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June 25, 2020

Via Electronic Filing

Ms. Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, Pennsylvania 17120

Re: Periodic Review of Duquesne Light Company's Long Term Infrastructure Improvement Plan
Docket No. M-2020-3019708

Dear Secretary Chiavetta:

Enclosed for filing, please find Duquesne Light Company's Comments regarding the Pennsylvania Public Utility Commission's Period Review of Duquesne Light Company's Long Term Infrastructure Improvement Plan.

If you have any questions or required additional information, please contact me.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Tishekia E. Williams".

Tishekia E. Williams
Director, Regulatory

cc: Certificate of Service
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CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing have been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

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Date: June 25, 2020



Tishekia Williams, Esq.

Duquesne Light Company
Long Term Infrastructure Improvement Plan (LTIIP)
Midterm Review
June 2020

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I. Background

Duquesne Light Company (“DLC” or “Company”) is a public utility as that term is defined under Section 102 of the Public Utility Code, 66 Pa. C.S. § 102, certificated by the Pennsylvania Public Utility Commission (“PUC” or “Commission”) to provide electric service in the City of Pittsburgh and in Allegheny and Beaver Counties in Pennsylvania. DLC is also an electric distribution company (“EDC”) as that term is defined under Section 2803 of the Public Utility Code, 66 Pa. C.S. § 2803. DLC provides electric distribution service to approximately 600,000 customers within its service territory that covers approximately 817 square miles.

On April 15, 2016, DLC filed a Long Term Infrastructure Improvement Plan (“LTIIIP”). In preparing its LTIIIP, DLC followed the guidelines established in the Commission’s August 2, 2012 Final Implementation Order. The LTIIIP provides for accelerated replacement of distribution system improvement charge (“DSIC”) eligible property to support and fulfill the goals of Act 11, which are aimed at constructing, installing, rehabilitating, improving, and replacing portions of the Pennsylvania electric distribution system in an accelerated time frame to the betterment of Pennsylvania electricity customers. The LTIIIP supports and enhances DLC’s continuing efforts to sustain its high level of reliability and safety that could otherwise suffer due to normal degradation of facilities that occurs with time and natural environmental stresses. The Company’s LTIIIP was approved as filed on September 15, 2016.

DLC’s Commission-approved LTIIIP includes five (5) asset programs and nine (9) initiatives. Details regarding the asset programs included factors used to identify the need for the project, average age of the asset, scope of the project including the number of units to be replaced or improved over the next six years, the approximate location by geographic region for the projects, and the annual expenditures for 2017 through 2022 for each asset class. The asset programs address DLC’s areas of aged infrastructure, which are approaching the end of their expected useful life.

By most measures, DLC’s LTIIIP has successfully aided the Company in maintaining the reliability of the overall distribution system and enhancing the reliability of assets repaired and replaced under the LTIIIP initiatives. For example, as illustrated in Table 1 below, the 4kV

elimination initiative significantly improved System Average Interruption Duration Index (“SAIDI”) performance with respect to equipment failures. The Company believes that this is directly attributed to reducing the age of its infrastructure. Additional information regarding the LTIP initiative performance is detailed below.

II. Summary of LTIP Spending Progress

Overall, DLC is on track with the spending forecasted in its LTIP. The following tables provide the actual and forecasted spending as compared to the LTIP spending projections included in the plan. The LTIP projections are in the columns labelled “Plan.” The other columns provide the actual and current forecasted spend as applicable.

<i>All Figures are \$Millions</i>	2017-2019	2017-2019	2020-2022	2020-2022	2017-2022	2017-2022
LTIP Initiative	Plan	Actual	Plan	Forecast	Plan	Forecast
4kV Program						
4kV Substation Elimination	\$ 88.0	\$ 65.2	\$ 7.5	\$ 21.9	\$ 95.5	\$ 87.1
Stepdown Transformer Conversion	\$ 13.4	\$ 14.7	\$ 8.3	\$ 4.1	\$ 21.7	\$ 18.8
Modular Integrated Transformer System	\$ 18.0	\$ 14.8	\$ -	\$ 4.1	\$ 18.0	\$ 18.9
Subtotal - 4kv Program	\$ 119.4	\$ 94.7	\$ 15.8	\$ 30.0	\$ 135.2	\$ 124.8
Overhead Program						
Aerial Cable Replacement	\$ 20.1	\$ 18.2	\$ 6.5	\$ 17.8	\$ 26.6	\$ 36.0
Subtotal - Overhead Program	\$ 20.1	\$ 18.2	\$ 6.5	\$ 17.8	\$ 26.6	\$ 36.0
Underground Program						
Underground Cable Replacement	\$ 11.5	\$ 10.1	\$ 3.5	\$ -	\$ 15.0	\$ 10.1
Network Transformer and Protector Replacement	\$ 14.3	\$ 11.2	\$ 8.2	\$ 8.4	\$ 22.5	\$ 19.7
Underground Residential Distribution Rehabilitation	\$ 12.7	\$ 14.8	\$ 15.3	\$ 13.9	\$ 28.0	\$ 28.7
Subtotal - Underground Program	\$ 38.5	\$ 36.2	\$ 27.0	\$ 22.3	\$ 65.5	\$ 58.5
Substations Program						
Breaker & Switch Replacements	\$ 12.1	\$ 17.3	\$ 10.8	\$ 13.3	\$ 22.9	\$ 30.6
Substation Upgrades	\$ 6.0	\$ 5.8	\$ -	\$ 0.0	\$ 6.0	\$ 5.8
Subtotal - Substations Program	\$ 18.1	\$ 23.1	\$ 10.8	\$ 13.3	\$ 28.9	\$ 36.4
Highway Relocation Program						
Unreimbursed Highway Relocations	\$ 8.5	\$ 6.6	\$ 8.7	\$ 16.8	\$ 17.2	\$ 23.3
Subtotal - Highway Relocations Program	\$ 8.5	\$ 6.6	\$ 8.7	\$ 16.8	\$ 17.2	\$ 23.3
Total Plan	\$ 204.6	\$ 178.8	\$ 68.8	\$ 100.1	\$ 273.4	\$ 279.0

<i>All Figures are \$Millions</i>												
LTIP Initiative	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
4kV Program												
4kV Substation Elimination	\$ 13.0	\$ 12.3	\$ 28.0	\$ 29.4	\$ 47.0	\$ 23.5	\$ -	\$ 19.7	\$ -	\$ 2.2	\$ 7.5	\$ -
Stepdown Transformer Conversion	\$ 1.1	\$ 1.8	\$ 6.1	\$ 7.7	\$ 6.2	\$ 5.3	\$ 6.1	\$ 1.0	\$ 1.1	\$ 0.2	\$ 1.1	\$ 2.9
Modular Integrated Transformer System	\$ 2.0	\$ 7.2	\$ 8.0	\$ 4.9	\$ 8.0	\$ 2.6	\$ -	\$ 0.9	\$ -	\$ 2.4	\$ -	\$ 0.9
Subtotal - 4kV Program	\$ 16.1	\$ 21.3	\$ 42.1	\$ 42.0	\$ 61.2	\$ 31.5	\$ 6.1	\$ 21.5	\$ 1.1	\$ 4.8	\$ 8.6	\$ 3.7
Overhead Program												
Aerial Cable Replacement	\$ 1.2	\$ 5.2	\$ 9.7	\$ 6.8	\$ 9.2	\$ 6.2	\$ 1.8	\$ 3.4	\$ 2.3	\$ 7.3	\$ 2.4	\$ 7.1
Subtotal - Overhead Program	\$ 1.2	\$ 5.2	\$ 9.7	\$ 6.8	\$ 9.2	\$ 6.2	\$ 1.8	\$ 3.4	\$ 2.3	\$ 7.3	\$ 2.4	\$ 7.1
Underground Program												
Underground Cable Replacement	\$ 5.0	\$ 9.5	\$ 3.5	\$ 0.6	\$ 3.0	\$ (0.0)	\$ 0.5	\$ -	\$ 1.0	\$ -	\$ 2.0	\$ -
Network Transformer and Protector Replacement	\$ 2.8	\$ 3.2	\$ 5.8	\$ 4.0	\$ 5.7	\$ 4.1	\$ 2.7	\$ 2.7	\$ 2.7	\$ 2.8	\$ 2.8	\$ 2.9
Underground Residential Distribution Rehabilitation	\$ 0.9	\$ 2.1	\$ 5.9	\$ 5.7	\$ 5.9	\$ 7.0	\$ 5.9	\$ 3.4	\$ 5.9	\$ 5.5	\$ 3.5	\$ 5.0
Subtotal - Underground Program	\$ 8.7	\$ 14.9	\$ 15.2	\$ 10.3	\$ 14.6	\$ 11.1	\$ 9.1	\$ 6.1	\$ 9.6	\$ 8.3	\$ 8.3	\$ 7.9
Substations Program												
Breaker & Switch Replacements	\$ 1.4	\$ 4.1	\$ 5.4	\$ 5.8	\$ 5.3	\$ 7.4	\$ 5.2	\$ 5.7	\$ 3.3	\$ 4.3	\$ 2.3	\$ 3.3
Substation Upgrades	\$ -	\$ 0.3	\$ 3.0	\$ 1.8	\$ 3.0	\$ 3.7	\$ -	\$ 0.0	\$ -	\$ -	\$ -	\$ -
Subtotal - Substations Program	\$ 1.4	\$ 4.4	\$ 8.4	\$ 7.6	\$ 8.3	\$ 11.1	\$ 5.2	\$ 5.7	\$ 3.3	\$ 4.3	\$ 2.3	\$ 3.3
Highway Relocation Program												
Unreimbursed Highway Relocations	\$ 2.8	\$ 1.2	\$ 2.8	\$ 2.6	\$ 2.9	\$ 2.7	\$ 2.8	\$ 4.2	\$ 2.9	\$ 9.0	\$ 3.0	\$ 3.6
Subtotal - Highway Relocations Program	\$ 2.8	\$ 1.2	\$ 2.8	\$ 2.6	\$ 2.9	\$ 2.7	\$ 2.8	\$ 4.2	\$ 2.9	\$ 9.0	\$ 3.0	\$ 3.6
Total Plan	\$ 30.2	\$ 47.0	\$ 78.2	\$ 69.3	\$ 96.2	\$ 62.5	\$ 25.0	\$ 40.9	\$ 19.2	\$ 33.7	\$ 24.6	\$ 25.5

The following two tables provide the units of work completed and forecasted as compared to the LTIP. The LTIP projections are in the columns labelled “Plan.” The other columns provide the actual units completed and current forecasted units as applicable.¹

LTIP Initiative	2017-2019		2020-2022		2017-2022	
	Plan	Actual	Plan	Forecast	Plan	Forecast
4kV Substation Elimination	22	10	2	4	24	14
Stepdown Transformer Conversion	11	11	7	3	18	14
Modular Integrated Transformer System	18	13	0	5	18	18
Aerial Cable Replacement	27.0	16.0	8.0	13.6	35.0	29.6
Underground Cable Replacement	5.0	8.9	1.0	0.0	6.0	8.9
Network Transformer and Protector Replacement	125	91	71	60	196	151
Underground Residential Distribution Rehabilitation	421	462	511	417	932	879
Breaker & Switch Replacements	98	69	89	67	187	136
Substation Upgrades	10	30	0	0	10	30

¹ Note that tables containing information regarding the total DSIC-eligible spend, including the LTIP initiatives, are included in the appendix.

LTIIIP Initiative	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
4kV Substation Elimination	3	3	7	5	12	2	0	4	0	0	2	0
Stepdown Transformer Conversion	1	2	5	7	5	2	5	2	1	0	1	1
Modular Integrated Transformer System	2	5	8	4	8	4	0	1	0	3	0	1
Aerial Cable Replacement	2.0	5.2	13.0	6.0	12.0	4.7	2.0	1.6	3.0	6.0	3.0	6.0
Underground Cable Replacement	2.0	7.7	2.0	1.2	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Network Transformer and Protector Replacement	25	30	50	31	50	30	23	20	24	20	24	20
Underground Residential Distribution Rehabilitation	29	72	196	180	196	210	197	102	198	165	116	150
Breaker & Switch Replacements	11	13	44	25	43	31	43	22	27	28	19	17
Substation Upgrades	0	0	5	8	5	22	0	0	0	0	0	0

The following sections provide details regarding the spending, units of work, and benefits associated with DLCs nine LTIIIP Initiatives.

III. 4kV Substation Elimination

The bulk of DLC’s 4kV substations were installed prior to the 1970s. As such, much of the equipment is more than 50 years old and approaching the end of its expected useful life. Some of the 4kV substations are operational islands with no ability to transfer load through circuit ties. Consequently, the Company is required to bring mobile transformers when taking out the substation for repairs. The 4kV system also has greater losses and less capacity than the 23kV system. Additionally, voltage regulation is provided by a load tap changer built into the 4kV substation which are also approaching the end of its expected useful life.

As loading and maintenance issues arise in aged 4kV substations, the preferred solution is substation elimination via load conversion to a 23kV supply. The expansion of the 23kV system during these conversions increases the overall load capacity, system reliability, and operational capabilities of the distribution system.

The combined 4kV SS Elimination LTIIIP projects have converted over 70,000 connected KVA from 2.4/4.16 kV to 13.2/23 kV operation utilizing nearby 23 kV distribution circuits as of December 2019. The outage information for equipment failures before and after rehabilitation for these projects is shown in Table 1.

Table 1: 4kV SS Eliminations Outage Information based on 2009-2019 data

CAUSE	AVERAGE SAIFI PER YEAR		AVERAGE SAIDI PER YEAR	
	BEFORE REHAB	AFTER REHAB	BEFORE REHAB	AFTER REHAB
Equipment Failures	0.16	0.26	17.09	14.69

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the 4kV Substation Elimination Initiative.

	2017-2019 Plan	2017-2019 Actual	2020-2022 Plan	2020-2022 Forecast	2017-2022 Plan	2012-2022 Forecast
Units (circuits)	22.0	10.0	2.0	4.0	24.0	14.0
Spending (\$ in millions)	88.0	65.2	7.5	21.9	95.5	87.1

	2017 Plan	2017 Actuals	2018 Plan	2018 Actuals	2019 Plan	2019 Actuals	2020 Plan	2020 Forecast	2021 Plan	2021 Forecast	2022 Plan	2022 Forecast
Units (circuits)	3.0	3.0	7.0	5.0	12.0	2.0	0.0	4.0	0.0	0.0	2.0	0.0
Spending (\$ in millions)	13.0	12.3	28.0	29.4	47.0	23.5	0.0	19.7	0.0	2.2	7.5	0.0

Each of the 4kV Substation Elimination projects vary significantly in scope and costs. For example, the conversion of one circuit on one project may require the conversion of the same number of miles as the conversion of four circuits on another project. Accordingly, the units of work completed are less than anticipated.

When DLC filed its LTIP, an average cost per circuit converted was used to estimate the number of circuits that would be converted over six years. This approach did not account for the varying lengths of circuits that would be included in the specific projects ultimately selected for this initiative. Nonetheless, the 4kV Substation Elimination program has allowed the Company to maintain and improve reliability as indicated in Table 1 above.

IV. Stepdown Transformer Conversion

The 4kV Stepdown Conversion Initiative will convert 4kV load fed from a 13.2/23kV to 2.4/4.16kV stepdown transformer to 23kV. By eliminating 4kV stepdown and upgrading the associated infrastructure to 23kV, this initiative will permit the decommissioning of portions of the 4kV system, as well as removing antiquated equipment on DLC’s system.

The combined 4kV Stepdown Conversion LTIP projects converted approximately 5,000 connected KVA from 2.4/4.16 kV to 13.2/23 kV operation as of December 2019. The outage information for equipment failures before and after rehabilitation for these projects is shown in Table 2.²

Table 2: 4kV Stepdown Conversions Outage Information based on 2009-2019 data.

CAUSE	AVERAGE SAIFI PER YEAR		AVERAGE SAIDI PER YEAR	
	BEFORE REHAB	AFTER REHAB	BEFORE REHAB	AFTER REHAB
Equipment Failures	0.39	0.50	32.18	28.69

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Stepdown Conversion Initiative.

	2017-2019		2020-2022		2017-2022		2012-2022	
	Plan	Actual	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (3 phase transformer set)	11.0	11.0	7.0	3.0	18.0	14.0	18.0	14.0
Spending (\$ in millions)	13.4	14.7	8.3	4.1	21.7	18.8	21.7	18.8

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (3 phase transformer set)	1.0	2.0	5.0	7.0	5.0	2.0	5.0	2.0	1.0	0.0	1.0	1.0
Spending (\$ in millions)	1.1	1.8	6.1	7.7	6.2	5.3	6.1	1.0	1.1	0.2	1.1	2.9

V. Modular Integrated Transformer System (MITS)

² SAIFI and SAIDI references for 4kV Stepdown Conversion Projects reference circuit-level indices and include existing equipment not part of the 4kV Stepdown Conversion Project.

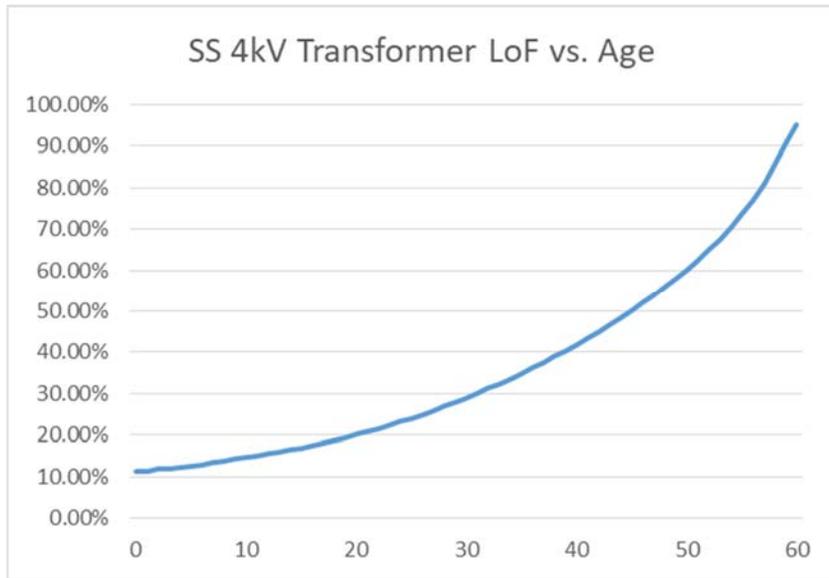
The Company's performance on this initiative substantially tracks the expected spend and units included in the LTIP. Additionally, as indicated in Table 2 above, the initiative has yielded the expected improvements

The purpose of the MITS initiative is to update 4kV unit substations that have a higher likelihood of failure due to deterioration. Updating the operating equipment reduces the risk of outages or subsequent outages caused by 4kV substation equipment failure and the resulting on-site setup, commissioning time, and expense.

The first seven unit substation locations in need of replacement utilized the MITS. The MITS is a packaged 23/4kV substation containing a transformer, breakers, switches, and regulators on a single skid. These seven replacements were restoration solutions or were performed as a result of failed 4kV switchgear or transformers.

As explained in the Company's 2018 Asset Optimization Plan filed with the Commission on March 1, 2018, after the use of the seventh overall MITS, DLC determined that it would be more efficient to utilize different equipment options to rehabilitate equipment at 4kV unit substations. The new solution consists of distribution class equipment installed in pad mount and pole top configuration. Four stations were chosen for proactive replacement after condition assessment found ongoing oil leaks, thermal faults internal to the transformer, and deteriorated potential transformers and batteries. The Company changed to different equipment because it was a more cost-effective solution.

Through December 2019, DLC completed a total of 13 installations in this initiative. Initial benchmarking from 2015 forecasted the likelihood of failure to increase from 56% to 67% by 2020 without an accelerated 4kV unit transformer replacements. This LTIP initiative was able to reduce the average likelihood of failure risk associated with 4kV Unit Substations from the projected 67% to 63% based off the increased effort in replacing failed or deteriorated transformers in these Unit Substations. This effort reduced the average age of Distribution Substation Transformers on DLC's system from 53 years in service to 51 years of service. The likelihood of failure in relation to average age of the 4kV unit transformers is depicted in following figure:



The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the MITS Initiative.

	2017-2019 Plan	2017-2019 Actual	2020-2022 Plan	2020-2022 Forecast	2017-2022 Plan	2012-2022 Forecast
Units (units)	18.0	13.0	0.0	5.0	18.0	18.0
Spending (\$ in millions)	18.0	14.8	0.0	4.1	18.0	18.9

	2017 Plan	2017 Actuals	2018 Plan	2018 Actuals	2019 Plan	2019 Actuals	2020 Plan	2020 Forecast	2021 Plan	2021 Forecast	2022 Plan	2022 Forecast
Units (units)	2.0	5.0	8.0	4.0	8.0	4.0	0.0	1.0	0.0	3.0	0.0	1.0
Spending (\$ in millions)	2.0	7.2	8.0	4.9	8.0	2.6	0.0	0.9	0.0	2.4	0.0	0.9

DLC expects to continue investment in this initiative completing this initiative on track with the six year plan through 2022.

VI. Aerial Cable Replacement

Aerial cable is used when multiple circuits are on the same pole. It is also used through rights-of-way with trees that may cause incidental contact. Several of the types of cable installed within DLC’s distribution system are at or approaching the end of expected useful lives. This initiative focuses on the replacement of aged, failure-prone aerial cable to maintain DLC’s current high level of reliability and reduce the likelihood of failures.

The outage data depicted for the Aerial Cable Replacements occurred between January 1, 2009 and December 31, 2019.

Table 3: Aerial Cable Failures

Aerial Cable Failures	
Before Cable Replacement	After Cable Replacement
25	0

There have been 14 aerial LTIP cable replacement projects replacing over 15 miles of aerial cable completed as of December 2019. The circuits covered in these projects experienced 25 cable failures before the portion of cable was replaced and zero cable failures after the replacement, as shown in Table 3.

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Aerial Cable Replacement Initiative.

	2017-2019	2017-2019	2020-2022	2020-2022	2017-2022	2012-2022
	Plan	Actual	Plan	Forecast	Plan	Forecast
Units (miles)	27.0	16.0	8.0	13.6	35.0	29.6
Spending (\$ in millions)	20.1	18.2	6.5	17.8	26.6	36.0

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (miles)	2.0	5.2	13.0	6.0	12.0	4.7	2.0	1.6	3.0	6.0	3.0	6.0
Spending (\$ in millions)	1.2	5.2	9.7	6.8	9.2	6.2	1.8	3.4	2.3	7.3	2.4	7.1

DLC experienced higher than expected costs for the Aerial Cable Replacement initiative. Costs were higher than expected as a result of project specific scope and location factors, such as the number of pole replacements required and traffic control requirements. Based on current information, DLC expects to replace 85% of the units forecasted in the LTIP with the allotted budget.

VII. Underground Cable Replacement

Some of DLC’s underground cable is approaching the end of its expected useful life.

Accordingly, the purpose of this initiative is to replace aged, failure-prone underground cable to maintain reliability and reduce the likelihood of failures.

The outage data depicted for the Underground Cable Replacements occurred between January 1, 2009 and December 31, 2019.

Table 4: Underground Cable Failures

Underground Cable Failures	
Before Cable Replacement	After Cable Replacement
24	0

There have been three underground cable replacement projects replacing approximately nine miles of underground cable completed through the LTIP Program, as of December 2019. The circuits covered in these projects experienced 24 cable failures before the portion of cable was replaced and zero cable failures after the replacement, as shown in Table 4.

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Underground Cable Replacement Initiative.

	2017-2019		2020-2022		2017-2022		2012-2022	
	Plan	Actual	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (miles)	5.0	8.9	1.0	0.0	6.0	8.9		
Spending (\$ in millions)	11.5	10.1	3.5	0.0	15.0	10.1		

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (miles)	2.0	7.7	2.0	1.2	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Spending (\$ in millions)	5.0	9.5	3.5	0.6	3.0	0.0	0.5	0.0	1.0	0.0	2.0	0.0

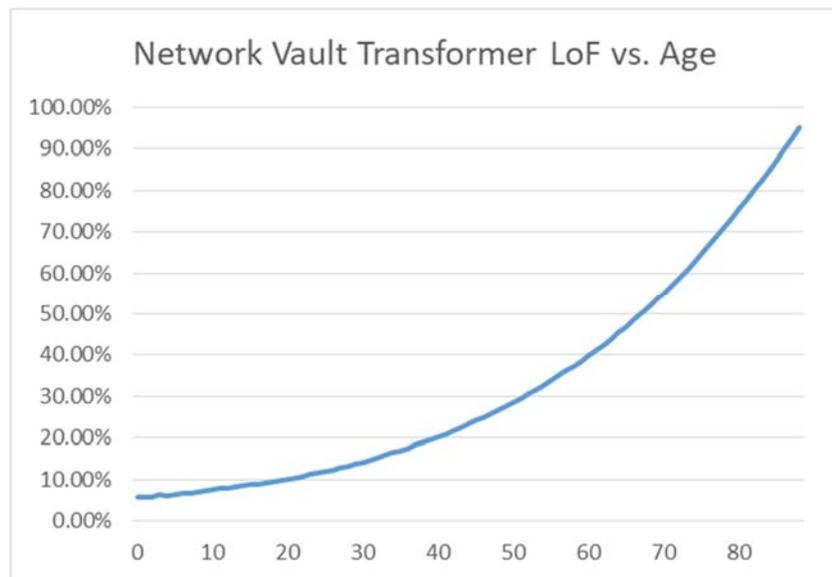
As shown in the tables above, the more substantial projects under this initiative have been successfully completed.

VIII. Network Transformer & Protector Replacement

The majority of DLCs network transformers and protectors are located in downtown Pittsburgh in sidewalk vaults. Many of these vaults are exposed to natural and human elements that may lead to corrosion. These factors contribute to the deterioration of the transformers. This initiative focuses on the rehabilitation of network transformer and protector installations in downtown Pittsburgh to maintain the reliability and reduce the risk of future failures.

DLC observed an increased rate of failures of network transformers that had lead wiped primary terminations. The terminations are made internal to the primary switch on the transformer and therefore it is not possible to detect if the termination is at risk of failure through typical testing. DLC is proactively replacing these types of transformers as part of the LTIP. Lead wiped termination transformers are prioritized above others unless another transformer is determined to have a higher risk of failure.

DLC has proactively replaced over 90 transformers as part of the LTIP Program from 1/1/2017-12/31/2019. These transformers consisted of lead wiped transformers and degraded transformers that posed a higher risk of failure. DLC experienced two network transformers failures over the 2017-2019 timeframe. In these instances, the network transformer and associated protector were replaced. There was one protector failure noted outside of these incidents, the protector was replaced. On the Downtown Network System, an individual failure does not typically result in the loss of power to any customers, however, it does lead to the loss of contingencies to critical customers. Initial benchmarking from 2015 forecasted the likelihood of failure to increase from 11% to 13% by 2020 without accelerated network transformer replacements. This LTIP initiative was able to reduce the average likelihood of failure risk associated with network transformers from the projected 13% to 10% based off the increased replacement effort while reducing the average age of network transformers on DLC's system from 27 years in service to 19 years of service. The likelihood of failure in relation to average age of the network transformer fleet is depicted in the following figure.



The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Network Transformer and Protector Replacement Initiative.

	2017-2019 Plan	2017-2019 Actual	2020-2022 Plan	2020-2022 Forecast	2017-2022 Plan	2012-2022 Forecast
Units (transformers)	125.0	91.0	71.0	60.0	196.0	151.0
Spending (\$ in millions)	14.3	11.2	8.2	8.4	22.5	19.7

	2017 Plan	2017 Actuals	2018 Plan	2018 Actuals	2019 Plan	2019 Actuals	2020 Plan	2020 Forecast	2021 Plan	2021 Forecast	2022 Plan	2022 Forecast
Units (transformers)	25.0	30.0	50.0	31.0	50.0	30.0	23.0	20.0	24.0	20.0	24.0	20.0
Spending (\$ in millions)	2.8	3.2	5.8	4.0	5.7	4.1	2.7	2.7	2.7	2.8	2.8	2.9

Based on the condition of the assets in this initiative, DLC expects to complete less units than originally expected. DLC will, however, continue to invest in replacing assets in this initiative to maintain a reliable downtown network.

IX. Underground Residential Distribution Rehabilitation

DLC installed a significant number of Underground Residential Distribution (URD) facilities in housing developments in the 1970s. This equipment is approaching the end of expected useful life. The deteriorated equipment includes pad mounted transformers, submersible transformers, primary cable, splices, bushing junctions, elbows, brackets, and in some cases, the vaults themselves.

This initiative focuses on the rehabilitation of the URD systems in order to maintain or improve reliability and reduce the risk of future failures. There have been twenty-three URD Rehabilitation plans completed through the LTIP, as of December 2019. Through these plans there have been over 460 transformers replaced with approximately 20,000 connected KVA. The reliability indices associated with these plans due to equipment failures before and after rehabilitation for these plans are shown in Table 5.

Table 5: URD Rehab Outage Information

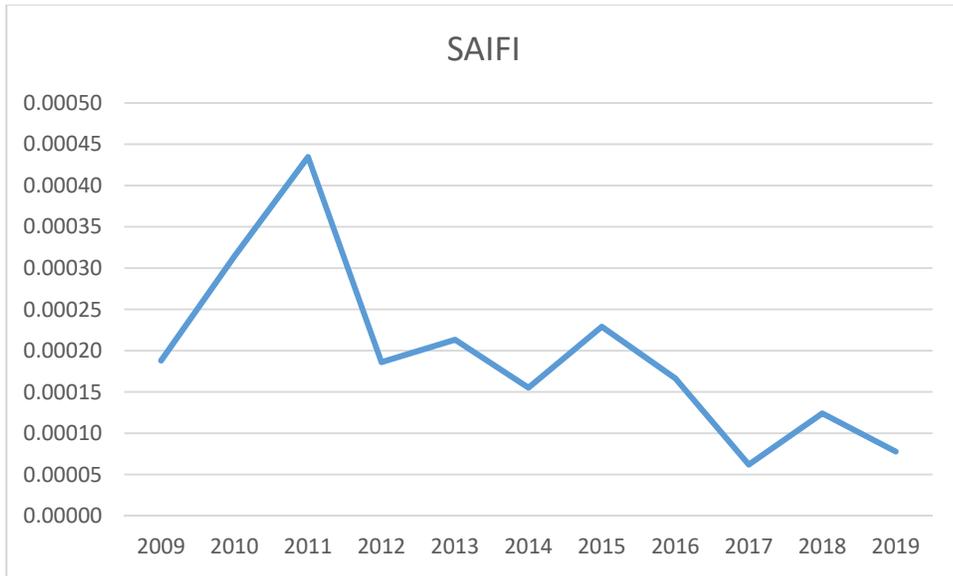
CAUSE	AVERAGE SAIFI PER YEAR		AVERAGE SAIDI PER YEAR	
	BEFORE REHAB	AFTER REHAB	BEFORE REHAB	AFTER REHAB
Equipment Failures	0.42	0.05	74.23	7.06

There has been a positive improvement in the SAIFI and SAIDI values for all the URD Plans within the DLC system. The reliability indices associated with URD plans are shown in Table 6. The SAIFI and SAIDI trends are shown in the figures that follow the table.

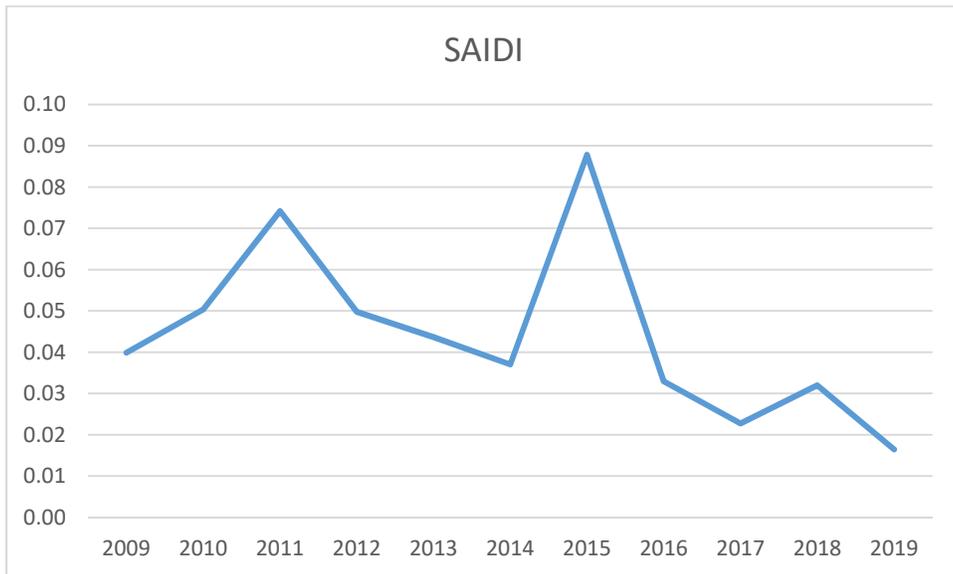
Table 6: All URD Reliability

Year	SAIDI	SAIFI
2009	0.04	0.00019
2010	0.05	0.00031
2011	0.07	0.00043
2012	0.05	0.00019
2013	0.04	0.00021
2014	0.04	0.00016
2015	0.09	0.00023
2016	0.03	0.00017
2017	0.02	0.00006
2018	0.03	0.00012
2019	0.02	0.00008

All URD SAIFI Trend



All URD SAIDI Trend



The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Underground Residential Distribution Rehabilitation Initiative.

	2017-2019		2017-2019		2020-2022		2020-2022		2017-2022		2017-2022	
	Plan		Actual		Plan		Forecast		Plan		Forecast	
Units (transformers)	421.0		462.0		511.0		417.0		932.0		879.0	
Spending (\$ in millions)	12.7		14.8		15.3		13.9		28.0		28.7	

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (transformers)	29.0	72.0	196.0	180.0	196.0	210.0	197.0	102.0	198.0	165.0	116.0	150.0
Spending (\$ in millions)	0.9	2.1	5.9	5.7	5.9	7.0	5.9	3.4	5.9	5.5	3.5	5.0

To date, DLC's progress towards this initiative is slightly ahead of plan. Projected units are lower than plan due to higher unit costs, however the Company expects to complete the work associated with this initiative on target for spending.

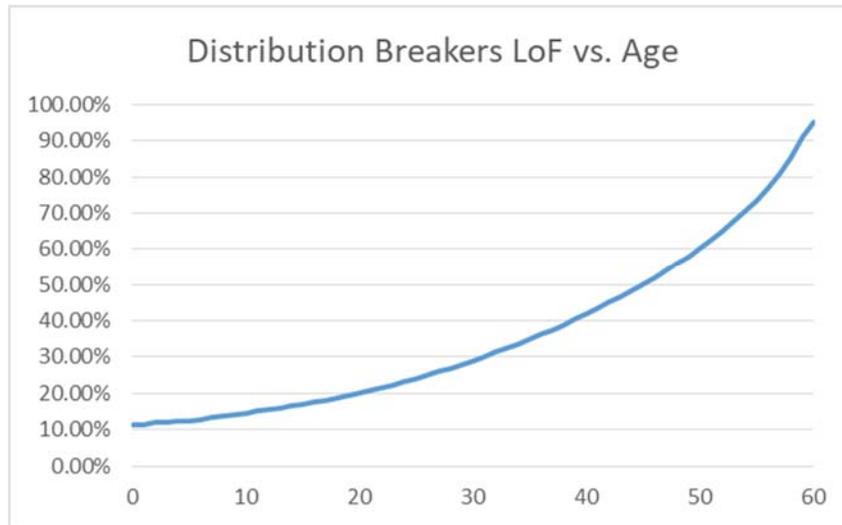
X. Breaker and Switch Replacements

The average service age of DLC's 23kV oil circuit breakers was approximately 40 years in 2016. By replacing these breakers and associated switches, DLC reduces the risk of outages increased by advanced circuit breaker age and removes obsolete equipment no longer supported by manufacturers. This initiative also reduces the likelihood of a disconnect switch not operating as intended to provide proper clearances, which could otherwise impact future planned outages within the station.

Through December 2019, 69 breakers have been replaced totaling approximately 14,000 gallons of oil removed from the system. This initiative also replaced over 100 disconnect switches of 1980's vintage to ensure reliable operation. Many replacements were located at DLC substations with the highest consequence of failure and the most critical customer substation sites such as local area hospitals and universities.

Initial benchmarking from 2015 forecasted the likelihood of failure to increase to from 49% to 58% by 2020 without accelerated breaker replacements. This LTIIP initiative was able to reduce the average likelihood of failure risk associated with 23kV oil filled breakers from 58% to 38% based off the increased effort in replacing breakers with over 40 years of service. This effort reduced the average age of 23kV oil breakers on DLC's system from 49 years in service to 37

years of service. The likelihood of failure in relation to average age of the breaker fleet is depicted in the following figure.



The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Breaker & Switch Replacement Initiative.

	2017-2019		2020-2022		2017-2022		2012-2022	
	Plan	Actual	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (breakers)	98.0	69.0	89.0	67.0	187.0	136.0		
Spending (\$ in millions)	12.1	17.3	10.8	13.3	22.9	30.6		

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (breakers)	11.0	13.0	44.0	25.0	43.0	31.0	43.0	22.0	27.0	28.0	19.0	17.0
Spending (\$ in millions)	1.4	4.1	5.4	5.8	5.3	7.4	5.2	5.7	3.3	4.3	2.3	3.3

DLC experienced higher site specific costs associated with this initiative because costs vary depending on the substation and the amount of work involved with specific breaker locations. Examples of these site specific costs include certain breakers requiring foundation, structural steel repair, or buswork modifications. Based on the condition of these assets, DLC anticipates investing more in this initiative to replacing these aged assets and maintain reliability.

XI. Substation Upgrades

This initiative replaces aged infrastructure within the balance of the substation including, but not limited to, relays and transformers. The key benefits realized include a reduced risk of outages caused by equipment failure, reduced risk of unplanned events from failed legacy substation equipment, removal of obsolete equipment, and reduced or avoided emergency repair or replacement.

Substation Upgrades projects were selected by a team of engineers who inspected stations rated with a higher consequence of failure. These projects were identified during those inspections. Through December 2019, DLC completed 30 units of work under this initiative. These projects included replacements of transformers with associated protection, line protection upgrades, transformer cooling system replacements, line reactor upgrades, instrument transformer replacements, and retrofitting vacuum breakers for outdoor switchgear.

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Substations Upgrades Initiative.

	2017-2019		2020-2022		2017-2022		2012-2022	
	Plan	Actual	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (projects)	10.0	30.0	0.0	0.0	10.0	30.0		
Spending (\$ in millions)	6.0	5.8	0.0	0.0	6.0	5.8		

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Units (projects)	0.0	0.0	5.0	8.0	5.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0
Spending (\$ in millions)	0.0	0.3	3.0	1.8	3.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0

The LTIP included planned spending over two years of the six year LTIP, and that work was completed in 2019 at approximately the planned amount of spending.

XII. Unreimbursed Highway Relocations

The Highway Relocation Program consists of work that arises during the course of normal operations required by the State of Pennsylvania, PennDOT, counties, cities, municipalities, or other government agencies. As part of unreimbursed road and bridge projects, DLC is required to relocate its distribution facilities. During these relocations, there is the potential for system

improvements. Due to the nature of how these relocation projects are scheduled, the amount of work each year varies.

The following two tables provide details regarding the projected spend and units under the LTIP, the actual spend and units through 2019, and forecasted amounts for 2020 through 2022 for the Unreimbursed Highway Relocations Program.

	2017-2019		2017-2019		2020-2022		2020-2022		2017-2022		2017-2022	
	Plan		Actual		Plan		Forecast		Plan		Forecast	
Spending (\$ in millions)	8.5		6.6		8.7		16.8		17.2		23.3	

	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
Spending (\$ in millions)	2.8	1.2	2.8	2.6	2.9	2.7	2.8	4.2	2.9	9.0	3.0	3.6

Appendix

Appendix Table 1 – All DSIC Eligible Spending

<i>All Figures are \$Millions</i>						
	2017-2019	2017-2019	2020-2022	2020-2022	2017-2022	2017-2022
LTIP Initiative	Plan	Actual	Plan	Forecast	Plan	Forecast
4kV Program						
4kV Substation Elimination	\$ 88.0	\$ 65.2	\$ 7.5	\$ 21.9	\$ 95.5	\$ 87.1
Stepdown Transformer Conversion	\$ 13.4	\$ 14.7	\$ 8.3	\$ 4.1	\$ 21.7	\$ 18.8
Modular Integrated Transformer System	\$ 18.0	\$ 14.8	\$ -	\$ 4.1	\$ 18.0	\$ 18.9
Other 4kV Work	\$ 9.1	\$ 0.3	\$ 9.2	\$ -	\$ 18.3	\$ 0.3
Subtotal - 4kv Program	\$ 128.5	\$ 95.0	\$ 25.0	\$ 30.0	\$ 153.5	\$ 125.0
Overhead Program						
Aerial Cable Replacement	\$ 20.1	\$ 18.2	\$ 6.5	\$ 17.8	\$ 26.6	\$ 36.0
Other Overhead Work	\$ 129.4	\$ 205.0	\$ 123.5	\$ 228.6	\$ 252.9	\$ 433.7
Subtotal - Overhead Program	\$ 149.5	\$ 223.2	\$ 130.0	\$ 246.5	\$ 279.5	\$ 469.7
Underground Program						
Underground Cable Replacement	\$ 11.5	\$ 10.1	\$ 3.5	\$ -	\$ 15.0	\$ 10.1
Network Transformer and Protector Replacement	\$ 14.3	\$ 11.2	\$ 8.2	\$ 8.4	\$ 22.5	\$ 19.7
Underground Residential Distribution Rehabilitation	\$ 12.7	\$ 14.8	\$ 15.3	\$ 13.9	\$ 28.0	\$ 28.7
Other Underground Work	\$ 39.8	\$ 36.0	\$ 40.3	\$ 78.2	\$ 80.1	\$ 114.2
Subtotal - Underground Program	\$ 78.3	\$ 72.3	\$ 67.3	\$ 100.5	\$ 145.6	\$ 172.7
Substations Program						
Breaker & Switch Replacements	\$ 12.1	\$ 17.3	\$ 10.8	\$ 13.3	\$ 22.9	\$ 30.6
Substation Upgrades	\$ 6.0	\$ 5.8	\$ -	\$ 0.0	\$ 6.0	\$ 5.8
Other Substations Work	\$ 14.9	\$ 38.6	\$ 11.4	\$ 63.6	\$ 26.3	\$ 102.2
Subtotal - Substations Program	\$ 33.0	\$ 61.7	\$ 22.2	\$ 76.8	\$ 55.2	\$ 138.5
Highway Relocation Program						
Unreimbursed Highway Relocations	\$ 8.5	\$ 6.6	\$ 8.7	\$ 16.8	\$ 17.2	\$ 23.3
Subtotal - Highway Relocation Program	\$ 8.5	\$ 6.6	\$ 8.7	\$ 16.8	\$ 17.2	\$ 23.3
Total	\$ 397.8	\$ 458.8	\$ 253.2	\$ 470.5	\$ 651.0	\$ 929.3

Appendix Table 2 – All DSIC Eligible Spending by Year

<i>All Figures are \$Millions</i>												
	2017	2017	2018	2018	2019	2019	2020	2020	2021	2021	2022	2022
LTIP Initiative	Plan	Actuals	Plan	Actuals	Plan	Actuals	Plan	Forecast	Plan	Forecast	Plan	Forecast
4kV Program												
4kV Substation Elimination	\$ 13.0	\$ 12.3	\$ 28.0	\$ 29.4	\$ 47.0	\$ 23.5	\$ -	\$ 19.7	\$ -	\$ 2.2	\$ 7.5	\$ -
Stepdown Transformer Conversion	\$ 1.1	\$ 1.8	\$ 6.1	\$ 7.7	\$ 6.2	\$ 5.3	\$ 6.1	\$ 1.0	\$ 1.1	\$ 0.2	\$ 1.1	\$ 2.9
Modular Integrated Transformer System	\$ 2.0	\$ 7.2	\$ 8.0	\$ 4.9	\$ 8.0	\$ 2.6	\$ -	\$ 0.9	\$ -	\$ 2.4	\$ -	\$ 0.9
Other 4kV Work	\$ 3.2	\$ 0.1	\$ 2.9	\$ 0.2	\$ 3.0	\$ -	\$ 2.9	\$ -	\$ 3.1	\$ -	\$ 3.2	\$ -
Subtotal - 4kv Program	\$ 19.3	\$ 21.4	\$ 45.0	\$ 42.2	\$ 64.2	\$ 31.5	\$ 9.0	\$ 21.5	\$ 4.2	\$ 4.8	\$ 11.8	\$ 3.7
Overhead Program												
Aerial Cable Replacement	\$ 1.2	\$ 5.2	\$ 9.7	\$ 6.8	\$ 9.2	\$ 6.2	\$ 1.8	\$ 3.4	\$ 2.3	\$ 7.3	\$ 2.4	\$ 7.1
Other Overhead Work	\$ 38.8	\$ 54.3	\$ 50.7	\$ 72.1	\$ 39.9	\$ 78.6	\$ 39.8	\$ 79.0	\$ 41.2	\$ 81.2	\$ 42.5	\$ 68.4
Subtotal - Overhead Program	\$ 40.0	\$ 59.5	\$ 60.4	\$ 79.0	\$ 49.1	\$ 84.8	\$ 41.6	\$ 82.4	\$ 43.5	\$ 88.5	\$ 44.9	\$ 75.5
Underground Program												
Underground Cable Replacement	\$ 5.0	\$ 9.5	\$ 3.5	\$ 0.6	\$ 3.0	\$ (0.0)	\$ 0.5	\$ -	\$ 1.0	\$ -	\$ 2.0	\$ -
Network Transformer and Protector Replacement	\$ 2.8	\$ 3.2	\$ 5.8	\$ 4.0	\$ 5.7	\$ 4.1	\$ 2.7	\$ 2.7	\$ 2.7	\$ 2.8	\$ 2.8	\$ 2.9
Underground Residential Distribution Rehabilitation	\$ 0.9	\$ 2.1	\$ 5.9	\$ 5.7	\$ 5.9	\$ 7.0	\$ 5.9	\$ 3.4	\$ 5.9	\$ 5.5	\$ 3.5	\$ 5.0
Other Underground Work	\$ 13.1	\$ 10.4	\$ 13.0	\$ 12.3	\$ 13.7	\$ 13.3	\$ 13.0	\$ 14.9	\$ 13.4	\$ 31.1	\$ 13.9	\$ 32.1
Subtotal - Underground Program	\$ 21.8	\$ 25.3	\$ 28.2	\$ 22.5	\$ 28.3	\$ 24.4	\$ 22.1	\$ 21.0	\$ 23.0	\$ 39.4	\$ 22.2	\$ 40.0
Substations Program												
Breaker & Switch Replacements	\$ 1.4	\$ 4.1	\$ 5.4	\$ 5.8	\$ 5.3	\$ 7.4	\$ 5.2	\$ 5.7	\$ 3.3	\$ 4.3	\$ 2.3	\$ 3.3
Substation Upgrades	\$ -	\$ 0.3	\$ 3.0	\$ 1.8	\$ 3.0	\$ 3.7	\$ -	\$ 0.0	\$ -	\$ -	\$ -	\$ -
Other Substations Work	\$ 6.9	\$ 5.5	\$ 4.4	\$ 17.5	\$ 3.6	\$ 15.6	\$ 3.7	\$ 39.5	\$ 3.8	\$ 10.2	\$ 3.9	\$ 13.9
Subtotal - Substations Program	\$ 8.3	\$ 9.9	\$ 12.8	\$ 25.1	\$ 11.9	\$ 26.7	\$ 8.9	\$ 45.2	\$ 7.1	\$ 14.5	\$ 6.2	\$ 17.1
Highway Relocation Program												
Unreimbursed Highway Relocations	\$ 2.8	\$ 1.2	\$ 2.8	\$ 2.6	\$ 2.9	\$ 2.7	\$ 2.8	\$ 4.2	\$ 2.9	\$ 9.0	\$ 3.0	\$ 3.6
Subtotal - Highway Relocation Program	\$ 2.8	\$ 1.2	\$ 2.8	\$ 2.6	\$ 2.9	\$ 2.7	\$ 2.8	\$ 4.2	\$ 2.9	\$ 9.0	\$ 3.0	\$ 3.6
Total	\$ 92.2	\$ 117.3	\$ 149.2	\$ 171.4	\$ 156.4	\$ 170.1	\$ 84.4	\$ 174.3	\$ 80.7	\$ 156.2	\$ 88.1	\$ 139.9