

# Economic Impacts of Natural Gas Infrastructure Spending

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*Prepared for*  
Washington Gas Light Company

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July 16, 2018

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## 1.0 Executive Summary

In 2013, Maryland created the Strategic Infrastructure Development and Enhancement Program (STRIDE), with the goal of speeding up the replacement of natural gas infrastructure throughout the state. In accordance with STRIDE, Washington Gas Light Company is undergoing a number of current and future projects to replace relatively higher risk natural gas pipe infrastructure in the state of Maryland. The Regional Economics Studies Institute (RESI) of Towson University estimated the economic and fiscal impacts of this infrastructure replacement for two five-year time periods:

- Investment made and planned between January 2014 and December 2018, and
- Investment planned between January 2019 and December 2023.

### 1.1 Key Findings

Infrastructure spending made and planned between January 2014 and December 2018 supported an average of 439 jobs each year, as well as nearly \$319.6 million in total output and total wages of \$117.8 million over the five-year period. Between 2014 and 2018, Washington Gas' economic activity had a fiscal impact of \$14.4 million for state and local governments.

Between January 2019 and December 2023, Washington Gas plans to spend nearly \$372 million on infrastructure projects in accordance with STRIDE. These projects will support 857 jobs each year, in addition to \$622.8 million in total output and a total of \$229.6 million in wages during the study period. Between 2019 and 2023, Washington Gas' planned infrastructure spending will support \$28.1 million in fiscal impacts for state and local governments.

## 2.0 Introduction

In 2013, Maryland created the Strategic Infrastructure Development and Enhancement Program (STRIDE), with the goal of speeding up the replacement of natural gas infrastructure throughout the state. In accordance with STRIDE, Washington Gas Light Company (“Washington Gas,” or “the Client”) is undergoing a number of current and future projects to replace relatively higher risk natural gas pipe infrastructure in the state of Maryland. The Client sought a study of the economic and fiscal impacts of this infrastructure replacement. The Regional Economics Studies Institute (RESI) of Towson University carried out this study for two time periods:

- Investment made and planned between January 2014 and December 2018, and
- Investment planned between January 2019 and December 2023.

## 3.0 Impact Analysis Findings

This section shows the economic and fiscal impacts of infrastructure spending by Washington Gas in accordance with STRIDE. Economic and fiscal impacts were calculated using the IMPLAN input/output model, as detailed in Appendix A.

### 3.1 Infrastructure Projects from 2014 to 2018

For projects conducted between 2014 and 2018, RESI found that activity associated with spending on these investments supported an average of 439 jobs each year. Spending associated with these investments also supported a total of \$319.6 million in output and \$117.8 million in employee compensation over the five years. Figure 1 shows the economic impacts associated with this spending.

**Figure 1: Economic Impacts of Infrastructure Spending, 2014 - 2018**

Type	Direct	Indirect	Induced	Total
Employment	254	69	117	439
Output	\$190,662,881	\$55,660,976	\$73,257,798	\$319,581,655
Employee Compensation	\$73,767,522	\$18,697,131	\$25,310,703	\$117,775,357

Sources: IMPLAN, RESI, Washington Gas

RESI also used the data provided to conduct a fiscal impact analysis. These fiscal impacts, or tax revenues, are driven by the total economic activity resulting from infrastructure spending by the Client. That is, the fiscal impacts are the tax revenues that correspond to the direct, indirect, and induced economic impacts of the infrastructure spending. Figure 2 presents the fiscal impacts.

**Economic Impacts of Natural Gas Infrastructure Spending**  
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**Figure 2: Fiscal Impacts of Infrastructure Spending, 2014 - 2018**

Type	Amount
Property	\$3,743,310
Income	\$4,614,379
Sales	\$3,845,529
Payroll	\$195,141
Other	\$2,009,627
<b>Total</b>	<b>\$14,407,986</b>

Sources: IMPLAN, RESI, Washington Gas

As seen in Figure 2, spending by the Client on infrastructure projects between 2014 and 2018 supported \$14.4 million in state and local tax revenues. Income taxes comprised the plurality of these impacts at \$4.6 million, followed by sales tax revenues of \$3.8 million.

### 3.2 Infrastructure Projects from 2019 to 2023

For project spending between 2019 and 2023, RESI found that activity associated with this proposed spending would support 857 jobs annually, along with a total of \$622.8 million in output and \$229.6 million in employee compensation over the five-year period. Figure 3 shows the economic impacts associated with this spending.

**Figure 3: Economic Impacts of Planned Infrastructure Spending, 2019 - 2023**

Type	Direct	Indirect	Induced	Total
Employment	496	133	228	857
Output	\$371,760,016	\$108,209,617	\$142,827,866	\$622,797,499
Employee Compensation	\$143,957,197	\$36,338,110	\$49,347,253	\$229,642,559

Sources: IMPLAN, RESI, Washington Gas

RESI also conducted a fiscal impact analysis on the proposed future spending. The fiscal impacts can be seen in Figure 4.

**Figure 4: Fiscal Impacts of Planned Infrastructure Spending, 2019 - 2023**

Type	Amount
Property	\$7,300,019
Income	\$8,996,369
Sales	\$7,499,390
Payroll	\$380,495
Other	\$3,918,423
<b>Total</b>	<b>\$28,094,696</b>

Sources: IMPLAN, RESI, Washington Gas

As seen in Figure 4, proposed spending on infrastructure projects between 2019 and 2023 would support a total of \$28.1 million in state and local tax revenues. Income taxes comprised the plurality of these impacts at \$9.0 million, followed by sales tax revenues of \$7.5 million.

## Appendix A—Methodology

### A.1 IMPLAN Model Overview

To quantify the economic impacts of a specific economic event or events, RESI used the IMPLAN input/output model. This model enumerates the employment and fiscal impact of each dollar earned and spent by the following: employees of the event, other supporting vendors (business services, retail, etc.), each dollar spent by these vendors on other firms and each dollar spent by the households of the event's employees, other vendors' employees, and other businesses' employees.

Economists measure three types of economic impacts: direct, indirect, and induced impacts. The direct economic effects are generated as the event being modeled creates jobs to support the event's activities. The indirect economic impacts occur as the vendors purchase goods and services from other firms. In either case, the increases in employment generate an increase in household income as new job opportunities are created and income levels rise. This drives the induced economic impacts that result from households increasing their purchases at local businesses.

Consider the following example. A new firm opens in a region and directly employs 100 workers. The firm purchases supplies, both from outside the region as well as from local suppliers, which leads to increased business for local firms, thereby hypothetically creating jobs for another 100 workers. This is called the indirect effect. The workers at the firm and at suppliers spend their income mostly in the local area, hypothetically creating jobs for another 50 workers. This is the induced effect. The direct, indirect and induced effects add up to 250 jobs created from the original 100 jobs. Thus, in terms of employment, the total economic impact (the sum of direct, indirect, and induced impacts) of the firm in our example is 250.

### A.2 Assumptions

Economic impacts were determined based on project expenditures provided by the Client. RESI's analysis includes the following modeling assumptions:

- Economic impact multipliers are developed from IMPLAN input/output software.
- IMPLAN data are based on the North American Industrial Classification System (NAICS).
- IMPLAN employment multipliers are adjusted for inflation using the Bureau of Labor Statistics CPI-U.
- Impacts were based on 2016 IMPLAN data for Maryland.
- For all project spending, RESI used a 2018 event year in IMPLAN. Impacts are represented in 2018 dollars.
- Employment impacts include both full- and part-time employees. IMPLAN does not differentiate between full- and part-time employment.

Figure 5 contains the IMPLAN industry codes that RESI utilized in this analysis.

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Figure 5: IMPLAN Industry Sectors

IMPLAN Code	Description
<b>Construction</b>	
58	Construction of new nonresidential structures (including pipelines)
<b>Paving</b>	
64	Maintenance and repair construction of highways, streets, bridges, and tunnels
<b>Overheads</b>	
449	Architectural, engineering, and related services

Sources: IMPLAN, RESI



## Appendix B—Detailed Impacts

**Figure 6: Detailed Employment Impacts of Infrastructure Spending, 2014 - 2018**

<b>Sector</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Construction	209	1	1	211
Professional, Scientific, and Technical Services	45	19	5	69
Retail Trade	0	10	18	29
Health Care and Social Assistance	0	0	25	25
Administrative and Support and Waste Management and Remediation Services	0	11	7	18
Accommodation and Food Services	0	3	14	18
Other Services (except Public Administration)	0	2	13	15
Real Estate and Rental and Leasing	0	4	6	10
Finance and Insurance	0	2	7	9
Wholesale Trade	0	5	3	8
Transportation and Warehousing	0	4	4	8
Educational Services	0	0	6	6
Arts, Entertainment, and Recreation	0	1	4	5
Manufacturing	0	3	1	4
Information	0	1	2	3
Management of Companies and Enterprises	0	1	1	2
Public Administration	0	1	1	1
Utilities	0	0	0	0
Agriculture, Forestry, Fishing and Hunting	0	0	0	0
Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0
<b>Total</b>	<b>254</b>	<b>69</b>	<b>117</b>	<b>439</b>

Sources: IMPLAN, RESI, Washington Gas

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**Figure 7: Detailed Output Impacts of Infrastructure Spending, 2014 - 2018**

<b>Sector</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Construction	\$150,482,629	\$436,141	\$1,004,388	\$151,923,158
Professional, Scientific, and Technical Services	\$40,180,253	\$13,444,658	\$3,733,760	\$57,358,671
Real Estate and Rental and Leasing	\$0	\$6,472,180	\$7,130,566	\$13,602,746
Health Care and Social Assistance	\$0	\$316	\$13,457,445	\$13,457,761
Finance and Insurance	\$0	\$4,350,193	\$7,904,627	\$12,254,820
Retail Trade	\$0	\$2,697,057	\$9,005,790	\$11,702,847
Wholesale Trade	\$0	\$6,363,829	\$3,507,192	\$9,871,022
Information	\$0	\$2,866,073	\$4,888,793	\$7,754,866
Administrative and Support and Waste Management and Remediation Services	\$0	\$6,024,527	\$1,574,665	\$7,599,192
Manufacturing	\$0	\$4,550,987	\$2,580,302	\$7,131,289
Accommodation and Food Services	\$0	\$1,011,823	\$4,884,815	\$5,896,638
Other Services (except Public Administration)	\$0	\$2,864,335	\$2,435,386	\$5,299,721
Transportation and Warehousing	\$0	\$1,249,636	\$3,889,409	\$5,139,044
Utilities	\$0	\$1,070,544	\$2,021,740	\$3,092,284
Educational Services	\$0	\$252,784	\$1,789,010	\$2,041,794
Arts, Entertainment, and Recreation	\$0	\$16,121	\$2,015,864	\$2,031,985
Management of Companies and Enterprises	\$0	\$1,117,212	\$843,444	\$1,960,656
Public Administration	\$0	\$309,136	\$461,502	\$770,637
Mining, Quarrying, and Oil and Gas Extraction	\$0	\$537,187	\$43,329	\$580,516
Agriculture, Forestry, Fishing and Hunting	\$0	\$26,235	\$85,772	\$112,007
<b>Total</b>	<b>\$190,662,881</b>	<b>\$55,660,976</b>	<b>\$73,257,798</b>	<b>\$319,581,655</b>

Sources: IMPLAN, RESI, Washington Gas

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**Figure 8: Detailed Employee Compensation Impacts of Infrastructure Spending, 2014 - 2018**

<b>Sector</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Construction	\$52,325,159	\$132,683	\$302,835	\$52,760,678
Professional, Scientific, and Technical Services	\$21,442,362	\$6,545,297	\$1,565,262	\$29,552,921
Health Care and Social Assistance	\$0	\$161	\$6,871,762	\$6,871,923
Retail Trade	\$0	\$1,695,221	\$2,845,482	\$4,540,703
Finance and Insurance	\$0	\$970,256	\$2,697,996	\$3,668,252
Administrative and Support and Waste Management and Remediation Services	\$0	\$2,247,481	\$1,162,630	\$3,410,111
Wholesale Trade	\$0	\$2,134,181	\$1,176,176	\$3,310,356
Other Services (except Public Administration)	\$0	\$474,882	\$2,044,497	\$2,519,379
Accommodation and Food Services	\$0	\$387,545	\$1,702,249	\$2,089,794
Transportation and Warehousing	\$0	\$996,669	\$859,677	\$1,856,345
Educational Services	\$0	\$9,666	\$1,277,988	\$1,287,654
Real Estate and Rental and Leasing	\$0	\$1,035,209	\$202,404	\$1,237,613
Information	\$0	\$587,158	\$506,695	\$1,093,853
Manufacturing	\$0	\$424,338	\$647,834	\$1,072,172
Management of Companies and Enterprises	\$0	\$550,968	\$415,956	\$966,925
Public Administration	\$0	\$255,818	\$349,536	\$605,354
Arts, Entertainment, and Recreation	\$0	\$60,927	\$445,170	\$506,097
Utilities	\$0	\$117,585	\$221,133	\$338,717
Mining, Quarrying, and Oil and Gas Extraction	\$0	\$65,594	\$2,455	\$68,049
Agriculture, Forestry, Fishing and Hunting	\$0	\$5,493	\$12,968	\$18,461
<b>Total</b>	<b>\$73,767,522</b>	<b>\$18,697,131</b>	<b>\$25,310,703</b>	<b>\$117,775,357</b>

Sources: IMPLAN, RESI, Washington Gas

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**Figure 9: Detailed Employment Impacts of Planned Infrastructure Spending, 2019 - 2023**

Sector	Direct	Indirect	Induced	Total
Construction	409	1	2	412
Professional, Scientific, and Technical Services	87	37	10	134
Retail Trade	0	20	36	56
Health Care and Social Assistance	0	0	48	48
Accommodation and Food Services	0	21	13	35
Administrative and Support and Waste Management and Remediation Services	0	6	28	35
Other Services (except Public Administration)	0	4	25	29
Real Estate and Rental and Leasing	0	8	11	19
Finance and Insurance	0	4	14	18
Wholesale Trade	0	10	6	16
Transportation and Warehousing	0	8	7	15
Educational Services	0	0	11	11
Arts, Entertainment, and Recreation	0	2	8	9
Manufacturing	0	6	1	7
Information	0	2	3	5
Management of Companies and Enterprises	0	2	1	3
Public Administration	0	1	1	3
Utilities	0	0	1	1
Agriculture, Forestry, Fishing and Hunting	0	1	0	1
Mining, Quarrying, and Oil and Gas Extraction	0	0	0	1
<b>Total</b>	<b>496</b>	<b>133</b>	<b>228</b>	<b>857</b>

Sources: IMPLAN, RESI, Washington Gas

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**Figure 10: Detailed Output Impacts of Planned Infrastructure Spending, 2019 - 2023**

<b>Sector</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Construction	\$293,571,913	\$845,291	\$1,958,210	\$296,375,415
Professional, Scientific, and Technical Services	\$78,188,103	\$26,072,152	\$7,279,545	\$111,539,800
Real Estate and Rental and Leasing	\$0	\$12,614,486	\$13,902,224	\$26,516,710
Health Care and Social Assistance	\$0	\$615	\$26,237,491	\$26,238,106
Finance and Insurance	\$0	\$8,428,757	\$15,411,312	\$23,840,070
Retail Trade	\$0	\$5,242,286	\$17,558,291	\$22,800,577
Wholesale Trade	\$0	\$12,461,739	\$6,837,832	\$19,299,571
Information	\$0	\$5,573,408	\$9,531,518	\$15,104,926
Administrative and Support and Waste Management and Remediation Services	\$0	\$11,681,783	\$3,070,068	\$14,751,851
Manufacturing	\$0	\$8,846,067	\$5,030,699	\$13,876,766
Accommodation and Food Services	\$0	\$1,967,112	\$9,523,720	\$11,490,832
Other Services (except Public Administration)	\$0	\$5,586,146	\$4,748,155	\$10,334,301
Transportation and Warehousing	\$0	\$2,424,195	\$7,583,031	\$10,007,226
Utilities	\$0	\$2,086,323	\$3,941,722	\$6,028,045
Educational Services	\$0	\$491,526	\$3,487,950	\$3,979,476
Arts, Entertainment, and Recreation	\$0	\$31,316	\$3,930,192	\$3,961,508
Management of Companies and Enterprises	\$0	\$2,178,386	\$1,644,430	\$3,822,816
Public Administration	\$0	\$601,043	\$899,772	\$1,500,815
Mining, Quarrying, and Oil and Gas Extraction	\$0	\$1,025,898	\$84,476	\$1,110,374
Agriculture, Forestry, Fishing and Hunting	\$0	\$51,088	\$167,226	\$218,314
<b>Total</b>	<b>\$371,760,016</b>	<b>\$108,209,617</b>	<b>\$142,827,866</b>	<b>\$622,797,499</b>

Sources: IMPLAN, RESI, Washington Gas

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**Figure 11: Detailed Employee Compensation Impacts of Planned Infrastructure Spending, 2019 - 2023**

<b>Sector</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Construction	\$102,231,784	\$257,154	\$590,424	\$103,079,362
Professional, Scientific, and Technical Services	\$41,725,413	\$12,687,357	\$3,051,722	\$57,464,492
Health Care and Social Assistance	\$0	\$314	\$13,397,625	\$13,397,938
Retail Trade	\$0	\$3,283,536	\$5,547,714	\$8,831,251
Finance and Insurance	\$0	\$1,886,462	\$5,260,192	\$7,146,655
Administrative and Support and Waste Management and Remediation Services	\$0	\$4,367,382	\$2,266,729	\$6,634,111
Wholesale Trade	\$0	\$4,179,182	\$2,293,143	\$6,472,325
Other Services (except Public Administration)	\$0	\$921,115	\$3,986,078	\$4,907,193
Accommodation and Food Services	\$0	\$753,612	\$3,318,803	\$4,072,415
Transportation and Warehousing	\$0	\$1,943,916	\$1,676,072	\$3,619,988
Educational Services	\$0	\$18,777	\$2,491,606	\$2,510,383
Real Estate and Rental and Leasing	\$0	\$2,014,555	\$394,620	\$2,409,175
Information	\$0	\$1,144,699	\$987,885	\$2,132,584
Manufacturing	\$0	\$825,665	\$1,263,059	\$2,088,725
Management of Companies and Enterprises	\$0	\$1,074,301	\$810,974	\$1,885,275
Public Administration	\$0	\$496,921	\$681,476	\$1,178,398
Arts, Entertainment, and Recreation	\$0	\$118,534	\$867,926	\$986,459
Utilities	\$0	\$229,124	\$431,136	\$660,260
Mining, Quarrying, and Oil and Gas Extraction	\$0	\$124,846	\$4,787	\$129,632
Agriculture, Forestry, Fishing and Hunting	\$0	\$10,657	\$25,283	\$35,940
<b>Total</b>	<b>\$143,957,197</b>	<b>\$36,338,110</b>	<b>\$49,347,253</b>	<b>\$229,642,559</b>

Sources: IMPLAN, RESI, Washington Gas