MARCH 2019

THE ECONOMIC IMPACT OF AMERICA'S ELECTRIC COOPERATIVES

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EXPERTS WITH **IMPACT™**

MARCH 2019

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Executive Summary

Electric co-ops supported nearly 612,000 jobs, $440 billion in U.S. GDP from 2013 to 2017

For decades, America's electric cooperatives ("co-ops") have played a vital role in the U.S. economy. Electric co-ops were built by and belong to the consumers they serve, and they are locally-engaged in their communities, driving economic activity, and fostering development. These benefits extend beyond their direct employment, spending, and investments, and they ripple throughout the economy, creating economic value for communities, regions, and the country.

To measure the impact of electric co-ops from 2013 to 2017, the National Rural Electric Cooperative Association ("NRECA")[1] and National Cooperative Services Corporation ("NCSC"), an affiliate of the National Rural Utilities Cooperative Finance Corporation ("CFC"),[2] engaged FTI Consulting, Inc. ("FTI") to perform an economic analysis.

We find that, over the five-year period, America's electric cooperatives contributed $881 billion in U.S. sales output,[3] $440 billion in gross domestic product ("GDP"), $200 billion in labor income, $112 billion in federal, state, and local tax revenues, and supported an average of nearly 612,000 U.S. jobs on an annual basis.

Methodology

To perform this analysis, FTI worked with NRECA and CFC to develop data on the financial scope of electric co-ops, including information on revenues, expenditures for operations, capital investments, maintenance of infrastructure and other types of equipment, and capital credits retired and paid in cash to co-ops' consumer-members.

From 2013 to 2017, electric co-ops spent $359 billion. This included $274 billion on operations, $60 billion on capital investments, $20 billion on maintenance activities, and $5 billion in retired capital credits.[4]

FTI used the data as inputs into a national economic model to simulate the economic effects from the direct expenditures by co-ops. The model calculated the "indirect" effects throughout the industrial supply chain and the "induced" effects from consumer expenditures by the employees of co-ops and their supplier firms.

ES Figure 1 – Categories of economic impacts generated by the modeling

1.	**Direct Impact**	**Definition:** the economic sector under study, in this case, electric co-ops **Examples:** electric co-ops themselves and their immediate expenditures
2.	**Indirect Impact**	**Definition:** industries in the supply chain of the economic sector under study **Examples:** transmission equipment manufacturers and professional services
3.	**Induced Impact**	**Definition:** industries affected by the spending of direct and indirect employees **Examples:** spending on food, real estate, healthcare, and education
4.	**Total Impact**	*The combination of direct, indirect, and induced impacts shows the total contribution of co-ops to the U.S. economy and their communities*

Economic Impact

ES Figure 2 shows what electric co-ops contributed to the U.S. economy from 2013 through 2017 in terms of sales output, GDP, and labor income. While these three metrics are informative on an individual basis, one should note they are not additive because they represent different measures of the same economic activity.

[1] "Our Organization," *National Rural Electric Cooperative Association*, https://www.electric.coop/our-organization/
[2] "About CFC," *National Rural Utilities Cooperative Finance Corporation*, https://www.nrucfc.coop/content/nrucfc/en/about-cfc.html
[3] The sum of all sales revenues across the U.S. economy, both public and private
[4] Electric co-ops operate at cost. They annually allocate excess operating revenue to members based upon the cooperative's business with each member. These are often referred to as allocated "capital credits" or "patronage capital." Electric co-ops use allocated capital credits to expand and improve the electrical system. At a time determined by its board of directors, a co-op "retires" capital credits and pays them in cash – generally by check or bill credits.

ES Figure 2 – Economic impact of electric co-ops on the U.S. economy (2013 to 2017, 2016 $ billions)

STATISTICS	IMPACT	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
Average	**Sales Output**	$71	$61	$44	$176
Total	**Sales Output**	$354	$306	$221	$881
Average	**GDP**	$32	$31	$25	$88
Total	**GDP**	$161	$155	$123	$440
Average	**Labor Income**	$11	$15	$14	$40
Total	**Labor Income**	$55	$76	$69	$200

Employment Impact

The five-year average of U.S. employment supported by electric co-ops was nearly 612,000 jobs (as shown in ES Figure 3). Electric co-ops employed an average of almost 68,000 workers, and their direct expenditures on capital investments and maintenance activities supported another 100,000 direct contractors.

ES Figure 3 also includes the indirect jobs related to the supply chains of electric co-ops and induced jobs connected to the consumer expenditures made by co-op, contractor, and supplier employees. On average, the indirect and induced categories add roughly 170,000 and 273,000 jobs, respectively, to the nationwide employment contribution.

ES Figure 3 – Average U.S. employment supported by electric co-ops (2013 to 2017 annual average, units)

	CATEGORY	JOBS SUPPORTED	DESCRIPTION
	**Direct Impact**	**Co-op employees:** 67,800 **Direct contractors:** 100,600 **Subtotal:** 168,400	*67,800 employees of the electric co-ops themselves and 100,600 direct contractors (estimated by the IMPLAN model based on capital investments or maintenance expenditures by co-ops)*
	**Indirect Impact**	170,300	*Jobs in the supply chain of co-ops' operations, capital investments, and maintenance expenditures, such as jobs involving natural resources, manufacturing, or professional services*
	**Induced Impact**	273,100	*Jobs throughout the U.S. economy supported by the spending of "direct" and "indirect" employees and by the capital credits retired and paid in cash by electric co-ops to consumer-members*
	**Total Impact**	611,800	*U.S. jobs supported by electric co-ops nationally*

Fiscal Impact

The economic activity shown in ES Figure 2 and the jobs in ES Figure 3 support federal, state, and local tax revenues, such as the federal income and payroll taxes paid by electric co-ops' employees.[5] Over the five-years, co-ops supported $52 billion in federal tax revenues and almost $60 billion in state and local tax revenues.

ES Figure 4 – Federal and state/local taxes supported by electric co-ops (2016 $ billions)

TAX CATEGORY	ANNUAL AVERAGE	FIVE-YEAR TOTAL
Federal taxes	$10	$52
State and local taxes	$12	$60

[5] Most electric co-ops are not required to pay federal income taxes directly, though their spending supports federal revenues indirectly because their impacts spread throughout the U.S. economy. Electric co-ops often pay state and local taxes, especially property taxes, though also through other categories.

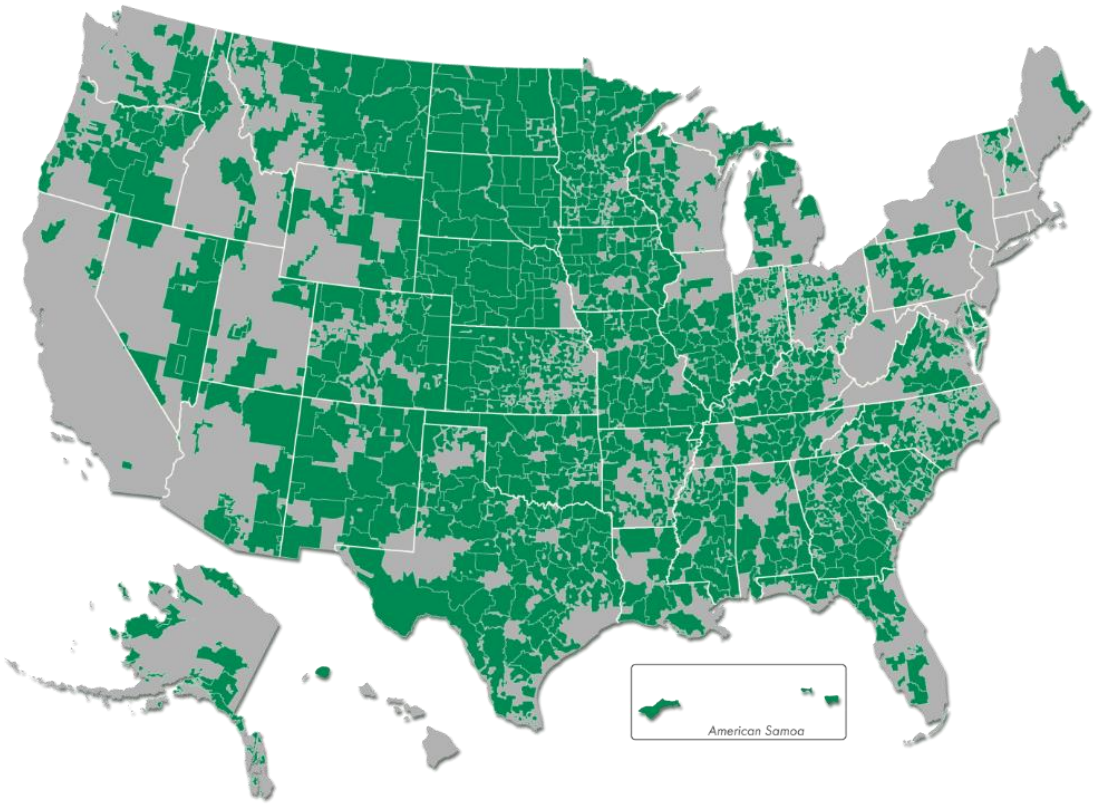
Introduction

Electric cooperatives are consumer-owned, locally-engaged, not-for-profit utilities that provide electricity and other services throughout the United States.[6] Co-ops are community-focused organizations that work to efficiently deliver affordable and reliable electricity to their consumer-members. Because each co-op was built by and belongs to the community it serves, it meets the community's needs and any excess revenue is shared with its members.

Electric co-ops emerged from a national effort to electrify rural areas during the 1930s through the 1960s. In the mid-1930s, only 10 percent of rural American homes had electricity, a number that grew to 90 percent by 1953 and ultimately to 99 percent today.[7] Access to electricity was a vital component of rural economic development, increasing the productivity of traditionally rural industries like agriculture and resource extraction and supporting the diversification of rural economies into activities such as manufacturing, services, healthcare, and technology.

Within the electric power value-chain, co-ops provide a range of services, including the generation, transmission, and distribution of electricity. Electric co-ops are also active in other services that promote economic development, including helping to expand broadband access and other rural infrastructure needs.[8]

Figure 1 – Map of electric co-ops' service territories



[6] See, for instance, Harold D. Wallace, "Power from the people: Rural Electrification brought more than lights," *National Museum of American History*, 12 February 2016, http://americanhistory.si.edu/blog/rural-electrification

[7] "History," *National Rural Electric Cooperative Association*, https://www.electric.coop/our-organization/history/

[8] "Electric Co-ops and Expanded Rural Broadband Access," *National Rural Electric Cooperative Association*, https://www.electric.coop/expanded-rural-broadband-access/

The data and resources underlying this analysis represent 815 distribution co-ops and 57 generation and transmission ("G&T") co-ops.[9] As Figure 1 shows, electric co-ops serve consumer-members throughout the country. Co-op service territories (the green area) cover 56 percent of the U.S. in terms of land area.[10] The regions served by electric co-ops include 42 million Americans (or roughly one in eight residents nationwide).[11]

To determine the economic contribution of electric co-ops to the U.S. economy, FTI used the IMPLAN impact model and relied upon data from NRECA, CFC, and third-party sources that detailed the financial scope, expenditures, activities, and physical infrastructure of electric co-ops from 2013 through 2017.

FTI applied the data to summarize the economic footprint of electric co-ops for the following metrics:

- **Direct** (e.g., co-ops themselves and their direct expenditures), **indirect** (the suppliers for co-ops and their contractors), and **induced** (economic activity supported by consumer spending)
- **Employment** and **labor income**
- **Sales output** and **GDP**
- **Federal, state,** and **local taxes**

[9] We include NRECA's non-electric co-op distribution members, which are primarily public power districts ("PPDs") in states such as Nebraska, under the "co-op" label
[10] "Our Mission," *National Rural Electric Cooperative Association*, https://www.electric.coop/our-mission/we-are-americas-electric-cooperatives/
[11] "Quick Facts," *U.S. Census Bureau*, https://www.census.gov/quickfacts/fact/table/US/PST045217

Methodology and Approach

Data Sources

NRECA and CFC compiled the data for this analysis, which was reported by electric co-ops across the nation.

The data falls into two broad categories as shown in Table 1, including: (1) data from generation and transmission co-ops (abbreviated as "G&T") and (2) data from distribution co-ops.

Table 1 – Summary of input data by co-op type

G&T CO-OP DATA	DISTRIBUTION CO-OP DATA
• Revenues • Operational expenditures • Employment and labor income • Taxes paid • Maintenance expenditures • Capital expenditures • Power generation by technology type • Purchased power	• Revenues • Operational expenditures • Employment and labor income • Taxes paid • Maintenance expenditures • Capital expenditures • Transmission infrastructure • Capital credit retirements • Consumer-member numbers and types • Electricity sales • Power generation • Purchased power

FTI divided the data summarized in Table 1 into four expenditure categories:

1. **Operational** expenditures ("opex")
2. **Maintenance** expenditures (termed "O&M" for *operations and maintenance* when combined with opex)
3. **Capital** expenditures ("capex")
4. **Capital credits** retired to co-op consumer-members

Opex includes the operational expenses for G&T co-ops and distribution co-ops. It also includes co-ops' direct employment and labor income, direct taxes paid, and all remaining data. Opex is derived by subtracting maintenance, capex, and capital credit retirements from total spending and represents the largest of the four categories. Maintenance, combined with opex as "O&M," includes expenditures made by the co-ops explicitly for maintaining their existing capital assets.

Capex includes only capital expenditures, such as funds spent on upgrading or adding a new plant or transmission line, and does not include employment, labor income, or taxes paid directly by co-ops.

Electric co-ops operate at cost. They annually allocate excess operating revenue to members based upon the cooperative's business with each member. These are often referred to as allocated "capital credits" or "patronage capital." Electric co-ops use allocated capital credits to expand and improve the electric system. At a time determined by its board of directors, a co-op "retires" capital credits and pays them in cash – generally by check or bill credits.

FTI mapped the data in these four expenditure categories into inputs for the IMPLAN model.

The IMPLAN Model

The IMPLAN model[12] is an input-output ("IO") model[13] of the U.S. economy and its regions. IMPLAN is widely used throughout the private and public sectors for economic impact analysis and the investigation of public policy. Major user groups include government agencies, academicians, private businesses, and consulting firms.[14]

An IO model works through a series of "multipliers" by industry. A multiplier is a concept embodying the added activity of an industry based on the "direct" impact of that industry's production or spending. Direct activities for co-ops might include the operations of a power plant or transmission system, maintenance of distribution lines, or capital credits retired and paid in cash to consumer-members who receive the rebates as income and spend it.

Direct activities stimulate the "indirect" activities in IMPLAN, which represent a sector's supply chain. For instance, indirect activities related to the power sector and co-ops might include the mining industry extracting coal or gas to fuel power plants, the manufacturing sector creating equipment and materials for capital assets or the maintenance of infrastructure, or the professional services (e.g., legal or engineering) needed for the industry to operate.

Direct and indirect activities each lead to "induced" spending – economic activity resulting from the employees of direct and indirect industries spending their income. An example might include a co-op employee shopping for the needs of everyday life, such as housing, healthcare, education, food, energy, transportation, and entertainment. Another example might include an employee of an electrical equipment manufacturer (an indirect sector) in Ohio taking a vacation to California or Nevada, therefore stimulating economic activity throughout the nation.

In our application of the IMPLAN model, the capital credits returned and paid in cash by co-ops to consumer-members are a form of consumer spending. That is, once provided to consumer-members, these amounts become part of income and spending. A residential consumer-member might use the money from retired capital credits to help finance an improvement to a home, for instance, which then becomes spending in an industry like construction, indirect activity in a support industry such as equipment rentals or wood manufacturers supplying related contractors, and induced spending by contractors' employees throughout the remainder of the supply chain and U.S. economy.

IMPLAN quantifies these effects through multipliers where $1 of direct activity results in a specified amount of indirect and induced activity. The total impact is therefore the sum of the direct, indirect, and induced impacts.

Figure 2 summarizes the four types of economic impacts described by IMPLAN:

Figure 2 – Summary of impact types in the IMPLAN model

1. **DIRECT** – *Economic activity resulting from direct operational, maintenance, and capital expenditures by co-ops as well as direct spending by consumer-members of money from their capital credit retirements*
2. **INDIRECT** – *Economic activity in the supply chain, such as the transportation or extraction of fossil resources or the manufacturing of equipment and materials for capital investments*
3. **INDUCED** – *Spending of co-op employees and workers associated with indirect industries as well as the impacts of the capital credit retirements on the economy, once spent by consumer-members*
4. **TOTAL** – *The sum of direct, indirect, and induced economic activities*

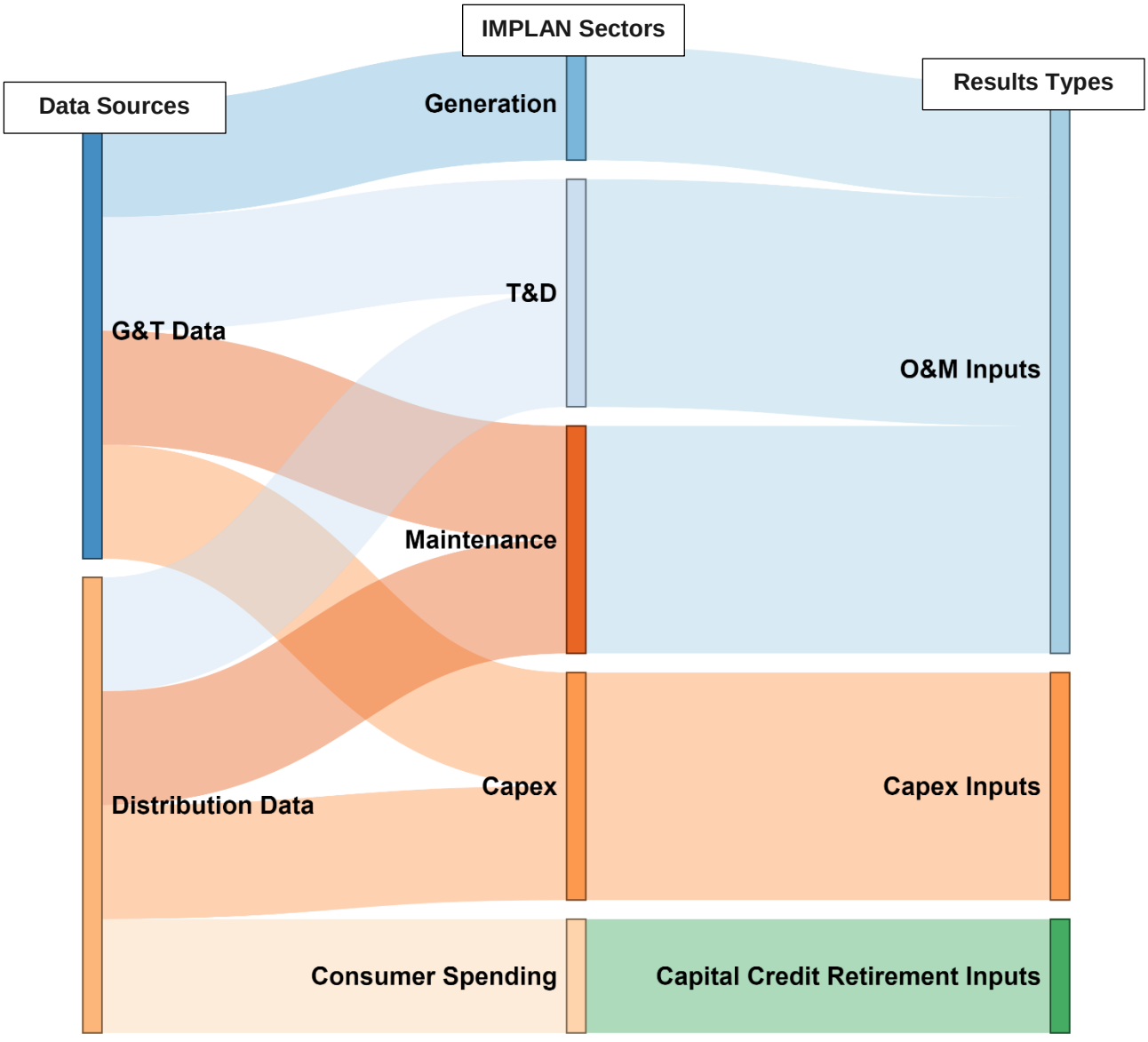
[12] "Home," *IMPLAN*, http://implan.com/
[13] For more background, please see, Will Kenton, "Input-Output Analysis," *Investopedia*, 16 July 2018, https://www.investopedia.com/terms/i/input-output-analysis.asp
[14] "Solutions," *IMPLAN*, https://implan.com/solutions/

Running the IMPLAN model

This section describes the translation of the data from electric co-ops into inputs for the IMPLAN model.

Figure 3 illustrates this process. The column on the left represents the two broad categories of co-op data provided to FTI (i.e., G&T co-op and distribution co-op data). To translate the data into IMPLAN, FTI assigned each spending activity to an IMPLAN sector, such as transmission and distribution ("T&D"). The expenditures flow through their assigned IMPLAN sectors, which generate the direct, indirect, induced, and total impacts. The right column shows the sorting of the direct spending within major results categories for O&M, capex, and capital credit retirements.

Figure 3 – Dataflow of co-ops' input data to IMPLAN variables and results



G&T Co-op Inputs

Capital Expenditures

The data on capex spending by G&T co-ops covered 2013 to 2017. FTI mapped expenditures into IMPLAN as sales for the "new power and communication structures" sector. To estimate the employment and labor income associated with these

expenditures,[15] FTI applied IMPLAN and its data on the underlying labor productivity[16] and average labor income[17] already present in IMPLAN for the industry and geography under analysis.

Operational Expenditures

For G&Ts, the operational data includes total opex, employment, and direct labor income for co-op employees. IMPLAN has more specific inputs available for operational expenditures made by utilities than the raw data provided, and this therefore requires a reasonable methodology for apportioning them into the correct subsectors.

IMPLAN has a combined sector for transmission and distribution and eight sectors for electric power generation based on the technology type, such as hydroelectric, thermal (a combination of coal, natural gas, and oil plants), nuclear, solar, or wind. The input data includes *total* operational expenditures as well as *breakouts* for transmission and distribution expenditures. FTI combined the numbers for transmission and distribution, entered them into the T&D sector in IMPLAN, and used co-op power generation by technology type as a proxy to spread the remaining operational expenditures between the various IMPLAN sectors for different types of power generation.

The input data contains information on electricity generation, including net energy produced (recorded in megawatt-hours, shortened as "MWh") from several technology types. These include coal, nuclear, hydroelectric, gas utilizing combined cycle ("CC") or combustion turbine ("CT") technology, and "other" types in co-op portfolios.[18]

FTI used the share of total generation in MWh for each power type to estimate a share of the generation expenditures for operations within the IMPLAN sectors. For instance, if generation expenditures were $100 million, generation across all technology types was 1,000,000 MWh, and hydroelectric generation was 250,000 MWh, then we would enter 25 percent[19] (or $25 million) of relevant generation expenditures in the IMPLAN hydroelectric sector.

Maintenance Expenditures

FTI categorized the maintenance expenditures into the "maintenance of nonresidential structures" sector in IMPLAN. Maintenance workers related to the activities of co-ops are likely a combination of co-op employees and outside contractors working for external companies who maintain co-ops' equipment, structures, and other energy systems.

We modeled maintenance workers related to co-op activities as a combination of electric co-op employees and third-party contractors. Based on discussions with NRECA and CFC, we modeled 30 percent of maintenance activities for G&T co-ops as contracted services and 70 percent of maintenance activities for distribution co-ops as contracted services, with the remaining shares attributed to electric co-op employees.

Distribution Co-op Inputs

Capital Expenditures

The distribution data reported capital expenditures, which we categorized under the "new power and communication structures" industry in IMPLAN. We then used IMPLAN's data on the underlying labor productivity and labor income by industry for the region to estimate the direct employment and labor income.

Operational Expenditures

The input data reported direct opex, employment, and labor income for electric co-ops' distribution activities. FTI modeled these inputs in the T&D sector in IMPLAN, the same as with the T&D inputs for the G&T data, but without the various and essential adjustments involving the power generation sectors from the G&T data.

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[15] This is an application of IMPLAN beyond using it to estimate the indirect and induced effects from direct employment or spending
[16] "Labor productivity" quantities the necessary labor inputs for a given quantity of output and, therefore, can help in estimating labor needs when output is known
[17] With output, labor productivity, and average labor income, one can first estimate the jobs needed and then multiply that by average labor income to estimate total labor income
[18] FTI sorted the NRECA "other" category into the IMPLAN categories for solar, wind, geothermal, biomass, and "all other" based on the state share of output for each of the same divided by their sum, usually a small proportion of the total after accounting for hydroelectric, thermal, and nuclear generation in the data
[19] 250,000 MWh / 1,000,000 MWh = 25 percent

Maintenance Expenditures

The distribution data reported expenditures on maintenance. FTI entered this into the "maintenance of nonresidential structures" industry. As previously mentioned with G&T data, FTI assumed 70 percent of maintenance employment for distribution co-ops went to outside contractors based on discussions with NRECA and CFC.

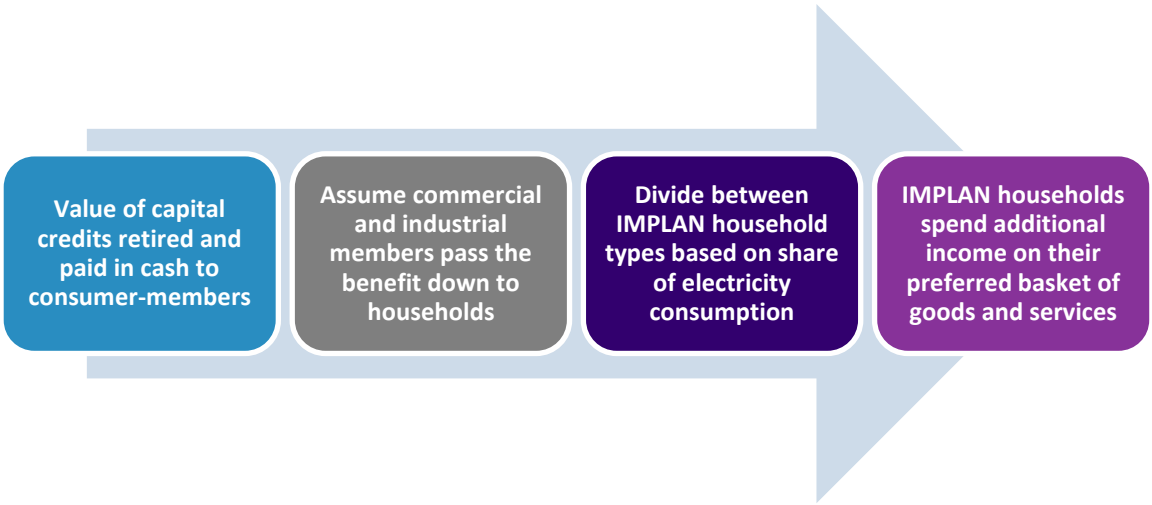
Capital Credit Retirement Expenditures

To model the impact of capital credits retired and paid in cash to consumer-members, FTI inputted their value into IMPLAN as consumer spending. FTI modeled all capital credit retirements in this manner, *including* those retired and paid in cash to commercial and industrial consumer-members. IMPLAN cannot represent lower electricity prices to commercial and industrial consumer-members; we therefore presumed the value to commercial and industrial consumer-members is passed down to households in the form of lower prices or higher wages, boosting household purchasing power.[20]

To input capital credits as consumer spending in the IMPLAN model, we assigned a portion of the capital credit retirements to each of IMPLAN's nine categories of households. Each household type in IMPLAN is based on a level of income[21] and has a different set of preferences (or preferred "basket" of goods and services that it tends to consume). For instance, low-income households in IMPLAN tend to concentrate most of their income/spending on necessities while high-income households tend to spend more of their income on luxuries, such as travel and personal services.

To translate capital credit retirements into IMPLAN, we divided the dollar value of the capital credits retired between the nine types of households based on each household type's share of spending on electricity out of total household spending on electricity. Each household type then spends its allotted portion of the retired capital credits based on its basket of goods and services. For example, at the U.S. level, households with incomes between $70,000 and $100,000 per year purchase 16.7 percent of residential electricity in IMPLAN. If retired capital credits total $100 for the year, that household grouping receives $16.70. IMPLAN represents this benefit to the economy by increasing this specific household group's spending on goods and services by $16.70 across its consumption basket. Figure 4 below illustrates this process.

Figure 4 – Steps for implementing the effects of the capital credit retirements in the IMPLAN model



Tax Payments

The input data included tax payments made by co-ops in the broad G&T and distribution categories. FTI implemented this data in IMPLAN's calculation of federal taxes supported and state/local taxes supported.

[20] This is necessary in a "static" model such as IMPLAN or IO models generally without price variables
[21] The lowest is less than $15,000 per year while the highest is more than $200,000 per year

Economic Impact

Summary of Results

Table 2 shows the economic impact of the electric co-op sector in terms of U.S. sales output, U.S. GDP, and U.S. labor income. The statistics include annual results for 2013 through 2017, the annual average, and the total across the five-year period. The direct impact includes *both* the co-ops themselves as well as their capex and maintenance contractors, and the induced impact includes the entirety of the impacts from the capital credit retirements.

Table 2 – U.S. economic activity supported by electric co-ops (2016 $ billions)

YEAR	METRIC	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT[22]	TOTAL IMPACT
2013	Sales Output	$69.5	$59.6	$43.2	$172.3
2014	Sales Output	$73.0	$62.9	$45.2	$181.1
2015	Sales Output	$70.2	$60.8	$43.9	$174.8
2016	Sales Output	$70.6	$61.0	$44.1	$175.8
2017	Sales Output	$71.1	$61.7	$44.4	$177.3
Average	**Sales Output**	**$70.9**	**$61.2**	**$44.2**	**$176.3**
Total	**Sales Output**	**$354.4**	**$306.1**	**$220.8**	**$881.3**
2013	GDP	$31.8	$30.2	$24.1	$86.2
2014	GDP	$33.2	$31.9	$25.3	$90.4
2015	GDP	$31.9	$30.8	$24.5	$87.2
2016	GDP	$32.2	$30.9	$24.7	$87.7
2017	GDP	$32.3	$31.2	$24.9	$88.4
Average	**GDP**	**$32.3**	**$31.0**	**$24.7**	**$88.0**
Total	**GDP**	**$161.3**	**$155.0**	**$123.5**	**$439.9**
2013	Labor Income	$11.0	$14.9	$13.6	$39.5
2014	Labor Income	$11.0	$15.7	$14.2	$40.9
2015	Labor Income	$10.6	$15.1	$13.8	$39.5
2016	Labor Income	$11.0	$15.2	$13.9	$40.1
2017	Labor Income	$11.1	$15.3	$14.0	$40.4
Average	**Labor Income**	**$10.9**	**$15.3**	**$13.9**	**$40.1**
Total	**Labor Income**	**$54.7**	**$76.3**	**$69.5**	**$200.4**

In 2017, electric co-ops contributed $88.4 billion to U.S. GDP. This comprised approximately 0.47 percent of the U.S. GDP of $19.4 trillion for that year.[23] Electric co-ops also contributed $177.3 billion in sales output and $40.4 billion in labor income for 2017, slightly down from the peak impact across all three metrics in 2014.

Table 3 shows the jobs supported throughout the U.S. economy by electric co-ops. These impacts include all categories of expenditures, including those on operations, capex, maintenance, and capital credit retirements. The column headers include the co-ops' employees, contractors, and the indirect, induced, and total impacts. The average employment supported by co-ops across the five-year period is 611,800 – or 0.31 percent of all U.S. jobs in 2017.[24]

[22] Includes the total impact of the capital credit retirements
[23] Adjusted to 2016 prices, "Gross Domestic Product," *Federal Reserve Economic Data*, https://fred.stlouisfed.org/series/GDP
[24] "Regional Economic Accounts," *Bureau of Economic Analysis*, https://www.bea.gov/data/economic-accounts/regional

Table 3 – U.S. employment supported by electric co-ops (thousands)

YEAR	DIRECT CO-OP EMPLOYEES	DIRECT CONTRACTORS[25]	INDIRECT IMPACT	INDUCED IMPACT[26]	TOTAL IMPACT
2013	67.6	106.8	166.9	267.0	608.3
2014	68.0	101.3	175.2	279.7	624.3
2015	67.1	97.2	168.7	271.3	604.3
2016	68.1	100.0	169.6	272.7	610.4
2017	68.2	97.6	170.9	274.9	611.6
Average	**67.8**	**100.6**	**170.3**	**273.1**	**611.8**

Table 4 shows the expenditures made by electric co-ops from 2013 through 2017 based on the type of co-op and category of expenditure. Over the period, co-ops spent $273.8 billion on operations, $60.3 billion on capital investments, $20.3 billion on maintenance, and retired $5.0 billion in capital credits. The difference in direct sales output from Table 2 and the total in Table 4 is the $5.0 billion in capital credit retirements counting as "induced" in the former.

Table 4 – Summary of 2013 through 2017 expenditures (2016 $ billions)

CO-OP TYPE	INPUT CATEGORY	ANNUAL AVERAGE	FIVE-YEAR TOTAL
G&T	**Opex[27]**	$18.7	$93.6
	Capex	$5.8	$28.8
	Maintenance	$1.7	$8.3
	Capital Credit Retirements	$0.0	$0.0
	Total	**$26.1**	**$130.7**
Distribution	**Opex**	$36.0	$180.2
	Capex	$6.3	$31.5
	Maintenance	$2.4	$12.0
	Capital Credit Retirements	$1.0	$5.0
	Total	**$45.7**	**$228.7**
Total	**Opex**	$54.8	$273.8
	Capex	$12.1	$60.3
	Maintenance	$4.1	$20.3
	Capital Credit Retirements	$1.0	$5.0
	Total	**$71.9**	**$359.5**

[25] Estimated by the IMPLAN model based on co-op expenditures for capex and maintenance
[26] Includes the entirety of the impact from capital credit retirements
[27] Opex includes all operational expenditures not elsewhere classified as maintenance

Impact to Employment

Table 5 shows the employment impact of electric co-ops from 2013 through 2017. It reports columns for the direct impact, which includes both employees of the co-ops themselves and direct contractors estimated by the IMPLAN model,[28] as well as the indirect, induced, and total impacts based on the IMPLAN modeling.

Built up through the categories, electric co-ops influence U.S. employment in several ways. Co-ops employ 67,800 workers (annual average from 2013 through 2017) and add 100,600 jobs through direct spending, mostly with capital expenditures. The sector has a total direct impact of 168,400 jobs as well as another 170,300 for indirect supplier jobs and 273,100 induced jobs, of which 15,600 come from capital credits retired and paid in cash to consumer-members.

Altogether, the electric co-op sector supported between 604,300 and 624,300 U.S. jobs annually over the study period.

Table 5 – U.S. employment supported by electric co-ops (thousands of jobs)

YEAR	CATEGORY	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
2013	O&M	73.1	135.4	181.9	390.3
2014	O&M	73.7	144.7	194.4	412.7
2015	O&M	73.2	140.3	189.0	402.5
2016	O&M	74.2	140.2	188.9	403.2
2017	O&M	74.4	142.3	191.9	408.5
Average	**O&M**	**73.7**	**140.5**	**189.2**	**403.5**
2013	Capex	101.3	31.5	72.5	205.4
2014	Capex	95.6	30.6	70.3	196.5
2015	Capex	91.0	28.4	65.4	184.9
2016	Capex	93.9	29.4	67.7	191.1
2017	Capex	91.4	28.6	65.9	185.9
Average	**Capex**	**94.7**	**29.7**	**68.4**	**192.8**
2013	Capital Credit Retirements	0.0	0.0	12.6	12.6
2014	Capital Credit Retirements	0.0	0.0	15.1	15.1
2015	Capital Credit Retirements	0.0	0.0	16.9	16.9
2016	Capital Credit Retirements	0.0	0.0	16.1	16.1
2017	Capital Credit Retirements	0.0	0.0	17.2	17.2
Average	**Capital Credit Retirements**	**0.0**	**0.0**	**15.6**	**15.6**
2013	Total	174.4	166.9	267.0	608.3
2014	Total	169.3	175.2	279.7	624.3
2015	Total	164.2	168.7	271.3	604.3
2016	Total	168.1	169.6	272.7	610.4
2017	Total	165.8	170.9	274.9	611.6
Average	**Total**	**168.4**	**170.3**	**273.1**	**611.8**

[28] For instance, if there is a direct expenditure of $1 million and labor productivity is $100,000 per worker, then IMPLAN would estimate ten workers. The same process repeats at a larger scale in estimating the direct contractor employment for maintenance and capex.

Impact to Sales Output

Sales output is akin to GDP with one important difference; while GDP measures value-added as the sum of all *net* economic activity, sales output is the sum of all *gross* revenues, production, or sales. If a co-op purchases a vehicle for maintenance, the sales related to the vehicle include its purchased price *and* the price of any of its *components*, such as its tires. GDP subtracts the value of intermediate inputs from final production – sales output does not.

Table 6 – U.S. sales output supported by electric co-ops (2016 $ billions)

YEAR	CATEGORY	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
2013	O&M	$56.7	$52.4	$29.5	$138.6
2014	O&M	$60.6	$55.9	$31.5	$148.0
2015	O&M	$58.7	$54.3	$30.6	$143.5
2016	O&M	$58.7	$54.3	$30.6	$143.6
2017	O&M	$59.5	$55.2	$31.1	$145.8
Average	**O&M**	**$58.8**	**$54.4**	**$30.7**	**$143.9**
Total	**O&M**	**$294.1**	**$272.1**	**$153.4**	**$719.5**
2013	Capex	$12.8	$7.2	$11.8	$31.8
2014	Capex	$12.4	$7.0	$11.4	$30.8
2015	Capex	$11.5	$6.5	$10.6	$28.7
2016	Capex	$12.0	$6.7	$11.0	$29.7
2017	Capex	$11.6	$6.6	$10.7	$28.8
Average	**Capex**	**$12.1**	**$6.8**	**$11.1**	**$29.9**
Total	**Capex**	**$60.3**	**$34.0**	**$55.4**	**$149.7**
2013	Capital Credit Retirements	$0.0	$0.0	$2.0	$2.0
2014	Capital Credit Retirements	$0.0	$0.0	$2.3	$2.3
2015	Capital Credit Retirements	$0.0	$0.0	$2.6	$2.6
2016	Capital Credit Retirements	$0.0	$0.0	$2.5	$2.5
2017	Capital Credit Retirements	$0.0	$0.0	$2.7	$2.7
Average	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$2.4**	**$2.4**
Total	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$12.1**	**$12.1**
2013	Total	$69.5	$59.6	$43.2	$172.3
2014	Total	$73.0	$62.9	$45.2	$181.1
2015	Total	$70.2	$60.8	$43.9	$174.8
2016	Total	$70.6	$61.0	$44.1	$175.8
2017	Total	$71.1	$61.7	$44.4	$177.3
Average	**Total**	**$70.9**	**$61.2**	**$44.2**	**$176.3**
Total	**Total**	**$354.4**[29]	**$306.1**	**$220.8**	**$881.3**

[29] The difference between this number and the $359.5 billion total in Table 4 is the $5.0 billion in capital credit retirements, which are counted as an induced impact

Impact to GDP

GDP represents the value-added through the *net* economic contribution of electric co-ops.[30] We find that electric co-ops contributed an aggregate of $440 billion to U.S. GDP over the five-year period (or $88 billion annually). For reference, U.S GDP was $19.4 trillion in 2017, meaning electric co-ops were responsible for approximately 0.47 percent of the U.S. economy as measured by GDP. According to the U.S. Bureau of Economic Analysis,[31] the annual GDP contribution is similar in magnitude to the annual GDP of states such as Hawaii, New Hampshire, or New Mexico.

Table 7 – U.S. GDP supported by electric co-ops (2016 $ billions)

YEAR	CATEGORY	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
2013	O&M	$23.7	$26.7	$16.5	$66.8
2014	O&M	$25.3	$28.4	$17.6	$71.4
2015	O&M	$24.6	$27.6	$17.1	$69.2
2016	O&M	$24.6	$27.6	$17.1	$69.3
2017	O&M	$24.9	$28.0	$17.4	$70.3
Average	**O&M**	**$24.6**	**$27.7**	**$17.1**	**$69.4**
Total	**O&M**	**$123.1**	**$138.3**	**$85.6**	**$347.0**
2013	Capex	$8.1	$3.6	$6.6	$18.2
2014	Capex	$7.9	$3.4	$6.4	$17.7
2015	Capex	$7.3	$3.2	$5.9	$16.4
2016	Capex	$7.6	$3.3	$6.1	$17.0
2017	Capex	$7.4	$3.2	$6.0	$16.6
Average	**Capex**	**$7.7**	**$3.4**	**$6.2**	**$17.2**
Total	**Capex**	**$38.3**	**$16.8**	**$30.9**	**$85.9**
2013	Capital Credit Retirements	$0.0	$0.0	$2.0	$2.0
2014	Capital Credit Retirements	$0.0	$0.0	$2.3	$2.3
2015	Capital Credit Retirements	$0.0	$0.0	$2.6	$2.6
2016	Capital Credit Retirements	$0.0	$0.0	$2.5	$2.5
2017	Capital Credit Retirements	$0.0	$0.0	$2.7	$2.7
Average	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$0.4**	**$1.4**
Total	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$2.2**	**$6.9**
2013	Total	$31.8	$30.2	$24.1	$86.2
2014	Total	$33.2	$31.9	$25.3	$90.4
2015	Total	$31.9	$30.8	$24.5	$87.2
2016	Total	$32.2	$30.9	$24.7	$87.7
2017	Total	$32.3	$31.2	$24.9	$88.4
Average	**Total**	**$32.3**	**$31.0**	**$24.7**	**$88.0**
Total	**Total**	**$161.3**	**$155.0**	**$123.5**	**$439.9**

[30] Phil Cheney, "Gross Domestic Product," *IMPLAN*, https://implanhelp.zendesk.com/hc/en-us/articles/115009666808-Gross-domestic-product-GDP-

[31] "Regional Economic Accounts," *Bureau of Economic Analysis*, https://www.bea.gov/data/economic-accounts/regional

This dollar value alone does not capture the vital role affordable electricity plays in enabling the wider economy – a role only increasing in a world of advancing automation, digitalization, and interconnectivity.

Impact to Labor Income

Within IMPLAN, labor income is the sum of wages, salaries, benefits,[32] proprietors' income, and other earnings.[33] Labor income represents households' share of the economic activity measured by GDP.

Table 8 – U.S. labor income supported by electric co-ops (2016 $ billions)

YEAR	CATEGORY	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
2013	O&M	$5.4	$12.7	$9.3	$27.4
2014	O&M	$5.5	$13.6	$9.9	$29.0
2015	O&M	$5.6	$13.2	$9.6	$28.4
2016	O&M	$5.8	$13.2	$9.6	$28.6
2017	O&M	$6.0	$13.4	$9.8	$29.2
Average	**O&M**	**$5.6**	**$13.2**	**$9.6**	**$28.5**
Total	**O&M**	**$28.2**	**$66.0**	**$48.2**	**$142.5**
2013	Capex	$5.6	$2.2	$3.7	$11.5
2014	Capex	$5.5	$2.1	$3.6	$11.2
2015	Capex	$5.0	$2.0	$3.3	$10.3
2016	Capex	$5.3	$2.0	$3.4	$10.7
2017	Capex	$5.1	$2.0	$3.4	$10.4
Average	**Capex**	**$5.3**	**$2.0**	**$3.5**	**$10.8**
Total	**Capex**	**$26.4**	**$10.2**	**$17.4**	**$54.1**
2013	Capital Credit Retirements	$0.0	$0.0	$0.6	$0.6
2014	Capital Credit Retirements	$0.0	$0.0	$0.8	$0.8
2015	Capital Credit Retirements	$0.0	$0.0	$0.8	$0.8
2016	Capital Credit Retirements	$0.0	$0.0	$0.8	$0.8
2017	Capital Credit Retirements	$0.0	$0.0	$0.9	$0.9
Average	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$0.8**	**$0.8**
Total	**Capital Credit Retirements**	**$0.0**	**$0.0**	**$3.9**	**$3.9**
2013	Total	$11.0	$14.9	$13.6	$39.5
2014	Total	$11.0	$15.7	$14.2	$40.9
2015	Total	$10.6	$15.1	$13.8	$39.5
2016	Total	$11.0	$15.2	$13.9	$40.1
2017	Total	$11.1	$15.3	$14.0	$40.4
Average	**Total**	**$10.9**	**$15.3**	**$13.9**	**$40.1**
Total	**Total**	**$54.7**	**$76.3**	**$69.5**	**$200.4**

[32] Predominantly the cash-equivalent value of employer-provided health insurance plans

[33] Phil Cheney, "Labor Income," *IMPLAN*, https://implanhelp.zendesk.com/hc/en-us/articles/115009668468-Labor-Income

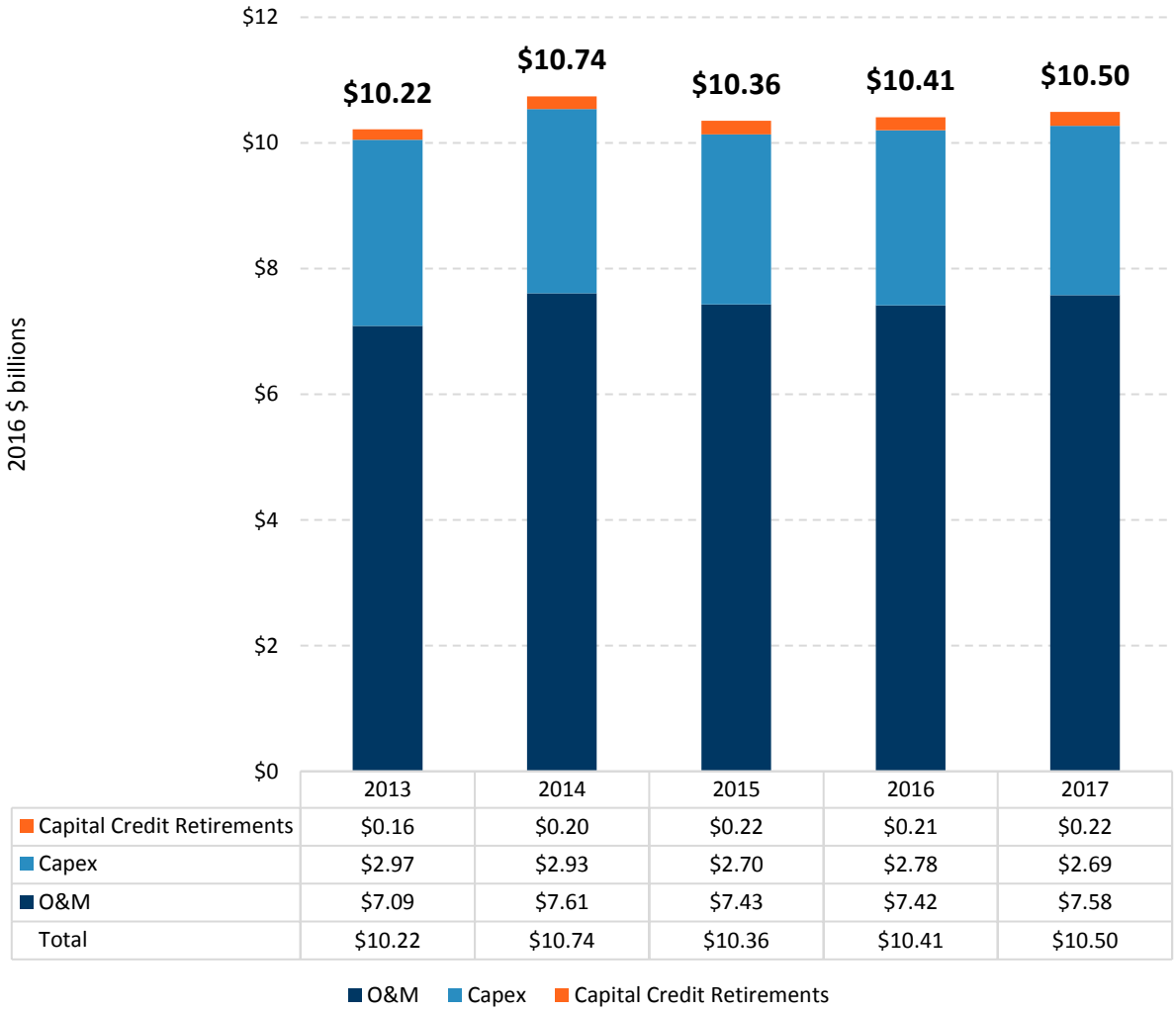
Fiscal Impact

The economic activity above, as measured by the four metrics, supports additional tax revenues nationally.

Federal Tax Revenues

IMPLAN calculates the federal taxes supported by direct, indirect, and induced activity. Most federal tax revenues in IMPLAN are from income and payroll taxes, which are usually the largest sources of tax revenues from numerous industries, especially in the utility sector.[34] Other federal tax categories in IMPLAN include excise taxes, such as the federal gas tax and customs duties, both of which also contribute to the federal fiscal impact. Figure 5 shows the impact of co-ops on federal taxes, which totals $52 billion over the five-year period. In 2013, co-ops generated $10.2 billion in tax revenue, peaking at $10.7 billion in 2014 and stabilizing around $10.4 billion through 2017.

Figure 5 – Federal taxes supported by co-op economic activity



	2013	2014	2015	2016	2017
Capital Credit Retirements	$0.16	$0.20	$0.22	$0.21	$0.22
Capex	$2.97	$2.93	$2.70	$2.78	$2.69
O&M	$7.09	$7.61	$7.43	$7.42	$7.58
Total	$10.22	$10.74	$10.36	$10.41	$10.50

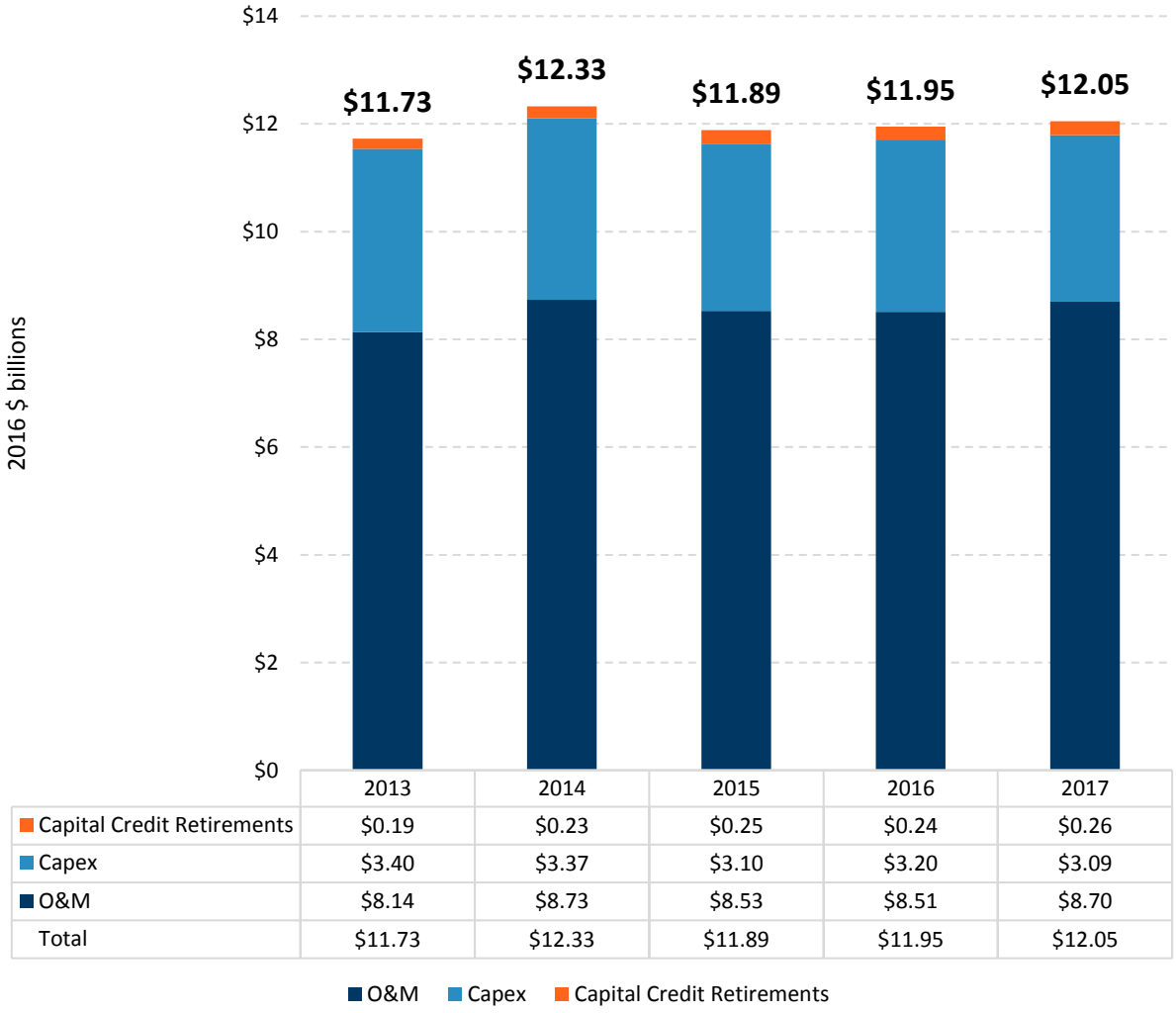
[34] Electric co-ops are generally exempt from paying federal taxes, leaving most of their impact to federal tax collections to come from income and payroll tax payments by co-ops' employees, the employees of indirect and induced industries, and the companies in indirect and induced industries

State and Local Tax Revenues

IMPLAN calculates a *combined* result for state and local tax revenues supported by economic activity. State and local taxes come from a more diverse set of sources compared to the dependency of the federal budget on income and payroll taxes, though income taxes factor into most state budgets and budgets for large cities and urbanized counties throughout the country. IMPLAN also includes sales taxes, property taxes, business taxes, and specific excise taxes on items such as motor fuels, and taxes on specific activities, such as the severance tax in some states.[35]

Electric co-ops supported nearly $60 billion in state and local tax revenues over the five-year period. For example, in 2014, co-ops generated a peak of $12.3 billion in state and local tax revenue, 15 percent higher than the $10.7 billion in federal tax revenues generated by co-ops shown above in Figure 5 for 2014. The mix of contributions from the input categories remains similar, with opex spending contributing the most to co-ops' supported state and local taxes.

Figure 6 – State and local taxes supported by co-op economic activity



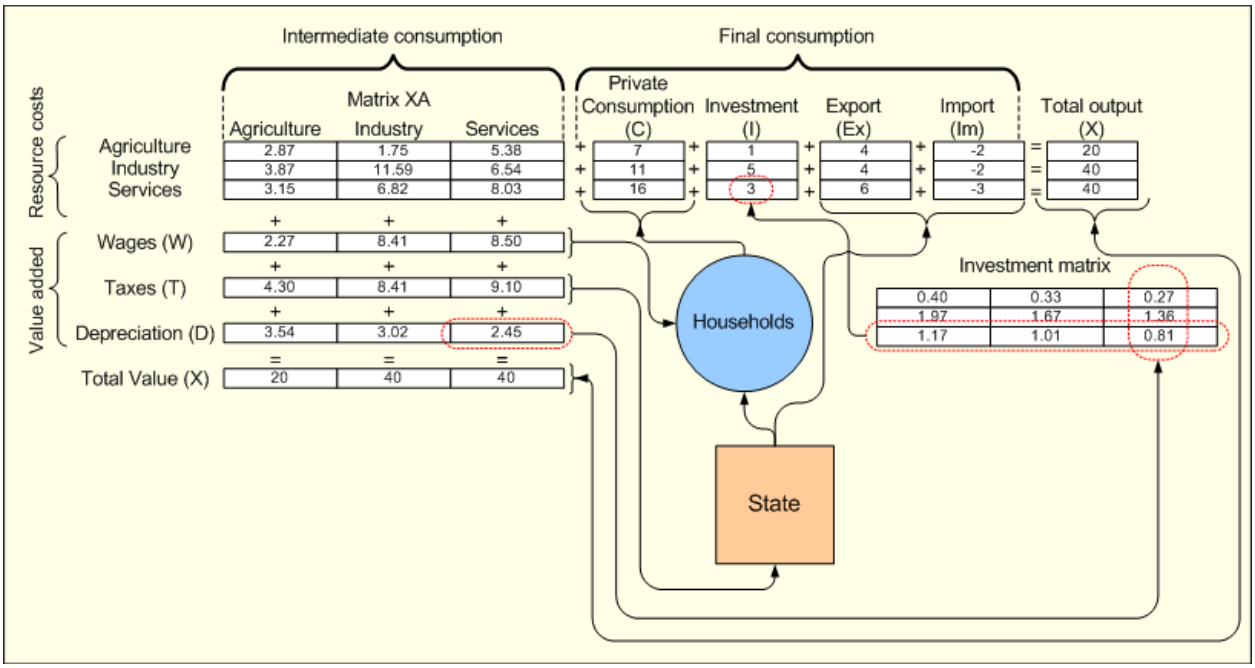
	2013	2014	2015	2016	2017
Capital Credit Retirements	$0.19	$0.23	$0.25	$0.24	$0.26
Capex	$3.40	$3.37	$3.10	$3.20	$3.09
O&M	$8.14	$8.73	$8.53	$8.51	$8.70
Total	$11.73	$12.33	$11.89	$11.95	$12.05

[35] While electric co-ops are typically exempted from federal taxes, many are not from state and local taxes and oftentimes pay significant state and local taxes in categories such as property taxes, sales taxes (for everyday purchases for operations), and other categories

Appendix A – IMPLAN Structure

The diagram in Figure 7 shows an example IO model. Three sectors trade with each other to produce, requiring labor inputs from households and paying them with wages, while paying taxes to the government. The industries also need to make investments to counter depreciation, and the model includes a representation of imports and exports where the sources of supply might not come from the immediate, local region – or in the case of a national model, from the U.S. as opposed to a trading partner in North America or overseas. The IMPLAN model underlying this study works on similar principles but includes additional industrial sectors and real data for the U.S. and its regions.

Figure 7 – Example IO model structure with three example industries[36]



[36] Danylo Kozub, "Microsimulation model of national economy MSMNE-02," http://dankozub.com/simulation/

Appendix B – Detailed Dataflow Diagrams

Figure 8 – Dataflow of co-ops' input data to IMPLAN variables and results (2013 to 2017, 2016 $ billions)

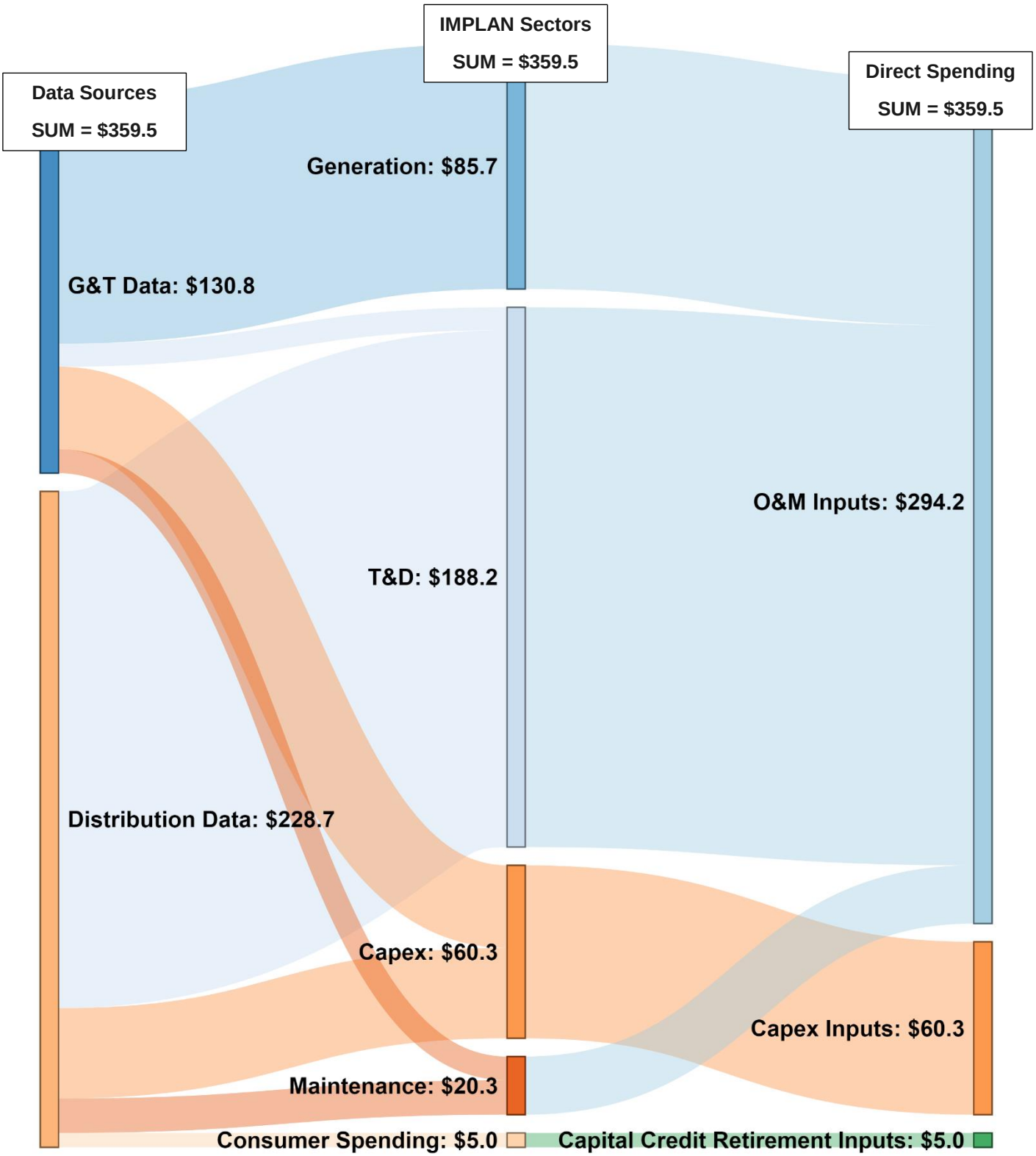


Figure 9 – Expanding Figure 8 and Table 6 into direct, indirect, and induced U.S. sales output (2013 to 2017, 2016 $ billions)

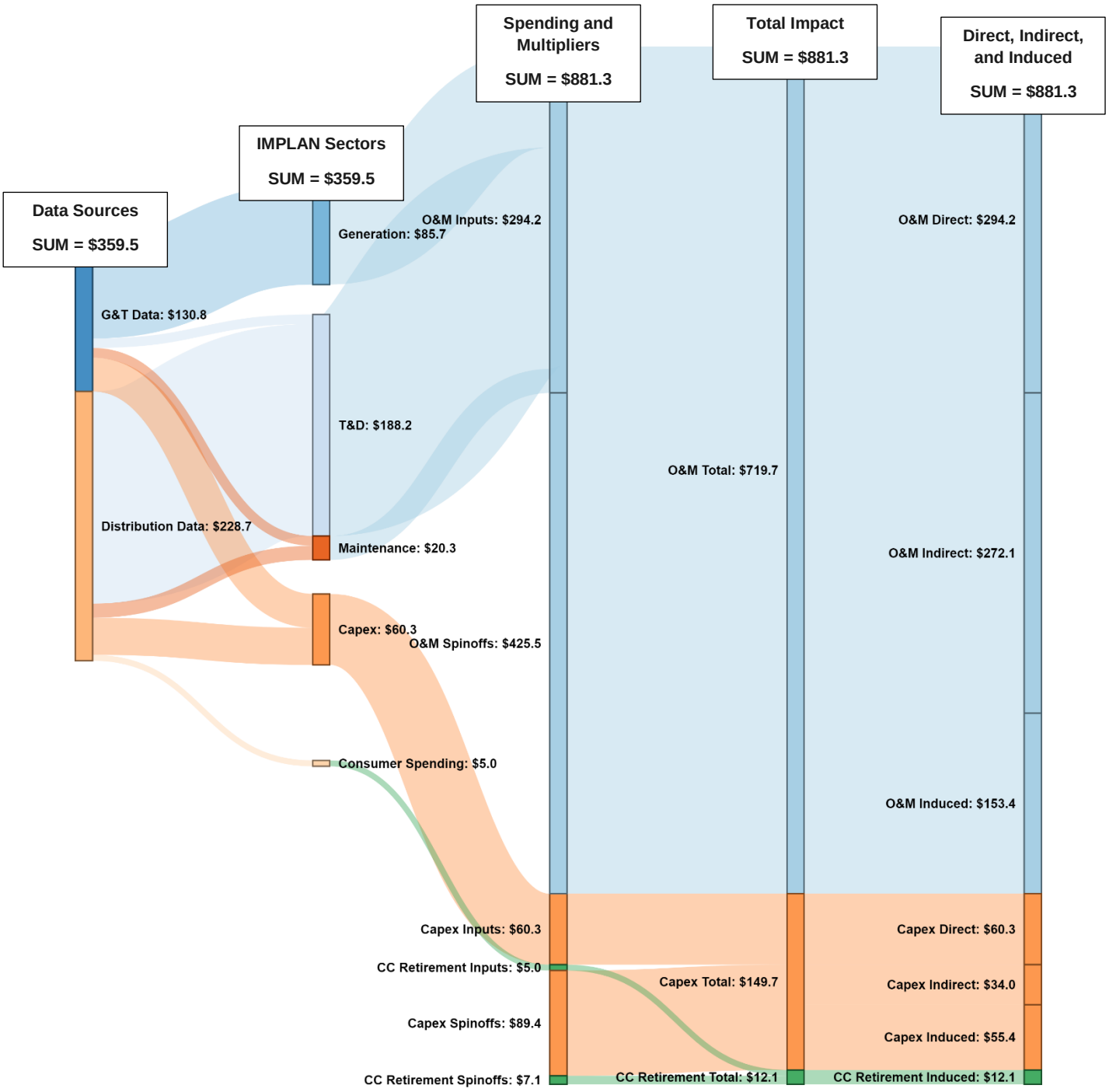


Figure 9 includes the expenditure data from Figure 8, and expands upon it with the impacts to U.S. sales output from Table 6 of the economic impacts, showing the whole process from inputs, to IMPLAN, to the results.

The central column adds co-ops' expenditures to IMPLAN's multipliers (shown as the "spinoffs" above) before sorting them into results in the right-center column. In the far-right column, Figure 9 breaks out the impacts for O&M, capex, and the capital credit retirements ("CC retirement") into their direct, indirect, and induced results.

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