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PROCEEDING ON MOTION OF THE COMMISSION AS TO THE RATES, CHARGES, RULES AND REGULATIONS OF THE BROOKLYN UNION GAS COMPANY FOR GAS SERVICE

PROCEEDING ON MOTION OF THE COMMISSION AS TO THE RATES, CHARGES, RULES AND REGULATIONS OF KEYSPAN GAS EAST CORPORATION FOR GAS SERVICE

Testimony and Exhibits of:

Gas Infrastructure and Operations Panel

Book 4 - KEDNY

January 29, 2016

Submitted to: New York State Public Service Commission Case 16-G-\_\_\_\_ Case 16-G-\_\_\_\_

Submitted by: The Brooklyn Union Gas Company and KeySpan Gas East Corporation

# national**grid**

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Before the Public Service Commission

THE BROOKLYN UNION GAS COMPANY d/b/a NATIONAL GRID NY

Direct Testimony

of

Gas Infrastructure and Operations Panel

Ross W. Turrini Johnny Johnston Laurie T. Brown

January 29, 2016

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Testimony of the Gas Infrastructure and Operations Panel

1	I.	Introduction and Qualifications
2	Q.	Please introduce the members of the Gas Infrastructure and Operations
3		Panel.
4	A.	The Panel consists of Ross W. Turrini, Johnny Johnston and Laurie T. Brown.
5		
6	Q.	Mr. Turrini, please state your name and business address.
7	A.	My name is Ross W. Turrini. My business address is 25 Hub Drive, Melville,
8		New York 11747.
9		
10	Q.	By whom are you employed and in what capacity?
11	A.	I am employed by National Grid USA Service Company, Inc., a subsidiary of
12		National Grid USA ("National Grid"), as the Senior Vice President for Gas
13		Process and Engineering. I oversee approximately 2,735 employees and \$6
14		billion of gas infrastructure assets serving over 3.6 million customers in New
15		York, Massachusetts and Rhode Island.
16		
17		National Grid owns and operates three gas distribution companies in New
18		York that provide retail gas service to more than 2.4 million customers in
19		three service territories: Niagara Mohawk Power Corporation d/b/a National
20		Grid ("NMPC") serves areas of eastern and central New York, The Brooklyn
21		Union Gas Company d/b/a National Grid NY ("KEDNY" or "Company")

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### Testimony of the Gas Infrastructure and Operations Panel

1		serves Brooklyn, Staten Island and parts of Queens in New York City, and
2		KeySpan Gas East Corporation d/b/a National Grid ("KEDLI") serves
3		customers on Long Island and the Rockaway Peninsula in Queens. I am
4		responsible for all aspects of the performance of National Grid's New York
5		gas networks, including emergency/storm response, gas engineering,
6		construction activities, and the operation and maintenance of gas transmission
7		and distribution facilities.
8		
9	Q.	Please describe your educational background and business experience.
10	A.	I received a Bachelor of Science in Civil Engineering from the United States
11		Military Academy at West Point in 1985. I have worked for National Grid
12		and its predecessor companies (the Long Island Lighting Company and
13		KeySpan Corporation ("KeySpan")) for 22 years in various roles in
14		engineering, operations and procurement. Prior to joining National Grid, I
15		spent five years as an Officer in the United States Army Corps of Engineers
16		and three years in engineering and construction roles at Brown & Root
17		Services Corporation, an international engineering, procurement and
18		construction company.
19		
20	Q.	Have you previously testified before the New York Public Service
21		Commission ("Commission")?

Commission ("Commission")?

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### Testimony of the Gas Infrastructure and Operations Panel

1	А.	No, I have not.
2		
3	Q.	Mr. Johnston, please state your full name and business address.
4	А.	My name is Johnny Johnston. My business address is One MetroTech Center,
5		Brooklyn, New York 11201.
6		
7	Q.	By whom are you employed and in what capacity?
8	А.	I am employed by National Grid USA Service Company, Inc. Effective
9		January 1, 2016, I was appointed the Senior Vice President for National
10		Grid's Gas Enablement Project, a long-term initiative to establish new work
11		management systems and enhance gas safety, compliance, customer service
12		and the performance of National Grid's US gas business. Immediately prior
13		to serving in my current role, I served as the Vice President of Customer
14		Meter Services where I oversaw more than 2,400 personnel supporting
15		National Grid's electric and gas distribution businesses in the US. With
16		respect to the New York gas business, I was responsible for all field service
17		personnel who provide gas emergency response, meter related activities
18		(including meter installation and removal) and field operations related to
19		billing (including meter reading, bill investigations and collections). My
20		responsibilities also included overseeing the gas dispatch centers.
21		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	Please describe your educational background and professional
2		experience.
3	Α.	I received a Master of Engineering Science from Oxford University in 2002
4		and a Master of Business Administration from Cranfield University in 2006. I
5		have worked for National Grid for 18 years. I started in Network Design in
6		National Grid's United Kingdom business before moving to Cleveland, Ohio
7		to join GridAmerica LLC, a wholly owned subsidiary of National Grid, where
8		I worked on transmission planning. I then moved to Salt Lake City, Utah to
9		support a transmission project to deliver wind energy from Wyoming to
10		California, before returning to the United Kingdom. Back in the United
11		Kingdom, I worked in National Grid's Engineering Department and was
12		responsible for Network Design, including renewable gas projects. I was then
13		promoted to the Gas Distribution Executive Team to lead Customer
14		Operations with responsibility for the gas call centers, resource planning and
15		dispatch teams. I then became Chief of Staff for the global Chief Executive
16		Officer before relocating to Brooklyn to lead Customer Meter Services.
17		
18	Q.	Have you previously testified before the Commission?
19	А.	No, I have not.
20		
21	Q.	Ms. Brown, please state your full name and business address.

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### Testimony of the Gas Infrastructure and Operations Panel

1	A.	My name is Laurie T. Brown. My business address is 300 Erie Boulevard
2		West, Syracuse, New York 13202.
3		
4	Q.	By whom are you employed and in what capacity?
5	A.	I am employed by National Grid USA Service Company, Inc. as the Director,
6		Network Strategy - Gas. I am responsible for all gas Network Strategy issues
7		in New York, including those related to the Company's capital investment
8		strategy. I support the New York Jurisdictional President (Company Witness
9		Kenneth Daly) and his staff on all matters related to the operation of National
10		Grid's New York gas systems. My responsibilities also include working as
11		the regulatory liaison on operational issues and developing the New York gas
12		work plan.
13		
14	Q.	Please describe your educational background and experience.
15	A.	I received an Associates of Science in Engineering Science from Canton
16		College in 1980 and a Bachelor of Science in Civil and Environmental
17		Engineering from Clarkson University in 1982. I have worked for NMPC and
18		now National Grid for over 30 years in various technical positions. I began
19		my career as a Quality Assurance Engineer at Nine Mile Point Unit 2 Nuclear
20		Plant in 1982. I later became an Engineer in NMPC's Gas Engineering
21		Department. I was then promoted to Gas Engineering Supervisor, Gas

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### Testimony of the Gas Infrastructure and Operations Panel

1		Operations Support Manager, and then Lab and Testing Services Director. At
2		the time of National Grid's merger with KeySpan, I returned to the gas
3		business as Director, Operations Regulatory Compliance for New York, as
4		well as Massachusetts, New Hampshire and Rhode Island, before taking my
5		current position of Director, Network Strategy - Gas. I am a member of the
6		American Gas Association, a member of the Northeast Gas Association
7		("NGA"), a senior member of the Society of Women Engineers, and I serve
8		on the Board of Directors for Dig Safely New York, the One-Call Center for
9		upstate New York.
10		
11	Q.	Have you previously testified before the Commission?
12	A.	Yes. I have submitted pre-filed testimony in NMPC's 2012 rate proceeding
13		(Case 12-G-0202) and testified before the Commission in NMPC's Article VII
14		proceedings on Natural Gas Pipeline 58, Hall Road to Oswego in Oswego,
15		New York (Case 89-T-058) and Natural Gas Pipeline 63, Schroeppel to Scriba
16		and Oswego proceeding (Case 92-T-0252).

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Testimony of the Gas Infrastructure and Operations Panel

1	II.	Purpose of Testimony
2	Q.	What is the purpose of the Gas Infrastructure and Operations Panel's
3		testimony?
4	A.	The purpose of the Panel's testimony is to provide a forecast of the capital
5		investments of the Company during the 12 months ending December 31, 2017
6		("Rate Year"), the 12 months ending December 31, 2018 ("Data Year 1") and
7		the 12 months ending December 31, 2019 ("Data Year 2") (Data Year 1 and
8		Data Year 2 are collectively referred to as the "Data Years"). The Panel
9		discusses capital expenditures that will (i) increase the safety and reliability of
10		the Company's gas network, (ii) modernize the Company's gas transmission
11		and distribution infrastructure, (iii) promote gas growth in a manner consistent
12		with the Commission's policy objectives and (iv) enhance storm resiliency
13		and the Company's ability to respond to future weather events. The Panel will
14		also discuss the Company's practices and policies for maximizing the
15		efficiency of its capital construction program from planning and budgeting
16		through the completion of construction.
17		
18		The Panel's testimony provides an overview of the significant projects in the
19		Company's capital plan, including acceleration of replacement of leak prone
20		pipe ("LPP") and new safety programs to identify and address system risks.
21		The Panel's testimony also presents an overview of the Company's pipeline

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### Testimony of the Gas Infrastructure and Operations Panel

1		integrity and reliability programs that will improve the overall safety and
2		reliability of the Company's gas system, and will also address recently
3		enacted, as well as pending, pipeline safety regulations administered by the
4		U.S. Department of Transportation ("DOT"), Pipeline and Hazardous
5		Materials Safety Administration ("PHMSA"). Lastly, the Panel discusses the
6		Company's plans to expand gas service to customers through targeted capital
7		investments.
8		
9	Q.	Does the Panel's testimony also address the Company's operations and
10		maintenance ("O&M") programs?
11	А.	Yes. In addition to capital investments in gas infrastructure, the Panel
12		describes a number of O&M programs the Company proposes to expand or
13		implement in the Rate Year, the costs of which are not fully reflected in the
14		12-month period beginning October 1, 2014 and ending September 30, 2015
15		("Historic Test Year"). These programs represent known and measureable
16		changes from Historic Test Year expense, including programs to (i) improve
17		system reliability, (ii) address new and emerging safety regulations, (iii)
18		enhance customer service and (iv) support the Company's capital investments.
19		The Panel also discusses various factors contributing to an increase in overall
20		O&M costs, such as an increase in the number of gas odor calls and leak
21		repairs, additional costs to facilitate customer account transitions and lock

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### Testimony of the Gas Infrastructure and Operations Panel

1		inactive meters, the cost to install external shut off valves as required by the
2		New York City Building Code, higher materials and labor costs, expanded
3		municipal paving requirements and increases in permitting fees and penalties.
4		
5	Q.	Does the Panel address any other topics?
6	A.	Yes. The Panel discusses an innovative project developed in partnership with
7		the City of New York that turns methane from sewage and organic food waste
8		into pipeline quality natural gas, while at the same time reducing emission of
9		greenhouse gases ("GHG"). Lastly, the Panel describes investments in
10		information technology, including digital risk and security systems that will
11		benefit the Company's gas business.
12		
13	Q.	Does the Panel sponsor any exhibits as part of its testimony?
14	A.	Yes. The Panel sponsors the following exhibits that were prepared under its
15		direction and supervision:
16		Exhibit (GIOP-1): Actual and Projected Capital Expenditures: Historic
17		Test Year, Rate Year, Data Year 1 and Data Year 2.
18		Exhibit (GIOP-2): Graph Comparing Actual and Projected Annual
19		Investment Levels for calendar years ("CY") 2015 - 2020.
20		Exhibit (GIOP-3): Chart Summarizing Projected Leak Rates for LPP for
21		Various Main Replacement Strategies.

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### Testimony of the Gas Infrastructure and Operations Panel

1		Exhibit (GIOP-4): Data Sheets for Significant Capital Programs. This
2		exhibit includes summaries of the Company's significant
3		capital projects/programs.
4		Exhibit(GIOP-5): Incremental O&M Expenditures: Historic Test Year,
5		Rate Year, Data Year 1 and Data Year 2.
6		Exhibit (GIOP-6): Incremental Full Time Equivalent Positions by Function
7		in the Rate Year, Data Year 1 and Data Year 2.
8		
9	Q.	For what periods does the Panel provide information?
10	A.	The Panel provides detailed information on (i) capital and O&M spending for
11		the Historic Test Year, (ii) proposed capital investments and O&M spending
12		in the Rate Year and (iii) projected capital and O&M spending for the Data
13		Years.
14		
15	Q.	How is the Panel's testimony organized?
16	A.	The testimony is organized into the following sections:
17		Sections I and II are introductory sections outlining the Panel's testimony.
18		Section III provides an overview of the Company's capital investment and
19		O&M program priorities and objectives, including the retirement of leak
20		prone mains and services, investments in pipeline safety, including
21		programs to address emerging regulations that are expected to impact

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### Testimony of the Gas Infrastructure and Operations Panel

1	future capital and O&M costs, as well as the Company's plans to expand
2	gas service. This discussion includes justification for the Company's gas
3	capital and O&M expenditures for these programs and the public interest
4	considerations that will be served by their implementation. Section III
5	also addresses the Company's deployment of joint sealing and cast iron
6	lining programs, as well as investments in storm hardening.
7	Section IV provides details on the Company's proposed capital investment
8	program for the Rate and Data Years, including the Company's spending
9	rationales, categories of capital investment and specific work activities
10	within each category.
11	$\underline{Section \ V}$ describes the Company's O&M programs, including those
12	targeted at current and emerging safety regulations. Section V also
13	describes O&M costs for leak repairs, the Company's efforts to lock
14	meters on inactive accounts, compliance with New York City's Local Law
15	30 and inspections/damage prevention programs.
16	Section VI describes the Company's investment in the Newtown Creek
17	Project and information technology/digital risk and security programs that
18	will support gas operations.
10	

19

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### Testimony of the Gas Infrastructure and Operations Panel

1		program to significantly accelerate the replacement of LPP. In developing its
2		capital and O&M plans, the Company balanced the need for spending to
3		achieve safety and service objectives with the need to manage costs and
4		minimize impacts on customer rates.
5		
6	Q.	Why have the Company's capital expenditures increased over the last
7		several years?
8	А.	Several developments have required KEDNY and other natural gas
9		distribution utilities to increase their annual capital expenditures. First, the
10		development of new domestic gas sources has created an abundant natural gas
11		supply that is conducive to the growth of the gas distribution business from
12		both an economic and security/reliability perspective. Natural gas supplies
13		are likely to be available to KEDNY and its customers now and for the
14		foreseeable future at a significantly lower cost than the cost to develop
15		alternative energy sources. To take advantage of the favorable gas supply
16		dynamics, natural gas utilities are increasing their growth spending to offer the
17		economic benefits of relatively inexpensive natural gas supplies to the greatest
18		possible number of consumers.
19		
20		Second, recent pipeline safety incidents, such as the tragic events in San
21		Bruno, California, Allentown, Pennsylvania and more recent incidents have

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### Testimony of the Gas Infrastructure and Operations Panel

1		appropriately increased focus on pipeline safety and the need to carefully
2		monitor and replace aging pipeline infrastructure.
3		
4		Finally, recent weather events such as Superstorm Sandy, Hurricane Irene and
5		the Polar Vortex, and the expectation that similar events will continue to
6		occur, require the Company to find ways to protect its facilities from severe
7		weather.
8		
9		The foregoing developments indicate that the Company must increase capital
10		spending to modernize its transmission and distribution assets, increase the
11		size and scope of its safety replacement and reliability programs, and promote
12		gas growth.
13		
13 14	Q.	How will the Company support this increased level of capital investment?
13 14 15	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to
13 14 15 16	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work
13 14 15 16 17	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work management and quality control organizations and capabilities to deliver an
13 14 15 16 17 18	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work management and quality control organizations and capabilities to deliver an unprecedented level of capital investment. Over the last several years, the
13 14 15 16 17 18 19	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work management and quality control organizations and capabilities to deliver an unprecedented level of capital investment. Over the last several years, the Company has hired and trained engineers, designers, planners, estimators,
13 14 15 16 17 18 19 20	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work management and quality control organizations and capabilities to deliver an unprecedented level of capital investment. Over the last several years, the Company has hired and trained engineers, designers, planners, estimators, project managers, analysts, inspectors and other construction support
13 14 15 16 17 18 19 20 21	<b>Q.</b> A.	How will the Company support this increased level of capital investment? As the Company developed plans to modernize its gas assets, it also began to build and enhance its operations, engineering, resource planning, work management and quality control organizations and capabilities to deliver an unprecedented level of capital investment. Over the last several years, the Company has hired and trained engineers, designers, planners, estimators, project managers, analysts, inspectors and other construction support personnel as the investment plan has grown. The Company will further

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### Testimony of the Gas Infrastructure and Operations Panel

1	develop these capabilities during CY 2016 and the Rate Year by adding
2	incremental resources to execute the capital plan and support the increased
3	operations workload (discussed below). The Company's efforts to develop its
4	internal workforce are discussed by the Human Resources Panel.
5	
6	With regard to contractor resources, the Company has developed a
7	procurement strategy that supports sustainable growth in qualified contractors
8	to meet the work plan increases. To address the overall shortage of qualified,
9	skilled labor and the challenges around developing qualified contractors, the
10	Company's resource plan includes the following elements:
11	Establishing longer term contracts to enable contractors to plan and
12	invest in hiring, training, facilities and equipment to meet the
13	Company's construction needs;
14	Providing greater work plan visibility to contractors on forecast crew
15	requirements to enable them to develop the required capacity; and
16	Managing the work plan to limit seasonal variability to support a
17	stable contractor workforce and promote worker retention.
18	To encourage portability of the regional contractor workforce, the Company
19	recently completed a pilot program, developed in conjunction with the NGA
20	and the Gas Technology Institute, to enhance contractor training and
21	standardize construction skills. The Company is also working with

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### Testimony of the Gas Infrastructure and Operations Panel

1		contractors to develop new pipelines of skilled labor to feed into the
2		workforce, including by recruiting prospective utility workers from
3		community colleges, trade schools and veteran groups (as discussed in the
4		Human Resources Panel's testimony).
5		
6	Q.	Does the Company require additional personnel in the Rate Year and
7		Data Years to execute its capital and O&M programs?
8	А.	Yes. The Company forecasts the need for an additional 199 full time
9		equivalent ("FTE") positions in the Rate Year to support the additional capital
10		investment, increasing O&M workload and new programs discussed below.
11		These FTEs include positions in field operations, meter services, engineering,
12		project management, resource planning, instrumentation and regulation,
13		damage prevention, gas production and gas control. The cost of these FTEs
14		will be charged to both capital and O&M programs based on the job function
15		and nature of the work. Exhibit (GIOP-6) identifies the incremental FTE
16		positions by function and these positions are discussed in more detail below.
17		The Company has already begun to fill these positions and will continue to
18		hire and train in CY 2016 and into the Rate Year to deliver KEDNY's capital
19		plan and incremental O&M workload.

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Testimony of the Gas Infrastructure and Operations Panel

1		A. Pipeline Integrity and Reliability Programs
2		i. <u>Accelerated LPP Replacement</u>
3	Q.	What is the Company's proposal regarding the acceleration of its LPP
4		replacement program?
5	Α.	The Company currently has approximately 1,900 miles of LPP in its inventory
6		comprised of: (i) unprotected (i.e., non-cathodically protected) steel pipe
7		whether bare or coated and (ii) cast and wrought iron pipe.
8		
9		To reduce the risk of leaks and breaks, improve system performance and
10		reliability, meet the Company's commitment to enhance customer satisfaction
11		and reduce methane emissions, the Company has prioritized the replacement
12		of older and higher-risk gas infrastructure - specifically, LPP that
13		disproportionally contributes to leaks on KEDNY's system. To accelerate
14		replacement of LPP, KEDNY proposes to increase its annual replacement
15		mileage target from 47 miles in CY 2016 to 50 miles in the Rate Year. In
16		addition, the Company is proposing a mechanism that would fund an increase
17		in LPP retirements of five miles or more in each year following the Rate Year.
18		
19		
20		
21		

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### Testimony of the Gas Infrastructure and Operations Panel

1		<u>Table 2</u> : Proposed LPP Retirements CYs 2017 to 2020				
		5 Miles     10 Miles     15 Miles       50 Miles     50 Miles     50 Miles     50 Miles     50 Miles     50 Miles     Base LLP Target				
2		CY 17 CY 18 CY 19 CY 20				
3	Q.	Why is the Company proposing to accelerate its LPP replacement				
4		program?				
5	A.	The Company's gas distribution network dates to pre-1900. Its piping				
6		inventory consists of cast iron, wrought iron, unprotected bare/coated steel,				
7		protected steel and plastic. Based on operating experience, the Company				
8		anticipates a larger number of failures on leak prone mains as these facilities				
9		continue to deteriorate over time. Indeed, as discussed below, the Company				
10		has observed leak rates for its leak prone mains that are double the average				
11		leak rate for all Company-owned distribution mains.				
12						
13		Accelerating the rate of main replacements is the best long term approach to				
14		reducing leaks on the gas system and enhancing system safety. As shown in				
15		Table 4 below, the leak rate on LPP is increasing at a rate that exceeds the				

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### Testimony of the Gas Infrastructure and Operations Panel

		Coated Steel	0	0%	0	0%
		Bare Steel	314	8%	24,450	4%
	1	Non-Cathodically Protected St	eel			
		Category	Miles of Main	Percent of Total	Number of Services	Percent of Total
17 18	_	<u>Table 3</u> : Composit KEDNY	ion of Maiı ''s Distribu	ns & Active tion System	Services on	
16		the delivery infrastructure w	as compris/	ed as follows		
15		compositions, vintages and	performanc	e histories. A	As of Decembe	r 31, 2014,
14		services. This distribution i	nfrastructur	e consists of	varying materi	al
13	A.	The Company has approxin	ately 4,100	miles of mai	in and 569,000	active
12		including a breakdown of	the compos	ition of mai	ns and service	s.
11	Q.	Please provide a brief over	rview of the	e Company's	s distribution :	system,
10						
9		0151).				
8		goal of replacing all LPP in	New York	within the ne	ext 20 years (Ca	nse 15-G-
7		accelerated replacement targ	gets are con	sistent with t	he Commission	n's stated
6		compared to more than 40 y	ears at the	current rate).	The Company	's
5		time - with the inventory of	LPP replac	ed completel	ly in 20 years (	as
4		rate to the target schedule, t	he Compan	y expects to s	see lower leak i	rates over
3		to a mileage level that will r	everse the t	rend. By acc	celerating the re	eplacement
2		address this issue, the Comp	oany is prop	osing to incr	ease the replace	ement rate
1		leak reductions achieved the	ough the cu	rrent replace	ment program.	То

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### Testimony of the Gas Infrastructure and Operations Panel

	Category		Miles of Main	Percent of Total	Number of Services	Percent of Total
	Ca	ast Iron & Wrought Iron	1,586	38%	0	0%
	LI	LPP Subtotal		46%	24,450	4%
	Ca	Cathodically Protected Steel				
		Bare Steel	0	0	0	0
		Coated Steel	1,151	28%	48,898	9%
	O	ther				
		Plastic	1,083	26%	366,434	64%
		Copper/Undetermined	0	0%	129,131	23%
	N	on–LPP Subtotal	2,234	54%	544,463	96%
	Di	istribution System Total	4,134		568,913	
		A significant amount of infr during expansion periods or 1,405 miles) and the post-W 741 miles). Most unprotect to 1959 and as early as pre- 50 to 100 years of age or gr	rastructure ti ccurring pre /orld War II ed steel mai 1910, which eater.	-1910 throug period of 19 ns in service means that	n service was 1 h 1929 (approx 146-1970 (appr today were ins the inventory ra	nstalled kimately oximately stalled prior anges from
•	Q.	How does the Company p	rioritize the	replaceme	nt of main seg	nents for
)		the replacement program	?			

11 A. Each year, the Company prioritizes LPP replacements by using a risk ranking

1

12 algorithm that is part of the Company's Distribution Integrity Management

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### Testimony of the Gas Infrastructure and Operations Panel

1		Plan ("DIMP") and the Company's Gas Operating Procedure for the
2		Identification, Evaluation and Prioritization of Distribution Main Segments
3		for Replacement (ENG04030). The Company's risk model calculates a
4		relative risk score for each LPP segment based on specific performance data
5		and localized incident probabilities and consequences, combined with
6		calculated risk factors for the asset classes being evaluated. This risk-based
7		algorithm along with the Company's good engineering judgment (taking all
8		factors and risks into consideration in each case) form the foundation of the
9		LPP replacement strategy.
10		
11	Q.	Please provide an overview of the performance of LPP on the Company's
11	Q.	Please provide an overview of the performance of LPP on the Company's distribution system.
11 12 13	<b>Q.</b> A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak
11 12 13 14	<b>Q.</b> A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The
11 12 13 14 15	<b>Q.</b> A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased
11 12 13 14 15 16	<b>Q.</b> A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased from 0.48 leaks per mile in 2013, which was due in part to extremely cold
11 12 13 14 15 16 17	<b>Q.</b> A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased from 0.48 leaks per mile in 2013, which was due in part to extremely cold weather in 2014. The current leak rate for LPP is 1.57 leaks per mile. After
11 12 13 14 15 16 17 18	Q.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased from 0.48 leaks per mile in 2013, which was due in part to extremely cold weather in 2014. The current leak rate for LPP is 1.57 leaks per mile. After several years of decline, the leak rate has been trending up since 2012, when it
11 12 13 14 15 16 17 18 19	Q.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased from 0.48 leaks per mile in 2013, which was due in part to extremely cold weather in 2014. The current leak rate for LPP is 1.57 leaks per mile. After several years of decline, the leak rate has been trending up since 2012, when it was 0.92 leaks per mile, as these facilities continue to deteriorate.
11 12 13 14 15 16 17 18 19 20	Q. A.	Please provide an overview of the performance of LPP on the Company's distribution system. As would be expected, the Company has observed a significantly higher leak rate on its LPP inventory as compared to all other distribution facilities. The current leak rate for all distribution piping is 0.75 leaks per mile, increased from 0.48 leaks per mile in 2013, which was due in part to extremely cold weather in 2014. The current leak rate for LPP is 1.57 leaks per mile. After several years of decline, the leak rate has been trending up since 2012, when it was 0.92 leaks per mile, as these facilities continue to deteriorate.

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### Testimony of the Gas Infrastructure and Operations Panel

1		Rate Year, ii	ncreasing b	y five miles	s each subse	quent year,	the Company	
2		expects leak	rates to de	cline measu	neasurably over the next five years.			
3								
4	Q.	Is there an o	environme	ntal benefi	t associated	l with an a	ccelerated LPP	
5		replacement program?						
6	A.	Yes. Retirement of LPP reduces gas losses and fugitive emissions of						
7		methane, considered by the United States Environmental Protection Agency						
8		("EPA") to b	e a GHG.	Table 5 pro	ovides a higl	h-level estir	nate of potential	
9		methane emi	ssions redu	actions over	the next se	veral years	assuming the	
10		retirement of	f LPP purst	ant to KEL	ONY's prope	osed progra	m.	
11		Tab	ole 5: Estin	mated Met	hane Emiss	ions Reduc	ction	
			Main Ir	wontory	Mothanal	Emission		
			iviain ii	= Mathema	Emission (34a)	Chinasion		
		440,000		- Meusare	callission (sect)	*System gr	owth is not included.	
		120.000	430,043					
		430,000		422,107				
		420,000			413,124			
		e <sup>410,000</sup>				403.065		
		N				402,963		
		Ē 400,000						
		ē 400,000					391,869	
		ق 400,000					391,869	
		ت 400,000 390,000 380,000					391,869	
							391,869	
12			CY2014	CY2015	CY2016	CY2017	391,869 CY2018	

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	What is the level of total spending required to achieve the Company's
2		accelerated replacement program in the Rate Year and the Data Years?
3	A.	Exhibit(GIOP-1) sets forth the projected spending for CYs 2017 through
4		2019 to achieve the base LPP replacement target (50 miles/year) discussed
5		above. As shown in Exhibit (GIOP-1), annual program spending would
6		increase from approximately \$56 million in CY 2016 to \$77.37 million in the
7		Rate Year and \$87.18 million and \$88.93 million in Data Years 1 and 2,
8		respectively.
9		
10	Q.	Please describe the factors contributing to increased main replacement
11		costs in KEDNY's service territory.
12	A.	Several factors are increasing the cost of LPP replacement. The remaining
13		LPP population contains a significant amount of large diameter pipe, which is
14		more costly to replace. The installation of large diameter plastic pipe (larger
15		than four inches) calls for fusion joints every 40 feet, requiring a larger layout
16		area, larger trenches and more permits as compared to the installation of
17		smaller diameter pipe. Larger pipe is also heavier and requires more
18		resources for transportation, handling and installation.
19		
20		Next, main replacements are costing more in New York City as a result of
21		working conditions and more onerous municipal permitting/restoration

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### Testimony of the Gas Infrastructure and Operations Panel

1		requirements and fees. Although KEDNY works closely with New York City
2		to minimize costs associated with construction (i.e., by coordinating main
3		replacements with municipal paving projects), many of these costs are driven
4		by field conditions and, therefore, are not within the Company's control.
5		
6		Finally, the cost of capital work has increased over the last several years due
7		to rising material costs and increased labor and contractor costs because of
8		market competition to secure qualified construction resources.
9		
10		To mitigate the cost, main replacements are coordinated with other programs,
11		such as the Public Works, Reinforcement and Reliability programs, to capture
12		synergy savings and cost avoidance. As the Company continues to accelerate
13		its rate of LPP replacement, it will look for more of these opportunities to
14		deploy construction resources more efficiently. The Company will also
15		identify areas of the gas network where entire LPP systems can be retired
16		efficiently and cost effectively. Finally, KEDNY is implementing a long term
17		contractor sourcing strategy (discussed above) to secure qualified construction
18		resources capable of performing LPP replacements at reasonable costs.
19		
20	Q.	What is the Company's proposal for the recovery of LPP replacement
21		costs following the Rate Year?

costs following the Rate Year?

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### Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Company is targeting the replacement of more than 300 miles of LPP
2		over a five-year period (2017 through 2021). In recognition of the
3		unprecedented incremental work associated with the Company's accelerated
4		main replacement targets, and to allow the Company to begin recovering the
5		actual costs of the accelerated replacement of LPP as the work is completed,
6		the Company proposes a Gas Safety and Reliability Surcharge under which
7		the Company would be allowed to recover a return on investment,
8		depreciation expense and related O&M expense (i.e., disconnects and
9		reconnects) associated with prudent investment in LPP replacement
10		incremental to the level funded in base rates. Provided the Company exhausts
11		its rate allowance for LPP replacements, incremental investment in LPP above
12		the base level of 50 miles in any calendar year, in an amount not to exceed the
13		Company's average cost of main replacement for comparable pipe materials,
14		sizes, strata (e.g., pavement, grass) and working conditions, would be included
15		in the Gas Safety and Reliability Surcharge. The Gas Safety and Reliability
16		Surcharge is discussed more by the Revenue Requirements Panel.
17		
18	Q.	Why is the Company proposing a base level of LPP replacement miles in
19		the Rate Year and Data Years?
20	А.	The base level (50 miles) represents a significant increase in replacement
21		miles compared to the replacement targets just four years ago when the

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### Testimony of the Gas Infrastructure and Operations Panel

1	Company was targeting 25 miles per year. The Company must continue to
2	ramp up its engineering, procurement, construction and project management
3	resources to support these new levels of main replacement. The Company's
4	ability to accelerate replacement above the base level could be impacted in
5	any year by resource constraints as local distribution companies ("LDCs") in
6	the area compete for scarce construction resources that are capable of safely
7	performing main replacements. Only a limited number of qualified
8	contractors are available, and it will take significant time and effort to "up-
9	skill" nonqualified construction staff to get all of the work done. Similarly,
10	the Company's ability to secure construction permits and coordinate
11	construction activities with municipalities and other utilities will be
12	challenged as the Company pursues unprecedented levels of main
13	replacement. At the same time, significant municipal infrastructure projects in
14	a given year may present opportunities to replace main more cost effectively.
15	
16	The Company's proposal ensures it will replace at least 50 miles of LPP each
17	year (with an associated negative revenue adjustment for failing to achieve the
18	penalty target, as discussed by the Gas Safety Panel), while providing
19	incentives to significantly accelerate its LPP replacement each year. The
20	proposal also provides flexibility to target additional replacements when
21	resources are available and other opportunities present to complete the work

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### Testimony of the Gas Infrastructure and Operations Panel

1		more cost effectively. The surcharge mechanism ensures that KEDNY will
2		recover LPP replacement costs only to the extent it is successful in delivering
3		its program.
4		
5	Q.	Is the Company proposing an incentive regarding its replacement of
6		LPP?
7	A.	Yes. The Gas Safety Panel discusses the Company's proposed incentive for
8		LPP replacements above the base target.
9		
10	Q.	Does the Company propose to enhance reporting on LPP replacement?
11	A.	Yes. The Company will provide Department of Public Service Staff ("Staff")
12		with visibility to the status of its LPP replacement program. The Company
13		proposes to report to Staff on a quarterly basis, including main retired (pipe
14		material, feet, location), cost data, opportunistic replacements and the status of
15		the Company's LPP replacement work plan.
16		
17		In addition, thirty days prior the beginning of each calendar year the Company
18		will submit its LPP prioritization summary identifying the proposed projects
19		for the year, the estimated cost for these projects and a forecast of average
20		LPP replacement costs per mile. Within ninety days after the end of the
21		calendar year, the Company will submit a report detailing the actual projects

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### Testimony of the Gas Infrastructure and Operations Panel

1		completed and any incremental replacement miles performed under the Gas
2		Safety and Reliability Surcharge.
3		
4		ii. <u>Service Line Replacement Program</u>
5	Q.	In addition to the LPP replacement program, is the Company also
6		proposing a program to proactively replace gas services?
7	A.	Yes. KEDNY is proposing a replacement program for its inventory of inside,
8		high pressure, unprotected steel services.
9		
10	Q.	Why is the Company proposing to replace these services?
11	A.	The Company performed an engineering assessment of its gas services that
12		analyzed the asset inventory by risk factors (e.g., pipe age, material, inside vs.
13		outside) and pressure tested a sampling of facilities throughout its territory.
14		The assessment suggested that high pressure, unprotected steel services
15		present a higher risk of failure, particularly at the "wall piece" where the
16		service piping penetrates the foundation wall of the building. The accelerated
17		replacement of high pressure bare steel services with meters/regulators located
18		inside the building is also supported by the risk assessment conducted
19		pursuant to the Company's DIMP.
20		
21	Q.	What are the costs of this program?

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### Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Company is proposing to replace approximately 250 services each year at
2		a cost of $1.69$ million in the Rate Year and $1.7$ million in each of the Data
3		Years.
4		
5		iii. Joint Sealing and Cast Iron Lining
6	Q.	In addition to the LPP replacement programs, is the Company proposing
7		any programs to recondition existing main?
8	А.	Yes, the Company's capital plan includes two programs that utilize pipe lining
9		and continuous sealing technologies to cost effectively improve the safety and
10		reliability of its large diameter mains. First, the Company is deploying the
11		Cast Iron Joint Sealing Robot or CISBOT. Second, the Company is utilizing
12		cured-in-place ("CIP") pipe lining to recondition large diameter cast iron and
13		steel mains.
14		
15	Q.	Please describe the CISBOT and CIP programs.
16	А.	CISBOT is a robotic internal sealing method for cast iron mains 16 inches to
17		42 inches in diameter. As CISBOT moves through the inside of the main, it
18		injects a sealant that eliminates existing leaks, prevents future leaks, reduces
19		emissions and reconditions cast iron joints, extending the life of the main,
20		improving system performance and reducing future joint leaks on treated
21		pipeline segments for years. Unlike traditional construction methods,

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# Testimony of the Gas Infrastructure and Operations Panel

1		CISBOT allows KEDNY to seal more than 80 joints on a pipeline segment
2		from one excavation without taking the main out of service, which avoids
3		service disruptions to customers. This process significantly reduces the
4		excavation and paving/restoration costs as compared to conventional leak
5		repair methods. KEDNY is proposing to use CISBOT to address
6		approximately two miles of large diameter cast iron main in the Rate Year and
7		Data Years.
8		
9		The CIP pipe lining process installs a treated fabric liner into cast iron and
10		steel mains. An adhesive resin in the liner bonds with the inside wall of the
11		pipe, forming a new layer that is impervious to gas. CIP lining reconditions
12		larger diameter cast iron and steel mains, eliminates existing leaks, prevents
13		future leaks, reduces emissions, improves performance and extends the life of
14		the main for more than 50 years. CIP lining technology has been used
15		extensively on water and sewer facilities in the United States for years and,
16		more recently, has been deployed by natural gas utilities to recondition aging
17		cast iron and steel mains. KEDNY is proposing to line 2.5 miles of main in
18		the Rate Year and four miles in each of the Data Years.
19		
20	Q.	How do CISBOT and CIP complement the Company's LPP replacement
21		program?

program?

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	Reconditioning large diameter main with CISBOT and CIP extends the life of
2		the main and defers its replacement. This allows the Company to focus more
3		attention, capital investment and construction resources on retiring smaller
4		diameter LPP with higher risk profiles, which will enhance the effectiveness
5		of KEDNY's LPP replacement program and promote public safety.
6		
7	Q.	What are the cost advantages of CISBOT and CIP lining?
8	А.	Large diameter main replacements and repairs are typically expensive because
9		of the location and depth of the excavations required to access the pipe joints.
10		The Company's cost to repair large diameter joints using traditional
11		construction methods can range from \$15,000 to \$30,000 per joint, depending
12		on the size and depth of the excavation and paving requirements for each
13		individual joint repair. Using CISBOT, the Company can recondition large
14		diameter joints for approximately \$5,500 per joint - less than one-third the
15		average cost of a traditional joint repair. This is largely attributable to the fact
16		that CISBOT is able to traverse the main and access joints without requiring a
17		pit excavation at each joint.
18		
19		CIP lining is also cost effective and efficient, especially in congested
20		metropolitan areas where it is not always possible to locate a sufficient
21		subsurface space to install new large diameter main. Similar to CISBOT,

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# Testimony of the Gas Infrastructure and Operations Panel

1		because CIP involves less excavation than traditional pipe replacement, it
2		reduces construction costs, avoids damage to roads and vegetation, minimizes
3		disruptions to the public and provides environmental benefits in the form of
4		reduced gas emissions and construction debris while maintaining the safety of
5		the main until it can be replaced.
6		
7	Q.	What are the Company's expected capital expenditures on CISBOT and
8		CIP?
9	A.	The Company's capital forecast for these programs includes \$14.34 million in
10		the Rate Year, \$19.28 in Data Year 1 and \$19.68 million in Data Year 2.
11		
11 12	Q.	Is the Company proposing a productivity mechanism for its CISBOT and
11 12 13	Q.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs?
11 12 13 14	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right,
11 12 13 14 15	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers
11 12 13 14 15 16	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers by including these programs in a productivity pilot that will share any
11 12 13 14 15 16 17	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers by including these programs in a productivity pilot that will share any CIP/CISBOT cost underruns directly with customers. To the extent
11 12 13 14 15 16 17 18	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers by including these programs in a productivity pilot that will share any CIP/CISBOT cost underruns directly with customers. To the extent KEDNY's actual costs to deliver the CIP and/or CISBOT annual mileage
11 12 13 14 15 16 17 18 19	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers by including these programs in a productivity pilot that will share any CIP/CISBOT cost underruns directly with customers. To the extent KEDNY's actual costs to deliver the CIP and/or CISBOT annual mileage targets are less than the rate allowance for these programs, the Company will
111 12 13 14 15 16 17 18 19 20	<b>Q.</b> A.	Is the Company proposing a productivity mechanism for its CISBOT and CIP programs? Yes. While CISBOT and CIP are cost effective programs in their own right, the Company is proposing to enhance the potential cost benefits to customers by including these programs in a productivity pilot that will share any CIP/CISBOT cost underruns directly with customers. To the extent KEDNY's actual costs to deliver the CIP and/or CISBOT annual mileage targets are less than the rate allowance for these programs, the Company will share the resulting saving with customers. The Company proposes to retain

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# Testimony of the Gas Infrastructure and Operations Panel

1		80 percent directly to customers. This mechanism will incent the Company to
2		achieve savings in the CISBOT and CIP programs, while at the same time
3		providing customers with a direct financial benefit. The Revenue
4		Requirements Panel also discussed the productivity sharing mechanism.
5		
6		iv. <u>Storm Hardening</u>
7	Q.	What is the Company's proposal with respect to storm hardening?
8	A.	The Company maintains approximately 25,000 gas services within the Federal
9		Emergency Management Agency's designated flood zones. These services
10		are especially susceptible to storm surge and flooding that could cause over-
11		pressurization of the gas facilities connecting customers' premises. The
12		impacts of recent severe storms (i.e., Superstorm Sandy and Hurricane Irene)
13		demonstrate the need for the Company to harden its infrastructure to provide
14		greater protection from future storms.
15		
16		The Company's storm hardening proposal involves the installation of
17		automated service shut-off valves with flood sensors on gas services in flood
18		zones. These valves will operate on a fixed communication network that will
19		allow for remote operation and monitoring. Automated valves stop the flow
20		of gas as soon as flooding is detected. This will prevent regulator over-
21		pressurization and stop gas from flowing to premises with damaged

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# Testimony of the Gas Infrastructure and Operations Panel

1		equipment and/or extinguished pilot lights, mitigating the risk of a potential
2		incident. Automated valves also provide a real-time count of services
3		impacted by flooding to inform the Company's storm response about the
4		resources needed to restore the affected customers expeditiously. Lastly, in
5		areas where flooding prevents physical access to valves and regulators, remote
6		shut-off valves will allow the Company to interrupt only those services
7		impacted by flooding, which could spare entire neighborhoods or larger areas
8		from losing gas service because of access issues.
9		
10		The Company's proposed storm hardening program will deploy
11		approximately 25,000 remote shut-off valves in the flood prone areas of
12		KEDNY's system over five years beginning in the Rate Year.
13		
14	Q.	What are the Company's expected capital expenditures for these remote
15		valves?
16	А.	The Company's forecast for this program includes \$3.51 million in the Rate
17		Year, \$4.75 million in Data Year 1 and \$4.84 million in Data Year 2.
18		
19		v. Integrity Management and Pending PHMSA Safety Regulations
20	Q.	What is the Company's Integrity Management Program?

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Company's transmission pipeline Integrity Management Program
2		("IMP") is a safety program mandated by the Pipeline Safety Improvement
3		Act of 2002. The IMP identifies and addresses potential issues affecting the
4		physical soundness of Company facilities before they become safety or
5		performance issues. The Company conducts baseline and periodic
6		reassessments of transmission facilities to identify and evaluate potential
7		threats to "Covered Segments" of pipelines, <i>i.e.</i> , transmission pipelines that
8		could affect High Consequence Areas (areas where a pipeline failure could
9		have significant adverse consequences), as well as remediation of significant
10		defects discovered during such assessments. Although tests and inspections
11		are generally an operating expense, the first inspection run of a pipeline
12		segment is capitalized. Additional capital work is required to support in-line
13		inspections (e.g., installation of pig launchers and receivers, and pipe
14		reconfiguration/replacement) and to resolve issues discovered during pipeline
15		inspections.
16		
17		KEDNY's capital investment plan includes IMP investments necessary to
18		comply with PHMSA's current regulations governing transmission pipeline
19		integrity management:
20		
21		

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# Testimony of the Gas Infrastructure and Operations Panel

1		Table 6: Integrity Mar	nagement P	rogram Exp	enditures	
		(\$000)	CY17	CY18	CY19	
		Capital Expenditures	16,877	11,818	4,226	
		Operating Expense	1,970	1,510	3,660	
2						
3		The construction activities associa	ted with the	se expenditu	res involve the	•
4		installation of "hot tap" fittings, th	ne reconfigu	ration of suc	h fittings to all	ow
5		in-line inspection passage, the con	struction of	access point	s to allow tethe	ered
6		in-line inspection and, in some cas	ses, the repla	cement of p	ipeline segmen	its.
7						
8	Q.	What is the status of the federal	regulations	in this area	n?	
9	A.	The federal regulations in this area	a are evolvir	ig, and PHM	SA is expected	l to
10		release proposed pipeline safety re	egulations in	2016. One	major compon	ent
11		of the anticipated IMP regulations	is a require	ment for inc	reased inspection	on of
12		IMP-covered pipelines utilizing in	-line inspec	tion technolo	ogy. To meet t	his
13		requirement, transmission pipeline	es must be "	piggable," o	r capable of	
14		accepting in-line inspection tools.				
15		Because the Company believes it	is a prudent	expenditure,	and in anticipa	ation
16		of PHMSA's new regulations exp	anding IMP	KEDNY is	proposing to	
17		increase its piggable inventory thr	ough reconf	iguring exist	ing facilities a	nd, in
18		some cases, replacing transmission	n pipeline se	ctions. The	Company expo	ects

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# Testimony of the Gas Infrastructure and Operations Panel

1		to spend \$16.8 million in the Rate Year. At the end of this program, the
2		Company estimates approximately 57 percent of its transmission main will be
3		piggable. The Company believes that its proposed program is a reasonable
4		and conservative approach pending the promulgation of PHMSA's new
5		regulations, and would be a prudent investment in any case, given that it will
6		enhance the Company's ability to assess the integrity of its transmission
7		pipelines.
8		
9	Q.	What if the heightened requirements associated with the Pipeline Safety
10		Act of 2011 do not become effective during the Rate Year?
11	A.	The Company is constantly evaluating the performance of the gas system and
12		analyzing the need for capital investment and maintenance. Having spent
13		considerable time examining the San Bruno, Allentown and other incidents,
14		and having closely followed the legislative process that culminated in the
15		Pipeline Safety Act of 2011, the Company is being proactive rather than
16		reactive to address important safety issues and to incorporate lessons learned
17		in its capital plan. These capital proposals are prudent investments that will
18		improve system safety and performance. Moreover, these investments should
19		go a long way toward satisfying the heightened safety requirements that are
20		expected to result from the Pipeline Safety Act of 2011.
21		

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1	Q.	What is covered in the Company's Integrity Verification Program
2		("IVP")?
3	A.	The Pipeline Safety Act of 2011 also mandates that PHMSA establish rules
4		requiring operators to demonstrate their pipelines are "fit for service" by
5		reviewing construction records for each pipeline segment to confirm it is
6		operating within design parameters. Among the specific changes under
7		consideration by PHMSA are new rules regarding the maximum allowable
8		operating pressure ("MAOP") and pressure testing requirements for existing
9		pipelines, including (i) eliminating the exemption for establishing the MAOP
10		of pre-1970 "grandfathered" pipe segments; (ii) mandating additional pressure
11		testing for pipelines previously operating above MAOP; and (iii) requiring
12		operators who lack certain records to establish material properties using
13		approved methods (e.g., cutting and testing pipe samples). The final rules are
14		expected to be released in 2016. However, in advance of a final rulemaking,
15		PHMSA issued an advisory bulletin (ADB-11-01; January 2011) directing
16		operators to perform a detailed threat and risk analysis that includes a records
17		review of their systems.
18		
19		Accordingly, the Company is proceeding with an IVP program that includes
20		thorough record reviews, pressure tests, pipeline replacement and retirement
21		of non-essential pipeline segments. As with the IMP program, the proposed

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# Testimony of the Gas Infrastructure and Operations Panel

1		IVP program is based on the Comp	any's asso	essment of s	ystem risks, v	while
2		also incorporating PHMSA's propo	sed rulen	naking.		
3						
4	Q.	What are the Company's forecas	t expendi	tures on IV	P?	
5	A.	The Company forecasts capital exp	oenditures	of \$1.8 mill	lion and O&!	M
6		expense of \$1.3 million in the Rate	Year. Ca	pital expend	litures includ	e
7		pipeline replacement and pressure t	esting, wl	hile O&M ex	xpenses inclu	de
8		material sampling and critical engir	neering ar	alysis:		
9		Table 7: Integrity Verificat	tion Prog	ram Expen	ditures	
		(\$000) C	Y 2017	CY 2018	CY 2019	
		Capital Expenditures	1,829	2,000	2,000	
		Operating Expense	1,300	1,300	1,300	
10						
11		B. Expansion of Gas Service				
12	Q.	Please describe recent growth tre	nds in th	e Company	's service ter	ritory.
13	A.	As a consequence of relatively low	natural g	as commodit	y prices and	
14		governmental mandates that require	e building	s in New Yo	ork City to ph	ase out
15		heavy heating oil, KEDNY is exper	riencing s	ignificant gr	owth and a	
16		concomitant need for growth-relate	d capital	expenditures	. Unlike KE	DLI,
17		new construction growth and conve	ersions in	KEDNY's s	ervice territo	ry have
18		not been significantly impacted by	the recent	dip in the p	rice of oil.	
19						

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	Residential and Commercial Services Installed
	2000
	1500 Commercial Residential
	1000
	500
2	0 2009 2010 2011 2012 2013 2014 2015
3	In addition to service requests from new customers, the Company's current
4	non-firm customers are increasingly requesting firm service upgrades (nearly
5	1,400 in the last five years) that require additional system capacity to
6	accommodate in most cases.
7	
8	Expanding the availability of natural gas in KEDNY's service territory can
9	bring significant economic benefits in the form of energy cost savings for
10	customers, job creation and increased local tax revenues, as well as
11	environmental benefits associated with lower carbon emissions. To enable
12	growth, KEDNY must make significant capital investments in mains, services
13	and system reinforcements.

Table 8: KEDNY Services Installed

1

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1	Q.	Please describe the Company's proposals to increase the availability of
2		gas service within its service territory.
3	A.	The Company is expanding and reinforcing its gas infrastructure to serve
4		additional customers who wish to take advantage of currently low gas
5		commodity costs. To that end, KEDNY is increasing its level of investment
6		in its Growth program to install new main, services and meters to keep up
7		with the projected customer/demand growth in New York City. It is also
8		delivering major reinforcement and reliability projects (e.g., Northern Queens
9		and Metropolitan Reliability Infrastructure) that will increase capacity in
10		constrained areas of the system. These programs include the capital
11		requirements necessary to meet growing customer demand resulting from (i)
12		increasing construction activity in New York City, (ii) interruptible to firm
13		service requests and (iii) continued multifamily conversions resulting from the
14		City's Clean Heat Initiative for No. 4 and No. 6 fuel oil customers.
15		
16	Q.	Please describe the Company's effort to support New York City's Clean
17		Heat initiative.
18	A.	The Clean Heat initiative seeks to phase out the use of No. 6 oil by 2015 and
19		No. 4 oil by 2030 throughout New York City. As of September 2015, the
20		Company has converted 551 of the approximately 797 eligible buildings to
21		natural gas with another 17 buildings currently in progress for a total of 568

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# Testimony of the Gas Infrastructure and Operations Panel

1		buildings, leaving just 229 buildings still unconverted. Conversions in Staten
2		Island are nearly complete, making it the first "Clean Borough" in New York
3		City.
4		
5	Q.	Please describe the Company's Northern Queens Expansion Program.
6	A.	The northern Queens area is among the most capacity constrained segments of
7		the Company's distribution system. These constraints impact the Company's
8		ability to serve existing gas customers and expand service to new customers in
9		the area. The Northern Queens Gas Transmission and Distribution Project
10		("Northern Queens Project") involves the installation of over six miles of 20-
11		inch transmission main, 2,000 feet of distribution main and other system
12		upgrades that will increase capacity and reliability in this area, support future
13		load growth and reduce service interruptions for non-firm customers. The
14		completion of the Northern Queens Project will open opportunities for
15		customers who previously could not be served because of capacity constraints
16		and optimize system reliability and integrity. In addition, the project will
17		allow additional Temperature Controlled ("TC") and interruptible customers
18		to switch to firm service.
19		
20	Q.	What are the Company's capital expenditures in connection with the
21		Northern Queens Project?

Northern Queens Project?

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Commission recently approved spending for CY 2015 and CY 2016 for
2		KEDNY's project to upgrade its transmission and distribution facilities for the
3		Northern Queens Project. The Company plans to expand upon the Northern
4		Queens Project over five years with a goal of installing approximately 12,000
5		feet of pipe per year at an estimated cost of \$5.42 million in the Rate Year to
6		connect customers to the system (in the Base Growth - Install Main budget).
7		
8	IV.	Gas Infrastructure Capital Investment
9	Q.	How much is the Company planning to invest in its gas system assets in
10		the Rate Year?
11	A.	The Company plans to invest approximately \$603.7 million in its gas
12		infrastructure and other capital investments in the Rate Year. Exhibit
13		(GIOP-2), which provides the actual or budgeted capital investment for CYs
14		2015 to 2020, is segmented into four primary spending rationales (programs):
15		"Mandated," "Growth," "Reliability" and "Non-Infrastructure." Table 9
16		summarizes the planned capital investment for the Historic Test Year and CYs
17		2017 to 2019 in each of these programs:
18		
19		
20		

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1 2

> 3 4

9

## <u>Table 9</u>: Capital Budget by Spending Rationale (\$000)

Spending Rationale	НТҮ	CY 2017	CY 2018	CY 2019
Growth	81,403	135,234	137,568	133,624
Mandated	273,208	330,931	365,574	352,279
Reliability	99,164	111,206	164,794	137,462
Non-Infrastructure	9,088	26,329	9,125	9,573
Total	462,010	603,700	677,061	632,938

5 identify specific programs. In addition to the forecast Rate Year capital

6 investment levels, Exhibit \_\_ (GIOP-1) shows actual capital spending for the

7 Historic Test Year and projected capital spending for the Data Years in each8 of these categories.

or mese emegories

10 Q. How were the projected capital estimates derived?

11 A. In accordance with the Company's budgeting policies and procedures, capital

12 budgets are prepared annually with a five year forward look. Budget

13 projections are based on historical work levels and unit cost performance for

14 ongoing mandated and routine work and programs, plus any identified new

15 requirements, programs and projects, such as those related to the anticipated

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1		regulations under the Pipeline Safety Act of 2011. Projects that fall outside of
2		routine work, such as safety-driven programs (e.g., the Company's LPP
3		replacement program in the Mandated Category), are developed by
4		Engineering based on the most recent material, labor and overhead costs.
5		
6	Q.	What are the primary drivers of the difference in the Company's planned
7		capital spending in the Rate Year compared to historic capital spending?
8	A.	As Exhibit (GIOP-1) shows, the primary driver of the increase in planned
9		capital investment in the Rate Year compared to the Historic Test Year is
10		increased investment in Growth and Mandated programs. Investments in
11		these programs are approximately \$54 million (66 percent) and \$58 million
12		(21 percent) higher, respectively, in the Rate Year than in the Historic Test
13		Year, and collectively account for approximately 80 percent of the difference
14		between the total annual capital spend level between the two periods. The
15		specific drivers for these increases are discussed below.
16		
17	Q.	Does the Company's revenue requirement in this case also include cost of
18		removal associated with the capital investment plan?
19	А.	Yes. In addition to the capital costs discussed below, there is a level of cost of
20		removal required to implement the Company's infrastructure investment plan.
21		As reflected in Exhibit (GIOP-1), the Company is forecasting costs of

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# Testimony of the Gas Infrastructure and Operations Panel

1		removal as follows: approximately \$38.47 million in the Rate Year, \$39.59
2		million in Data Year 1 and \$37.51 million in Data Year 2. The capital
3		forecasts for each program presented below are inclusive of cost of removal.
4		
5	Q.	What types of activities are associated with cost of removal?
6		The Company defines removal as any work on an asset that results in it being
7		removed from the asset inventory, whether or not a different asset is added in
8		its place. This type of work would include, but is not limited to, the activities
9		associated with disconnection, removal and disposal (or retirement in place)
10		of gas mains, gas services and related facilities.
11		
12	Q.	What information is presented in Exhibit (GIOP-4)?
12 13	<b>Q.</b> A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the
12 13 14	<b>Q.</b> A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during
12 13 14 15	<b>Q.</b> A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes:
12 13 14 15 16	Q. A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes: • Project or Program name
12 13 14 15 16 17	<b>Q.</b> A.	What information is presented in Exhibit(GIOP-4)? Exhibit(GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes: Project or Program name Spending rationale
12 13 14 15 16 17 18	<b>Q.</b> A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes: • Project or Program name • Spending rationale • Project or Program description
12 13 14 15 16 17 18 19	<b>Q.</b> A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes: • Project or Program name • Spending rationale • Project or Program description • Project or Program justification
12 13 14 15 16 17 18 19 20	Q. A.	What information is presented in Exhibit (GIOP-4)? Exhibit (GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes: Project or Program name Spending rationale Project or Program description Project or Program justification Estimated costs
12 13 14 15 16 17 18 19 20 21	<b>Q.</b> A.	<ul> <li>What information is presented in Exhibit(GIOP-4)?</li> <li>Exhibit(GIOP-4) provides additional information for each of the significant gas capital projects and programs expected to be performed during the Rate Year. This additional information includes:</li> <li>Project or Program name</li> <li>Spending rationale</li> <li>Project or Program description</li> <li>Project or Program justification</li> <li>Estimated costs</li> <li>Customer benefits discussion</li> </ul>

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# Testimony of the Gas Infrastructure and Operations Panel

1		<ul> <li>Alternatives discussion</li> </ul>
2		Reference to other supporting information
3		
4	Q.	Please describe some of the technologies and practices the Company uses
5		to reduce the total cost of its capital expenditures.
6	A.	The Company continues to employ a number of technologies and best
7		practices designed to increase the efficiency and reduce the cost of its capital
8		expenditures. These practices include:
9		• Increasing the amount of planned capital work (versus reactive work).
10		Increasing coordination among capital programs to increase
11		efficiencies (e.g., leveraging LPP opportunities).
12		Installing more small diameter, high-pressure facilities that can be
13		installed at lower cost.
14		Using smaller excavating equipment, increasing operating efficiency
15		and reducing instances of damage (because of decreased size and
16		weight of equipment).
17		Employing "low dig" technology as opposed to traditional open cut
18		methods for main installation, including use of small directional
19		drilling machines for services and small diameter mains.
20		Using "coring and keyhole" technology to repair existing mains.
21		Enhancing contractor management.

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# Testimony of the Gas Infrastructure and Operations Panel

1		<ul> <li>On-site reporting for work crews in many large construction projects.</li> </ul>
2		• Deploying CISBOT and CIP lining (as described in Section III(A)(iii)
3		above).
4		In addition, the Company is addressing escalating municipal permitting fees
5		and restoration costs through proactive outreach to municipalities in the
6		service territory.
7		
8		Finally, as discussed by the Revenue Requirements Panel, the Company's
9		performance excellence initiatives have contributed to lower Historic Test
10		Year and Rate Year capital costs. The capital savings associated with these
11		initiatives are embedded in the capital plan and, therefore, not reflected as
12		separate adjustments.
13		
14	Q.	Is the Company doing anything to reduce methane releases during
15		construction activities?
16	A.	Yes. The Company is developing a new operating procedure to capture gas
17		during "blow-downs," during which gas is purged from a gas pipeline and
18		released. Under the Company's new protocol, a draw down compressor will
19		capture the gas (where possible) and inject it into another pipeline that is in
20		service. The Company is currently developing standards and procedures for
21		this new blow down process, and anticipates deployment in the Rate Year.

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	Did the recent Gas Management Audit address any aspects of the
2		Company's gas operations?
3	Α.	Yes. While the New York Gas Management Audit found the Company's gas
4		operations perform well overall in providing gas service in a reliable manner,
5		the audit identified a number of findings and recommendations addressing
6		aspects of the Company's system planning, engineering, project management
7		and work management functions. These audit recommendations, which are in
8		varying stages of implementation, suggest that the Company: (i) develop an
9		integrated natural gas system-wide plan that includes all reliability work,
10		mandated replacements, growth projects and system planning work
11		identifiable over a five year period (in progress); (ii) update and consolidate
12		the Company's IMP (completed); (iii) develop an estimating program for the
13		Company's gas projects (in progress); (iv) implement a program to track and
14		manage crew and individual worker productivity (in progress); and (v)
15		develop a manpower planning program (in progress). Once fully
16		implemented, these recommendations will enhance the Company's system
17		planning, estimating and work management capabilities. The testimony of
18		Company Witness Keri Sweet Zavaglia discusses the status of the Gas
19		Management Audit implementation.
20		

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Testimony of the Gas Infrastructure and Operations Panel

1		A. Capital Planning and Budgeting
2	Q.	Please describe the annual development of the Company's capital plan.
3	А.	Each year, the Company develops a ten-year capital plan to achieve its
4		performance objectives of delivering safe, reliable service. In the summer of
5		each year, Investment Planning compiles proposed spending for programs and
6		individual capital projects. Programs and projects are categorized by the four
7		spending rationales (Mandated, Growth, Reliability and Non-Infrastructure).
8		The proposed spending for each program or project includes the latest cost
9		estimates for in-progress projects as well as initial estimates for new projects.
10		Expected deviations from historical trends in mix, volume and cost of work
11		are considered.
12		
13		All known mandatory programs and projects are included in the ten-year
14		capital plan. Once the budget level has been established for Mandated work,
15		the programs and projects in the other spending rationales are reviewed for
16		inclusion in the plan. Whether any other project is included in the plan is
17		based on several factors, including, but not limited to, whether the project is
18		new or in-progress, the project risk score and/or resource availability. In
19		addition, program work is examined to capture any possible cost efficiencies,
20		specifically with respect to LPP replacement.
21		

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# Testimony of the Gas Infrastructure and Operations Panel

1		In late fall, the capital plan is reviewed by the New York Jurisdictional
2		President (Company Witness Kenneth Daly) and the Vice President, Finance,
3		New York (Company Witness David Doxsee). The New York Jurisdictional
4		President reviews the overall customer, service quality and financial impacts
5		of the investment plan as part of the business planning process and may
6		request changes to the level or mix of investments.
7		
8		In early winter, the capital plan is presented to the National Grid plc Executive
9		Committee and, in early spring, the capital portfolio is presented to the
10		National Grid plc Board of Directors for review and approval.
11		
11	Q.	Are there additional approvals needed before a project in the annual
11 12 13	Q.	Are there additional approvals needed before a project in the annual capital plan may proceed?
11 12 13 14	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific
11 12 13 14 15	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten-
11 12 13 14 15 16	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten- year capital plan to proceed. Presently, all projects greater than \$8 million,
11 12 13 14 15 16 17	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten- year capital plan to proceed. Presently, all projects greater than \$8 million, and all complex projects greater than \$1 million, up to a limit of \$25 million,
11 12 13 14 15 16 17 18	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten- year capital plan to proceed. Presently, all projects greater than \$8 million, and all complex projects greater than \$1 million, up to a limit of \$25 million, are reviewed and approved by the U.S. Sanctioning Committee, a committee
11 12 13 14 15 16 17 18 19	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten- year capital plan to proceed. Presently, all projects greater than \$8 million, and all complex projects greater than \$1 million, up to a limit of \$25 million, are reviewed and approved by the U.S. Sanctioning Committee, a committee established by the National Grid USA Board of Directors specifically for this
11 12 13 14 15 16 17 18 19 20	<b>Q.</b> A.	Are there additional approvals needed before a project in the annual capital plan may proceed? Yes. Aside from the capital planning and budgeting process, specific "delegation of authority" approval must be obtained for any project in the ten- year capital plan to proceed. Presently, all projects greater than \$8 million, and all complex projects greater than \$1 million, up to a limit of \$25 million, are reviewed and approved by the U.S. Sanctioning Committee, a committee established by the National Grid USA Board of Directors specifically for this purpose. Projects from \$1 million to \$8 million are approved by the Senior

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# Testimony of the Gas Infrastructure and Operations Panel

1		are approved through a supervisory hierarchy based on certain established
2		thresholds. Effective January 1, 2016, projects between \$25 million to \$176
3		million will be reviewed by a newly-established Senior Executive Sanctioning
4		Committee.
5		
6	Q.	Please describe how the Company's DIMP impacts its capital investment
7		planning.
8	A.	The DIMP involves a risk-based assessment of the Company's distribution
9		system to identify threats in seven categories: corrosion, natural forces,
10		excavation damage, other outside force damage, material and weld failure,
11		equipment failure/malfunction and inappropriate operation. The DIMP
12		requires evaluation and prioritization of the risks that these threats pose, and
13		the implementation of measures to address the highest risks with an emphasis
14		on leak management, enhanced damage prevention, operator qualification to
15		reduce human error and system replacement. Consistent with the DIMP, the
16		Company prioritizes asset replacements in its investment plan based on a risk
17		ranking that considers, among other things, leak repair history, types of leak,
18		pipe material, surrounding geography, segment length, nearby construction
19		activity, field conditions, customer issues, open leaks and engineering
20		judgment. The risk ranking factors are carefully designed to consider known
21		differences in the performance of asset subclasses, extensive experience with

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# Testimony of the Gas Infrastructure and Operations Panel

1		asset failures, current performance data for the asset subclasses for various
2		threat categories, and subject matter experts' analysis and opinions on the
3		future performance of the assets.
4		
5		B. Mandated Category of Capital Spending
6	Q.	What portion of the Company's capital investment plan is Mandated?
7	A.	The Mandated category of work accounts for approximately 55 percent (\$330
8		million) of the total planned capital investment in the Rate Year.
9		
10	Q.	Please describe what is included in the Mandated spending category.
11	A.	Projects covered by the Mandated spending rationale are those needed to
12		comply with regulatory obligations and rate plan commitments, including:
13		City/State Construction projects that require the Company to relocate facilities,
14		Local Law 30 compliance, code-required corrosion testing and mitigation or
15		other pipeline integrity related activity, proactive and reactive capital main
16		and service replacement, required meter replacement and cross bore
17		investigations. Exhibit (GIOP-4) includes a summary description of each
18		of the significant projects included in the Company's Mandated spending
19		rationale/category, along with the estimated annual funding during the Rate
20		Year and Data Years for each.
21		

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1	Q.	Please describe what is included in the City/State construction sub-
2		category.
3	A.	City/State construction work is performed to accommodate third-party,
4		municipal construction activity that could impact the integrity of the
5		Company's natural gas facilities. Typical third-party construction activities
6		that impact gas facilities include work on water, sewer and drainage
7		infrastructure, street reconstruction, road realignment and bridge replacement.
8		The forecast cost for this program is approximately \$197 million in the Rate
9		Year.
10		
11		State regulations and Company procedures require the replacement of eight
12		inch and smaller cast iron gas mains if roadway or underground construction
13		is being performed in such a way that would impact the integrity of the
14		Company's mains. Non-cast iron gas mains (i.e., steel and plastic) are not
15		subject to the same replacement regulations and are typically supported and
16		protected if not in direct conflict with third-party construction. Direct
17		conflicts are addressed through relocation regardless of material type.
18		
19		KEDNY forecasts its City/State expenditures by reviewing the known and
20		planned work identified by municipalities, historical work volumes and unit
21		information. In CY 2015, approximately 169,000 linear feet (approximately

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# Testimony of the Gas Infrastructure and Operations Panel

1		32 miles) of main replacement was required to address municipal
2		infrastructure improvements. Thirty-four percent (\$61 million) of this
3		replacement work was subject to some level of reimbursement from third
4		parties, while the remaining 66 percent (\$117 million) of capital investment
5		was non-reimbursable main and service replacements.
6		
7	Q.	Are there opportunities to retire LPP during City/State construction
8		projects?
9	А.	Yes. As part of the City/State construction program, the Company looks to
10		identify cost-effective opportunities to retire LPP when main replacements are
11		required to accommodate municipal construction. City/State construction
12		projects present opportunities to perform safety and reliability upgrades on the
13		Company's infrastructure, the costs of which can be offset by coordinating
14		construction activities (shared trenching and paving) and securing third party
15		reimbursements. Of the approximately 169,000 linear feet of City/State
16		construction main replacements in CY 2015, approximately 110,880 linear
17		feet (21 miles) of LPP was retired.
18		
19	Q.	Does the Company's forecast reflect potential reimbursement from
20		municipalities and other third parties?

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# Testimony of the Gas Infrastructure and Operations Panel

1	А.	Yes. KEDNY's forecast reflects likely reimbursements of expenditures
2		obtained by KEDNY pursuant to the Gas Facility Cost Allocation Act and
3		other cost sharing arrangements with municipalities. Expected
4		reimbursements total \$16.11 million in the Rate Year, \$17.15 million in Data
5		Year 1 and \$17.15 million in Data Year 2.
6		
7	Q.	Why is the cost of the City/State construction program increasing to \$197
8		million in the Rate Year?
9	A.	Aging municipal infrastructure (buildings, schools, bridges, roadways,
10		transportation systems, water mains and sewer facilities) will require
11		significant upgrades in the coming years. Over the last two years, there has
12		been an increase in the level of municipal construction activity, as Superstorm
13		Sandy and recent gas incidents focused attention on the state of municipal
14		infrastructure. Going forward, New York City will invest billions of dollars
15		to upgrade its infrastructure, and many of these projects will directly impact
16		KEDNY's gas system.
17		
18		Based on New York State and New York City's current five-year construction
19		plans, the Company estimates that main replacement associated with
20		infrastructure projects will increase from 169,000 linear feet in CY 2015 to
21		approximately 211,200 linear feet (40 miles) in the Rate Year. Thereafter, the

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# Testimony of the Gas Infrastructure and Operations Panel

1		Company projects that the amount of footage installed in accord with
2		City/State construction will remain the same for the next four years. The
3		Company forecasts that approximately 132,000 linear feet (25 miles) of LPP
4		will be retired as part of the public works program in the Rate Year. While
5		the Company believes its forecasts are reasonable based on available
6		information, capital expenditures in this area are subject to a high degree of
7		variability as the scope and scheduling of municipal construction projects are
8		constantly revised.
9		
10	Q.	Please describe the LaGuardia Airport Redevelopment Project.
11	A.	The Port Authority of New York and New Jersey (the "Port Authority") is
12		undertaking a \$4 billion capital redevelopment program to upgrade LaGuardia
13		Airport. This project requires KEDNY to relocate its gate and governor
14		stations (and associated infrastructure), as well as install a new 60 pounds per
15		square inch gauge ("psig") gas distribution system on the grounds of the
16		airport. This work must be performed in conjunction with the Port
17		Authority's ongoing construction activities while maintaining the existing gas
18		system to support the airport.
19		
20		Under an agreement with the Port Authority, KEDNY will be responsible for
21		the cost of designing and constructing the new gate station and associated

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# Testimony of the Gas Infrastructure and Operations Panel

1		infrastructure, as well as the demolition of the existing gate and governor
2		station. The Port Authority, in lieu of direct reimbursement, will provide
3		qualified gas construction resources for the installation of the new gas
4		distribution system that will be built to support upgraded airport. The Port
5		Authority will reimburse KEDNY for the cost of procuring the pipe and other
6		materials associated with the new gas distribution system.
7		
8		The LaGuardia Airport Redevelopment Project is currently in the design
9		phase with construction anticipated to begin in the Rate Year. The Company
10		estimates capital costs of \$4.57 million in the Rate Year, \$20.21 million in
11		Data Year 1 and \$3.59 million in Data Year 2 for this project.
12		
12 13	Q.	Please describe New York City's joint bidding process and its potential
12 13 14	Q.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs.
12 13 14 15	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public
12 13 14 15 16	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S.
12 13 14 15 16 17	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S. Assembly Bill A10021B) that will impact KEDNY's City/State construction
12 13 14 15 16 17	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S. Assembly Bill A10021B) that will impact KEDNY's City/State construction projects in New York City. Currently, utilities impacted by New York City
12 13 14 15 16 17 18 19	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S. Assembly Bill A10021B) that will impact KEDNV's City/State construction projects in New York City. Currently, utilities impacted by New York City public works projects are individually responsible for performing their own
12 13 14 15 16 17 18 19 20	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S. Assembly Bill A10021B) that will impact KEDNY's City/State construction projects in New York City. Currently, utilities impacted by New York City public works projects are individually responsible for performing their own relocation work, as well as negotiating all support and protect work directly
12 13 14 15 16 17 18 19 20 21	<b>Q.</b> A.	Please describe New York City's joint bidding process and its potential impact on City/State construction costs. In 2014, New York State adopted a "joint bidding" requirement for public works projects in cities with populations of one million or more (N.Y.S. Assembly Bill A10021B) that will impact KEDNY's City/State construction projects in New York City. Currently, utilities impacted by New York City public works projects are individually responsible for performing their own relocation work, as well as negotiating all support and protect work directly with the City's contractor. Under the "joint bidding" model, the City will bid

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# Testimony of the Gas Infrastructure and Operations Panel

1		and manage the entire project. If the City's contractor is qualified by National
2		Grid to work on its gas facilities, the contractor may perform the gas
3		relocation work. If the City's contractor is not gas qualified, KEDNY will
4		perform its own relocation work ahead of the planned project. Each impacted
5		utility will also be responsible for a portion of the "shared costs" of work
6		performed by the City's contractors, including, for example, maintaining the
7		construction site, establishing field offices, setting up transportation and
8		managing contracts and expenses. The joint bidding process is expected to be
9		fully implemented by July 2016, but the scope of its application is currently
10		unknown. While the Company's forecast includes an estimate of the expected
11		costs, the true cost implications on utilities of working through the City's
12		selected contractors, as well as the impact of the shared costs contribution,
13		remains to be seen.
14		
15	Q.	Please describe the Company's proposal to track and defer for future
16		recovery the capital and O&M costs relating to City/State construction.
17	A.	While the Company has projected costs for City/State construction, there is
18		significant risk that the actual work required to support municipal construction
19		activities will be more than what is assumed in the capital plan. Indeed, over
20		the past several years, the Company's forecasts have underestimated
21		City/State costs to support construction activities in New York City. This is

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# Testimony of the Gas Infrastructure and Operations Panel

1	partially attributable to changes in the City's annual construction plans and the
2	scope/location of the City's emergency and "where and when" construction
3	projects, which the Company does not know in advance. Also, as
4	demonstrated by the LaGuardia Airport Redevelopment Project, a single large
5	municipal project can necessitate tens of millions of dollars in unplanned
6	City/State costs. The new Joint Bidding requirements will add uncertainty to
7	the level of City/State construction costs over the next few years.
8	
9	Because it is difficult to predict the level of City/State construction during the
10	Rate Year, and the investment requirements are beyond the Company's
11	reasonable control, the Company is proposing that the Commission authorize
12	a discrete deferral mechanism for recovery of costs in excess of the Rate Year
13	allowance for City/State construction. In the event the scope and/or timing of
14	City/State construction causes the Company to incur capital and/or O&M
15	costs in excess of amounts reflected in base rates, such amounts would be
16	deferred for collection in subsequent years. Prior to incurring any significant
17	costs in excess of the rate allowance, the Company will submit an annual
18	report to Staff that will detail the incremental projects or programs required to
19	accommodate City/State construction. Conversely, to the extent the
20	Company's City/State construction costs are lower than the allowance in base

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# Testimony of the Gas Infrastructure and Operations Panel

1		rates, the Company will credit the City/State deferral for the revenue
2		requirement impact of any over recovery.
3		
4		The Company will establish specific capital and/or expense work orders in its
5		plant accounting system and record all associated costs. The Company will
6		defer the revenue requirement associated with the cumulative incremental
7		costs not included in rates (or credit any over recovery), which would include
8		the return on the capital investment, depreciation and any associated O&M
9		costs.
10		
11	Q.	Please describe New York City Local Law 30.
12	A.	Local Law 30 is a New York City Building Code that requires every gas
13		service line in the City to have a gas service valve or other emergency shut-off
14		device installed outside. Local Law 30 sets compliance deadlines for defined
15		"Tiers" of gas services. All Tier 1 gas services (three-family or greater,
16		commercial, governmental and industrial) valves were required prior to
17		January 1, 2010 and the Company met this requirement. The Company must
18		install all Tier 2 (one and two family homes) valves by January 1, 2020.
19		
20	Q.	Please describe the status of KEDNY's Local Law 30 compliance
21		program for Tier 2 services.

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# Testimony of the Gas Infrastructure and Operations Panel

1		For years, the Company has primarily installed external service valves where
2		it could leverage opportunities in coordination with other projects (e.g., main
3		or service replacements). In many years, the Company deferred Local Law 30
4		work to focus on projects that addressed more pressing operational needs. As
5		the Local Law 30 compliance deadline approaches, the Company must now
6		install thousands of service valves over the next four years. Presently,
7		KEDNY has approximately 67,000 low pressure services in Brooklyn, Queens
8		and Staten Island that do not have an exterior gas service valve. The
9		Company's capital plan includes a four-year program, commencing in CY
10		2016, to install valves at all remaining one and two family premises (Tier 2)
11		by January 1, 2020. In CY 2016, the Company will install more than 8,500
12		valves at a total cost of \$22.5 million (\$7.5 in capital expenditures and \$15
13		million in O&M (discussed below)).
14		
15	Q.	What are the capital expenditures associated with Local Law 30
16		compliance in the Rate Year and Data Years?
17	А.	KEDNY forecasts Local Law 30 related capital expenditures of \$9.71 million
18		in the Rate Year, \$12.77 million in Data Year 1 and \$16.7 million in Data
19		Year 2. O&M expenses for Local Law 30 compliance are discussed in
20		Section V(A)(iv) below.
21		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	Please describe what is included in the Transmission Pipeline Integrity
2		program.
3	A.	The transmission pipeline integrity management program is discussed above
4		in Section III(A)(v).
5		
6	Q.	Please describe what is included in the Corrosion Control program.
7	A.	This program funds work on above-ground gas mains at bridge locations and
8		includes complete recoating of existing aged, dis-bonded, deteriorated or
9		uncoated gas mains, as well as retirement of LPP where it extends
10		underground near these crossings. In addition, this program includes upgrades
11		to existing cathodic protection systems.
12		
13	Q.	Please describe what is included in the Meter Changes program.
14	A.	The Meter Changes program involves the labor to replace gas meters that are
15		retired from service or abandoned based on the result of periodic testing
16		requirements established by the Commission.
17		
18	Q.	Please describe what is included in the Purchase Meters program.
19	A.	This program includes the purchase, testing, processing and delivery of gas
20		meters and associated instrumentation needed to support the Meter Change
21		program, gas growth and Customer Meter Service ("CMS") operations.

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1	Q.	Please describe the Main Replacements - Proactive and Service
2		Replacements - Proactive Programs.
3	Α.	These programs funds the planned replacement of LPP and leak prone
4		services, discussed above in Sections III(A)(i) and (ii).
5		
6	Q.	Please describe what is included in the Reactive Main and Service
7		Replacement program.
8	А.	The Reactive Main and Service Replacement program provides for the
9		replacement of gas mains and services during urgent or emergency situations
10		that fall outside the normal scope of integrity, reinforcement, reliability and
11		public works programs. These replacements are performed in lieu of repair in
12		instances when repairing damaged facilities is not possible, or where the
13		pipeline segment is too short be covered by the Proactive Program.
14		
15	Q.	Please describe the Cross Bore Investigation program.
16	А.	A cross bore is an unintended consequence of horizontal directional drilling
17		("HDD"). It occurs when a plastic gas main goes through a sewer lateral that
18		was not identified during the gas installation process. A cross bore can block
19		the sewer line and any attempt to clear the blockage can damage the gas line
20		and cause gas to migrate into a building. Over the last few years, several such

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# Testimony of the Gas Infrastructure and Operations Panel

1		incidents have occurred in the industry and, as a result, many utilities have
2		initiated programs to remedy this situation.
3		
4		The Company updated its HDD procedures in 2014 to address and eliminate
5		possible cross bores. The proposed investigation and remediation program
6		will address all HDD installations prior to 2014 to ascertain if any cross bores
7		exist and, if so, to remediate them.
8		
9	Q.	What work is addressed in the Latent Damage category?
10	Α.	In response to recent industry events and directives coming out of the
11		Commission's generic safety proceedings (including the Horseheads
12		Proceeding (11-G-0565) and Plastic Fusions Proceeding (Case 14-G-0212),
13		which are discussed in the testimony of the Gas Safety Panel), the Company
14		will perform additional inspections of its underground infrastructure when
15		opportunities present during the course of normal operations. For example,
16		the Horseheads Proceeding focused attention on the need to inspect facilities
17		near third party excavations for potential latent damage. While the
18		Company's risk assessment did not identify systemic issues with third party
19		latent damage, increased inspections will certainly identify facilities in need of
20		repair. Similarly, in the Plastic Fusion Proceeding, the Commission directed
21		all LDCs to conduct inspections of plastic fusion joints exposed during regular

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# Testimony of the Gas Infrastructure and Operations Panel

1		operations. As some of the plastic facilities on KEDNY's system are more
2		than 40 years old, the Company anticipates these incremental inspections will
3		identify the need to replace or repair plastic mains and joints. The Latent
4		Damage category includes an estimate of cost to perform these capital repairs,
5		which includes \$0.70 million in the Rate Year, \$0.81 million in Data Year 1
6		and \$0.82 million in Data Year 2.
7		
8		C. Growth Spending Rationale of Capital Spending
9	Q.	What portion of the Company's capital investment plan is in the Growth
10		spending category?
11	A.	The Growth category of work accounts for approximately 22 percent (\$135
12		million) of the total planned capital investment in the Rate Year.
13		
14	Q.	Please describe what is included in the Growth category.
15	A.	Growth programs are designed to support forecast customer growth and add
16		new load by increasing system utilization in a cost-effective way. Growth
17		programs involve the installation of new mains, services and meters and
18		include Base Growth and system reinforcement. Contained in the Growth
19		category are the estimated capital costs of new mains, services and meters
20		required to serve additional load. Exhibit (GIOP-4) includes a summary of
21		significant projects included in the Company's Growth spending

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1		rationale/category, along with the estimated annual funding during the
2		proposed Rate and Data Years for each project.
3		
4	Q.	Please describe what is included in the Base Growth category.
5	А.	As discussed in Section III(B) above, Base Growth occurs as a result of new
6		construction, customer-initiated conversions and/or gas marketing. Generally,
7		facilities, including main, services and meters, must be installed to serve the
8		additional load. To serve new load economically, the Company must balance
9		the costs of adding that load against incremental revenues.
10		
11	Q.	Please describe the System Reinforcement category.
12	А.	The System Reinforcement category contains projects intended to ensure that
13		minimum system pressures are maintained throughout the gas network during
14		periods of peak demand. The Company models peak demand based on the
15		sendout forecasts developed by Analytics, Modeling and Forecasting
16		(Company Witness Theodore Poe). As a result of growth in gas usage in its
17		service territory, KEDNY has determined that it is necessary to complete a
18		number of projects to ensure its ability to meet peak requirements. These
19		reinforcement projects are essential to serve growing demand, particularly in
20		the constrained area of Northern Queens.

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# Testimony of the Gas Infrastructure and Operations Panel

1		During the winter of 2014/2015, KEDNY recorded seven of its top ten
2		sendout records, including a firm load record of 1,331,796 dekatherms on
3		February 15, 2015 when the average temperature was nine degrees Fahrenheit.
4		The recent growth in peak sendout underscores the need to ensure that
5		minimum system design pressures are maintained throughout the distribution
6		network during periods of peak demand.
7		
8	Q.	Please provide examples of System Reinforcement projects.
9	А.	Examples of System Reinforcement projects include:
10		Replacing undersized mains with larger diameter mains. LPP is
11		targeted whenever practical during this work.
12		Looping or connecting system endpoints by installing new main.
13		• System pressure uprates (e.g., 15 pounds per square inch ("psi") to 60
14		psi).
15		Installing new district regulators and replacing existing undersized
16		district regulators.
17		Transferring existing low pressure customers to an adjacent high-
18		pressure main (i.e., load shedding).
19		
20		

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1		D. <u>Reliability Category of Capital Spending</u>
2	Q.	What portion of the Company's capital investment plan is Reliability?
3	А.	The Reliability category accounts for approximately 18 percent (\$111 million)
4		of the total planned capital investment in the Rate Year.
5		
6	Q.	Please describe the goals of the Gas System Reliability Program.
7	А.	Investments in this category are intended to maintain reliable service to
8		customers by ensuring that all facilities on the gas system are operating
9		efficiently and reliably.
10		
11	Q.	Please describe what is included in the Reliability category.
12	A.	The Reliability category includes programs related to gas control, heaters,
13		reactive Instrument & Regulation ("I&R"), pressure regulating facilities, valve
14		installation/replacement, remote-controlled valves, gas planning, system
15		reliability, water intrusion, system automation and control line integrity and
16		liquefied natural gas ("LNG") facilities. Exhibit (GIOP-4) includes a
17		summary description of significant projects included in the Reliability
18		spending rationale/category, along with the estimated cost during the Rate
19		Year and Data Years for each project. Two specific projects are described
20		below: the Spring Creek Reconfiguration and Reinforcement Project and the
21		Metropolitan Reliability Infrastructure Project.

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1	Q.	Please describe what is included in the Heater Program category.
2	А.	There are 40 natural gas heaters currently operating on the Company's system.
3		Because high-pressure gas cools when reduced to a lower pressure, heaters are
4		required at pressure regulating stations to prevent freeze-ups that can impact
5		flow control devices. In addition, cold gas temperatures can lead to reduced
6		pipe toughness and increased potential for frost heave and cold temperature-
7		induced stresses. The heater program adds new heaters (where required) and
8		replaces or rebuilds existing heaters that have reached the end of their useful
9		lives or require component replacement.
10		
11	Q.	Please describe what is included in the I&R Reactive category.
12	А.	The reactive I&R budget provides funding for capital investment in pressure
13		regulating and control stations. Typical projects in this category include
14		unplanned capital work resulting from emergency conditions, including the
15		replacement of station valves, regulators and relief valves, as well as related
16		capital work on station equipment.
17		
18	Q.	Please describe what is included in the Pressure Regulating Facilities
19		category.
20	A.	The Pressure Regulating Facilities category provides funding for replacement
21		and/or rebuilding and reconditioning of existing regulating and control

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# Testimony of the Gas Infrastructure and Operations Panel

1		stations. Pressure regulating facilities (or stations) are designed to control
2		system pressures and maintain continuity of supply during normal operating
3		conditions and during periods of peak gas demand. This category includes
4		full or partial replacement of existing stations.
5		
6		KEDNY has assessed regulating stations on its system, evaluating factors
7		such as pressure, location and the number of dependent customers for each
8		station. In addition, the assessment considered station condition, including
9		pipe corrosion, location and type of overpressure protection, automation,
10		condition of vaults, vault covers, wall sleeves, piping vents and ladders. The
11		results of the assessment were used to create an overall risk rating for each
12		station that serves as the basis for prioritizing projects in this area.
13		
14	Q.	Please describe what is included in the Remote Controlled Valve ("RCV") $% \left( \left( {{{\rm{CV}}} \right)^2 } \right)$
15		category.
16	A.	This program involves the installation of additional RCVs on transmission
17		pipelines to improve emergency response capability and reduce the risk of gas
18		releases. In the event of a pipeline failure, RCVs allow control room
19		operators to stop the flow of gas and isolate and shut down a portion of the
20		system remotely. Currently, transmission pipelines can only be shut down
21		using manually-controlled isolation valves, which can take longer to close and

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# Testimony of the Gas Infrastructure and Operations Panel

1		result in a larger number of customers being isolated. Improving response
2		time through the expanded deployment of RCVs reduces the quantity of gas
3		released and reduces the likelihood of harm to people and property.
4		
5	Q.	Why does the Company propose to make this investment in the Rate
6		Year?
7	A.	The PHMSA regulations promulgated in response to the Pipeline Safety Act
8		of 2011 will mandate the installation of additional RCVs. But even in the
9		absence of the PHMSA regulations, investment in RCVs is required given the
10		safety and reliability benefits. As highlighted by recent industry events, there
11		are significant operational benefits associated with the increased deployment
12		of RCVs, such as enhanced pipeline shutdown capabilities.
13		
14	Q.	Please describe what is included in the Valve Installation and
15		Replacement category.
16	A.	Federal and state regulations require installation, inspection, operation and
17		maintenance of critical pipeline valves on all gas distribution systems. The
18		purpose of these valves is to facilitate the rapid shutdown of distribution
19		piping during gas emergencies such as third-party damage or water intrusion.
20		A secondary purpose of these valves is to facilitate maintenance and pipe
21		replacement on associated distribution piping.

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# Testimony of the Gas Infrastructure and Operations Panel

1		This program will strengthen the Company's emergency response capabilities
2		by improving the level at which Field Operations personnel can safely and
3		efficiently isolate sections of the distribution system while mitigating
4		customer impacts (e.g., reducing the duration of future outages). Ensuring all
5		critical valves are properly maintained and operable is a key public safety
6		function and is essential to the effective operation of the Company's gas
7		distribution system.
8		
9	Q.	Please describe what is included in the Water Intrusion category.
10	A.	The Water Intrusion program is designed to address water entering the gas
11		distribution system, resulting in main obstructions, poor pressure and/or
12		freezing customer services. This program targets the retirement of LPP that is
13		susceptible to water intrusion but is not prioritized for replacement under the
14		Main Replacement programs because of the absence of leaks and/or historical
15		leak repair activity.
16		
17	Q.	What are the goals of the Water Intrusion program?
18	A.	The goals of the Water Intrusion program include improved customer
19		satisfaction by focusing on addressing reliability and integrity issues. Also,
20		the program will support the continued elimination of low pressure
21		distribution systems by elevating pressure whenever practical. Finally,

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# Testimony of the Gas Infrastructure and Operations Panel

1		successful execution of the program will promote public and municipal
2		relations as fewer unplanned outages will reduce unplanned road excavations.
3		
4	Q.	Please describe what is included in the Control Line Integrity category.
5	A.	Control line piping is small diameter (two inches or less) piping used to
6		monitor and control the pressures and flows at pressure regulating facilities.
7		Control lines provide pressure feedback to the regulators and system
8		automation equipment within the station. They are critical to maintaining
9		control of system pressures and to maintaining continuity of supply during
10		periods of normal and peak gas demand. The key driver for the Control Line
11		Integrity program is the remediation or replacement of control line piping at
12		pressure regulator stations that do not meet current standards of reliability,
13		safety and performance. The program is designed to assess, remediate and/or
14		replace control lines with these issues. Field data on control line conditions is
15		collected during annual regulator station testing and on-site inspections.
16		Based on the results of those inspections, projects in this area are coordinated
17		with the proactive regulator program.
18		

19 Q. Please describe what is included in the Gas Planning category.

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Gas Planning program ensures that customers continue to have reliable
2		service and that no customers experience interruptions as a result of an
3		unplanned outage of a facility under normal winter conditions.
4		
5	Q.	Please provide examples of Gas Planning projects.
6	А.	Examples of Gas Planning projects include: eliminating distribution systems
7		fed by a single district regulator or main, integrating distribution systems with
8		the same operating pressures through pipeline connections, adding new supply
9		diversity, and projects targeting areas of the system where large numbers of
10		customers would lose service if a gas facility became inoperable when the
11		average daily temperature is 15 degrees Fahrenheit.
12		
13	Q.	Please describe what is included in the System Automation category.
14	A.	This program will install Remote Terminal Units ("RTUs") at multiple gate
15		and regulator stations. RTUs provide temperature, pressure and flow data
16		back to the Gas Control Room. RTUs can also monitor gas detectors and
17		intrusion alarms and allow Gas Control Operators to adjust flow and pressure
18		set points at regulator stations. The benefits include enhanced calibration of
19		network models from automation and telemetry data, improved accuracy of
20		network analysis, and enhanced ability to forecast the need for capital
21		reinforcements, which will lead to more efficient capital planning.

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# Testimony of the Gas Infrastructure and Operations Panel

1		Automation allows Gas Control Operators to selectively close valves, raise or
2		lower pressures, and shut down take stations. System alarms also alert Gas
3		Control Operators to system issues and allow quick pinpointing of the source.
4		
5		PHMSA regulations regarding Control Room Management require Operators
6		to ensure that "practices and procedures within their control rooms are
7		adequate to maintain pipeline safety and integrity." These rules indicate that
8		Operators should have telemetry to monitor pipelines, as it would increase
9		system awareness and enable a proactive response to abnormal operating
10		conditions. The System Automation program complies with these regulations
11		by providing for increased deployment of telemetry on the Company's system.
12		
13	Q.	How is system performance monitored currently?
14	A.	Currently, 58 percent of the pressure regulation stations are equipped with
15		some form of telemetry, while the rest of the system relies on paper chart
16		recorders. KEDNY's System Automation program adds automation
17		capabilities to low pressure regulator stations. RTUs installed under the
18		System Automation program will provide enhanced ability to monitor system
19		performance and remotely adjust pressures on the gas system. The program
20		will also replace aging and obsolete telemetry equipment.
21		

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# Testimony of the Gas Infrastructure and Operations Panel

1	Q.	Please describe the Company's LNG program.
2	А.	The Company maintains on-system supply through its LNG facility at the
3		Greenpoint LNG Plant. The Greenpoint LNG Tank #1 (0.6 billion cubic feet
4		("bcf")) was put into service in 1968 and Tank #2 (one bcf) was put into
5		service in 1971. The Greenpoint LNG Plant is capable of supplying 290
6		million cubic feet of gas per day, which represents approximately 18 percent
7		of KEDNY's peak day demand. Refilling the tanks is accomplished through
8		liquefaction during the summer period when gas supplies are available and
9		less expensive. The liquefaction system can refill at a rate of about 7 to 8.5
10		million cubic feet of gas per day and it takes between 150 and 200 days to
11		refill both tanks.
12		
13		Noting the critical roles LNG plays in meeting peak demand, the Commission
14		recently directed KEDNY to prioritize spending at the Greenpoint LNG Plant
15		to enhance storm resiliency and avoid disruptions to LNG production.
16		
17	Q.	Please describe the Company's proposed capital investments for the LNG
18		program during the Rate Year and Data Years.
19	А.	The Greenpoint LNG Plant has been in service for more than 40 years and
20		requires significant investment to support continued safe and reliable
21		operation. Therefore, the Company proposes a number of capital projects for

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# Testimony of the Gas Infrastructure and Operations Panel

1	the Greenpoint LNG Plant, including programs to upgrade critical facilities					
2		and equipment at the plant, an LNG tank modernization project and a new Salt				
3		Water Pump House to support safety systems.				
4		Table 10: LNG Investments (\$000)				
		Program	CY 2017	CY 2018	CY 2019	
		LNG Blanket Programs	2.571	2.575	2.065	
		LNG Special Projects	16,988	11,876	9,870	
		Tank Modernization	3,645	15,795	37,665	
		Salt Water Pump House	6,500	8,125	4,250	
5						
6	Q.	What is covered in the I	NG Blanket Pro	gram?		
7	A.	The LNG Blanket Program provides funding for near-term and emergent				
8		capital projects needed to maintain safety and reliability at the Greenpoint				
9		LNG facility. Examples of projects in this category include: upgrades to				
10		mechanical equipment and systems; upgrades and replacement of electrical				
11		and control systems; structural improvements of plant and facilities;				
12		procurement of capital to	ols and equipment	t; preliminary eng	gineering and	
13		design of capital projects	and retirement ar	nd decommission	ing of equipment,	
14		plant and facilities. These	e projects will ext	end the service li	ife of the facility	
15		and improve operational	performance of pla	ant equipment.		
16						
17	Q.	Please describe the LNG	Special Projects	s category.		

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	In addition to the LNG Blanket Program work, KEDNY has identified a
2		number of significant, discrete capital projects to be completed in the Rate
3		Year and Data Years. These projects each have a cost of approximately \$1
4		million or greater and include: upgrades and improvements to mechanical
5		equipment and systems such as the replacement of the cold blower;
6		replacement of Vaporizers 7 and 8 along with upgrades to 9 and 10; upgrade
7		of existing controls system; upgrades and replacement of electrical feeders,
8		switchgear and transformers along with control systems including safety
9		shutdown systems; structural improvements to the dike wall and facilities.
10		These projects are discussed in more detail in Exhibit (GIOP-4).
11		
12	Q.	What is the Tank Modernization Project?
12 13	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into
12 13 14	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope
12 13 14 15	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii)
12 13 14 15 16	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging
12 13 14 15 16 17	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging systems on the tank to bring them up to current code, (iv) replacing the tank
12 13 14 15 16 17 18	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging systems on the tank to bring them up to current code, (iv) replacing the tank foundation heaters and (v) performing detailed non-destructive examination of
12 13 14 15 16 17 18 19	<b>Q.</b> A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging systems on the tank to bring them up to current code, (iv) replacing the tank foundation heaters and (v) performing detailed non-destructive examination of tank plate welds to validate long term integrity.
12 13 14 15 16 17 18 19 20	Q. A.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging systems on the tank to bring them up to current code, (iv) replacing the tank foundation heaters and (v) performing detailed non-destructive examination of tank plate welds to validate long term integrity.
12 13 14 15 16 17 18 19 20 21	Q. A. Q.	What is the Tank Modernization Project? This project will temporarily take Tank #2 out of service to allow entry into the tank to perform a major tank upgrade. Specifically, the project scope includes: (i) eliminating the bottom penetration nozzles on the tank, (ii) installing new LNG pumps inside the tank, (iii) modifying the level gauging systems on the tank to bring them up to current code, (iv) replacing the tank foundation heaters and (v) performing detailed non-destructive examination of tank plate welds to validate long term integrity. Please described the proposal for the Salt Water Pump House.

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Company is proposing to construct a new Salt Water Pump House that
2		will provide a dedicated source of salt water to supply the deluge system for
3		each tank. The deluge system consists of piping and nozzles that surround
4		each tank and produce a 60 to 70 foot high water curtain to protect the plant in
5		the event of an LNG spill. The water curtain requires approximately 12,000
6		gallons of water per minute. The current pump house system at the plant is at
7		the end of its useful life and requires replacement. The new Salt Water Pump
8		House will more effectively provide adequate supplies of salt water to support
9		operation of the deluge system.
10		
11	Q.	Please describe the Spring Creek Reconfiguration and Reinforcement
12		Project.
13	А.	The Spring Creek Reconfiguration and Reinforcement Project is required to
13 14	A.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as
13 14 15	A.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and
13 14 15 16	A.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installation of two new regulator
13 14 15 16 17	A.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installation of two new regulator runs at the Spring Creek Gate Station that will feed the 15 psig system. The
13 14 15 16 17 18	Α.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installation of two new regulator runs at the Spring Creek Gate Station that will feed the 15 psig system. The two new runs will include approximately 1,100 feet of 30 inch steel main.
13 14 15 16 17 18 19	Α.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installation of two new regulator runs at the Spring Creek Gate Station that will feed the 15 psig system. The two new runs will include approximately 1,100 feet of 30 inch steel main. This will allow KEDNY to retire the IF5 Regulator Station rather than spend
<ol> <li>13</li> <li>14</li> <li>15</li> <li>16</li> <li>17</li> <li>18</li> <li>19</li> <li>20</li> </ol>	Α.	The Spring Creek Reconfiguration and Reinforcement Project is required to maintain minimum pressures in the East New York region of Brooklyn, as well as to address integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installation of two new regulator runs at the Spring Creek Gate Station that will feed the 15 psig system. The two new runs will include approximately 1,100 feet of 30 inch steel main. This will allow KEDNY to retire the IF5 Regulator Station rather than spend considerable funds to renovate it. The retirement of the IF5 Station has the

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# Testimony of the Gas Infrastructure and Operations Panel

1		currently undersized and would need to be replaced even if IF5 Station
2		remained in service. An additional component of this project will involve
3		transferring low pressure Governor 88, which is fed by the 15 psig system, to
4		the 60 psig system thereby improving pressures on the 15 psig pressure
5		system.
6		
7	Q.	Please describe the Metropolitan Reliability Infrastructure ("MRI")
8		Project.
9	А.	The MRI project will provide the downstate New York system with increased
10		supply diversity, pressure support, outage contingency, operational flexibility
11		and operational autonomy by reducing dependence on gas from Consolidated
12		Edison Company of New York ("Con Edison") at Newtown Creek. The
13		project will also maximize existing and proposed upstream capacity that will
14		better position the Company to meet customers' long-term supply needs over
15		the next 15 to 20 years.
16		
17		Specifically, the MRI project will provide an operational loop to the Brooklyn
18		backbone system consisting of approximately 34,000 feet of 30 inch, 350 psig
19		transmission main from Linden Boulevard in Brownsville to Maspeth Avenue
20		in Greenpoint (and an associated gate station). This new loop will:

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1	Immediately improve reliability by increasing supply sources. Sources
2	from any directly connected supply point will be accessible and gas
3	may be moved to any point across the Company's system. This will
4	significantly reduce the reliance on any individual gate deliveries.
5	Allow the Brooklyn backbone system to be taken out of service for
6	system integrity work, while still maintaining gas operations.
7	Enhance the effectiveness of RCVs on the transmission system by
8	allowing increased utilization of remote valves in the event of a system
9	disturbance that requires a remote shut down (without disrupting
10	service to potentially thousands of customers).
11	Reinforce the Brooklyn/Queens high pressure system by installing a
12	distribution regulator station, which will also facilitate the retirement
13	of LPP by replacing lower pressure cast iron mains with high pressure
14	plastic.
15	Provide for the movement of incremental supplies from both the
16	Narrows and the Lower New York Bay Lateral to any point across the
17	system, including transfer points with Con Edison.
18	The MRI Project will enable KEDNY to move an additional 850 dekatherms
19	each day by 2021. The forecast for MRI project is \$45.46 million in the Rate
20	Year, \$86.54 million in Data Year 1 and \$56.72 million in Data Year 2. The

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# Testimony of the Gas Infrastructure and Operations Panel

1		Company expects this project to be in service before the 2020/21 winter				
2		season.				
3						
4		E. Non-Infrastructure and Other Capital Spending				
5	Q.	What portion of the Company's	s capital inv	estment pla	n is Non-	
6		Infrastructure and Other?				
7	A.	The Non-Infrastructure and Other	category of	work accou	nts for	
8		approximately four percent (\$26 r	nillion) of th	e total planr	ned capital	
9		investment in the Rate Year. Other Capital includes special projects not				
10		included in the Company's other investment programs, most notably				
11		KEDNY's investment in automated meter reading. The Non-Infrastructure				
12		budget also includes funds for the purchase of tools that meet the criteria for				
13		capitalization.				
14		Table 11: Other and N	ion-Infrastr	ucture Cap	ital	
		(\$000)	CY 2017	CY 2018	CY 2019	
		AMR - Installation	17,718	0	0	
		AMR - Replacement	5,078	5,225	5,330	
		Tools and Equipment	3,432	3,796	4,138	
		Indirect Capital	6,375	3,770	3,820	
15						

16

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Testimony of the Gas Infrastructure and Operations Panel

1		i. <u>Automated Meter Reading</u>
2	Q.	Please describe the Company's Automated Meter Reading ("AMR")
3		program.
4	А.	To date, KEDNY has deployed more than 770,000 AMR devices
5		(approximately 60 percent of accounts). This program will complete
6		KEDNY's AMR deployment by installing an additional 528,000 devices on
7		the remaining meters. The Company anticipates that AMR deployment in
8		KEDNY's service territory will be complete in CY 2018.
9		
10	Q.	Is additional investment required after full AMR deployment has been
11		achieved?
12	Α.	Yes. KEDNY has utilized AMR in its service territory for nearly twenty years,
13		thus a significant number of existing AMR units are at or near the end of their
14		useful lives. As a result, additional capital costs are required to replace
15		existing AMR units and batteries.
16		
17	Q.	What are the customer benefits of AMR?
18	А.	The installation of AMRs will significantly decrease the number of estimated
19		bills. Additionally, AMRs enhance storm resiliency and improve customer
20		service. In the aftermath of major storms, meters usually go unread because
21		meter-reading personnel are needed to assist with storm recovery. AMRs will

meter-reading personnel are needed to assist with storm recovery. AMRs will

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# Testimony of the Gas Infrastructure and Operations Panel

1		allow the Company to continuing gathering gas usage data following major
2		weather events that can be used to identify customer outages and restore
3		service more quickly.
4		
5		ii. <u>Capital Tools and Equipment</u>
6	Q.	What is included in the Purchase of Miscellaneous Capital Tools and
7		Equipment program?
8	A.	The Purchase of Miscellaneous Capital Tools and Equipment program
9		captures the items that are not used for specific projects but support the safe,
10		efficient and on-going day-to-day operations of the gas business. Examples
11		include tools (hand, power, pneumatic, hydraulic), specialty equipment, PPE,
12		office machines, electronic data processing equipment and software
13		applications, shop and garage equipment and communications devices.
14		
15		iii. Indirect Capital Costs
16	Q.	Is the Company allocated indirect capital costs?
17	A.	Yes, KEDNY is allocated a portion of indirect costs, such as facilities, fleet
18		services and inventory management/warehouse management. For example,

19 major projects/expenditures during the Rate Year and Data Years include:

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1	<u>Facilities</u> - roof replacements at the Canarsie and Greenpoint Service
2	Centers, as well as ongoing paving and fire system improvements at
3	these locations (\$2.4 million in the Rate Year).
4	• <u>Fleet</u> - fuel tank replacements, vehicle lifts, bulk storage tanks,
5	diagnostic scanners and technician tool boxes (\$2.5 million in the Rate
6	Year).
7	Inventory Management/Warehouse Management - warehouse lighting,
8	paving, warehouse racking, and tractor-trailer equipment at the
9	Greenpoint warehouse.
10	The Service Centers are used to stage and deploy the Company's field
11	workforce, store vehicles, equipment and materials, and provide various utility
12	functions (e.g., meter shop) in support of the operation and maintenance of
13	KEDNY's system. The proposed fleet and facilities expenditures will provide
14	required upgrades to these critical operating facilities.
15	
16	Non-Infrastructure capital also includes the cost of demonstration programs to
17	deploy new technologies to facilitate the Commission's Reforming the Energy
18	Vision goals, as discussed in the testimony of Company Witness Sean
19	Mongan.
20	

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1		iv. <u>Capitalization Policy Change - Corrosion</u>
2	Q.	Is the Company proposing any changes to its capitalization policy for
3		corrosion control activities?
4	A.	Yes. Accounting for some corrosion control activities is currently expensed
5		by the Company. However, applicable accounting principles and regulations
6		permit the installation/replacement of new test stations and rectifiers, among
7		other items, to be capitalized. The Company is proposing to capitalize these
8		corrosion control activities in accordance with Accounting Standards
9		Codification 360, the Federal Energy Regulatory Commission's accounting
10		regulations and International Accounting Standard 16. This change will
11		standardize the accounting treatment of these work items between National
12		Grid's downstate New York gas distribution companies. Testing and
13		inspection activities related to corrosion control will remain as expensed
14		items.
15		Table 12: Corrosion Capitalization

Activity Description	KEDLI	KEDNY	Proposal
Install test station (TS) on Main	Capital	Expense	Capital
Replace existing TS	Capital	Expense	Capital
Install TS on main across Insulated Joints (IJ)	Capital	Expense	Capital
Install TS on Distribution Service	Capital	Expense	Capital
Install TS on Main with anode(s)	Capital	Expense	Capital
Install TS on main across IJ with anode(s)	Capital	Expense	Capital
Install TS on Distribution Service with anode(s)	Capital	Expense	Capital
Install/Replace IJ at Meter	Expense	Expense	Capital
Install/Replace IJ at Distribution Service Tie-in	Expense	Expense	Capital

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	Insta	ll/Replace IJ on Main	Capital	Expense	Capital	
	Spec	ial Request - Renew Service with Plastic	Capital	Capital	Capital	l
	Install new Rectifier		Capital	Expense	Capital	
	Relo	cate Existing Rectifier	Expense	Expense	Capital	l
	Reco	at Main	Capital	Capital	Capital	l
1						
2	v.	Gas Operations and Maintenance Expen	ises			
3	Q.	Please summarize the Panel's testimony	regarding	g the costs	of operati	ing
4		the gas system.				
5	A.	The Panel addresses major expenses associ	ated with	operating t	he Compa	ny's
6		gas delivery system, and incremental O&M	I expenses	the Comp	any expect	ts to
7		incur in the Rate Year.				
8						
9	Q.	Please generally describe the nature of the	he Compa	ny's gas s	ystem O&	:M
10		expenses.				
11	A.	O&M expenses relate to work performed to	o provide o	customer s	upport,	
12		respond to emergencies, perform safety ins	pections a	nd other c	ompliance	
13		activities, restore service and maintain the	life of cap	tal assets.	The Comp	pany
14		has a significant maintenance program to e	nsure that	system ass	sets are util	lized
15		to their fullest potential life expectancy. A	s gas facil	ities age, n	naintenanc	e
16		costs increase. These costs include costs for	or more fre	quent insp	ection and	l
17		testing, increased volume of repairs, more	significant	repair wo	rk and	

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# Testimony of the Gas Infrastructure and Operations Panel

1		increased emergency work. These expenditures are required to prevent failure
2		and maintain the life of the assets until replacement occurs.
3		
4		The Company's O&M programs are also designed to maintain the service
5		commitments in its gas safety performance metrics, which cover various
6		aspects of its performance in the areas of reliability and safety, including
7		metrics measuring pipeline replacement, emergency response, leak
8		management and damage prevention. Since these performance measures were
9		established, the Company has consistently met or exceeded performance
10		targets.
11		
11	Q.	How does the projected Rate Year expense level compare to the Historic
11 12 13	Q.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system?
11 12 13 14	<b>Q.</b> A.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately
11 12 13 14 15	<b>Q.</b> A.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test
11 12 13 14 15 16	<b>Q.</b> A.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test Year.
11 12 13 14 15 16 17	<b>Q.</b> A.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test Year.
11 12 13 14 15 16 17 18	Q. A. Q.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test Year. Please summarize the adjustments to the Historic Test Year O&M
11 12 13 14 15 16 17 18 19	Q. A. Q.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test Year. Please summarize the adjustments to the Historic Test Year O&M expense necessary to arrive at the proposed Rate Year expense.
11 12 13 14 15 16 17 18 19 20	Q. A. Q. A.	How does the projected Rate Year expense level compare to the Historic Test Year expenses for operating the gas system? The Company projects its Rate Year O&M expense to be approximately \$46.64 million greater than its adjusted O&M expense for the Historic Test Year. Please summarize the adjustments to the Historic Test Year O&M expense necessary to arrive at the proposed Rate Year expense. Increases in O&M expense are primarily driven by (i) an increase in the

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# Testimony of the Gas Infrastructure and Operations Panel

1		Company's increasing capital investments and (iii) initiatives the Company is
2		undertaking in the Rate Year to address new or expanding safety
3		requirements. The Company's incremental O&M costs include: costs
4		associated with responding to an increased volume of gas odors calls from the
5		public as a result of heightened public awareness and the New York City Fire
6		Department's ("FDNY") new odor reporting protocol; costs associated with
7		locking gas meters on a shorter timeline at premises with inactive accounts;
8		the cost to comply with New York City's Local Law 30, as well as new state
9		pipeline safety regulations; implementation of enhanced damage prevention
10		measures; and incremental costs for operational support personnel to deliver
11		KEDNY's significant capital plan.
12		
13	Q.	What is the Company doing to manage its O&M costs?
14	A.	The Company has implemented various initiatives to reduce its O&M
15		expenses, including:
16		Increasing the use of scheduled O&M work appointments to reduce
17		multiple unproductive field visits to complete work.
18		Coordinating O&M activities required at each premise so that multiple
19		maintenance requirements can be completed during a single visit.

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# Testimony of the Gas Infrastructure and Operations Panel

1	Increasing the use of coring and low-dig technology, reducing debris
2	removal and paving restoration costs associated with smaller roadway
3	excavations.
4	Modifying shift schedules to more efficiently respond to higher leak
5	volumes.
6	Exploring new work management systems to optimize dispatch of
7	resources.
8	
9	In addition, the Company's expanded installation of AMRs has significantly
10	decreased manual meter reading costs, which are expected to continue to
11	decrease in the Rate Year as AMRs are fully deployed throughout the service
12	territory. Accordingly, KEDNY's forecast meter reading expenses are \$1.25
13	million lower in the Rate Year as compared to meter reading expense in the
14	Historic Test Year. The Company expects these savings will be partially
15	offset by a temporary increase in CMS billing investigations (\$0.369 million
16	in the Rate Year) resulting from additional customer billing inquiries
17	regarding the initial automated readings, as was experienced during KEDLI's
18	recent AMR deployment.
19	

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Testimony of the Gas Infrastructure and Operations Panel

1 A.	Increased O&M Workload
------	------------------------

2 (	Q.	Has the Company identified areas where the O&M workload is forecast
-----	----	---

- 4 A. Yes. The table below sets forth the more significant O&M items where the
  - Company expects to see an increase in workload in the Rate Year.
- 5 6

7 8

Table 13: Incremental C	)&M V	Workload
-------------------------	-------	----------

Category (\$000)	CY 2017
Emergency Response	1,025
Leak Repairs and Surveillance	779
Meter Oriented Services	1,451
Local Law 30	14,729
Field Collections	501
Pressure Testing	205
I&R Support	1,429

9	Q.	Why has the Company's emergency response workload increased in
10		recent years?
11	A.	Emergency and odor response work has increased as a result of several
12		factors. First, odor calls have increased significantly following

- 13 implementation of new FDNY procedures in December 2014 that directs the
- 14 public to report all suspected gas related calls to the FDNY. Second, the
- 15 public's awareness of gas safety increased following well-publicized gas
- 16 incidents in New York City in 2014 and 2015. This increase in public
- 17 awareness is attributable to extensive media coverage following these

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# Testimony of the Gas Infrastructure and Operations Panel

1		incidents, New York City and Con Edison gas safety campaigns, and the
2		Company's own increased outreach and education (described in the
3		Company's Gas Safety Panel testimony). As a result, the Company forecasts
4		an approximate 12 percent increase in emergency response work in the Rate
5		Year as compared to the Historic Test Year. The Company expects this
6		elevated level of emergency response work will continue through the Data
7		Years.
8		Table 14: KEDNY Leak Investigation Trends
9		NYC Gas Leak Investigation 4 Year Trend
10		
11	Q.	Please explain how the new FDNY odor reporting procedure has
12		increased the volume of leak calls.
13	А.	First, publicity and public education programs regarding the change in the gas

14 odor reporting procedure has increased public awareness on gas safety. In

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1		addition, the FDNY has changed its practice with regard to notifying the
2		Company of gas related calls. In the past, the FDNY would report to a scene
3		and confirm the presence of gas before calling the Company. Now, the
4		FDNY calls the Company immediately to report to the scene of all potential
5		gas related calls, increasing the number of actual dispatches.
6		
7		ii. Leak Repairs and Surveillance
8	Q.	Please describe how the Company manages leak repairs and surveillance.
9	А.	CMS is responsible for leak response, surveillance and inside repairs. Field
10		Operations is responsible for repairs on mains and services and leak surveys.
11		Leak survey and surveillance includes completion of all transmission and
12		distribution mandated leak survey and system patrols to ensure the integrity of
13		the gas system.
14		
15		Over the last several years, KEDNY has seen an increase in its leak
16		surveillance and repair workload due to an increase in identified system leaks,
17		which require repair and/or inspection at designated intervals depending on
18		the leak classification (i.e., Type 1, 2, 2A, 3). This increase in the number of
19		detected leaks is attributable to a combination of the new FDNY gas
20		emergency procedures and increased public awareness on gas safety driving
21		more leak calls, higher leak rates on the Company's LPP and colder weather.

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1		As a result, KEDNY has experienced an increase in its leak surveillance
2		activities to monitor and investigate additional system leaks. Similarly, the
3		Company is performing additional leak repairs to address the increased
4		volume of new leaks and to reduce its backlog of non-hazardous leaks.
5		
6	Q.	What are the anticipated incremental O&M costs associated with leak
7		repairs and surveillance?
8	А.	Incremental costs in the Rate Year, approximately \$0.779 million, include the
9		costs to conduct additional leak surveillance and the costs to repair additional
10		leaks.
11		
12		iii. <u>Meter Oriented Services</u>
13	Q.	Please describe the increase in Meter Oriented Services.
13 14	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services,
13 14 15	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag
13 14 15 16	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag rechecks, cut on/off service orders and meter repair/maintenance. An
13 14 15 16 17	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag rechecks, cut on/off service orders and meter repair/maintenance. An increase in the Company's forecast number of customer cut on/offs resulting
13 14 15 16 17 18	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag rechecks, cut on/off service orders and meter repair/maintenance. An increase in the Company's forecast number of customer cut on/offs resulting from increased collections activity, increases in the number of service/meter
13 14 15 16 17 18 19	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag rechecks, cut on/off service orders and meter repair/maintenance. An increase in the Company's forecast number of customer cut on/offs resulting from increased collections activity, increases in the number of service/meter locks due to leaks, and an increase in safety inspections are the main drivers
13 14 15 16 17 18 19 20	<b>Q.</b> A.	Please describe the increase in Meter Oriented Services. CMS has observed an increase in its workload of Meter Oriented Services, which include regulator inspections, corrosion inspections, warning tag rechecks, cut on/off service orders and meter repair/maintenance. An increase in the Company's forecast number of customer cut on/offs resulting from increased collections activity, increases in the number of service/meter locks due to leaks, and an increase in safety inspections are the main drivers of further workload increases in the Rate Year.

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Testimony of the Gas Infrastructure and Operations Panel

1		iv. Local Law 30				
2	Q.	Please describe the incremental	O&M exper	ises related	to Local La	ıw 30
3		Compliance.				
4	A.	The Company's need to ramp-up	its Local Law	/ 30 complia	ince program	n is
5		described above in Section IV(B).	While the c	ost of install	ling an exter	nal
6		shut off valve can be capitalized in	n some cases	(i.e., when a	a valve is ins	stalled
7		as part of a main replacement), the	e majority of	the Local L	aw 30 compl	liance
8		costs are O&M expense.				
9		Table 15: Incremental	Local Law	30 Complia	nce	
		(\$000)	CV 2017	CV 2018	CV 2019	1
		External Shut Off Valves	9 600	12 288	12 112	ł
		O&M Costs	14.729	20.642	20.255	ł
10					1 -	1
11		Operating costs in this area includ	e the cost to	excavate the	service line	, instal
12		the new valve and restore the affe	cted area. In	CY 2016, tł	he Company	will
13		incur approximately \$15 million i	n O&M costs	s to install 6.	.800 valves (	with
14		another \$7.5 million of capital ext	penditures to	install an ad	ditional 1.70	00
15		unbuner () () () () () () () () () () () () ()	penditures to	instan un uu		
15		valves).				
16						
17		v. <u>Field Collections</u>				
18	Q.	Why is the Company forecasting	g increased f	ïeld collecti	ons work in	ı the
19		Rate Year?				

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	CMS is responsible for all customer-facing field operations, including odor
2		calls, "no gas" complaints, meter related activities, field collections, theft of
3		service investigations, meter reading and bill inquiries (e.g., high bill
4		investigations). CMS's field workload increased significantly over the last
5		several years, during which time it prioritized safety and compliance activities
6		such as leak investigations, leak surveillance, inactive accounts, meter testing
7		and regulator inspections. To accommodate the increased workload, the
8		Company diverted some CMS resources from field collections activities in the
9		Historic Test Year.
10		
11		As CMS resources have increased to meet the expanded workload, KEDNY
12		will resume field collection activities in the Rate Year at a level in line with
13		historical collections activity. The Company forecasts incremental field
14		collections expenses of \$0.501 million in the Rate Year. The Shared Services
15		Panel also discusses this increase in field collection activity.
16		
17		vi. <u>Pressure Testing</u>
18	Q.	Please describe the increased O&M expense to perform pressure testing
19		on new pipeline segments.
20	A.	In 2015, the Commission amended its regulations (16 NYCRR § 255.507) to
21		eliminate the option of soap testing short sections (100 feet or less) of gas

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# Testimony of the Gas Infrastructure and Operations Panel

1		piping before it is placed into service. As result, the Company must now
2		perform a pressure test on each segment of new pipe, which requires that the
3		field crew weld caps on each end of the new pipe segment, pressurize the pipe
4		and confirm that the pipe maintains pressure for an hour or more. The new
5		pressure testing requirement adds several man hours to the typical leak repair.
6		As a result of this change in process, the Company estimates incremental
7		O&M costs of \$0.205 million in the Rate Year.
8		
9		vii. <u>I&amp;R Support</u>
10	Q.	How have new Instrumentation & Regulation ("I&R") assets on the gas
11		system impacted the Company's O&M costs?
12	A.	The increased deployment of pressure regulating, heater, gas quality and
13		system automation assets have increased the O&M workload and associated
14		
		expenses, as these assets require regular maintenance, inspection, calibration
15		expenses, as these assets require regular maintenance, inspection, calibration and repair. These I&R assets were installed over the last ten years as the gas
15 16		expenses, as these assets require regular maintenance, inspection, calibration and repair. These I&R assets were installed over the last ten years as the gas industry and safety regulators have stressed the need to enhance remote
15 16 17		expenses, as these assets require regular maintenance, inspection, calibration and repair. These I&R assets were installed over the last ten years as the gas industry and safety regulators have stressed the need to enhance remote monitoring and control capabilities.
15 16 17 18		expenses, as these assets require regular maintenance, inspection, calibration and repair. These L&R assets were installed over the last ten years as the gas industry and safety regulators have stressed the need to enhance remote monitoring and control capabilities.
15 16 17 18 19		expenses, as these assets require regular maintenance, inspection, calibration and repair. These I&R assets were installed over the last ten years as the gas industry and safety regulators have stressed the need to enhance remote monitoring and control capabilities.
15 16 17 18 19 20		expenses, as these assets require regular maintenance, inspection, calibration and repair. These I&R assets were installed over the last ten years as the gas industry and safety regulators have stressed the need to enhance remote monitoring and control capabilities.

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	As discussed above, the Company is deploying additional system automation,
2		regulation and control facilities and, therefore, the Company expects to see its
3		O&M workload in this area continue to increase. The I&R equipment at the
4		recently completed Floyd Bennett Field take station alone (the largest station
5		on the Company's system), for example, will require significant incremental
6		O&M.
7		
8		The Company estimates approximately \$1.43 million of incremental costs in
9		this area in the Rate Year.
10		
11		B. Incremental O&M Costs Associated With Capital Investment
12	Q.	Please describe the Company's need for incremental O&M costs
13		associated with its planned capital investments.
14	A.	As discussed above, the Company needs to significantly increase its capital
15		investment program during the Rate Year. This increase in capital investment
16		will result in incremental operating expense as well. As shown in Exhibit
17		(GIOP-5), the Company estimates incremental O&M costs of approximately
18		\$14.99 million in the Rate Year directly related to the Company's capital
19		investments.
20		

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# Testimony of the Gas Infrastructure and Operations Panel

1		Table 17: Incremental O&M Costs Related to Capital Investments
		Category (\$000) CY 2017
		Capital Support – General 2,279
		Disconnects/Reconnects 3,255
		City/State Construction 9,459
2		
3		i. <u>Capital Support - General</u>
4	Q.	What O&M services will the various construction support functions
5		provide to support the Company's increased capital investments?
6	А.	Construction support functions include internal groups providing contract
7		administration, project management, budgeting and resource planning. While
8		the majority of costs from these functions are directly charged to capital
9		projects, the Company incurs O&M expenses for items such as training,
10		travel, conferences, licensing, new employee on-boarding, and costs for
11		administering O&M contracts. The Company estimates that approximately 10
12		percent of construction support employees' time is O&M expense.
13		
14		As KEDNY increases its capital expenditures, the Company will require
15		additional capital support resources, including gas system engineering
16		(estimators, designers, engineers), investment planning (clerks, inspectors,
17		program managers), operations support (permit clerks) and resource planning
18		(analysts, coordinators).
19		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	Why are incremental Gas Control resources required in the Rate Year?
2	А.	Additional Gas Control resources are required to support increased
3		construction activities affecting system operations, including coordinating
4		standard operating procedures ("SOPs") for all major growth, system
5		reinforcements, reliability and gate station projects. SOPs ensure that all
6		critical systems potentially impacted by construction are identified,
7		temperature and other work restrictions are followed, and that all internal
8		process owners (engineering, construction, I&R, Planning and Gas Control)
9		review and approve the project before construction begins.
10		
11	Q.	What are the incremental support costs in the Rate Year?
12	А.	The Company forecasts approximately \$2.28 million in incremental O&M
13		expenses from these support functions in the Rate Year.
14		
15		ii. <u>Disconnects and Reconnects</u>
16	Q.	Please describe the O&M costs associated with service line disconnects
17		and reconnects.
18	А.	Main replacements require the Company to disconnect gas service lines from
19		the main being removed, and then reconnect the service to the new main. A
20		2,000 foot main replacement can require dozens of disconnects and
21		reconnects, especially in densely populated, urban areas. The Company's

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# Testimony of the Gas Infrastructure and Operations Panel

1		capital plan involves significant investment in main and service replacements,
2		including the accelerated retirement of LPP. This work will increase O&M
3		costs for disconnection and reconnection of gas services by \$3.26 million in
4		the Rate Year.
5		
6		iii. <u>City/State Construction</u>
7	Q.	Please describe O&M costs associated with the City/State Construction
8		program.
9	A.	The Company incurs O&M costs related to City/State construction in the form
10		of disconnects and reconnects, as well as the costs to support and protect the
11		Company's facilities during municipal construction activities (e.g., shoring,
12		support and protect payments to municipal contractors to avoid existing gas
13		facilities).
14		
15	Q.	Is the Company proposing a reconciliation mechanism for City/State
16		construction O&M costs?
17	A.	Yes. Because of the variable nature of this program, which is outside of the
18		control of the Company, the Company proposes to track the capital and
19		associated O&M costs as described in Section IV(B) above.
20		

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Testimony of the Gas Infrastructure and Operations Panel

1		C. O&M Costs Related to Safety and Reliability	Programs	
2	Q.	Has the Company identified other areas of increa	used O&M expense	
3		related to gas safety and reliability that it anticip	ates incurring in the	
4		Rate Year?		
5	А.	Yes. The table below sets forth the incremental O&	M expenses related to	)
6		safety and reliability.		
7		Table 18: Safety and Reliability Prog	grams	
		Category (\$000)	CY 2017	
		Enhance Damage Prevention	587	
		Latent Damage	1,900	
		Inactive Accounts	1,259	
		Roadway Depression Inspections	1,120	
		Compliance Analysts	298	
		QA/QC Inspectors	84	
		Process Safety	122	
		Independent Compliance Assessment	525	
8				
9		The Company's Compliance Analyst, Quality Assur	ance/Quality Control	and
10		Independent Compliance Assessment programs are	discussed in the testin	aony
11		of the Gas Safety Panel.		
12				
13		i. Enhanced Damage Prevention		
14	Q.	Please describe the nature and impact of the Con	pany's efforts to	
15		promote damage prevention as a cost-containment	nt strategy.	

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Company is focusing new attention on its damage prevention program in
2		an effort to reduce instances of third-party damage. Third-party damage not
3		only raises public safety concerns, but it also increases the costs of
4		maintaining the distribution system because the Company has to remediate,
5		repair or replace its facilities that have been damaged and Company resources
6		have to be devoted to these activities on an unplanned basis.
7		
8		To reduce the potential for third-party damage and the resulting public safety
9		and cost impacts, over the last several years the Company has invested in
10		improvements to training and education of third-party excavators. Also, the
11		Company has stepped up its communications with third-party excavators and
12		has instituted new communication protocols with municipalities regarding
13		permitting and construction activities.
14		
15	Q.	Please describe the Company's proposal to reduce instances of third-
16		party damage.
17	A.	The Company's plan is to drive improvement in the area of damage
18		prevention by focusing on the most frequent cause of third-party damage,
19		which is excavator error. Accordingly, the Company is proposing a Damage
20		Prevention Advisor program based on a similar program adopted by NMPC.
21		This program would consist of five Damage Prevention Advisors, who would

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# Testimony of the Gas Infrastructure and Operations Panel

1		be equipped with vehicles and equipment that allow employees/contractors to
2		survey the ticket management systems for active location requests and
3		proactively work with excavators to reduce instances of damage.
4		
5	Q.	Please explain in more detail how adding five Damage Prevention
6		Advisors would help lower instances of third-party damage.
7	А.	Of the 263 instances of third-party damage recorded in CY 2014, 157 were the
8		result of excavator errors. While it is difficult to quantify the expected impact
9		of the Damage Prevention Advisors on instances of third-party damage, the
10		program is specifically targeted at lowering these excavator errors. These
11		dedicated damage prevention employees would visit excavation sites with
12		active One Call tickets to:
13		Remind excavation crews of the requirements included in the New
14		York State Damage Prevention regulations to improve compliance.
15		Remind excavators to verify and expose facilities via hand digging, as
16		required.
17		Discuss appropriate steps to take if facilities are not located.
18		Provide safe digging literature.
19		Coordinate requests for safe digging training.

Coordinate requests for safe digging training.

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# Testimony of the Gas Infrastructure and Operations Panel

1		The Damage Prevention Advisors would also stay on site with excavators
2		with repeated errors during excavation and investigate sites where there is no
3		location request.
4		
5	Q.	Is the Company's proposed Damage Prevention program supported by
6		the findings in the Commission's recent Horseheads proceeding?
7	A.	Yes. In the Horseheads proceeding, the Commission directed New York's
8		LDCs to perform risk assessments of their gas systems to identify instances of
9		latent damage to underground gas facilities caused by third party excavations.
10		The Company's response to the Horseheads proceeding is described in the
11		Gas Safety Panel's testimony. While KEDNY's risk assessment did not
12		identify significant instances of latent damage on the gas system, the
13		Company believes it is prudent to enhance inspections of municipal
14		infrastructure work near gas facilities. Accordingly, the Company's damage
15		prevention program will include (i) proactive inspections of municipal
16		infrastructure projects and (ii) increased municipal and public outreach in its
17		service territory.
18		
19	Q.	What are the estimated costs of these damage prevention measures?
20	A.	The estimated costs for the Damage Prevention Advisor program is \$0.59
21		million in the Rate Year.

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Testimony of the Gas Infrastructure and Operations Panel

1		
2		ii. <u>Latent Damage</u>
3	Q.	What is included in the Latent Damage category?
4	A.	The Latent Damage program is discussed above in Section $\ensuremath{\text{IV}}(B).$ The O&M
5		component includes the costs to conduct additional latent damage inspections
6		and perform non-capital repairs on damaged facilities identified during these
7		inspections. The Company forecasts Latent Damage O&M costs of \$1.9
8		million in the Rate Year.
9		
10		iii. <u>Inactive Accounts</u>
11	Q.	Please explain why the Company is incurring additional costs to address
12		inactive accounts.
13	A.	The Company's operating procedures provide that a gas service should be
14		
		locked when an account becomes inactive (i.e., an account with no customer
15		locked when an account becomes inactive ( <i>i.e.</i> , an account with no customer of record). If the Company is unable to gain access to lock its meter after
15 16		locked when an account becomes inactive ( <i>i.e.</i> , an account with no customer of record). If the Company is unable to gain access to lock its meter after reasonable attempts ( <i>e.g.</i> , mailings, site visits), the Company will physically
15 16 17		locked when an account becomes inactive ( <i>i.e.</i> , an account with no customer of record). If the Company is unable to gain access to lock its meter after reasonable attempts ( <i>e.g.</i> , mailings, site visits), the Company will physically cut service at the street or, for accounts in multi-unit buildings, attempt to
15 16 17 18		locked when an account becomes inactive ( <i>i.e.</i> , an account with no customer of record). If the Company is unable to gain access to lock its meter after reasonable attempts ( <i>e.g.</i> , mailings, site visits), the Company will physically cut service at the street or, for accounts in multi-unit buildings, attempt to secure a court order allowing access to the premises to lock the meter. The
15 16 17 18 19		locked when an account becomes inactive ( <i>i.e.</i> , an account with no customer of record). If the Company is unable to gain access to lock its meter after reasonable attempts ( <i>e.g.</i> , mailings, site visits), the Company will physically cut service at the street or, for accounts in multi-unit buildings, attempt to secure a court order allowing access to the premises to lock the meter. The Company recently modified its practices and procedures regarding inactive

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# Testimony of the Gas Infrastructure and Operations Panel

1		structured approach to access and lock gas facilities on an accelerated
2		schedule.
3		
4	Q.	Has the Company's modified process for inactive accounts increased
5		O&M costs?
6	А.	Yes. The modified procedures have significantly increased the number of
7		field visits and customer mailings, the level of back office support to identify
8		property owners, Field Operations costs to cut services in the field and legal
9		costs. For example, just the legal replevin component of the new process is
10		forecast to generate an additional 2,400 field jobs for CMS each year. As a
11		result, the Company estimates approximately \$1.26 million in additional field
12		operations and CMS costs to address inactive accounts in the Rate Year. The
13		Shared Services Panel addresses the related back office support costs.
14		
15	Q.	What is the Company doing to improve its process and better address
16		inactive accounts?
17	А.	To manage this issue going forward, the Company is coordinating a number
18		of programs and initiatives to reduce the number of inactive accounts. For
19		example, the Company is implementing a "Leave on for Landlord" program
20		whereby participating accounts transition to the landlord in the event a tenant
21		vacates the premises. KEDLI and NMPC have already successfully

vacates the premises. KEDLI and NMPC have already successfully

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# Testimony of the Gas Infrastructure and Operations Panel

1		implemented this program and experienced a reduction in the occurrence of
2		inactive accounts. Additionally, the Company is pursuing non-traditional
3		options to assist with identifying responsible owners/occupants and accessing
4		premises with inactive accounts, including: (i) supporting potential legislation
5		to assist utilities in gaining access to premises for purposes of accessing
6		facilities by creating a database of contact information for superintendents or
7		other individuals authorized to provide access to customers' buildings, (ii)
8		working with other utilities to identify owners/occupants of premises with
9		inactive accounts and (iii) developing an enhanced public awareness program
10		to educate customers and other stakeholders about the Company's need to
11		access premises to lock meters when accounts are terminated.
12		
13		iv. <u>Roadway Depression Inspections</u>
14	Q.	Please describe the Road Depression Inspection program.
15	A.	Depressions in the roadway can be an indication of subsurface instability that
16		could result in damage to underground utility facilities, including gas mains
17		and services. New York City's Department of Transportation ("DOT") has
18		requested enhanced coordination among the Company and other utilities for
19		inspecting road depressions for potential damage to underground utility
20		infrastructure. Under this new protocol, which is expected to commence in
21		CY 2016, upon receiving a report of a roadway depression, the DOT will

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# Testimony of the Gas Infrastructure and Operations Panel

1		notify any utilities with underground facilities in the vicinity so they can
2		inspect the area for possible damage. KEDNY anticipates using existing in-
3		house systems and personnel to perform inspections but expects startup costs
4		for development and implementation of the program and labor costs to
5		conduct the additional inspections each year. The Company forecasts total
6		costs of \$1.12 million in the Rate Year.
7		
8		v. <u>Process Safety</u>
9	Q.	Please describe the proposed Process Safety program.
10	A.	As discussed in the testimony of the Gas Safety Panel, the Company is
11		adopting the American Petroleum Institute's ("API") recommended pipeline
12		safety management system standards (Recommended Practice 1173 ("API RP
13		1173")), which provides a framework for identifying hazards and controlling
14		potential risks, and addressing safety and maintenance requirements
15		throughout a pipeline's life cycle to significantly reduce the likelihood of
16		safety incidents. API RP 1173 is a holistic approach to pipeline safety that
17		applies key principles, including risk management, incident investigation,
18		safety assurance, emergency preparedness, recordkeeping, training,
19		management review and continuous improvement to enhance the operator's
20		existing risk control standards and programs (e.g., DIMP/IMP, Compliance

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# Testimony of the Gas Infrastructure and Operations Panel

1		Assessment Control Room Management). API RP 1173 does not replace
2		existing risk management systems, but strengthens accountability and
3		effectiveness. Through the Process Safety program, the Company will
4		conduct process workshops to isolate risks, identify process hazards, and then
5		develop, implement and oversee process safety documents and procedures.
6		KEDNY's estimated cost of this program is \$0.122 million in the Rate Year.
7		
8		D. Other O&M – Gas Control
9	Q.	What is the Temperature Control Communications Upgrade project?
10	А.	KEDNY has more than 3,100 TC (temperature-dependent interruptible)
11		customers in New York City whose meters are remotely managed using a
12		vendor-hosted application that uses a gateway modem to monitor gas usage
13		and remotely switch these customers to their alternate fuel at the designated
14		interruption temperature (or when emergency system conditions warrant load
15		shedding). These gateway modems will become obsolete in January 2017
16		when the cellular network technology they utilize (2G) sunsets. Under the
17		Temperature Control Communications Upgrade Project, the Company will
18		upgrade each gateway modem with new cellular technology (4G), which
19		involves removing the current device, sending the device to the vendor to
20		upgrade, and re-installing the upgraded device on each active meter. The
21		upgrade from 2G to 4G, which is expected to be completed in CY 2016, will

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# Testimony of the Gas Infrastructure and Operations Panel

1		provide a reliable communications network to monitor and control TC tariff
2		compliance. In addition, the communications upgrade is critical to preserving
3		KEDNY's ability to remotely manage its non-firm load during periods of peak
4		demand. Therefore, even as the Company considers options for serving its
5		non-firm customers, and is proposing a collaborative to develop and
6		implement a new demand response service classification (see the testimony of
7		the Rate Design Panel), this system is needed to maintain system reliability
8		for the foreseeable future.
9		
10		Ongoing O&M expenses related to this program include the cost of the new
11		vendor application and maintenance/repair of the remote switching devices.
12		The Company forecasts approximately \$1.61 million in incremental expense
13		in the Rate Year.
14		
15	VI.	Other Gas Operations Projects and Programs
16		A. <u>Newtown Creek Project</u>
17	Q.	What is the purpose of the Newtown Creek Project?
18	A.	The Newtown Creek Project ("Newtown Project") advances the Company's
19		commitment to a low-carbon, sustainable energy future by reducing GHG
20		emissions and promoting renewable natural gas as a long term supply source.
21		

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# Testimony of the Gas Infrastructure and Operations Panel

1	Q.	How does the Newtown Project work?
2	A.	The New York City Newtown Creek Wastewater Treatment Plant handles
3		approximately 250 million gallons of sewage per day. Biogas generated from
4		the wastewater plant is approximately 60 percent methane and 40 percent
5		carbon dioxide (CO <sub>2</sub> ). The Newtown Project is a gas purification facility that
6		captures this biogas, upgrades it to pipeline quality natural gas, adds odorant
7		and injects the gas into the Company's gas system for direct use by customers.
8		
9	Q.	How much GHG emissions will the Newtown Project eliminate?
10	A.	The Newtown Project, which will be one of the first and largest of its kind in
11		the country, is expected to produce approximately 277,500 dekatherms of
12		pipeline quality renewable natural gas per year, reducing CO2 emissions by
13		approximately 16,000 tons annually (the emissions of approximately 3,000
14		automobiles). New York City will soon start receiving pre-processed organic
15		food waste at the plant that will be added to the sewage to increase the
16		production of biogas.
17		
18	Q.	When will the Newtown Project be operational?
19	A.	Construction is expected to begin in early 2016 and the Newtown Project is
20		expected to be operational one year after construction starts.
21		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	What are the Company's forecast capital costs for the Newtown Project?
2	А.	The current budget is approximately \$32.7 million for the Newtown Project,
3		which was recently increased by approximately \$12 million from the previous
4		budget of \$20 million. The increase is primarily due to added mechanical and
5		civil construction costs to ensure adequate structural support for the Newtown
6		Project, and design changes to meet the final requirements of the New York
7		City Public Design Commission ("PDC"). The PDC requirements include
8		items like stainless steel sheeting, sound mitigation measures and layout
9		changes. The most extensive and costly change was the reconfiguration of the
10		plant to place it behind the stainless steel tanks that face the public street. The
11		new location of the plant put it closer to the primary sewage pipe into the
12		wastewater plant. The weight of the Newtown Project's processing
13		equipment and walled enclosure led to concerns that the sewage pipe could be
14		damaged. Accordingly, the Company redesigned the Newtown Project to
15		include an underground "bridge" for the plant, requiring the driving of
16		numerous piles and construction of a platform. The civil work redesign,
17		which has been approved by the PDC, represents the bulk of the \$12 million
18		dollar increase in the Newtown Project budget.
19		
20	Q.	Is the Newtown Project budget now final?

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# Testimony of the Gas Infrastructure and Operations Panel

1	A.	The Newtown Project is currently at the 90 percent complete design phase.
2		This means the latest engineering and design plans are under review and are
3		subject to minor modifications prior to commencement of construction. In
4		addition, final permitting approval by the New York City Department of
5		Buildings and FDNY is required.
6		
7	Q.	Are there going to be O&M costs for the Newtown Project?
8	A.	Yes. The annual O&M cost estimate is approximately \$0.700 million. The
9		majority of the O&M cost (approximately \$0.600 million) is for electricity to
10		operate the compressor and other machinery. The other O&M costs include
11		labor expenses for maintenance personnel, chromatograph annual
12		maintenance, odorant service and other routine maintenance activities such as
13		changing filters and belts.
14		
15	Q.	What has the Company done to mitigate the costs of the Newtown
16		Project?
17	A.	The Company has pursued several measures to reduce the total costs of the
18		Newtown Project. First, in developing the Newtown Project, the Company
19		utilized its in-house engineering, design, operations and other resources when
20		practical and cost effective. Second, the Company collaborated closely with

21 the City to find operational synergies to reduce costs. For example, electrical

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# Testimony of the Gas Infrastructure and Operations Panel

1		equipment for the project will be housed in the already existing electrical
2		room for the wastewater treatment plant, and the Company will pay for
3		electricity (the largest component of running the project) at lower New York
4		Power Authority rates procured through the City. Third, the Company's
5		agreement with the City provides for use of the property at the wastewater
6		treatment plant, as well as the methane gas, at no cost until the Company's
7		customers have been fully compensated for the annual cost of the Newtown
8		Project (discussed more below) through the sale of the project's output. The
9		Company also secured a property tax abatement from the City that will
10		provide a five-year exemption from real property taxes for a significant
11		portion of the Newtown Project. In addition, the Company is pursuing
12		potential tax-exempt financing for the construction costs of the Newtown
13		Project, which would lower the Company's annual financing costs.
14		
15	Q.	How will the revenues/credits from the Newtown Creek Project be
16		treated?
17	A.	KEDNY and KEDLI's sales customers will pay for the gas produced by the
18		Newtown Project based on the monthly weighted average cost of gas
19		("WACOG"). KEDNY firm sales and transportation customers will receive a
20		credit equal to the gas charges paid by KEDNY/KEDLI's sales customers.
21		KEDNY's customers will also receive credit for any environmental attributes

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# Testimony of the Gas Infrastructure and Operations Panel

1		or third-party sales. Every year, the Company will compare the Newtown
2		Project's implied cost (revenue requirement) to the market value (annual
3		project output multiplied by an annual WACOG). Additionally, if the
4		Company finds a customer willing to purchase the biogas at a premium (i.e., a
5		customer who can monetize the environmental attributes (discussed below)),
6		all proceeds will offset the Project's revenue requirement. If at the end of
7		year five there are cumulative excess benefits (cumulative benefits less the
8		cumulative revenue requirement for years one through five), New York City
9		will receive 50 percent of the excess benefits and the other 50 percent of the
10		excess benefits will be credited to KEDNY's firm customers. The Rate
11		Design Panel discusses the mechanism to pass these benefits to KEDNY's
12		firm customers.
13		
14	Q.	Will there be avoided emissions credits (federal or state) for the Newtown
15		Project?
16	A.	The renewable gas generated by the Newtown Project may qualify for various
17		federal and state emissions credits depending on how the gas is utilized by the
18		end user. For example, if the output is purchased by a power generator in
19		New York State, the gas-fired generation would qualify for Renewable
20		Energy Credits under New York's Renewable Portfolio Standard program. If
21		the output is used in the transportation sector by a compressed natural gas

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# Testimony of the Gas Infrastructure and Operations Panel

1		customer, the renewable gas would generate Renewable Identification
2		Number credits under the EPA's Renewable Fuel Standard Program. The
3		Company will work to identify and leverage available emissions credits to
4		offset the cost of the Newtown Project.
5		
6	Q.	Please discuss Company's efforts to develop standard interconnection
7		guidelines for renewable natural gas projects.
8	A.	National Grid is working with the NGA to develop standard interconnection
9		guidelines for renewable natural gas projects. Once the initial draft is
10		completed, the Company will share its proposed interconnection guidelines
11		with other interested stakeholders (including the New York Biogas Study
12		Group, the Renewable Natural Gas Coalition and Staff) for feedback.
13		
14		B. Information Technology/Cyber Security
15	Q.	Is National Grid making any information technology investments to
16		support KEDNY's gas business in the Rate Year and Data Years?
17	A.	Yes. National Grid is pursuing the Gas Geographic Information System
18		("GIS") Consolidation and Gas GIS Upgrade initiatives that will improve
19		KEDNY's ability to capture, store, access and analyze geographical asset
20		information concerning its gas distribution network.
21		

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# Testimony of the Gas Infrastructure and Operations Panel

1		In addition, National Grid is in the early planning stages of an effort to update,
2		simplify and standardize its gas work management and asset management
3		processes and systems, known as the Gas Enablement System initiative.
4		
5		Finally, National Grid is planning a number of cyber security projects to
6		detect and respond to known and emerging cyber security threats.
7		
8	Q.	Please describe the Gas GIS Consolidation project.
9	A.	The Gas GIS Consolidation project will merge the multiple gas GIS systems
10		onto a single platform. The project will:
11		Provide field technicians and engineers a single, streamlined
12		source of gas asset information to improve leak response and
13		enhance the ability to coordinate other emergency work;
14		Simplify the viewing and querying of GIS data for customer
15		service representatives, thereby reducing phone wait time for
16		customers;
17		Provide a simplified and faster GIS user interface that will
18		decrease response times for customers contacting the call center
19		(or querying publicly available National Grid map data on the

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# Testimony of the Gas Infrastructure and Operations Panel

1		web) regarding new gas service or reporting service
2		interruptions; and
3		• Streamline and simplify regulatory reporting with the use of a
4		single system to obtain data and generate reports.
5		The anticipated in service date of this project is April 2019.
6		
7	Q.	What is the cost of the Gas GIS Consolidation project?
8	Α.	The Gas GIS Consolidation project is estimated to cost \$11.6 million. As
9		shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3),
10		Schedule 9, Workpaper 6, KEDNY's allocated share of the forecast costs for
11		the Gas GIS Consolidation project is \$0.53 million in Data Year 2.
12		
13	Q.	Please describe the Gas GIS Upgrade project.
14	Α.	The Gas GIS Upgrade project is required to support the Gas GIS
15		Consolidation project discussed above. The performance of the current
16		mapping application has been degrading, and there are issues not only with
17		system response time but with the ability to utilize certain tools and features
18		of the software such as map data storage and consolidated data models.
19		National Grid plans to upgrade the software for additional functionality such
20		as the availability of standard reports and tools (e.g., leak reports) in

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# Testimony of the Gas Infrastructure and Operations Panel

1		anticipation of the Gas GIS Consolidation project. The anticipated in service
2		date of this project is October 2016.
3		
4	Q.	What is the cost of the Gas GIS Upgrade project?
5	A.	The Gas GIS Upgrade project is estimated to cost approximately \$1.2 million.
6		As shown Exhibit _ (RRP-11), the Workpaper to Exhibit _ (RRP-3),
7		Schedule 9, Workpapers 2, 4 and 6, KEDNY's allocated share of the forecast
8		costs for the Gas GIS Consolidation project is approximately \$0.08 million in
9		the Rate Year and $0.08$ million and $0.07$ million in Data Years 1 and 2,
10		respectively.
11		
12	Q.	Please describe the Gas Enablement System initiative.
12 13	<b>Q.</b> A.	Please describe the Gas Enablement System initiative. The Gas Enablement System initiative will replace, update, consolidate and
12 13 14	<b>Q.</b> A.	Please describe the Gas Enablement System initiative. The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems,
12 13 14 15	<b>Q.</b> A.	Please describe the Gas Enablement System initiative. The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems, including gas leak management systems, to:
12 13 14 15 16	<b>Q.</b> A.	Please describe the Gas Enablement System initiative. The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems, including gas leak management systems, to: • standardize work and asset management processes that directly
12 13 14 15 16 17	<b>Q.</b> A.	Please describe the Gas Enablement System initiative. The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems, including gas leak management systems, to: • standardize work and asset management processes that directly support gas processes
12 13 14 15 16 17 18	<b>Q.</b> A.	<ul> <li>Please describe the Gas Enablement System initiative.</li> <li>The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems, including gas leak management systems, to: <ul> <li>standardize work and asset management processes that directly support gas processes</li> <li>improve forecasting, scheduling and planning</li> </ul> </li> </ul>
12 13 14 15 16 17 18 19	<b>Q.</b> A.	<ul> <li>Please describe the Gas Enablement System initiative.</li> <li>The Gas Enablement System initiative will replace, update, consolidate and simplify aging and disparate gas work and asset management systems, including gas leak management systems, to: <ul> <li>standardize work and asset management processes that directly support gas processes</li> <li>improve forecasting, scheduling and planning</li> <li>enhance field device mobility</li> </ul></li></ul>

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# Testimony of the Gas Infrastructure and Operations Panel

1		improve customer interactions
2		
3	Q.	Please summarize the overall objectives of this project.
4	A.	There are dozens of applications and associated systems that directly support
5		gas processes. Most of National Grid's current work and asset management
6		systems are more than ten years old, lack vendor support because of their age
7		and present an increased risk of failure. These systems also lack the ability to
8		meet new business requirements and to plan, track and manage work
9		efficiently and consistently.
10		
11		The overall objective of the project is to standardize and simplify the work,
12		asset and performance management processes and replace aging work
13		management systems and field-based computers with new technology that
14		will improve virtually all interactions with the customer, from the contact
15		center through field operations. The Gas Enablement System initiative will
16		deploy field devices that are in continuous communication with the work and
17		asset management systems, providing mobile access to the Company's maps,
18		policies and procedures to enhance work quality, reduce the potential for
19		errors and improve the Company's recordkeeping.
20		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	When will the Gas Enablement System initiative be implemented?
2	А.	Although some preliminary scoping work has been completed, a detailed
3		project plan and timetable for implementation have not. National Grid is in
4		the process of organizing a program planning team, and will provide an
5		update on the program effort and, to the extent they are available at the time, a
6		timetable, project scope, and costs in its Corrections & Updates filing.
7		
8	Q.	How is KEDNY addressing cyber security threats?
9	A.	In 2010, National Grid formally established the Digital Risk and Security
10		organization within its Information Services organization to protect National
11		Grid's energy networks, IS systems, and confidential company and customer
12		information from cyber security threats. The cyber security environment is
13		fluid as threats become more common and diverse. The Digital Risk and
14		Security organization not only addresses known threats, but also proactively
15		identifies and protects National Grid from emerging threats. The current
16		organization is staffed internally to determine the cyber security projects
17		necessary to protect National Grid's energy networks, systems, and
18		information but utilizes an external vendor to monitor and provide immediate
19		response to threats. As discussed below, National Grid plans to perform the
20		monitoring and response functions internally.
21		

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Testimony of the Gas Infrastructure and Operations Panel

1	Q.	What cyber security projects is National Grid planning for the Rate Year
2		and Data Years?
3	А.	National Grid plans to complete 17 cyber security projects in the Rate Year
4		and Data Years. An additional 11 cyber security projects are expected to be in
5		service after the Historic Test Year but prior to the Rate Year. The complete
6		list of projects is provided in Exhibit (RRP-11), the Workpaper to Exhibit
7		(RRP-3), Schedule 9, Workpapers 2, 4 and 6. The projects will address a
8		wide range of cyber security issues, including:
9		Ensuring adequate security protection to cyber assets supporting
10		critical reliability functions across National Grid's networks and
11		systems.
12		Providing security information and event management capabilities
13		to analyze security alerts in real time, and to collect, store and
14		report on data for compliance and forensic analysis across critical
15		assets and business functions.
16		Strangthaning identity access and authorization management
10		Strengthening identity, access and autorization management
17		capabilities to ensure that only authorized personnel are able to
18		access critical assets and perform only those functions for which
19		they are authorized.

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# Testimony of the Gas Infrastructure and Operations Panel

1		Protecting energy networks from malicious and inadvertent
2		damage that can occur as a result of the increased use of smart
3		devices (e.g., smart meters, remote terminal units, temperature and
4		pressure sensors).
5		Implementing a Security Operations Center to consolidate security
6		operations and monitoring systems in a centralized facility, which
7		will significantly improve National Grid's ability to detect security
8		threats, determine their nature and deal with them as, or before,
9		they occur.
10		
10		
11	Q.	What are the projected costs of the cyber security projects planned for
11 12	Q.	What are the projected costs of the cyber security projects planned for the Rate and Data Years?
11 12 13	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost
10 11 12 13 14	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit(RRP-11),
10 11 12 13 14 15	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3), Schedule 9, Workpapers 2,4 and 6.
10 11 12 13 14 15 16	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3), Schedule 9, Workpapers 2,4 and 6. KEDNY's allocated share of these forecast project costs are \$0.51 million for
10 11 12 13 14 15 16 17	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit(RRP-11), the Workpaper to Exhibit(RRP-3), Schedule 9, Workpapers 2,4 and 6. KEDNY's allocated share of these forecast project costs are \$0.51 million for the Rate Year, \$0.64 million for Data Year 1, and \$0.87 million for Data Year
11 11 12 13 14 15 16 17 18	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3), Schedule 9, Workpapers 2.4 and 6. KEDNY's allocated share of these forecast project costs are \$0.51 million for the Rate Year, \$0.64 million for Data Year 1, and \$0.87 million for Data Year 2, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3),
11 11 12 13 14 15 16 17 18 19	<b>Q.</b> A.	What are the projected costs of the cyber security projects planned for the Rate and Data Years? The cyber security projects summarized above are forecast to cost approximately \$45 million in capital costs, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3), Schedule 9, Workpapers 2,4 and 6. KEDNY's allocated share of these forecast project costs are \$0.51 million for the Rate Year, \$0.64 million for Data Year 1, and \$0.87 million for Data Year 2, as shown in Exhibit (RRP-11), the Workpaper to Exhibit (RRP-3), Schedule 9, Workpapers 2, 4 and 6. An incremental \$0.43 million in

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# Testimony of the Gas Infrastructure and Operations Panel

1		is required in the Rate Year for licenses, software, hardware, infrastructure
2		maintenance fees, and vendor support costs such as configuration and network
3		security changes.
4		
5	Q.	What is National Grid's staffing plan for the Digital Risk and Security
6		organization?
7	A.	Currently, National Grid utilizes an outside firm to monitor and provide
8		immediate response to cyber threats. Because of the critical nature of this
9		work, National Grid plans to perform the function internally. This will
10		further strengthen National Grid's capability to ensure the safe and effective
11		operation of the company's energy networks and protect confidential
12		customer and company information. National Grid projects that the costs of
13		the incremental employees needed to perform the function internally will be
14		cost neutral compared to the costs of the outside monitoring firm.
15		Accordingly, no adjustment has been made to the revenue requirements.
16		
17	Q.	Does this conclude your testimony?

18 A. Yes, it does.

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> Exhibits of Gas IOP

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# Testimony of the Gas Infrastructure and Operations Panel

# Index of Exhibits

Exhibit (GIOP-1)	Actual and Projected Capital Expenditures: Historic Test Year, Rate Year and Data Years
Exhibit (GIOP-2)	Actual and Projected Annual Investment Levels, CYs 2015 - 2020
Exhibit (GIOP-3)	Projected Leak Rates for Leak Prone Pipe for Different Main Replacement Strategies
Exhibit (GIOP-4)	Data Sheets for Significant Capital Programs
Exhibit (GIOP-5)	Incremental O&M Expenditures: Historic Test Year, Rate Year and Data Years
Exhibit (GIOP-6)	Incremental Full Time Equivalent Positions by Function in the Rate Year and Data Years

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Exhibit\_\_(GIOP-1)

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Testimony of the Gas Infrastructure and Operations Panel

Exhibit \_\_(GIOP-1)

Actual and Projected Capital Expenditures: Historic Test Year, Rate Year and Data Years

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### KEDNY Capital Investment Plan \$000

Classification	Category		Historic Test Year		CY'17 Capital Plan		'18 Capital Plan	CY'19 Capital Plan	
Growth	Base Growth - Install Main	s	21.853	s	48,136	s	48.889	s	48.356
	Base Growth - Install Services	s	22,401	s	23,106	s	22.279	s	22,165
	Base Growth - Customer Contributions	s	(2,438)	s	(4,895)	s	(3,298)	s	(2,500
	Base Growth - Install Meter/Regulator	s	2,338	\$	1,108	s	1,120	\$	1,120
	Base Growth- Meter Purchases	s	1,455	s	2,027	s	2,138	\$	2,244
	Gas System Reinforcement	s	35,794	\$	65,752	\$	66,440	\$	62,239
	Total Growth	\$	81,403	\$	135,234	\$	137,568	\$	133,624
Mandated	CSC/Public Works - Non Reimbursable	\$	111,953	\$	112,528	\$	115,985	\$	118,305
	CSC/Public Works - Reimbursable	\$	70,122	\$	84,488	\$	86,985	\$	88,72
	CSC/Public Works Reimbursements	\$	(5,678)	s	(16,117)	s	(17,158)	\$	(17,15
	LaGuardia Redevelopment	s		s	4,573	\$	20,210	\$	3,59
	Flatlands	s	9,309	\$		\$		s	
	Atmospheric Corrosion Inside Inspections	\$	18	\$	507	\$	519	s	53
	Service Replacements - Proactive	s	680	s	1,696	s	1,700	\$	1,70
	Main Replacements - (Proactive) - Leak Prone Pipe	s	52,572	\$	77,375	\$	87,189	\$	88,93
	Cross Bore Remediation	s		\$	477	\$	510	\$	51
	Latent Damage	s		\$	700	\$	812	\$	82
	Large Diameter CI System Sealing/Lining Program	s		\$	14,340	\$	19,282	\$	19,68
	Corrosion	s	184	\$	857	\$	881	\$	89
	Service Replacement (Reactive) - Leaks	\$	5,850	s	5,786	s	6,011	s	6,13
	Service Replacement (Reactive) - Non-Leaks - Other	s	6,113	s	5,173	s	5,337	s	5,44
	Main Replacements - (Reactive) - Maintenance	\$	3,517	s	2,521	s	2,591	s	2,64
	Plastic Fusions - New	s		s	2,103	s	2,355	s	2,58
	Pipeline Integrity - IMP	\$	6,072	\$	16,877	\$	11,818	s	4,22
	Pipeline Integrity - IVP	\$		s	1,829	s	2,000	s	2,00
	Local Law 30	\$	7,317	s	9,714	\$	12,777	\$	16,70
	Purchase Meters (Replacements)	s	2,277	\$	3,719	s	3,923	\$	4,11
	Meter Changes	\$	2,613	s	1,785	s	1,847	s	1,88
	Misc Mandated Work	s	289	\$		\$		\$	
	Total Mandated	\$	273,208	\$	330,931	\$	365,574	\$	352,27
Reliability	Gas System Control	\$		\$	113	\$	117	\$	18
	Gas System Control - M2M Upgrade	\$		\$	292	\$		S	1,16
	Gas System Reliability - Gas Planning /RCV Program	\$	3,032	s	3,557	s	5,815	S	5,05
	Valve Installations / Replacements	\$		\$	141	\$	142	\$	14
	Pressure Regulating Facilities	\$	4,226	s	4,928	s	5,742	\$	5,57
	Canarsie Gate - Repair Penatrations	s	752	\$	76	\$		\$	
	Citizens Gate - Bulkhead	\$	69	s	3,376	s	4,300	s	1,07
	Coney Island Heater	s	2,124	\$	30	\$		\$	
	Tetco Relief Valve Retirement	\$		s	1,107	\$	525	\$	
	Varick Reg Station Retirement	\$		\$	717	s	1,000	ŝ	28
	Bay Ridge Retirement	\$		\$	91	\$		\$	
	Bowery Bay Station Upgrade	\$		s	1,147	\$	453	S	
	McGuiness Mini Gate	\$		S		s	1,183	\$	46
	Kings Plaza Mini Gate	\$		\$		\$		\$	1,21
	Maspeth Decommishing	\$	1,268	\$	61	\$		\$	
	System Automation	\$	630	s	1,617	s	1,697	S	1,70
	Control Line Integrity Program	\$		\$	270	\$	390	\$	10
	Water Intrusion	\$	1	\$	975	s	1,155	S	1,18
	Channe Unerdening Description Constant Mahare	\$		s	3,518	s	4,758	\$	4,84
	Storm Hardening - Remote Service Shutoli Valves		140	2	1.626	1.5	1 447	s	1,69
	I&R - Reactive/CNG	\$	100	~	1,020	-	1,007		
	I&R - Reactive/CNG LNG - Blanket	s	2,208	s	2,571	s	2,575	\$	2,00
	SIOTH Hardening - Remote service Shutori Valves 1&R - Reactive/CNG LNG - Blanket LNG - Special Projects	\$ \$ \$	2,208	s s	2,571	s s	2,575	s s	2,00
	Storm Hardening - Hemote Service shutor Valves 1887 - Reactive/CNG LMG - Blanket LNG - Special Projects LNG - Tank 2 Upgrade	s s s	2,208	s s s	2,571 16,988 3,645	s s	2,575 11,876 15,795	s s	2,06 9,87 37,66
	storm Hardening - Kennois Service Snuton Varves 184 R - Reactive/CNG LNG - Blanket LNG - Special Projects LNG - Tank 2 Upgrade LNG - Sait Water Pump House Upgrade	s s s	2,208	5 0 0 0 0	2,571 16,988 3,645 6,500	s s s	2,575 11,876 15,795 8,125	s s s	2,06 9,87 37,66 4,25
	saam Kardening - kennou service sinution varves IAR - Reactive(NG UNG - Starket UNG - Special Projects UNG - Tank 2 Upgrade UNG - Sall Water Pump House Upgrade Paredlegal Basin ILI	s s s s s	2,208 776	~ ~ ~ ~ ~ ~	2,571 16,988 3,645 6,500	5 5 5 5 5 5	2,575 11,876 15,795 8,125	s s s	2,06 9,87 37,66 4,25
	John Hardening - kentile service sinulari varves L&R - Reactive/NG LNC - Special Projects LNC - Tank 2 Upgrade LNC - Saft Water Pump House Upgrade Peerdegaf Basin ILI Verrazano karons Upgrade	s s s s s	2,208 776	~ ~ ~ ~ ~ ~ ~	2,571 16,988 3,645 6,500	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2,575 11,876 15,795 8,125 -	5 5 5 5 5	2,00 9,81 37,60 4,25
	Sutar In Redeeming - kernice service Suturini Vaives LBR - Reactive/CMG LBR - Banket LBR - Sealer Sealer Notes LBR - Tank 2 Upgrade LBR - Tank 2 Upgrade Pareflaget Basin IL Verzazen Narrows Upgrade Billym Cueres Intercoment Phase I	\$ \$ \$ \$ \$ \$ \$ \$ \$	2,208 776 (2,517) 2,054 3,907	~ ~ ~ ~ ~ ~ ~ ~	2,571 16,988 3,645 6,500	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	2,575 11,876 15,795 8,125 -	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$	2,04 9,8 37,64 4,2
	Suffin Hardenhey - Vertraue Service Solution Valves Lika - Beacter/CAG Lika - Beacter/CAG Lika - Secold Projects Lika - Tank 2 Upgrade Lika - Sant Valver Pump House Upgrade Pserdogal Basin Li Vertraueno Natrons Upgrade Bayn Queens Intercommed Phase I Bayn Queens Intercommed Phase I	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	2,208 776	0 0 0 0 0 0 0 0	2,571 16,988 3,645 6,500	~ ~ ~ ~ ~ ~ ~ ~ ~	1,007 2,575 11,876 15,795 8,125	* * * * * *	2,0 9,8 37,6 4,2

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Boston Gas Company and Colonial Gas Company each d/b/a National Grid D.P.U. 17-170 Attachment AG-21-2-2 Page 140 of 241

### KEDNY Capital Investment Plan \$000

Classification	Category	н	istoric Test Year	Ca	CY'17 pital Plan	сү	'18 Capital Plan	CY	19 Capital Plan
	Bklyn Queens Interconnect Phase III	s	193	\$	-	\$	-	\$	-
	Northern Queens Gas T&D	\$	57,737	\$	-	\$	-	\$	-
	MRI- Metropolitan Reliability Infrastructure	s	526	\$	45,469	\$	86,542	\$	56,721
	Newtown Creek	s	5,457	\$	6,975	\$	-	ŝ	
	Spring Creek Reconfiguration	s	-	\$	5,416	\$	10,937	\$	2,159
	Misc Reliability Work	s	(39)	\$	-	\$	-	\$	
	Total Reliability	\$	99,164	\$	111,206	\$	164,794	s	137,462
Non-Infrastructure	AMR Installation	\$	-	\$	17,718	\$	-	\$	-
	AMR Replacement	s	4,042	s	5,078	\$	5,225	\$	5,330
	Tools & Equipment - All	\$	3,060	\$	3,432	\$	3,796	\$	4,138
	Telecomm	s		\$	101	\$	104	\$	105
	Combustible Gas Indicators	s	1,986	ŝ	-	\$	-	ŝ	
	Total Non-Infrastructure	\$	9,088	s	26,329	\$	9,125	\$	9,573
Misc	Misc	\$	(853)	\$	-	\$	-	\$	-
	Total Misc	\$	(853)	\$	-	\$	-	\$	
	Total Direct Gas (Capital & COR)	\$	462,010	\$	603,700	\$	677,061	\$	632,938
	Cost of Removal	\$	21,064	\$	38,475	\$	39,595	\$	37,511
	Total Direct Gas (Net of COR)	\$	440,946	\$	565,225	\$	637,466	\$	595,427
Indirect Capital									

mail cot oupital						
Facilities/Customer/Other	Facilities	\$ 6,047	\$	2,400	\$ 2,480	\$ 2,560
	Customer - Gas REV Pilots	\$ -	\$	790	\$	\$
	Other	\$ 665	\$	-	\$ -	\$ -
	COR	\$ -	ŝ	600	\$ 620	\$ 640
	Total Facilities/Customer	\$ 6,712	\$	3,790	\$ 3,100	\$ 3,200
Fleet/IM/IR (Capex only)	Fleet	\$ 59	\$	2,500	\$ 400	\$ 350
	IM/IR	\$ -	\$	85	\$ 270	\$ 270
	Total Fleet/IM/IR	\$ 59	\$	2,585	\$ 670	\$ 620
	Total Capital/COR	\$ 468,781	\$	610,075	\$ 680,831	\$ 636,758

The Narragansett Electric Company d/b/a National Grid RIPUC Docket No. 4770 Boston Gas Company and Attachmenst Colly and 49-34 each d/b/a National Grid of 241 D.P.U. 17-170 Attachment AG-21-2-2 Page 141 of 241

Exhibit\_\_\_(GIOP-2)

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Boston Gas Company and Colonial Gas Company each d/b/a National Grid D.P.U. 17-170 Attachment AG-21-2-2 Page 142 of 241

Testimony of the Gas Infrastructure and Operations Panel

Exhibit \_\_ (GIOP-2)

Actual and Projected Annual Investment Levels CYs 2015 - CY 2020

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Exhibit\_\_\_(GIOP-3)
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Testimony of the Gas Infrastructure and Operations Panel

Exhibit \_\_ (GIOP-3)

Projected Leak Rates for Leak Prone Pipe for Different Main Replacement Strategies

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Exhibit\_\_\_(GIOP-4)

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Testimony of the Gas Infrastructure and Operations Panel

Exhibit (GIOP-4)

Data Sheets for Significant Capital Programs

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## Program Title: Base Growth Capital Plan - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

Brief Description:

KEDNY's Base Growth program involves the installation of new main, services and meters to serve projected customer/demand growth in the New York City. The program includes the capital requirements necessary to meet increasing customer demand resulting from (i) increasing construction activity in the service territory, (ii) interruptible to firm service requests, and (iii) continued multifamily conversions resulting from NYC's Clean Heat Initiative for No. 4/6 fuel oil customers.

#### Program Justification:

Conversions. The growth forecast shows a slight increase in the multifamily and commercial conversion market as the Northern Queens project will open opportunities for customers that previously could not be served. Residential conversions and commercial conversion in areas other than northern Queens will decrease due to low oil pricing, saturation and system issues.

New Construction. An increase in permit activity indicates increases in the residential new construction market and the commercial new construction market. While New York City has experienced flat new construction activity since 2008, Moody's is forecasting an increase in new construction activities.

Interruptible-Firm Rate Changes. The completion of the Northern Queens project will open opportunities for customers who previously could not be served due to capacity constraints. In addition, a number of Temperature Controlled (TC) customers have switched to firm service over the past several years, which has increased capacity demands on the system. The Northern Queens build-out will optimize system reliability, integrity and growth opportunities – which will increase base growth spending in this area.

The growth forecast considers the implications of (a) changes in the various market segments; (b) large project inventories; (c) rate/regulatory changes; and (d) system constraint. The forecast also considers factors that drive growth projections and the associated capital expenditures:

- Fuel Pricing oil versus natural gas
- · Inventory levels and turnover ratios
- Saturation levels
- Marketing Lead performance

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- · Designs and resourcing that supports the delivery of capital at efficient
- pricing.
  Economic Conditions / Building Starts
- Gas system constraints
  NYC permitting requirements that increase permitting/restoration costs.

Growth Capital Program Cost Breakdown:

The capital growth program will provide support to meet the anticipated customer demand for a five year period.

CAPEX \$000	CY17	CY18	CY19
Services	2,235	2,271	2,200
Main Footage	103,800	108,000	108,600
Base Growth - Install Main	48,136	48,889	48,356
Base Growth - Install Services	23,106	22,279	22,165
Base Growth - Customer Contributions	(4,895)	(3,298)	(2,500)
Base Growth – Install Meter/Regulator	1,108	1,120	1,120

### Customer Benefits:

More than 2,200 gas heating conversions in New York City have positive economic and environmental benefits, including:

- 56 tons of local emissions reduced (NOx, SO2, VOC, NH3 and PM2.5)
- 56 tons of local emissions reduced (NOx, SO2, VOC, 30,106 tons of CO2 reduced
  9.8 million gallons of oil displaced (319,756 barrels)
  Same as taking 73,000 cars off the road
  \$13.6 million annual encry savings
  \$10.8 million annual GDP created
  \$7.2 million annual income created
  \$127 annual jobs created
  \$1.1 million state and local tax revenues

- Estimated per customer: \$5,597 annual energy savings 4,049 gallons of oil eliminated

  - \$4,467 individual GDP created
    Equivalent emissions reduction to removing 30 cars off the road

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## Alternatives

Alternative 1: Tariff Change to Increase Contributions in Aid of Construction (CIAC)

Propose amending the tariff section to require smaller customers to pay for necessary reinforcements to provide service. This alternative is rejected because it increases customer costs and will likely lead to reduced growth.

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# Program Title: Gas System Reinforcement Program - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

#### Brief Description:

The System Reinforcement Program consists of capital reinforcement projects required to maintain pressure above system minimums on the gas network during periods of peak demand, thereby maintaining continuous service to all gas customers within the territory. This program is a five year program covering the winter periods for 2017/18 through 2021/22.

#### Program Justification:

Federal Code 49 CFR 192.623 and New York State 16 NYCRR 255.623 require the Company to maintain minimum pressures on the gas system necessary to maintain reliable service to all firm customers. The System Reinforcement Program identifies projects required to maintain service under peak day, peak hour conditions. KEDNY's gas system is designed for a peak day with an average temperature equal to 0°F (65HDD – Heating Degree Days) with 5 percent of the daily send-out as a peak hour. The peak demand is based on the same forecast utilized to develop the gas supply portfolio, and the System Reinforcement program is a critical component for enabling that gas supply to be delivered to firm customers.

Examples of distribution system reinforcement projects include, but are not limited to, the following:

- Replacing existing undersized mains with larger diameter mains. Leak-prone pipe is targeted whenever practical.
- · Looping or connecting system endpoints by installing new main
- Installing new district regulators as well as replacing and/or rebuilding existing undersized district regulators.
- Transferring existing customers supplied from low-pressure mains to adjacent highpressure mains (*i.e.*, load shedding).

Total Project Cost Breakdown:

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	65,752	66,440	62,239

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#### Customer Benefit:

By installing these reinforcements, the Company is ensuring that service is maintained to all firm gas customers on the system. Without the reinforcement program, as many as 264,805 customers are at risk of experiencing pressures below minimum design pressures and, therefore, at risk of losing service. The estimated cost to relight these customers is \$264.8M (approximately \$1,000 per customer based on previous experiences). A secondary benefit of the program is the elimination of leak-prone pipe wherever practicable. For example, the program represents a replacement rate of about 42%, approximately 20,350 feet (3.9 miles), of leak-prone pipe in the first year of the plan.

Alternatives

### Alternative 1: Do Nothing

This alternative is rejected because 264,805 customers are predicted to experience pressures below minimum design levels and be at risk of losing service if design conditions were to be experienced during the five year heating season term under the current Gas Supply send-out forecast.

### Studies/References That Support the Program:

Studies were run on the Company's network models using Synergi software, which is industry standard software used by nearly all of the LDC gas companies. The models, which are validated on an annual basis, were loaded with the forecast provided by National Grid's Analytics, Modeling, and Forecasting (AMF) department. Additionally, AMF provided a forecast at a zip code level. There is a high degree of confidence in the accuracy of the modeling and forecast and that the appropriate reinforcement projects were identified.

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Program Title: Public Works Program (City/State Construction) - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

## Brief Description:

The City/State Construction Program for KEDNY (CSC) consists of work driven predominantly by the NYC Department of Design and Construction (NYCDDC) and NYC Department of Transportation (NYCDOT), as well as various private entities in the Boroughs of Queens, Brooklyn and Staten Island. The CSC program is directed at replacing infrastructure that will be compromised by third party construction activities.

Major categories of work include

- Planned Municipal ProjectsWhen & Where Water Projects
- Emergency Sewer Projects Complex Curb Projects
- Encroachments
- Support & Protection of Facilities

The 2017 CSC program includes approximately 211,200 linear feet (40 miles) of main installation to accommodate municipal capital infrastructure improvements. The program will contribute approximately 132,000 linear feet (25 miles) of leak prone pipe (LPP) retirement to KEDNY's main replacement program in New York City. These mileage

and spending estimates are based on historical information and current schedule of municipal work.

# Program Justification

National Grid facilities are often in direct conflict with proposed municipal infrastructure or are required to be relocated based on regulatory and code requirements.

The CSC program is subdivided into three components: Reimbursable, Non Reimbursable and Reimbursements. Projects are categorized into these buckets based on the project funding source. Capital projects initiated by the NYCDDC on behalf of the NYC Department of Environmental Protection (NYCDEP) are reimbursable and subject agreement) As per the NYC Gas Facility Cost Allocation Act (Gas Cost Sharing agreement). As per the NYC Gas Facility Cost Allocation Act (Gas Cost Sharing agreement) relocation costs incurred by National Grid on this project are eligible for

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reimbursement by the City of New York, on an age of main basis (depreciated book value). Conversely, projects funded by the NYSDOT, NYCDOT and private entities are not eligible for reimbursement.

The Encroachment category ensures the protection and/or replacement of cast iron piping eight inches in diameter or less, which may become exposed and undermined or otherwise be subjected to undue stresses because of its proximity to third-party excavations. Third Party Construction is defined as work performed by sewer, water, electric utility or any agency other than National Grid or its contractors.

The Support and Protection work supports utility facilities during the performance of City of New York sponsored contracts. Examples include the support and protection of utility facilities during trench crossings, installation and removal of catch basins and catch basin chute connection pipes, special care for excavation and backfilling, etc.

As part of New York City's implementation of NYS Assembly Bill A10021B - Joint Bidding on contracts for Public Works projects, National Grid will be responsible for a portion of the "Shared Costs" of work performed by the City contractors. Examples of shared costs include: the maintenance of the construction site, field office, transportation, contract management and mobilization.

National Grid's Government Liaisons work closely with NYC Department of Design and Construction Engineers and consultants to minimize any direct conflicts to the existing gas infrastructure located in the boroughs of Queens, Brooklyn and Staten Island. This work reduces Support and Protect (O&M) costs, maximizes remuneration, and reduces risk exposure to the Company.

Total Project Cost Breakdown:

CAPEX \$000	CY 2017	CY 2018	CY 2019
CSC/Public Works - Non Reimbursable	112,528	115,985	118,305
CSC/Public Works - Reimbursable	84,488	86,985	88,724
CSC/Public Works Reimbursements	(16,117)	(17,158)	(17,158)

Customer Benefit:

Minimal customer impact is expected during the construction of these projects; they are intended to ensure continuous service to customers.

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Customers will benefit from the program in the following ways:

- CSC will contribute approximately 132,000 linear feet (25.0) miles of LPP retirement to KEDNY's main replacement program in New York City.
- Synergistic opportunities are realized through integration with other Operational
  Program work including, but not limited to: Main & Service Replacement,
  Customer Driven Construction, Reliability, and Long Term Planning

Alternatives:

None

Studies/References That Support the Program:

The program is supported by KEDNY's legal obligations under New York State code (including 16 NYCRR Part 255.755, Part 255.756, and Part 255.757), New York law (including NYS General Obligations Law Section 11-102 and Part 131 of NYSDOT Rules & Regulations, NYCRR Title 17 - Accommodation of Utilities within State Highway Right-of-Way) and the New York City Gas Facility Cost Allocation Act (Gas Cost Sharing agreement) which require replacement and/or support and protection of gas facilities during third-party construction.

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#### Program Title: LaGuardia Airport Redevelopment - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

#### Brief Description:

The Port Authority of New York and New Jersey is undertaking an extensive capital redevelopment program at the LaGuardia Airport. The \$4 billion program is expected to include the demolition of the existing Central Terminal Building and the construction of a new 1.3 million square foot, 35 gate terminal building; a new aeronautical ramp; frontage roads that will serve the new terminal; a new central heating and refrigeration plant; and other utilities and site improvements. These project elements will be constructed, operated, maintained and partially financed by a private developer (PPP), LaGuardia Gateway Partners. In addition, the PPP will design and construct new airport roadway systems, utilities in the Central Terminal Area, and the West Parking Garage.

The Port Authority will also undertake certain supporting projects that have independent utility and will support airlines and passengers across the entire airport including the construction of utilities; the demolition of Hangars 2 and 4; the construction of the new East Parking Garage; and the installation of runway safety enhancements.

As a result of this redevelopment effort, KEDNY is required to relocate its existing Gate and Governor Stations (with their associated infrastructure) currently residing on airport property to a new location within the airport, as well as installing a new 60 psig gas distribution system within the airport to feed the existing/new structures. This work must be performed in conjunction with the PPP's activities, while maintaining the existing gas system to support ongoing airport operations.

KEDNY has entered into a Memorandum of Understanding (MOU) with the Port Authority for this work. KEDNY will be responsible for the cost of the design and construction of the new Gate Station with its associated infrastructure and the demolition of the existing Gate & Governor Station, once the new station is operational. The Port Authority will provide gas qualified resources through the PPP for the installation of the gas distribution system within the airport. The Port Authority will also directly reimburse KEDNY for the cost of procuring the gas material associated with the gas distribution system.

At a summary level KEDNY's responsibilities include the following:

- the design and construction of a new Gate Station with heater on airport property which will operate at 350-60 psig
- retire the existing Gate Station and Governor 161X and associated piping

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- install ~ 500 ft. of 12" 350 psig transmission rated steel gas main. install ~ 4,000 ft. of 12" 60 psig distribution rated steel gas main
- perform ~800 ft HDD of 24" 60 psig distribution rated steel gas main beneath Grand Central Parkway .
- furnish and install all service regulators and meters required for the reconnection to the existing or connection to new service facilities on the airport
- maintain the existing gas system to LaGuardia to support ongoing operations while the new facilities are being built •

At a summary level the Port Authority's responsibilities include the following:

- in conjunction with their PPP provide qualified gas resources to install distribution gas trunk main, branch lines and service lines on the airport property provide reimbursement in an amount not to exceed \$1,012,000 for the cost of materials for the gas distribution trunk main, branch lines and service lines which will be provided by KEDNY.

# Program Justification

Existing KEDNY facilities are in direct interference with the approved Port Authority Redevelopment Program at the LaGuardia Airport and are required to be relocated based on regulatory and code requirements.

#### Total Project Cost Breakdown:

\$000	CY 2017	CY 2018	CY 2019
CAPEX	4,573	20,210	3,595

# Customer Benefit:

KEDNY is working closely with the Port Authority of New York and New Jersey and its PPP to support this major redevelopment effort. KEDNY is required to keep the existing gas system operational in the Airport to support ongoing operations while the redevelopment effort is undertaken.

### Alternatives:

None

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Studies/References That Support the Program:

June 2, 2014 Agreement between the Port Authority of New York and New Jersey and the Brooklyn Union Gas Company – Installation of gas facilities at LaGuardia Airport.

The program is supported by KEDNY's legal obligations under New York State codes (including 16 NYCRR Part 255.755, Part 255.756, and Part 255.757), New York law (including NYS General Obligations Law Section 11-102 and Part 131 of NYSDOT Rules & Regulations, NYCRR Title 17 - Accommodation of Utilities within State Highway Right-of-Way) and the New York City Gas Facility Cost Allocation Act (Gas Cost Sharing agreement) which require replacement and/or support and protection of gas facilities during third-party construction.

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Program Title: Service Replacement (Proactive Bare Steel HP Inside) - KEDNY

Spending Rationale:	$\boxtimes$	Mandated		Growth
	~ *		_	

Reliability Non-Infrastructure

Brief Description:

KEDNY is proposing a replacement program for its inventory of high pressure, unprotected (bare) steel services with meters/regulators located inside the building. The program prioritizes replacement of high risk segments.

#### Program Justification:

Following an engineering assessment of National Grid's steel gas service assets in 2007, a determination was made to replace all high pressure, unprotected steel services with meters/regulators located inside buildings. The engineering assessment included both detailed asset inventory analyses (*i.e.*, age, material, inside vs. outside), as well as pressure testing on services throughout the enterprise. Although test results varied throughout the enterprise, test program results indicate the "wall piece" is of integrity concern. A total of 512 services were pressure tested in KEDNY's service territory with a failure rate of 0.40%.

The purpose of the service replacement program is to mitigate the risk of failure of the "wall piece," which is the section of service piping that penetrates through the foundation wall of the building. Because this section of pipe is embedded in the foundation wall (or in a sleeve in the foundation wall), it cannot be visually inspected, and there is the potential for undetected corrosion of the steel pipe to take place. In 2012, 166 services were tested and replaced through the service replacement program. As there were no failures, the Company achieved a 99% confidence level that there are no attributes that can be correlated with service failures. As a result, the program focus has shifted from testing to proactively replacing the remaining candidates at the current replacement rate. The current inventory level for these high pressure bare steel services is approximately 8,100. KEDNY is proposing to replace 250 services a year.

The accelerated replacement of high pressure bare steel services with meters/regulators located inside the building is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the Company: (i) know its distribution piping system, (ii) understand the threats to the system, and (iii) evaluate the risks and prepare replacement programs for its leak prone mains and services inventory to help mitigate those risks.

Leak predictive models show that replacement levels below a certain threshold will cause leak rates to increase exponentially. Replacement levels below this amount will cause leaks to increase to a point where it will not be feasible to timely react to the quantity of

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new leaks. The model shows that there is a practical limit to how many leaks a system can have and continue to operate safely.

Following are the key benefits of an accelerated replacement program high pressure, bare steel services with meters/regulators located inside the building:

- · Improved public safety by reducing the risk for gas related incidents
- Improved public safety by reducing the risk tor gas related incidents
   Improved system reliability and customer satisfaction
   Compliance with federal and state code requirements including new US
   Department of Transportation (USDOT) Distribution Integrity Management
   Program requirements (DIMP)
   Increased efficiency resulting from reduced commodity loss
   Reduction of methane emission which help reduce greenhouse gases

Total Project Cost Breakdown:

	CIII
CAPEX 1,696 1,700	1,700

Customer Benefit:

Minimal customer impact is expected during the construction of these projects. Customers can benefit from the program in the following ways:

- Improved public safety due to reduced risk of gas incidents;
  Fewer unplanned service interruptions; and
- · Fewer unplanned disruptions to traffic and roadways.

## Alternatives

Alternative 1: Minimal Replacement

This option would increase the risk of an incident associated with the bare steel, high pressure services with inside meter/regulators.

Studies/References that Support the Program:

This program is in accordance with the Company's recently developed DIMP; complies with Federal Code 49 CFR 192.1005, 1007, 1009, 1011 and 1013.

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Program Title: Main and Service Replacement (Proactive/Leak Prone Pipe) - KEDNY

Spending Rationale:	Mandated	Growth
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Reliability Non-Infrastructure

Brief Description:

KEDNY considers leak prone pipe ("LPP") as including all 12 inch and smaller pipe that is (i) unprotected (*i.e.*, non-cathodically protected) steel pipe (whether bare or coated), (ii) cast and wrought iron pipe, and (iii) unprotected steel/wrought iron and copper services ("associated services").

KEDNY's existing rate plan (Case 12-G-0544 - In the Matter of the Commission's Examination of The Brooklyn Union Gas Company db/a National Grid NY's Earnings Computation Provisions and Other Continuing Elements of the Applicable Rate Plan, "Order Adopting Terms of a Joint Proposal" (Issued June 13, 2013) requires the Company to replace at 40 miles/year (including at least 10 miles per year outside of City/State Construction-driven work). In 2015, the Commission directed KEDNY to replace 40 miles of leak prone pipe in 2015 and 47 miles of leak prone pipe in 2016. Failure to meet rate plan targets will result in penalties.

For the reasons described below, the Company is recommending a proactive base LPP replacement target of 50 miles in CY2017. In addition, the Company is recommending an incentive target of 5 additional miles in CY2018, increasing by 5 miles per years thereafter. Accelerating replacement to the incentive target level will eliminate all LPP on KEDNY's system in 20 years.

Calendar Year	2017	2018	2019	2020
Base Target	50	50	50	50
Incentive Target	0	5	10	15
Total Miles	50	55	60	65

The current inventory of LPP of 12 inch and smaller pipe is 1,780 miles (308 miles of unprotected steel and 1,472 miles of cast iron/wrought iron), which represents approximately 41 percent of the distribution system in KEDNY's territory. The current leak repair rate for all distribution piping on the KEDNY system is 0.75 leaks per mile excluding excavations, decreased from 0.84 leaks per mile in 2005. The current leak repair rate for LPP is 1.57 leaks per mile (trending down since 2005); however, the leak rate increased significantly during 2014 and early 2015 due to exceptionally cold weather in Northeast. The impact of CPP is warranted.

The accelerated replacement of LPP is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the

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Company: (i) know its distribution piping system, (ii) understand the threats to the system, and (iii) evaluate the risks and prepare replacement programs for its leak prone mains and services inventory to help mitigate those risks.

Leak predictive models show that main replacement levels below a certain threshold will cause leak rates to increase exponentially. Replacement levels below this amount will cause leaks to increase to a point where it will not be feasible to timely react to the quantity of new leaks. The model shows that there is a practical limit to how many leaks a system can have and continue to operate safely.

#### Program Justification:

LPP is only 41 percent of the KEDNY distribution main inventory, yet LPP accounts for 95 percent of leak repairs (excluding damages). Accelerated replacement of this pipe will improve safety, reliability, and customer satisfaction. The key benefits of an accelerated replacement program for LPP include:

- Improved public safety by reducing the risk for gas related incidents
   Improved system reliability and customer satisfaction
   Compliance with federal and state code requirements, including new US Department of Transportation's DIMP requirements
   Increased efficiency resulting from reduced commodity loss
   Reduction of methane emissions help reduce greenhouse gases

### Total Project Cost Breakdown:

Base Target – 50 miles/year				
\$000	CY17	CY18	CY19	
CAPEX	77,375	87,189	88,933	

<u>Note</u>: The Company is proposing a surcharge to recover the costs incurred replace LPP miles above the base target.

## Customer Benefit:

Minimal customer impact is expected during the construction of these projects. Customers can benefit from the program in the following ways:

- · Improved public safety due to reduced risk of gas incidents
- Fewer unplanned service interruptions
  Fewer unplanned disruptions to traffic and roadways

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## Alternatives

### Alternative 1: Minimal Replacement

This option would replace only the quantity of main required to hold leak rates to present levels. This option increases safety risks and does not align with the Company's or the Commission's goals. This option also will have negative financial consequences for failure to meet LPP replacement targets in the existing rate agreement.

#### Alternative 2: Do Nothing

No main replacement will result in increasing leak activity and increased risk to public safety. This will also result in a negative financial incentive (current rate agreement) and loss of credibility with regulators and also put the Company in violation of its federallyregulated DIMP.

Studies/References that Support the Program:

This program is supported by the Company's recently developed DIMP, and complies with the requirement in Federal Code 49 CFR, 192.1005, 1007, 1009, 1011 and 1013. Accelerating the rate of LPP replacement is also consistent with the NYPSC's stated goal of of reducing the statewide LPP average replacement timeline to 20 years (Case 15-G-0151).

Recent gas related incidents in the industry have emphasized the urgency of eliminating the aging infrastructure at faster pace. Annual System Integrity Analysis, which reviews last 10 years of system trends, clearly demonstrates the benefits of leak reduction due to accelerated LPP main replacements.

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## Program Title: Cross Bore Remediation - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

Brief Description:

KEDNY is proposing a cross bore investigation and remediation program. A "cross bore" is an unintended consequence of horizontal directional drilling (HDD) technology where a plastic gas main goes through a sewer lateral that is not positively identified (marked) during the installation process. This program will address all previous HDD installations to ascertain if a cross bore incident has occurred, and if so, take proactive steps to remediate the situation. The Company updated its HDD procedures in 2014 to address and eliminate possible cross bores.

#### Program Justification:

The remediation program will address a potential hazardous situation that exists as a result of cross bore situations. In these cases, the sewer line may become blocked. If a mechanical clearing tool is used to remove the blockage, it may lead to damaging the gas line, causing the gas to migrate into the building. Over the last years, several incidents have occurred in the industry. Many utilities have initiated programs to address this substantial risk. PHMSA has taken a step further and declared the necessity for operators to review and assess the risk that cross bore poses on their system as a part of their Distribution Integrity Management Plan (DIMP), and depending on the risk evaluation, to identify and implement measures to reduce the risk.

The Company will investigate and identify all previous HDD installations using CCTV technology to inspect sewer laterals that could have been compromised during the service installation process, and remediate any possible damage to sewer lateral. KEDNY has an estimated population of 3,500 sewer laterals requiring inspection.

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	477	510	510

### Customer Benefit:

Minimal customer impact is expected during the operation of this project. This program will enhance public safety due to the reduced risk of gas incidents.

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## Alternatives

Alternative 1: Inspect only when requested by customer

This option could miss potential situation where customer is not fully aware of the possibility of a cross bore.

Alternative 2: Do Nothing

This option is not consistent with the Company's DIMP requirements.

Studies/References that Support the Program:

This program is in accordance with the Company's recently developed DIMP; complies with Federal Code 49 CFR, 192.1005, 1007, 1009, 1011 and 1013.

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Program Title: Damage Inspection - Latent Damage & Plastic Fusions - KEDNY

Spending Rationale: Mandated

Growth

Reliability Non-Infrastructure

## Brief Description:

The Damage Inspection Program provides for latent damage and inspection of plastic fusions pursuant to:

- New York State PSC order Case 11-G-0565 dated February 20<sup>th</sup> 2014, which required all New York State natural gas local distribution companies (LDC's) to conduct risk assessments of their distribution network.
- New York State PSC order Case 14-G-0212 dated May 15<sup>th</sup> 2015, which required all New York State natural gas local distribution companies (LDC's) to keep records of each fuse uncovered in the regular course of business and shall remediate any fuse that fails visual inspection.

The proposed program is to proactively inspect all third party excavations in the operating region that occur in close proximity to gas facilities and to inspect uncovered plastic fuses during regular course of business. This will ensure appropriate procedures are followed and faster emergency response, if required. Improved public awareness through mass media, social media as well as awareness among municipalities will significantly reduce latent damages. If any latent damage or failed plastic fuse on the gas infrastructure is observed, its proactive replacement will significantly enhance public safety.

#### Program Justification:

KEDNY has approximately 569,000 services and more than 4,100 miles of main including 1,083 miles of plastic mains. Much of this gas infrastructure intersects with other municipal infrastructure is also being replaced at an accelerated pace. Replacement of these infrastructures will increase the risk of latent damage to gas facilities. On an average, the Company receives 119,510 gas related tickets and 216 damages per year. The need of all third party excavations and uncovered plastic fuse inspections as well as improved public awareness programs will improve the integrity of gas facilities and hence enhance the public safety.

KEDNY has conducted a thorough risk assessment of its gas facilities to evaluate a potential risk of latent damage where municipal infrastructure is installed subsequent to gas facilities within its operating region. Furthermore, The Company has randomly selected potential locations for field verification of latent damages. Although, this risk assessment did not reveal any widespread latent damage to the system, The Company intends to proactively inspect all third party excavations including but not limited to water, sewer, drainage, electric and cable infrastructure projects, street reconstruction and road realignment projects, and bridge replacement projects near the vicinity of its gas facilities. In addition, the Company will ramp up public awareness

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programs regarding third party excavations and will incorporate changes to the Leak Management Systems (LMS) to capture leaks caused by latent damages.

KEDNY has also initiated a program to record exposed plastic fuses and remediate any damage to plastic fuses which might pose an integrity issue. These gas facilities will be replaced.

Following are the key benefits of inspecting third party excavation near gas facilities and uncovered plastic fuses:

- · Improved public safety by reducing the risk for gas related incidents
- Improved system reliability and customer satisfaction Compliance with federal and state code requirements including new US Department of Transportation (USDOT) Distribution Integrity Management Program requirements (DIMP)
- Increased efficiency resulting from reduced commodity loss Reduce natural gas emissions

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	700	812	828

Customer Benefit:

Minimal customer impact is expected during the inspection of third party excavations. Customers can benefit from the program in the following ways:

- Improved public safety que to reactionFewer unplanned service interruptions Improved public safety due to reduced risk of gas incidents

Alternatives

None

Studies/References that Support the Program:

Risk assessment conducted by Keyspan East Corp., d/b/a National Grid regarding latent damage, which included statistically significant sample excavations at randomly selected and geographically spread locations across the operating territory as recommended by Gas Technology Institute.

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Program Title: CISBOT & Lining of Large Diameter Mains - KEDNY

Spending Rationale: Mandated Growth	Spending Rationale:	Mandated	Growth
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Reliability Non-Infrastructure

Brief Description:

KEDNY utilizes several different types of main: cast iron, steel and, more recently, plastic. Cast iron mains were constructed with bell and spigot joints and over time, leaks have begun to develop at these connections, whereas steel mains typically develop leaks due to corrosion.

While there are cost effective methods of repairing and reducing the leaks on small diameter mains, leak repairs on large diameter pipes 12 inch and larger typically cost more due to the location and the depth of the excavations required to access the pipe joints. KEDNV is proposing to continue two programs that leverage new technology to cost effectively address large diameter pipe leaks.

The first program involves the use of a robotic internal sealing method known as CISBOT (Cast Iron Sealing Robot) for cast iron mains 16 inches to 42 inches. Unlike other methods of joint repair, CISBOT allows KEDNY to seal more than 80 joints from one excavation without shutting down the main. KEDNY is proposing to use CISBOT to address approximately two miles of large diameter cast iron per year beginning in CY17.

KEDNY is also proposing to recondition large diameter cast iron and unprotected steel mains with cured in place lining, which can extend the life of the main for more than 50 years. This proven technology has been successfully used by the Company for several years. In congested metropolitan areas, where it is almost impossible to find another lane in the roadway to install new large diameter main, installation of the lining is the most cost effective way to recondition the existing mains, reduce costs and minimize disruptions to the public. KEDNY is proposing to line 2.5 miles in CY17 and four miles in CY18 and 19.

# Program Justification:

The current leak repair rate of large diameter distribution piping on the KEDNY system is 3.8 leaks per mile (excluding damages), increasing from 1.6 leaks per mile in 2010. Leaks have increased significantly due to exceptionally cold weather during 2014 and early 2015 in the northeast US. The impact of cold weather on the system, and resultant leak rates, suggests that an accelerated response to large diameter pipe is warranted. However, the current LPP replacement program only addresses mains up to 12 inches.

This response to leak prone large diameter pipe is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the Company should: (i) know its distribution piping system, (ii) understand the threats to

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the system, and (iii) evaluate the risks and prepare replacement programs for its leak prone mains and services inventory to help mitigate those risks.

Most of the leaks on large diameter pipe are due to Cast Iron joint failures that can be addressed by CISBOT, but long term integrity of the pipe will be achieved by lining. KEDNY has more than 120 miles of large diameter cast iron and unprotected steel main. Installation of the lining is the most cost effective way to recondition the existing mains, reduce costs and minimize disruptions to the public.

Following are the key benefits of CISBOT and Lining programs:

- More cost-effective than replacing the large diameter pipe
  Improved public safety by reducing the risk for gas related incidents

- Improved public safety by reducing the fast on gas related incutents
   Improved system reliability and customer satisfaction
   Compliance with federal and state code requirements including new US Department of Transportation (USDOT) Distribution Integrity Management Program requirements [OIMP]
   Increased efficiency resulting from reduced commodity loss
- Ability to focus more attention on retiring small diameter main segments with higher risk profiles
  Reduction in Methane emission

## Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	14,340	19,282	19,682

### Customer Benefit:

Minimal customer impact is expected during the construction of these projects. Customers can benefit from the program in the following ways:

- · Improved public safety due to reduced risk of gas incidents;
- Fewer unplanned service interruptions; and
  Fewer unplanned disruptions to traffic and roadways.

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#### Alternatives

Alternative 1: Minimal reconditioning of pipe and cast iron joint sealing

This option would treat only the quantity of main required enabling the company to hold leak rates to present levels. This option will have negative financial consequences as it would require the more traditional repair methods to be used on the large diameter mains which are typically very expensive.

### Alternative 2: Do Nothing

No proactive repair method would result in increasing leak activity and increased risk to public safety. This will also result in a negative financial incentive and loss of credibility with regulators and also put the Company in violation of its federally-regulated DIMP.

Studies/References that Support the Program:

This program is in accordance with the Company's recently developed DIMP; complies with Federal Code 49 CFR, 192.1005, 1007, 1009, 1011 and 1013.

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Program Title: Gas Corrosion Control Inspection and Remediation - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

#### Brief Description:

Corrosion can lead to failures in plant infrastructure and equipment, which are costly to repair and adversely impact system reliability. Decisions regarding the future integrity of an asset or its components depend entirely upon an accurate assessment of the conditions affecting its corrosion and rate of deterioration. The Corrosion group performs field testing, monitoring, upgrades and repairs to existing corrosion control systems in accordance with federal and state code requirements (Federal CFR Title 49 – Transportation (Subpart D - Pipeline Safety Part 192) and 16 NYCRR Part 255 (Transmission and Distribution of Gas)), as well as industry standards. This includes periodic testing, inspection, monitoring and diagnostic troubleshooting of existing corrosion control systems. The Corrosion group also provides engineering standards as well as the design and development of new cathodic protection system and upgrades to existing cathodic protection systems.

There are two components to corrosion mitigation for buried piping:

- Protective Coating/Barrier installed and tested at the mill or in the field and provides a
  protective barrier from the elements and the naturally occurring corrosion process.
- <u>Cathodic Protection</u> installation of cathodic protection system and acceptance testing of buried piping, which is typically performed during the installation of the piping or shortly thereafter. There are two types of cathodic protection systems:
  - Galvanic provide direct current (DC) onto the pipe through the use of sacrificial anodes (typically 17 lbs. of magnesium) that corrode away. Thus they sacrifice themselves to corrosion to protect the pipe from corrosion.
  - Rectifier takes alternating current (AC) and changes it to DC while utilizing specialized anodes (due to the higher current demands of the piping system).

All cathodic protection systems require the following:

- Proper protective coatings
- Isolation from other metallic structures
- Test boxes with anodes & lead wires

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· Periodic inspection and testing

· Periodic upgrades (remediation measures) to provide for extended life of the asset

Program Justification:

The work in the corrosion control programs is mandated by federal and state regulations.

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	857	881	898

The work in this area is either expense (OpEx) or capital depending on the activity being performed. Typically, testing and monitoring are operating expenses to maintain the asset. Capital work is normally remediation, which substantially extends the life of the asset.

<u>OpEx Work</u>: periodic testing, inspection, monitoring and diagnostic troubleshooting of existing corrosion control system in accordance with state & federal codes.

<u>CapEx Work</u>: asset improvements to the pipeline to enhance and remediate the existing cathodic protection system in accordance with state and federal codes and extend the life of the asset.

KEDNY is projecting a modest increase in spending for KEDNY program for CY 2017-2019. The capital work in NYC to date has been limited to exposed gas mains that require remediation work. That work would include hanger bracket or roller modifications, re-coating or replacement of the piping. The work is typically performed in September and October to minimize interference with local summer traffic congestion. The increase in spending is to support additional improvements to the cathodic protection system as described above.

### Customer Benefit:

Minimal customer impact is expected during the performance of these corrosion control programs and construction of these projects. Customers can benefit from the program in the following ways:

- · Improved public safety due to reduced risk of gas incidents;
- Fewer unplanned service interruptions; and
  Fewer unplanned disruptions to traffic on roads.

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Alternatives

None

Studies/References that Support the Program:

This program is in accordance with the Company's standards and complies with Federal CFR Title 49- Transportation, Subpart D Pipeline Safety Part 192 and 16 NYCRR Part 255 Transmission and Distribution of Gas.

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# Program Title: Plastic Fusions - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

### Brief Description:

In May 2015, KEDNY and all gas local distribution companies (LDCs) in New York State were ordered by the New York State Public Service Commission to "begin keeping records in an auditable database that can be tied into and correlates with the location of plastic fusions so that the exact locations of fuses can be determined using either a GPS system or a comparably specific system of identifying and recording the location of plastic fusions" by January 1, 2016.

KEDNY is developing a process for capturing, recording and reporting on geospatial and specific asset information (*i.e.*, size, type) for plastic fusions. Contractor unit pricing for installation of plastic facilities is anticipated to increase 2 percent due to:

- Increased crew time spent on second qualified person to visually inspect fuse;
   Increased time for fuser to enter data into the mobile device that is required;
- Back office QA/QC of data.

### Program Justification:

KEDNY gas operations personnel and contractors will capture information on plastic fusion joints in the field, using GPS-enabled mobile devices within the "Plastic Fusion Joint-Data Collector" application.

This program enables National Grid gas field employees and contractors to collect the locations of plastic fuses, record the employees performing and inspecting the fusion, and asset information (*i.e.*, size, type). Geospatial information provides the ability to return to those locations at a later point in time and perform inspections, as necessary. In addition, this asset information will be utilized to enhance the Distribution Integrity Management Program (DIMP) managed within Network Strategy.

Total Project Cost Breakdown

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	2,103	2,355	2,582

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Customer Benefit:

The program seeks to further reduce the risk of operating the gas distribution system which will improve public safety and the reliability of the gas delivery system.

# Alternatives

Alternative 1: Capture Fusion Information on Paper

All data is captured on paper, which will then be entered into an electronic database by back office personnel.

During peak construction season, KEDNY and its contractors perform nearly 500 fuses per day. Capturing all required information on paper to be entered at a later date by back office staff is not practical and increases the likelihood of missed or inaccurately entered data. Risks include:

- Increased risk of human errors when capturing the data or entry into the database;
- Risk of fuses not being in the database due to loss of paperwork;
- Increased crew time to capture measurements off of acceptable landmarks for fuse location.

<u>Cost</u>: \$3,055,000 - 4,030,000

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Program Title: Integrity Management Program – KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

# Brief Description:

This program covers projects related to the management of KEDNY's gas transmission system, specifically the O&M and capital projects that are components of the US Department of Transportation's (DOT) mandated Integrity Management Program (IMP). The Pipeline Safety Improvement Act of 2002 requires operators of DOT-reportable gas transmission systems to develop and implement an IMP program for all pipelines operating above 20 percent SYMS in a high consequence area. The renewed Pipeline Safety Act of 2011 mandates that Pipeline and Hazardous Material Safety Administration (PHMSA) consider whether the existing transmission IMP should be expanded beyond the current requirements, including increased inspections of IMP-covered pipelines using in-line inspection technology.

KEDNY's improved IMP incorporates the elements of the current IMP program along with proactive programs such as retrofitting for IL1 including free swimming, robotic and tethered tools. The proposed IMP enhancements provide the greatest amount of risk reduction, thereby improving system safety and reliability. Additionally, it is anticipated that the company will be in compliance with future regulatory requirements.

## Program Justification:

The Pipeline Safety Improvement Act of 2002 was signed into law in December 2002. Among several important requirements, the 2002 Act directed the DOT to issue rules on managing the integrity of transmission pipelines used by the gas and hazardous liquids industries. The rules affecting the gas industry are included in CFR Title 49, Part 192.901-192.951, and became effective on January 14, 2004. These regulations require pipeline operators to develop and implement an IMP for "covered" transmission pipelines, which are defined as certain pipelines in High Consequence Areas (HCA). The program required that the first cycle of pipeline assessments be completed no later than 2012. Reassessments are required to be completed at intervals not exceeding seven years thereafter from the last assessment. The assessments are comprised of External Direct Assessment (ECDA) and Inline Inspection (ILI). The results of each operator's program are summarized and reported to the DOT on an annual basis.

Pipeline safety laws and regulations constantly evolve driving progressive changes in utility operations and asset management. San Bruno and several other high profile pipeline incidents have set in motion recommendations, proposed rulemaking, and the Pipeline Safety, Regulatory Certainty and Job Creation Act of 2011 signed into law on

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January 3, 2012. The Pipeline Safety Act, and the regulations to follow, will create very significant compliance challenges for the gas LDCs.

The Act requires PHMSA to write code requirements that:

- Make all pipeline segments operating at or over 20% SYMS ILI enabled Make an pipeline segments operating at of over 20% STMS Lit enabled
   Consider requiring installation of RCVs/ASVs where economically, technically and operationally feasible
   Consider expansion of IMP beyond HCAs
   Develop requirements for medium consequence areas (MCA)
   Consider reduction of the IMP reassessment time cycle
   Reduce or eliminate the use of external direct assessment (ECDA)

Proposed rulemaking by PHMSA in response to the Pipeline Safety Act is expected in 2016.

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	16,877	11,818	4,226

Customer Benefit:

The program seeks to further reduce the risk of operating the gas transmission system which will improve public safety and the reliability of the gas delivery system.

# Alternatives:

#### Alternative 1: Maintain Current IMP

Proceed with the current IMP utilizing current inspection methods until such time as US DOT/PHMSA issues final rule making from the Pipeline Safety Act of 2011. Proceeding with the current IMP plan does not position the Company to improve on risk reduction or public safety. This approach fails to account for the likely impact of expected future rule making. Compliance with new code requirements will likely be required within a prescribed schedule. The established regulation time frame will likely require accelerated project and assessment schedules. Accordingly, there is a risk of not meeting new stablished deadlines, or spending on an accelerated basis which is not necessarily effective. The new proposed rule making also has provisions for large fines for non compliance and not meeting deadline requirements. compliance and not meeting deadline requirements

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Current vs Proposed Assessment Method Summary

Description	MAOP >125psig	DOT >20% SMYS	НСА
<b>Transmission Pipe</b> (Miles, Total)	86	69	69
Existing IMP			
ECDA	57 (6%)	57 (83%)	57 (83%)
ILI	12 (4%)	12 (17%)	12 (17%)
Sub Total	69	69	69
Proposed IMP			
ECDA	30 (35%)	30 (43%)	30 (43%)
ILI	39 (45%)	39 (57%)	39 (57%)
Sub Total	69	69	69

Studies/References That Support the Program:

Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 ("Pipeline Safety Act of 2011"), signed into law by the President on January 3, 2012 (Public Law. No. 112-90).

Pipeline Safety: Safety of Gas Transmission Pipelines; Advance Notice of Proposed Rulemaking, Federal Register, Vol. 76, No. 165 (August 25, 2011).

NTSB Safety Study: NTSB/SS-15/01 PB2015-102735 (Integrity Management of Gas Transmission Pipelines in High Consequence Areas – January 27,2015

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Program Title: Integrity Verification Program - KEDNY

Spending Rationale:	Mandated	Growth

Reliability Non-Infrastructure

## Brief Description:

This program covers projects related to the US Department of Transportation's (DOT) pending rules on Integrity Verification Process (IVP) programs. The renewed Pipeline Safety Act of 2011 mandates that PHMSA establish rules requiring operators to demonstrate their pipelines are "Fit For Service." This includes reviewing existing records to determine if prior strength tests (hydro static pressure tests) were completed at the time of construction, as well as other records that prove the pipeline is operating within design parameters. On January 10, 2011, the Pipeline and Hazardous Material Safety Administration (PHMSA) issued advisory bulletin ADB-11-01 directing operators to conduct a comprehensive records review and verification prior to issue of the final rule making.

KEDNY's IVP program incorporates the elements of the proposed IVP rule making and PHMSA guidance document ADB-11-01 along with proactive programs, records review, pipeline replacement and the retirement of non-essential pipeline segments. The proposed IVP provides the greatest amount of risk reduction, thereby improving system safety and reliability. Additionally, it is anticipated that the company will be in compliance with future regulatory requirements.

### Program Justification:

PHMSA is expected to issue a Notice of Proposed Rulemaking (NOPR) that will address the 2011 Pipeline Safety Act mandates, and implement a number of additional changes to the regulations for gas pipelines. Among the changes under consideration are the establishment of maximum allowable operating pressure (MAOP) and testing mandates for existing pipelines. PHMSA is considering eliminating the exemption clause for establishing the MAOP of pre-1970 "grandfathered" pipe, which allows certain pipelines to operate at the highest actual operating pressure to which they were subjected during the five years prior to July 1, 1970, without having to perform a pressure test. PHMSA is also considering whether all pipelines not previously pressure tested at or above 1.1 times MAOP should be required to be pressure tested in accordance with current regulations. Another initiative under consideration is PHMSA's IVP, which may require operators lacking certain records to conduct pressure tost confirm MAOP, and require operators lacking records, inadequately validated or traceable material documentation (TVC) to design and implement a program to establish material properties by one or more of the following methods: (1) cutting out and testing pipe samples; (2) institue non-destructive
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testing; (3) field verification of code stamp for components such as valves, flanges, and fabrications; or (4) other verifications

Some pipelines without adequate material and pressure test documentation may be required to be retired or replaced. The IVP may also require an operator to develop a "Fit for Service Program" to establish that all pipelines are operating within their design parameters. On January 10, 2011 PHMSA issued advisory bulletin ADB-11-01 directing operators to conduct a comprehensive records review and verification prior to issue of the final rule making.

The Act requires PHMSA to:

- Issue rules to eliminate grandfathering of non-hydrostatically tested pipe satisfying the following three criteria: (i) installed prior to 1970, (ii) having a maximum allowable operating pressure ("MAOP") >30% SMYS, and (iii) are located in HCAs. Such pipelines will now be subject to hydrostatic testing. The threshold of 30% Specified Minimum Yield Strength (SMYS) supports recent studies which have shown that pipe operating below the 30% level will fail as a leak as opposed to rupture.
   Require operators to confirm the records they use to justify MAOP (TVC)
   Re-Hydro test pipe segments
   Run Inline Inspection Tools (ILI)
   Abandon / retire pipelines
   Replace pipelines

- Run nmme m-p-ec...
   Abandon / retire pipelines
   Replace pipelines
   Material sampling to establish properties
   Advance fit for service analysis

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	1,829	2,000	2,000

Customer Benefit:

The program seeks to further reduce the risk of operating the gas transmission system, which will improve public safety and the reliability of the gas delivery system.

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## Alternatives

Alternative 1: Maintain Current IMP

Do not proceed with the IVP Program until such time as US DOT/PHMSA issues the final rule based on the Pipeline Safety Act of 2012. Proceeding with the current IVP plan does not position the Company to improve on risk reduction or public safety. This approach also fails to account for the likely impact of expected future rule making. Compliance with new code requirements will likely be required within a prescribed schedule. The established regulation time frame will likely require accelerated project and assessment schedules. Accordingly, there is a risk of not meeting new established deadlines, or spending on an accelerated basis which is not necessarily effective. The new proposed rulemaking also has provisions for large fines for non-compliance and not meeting deadline requirements.

Studies/References That Support the Program:

Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 ("Pipeline Safety Act of 2011"), signed into law by the President on January 3, 2012 (Public Law. No. 112-90).

Pipeline Safety: Safety of Gas Transmission Pipelines; Advance Notice of Proposed Rulemaking, Federal Register, Vol. 76, No. 165 (August 25, 2011).

PHMSA Advisory Bulletin (ADB-11-01) 1/10/11

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Program Title: New York City Local Law 30 - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

Brief Description:

Local Law 30 is part of the Building Code of the City of New York that requires every gas service line in the City to have a gas service valve or other outside emergency shut-off device installed.

All existing Tier 1 services (three family or greater, commercial, governmental and industrial) were installed prior to January 1, 2010. All one and two family services (Tier 2) must be completed by January 1, 2020. For years, the Company has primarily installed external service valves where it could leverage opportunities in coordination with other projects (*e.g.*, main or service replacements). In many years, the Company deferred Local Law 30 work to focus on projects that addressed more pressing operational needs. The Company now needs to aggressively and proactively install these service valves over the next four years to achieve compliance. Presently, KEDNY has 67,000 low pressure services in Brooklyn, Queens and Staten Island that do not have a gas service valve. The Company's capital plan includes a four-year program, commencing in CY 2016, that will install valves at all one and two family premises (Tier 2) by January 1, 2020.

#### Program Justification:

Local Law 30 stipulates "that an outside gas service line valve or other outside emergency shut-off device or method acceptable to the Building Department Commissioner and Fire Commissioner shall be installed for each gas service pipe allowing shut-off from outside the building." If buried, such valve, device or method shall be readily accessible from grade. Every existing service being replaced or refurbished shall also be provided with such valve, device or method, but in any event, all existing gas services shall be provided with such valve, device or method by January 1, 2010 (Tier 1) and January 1, 2020 (Tier 2)."

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	9,714	12,777	16,702

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## Customer Benefit:

Local Law 30 compliance will enable FDNY and National Grid employees to shut off gas supply to a premise, utilizing an external shut-off device, in an emergency or nonemergency situation.

## Alternatives

Alternative 1: Complete only in conjunction with other work.

Although leveraging of other work is a prudent course and is currently performed (where possible), the volume of Tier 2 locations addressed by this means only would not enable program completion by January 1 2020.

## Studies/References that Support the Program:

Reference: "Building Code of the City of New York, Building Code Reference Standards, Appendix to Title 27, Chapter 1, Reference Standard 16, P115.5 Outside Gas Cut-off."

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Program Title: Meter Purchases - KEDNY

 Spending Rationale:
 X Mandated
 X Growth

 Reliability
 Non-Infrastructure

Brief Description:

This program includes the purchase, testing, processing, and delivery of gas meters and associated instrumentation, including Mandated Meter Test/Replacement Program, growth targets, and continued Customer Meter Services (CMS) operations. This program does not include the installation of meters (see Meter Change program).

Each year, National Grid is required to randomly select and remove from service a quantity of meters to be tested for accuracy. The number of meters removed and tested is sufficient to assure a statistical confidence level of 95 percent. Test results are entered into a program that performs the statistical calculations based on an approved American National Standards Institute (ANSI) Standard. The NY Public Service Commission has set accuracy limits for both residential and commercial meter types. Meter groups that fall beyond the specified limits are placed in a retirement program and are subsequently removed from service and retired.

Program Justification:

The primary driver for meter and metering instrumentation purchases is compliance with state regulations governing meter accuracy and measurement of gas usage for customer bills. PSC requirements stipulate a random sample and associated remediation/retirement program for installed gas meters.

In addition to the mandated meter change program, meters are required to support growth targets, as well as to support CMS operational requirements (load change, meter and/or service relocations, damage, & stopped meters).

Total Project Cost Breakdown:

CAPEX \$000	CY17	CY18	CY19
Purchase Meters (Growth)	2,027	2,138	2,244
Purchase Meters (Replacements)	3,719	3,923	4,119

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# Customer Benefit:

- Metering and billing accuracy
- Fewer unplanned service interruptions
- Ensure meters meet safety standards

# Alternatives:

Alternative 1: Partial Deferral of meter replacements

This option is not viable as it would result in a partial violation of regulatory requirements, or result in our inability to support fiscal year growth targets

# Alternative 2: Do nothing

This option is not viable as it would violate regulatory requirements, adversely impact customer satisfaction, and result in our inability to support fiscal year growth targets

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## Program Title: Gas Meter Change Program - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

### Brief Description:

KEDNY'S Gas Meter Change Program involves the replacement of gas meters that are retired from service or abandoned based on the result of periodic testing requirements established by the New York Public Service Commission.

## Program Justification:

New York requires random sampling of gas meter performance on an annual basis. Meters are segregated into classifications based on manufacturer/model, and the number of meters to be tested within each of these classifications is determined by the population size. New York code requires remediation of meters that do not meet the required level of accuracy. The Company is typically allowed eight years to remove and replace a "failed" meter population. The Commission has the discretion, however, to require utilities to remove the population at a faster rate. In addition, New York code allows for the retirement of meter groupings. KEDNY currently has meters in each of the meter change program types (random, remediation, and retirement). The quantity of meters changed annually is based on the prior year's performance and remediation program status.

In addition to the mandated programs, the Company also initiates requests to change meters based on performance. These meters are known as "change for cause" meters

## Total Project Cost Breakdown:

\$M	CY17	CY18	CY19
CAPEX	1,785	1,847	1,884

Customer Benefit:

Testing and replacing meters supports accurate meter reading and customer billing.

# Alternatives

None

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Program Title: Temperature Control Communications ("M2M") Upgrade - KEDNY

 Spending Rationale:
 Mandated
 Growth

 Image: Spending Rationale:
 Non-Infrastructure

## Brief Description:

There are over three thousand Temperature Controlled (temperature-dependent interruptible) accounts in New York City (KEDNY) and Long Island (KEDLI), whose meter reads are managed by a vendor-hosted application and are collected via by the vendor's gateway modems. These gateway modems will become obsolete when the cellular network technology they utilize sunsets on January 1, 2017. Under the Temperature Control Communications Upgrade project, the Company's Metering personnel will un-install each of the gateway devices and ship the communications board containing the obsolete modem back to the vendor. The vendor will upgrade each board, which includes: installing a new cellular modem, testing the board's functionality, and shipping the board back to the Company's Metering personnel will re-install an upgraded board back into each active meter gateway device.

The project also seeks to identify an alternative technology to reduce KEDNY's reliance upon its sole sourced hardware/software vendor. The vendor has also indicated that it may discontinue service in the longer term, and will not provide service assurance and support beyond 2021. Therefore, KEDNY needs to identify an alternative technology and develop a migration plan to move its Temperature Controlled customers to a new meter reading and control platform before 2021.

#### Program Justification:

In an effort to maximize the availability of natural gas to its customers and utilize the excess capacity of the system during non-peak load periods, KEDNY created a Temperature Controlled (TC) service classification. These customers utilize the excess capacity of the system during non-load periods and have agreed to switch to their alternate fuel source during peak load periods. To ensure the safety and reliability of the gas system each, TC customer has a remote control device on their boiler that allows KEDNY to monitor and remotely switch these customers to their alternate fuel source at the designated interruption temperature or when emergency system conditions warrant local or regional load sheading. KEDNY is required to facilitate the immediate ability for customers to switch fuels as well as remotely verify/measure a customer's compliance with gas usage restrictions during an interruptible period.

The existing "M2M" Communications platform was installed in the mid-2000's and enabled KEDNY to remotely monitor network communication performance and TC customer compliance during an interruption. The 2G communications network platform

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facilitated remote fuel switching and remote data collection of hourly meter readings for each TC account. In January 2011, M2M Communications was acquired by EnerNOC. The EnerNOC solution consists of a hosted application platform in the cloud and a custom made Gateway device attached to each KEDNY TC meter. The Gateway device collect consumption information and remotely switch fuel source on-command or automatically in response to meeting pre-determined thresholds. The fuel switch will occur within 1 minute of the trigger condition being met.

In February 2014, AT&T has announced that it is sun-setting its 2G network on January 1, 2017 to free up space for its newer networks. If left as is, all of KEDNY's current TC gateways will be unable to communicate after January 1, 2017. Accordingly, KEDNY began discussions with EnerNOC to identify an alternative communications network and subsequently agreed to upgrade its service from 2G to 4G. During these discussions, the vendor indicated it may not be willing to support this application beyond 2021 due to changing technological advancements, prompting KEDNY to seek an alternative longer term solution. This project serves to identify the costs to upgrade its system from 2G to 4G and in the longer term.

Total Project Cost Breakdown

\$000	CY	CY	CY	
	2017	2018	2019	
CapEx	292	0	1,160	

Customer Benefit:

Allows non-firm customers to utilize excess system capacity during peak load periods and maintains gas system safety and reliability

Without the Temperature Control Communications Upgrade project KEDNY will need to interrupt non-firm customers with increased frequency and will not be able to monitor and control the gas system in a safe and reliable manor and could cause the elimination of the TC service classifications.

## Alternatives

Alternative 1: Do nothing

Doing nothing will adversely impact cost, customer satisfaction and reliability. This alternative does not meet the company objective to provide service under the current tariff service classification and will adversely impact the safety and reliability of the KEDNY gas system

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Program Title: Gas System Reliability/Remote Control Valve (RCV) Program – KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

## Brief Description:

The System Reliability Program includes capital projects required to maintain system minimum pressures on the gas network in the event of an abnormal operating condition (failure involving a regulator station, gate station, critical main or other major pressure facility on the system). This program includes new RCVs on transmission pipelines to improve emergency response capabilities and reduce risk. In the event of a pipeline failure that results in a release of natural gas, RCVs will allow control room operators to stop the flow of gas, isolate and shutdown a portion of the system, and mitigate further consequences utilizing a remote command.

#### Program Justification:

Gas system reliability concerns include transmission and distribution systems with limited number of feeds (*i.e.*, take stations or regulator stations), systems that are either weakly integrated or consist of long single-feed laterals, networks that contain a wide variety of operating pressures, and varying design philosophics associated with system and supply redundancy (*e.g.*, production plants, take stations, regulator stations).

Gas safety concerns focus on our ability to quickly and efficiently shut down gas supply remotely following a pipeline failure resulting in the release of natural gas, to ensure the safety of the first responders, impacted gas customers and the public. The use of RCVs also eliminates the need to locate and excavate manual valves.

Also, the Company anticipates that federal regulations (Pipeline and Hazardous Materials Safety Administration (PHMSA), Advanced Notice of Proposed Rule Making (ANPRM), dated August 25, 2011, FR 53086, Docket PHIMSA-2011-0023) will require installation of RCVs. RCV programs will be developed utilizing PHMSA criteria.

## Total Project Cost Breakdown:

\$M	CY 2017	CY 2018	CY 2019	
CAPEX	3,557	5,815	5,098	

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### Customer Benefit:

The Gas System Reliability program ensures that service is maintained in the event of a failure on a major pressure facility. Reliability is improved by adding supply flexibility, integrating single feed systems, making progress to eliminate single feed systems, and by installing RCVs. Without this program, greater numbers of customers are at risk of losing service in the event of a facility failure.

KEDNY's goal is to proactively upgrade the existing valves or install new valves in certain high-volume and high-risk locations to enhance reliability and safety by reducing the amount of time needed to stop the flow of gas in the event of a pipeline failure thereby mitigating the consequences of any such event. Installation of RCVs will be undertaken in a manner that will ultimately comply with regulatory guidance (PHMSA's August 25, 2011 ANPRM).

#### Alternatives:

## Alternative 1: Do Nothing

If RCVs are not installed, a pipeline failure would require a manual shutdown of the transmission pipe. This may result in longer times to contain the incident and could result in more damage. Also, by not adding any RCVs the isolation area could be larger in some instances, resulting in a larger loss of service to customers. Given pending PHMSA regulations, this option would leave the Company in violation of industry code requirements.

## Studies/References that Support the Program:

Studies were run on the Company's network models using Synergi software, which is industry standard software used by nearly all of the LDC companies. The models, which are validated on an annual basis, were loaded with the forecast provided by National Grid's Analytics, Modeling, and Forecasting (AMF) Department. Individual facilities were taken out of service, and reliability projects were then identified to bring pressures back above minimum.

Several studies have been conducted regarding the benefits of RCVs. The results were summarized in a report by the Department of Transportation (DOT), Research and Special Programs Administration (RSPA) in September 1999, entitled "*Remotely Controlled Valves on Interstate Natural Gas Pipelines*," and updated in another report by Robert J. Eiber Consultants, Inc. and Keifner and Associates in July 2010, entitled "*Review of Safety Considerations for Natural Gas Pipeline Block Valve Spacing*," Based on these reports and underlying studies, the vast majority of fatalities, injuries and property damage associated with a catastrophic pipeline accident occur within the first few minutes of the event, well before any activation of RCVs would be possible. Even if

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RCVs are installed on a transmission line, there would be a considerable delay before the equipment "recognizes" that a pipeline incident has occurred, and closes the valve in response to the incident. In the case of an RCV, there would be a delay associated with the control center recognizing the event as an incident, and making a determination as to the appropriateness of closing RCVs in response to the vent. However, the true benefit of a RCV would be to minimize the loss of natural gas after the incident had occurred and minimizing the impact of the incident on the operation of the gas system (such as pressure collapse due to a rupture). In addition it will shorten the duration of the event (*i.e.* gas fueled fire) and that could help to reduce the amount of damage resulting from the event.

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# $\underline{\textbf{Program Title:}} Valve Installation and Replacement Program-KEDNY$

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

## Brief Description:

The Valve Installation and Replacement Program addresses valve replacements in addition to new valve installations necessitated by ongoing annual inspections. The program will strengthen the emergency response capabilities of the gas organization by improving the level at which Field Operations can safely and efficiently isolate sections of the distribution system while ensuring minimum customer impact and will benefit KEDNY's customers by reducing the duration of future outages. This program highlights the need to provide investment in our infrastructure to maintain acceptable standards for system reliability and emergency response.

## Program Justification:

KEDNY is required by federal (49 CFR 192.181) and state (16 NYCRR 255.181) regulations to install, inspect, maintain and operate critical pipeline valves on all gas distribution systems. The purpose of these valves is to facilitate the rapid shutdown of distribution piping or regulator stations during gas emergencies such as third party damage, water intrusion, or other operational reasons. A secondary purpose of these valves is to facilitate maintenance and pipe replacement activities on associated distribution piping. Ensuring all critical valves are properly maintained and operable is a key public safety function and is critical to the effective operation of National Grid's gas distribution system.

In New York, the local gas distribution yards are responsible for performing annual valve inspections and any resulting repair and/or replacement work identified through the inspections. Program status and compliance is reported monthly. Gas Systems Engineering has enterprisewide responsibility for the Critical Valve Program. This includes valve selection criteria and determination, development of system isolation districts. The Gas Operations Engineering and Project Engineering & Design teams also provide ongoing support to Field Operations through diagnosis of inoperable valves, identification of alternate valves and selection of new valves.

## Total Project Cost Breakdown:

\$000	CY 2017	CY 2018	CY 2019	
CAPEX	141	142	142	

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## Customer Benefit:

Successful execution of the program will ensure the safety and reliability of the gas assets while focusing on improvements in customer satisfaction. The primary driver for this program is to improve distribution system and customer reliability while maintaining the highest standards for safety of the gas distribution assets. The program will minimize the unplanned release of gas during restoration of damage to Company facilities.

Alternatives:

## Alternative 1: Do Nothing

The valves found to be deficient will need to be managed on a case by case basis, creating process and investment inefficiencies. Lack of the ability to properly plan and employ uniform criteria to these issues increases risk to the Company and can portray a negative image of the organization to customers, investors and regulators.

Studies/References That Support the Program:

1. Outage Restoration Costs Study

Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

Actual relight costs have been captured from recent incidents to quantify company expenses related to restoring service. These were all related to outages that occurred for reasons other than insufficient system capacity and operations were conducted under benign weather conditions. It is likely that during severe winter weather, costs would increase.

The claims data related to burst pipes and equipment damage due to a lack of heat during severe cold weather was captured from National Grid incidents in other jurisdictions. The combined cost of relighting customers and resolving claims in those incidents averaged \$1,764 per customer. Recognizing the amount of variability in different incidents such as weather conditions, different types of neighborhoods, variable labor costs, economies of scale, etc., for purposes of evaluating the benefits of reinforcement projects, an average value of service restoration costs and claims of \$1,000 per customer is used.

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Program Title: Heater and Regulator Station Management Program - KEDNY

Spending Rationale: Mandated Growth

Reliability Non-Infrastructure

Brief Description:

This program covers capital projects involving the pressure regulating facilities and heaters utilized on the Company's gas system. Regulating stations identified for full replacement are those that do not meet current company standards for design, including the following criteria:

- Severe corrosion; usually occurs where no cathodic protection was installed (*i.e.* Pre-DOT pipe; pre-1971),
- It is not cost effective to repair or modify,
- Under capacity the station is too small and would require new vaults, new
  piping with larger valves and regulators as identified by Gas System Planning,
- piping with larger valves and regulators as identified by Gas System Planning, Structural problems with vaults, coupled with flooding and traffic problems that need to be addressed

The program will also install new heaters to mitigate cold gas temperatures and to replace heaters nearing the end of their useful lives, manage control line integrity, and provide for special projects related to heaters and regulator stations.

## Program Justification:

There are three elements to consider when ensuring adequate safety and reliability of pressure regulators stations: heater management, pressure regulator station management and control line integrity. Using data from the annual Performance Testing (PT), Cathodic Protection (CP) testing, risk assessments and on-site inspections, technical assessments were made for each pressure regulating station taking into account pipe and equipment condition, regulator performance, corrosion data, heater and scrubber performance. In addition, Guided Bulk Wave Testing (GBWT) has been used in regulator vaults to determine if there are any anomalies in the pipe within the vault penetrations. The results of these tests/assessments, combined with an analysis of the potential customer impact resulting from a station outage, were used to prioritize and schedule capital projects in the Heater and Regulator Station Management Program

Pressure Regulating Facilities: Planned replacements will eliminate older regulating stations that no longer meet current company standards for design (*i.e.*, over pressure protection). These replacements will comply with regulatory requirements for the operation of the gas system and will improve system integrity.

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Collaboration with other programs such as the Main Replacement Program, System Reinforcements and System Reliability can change the scope of work for an existing pressure regulation station by increasing flow, reducing flow or allowing the station to be retired.

An event at any vault could jeopardize the customers downstream through loss of supply or by over pressurizing the system. The program addresses corrosion issues, structural vault problems, obsolete pressure control valves, inadequate by-pass designs, accessibility and maintainability (automation is handled within a separate System Automation Program).

Since Super Storm Sandy, National Grid has begun a program to storm harden pressure regulating stations that are within the identified 100 year flood plan. This program consists of making the vaults water tight by: installing Roxtec seals at all vault penetrations, water tight manhole covers, vent poles, water proof vault, and relocate telemetry to above grade cabinets.

Heaters: The Company's policy ("Management of Cold Gas Temperatures") recommends that heaters be considered for installations where pressure drops of 200 psi or more occur. Because natural gas temperature will decrease approximately 14 degrees given a 200 psi pressure drop, the temperature of the gas leaving a pressure regulating station can fall below freezing if heat is not added. On a cold day, flowing gas temperatures may average 40 degrees or less. After a 200 psi pressure reduction, the gas will be flowing at 26 degrees or less. Frost heave can occur as ice forms below 32 degrees and piping can begin to lose strength (become more brittle) as temperature falls below 20 degrees.

The heaters in the program are earmarked for full replacement because they are reaching the end of their service lives. Natural gas heaters are made from carbon steel. They contain a glycolwater mixture, similar to the antifreeze in an automobile radiator. These heaters have a life expectancy of approximately 25 years, which can be extended or diminished according to maintenance practices. However, at some point, the integrity of the steel tubes within the heater can become compromised and my result in a leak. Since all of these heaters are connected to transmission piping, they are subject to higher pressures and the impact of a leak or tube failure can be caterophic.

There have been past pipeline failures on National Grid affiliates' systems due to increased stresses associated with cold gas being introduced into the distribution network. The higher stresses have created axial contraction, coupled with frost heave and lower pipe toughness which has resulted in weld failures. The installation of additional heaters will help to address these issues.

**Control Line Integrity:** Control lines are an integral part of each regulating station. This program is managed in conjunction with the pressure regulating facility replacements and rebuilds. When Guided Bulk Wave Testing (GBWT) is performed at a regulating station, all control line vault penetrations are inspected. This program corrects any control line integrity deficiencies identified.

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Control line integrity will provide cathodic protection to previously unprotected buried steel lines, which will improve the reliability of the gas system. Cathodic protection is a proven and cost effective method to enhance the life cycle of pressure regulating stations.

Special Projects: These are complex projects that are multiyear and are typically located at take/gate stations, which are at transmission pressure. A typical take station overhaul will include an overhaul of all equipment, and buildings on the site, retriement of obsolete equipment, and the abatement of environmental concerns such as lead paint, asbestos and soil contamination.

An additional special project will include the transfer of ownership and upgrade of the Tetco/Goethals over pressure protection. This project will require KEDNY to take ownership of Tetco's relief valve and remote outlet valve at the Gate Station. KEDNY will then retire the relief valve and provide over pressure protection by upgrading the controller on the 30° Shafer actuator to close the 30° ball valve in the event of over pressure condition. A 10° by pass with a control valve and independent controller will be installed around the 30° ball valve to maintain the downstream pressure of 419psig in the event of a full closure of the 30° valve. This project will prevent the release of gas from an over pressure condition in the highly congested area around the Goethals Bridge.

Total Project Cost Breakdown

CAPEX \$000	CY 2017	CY 2018	CY 2019
Pressure Regulating Facilities	4,928	5,742	5,571
Control Line Integrity	270	390	100
Canarsie Gate - Repair Penatrations	76	0	0
Citizens Gate - Bulkhead	3,376	4,300	1,075
Coney Island Heater	30	0	0
Tetco Relief Valve Retirement	1,107	525	0
Varick Reg Station Retirement	717	1,000	283
Bay Ridge Retirement	91	0	0
Bowery Bay Station Upgrade	1,147	453	0
McGuiness Mini Gate	0	1,183	468

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Kings Plaza Mini Gate	0	0	1,218
Maspeth Decommissioning	61	0	0

## Customer Benefit:

The primary customer benefit is the continuous, safe, and reliable supply of natural gas without unplanned outages due to pressure regulating facility shutdowns. Pressure regulating stations supply from 500 customers for low pressure distribution stations to 500,000 customers for high pressure stations.

## Alternatives - Pressure Regulating Facilities

Alternative 1: Station rebuild in lieu of replacement

The station can be rebuilt and brought to current standards. This may require the following:

- · Control line rework or replacement
- Minor work to ensure adequate sustained CP readings
  New regulators or replacement of "soft goods"
- New sleeves, ladders, vaun covers, end r r
  Recoating of all exposed piping with epoxy New sleeves, ladders, vault covers, and pipe stubs

Station rebuilds can extend the life of an existing station by twenty years or more and are cost effective

Cost: \$750,000 - \$950,000 depending on size and condition

Alternatives - Heaters

Alternative 1: Rebuild existing heaters in lieu of replacements

The main components of gas heaters can be replaced; however, the manufacturers of older heaters are generally no longer in business after 25 years. For example, BS&B, Tulpro, and QB Johnson are all heater manufacturers that have gone out of business in the last 20 years. This presents a unique problem as replacement parts are not available and large components would have to be custom fabricated. The cost to remove and replace large components in the field coupled with the availability generally makes the cost to rebuild a heater as high (or higher) than the replacement cost.

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Studies/References that Support the Program:

The Company's Distribution Integrity Management Program was put in place in 2011. The program includes a risk ranked approach for ranking pressure regulating facilities according to Health & Safety Risks and the Technical risks associated with their age and condition.

<u>TI 020040 - Management of Cold Gas Temperatures</u>. This TI provides the Company's general strategy which is that all stations with a pressure drop of 200 psi or greater should have heaters where practical. It supports the operation of natural gas heaters and the need to add or replace heaters.

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Program Title: System Automation & Control – KEDNY

Mandated

Spending Rationale:

Non-Infrastructure

Growth

## Brief Description:

This program will install Remote Terminal Units (RTUs) at multiple gate stations and regulator stations located throughout KEDNY's service territory. RTUs are installed locally at gate and regulator stations to provide temperature, pressure and flow data back to the Gas Control Room. Where required, the RTUs can also monitor gas detectors, intrusion alarms and allow Gas Control to adjust flow and pressure set point at the regulator stations. Data is transmitted via phone lines or cellular networks. The automation projects include raise/lower controllers to remotely adjust pressure on the gas system. Gas analyzers projects are also included to provide gas composition and BTU content of the gas.

The objective is to standardize operations, maintain custody check metering and increase control and monitoring at city gate stations and regulator stations. Project delivery also serves to increase operational understanding of the system to identify abnormal operating conditions and taking a proactive approach to alarm management in support of new PHMSA requirements (*i.e.* Control Room Management). The program also adopts a best practice with respect to check metering and leak management.

## Program Justification:

This program is necessary to enhance system reliability. Increasing the level of automation at pressure regulating stations will enhance the ability of the Gas Control to pinpoint problems and take corrective action. Recent changes in federal regulations for Control Room Management focus on increasing system awareness and providing proactive response to abnormal operating conditions. This program supports compliance with these regulations. This program also supports the standardization of telemetry across National Grid's gas transmission and distribution system. Enhanced calibration of network models from automation and telemetry data improves the accuracy of network analysis and enhances the ability to forecast future capital reinforcements, which leads to more efficient capital investment.

Currently, the KEDNY gas system has a limited amount of system automation – 58 percent of the pressures regulating stations are equipped with some form of telemetry while 42 percent of the system relies on paper chart recorders. Some of this equipment was installed many years ago and has become obsolete. This equipment includes obsolete modems, telescadas and metameters. Updating this obsolete equipment supports

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the standardization of telemetry across National Grid's gas transmission and distribution system.

The recent change from traditional Gulf gas supplies to Marcellus shale gas has brought about a significant need for new equipment to measure and monitor the gas quality at change of custody points. Where gas is introduced into the National Grid system, gas monitoring instruments are needed to monitor odorant levels, BTU, composition, hydrates, and hydrocarbon dew point (HCDP). This equipment will be installed at take stations (transfer of custody points). This program to meet gas quality monitoring standards will take five years to implement.

Also, due to the increased scrutiny placed on system automation in the aftermath of the San Bruno pipeline incident, it is anticipated that federal regulations will require additional levels of system automation on both transmission and distribution systems.

Total Project Cost Breakdown

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	1,617	1,697	1,700

Customer Benefit: More reliable system performance with fewer customer outages.

The advantages of system automation and telemetry are that the source and location of any system problem can be more readily and accurately identified from the Gas Control Center. Crews can be dispatched immediately to the location of the problem. This process saves valuable time and will reduce the need to wait for customers to call in and report a problem. In addition, the removal of paper charts recorders provides a more accurate and timely record of station pressures and this information is also available for Gas Planning.

## Alternatives

## Alternative 1: Do nothing

Doing nothing does not meet the long term company objective to actively manage system pressures and leak activity. Also this alternative will leave approximately 42% of this region without the ability to remotely manage operating pressures.

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Studies/References That Support The Program:

National Grid Policy PL 030002 - SCADA Instrument & Control

This policy requires that new telemetry points are approved by Gas Control in accordance with the U.S. Department of Transportation - Pipeline and Hazardous Materials Safety Administration (PHMSA) Control Room Management standards (49CFR 192.631)

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Program Title: Water Intrusion and Main Exposure Program - KEDNY

Reliability Non-Infrastructure

# Brief Description:

KEDNY's Water Intrusion and Main Exposure program will have two components. The first will address unanticipated (*i.e.*, emergent) water intrusion causing disruption of service to customers as well as poor pressures requiring investigation by I&R, CMS and Field Operations. The second part of the program will address unanticipated infrastructure washouts/main exposures that can occur during storms, heavy rains and/or seasonal snow melting, which can cause damage to facilities, emergency response and potential loss of service to customers. The program will address both water intrusion projects that have already been identified and management of emergent reliability problems as they are identified. Newly identified locations meeting the program criteria will be risk ranked and prioritized for replacement or other action within the existing budgetary limits.

#### Program Justification:

The Water Intrusion/Main Exposure Program will support two critical areas not currently linked to specific capital or operating expense budgets. This program will enable improved management of these budgets with specific focus on emergent activities. Previous efforts have linked these emergent projects with LPP replacement activities whenever practical. The program will also facilitate swift decision making based upon predetermined criteria for project execution, allowing improved customer satisfaction while further ensuring the safety and reliability of the system.

Total Project Cost Breakdown.

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	975	1,155	1,183

## Customer Benefit:

Successful execution of the program will further ensure the safety and reliability of the gas assets while focusing on the improvements in service delivery. Unplanned customer outages, driving poor system reliability in low pressure distribution systems are targeted through this program. Customer satisfaction is negatively impacted due to disruptions of gas service, inconvenience associated with relight process and in instances customer costs associated with remedy and/or

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repair of customer owned equipment. Customer disruptions portray a negative image of the Company impacting reputation. The recommended program will resolve future, recurring disruptions to customers on low pressure systems. The program will take the opportunity to support continued elimination of low pressure distribution systems by upgrading to elevated pressure whenever practical. Successful execution of the program will also realize improvements in public and municipal relations due to a decrease in unplanned outages which will result in lower occurrence in unplanned road excavation.

#### Alternatives:

## Alternative 1: Previously-Identified Projects Only

This option highlights the minimum capital investment and operating expense requirements to execute the replacement and/or permanent remedy of the identified aforementioned water intrusion and main exposure projects meeting the criteria for replacement under the said program, and would exclude newly-identified issues going forward. This scenario will not include the additional allocated funding to support walk-in projects as they are identified during the fiscal year. The risk with this option presents itself with the program approval in advance of the rainy season which can highlight new areas of concern and/or scope adjustments to existing problematic areas. As such, this limits flexibility to initiate timelier repair to pressing/urgent needs on the system which has potential to manifest itself in customer outages. Additional inyear emergent issues would need to be managed on a case by case basis and will require additional funding support from the proactive or reactive main replacement programs.

## Alternative 2: Do Nothing

This option does not allow water intrusion/washout issues to be identified for consideration through the budget planning process. Further, the emergent issues presented in this proposal are likely to continue and will need to be managed on a case by case basis and will require additional funding support from other programs. These occurrences present the risk of pipe failure due to unsupported segments; failure of the pipelines can negatively impact safety and system reliability leading to increased Opex and customer dissatisfaction. Lack of the ability to properly plan and employ uniform criteria to these issues increases risk to the Company and can portray a negative image of the organization to customers, investors and regulators.

#### Studies/References that Support the Program:

## Outage Restoration Costs Study

Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

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Program Title: Storm Hardening - Remotely Operated Service Shutoff Valves - KEDNY

Growth

Spending Rationale: Mandated

Reliability Non-Infrastructure

Brief Description:

KEDNY has more than 25,500 services within the Federal Emergency Management Agency (FEMA) defined 500 year flood zone. Approximately 4 percent of the total services are susceptible to storm surge. To mitigate the risk of flood damage to the Company's facilities, the Storm Hardening program will install remotely operated service shut-off valves with flood sensors within the FEMA defined flood zones across the operating region. The program proposes to install the valves on both existing services in the identified flood zone and on new services installed within that zone. This will address two important objectives in the event of flooding. The first objective will be shutting off the services automatically as soon as flood water reaches the service is obter will be no regulator over-pressurization, thereby preventing a potential incident and ensuring the safety of our customers. The second objective is to provide an accurate count of services impacted by flooding in real time, which will inform the Company's storm response with respect to the resources needed to restore the impacted customers expeditiously. Remote shut off valves will also allow the Company to interrupt the services impacted by flooding without shutting down the entire neighborhood.

#### Program Justification:

The Storm Hardening Program – installing Remote Service Shutoff Valves with flood sensors that automatically shut off gas to structures that experience flooding and provide an accurate count of services impacted by the flooding – will enable improved emergency response in the event of flooding. This targeted approach shuts down only the services affected by flooding (as opposed to the larger gas service districts) and sends alerts to the customers impacted, isolating the system and alerting the Company of the loss of service to our customers in real time. This will enable improved management of storm restoration with specific focus on the affected customers. During Superstorm Sandy, the Company had to shut down much larger service districts because of there were no remotely operated service shut-off valves. This resulted in the loss of service to a larger number of our customers for a significantly longer time than would be the case if remote shut off valves were in place. This program will also facilitate swift decision making focused upon affected regions, thus generating efficient execution of service restoration work and allowing improved customers satisfaction while further ensuring the safety and reliability of the system.

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#### Total Project Cost Breakdown:

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	3,518	4,758	4,848

## Customer Benefit:

Implementing these storm hardening measures will further ensure the safety and reliability of the gas assets within the flood zone while focusing on improvements in service delivery. This program will address the gas service reliability of the customers within the flood zone in the event of storm surge. Customer satisfaction is negatively impacted due to disruptions of gas service, inconvenience and company cost associated with the relight process. Conducting targeted interruption of service will reduce the customer impact and water intrusion in mains that has long lasting impact on the system. The recommended program will resolve future, recurring disruptions to customers in a flood zone due to service freze ups during winter. This program will also generate improvements in emergency planning, incident management and public safety.

### Alternatives:

Alternative 1: Identified Flood Zone Services Only

This option highlights the minimum capital investment and operating expense requirements to install remotely operated service shutoff valves for the existing services within the flood zones, excluding new services from the program. The risk with this option presents itself with the unsystematic management in the event of flooding. The new services will be susceptible to similar problems that currently exist within the system. Moreover, with two different sets of services, now with remotely operated service shutoff valves and other without these valves will call for emergency response in two different scenarios in the event of flooding. This not only impacts the response time but also increases the customer outages and puts customers and public at risk.

## Alternative 2: Do Nothing

This option leaves services within the Flood Zone vulnerable in the event of flooding. Further, the emergent issues presented in this proposal are likely to continue and customers will be susceptible to longer durations of service loss. The flooding occurrences present a risk to customers and public safety; flooding of the services can negatively impact safety and system reliability leading to increased Opex and customer dissatisfaction. Lack of the ability to properly plan and employ uniform criteria to fluture flooding events increases public risk and significant cost to shut off and restore the customers in the event of flooding.

Studies/References that Support the Program:

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1. Outage Restoration Costs Study

Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

Actual relight costs have been captured from recent incidents to quantify company expenses related to restoring service. These were all related to outages that occurred for reasons other than insufficient system capacity and operations were conducted under benign weather conditions. It is likely that during severe winter weather, costs would increase.

The claims data related to burst pipes and equipment damage due to a lack of heat during severe cold weather was captured from National Grid incidents in other jurisdictions. The combined cost of relighting customers and resolving claims in those incidents averaged \$1,764 per customer. Recognizing the amount of variability in different incidents such as weather conditions, different types of neighborhoods, variable labor costs, economies of scale, etc., for purposes of evaluating the benefits of reinforcement projects, an average value of service restoration costs and claims of \$1,000 per customer is used.

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## Program Title: I&R Reactive - KEDNY

pending Rationale: Mandated Growth	Spending Rationale:	Mandated	Growth
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Non-Infrastructure Reliability

Brief Description:

KEDNY's Instrumentation and Regulation (I&R) Reactive program includes demands maintenance, repairs and upgrades of all pressure regulating devices, valves, gas telemetering equipment, gas quality equipment, compressed natural gas (CNG) equipment, compressor stations and gas plant facilities (buildings, grounds, etc.). This reliability program will ensure that systems upgrades/replacements are accomplished reactively while performing regular maintenance activities.

Pressure Regulating Stations: KEDNV operates and maintains 309 pressure regulating stations in Brooklyn, Queens and Staten Island. These stations regulate high pressure gas to distribution pressures, ensuring system reliability, efficiency and safety. Each station is composed of several valves, vent poles and filterstrainers.

#### Valvas

Valves: KEDNY maintains and inspects over 6,000 valves (line, facilities, station and customer curb valves) throughout Brooklyn, Queens and Staten Island. These valves are inspected annually pursuant to New York code. Maintenance of valves typically requires repair and replacements.

Gas Telemetering Equipment: KEDNY operates and maintains 77 test points and telemetering equipment at 196 regulator stations. These devices provide a live pressure read and system control to SCADA through both cellular and network communications. Control to the regulator stations is provided by electrically driving gas control pilots, which can remotely raise and lower station outlet pressures. KEDNY continues to move towards complete automation.

Due to the increased scrutiny placed on system automation in the aftermath of the San Bruno Due to the increased scrutiny placed on system automation in the aftermath of the San Bruno pipeline incident, it is anticipated that federal regulations will require additional levels of system automation on both transmission and distribution systems. Improving the level of automation at pressure regulating stations will enhance the ability of the Gas Control to pinpoint problems and take corrective action. The system automation program supports the Pipeline and Hazardous Materials Safety Administration (PHMSA) requirement that "each operator must provide its controllers with the information, tools, processes and procedures necessary for the controllers to carry out the roles and responsibilities the operator has defined." This program supports compliance with these regulations.

#### Gas Quality Equipment:

bus guarny Equipment, and the equipment maintains gas temperatures at 40 degrees Fahrenheit to prevent freeze-up of regulator stations and customer services. KEDNY has heaters located at five sites throughout Brooklyn, Queens and Staten Island, with two additional sites under construction.

Odorant Equipment - includes one portable odorant injection trailer, an Odorant Chromatograph to measure odorant levels in the gas main, five portable odorant detection devices, and a

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permanent odorant injection site at the Staten Island Land Fill. The odorant injection trailer is a new addition for FY 2015-16.

Compressed Natural Gas (CNG) Equipment: KEDNY supports the operation and maintenance of four CNG fill stations throughout Brooklyn, Queens and Staten Island.

Gas Plant Facilities: KEDNY maintains 33 gas facilities within Brooklyn, Queens and Staten Island that support gas operations. The new Transco Station, located at Floyd Bennet Field, is the largest take station on the east coast. Site support at these facilities is necessary to ensure personal and public safety, site security and equipment maintainability. Along with maintaining valves, regulators, strainers, filters, pig launchers, vents vaults, telemetering equipment, site support also includes maintaining driveways, gates, fences, security (cameras and alarms), grounds keeping, building maintenance, plumbing, heating and general housekeeping.

#### Program Justification:

Reliability: Maintaining proper pressure control on the gas system is imperative to ensuring the safety and reliability from the gate station to the customer meter. Proper pressure control also increases efficiency by reducing commodity loss.

Mandated: The reliability program is administered in accordance with the Pipeline and Hazardous Materials Safety Administration (PHMSA) requirements.

### Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	1,626	1,667	1,697

## Customer Benefit:

Minimal customer impact is expected during the maintenance and replacements of these assets. Various stakeholders can benefit from this improvement plan in the following ways:

- · Improved public safety due to reduced risk of gas incidents
- Fewer unplanned service
  Reduction in gas leaks Fewer unplanned service interruptions

Alternatives

None

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## Program Title: LNG Blanket Program - KEDNY

Spending Rationale: Ma	ndated
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Reliability Non-Infrastructure

Brief Description:

KEDNY's Liquefied Natural Gas ("LNG") Blanket Program provides for the safe, reliable and compliant operation of the Greenpoint LNG Facility through procurement, installation, modification and/or enhancements to equipment, systems and facilities (excluding special projects, the salt water yump house project, and tank upgrades that are individually budgeted). An effective LNG expital program allows for replacement of obsolete and/or deteriorating equipment, systems and facilities that are reaching the end of their useful lives, along with modifications to enhance the safe, reliable, compliant and efficient operation. This program will extend the service life of critical production facilities and institute process safety improvements for plant equipment. Capital investiments in the program consist of projects identified and planned in advance of the fiscal year as well as projects to address emerging issues during the course of the year. . course of the year

Growth

The capital work to be sanctioned under this program includes, but is not limited to, the following:

- Upgrades and improvements to mechanical equipment and systems
   Upgrades to and replacement of electrical and control systems including safety shutdown systems
   Structural improvements of plant and facilities

- Studential influencements of pairs and reactives
   Procurrent of capital lools and equipment
   Preliminary engineering and design of capital projects
   Retirement and/or decommissioning of equipment, plant and facilities

## Program Justification:

KEDNY operates the Greenpoint LNG plant which is an on-system peak shaving facility. LNG KEDNY operates the orcempoint LNC plant which is an on-system peak shaving racinty. LNC is primarily methane gas cooled to minus 260 F at which point it changes from a gaseous state to a liquid state and occupies about 600 times less volume. Natural gas converted into LNG is an ideal method for storing supply to be used during peak days (periods of high demand). Greenpoint has two storage tanks with a total capacity of 1,600 million cubic feet of natural gas, which supplies up to 290 million cubic feet on any given peak day. The LNG is warmed up to supply the distribution system through the vaporization process and feeds both high pressure and low pressure distribution systems.

The refilling operation today is done exclusively through liquefaction due to the New York law that prohibits LNG filled trailers to deliver LNG to Greenpoint. The liquefaction system can refill at a rate about 7 to 8.5 million cubic feet of gas per day. The refilling/liquefaction operation can take up to 200 days to refill both Greenpoint LNG tanks between the months of April through December and varies based on how empty the tanks are from the previous heating season use.

This LNG Blanket Program provides funding for near-term and emergent capital projects needed to maintain safety and reliability at the Greenpoint LNG facility by: (i) replacing obsolete and/or

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deteriorating equipment, systems, and facilities that are near the end of their useful lives; and (ii) modifying/enhancing equipment needed to operate facilities safely and reliably.

Additionally, these projects are designed to maintain compliance with federal and state rules and regulations regarding the safe and reliable operation of LNG facilities. Operator noncompliance could result in penalties and forced removal from service as directed by federal and state regulators.

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	2,571	2,575	2,065

### Customer Benefit:

This plant is a critical component of the Company's gas supply portfolio and gas operating network. Greenpoint LNG can provide as much as 18% of KEDNY's peak day demand. The key driver for this project is to ensure the continued, safe operation and availability of the Greenpoint LNG as a natural gas supply point into the NY distribution system. This plant is critical to the NY gas supply portfolio over the next 10 years. KEDNY's firm gas customers benefit from the availability of this less-expensive peaking supply because gas is liquefied during the summer and stored for use in the winter.

The Greenpoint LNG plant has played a significant role in KEDNY's ability to supply unprecedented volumes of gas during record breaking cold spells over the past two winters. The plants inability to vaporize during peak winter weather conditions may result in the unplanned interruption of a significant number of gas customers.

## Alternatives

Alternative 1: Portable CNG

The only comparable alternative to LNG is portable CNG. The Company currently utilizes portable CNG skids to manage low pressure conditions on the gas system. This is effective for boosting pressures at specific low points on the system. This alternative is rejected because replacing Greenpoint LNG with portable CNG is not feasible due to the number of units and CNG tanks required to match Greenpoint's output.

## Alternative 2: Do nothing

If the LNG Blanket Program investments are not made, there is a risk that the Greenpoint LNG resources will become unavailable during the heating season. This would require the purchase of higher cost city gate supplies (if available) and may result in financial penalties from pipelines if the Company cannot adhere to operational flow orders and other contractual requirements. The lack of LNG Plant availability could lead to customer outages during heating season resulting in a negative customer impact.

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Any potential short-term savings of doing nothing are quickly outweighed by increased maintenance, operating and replacement costs. A "Do Nothing" alternative does not address potential reliability and safery risks associated with not replacing obsolete and/or deteriorating equipment, systems and facilities that are reaching the end of their useful life, or modifying/enhancing equipment needed to operate facilities safely and reliably. These risks include:

- Deterioration of gas facilities/assets
   o severe reduction in useful service life
   o leaks safety hazards and increased greenhouse gas emissions
   o unplanned maintenance and repairs
   o operator work around to continue system operations
   Potential loss or danger to customers and public

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Program Title: LNG Special Projects - KEDNY

Mandated Spending Rationale:

Growth

Reliability

Non-Infrastructure

Brief Description:

In addition to the LNG Blanket Program , KEDNY has identified a number of special projects to be completed over the next five years that are required to ensure the continued safe and reliable operation of the Greenpoint LNG plant. "Special" projects are those having a cost of approximately S1 million or greater. Special projects planned during the next five year include the following:

- Field instrumentation upgrades
   Vaporizer 7, 8, 9 & 10 upgrades
   Control System Upgrade
   Barge Priping Decommissioning
   Bulkhead Upgrade
   Replacement of Vaporizer 7 & 8
   Relocation of Maintenance Area to Control Building
   View Electrical Exadema
- New Electrical Feeders Renovate & Expand Truck Station

- cenuvate & Expand 1 (Tuck Station
   Roadway Paving Drainage Redesign
   Replace T2 Foundation Heating
   Underground Electrical Upgrades/Switchgear Planning
   Tank Repainting
   Geoweb Dike Replacement
   Vaporizer 3 & 4 Replacement

## Program Justification:

## Field instrumentation upgrades

Some of the existing LNG plant field instrumentation connected to the control panel in the control room is original to the plant and needs to be upgraded. The project will transition the existing instrumentation to Programmable Logic Controllers (PLC) that will be integrated into the Greenpoint Control Room Human Machine Interface (HMI) System. These upgrades replace existing pneumatic controllers and earlier relacy circuits. A vendor will be used to help integrate this project into the HMI and Control System upgrade projects.

### Vaporizer 7, 8, 9 & 10 upgrades

The upgrades to vaporizers 7, 8, 9 & 10 are associated with the ancillary systems that interconnect these units with the rest of the Greenpoint LNG Plant. The scope of work includes the following:

 Replacement of the fuel gas lines and the installation of a common shut off valve configuration.
 Upgrade the water make up system and associated valves.

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Upgrade the blower motors and add system diagnostic instrumentation.

#### Control System Upgrade

The liquefaction, vaporization and other ancillary systems in the Greenpoint LNG Plant has control systems attached to their equipment. These control systems either feed signals into the control panel or the plant's Control Room HMI. This project will direct these systems (e.g. water, fuel gas, etc.) to feed into the HMI and upgrade their connections. In addition, the original systems did not have common shut-off valves and water supply valves. Vaporizer upgrades will allow for those signaling capabilities providing greater system visibility to the Controller. A vendor will be used to help integrate this project into the HMI and Field Instrumentation upgrade projects.

## Barge Piping Decommissioning

In 1971 a barge unloading and loading system was installed to allow LNG import and export through the NY City waterways. The system was used initially and then shut down after the NY State moratorium on LNG transport was put into effect in 1976. This piping is currently disconnected, contains absects and is sitting on pipe racks. The decommissioning will include the removal and proper disposal of asbestos insulation, piping and pipe rack associated with this system.

### Bulkhead Upgrade

Renew the existing bulkhead walls alongside Newtown Creek. The existing bulkhead has deteriorated over the years. Repairs to the bulkhead were performed following Superstorm Sandy. This work will require an engineering firm to prepare a design that includes additional storm hardening measures to withstand storm surge.

## Replacement of Vaporizer 7 & 8

Vaporizer 7 and 8 are almost 40 years old and are approaching the end of their useful life. These vaporizers are used to feed our high pressure system and represent two-thirds of the high pressure vaporization capacity that feeds into our 350 psig system. The scope of the project includes replacement of the existing vaporizers with newer single burner units that are more efficient and easier to operate and maintain. This project improves the long term reliability of the plant and replaces existing assets that are approaching the end of their useful lives. This project should not be confused with the Vaporizer 7, 8, 9 & 10 upgrades, as that project addresses the ancillary equipment that is connected to the vaporizers.

## Relocation of Maintenance Area to Control Building

The Greenpoint LNG Maintenance area is located in a building that is not located within the plant property. This move will allow the Maintenance Team to properly store spare parts and establish a maintenance area that will be used to test relief valves, rebuild motors, pumps and build a testing and calibration area for maintenance on all of the transmitters and PLC equipment. In addition this relocation will also allow for the segregation of a maintenance area and servers used to operate the plant. Additionally, the project includes modifying the bathrooms in the existing control building to accommodate the additional resources that are located with this move. The scope of this project requires modifications to the existing control building and control room

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needed to accommodate the additional maintenance personnel and a work area that accommodates those activities.

#### New Electrical Feeders

This project will upgrade the electrical feeders to the plant to improve reliability of the Greenpoint LNG Plant. The project will upgrade the existing switchgear add associated controls and monitoring to assist in the trouble shooting of electrical feeder issues. The project scope also includes performing an arc flash study. This effort is part of a larger project to eliminate many of the substations that have been kept in service beyond their useful lives. The electrical system at the LNG Plant has in-service equipment that is from the 1920's, 1940's, 1960's, 1980's, 1990's and 2000's.

#### Renovate & Expand Truck Station

The scope of this project includes fabrication and construction of a new LNG truck loading/unloading station in a new location at the plant. The new station will accommodate two trucks and will be utilized for contingency operations requiring LNG trailer transport. The foreenpoint Plant cannot operate the trucking station and ilquely at the same time due to a limitations the FDNY established as a condition to the approval to build a new liquefier that was put into service in 2007. Included in the scope is the upgrade of new controllers, valves and integration into the Greenpoint Plant Control Room HMI. The existing truck station will be decommissioned and removed.

#### **Roadway Paving Drainage Redesign**

The existing roadways in the Greenpoint LNG have deteriorated from heavy equipment traveling on the paved surfaces over the years. There are existing depressions where water accumulates on the road creating unsafe conditions during winter operations. The scope of work includes grading and paving all of the roadways in Greenpoint LNG Plant and adding proper drainage to ensure longevity of the project.

## Replace T2 Foundation Heating

The purpose of an LNG tank foundation heating system is to prevent frost formation under the tank which could jeopardize tank integrity. The LNG contained inside the tank maintains a temperature of approximately -260 degrees Fahrenheit. The extremely cold temperatures penetrate the subsurface of the foundation necessitating the need to add supplemental heat.

The 45 year old foundation heating system with 84 pipe conduit circuits and control systems have been serviced and/or repaired numerous times. The current system is well beyond its expected service life, and the technology used in the original design has beecome outdated. The heating system is operating at a reduced capacity which has resulted in frozen/clogged heating conduits. The ongoing maintenance activities have become increasingly difficult to perform necessitating which will result in the installation of an entirely new system that meets current industry standards.

The key driver for this project is to ensure the continued, safe operation and availability of the Greenpoint LNG Tank 2 as a natural gas supply point into the NY distribution system. This plant is critical to the NY gas supply portfolio over the next 10 years. The foundation heating system is

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a primary/critical safety system required to prevent damage to the storage tank system from potential frost heave. As such, the heating system needs to be effective and reliable. The existing system needs to be replaced and upgraded to provide continued safe operation of the LNG tank as the current system is operating at a reduced capacity due to weakened or failed heating element wires and frozen conduits creating a risk for continued operation in its current state. The proposed permanent replacement of the heating system with current technology provides more effective heating over a longer service life. Additionally, the new system will be integrated into the Greenpoint LNG Plant control system

## Underground Electrical Upgrades/Switchgear Planning

The electrical infrastructure at the Greenpoint LNG Plant allows it to operate in a safe manner and when called upon during the coldest days of the year. Many of the older substations have reached the end of their useful life and obtaining replacement parts is difficult when an outage occurs. The age of the substations vary with the olders in service substation built in the 1920's and others as built as recently as 2007. The locations of some the existing infrastructure are susceptible to flooding due to storm surge as was the case for Old Substation A during Superstorm Sandy. This project replaces obsolete equipment with new equipment in compliance with today's standards and moves equipment out of the flood zones along Newtown Creek.

### Tank Repainting

The Greenpoint LNG Tank 1 and Tank 2 need to be repainted by a qualified vendor that will perform surface preparation, prime and apply a final coat to the tank surface in accordance with painting specifications of carbon steel tanks. The qualified vendor will be reviewing all weathered areas to ensure the proper re-application of a primer and final coat are performed per coating specifications. This work will also include the erection of scaffolding equipment and proper air monitoring to ensure the safety of those working on and around this project.

## Geoweb Dike Replacement

Over time, the asphalt coating used to protect the side slopes of the existing dike has deteriorated and the slopes have eroded in some areas. In addition to the erosion, the asphalt coating has cracked allowing water to wash away the sand supporting the dike. This scope of this project requires building up the side slopes with Geoweb, gootextile and crushed stome. The project renews the deteriorated dike walls with a Geoweb structure to better handle rainwater runoff and maintain the integrity of the existing dike. The project extends the life of the dike wall and decreases the need for recurring maintenance. The Geoweb system has been installed previously in other areas of the dike and is proven to reduce recurring O&M costs. The benefits of the Geoweb design include the following: (1) the three-dimensional structure confines selected infill material to resist down-slope movement of embankment materials and anticipated hydraulic flows, (2) minimizes the movement and migration of embankment materials by functioning as anchored containers in the upper soil layer, and (3) inhibits erosion and controls rill and gully formation, particularly in areas of concentrated flow over erosive soils.

## Vaporizer 3 & 4 Replacement

The Greenpoint LNG facility provides supplemental supply during periods of peak demand and serves as a contingency supply operation for firm gas customers. The vaporizer units heat the
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LNG to gas state to provide supply to customers. The vaporization capacity of the Greenpoint LNG ficality is comprised of a total of six vaporizers. Vaporizers 3.& 4 are original to the plant which is over 40 years old. These two units contribute approximately 17% to the total vaporization capacity of the LNG facility. This equipment has experienced several LNG tube leaks over the years resulting in maintenance repairs to ensure the safety and reliability of the units. The Company hired a contractor to conduct an independent evaluation of vaporizers 3 and 4 to evaluate their condition. This work was performed by Metallurgist Richard Hoffmann, PE President and Chief Metallurgical Engineer of Hoffmann & Feige, and the results of the evaluation concluded that this equipment is beyond its useful life.

The assessed condition of the vaporizers necessitates replacement this equipment with two new vaporizers. The drivers for this project are ensuring safe operations and reliable supply to National Grid's firm gas customers. These vaporizers are required to meet the needs of the Company's supply portfolio to support peak gas demand.

Total Cost Breakdown of Specific Projects:

\$000	CY17	CY18	CY19
CAPEX	16,988	11,876	9,870

Customer Benefit:

This plant is a critical component of the Company's gas supply portfolio and gas operating network. Greenpoint LNG can provide as much as 18 percent of KEDNY's peak day demand. The key driver for this project is to ensure the continued, safe operation and availability of the Greenpoint LNG as a natural gas supply point into the NY distribution system. This plant is critical to the NY gas supply portfolio over the next 10 years. KEDNY's firm gas customers benefit from the availability of this peaking supply because gas is liquefied during the summer and stored for use in the winter.

The Greenpoint LNG plant has played a significant role in KEDNY's ability to supply unprecedented volumes of gas during record breaking cold spells over the past two winters. The plants inability to vaporize during peak winter weather conditions may result in the unplanned interruption of a significant number of gas customers.

#### Alternatives

Alternative 1: Portable CNG

The only comparable alternative to LNG is portable CNG. The Company currently utilizes portable CNG skids to manage low pressure conditions on the gas system. This is effective for boosting pressures at specific low points on the system. This alternative is rejected because replacing Greenpoint LNG with portable CNG is not feasible due to the number of units and CNG tanks required to match Greenpoint's output.

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Alternative 2: Do nothing.

If the LNG Special Projects Program investments are not made, there is a risk that the Greenpoint LNG resources will become unavailable during the heating season. This would require the purchase of higher cost city gate supplies (if available) and may result in financial penalties from pipelines if the Company cannot adhere to operational flow orders and other contractual requirements. The lack of LNG Plant availability could lead to customer outages during heating season resulting in a negative customer impact.

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### Program Title: Greenpoint LNG Tank Modernization Project - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

Brief Description

The Project scope includes the following:

- Replace all of the inner tank penetrations below the liquid level with new piping and two internal tank pumps, for the following reasons.
   Reduce the design spill through the elimination of inner tank penetrations below the liquid level.
   Make minor piping changes to provide new locations for the existing tank fill and arrange merity.

- Make minor piping changes to provide new locations for the existing tank fill and pump recycle lines.
  Modify the level gauging systems on the tank to bring them up to current code by:

  Adding a stilling well to the existing servo motor operated level gauge.
  Adding a second level gage that is maintainable without taking the tank out of service.
  Adding an independent high level switch and controls to automatically close the fill valve.
  Ad new temperature elements to measure the temperature of LNG and the inner tank during cool down (code required).

#### Program Justification:

This project is necessary to ensure the long term safety and the reliability of the LNG tank. Prior studies of LNG tanks of this age and style have recommended that the tank be taken out of service temporarily to perform tank entry to install new in-tank LNG withdrawal pumps and to eliminate the existing internal valves and bottom penetration withdrawal nozzles.

#### Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	3,645	15,795	37,665

#### Customer Benefit:

This plant is a critical component of the Company's gas supply portfolio and gas operating network. Greenpoint LNG can provide as much as 18 percent of KEDNY's peak day demand. The key driver for this project is to ensure the continued, safe operation and availability of the Greenpoint LNG as a natural gas supply point into the New York distribution system. This plant is critical to the New York gas supply portfolio over the next 10 years. KEDNY's firm gas customers benefit from the availability of this

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less-expensive peaking supply because gas is liquefied during the summer and stored for use in the winter.

The Greenpoint LNG plant has played a significant role in KEDNY's ability to supply unprecedented volumes of gas during record breaking cold spells over the past two winters. The plants inability to vaporize during peak winter weather conditions may result in the unplanned interruption of a significant number of gas customers.

### Alternatives

## Alternative 1: Portable CNG

The only comparable alternative to LNG is portable CNG. The Company currently utilizes portable CNG skids to manage low pressure conditions on the gas system. This is effective for boosting pressures at specific low points on the system. This alternative is rejected because replacing Greenpoint LNG with portable CNG is not feasible due to the number of units and CNG tanks required to match Holtsville's output.

#### Alternative 2: Do nothing.

If the LNG Tank Modernization Program investments are not made, there is a risk that the Greenpoint LNG resources will become unavailable during the heating season. This would require the purchase of higher cost city gate supplies (if available) and may result in financial penalties from pipelines if the Company cannot adhere to operational flow orders and other contractual requirements. The lack of LNG Plant availability could lead to customer outages during heating season resulting in a negative customer impact.

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Program Title: Greenpoint LNG Salt Water Pump House Upgrades - KEDNY

Spending Rationale:	Mandated	Growth
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Reliability Non-Infrastructure

Brief Description:

This project will upgrade the salt water pump house, which provides a dedicated source of salt water for the LNG tanks' deluge system. The deluge system consists of coated piping that surrounds each tank and associated nozzles rising from the ground made of 2 inch steel pipe risers and nozzles. The water curtain that is created requires approximately 12,000 gpm of water and will produce a water curtain surrounding the tank that is approximately 60 – 70 feet in height.

#### Project Justification:

The purpose is to warm LNG vapor in case of a spill inside the inner dike and to reduce thermal The purpose is to warm LNG vapor in case of a spin inside the inner lake and to reduce internal radiation that would otherwise heat the tank in case of a nearby fire from another source, including the other LNG tank. The pump house is required because the NYC fire hydrant system is not adequately sized to provide this volume of water. Also, the new salt water pump house will be designed and constructed to mitigate flooding impacts like those experienced during Super Storm Sandy.

KEDNY's existing system is subject to the following inefficiencies and potential problems:

- High maintenance costs
   Susceptibility to flooding as seen during Super Storm Sandy
   Dependency on electric power from Con Edison's distribution system
   Aging electrical switchgear
   Backup turbine can only supply water to the deluge system, not the hydrant system
   Use of carbon steel piping, cases iron piping, and steel equipment supports, all of which have deteriorated from exposure to salt water

Objectives:

- 1. To construct a new, parallel source of water supply for both the hydrant system as well as
- To construct a new, parallel source of water supply for both the nyurani system as wen as the deluge system.
   To meet and or exceed the existing capacity of the pumps while maintaining the overall philosophy of sparing and equipment backup. Although salt water seems to be the most obvious choice, some investigation into the possibility of accomplishing a feed to the hydrant system using fresh water should be included.
   To provide a new system that is structurally and electrically storm hardened to such extent that the system will remain undamaged and fully operational after a 100 year storm as a minimum and after a 500 year storm as a primary trajet for the design.
   To eliminate the confusing array of remote operated valves, pumps, and the need for a vacuum system.
- vacuum system.
- vacuum system.
   5. To provide a constant source of fresh water to the existing hydrant system with equal capacity to the existing fire pumps and additional capacity for future foam suppression system.
   6. To eliminate the use of booster pumps and the need for the Solar turbine deluge pump.

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 To add sufficient back up power in the form of a natural gas powered generator that can generate adequate electric power to supply the pumps and also service as a backup power source with sufficient capacity to power the LNG Pumps and vaporizers in case of a power outage along with requisite plant controls and emergency equipment.
 To demolish the existing Salt Water Pump House.

#### Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	6,500	8,125	4,250

#### Customer Benefit:

This plant is a critical component of the Company's gas supply portfolio and gas operating network. Greenpoint LNG can provide as much as 18 percent of KEDNY's peak day demand. The key driver for this project is to ensure the continued, safe operation and availability of the Greenpoint LNG as a natural gas supply point into the NY distribution system. This plant is critical to the NY gas supply portfolio over the next 10 years. KEDNY's firm gas customers benefit from the availability of this less-expensive peaking supply because gas is liquefied during the summer and stored for use in the winter.

The Greenpoint LNG plant has played a significant role in KEDNY's ability to supply unprecedented volumes of gas during record breaking cold spells over the past two winters. The plants inability to vaporize during peak winter weather conditions may result in the unplanned interruption of a significant number of gas customers.

### Alternatives

#### Alternative 1: Portable CNG

The only comparable alternative to LNG is portable CNG. The Company currently utilizes portable CNG skids to manage low pressure conditions on the gas system. This is effective for boosting pressures at specific low points on the system. This alternative is rejected because replacing Greenpoint LNG with portable CNG is not feasible due to the number of units and CNG tanks required to match Holtsville's output.

#### Alternative 2: Do nothing

If the LNG Special Projects Program investments are not made, there is a risk that the Greenpoint LNG resources will become unavailable during the heating season. This could require the purchase of higher cost city gate supplies (if available) and may result in financial penalities from pipelines if the Company cannot adhere to operational flow orders and other contractual requirements. The lack of LNG Plant availability could lead to customer outages during heating season resulting in a negative customer impact.

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Program Title: Metropolitan Reliability Infrastructure (MRI) - KEDNY

 Spending Rationale:
 Mandated
 Growth

 Reliability
 Non-Infrastructure

#### Brief Description:

The MRI project will provide an operational loop to the existing Brooklyn backbone system through the installation of approximately 34,000 feet of 30 inch, 350 psig transmission main from Linden Boulevard in Brownsville to Maspeth Avenue in Greenpoint and installation of associated gate stations. This project will enable KEDNY's system to move an additional 850 Mdt/day by 2021 as full expansion of the Lower New York Bay Lateral project occurs and capacity increases from the Transco system at Narrows. The MRI will significantly increase system reliability and operational flexibility in the area. Further, the MRI project will reduce dependency on deliveries from Con Edison at the Newtown Creek delivery point.

The MRI project is expected to be in service before the 2020/21 winter season.

#### Program Justification:

KEDNY's gas system is designed for a peak day with an average temperature of 0°F (65HDD – Heating Degree Days) with 5% of the daily sendout as a peak hour. The peak demand is based on the same forecast utilized to develop the gas supply portfolio.

The primary driver of this strategy is network and supply reliability. The MRI project has been developed as part of the overall Long-Term Supply and Strategic Infrastructure Plan designed to increase system reliability throughout National Grid's gas distribution systems.

The MRI project provides the Downstate NY system with increased supply diversity, pressure support, outage contingency, and operational autonomy through reduction of dependence on transferring gas from Con Edison at Newtown Creek. The project also will provide the ability to maximize the utilization of existing and proposed upstream capacity which will better position the company to meet the long-term supply needs of its customers over the next 15-20 years.

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Total Project Cost Breakdown:

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	45,469	86,542	56,721

#### Customer Benefit:

Completion of this project in a timely manner will ensure the continued reliability of the downstate New York gas distribution system and provide long-term system reliability enhancements to the overall system. This project, in conjunction with the commitments undertaken on upstream pipeline projects, will provide access to long-term gas supply availability and diversity benefits to the downstate systems and their customers.

The MRI Project will:

- Provide immediate system reliability benefits as it will allow supplies to be sourced from any of the directly connected supply points and moved to any point across the National Grid NY system, significantly reducing the current reliance on individual gate deliveries.
- Complete the main transmission supply loop in Brooklyn which will allow system independence from Con Edison transfers at Newtown Creek, an operational concern as the Con Edison system continues to grow and it will also allow National Grid to flow supply into the Newtown Creek system to Con Edison if future New York Facilities System operations require it.
- Allow for outages on sections of the Brooklyn Backbone system (the Company's highest risk rated pipeline) necessary to complete planned system integrity work.
- Allow for the use of remote controlled valves in the event of any system disturbance requiring a shut-down, without initiating service outages to hundreds of thousands of customers.
- Eliminate the need for projected system reinforcement requirements estimated at over \$100 million.
- Allow for the installation of new distribution regulator station reinforcing the Brooklyn/Queens high pressure system and thereby supports replacement of low pressure cast iron mains with high pressure plastic.

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 Provide the ability to move incremental supplies from new gate capacity at both Narrows and the Lower New York Bay Lateral to any point across the system, including transfer points with Con Edison.

### Alternatives

### Alternative 1: New East River Connection

An alternative considered was the installation of a new connection across the East River which would be coupled with upgrades to the Con Edison system. While this would achieve some of the objectives of the MRI project, this option would <u>increase</u> the dependence on transfers from Con Edison. Further, as National Grid has contracted for capacity on Transco (Lower New York Bay and Narrows), and not on the Spectra NJ/NY project, there would be no incremental supply benefit realized, undermining the ability to serve future market growth. Lastly costs for such a project would likely be similar to the costs for the MRI project, without the same benefits and therefore it is not the preferred alternative.

## Alternative 2: Backbone Loop up Third Avenue

Looping the system up Third Avenue was also considered and could meet some of the objectives that the MRI project provides. However this option, based on a high level constructability assessment, would likely be more expensive and challenging from a routing and construction perspective, and would not provide as many benefits as the proposed project.

#### Alternative 3: Do Nothing

Although the least cost option, a decision to do nothing does not meet the objectives outlined herein. System reliability and flexibility will continue to be challenged as load increases, utilization of new upstream capacity will be limited by operational constraints, and the ability to serve long-term system growth will be restricted.

#### Studies/References That Support the Program:

Studies were run on the Company's network models using Synergi software, which is industry standard software used by nearly all of the LDC gas companies. The models, which are validated on an annual basis, were loaded with the forecast provided by National Grid's Analytics, Modeling, and Forecasting (AMF) department. Additionally, AMF provided a forecast at a zip code level. There is a high degree of comfort with accuracy of the modeling and forecast and that the appropriate project was identified.

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Program Title: Spring Creek Reconfiguration and Reinforcement Project - KEDNY Mandated Growth Spending Rationale:

Reliability Non-Infrastructure

#### Brief Description:

The Spring Creek Reconfiguration and Reinforcement Project is required to maintain system minimum pressures in the East New York region of Brooklyn, as well as addressing integrity issues within the Spring Creek Gate Station and IF5 Regulator Station. The project involves installing two new regulator runs at the existing Spring Creek Gate Station to feed the 15 psig system, including installing approximately 1,100 feet of 30 inch, 15 psig steel main. This will allow KEDNY to retire the IF5 Regulator station, which is currently a liability to the gas system due to its poor condition and its enderfut of considerable renovations. The retirement of IF5 has the added benefit of enabling retirement of approximately 210 feet of main that is currently undersized and would need to be replaced should IF5 remain in service. An additional component of this system, to the 60 psig system thereby improving pressures on the 15 psig pressure system.

## Program Justification:

Federal (49 CFR 192.623) and New York (16 NYCRR 255.623) regulations require the Company to maintain minimum pressures on the gas system to uphold reliable service to all firm customers. The purpose of the Spring Creek Reconfiguration and Reinforcement Project is to ensure that these requirements are met by improving reliability and system pressures.

#### Total Project Cost Breakdown:

\$000	CY	CY	CY
	2017	2018	2019
CAPEX	5,416	10,937	2,159

#### Customer Benefit:

This project will improve pressures and reliability to customers on the 15 psig and low pressure system in East New York, Brooklyn, and will eliminate flow-restrictive undersized pipe and the IF5 regulator station currently plagued by integrity issues, both

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of which pose a potential threat to system pressures, reliability, and operational flexibility if left in service.

The Spring Creek Reconfiguration and Reinforcement Project will:

- Brovide immediate pressure and reliability benefits to the 15 psig system by creating two new regulator runs with appropriately sized piping
   Improve pressures to the 15 psig system by transferring the supply to the Governor 88 inlet from the 15 psig system to the more capable 60 psig system
   Eliminate integrity concerns and the need for extensive renovations to the existing IIS sender attribute retiring the state.

- IF5 regulator station by retiring this station
  Eliminate approximately 210 feet of undersized, flow-restrictive pipe as a result of the retirement of IF5 which is currently hindering pressure and reliability
- of the retirement of 1FS which is currently inndering pressure and reliability within the 15 psig system
  Replace an additional 160 feet of undersized pipe with larger, adequately sized pipe to further improve pressures on the 15 psig system
  Identify and repair any integrity issues within the Spring Creek Gate Station facility and buildings

#### Alternatives

Alternative 1: Rebuild IF5 Regulator Station

A potential alternative to retiring the IF5 regulator station and relocating it to the Spring Creek Gate Station was to rebuild IF5 and have it remain at its current location. This would include addressing integrity issues with the gas system infrastructure and regulator station components as well as repairing structural issues with the station itself. By rebuilding IF5 and having it remain in service, the replacement of a significant amount of undersized main, both on the inlet and outlet side of IF5, would then be necessary. Due to the poor condition of IF5 and the length of main that would have to be replaced in order to maintain suitable system pressures this alternative is more complex and would order to maintain suitable system pressures, this alternative is more complex and would likely be more costly than the plan to retire IF5 altogether and relocate the 15psi regulator.

#### Alternative 2: Do Nothing

A decision to do nothing would ultimately lead to a failure to comply with the regulations defined by Federal and New York State codes as conditions would continue to decay resulting in station failure and/or customer outages. In addition, restrictions on sales activities would be required in constrained areas and the Company could find itself in violation of its tariff.

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## Studies/References That Support the Program:

Studies were run on the Company's network models using Synergi software, which is industry standard software used by nearly all of the LDC gas companies. The models, which are validated on an annual basis, were loaded with the forecast provided by National Grid's Analytics, Modeling, and Forecasting (AMF) Department. Additionally, AMF provided a forecast at a zip code level. There is a high degree of confidence in the accuracy of the modeling and forecast and that the appropriate project was identified.

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Program Title: Automatic Meter Reading Installation Completion - KEDNY

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

#### Brief Description:

This program provides for the purchase and installation of Automatic Meter Reading (AMR) equipment for the remaining non-AMR meters in KEDNY's service territory.

KEDNY has installed approximately 770,000 AMR units (60% meters). In late 2015, KEDNY will commence a program to complete AMR installations on the remaining 528,000 meters (40% of the service area). This program is expected to be completed during calendar year 2018.

### Program Justification:

Completing the AMR program will increase meter reading accuracy, reduce the number of estimated bills, and reduce the cost of meter reading.

## Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	17,718	0	0

#### Customer Benefit:

The installation of AMRs will decrease the incidence of both estimated bills and erroneous bills that require cancellation and rebilling. Additionally, KEDNY's AMR installation will enhance storm resilience and improve customer service. In the aftermath of major storms such as Superstorm Sandy, meters are not read because of the need to use the meter reading workforce to assist in storm recovery. With AMRs, the Company can confirm remotely if the customer is burning gas. Also, the AMR devices can store forty days of hourly data, which will assist in billing following an extended outage.

### Alternatives

#### Alternative 1: Do Nothing

The program will begin in late 2015 and be 80% completed by CY2017. Service improvements and associated cost reductions are dependent on full deployment of AMR

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meters. Early termination of the project will result in inefficiencies by increasing the number of estimated customer bills and increasing meter reading costs by requiring manual meter reading.

### Alternative 2: Reduce Scope

This alternative is rejected because failing to reach 100% AMR deployment will result in the inability to realize the efficiencies and customer benefits associated with the program.

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## Program Title: AMR Maintenance - KEDNY

Spending Rationale: Mandated Growth

Brief Description:

This program provides for the purchase and installation of Automatic Meter Reading (AMR) equipment to maintain or replace existing AMR units in the KEDNY service area.

KEDNY currently has an installed AMR population of approximately 770,000 units (60% of the service area). Each year a quantity of AMR units require replacement due to failure or expiration of their useful lives. Recently the Company's AMR vendor provided a battery life model that allows the Company to more accurately predict the number of AMR replacements which must be performed on an annual basis for the existing AMR units. Using this model, approximately 37,000 AMR units will require replacement each year for the next five years.

#### Program Justification:

Continuation of the AMR Maintenance program will increase meter reading accuracy, reduce the number of estimated bills, and reduce the cost of meter reading.

Total Project Cost Breakdown:

\$000	CY17	CY18	CY19
CAPEX	5,078	5,225	5,330

Customer Benefit:

· Provides actual meter readings for billing

Reduces estimated bills

Alternatives

Alternative 1: Do Nothing

This alternative is rejected. Without proactive replacement at the end of the useful lives of AMR units, the Company projects AMR unit failures for 50,000 units within 2 years. This failure rate will adversely impact meter read rates, customer satisfaction, and will result in labor inefficiencies.

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Alternative 2: Reduce Scope

This alternative is rejected because failing to maintain/replace existing AMR units will result in the inability to realize the projected savings and efficiencies associated with the program.

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Program Title: Purchase of Miscellaneous Capital Tools & Equipment - KEDNY

Company Name: The Brooklyn Union Gas Company d/b/a National Grid

Spending Rationale:	Mandated	Growth
Reliability	Non-Infrastructure	

#### Brief Description:

KEDNY's Purchase of Miscellaneous Capital Tools and Equipment program covers tools that are not used for specific projects. These items relate to safety (e.g., mechanized maintenance of traffic devices, worker safety enhancements), emissions reduction (e.g., apparatus to minimize emissions through natural gas drawdown operations), support of new, emerging and on-going technologies (e.g., capital spares and parts for trenchless and keyhole technologies) and the innovative applications that will lead to improved operations. These items support the safety of our employees, our customers and the general public. The items provide cost efficiencies across multiple mandated programs, support commitments to customer needs and expectations, and will allow the potential increase of productivity for on-going day-to-day operations of the gas business unit.

## Program Justification:

Company policy capitalizes general tool and/or equipment purchases subject to predetermined minimal dollar thresholds (\$500 for KEDNY). Such general equipment includes tooling (hand, power, pneumatic, hydraulic), specialty equipment, PPE, office machines, electronic data processing equipment and software applications, shop and garage equipment and communications. The Purchase Miscellaneous Capital Tools and Equipment program captures the items that are not used for specific projects but rather support the safe, efficient and on-going day-to-day operations of the gas business unit. Purchase of Miscellaneous Capital Tools and Equipment utilize project numbers that are budgeted based on historical funding due to the inability to associate this equipment with any one specific project.

## Program Budget Methodology:

The Purchase of Miscellaneous Capital Tools and Equipment budget reflects historical budgets, increases in conjunction with additional pipe replacement of mandated programs (e,g, Leak Prone Pipe replacement), as well as, cost of inflation budget increases. The volume of Public safety equipment, road traffic plates and sheeting systems are just a few examples of additional tools and equipment needed to support mandated program increases.

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Total Program Cost:

\$000	CY17	CY18	CY19
CAPEX	\$3,432	\$3,796	\$4,138

Customer Benefit:

- · Improved public safety due to mechanized maintenance of traffic devices and public
- safety enhancements.Noise reduction enhancements with new technology tooling.
- Productivity increases and potential unit cost reductions.
- Compliance with federal and state code requirements including new US Department of Transportation (USDOT).
- Reduction of methane emissions and reduction of greenhouse gases.

## Alternatives:

Alternative 1: Reduce Request

Reducing the budget line item is not recommended because funds allocated here drive process changes that support new initiatives and productivity improvements throughout the Gas distribution organization. It will potentially drive a downturn in safety for the company, employees, customers and general public.

## Alternative 2: Do Nothing

It will force the spending of these items to be allocated to specific projects and mandated programs resulting in inconsistent unit costs, excessive tool ordering (lack of controls) and jeopardize safety for the company, employees, customers and general public.

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Exhibit\_\_(GIOP-5)

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Testimony of the Gas Infrastructure and Operations Panel

Exhibit \_\_ (GIOP-5)

Incremental O&M Expenditures: Historic Test Year, Rate Year and Data Years

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	Operations Support-Supervisor	- 00	18,456 \$		18,456 \$	29,000 \$		19,0	8	19,579 \$		19.5

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Exhibit\_\_(GIOP-6)

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Testimony of the Gas Infrastructure and Operations Panel

Exhibit \_\_ (GIOP-6)

Incremental Full Time Equivalent Positions by Function in the Rate Year and Data Years

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# GIOP-6 KEDNY Incremental FTEs CY17-CY19

Company	L05 Receiving Cost Center	CY17	CY18	CY19
KEDNY	110-Complex Project Mgmt	5.5	2.0	-
	110-Contract Management	13.0	-	-
	110-Gas Control	4.5	-	-
	110-LNG/Propane-NY Downstate	2.0		
	110-Ops Support Services	11.5	2.0	
	110-Program Management	8.5		-
	120-Customer Meter Svcs	65.7	(25.0)	(10.0)
	120-Gas Pipeline Safety & Compliance	7.5	-	-
	120-Maint & Const-NY Gas	44.0	7.0	8.0
	130-Corrosion Control	2.0		
	130-Gas Distribution Engineering	1.0	-	-
	130-Gas Estimating Office of Excellence	3.5		
	130-Gas Investment Planning	11.0		
	130-Gas Long Term Planning	1.0		
	130-Gas Operations Engineering	2.0		
	130-Gas Project Eng & Design	10.0		
	130-Gas Transmission Engineering	0.5		
	130-Main & Service Replacement	3.0		
	130-Pressure Regulation Engineering	3.0	-	-
KEDNY Total		199.2	(14.0)	(2.0)