significant contributor to the region's economy. It provides high paying jobs with benefits to hundreds of workers and supports the area economy with millions of dollars each year in vendor purchases. In addition, the capital investments associated with this plant result in significant annual property tax revenues to local governments. Retirement of this plant would not only impact FirstEnergy employees and contractors working at the facility, but also many surrounding businesses that are supported by purchases from FirstEnergy and its employees.

The retirement of the plant would result in significant losses over a very short period of time, typically three to four months, as depicted here. However, there would be a longer term impact as well since many employees and their families would be forced to move out of the area to find similar paying jobs in the utility industry. Additionally, there would be some local supplier businesses that would no longer be viable without purchases from FirstEnergy and their employees. The longer term end result of this type of plant closure is a permanent loss in the regional economy that exceeds the value of the plant's current operations.

**ATTACHMENT 1
SAMMIS PLANT INPUT DATA**

2015 Regular Full Time Employees	2015 Labor and Benefits ¹	Estimated Annual Contractors	Contractor Labor Cost	Annual Operating Expense	Annual Property Taxes
342	\$36,015,216	140	\$11,900,000	\$528,700,000	\$5,245,000

¹ Excludes benefits and loadings.

Losses due to Plant Retirement

Day One Job Losses-Regular Employees	275
Additional Job Losses in 3 to 4 months	67
Post Closure Property Tax	\$945,000



APPLIED ECONOMICS

**ECONOMIC AND REVENUE IMPACTS OF
THE SHUT DOWN OF THE FIRSTENERGY
DAVIS BESSE NUCLEAR POWER STATION**

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MAY 2015

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1.0 Introduction

1.1 Project Description

Applied Economics was retained by FirstEnergy to perform an analysis of the economic impact of retiring the Davis Besse Nuclear Power Station in Oak Harbor, Ohio. When a productive utility generation facility ceases operations, the economic loss affects local and state economies for years to come.

Davis-Besse is about 35 miles east of Toledo and was the first nuclear plant in Ohio. It has been in operation since 1977 and is capable of generating over 900 megawatts of electricity. The primary local impacts of the plant are concentrated in Ottawa County where Davis Besse is located; however the analysis also includes impacts for the State of Ohio.

Davis-Besse is not only a major employer in the Toledo area, but also makes a substantial amount of local supplier purchases that support the region's economy. As of 2015, Davis-Besse directly employs 696 people with an annual payroll of \$66.4 million. If a decision to close the plant were to be implemented, 50 percent of these jobs would be eliminated in a period of six months. An additional 324 jobs would be eliminated over the next ten years. At the end of that time period, the plant would reach a long term dormancy level of operations with 21 employees and an estimated payroll of \$2.5 million.

Although the closure of a nuclear plant results in a more gradual shut down process than other types of electric generation facilities, the reduction in local employment is still significant, particularly in the first six months. The purpose of this study is to quantify the value of the Davis Besse plant and the impact that a plant closure would have on the region and the state.

1.2 Applied Economics Background

Applied Economics LLC is an economic consulting firm, based in Phoenix, Arizona, specializing in economic development, economic and fiscal impact assessment, socioeconomic modeling, urban planning and custom software applications. Applied Economics conducts economic and fiscal impact studies and develops models to measure the effects of a wide variety of activities. These activities include development land use and policy changes, business-driven economic impacts, incentives, and program-driven economic and fiscal impacts. The principals at Applied Economics have worked together for more than twenty years, and are very experienced in working with local and regional planning and development issues.

2.0 Impact Summary

The economic impacts shown here depict the potential losses associated with decommissioning of the Davis Besse Nuclear Power Station. Economic impacts measure the effects of gains or losses in expenditures in the local economy. These impacts are quantified in terms of direct, indirect and induced jobs, personal income and output that are generated by the plant. Indirect and induced impacts are the result of the multiplier effect and capture supported supplier and consumer businesses and their employees in the county and the state that would be impacted by the retirement of the Davis Besse plant.

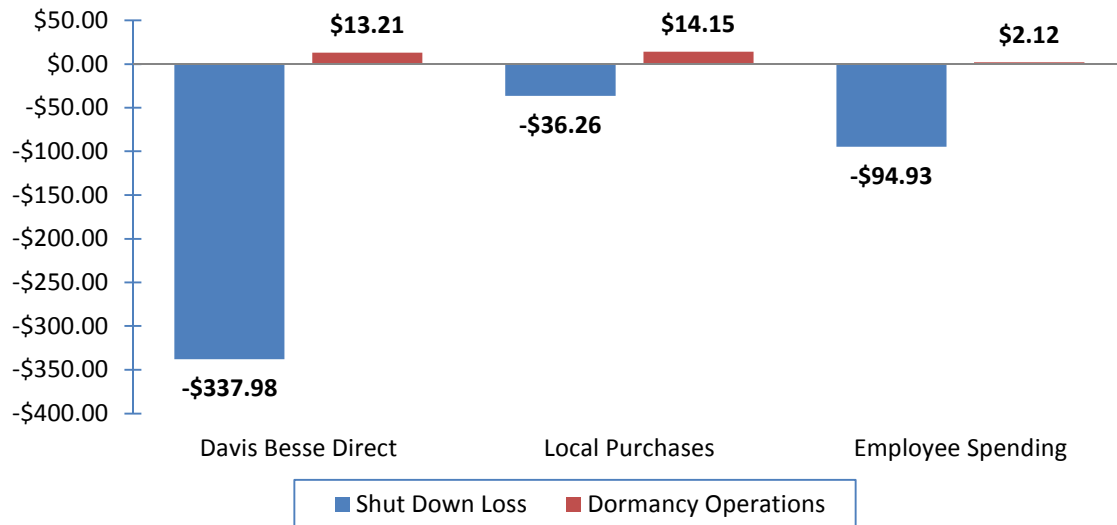
For a nuclear power plant, there is a significant reduction in jobs in the first six months after a shutdown, followed by a more gradual reduction over the next ten years. The primary goal of decommissioning is the removal and disposal of the contaminated systems and structures so that the operating licenses for the plant can be terminated. Spent fuel storage operations continue at the site until the transfer of fuel to an appropriate disposal facility is completed. After the fuel is removed, the fuel storage unit must remain in protective storage for a sufficient time period until the site can be released for an alternative use. This process could take as long as 60 years.

The initial job reductions in the first six months create a significant and immediate economic shock to the local economy. However, there are additional impacts that typically occur over the next several years due to out-migration of workers, as well as business closures, as the economy adjusts to a reduced level of overall activity. This analysis quantifies the short and long term impacts of retiring the Davis Besse plant. However, the longer term impacts to the regional economy are difficult to predict beyond the additional staffing reductions, although out-migration of workers and businesses would add to the estimated losses shown here.

The retirement of the Davis Besse plant in Ottawa County, Ohio could result in the following impacts to the county and the state.

- 675 direct jobs lost at the Davis Besse plant including about 350 jobs lost in the first six months;
- 750 indirect and induced jobs lost at local businesses in the region that do business with the plant and its employees, and 910 indirect and induced jobs lost throughout the State of Ohio;
- \$86.1 million in annual lost wages paid to direct and indirect workers in the region, and \$104.9 million in wages throughout Ohio
- \$422.0 million in annual lost economic activity in the county, \$469.2 million statewide
- \$6.3 million in property tax reductions in Ottawa County, Ohio over ten years based on taxes paid by FirstEnergy
- \$3.9 million reduction in additional annual state and local income and sales taxes in Ohio related to employees

Figure 1
Economic Impacts of Davis Besse Power
Station Shut Down on Ohio
(millions of dollars)



3.0 Economic Impacts

Economic impact analysis is a means for identifying the nature of changes in jobs, personal income and output that can occur in a given area as a result of a one-time or on-going activity. Economic impacts include direct, indirect and induced jobs, personal income and output that are generated by the facility through its operations. Indirect and induced impacts are the result of the multiplier effect and capture supported supplier and consumer businesses and employees in the county and the state that are impacted by Davis Besse Nuclear Power Station. Multiplier effects are a way of representing the larger economic effects on the local and state economy.

In this case, we are able to measure the loss of jobs, income and output at the Davis Besse facility, as well as the estimated loss of local demand created by vendor purchases as well as employee spending. In the short term, unemployed workers would no longer be making the same level of consumer purchases within the local economy. Local economies that experience major job losses such as those that would occur with the retirement of the Davis Besse plant are clearly negatively impacted immediately following the shutdown. As a result, unemployment rises, employee income and tax revenues decline.

Over the longer term, economies adjust to these types of shocks, although in the case of a nuclear plant retirement, direct job losses continue for up to ten years after the initial shock. People will seek other jobs within the region, or they may be forced to move out of the region to find suitable employment. As this out-migration occurs, the overall size of the regional economy shrinks. Thus, the negative impacts of closing the plant are often estimated to be greater than the positive impacts of the plant's on-going operations. The number of direct jobs lost is fixed, and with a significant portion of the loss occurring early in the shutdown process. However, the losses of indirect and induced jobs are generally spread out over a longer period as the full impact of lost purchases by the plant combined with out-migration of former employees flows through the regional economy. The losses shown in this analysis are very conservative and account for only the direct impacts of the plant retirement, not the longer term losses due to out-migration of employees and businesses.

3.1 Direct Impacts

Direct impacts include the output value generated by Davis Besse, as well as employees and payroll at the facility. Using the IMPLAN multipliers and the estimated payroll for regular employees, direct output is estimated at \$351.2 million. The facility currently has 696 regular employees with a payroll of \$66.4 million. This analysis documents the loss of employment and payroll over the first ten years following the shutdown until a long term dormancy state is reached.

An estimated 200 regular employees would lose their jobs within the first month of implementation, and an additional 151 jobs would be eliminated within six months. Then over the next ten years, an additional 324 jobs would be eliminated as the plant proceeded through

the shutdown and transition process leading to decommissioning. These job reduction estimates are based on information provided by FirstEnergy.

3.2 Vendor Purchases

A major component of Davis Besse's impact on the county and on the state is its local vendor purchases. Due to the complexities of collecting data on vendor purchases by product type and location from the plant, this analysis relies on IMPLAN assumptions about the types of supplies typically purchased by nuclear generating facilities and the types of suppliers available within the county and state.

It is estimated that the plant's vendor purchases currently create an annual impact estimated at \$14.6 million per year in the county and \$37.7 million statewide in Ohio. If the plant shut down, there would be a \$19.0 million loss statewide in the first 6 months and a \$36.3 million total reduction in annual impacts after ten years. This would result in the loss of an estimated about 190 jobs and \$9.9 million in vendor payroll statewide. In some cases, vendors would continue to operate at a lower level with other existing customers. However, for other vendors, the loss of sales from Davis Besse may force them to close and forego sales from other customers, thereby creating greater losses than those represented by the reduction in Davis Besse vendor impacts.

3.3 Employee Spending

In addition to direct impacts and impacts from vendor purchases, Davis Besse creates economic impacts by virtue of its employees and payroll. If \$33.5 million in annual payroll from regular employees is lost within a six month period, it would significantly reduce consumer spending within the region.

Some of these employees would find other jobs within the region, although their spending impacts would no longer be related to FirstEnergy. However, some employees would be forced to leave the region in order to find suitable employment. This is particularly true since the average wages for regular employees are more than \$95,000 per year, and jobs at this wage level within the local area are limited. The out-migration of employees, and potentially other working members of their families, would result in a permanent loss of consumer spending in the regional economy.

The loss of income and related household spending attributed to the approximately 675 plant employees who would lose their jobs over the first ten years, plus all of the local supplier employees, creates an annual induced impact loss of (\$70.0 million) in the county and (\$94.9 million) throughout the State of Ohio. This employee spending supports an estimated 610 local jobs and about 720 jobs statewide, all of which could be lost in the event that the plant is shut down (Figure 2). Over the longer term, it is likely that the induced impacts would be even greater due to the effects of out-migration.

FIGURE 2
ANNUAL DIRECT AND TOTAL ECONOMIC IMPACT
OF SHUT DOWN OF THE DAVIS BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County Impacts												
Loss at One Month	(\$100.92)	(200)	(\$19.09)	(\$4.20)	(39)	(\$1.13)	(\$20.89)	(183)	(\$5.50)	(\$126.01)	(422)	(\$25.72)
Add'l Loss within 6 months	(\$76.19)	(151)	(\$14.42)	(\$3.17)	(30)	(\$0.86)	(\$15.77)	(138)	(\$4.15)	(\$95.14)	(319)	(\$19.42)
Add'l Loss Year 1 to Year 10	(\$160.87)	(324)	(\$30.44)	(\$6.70)	(62)	(\$1.81)	(\$33.30)	(292)	(\$8.76)	(\$200.86)	(679)	(\$41.00)
Total Ottawa County Loss	(\$337.98)	(675)	(\$63.94)	(\$14.07)	(131)	(\$3.79)	(\$69.96)	(614)	(\$18.41)	(\$422.01)	(1,420)	(\$86.14)
State of Ohio Impacts												
Loss at One Month	(\$100.92)	(200)	(\$19.09)	(\$10.83)	(58)	(\$2.97)	(\$28.35)	(214)	(\$9.25)	(\$140.09)	(472)	(\$31.31)
Add'l Loss within 6 months	(\$76.19)	(151)	(\$14.42)	(\$8.17)	(44)	(\$2.24)	(\$21.40)	(162)	(\$6.99)	(\$105.77)	(356)	(\$23.64)
Add'l Loss Year 1 to Year 10	(\$160.87)	(324)	(\$30.44)	(\$17.26)	(92)	(\$4.73)	(\$45.19)	(341)	(\$14.75)	(\$223.31)	(758)	(\$49.92)
Total Statewide Loss	(\$337.98)	(675)	(\$63.94)	(\$36.26)	(194)	(\$9.94)	(\$94.93)	(717)	(\$30.99)	(\$469.17)	(1,586)	(\$104.87)

3.4 Overall Economic Losses of Plant Retirement

The overall economic impacts are broken down in terms of direct impacts, indirect impacts (supplier purchases) and induced impacts (employee spending). All total, the shutdown of the Davis Besse plant would create an economic loss of \$422.0 million in Ottawa County each year, directly and indirectly eliminating about 1,400 jobs and \$86.1 million in annual payroll, including jobs and payroll at the plant. The impacts to the State of Ohio are even larger, with a projected loss of economic output estimated at \$469.2 million and the loss of close to 1,600 jobs.

3.5 On-Going Dormancy Impacts

Within approximately ten years, the plant would reach a dormancy state. It would operate at this level for several decades until all of the spent fuel was removed from the facility. During this period, the plant would support approximately 21 direct jobs with an estimated payroll of \$2.5 million. It would also make annual expenditures of approximately \$8.5 million for security, NRC fees, waste shipments, insurance, maintenance and other activities related to fuel storage. While this dormancy state would certainly create on-going economic impacts, they would be significantly smaller than the current impacts created by the plant's operations.

The total economic impacts at dormancy are estimated at \$25.6 million per year in Ottawa County, including operations at the Davis Besse site, impacts related to local supplier expenditures and local spending by employees (Figure 3). This level of activity would directly and indirectly support about 90 jobs and \$5.0 million in personal income in Ottawa County. At the state level, the dormancy state would create an annual impact of \$29.5 million, supporting about 110 jobs and \$5.8 million in payroll, including impacts in Ottawa County. *At the state level, annual impacts at dormancy are only about 6 percent of current annual operating impacts.*

FIGURE 3
ON-GOING ECONOMIC IMPACTS OF DORMANCY STATE
DAVIS BESSE NUCLEAR POWER STATION
(millions of dollars)

	Direct			Indirect (Supplier) Impacts			Induced (Employee) Impacts			Total		
	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income	Output	Jobs	Personal Income
Ottawa County Impacts	\$13.21	21	\$2.50	\$11.20	58	\$2.20	\$1.14	11	\$0.31	\$25.56	90	\$5.00
State of Ohio Impacts	\$13.21	21	\$2.50	\$14.15	68	\$2.64	\$2.12	17	\$0.70	\$29.48	106	\$5.84

The multipliers used in this analysis are from IMPLAN, a national vendor of economic impact software, and are specific to Ottawa County and the State of Ohio. Industry specific multipliers were used for nuclear power generation as well as for specific types of annual expenditures during the dormancy period including security, insurance and waste shipment. At the state level, the output multiplier for the power plant is 1.39. This means that for every \$1.0 million of output losses from Davis Besse, an additional \$390,000 in economic activity is lost in the state's economy. Similarly, for every direct job lost at Davis Besse, an additional 1.35 jobs could be lost at other businesses in Ohio. This is a conservative estimate and does not take into account the impacts of employee out-migration and vendor business closures that could result in the years following the initial job reductions.

4.0 Revenue Impacts

In addition to the loss of economic output and related jobs and payroll in the county and state economies, there would also be a loss of state and local tax revenues from the shutdown of the Davis Besse plant. Economic impacts represent the losses to the private sector economy, while revenue impacts represent the losses to state and local government. All total, the shutdown of Davis Besse could result in an estimated loss of \$10.1 million in direct and indirect revenues to local and state governments each year, including property taxes from the power plant facilities. This level of annual tax reductions would not be realized until the tenth year following shut down. However, the annual losses would cumulate during that time period. Over ten years, the cumulative losses that are projected to occur based on job reductions in the first six months are estimated at (\$20.2 million).

4.1 Direct Revenues

Davis Besse is one of the largest property taxpayers in Ottawa County. The plant generates an estimated \$6.3 million in annual local property taxes (Figure 4). Following the retirement of the plant, annual taxes could be reduced by about 50 percent each year for the first ten years. At this rate, annual property taxes by year ten would be minimal.

FIGURE 4
LOCAL AND STATE REVENUE IMPACTS
OF RETIREMENT OF THE DAVIS BESSE PLANT

	Local Taxes			State Taxes		Local & State Total
	Property	Sales	Income	Sales	Income	
Direct Revenues from Davis Besse						
Current Annual Revenues	\$6,267,547	na	na	na	na	\$6,267,547
Annual Loss by Year 10	(\$6,255,306)	na	na	na	na	(\$6,255,306)
Current Indirect (Employee-Driven) Revenues	\$1,537,263	\$176,427	\$986,862	\$795,594	\$2,047,181	\$5,543,326
Annual losses beginning in first year	na	(\$88,974)	(\$497,685)	(\$401,226)	(\$1,032,415)	(\$2,020,299)
Additional Annual Loss by Year 10	na	(\$80,815)	(\$459,401)	(\$364,433)	(\$952,998)	(\$1,857,647)
Total Annual Loss Due to Retirement	(\$6,255,306)	(\$169,789)	(\$957,086)	(\$765,659)	(\$1,985,413)	(\$10,133,252)

4.2 Indirect Revenues

Former Davis Besse employees would also create a loss in tax revenues. Indirect revenue impacts shown here are for FirstEnergy employees. While employee homes would remain on the tax rolls, regardless of whether or not those employees leave the area, there would be an immediate reduction in consumer spending associated with the loss of \$33.5 million in annual payroll in the region within the first six months following a shutdown.

Based on the reduction in employee payroll at Davis Besse, annual sales tax revenues from employee spending could be reduced by \$89,000 in Ottawa County and \$401,000 at the state level each year, beginning in the first year. These losses would increase in magnitude each year as workforce reductions continued. By year ten, annual losses are estimated at \$170,000 in Ottawa County and \$766,000 to the state. This estimate assumes that employees spend

approximately 31 percent of their wages on goods that are subject to sales tax, based on data from the Census Annual Consumer Expenditure Survey. Applying this assumption to personal income, and multiplying by the appropriate state and local sales tax rates, yields sales tax revenues from employee spending.

In terms of state and local income taxes, the shutdown of the Davis Besse facility could result in annual losses of approximately \$960,000 in annual local income taxes, plus \$2.0 million in state income taxes in Ohio based on the reduction in employment during the first ten years. Income taxes are based on average income per direct employee times the appropriate state and local income tax rates. Local income taxes in Ohio are paid based on where residents work.

All total, annual reductions in state and local revenues on an on-going basis are estimated at \$10.1 million based on the projected reductions in jobs and payroll by year ten of the decommissioning process. This includes revenues generated by employees as well as by the plant.

5.0 Summary

Davis Besse is a significant contributor to the economy in Ottawa County. It provides high paying jobs with benefits to hundreds of workers and supports the area economy with millions of dollars each year in vendor purchases. In addition, the capital investments associated with this plant result in significant annual property tax revenues to local governments. Retirement of this plant would not only impact FirstEnergy employees working at the facility, but also many surrounding businesses that are supported by purchases from FirstEnergy and its employees.

The retirement of the plant would result in significant losses over the first six months, with continuing more gradual losses of the next ten years. As a result of the sizeable reductions in labor force and payroll during the first six months, as well as on-going reductions, there would be longer term impacts as many employees and their families would be forced to move out of the area to find similar paying jobs in the utility industry. Additionally, there would be some local supplier businesses that would no longer be viable without purchases from FirstEnergy and their employees. Although there would be on-going positive impacts related to dormancy level operations that would continue for several decades, these would only represent a fraction of the level of economic activity that was generated by the plant at full operational levels. The end result of this type of plant closure is a permanent loss in the regional economy that far exceeds the value of the plant's current operations.

**ATTACHMENT 1
DAVIS BESSE INPUT DATA**

Current Operations	Employment	Labor and Benefits ¹	Annual Real Property Taxes	Annual Personal Property Taxes
2015	696	\$66,444,562	\$1,802,706	\$4,464,841

¹ Excludes benefits and loadings.

Losses due to Plant Shutdown	Job Losses	Payroll Reduction
Month 1 Job Losses-Regular Employees	200	\$19,093,265
Additional Job Losses in 6 months	151	\$14,415,415
Additional Job Losses in Years 1-10	324	\$30,435,882
Property Tax Reduction 50% per year thru year 10 (demolition completion)		

Dormancy State 21 Jobs
\$2,500,000 Payroll

Dormancy Annual Expenditures	
Security (40 officers)	\$4,300,000
NRC Fees	\$290,000
Waste Shipments	\$550,000
Insurance	\$850,000
Maintenance	\$300,000
All other costs to maintain SAFESTOR	\$2,180,000

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Summary: Testimony Supplemental Testimony of Sarah Murley electronically filed by Mr. Nathaniel Trevor Alexander on behalf of Ohio Edison Company and The Cleveland Illuminating Company and The Toledo Edison Company