

Columbia Gas Modernization Program
Eligible Facilities Plan

Date: 8/9/2012

Contents

<i>Overview of TCO Assets</i>	3
<i>Modernization Project Plan</i>	6
<i>Project Overview – 2013</i>	8
<i>Project Overview – 2014</i>	15
<i>Project Overview – 2015</i>	19
<i>Project Overview – 2016</i>	22
<i>Project Overview – 2017</i>	24
<i>Modernization Plan – 2018 and beyond</i>	26

Overview of Columbia Gas Assets

Columbia Gas operates approximately 12,000 miles of DOT regulated transmission and gathering pipeline. As shown in Figure 1, 73% of those pipelines were installed prior to the enactment of federal pipeline safety standards.

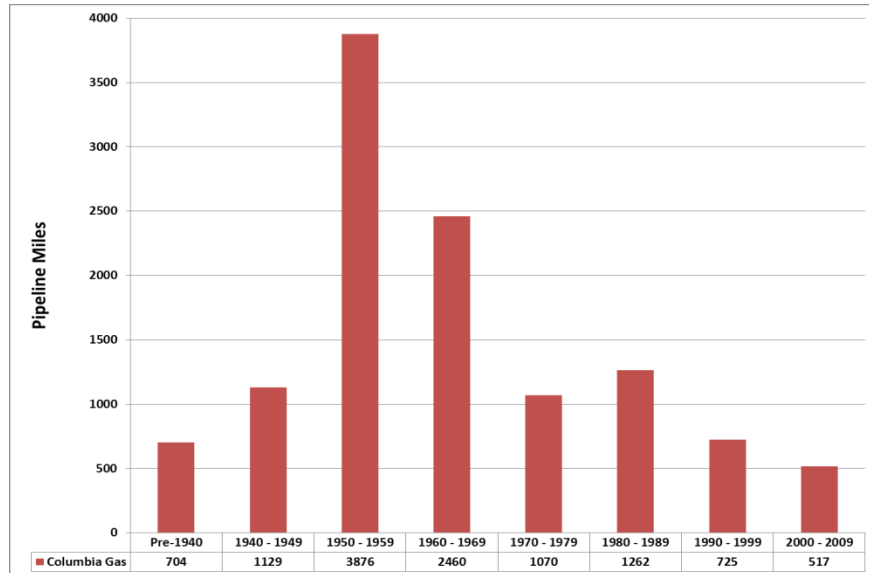


Figure 1. NGT&S pipelines by decade of installation.

The Columbia Gas (TCO) system consists of a pipeline network that was primarily not designed for in-line inspection. As of January 2012, approximately 4,000 miles (~30%) of TCO’s 12,000 miles are capable of handling in-line tools. TCO contains approximately 2,000 miles of bare steel, of which 1,070 miles are currently subject to DOT jurisdiction. Forthcoming regulations are likely to further extend the jurisdiction of federal safety standards. TCO operates 35 miles of bare steel in DOT defined High Consequence Areas (HCA).

A simplified definition of an HCA is an area within which significant loss of life and property is possible in the event of a pipeline failure. Operators must model the potential blast and burn radius of a rupture based on the unique operating pressure, gas composition and diameter of each pipeline. The modeled radius is termed the Potential Impact Radius (PIR). If 20 or more habitable structures (i.e. homes) or other DOT identified sites (hospital, school, etc.) are contained within a pipeline PIR, that area of the pipeline is deemed as an HCA.

A 2011 survey of INGAA operators reported that approximately 53 miles of bare steel are operated within HCAs. TCO operates 35 miles of bare steel in HCAs, over 65% of the industry mileage of bare pipe within HCAs. TCO bare pipe in HCAs operate primarily in suburban areas.

DOT requires operators to annually report statistics for pipelines, including those deemed higher risk. Higher risk pipelines include bare steel, cast and wrought iron, and bare steel operated without cathodic protection – a current impressed along pipelines to prevent external corrosion. In 2009, TCO reported

Eligible Facilities Plan

1,070 miles of DOT higher risk pipeline miles, which as shown in Figure 3, was the most of any operator in the industry.

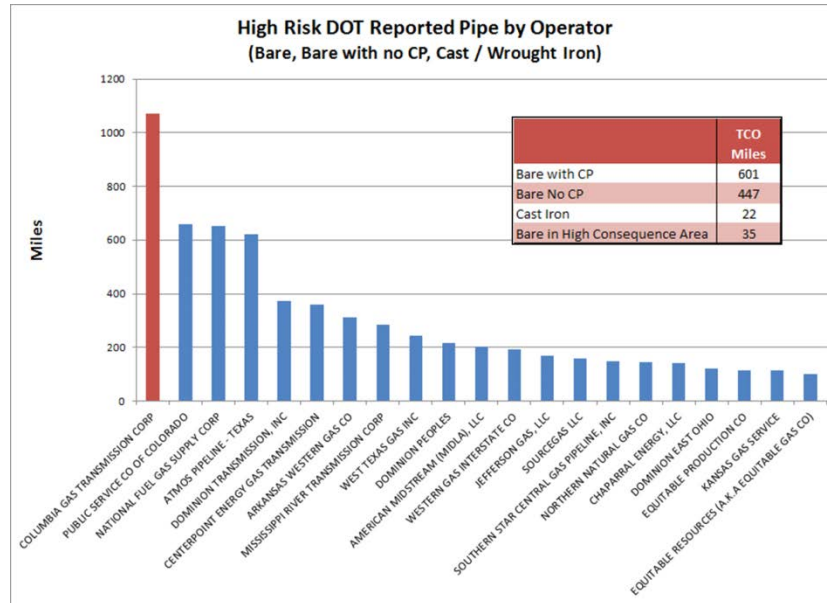


Figure 3. High risk DOT reported pipelines by operator.

TCO Assets - Facilities

TCO operates over 300 compressor units delivering approximately 650,000 horsepower. The compression fleet has an age distribution similar to that of the pipeline system, as shown in Figure 5, with approximately 55% of the compressors installed prior to 1970. The compressor fleet consists of an array of turbines, reciprocating engines and electric motors from a variety of manufacturers.

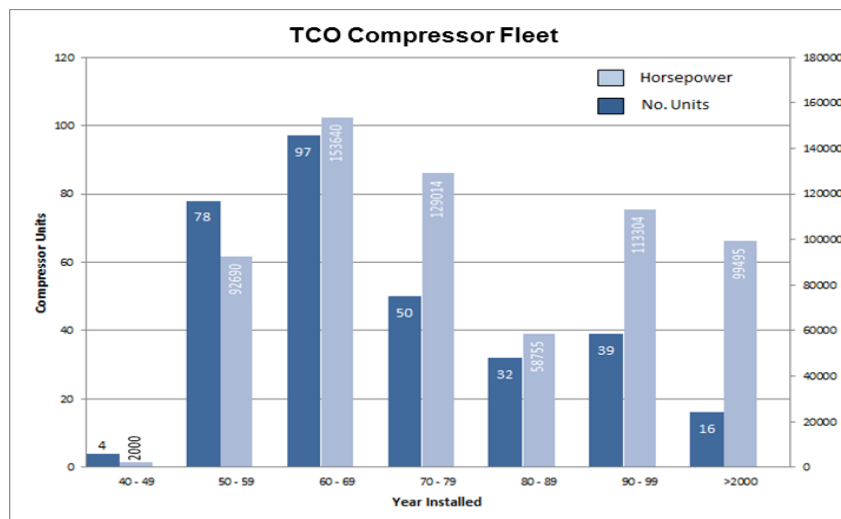


Figure 5. Overview of TCO compressor fleet by decade of installation.

In 2010, the Company’s internal strategic reliability program identified 18 facilities as “high commercial risk” (HCR) facilities. An HCR is a facility that is at a high risk of causing an upset to firm transportation in

Eligible Facilities Plan

the event of a reliability failure. At the 18 HCR facilities, it was identified that 57 compressor units must be available 100% of the time for a four month period from November to March in order to ensure all firm deliveries can be made. Assessments of the 18 facilities have been performed and reliability enhancement projects have been developed for each facility. In general, the modernization of automation and control systems is identified as a need to enable reliable operation and real time monitoring and troubleshooting. Modernizing automation systems will also enable more advanced predictive and preventative maintenance.

Modernizing control systems can significantly improve reliability at critical facilities; however, there remains no redundancy or excess capacity at these older vintage facilities. It is clear that full reliability cannot be achieved without replacing certain compression units. In many cases, replaced horsepower will be retained on site to provide standby compression for use during both planned and unplanned outages. In addition to replacements, the modernization plan includes horsepower uprates, all as required to create full reliability.

Evolving greenhouse gas regulations also lead to requirements for horsepower replacement. It is currently estimated that several horsepower replacements will be required over the next ten years.

Modernization Project Plan

Modernization projects are identified and prioritized by identifying aging infrastructure that: 1) operates at a relatively high level of risk, 2) will require upgrades to meet emerging regulations, and/or 3) has lower than desired reliability to meet current or future service requirements due to current design and/or condition. Projects are prioritized and grouped in order to maximize the value of expenditures to meet these risk, compliance and customer needs.

For the purpose of the Modernization Plan, projects primarily focus in the following key areas:

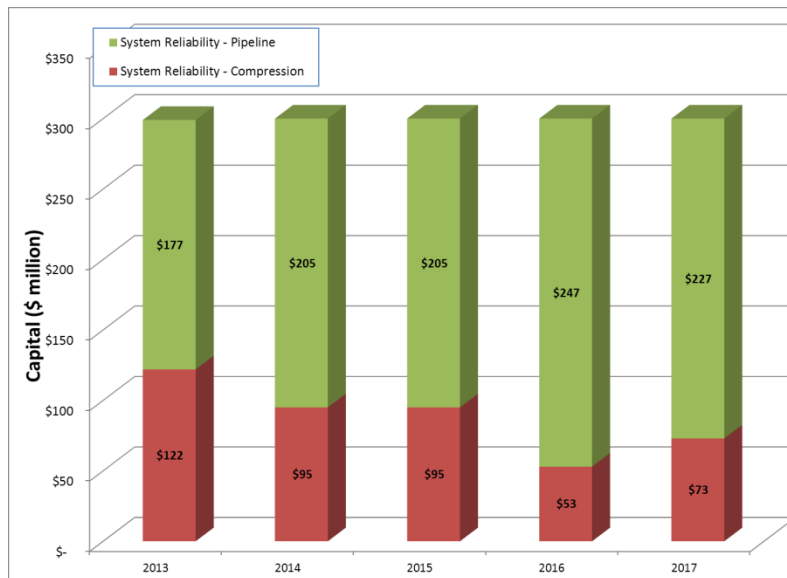
1. **System Reliability - Pipeline.** These projects typically include the replacement of high pressure bare steel; pipelines with a history of failure and/or bare steel located in high consequence areas. These projects are typically considered the most impactful from a pipeline safety risk reduction perspective and the most beneficial to the general public, as recognized by key regulatory and pipeline safety agencies. These projects also focus on modernizing pipelines through rehabilitation, strategic replacements and looping of aging pipelines. These projects are focused where not only constraint is the highest and where customers can benefit the most, but also where risk analysis and integrity assessments indicate the need for modernization. Where possible, these projects are integrated with compression reliability projects to provide the greatest benefit. These projects are considered the most impactful from a customer reliability and pipeline safety perspective and are the most beneficial to key shippers and end customers as well as to regulatory and public safety stakeholders.
2. **System Reliability - Compression.** These projects focus on modernizing compression equipment through the installation of advanced control systems and the strategic replacement of aging horsepower. These projects are focused along mainlines where constraint is the highest and where customers can benefit the most. Emphasis is on the most constrained systems that serve a broad customer base. These projects are considered most impactful from a customer reliability perspective. Significant benefit from an air emissions and efficiency perspective is also realized.

Eligible Facilities Plan

The investment schedule for years 2013 through 2017 of the Modernization Program is depicted below. Projects have been identified and scoped with initial estimates through 2017. An inventory of modernization projects has been identified that provides for a long term program (10-15 years); however, initial scopes and estimates have currently been developed through 2017 in recognition of the potential for assumptions to change as the program progresses. In addition, near term projects have more refined estimates and projects further out are represented as an order of magnitude and estimates will refine as the projects develop further.

Modernization Plan 2013-2017 (\$ million)

	2013	2014	2015	2016	2017
System Reliability - Pipeline	177	205	205	247	227
System Reliability - Compressor	122	95	95	53	73
TOTAL	299	300	300	300	300



Eligible Facilities Plan

Project Overview – 2013

In 2013, modernization projects focus on high risk pipelines and system reliability compression and pipeline projects. High risk pipeline projects consist of replacements of bare steel in high consequence areas and replacements of wrought iron pipe. The system reliability compression and pipeline projects consist of modernizing compression and pipeline infrastructure along key mainlines that serve a broad customer base and provide for significant increases to reliability and efficiency. These investments, as a by-product, will also increase system flexibility. A summary of the investment for 2013 is provided below, followed by a brief overview of each project. **Projects and costs represent the investment placed in service between the period beginning January 1, 2013 and ending October 31, 2013.**

2013 Capital (\$ million)

System Reliability – Pipeline	
Bare Steel in HCA	24.4
Wrought Iron Replacements	28.7
Line PM-117	14.0
Line PM-17	20.0
Line SM-81	9.0
WB System Efficiency	33.0
MB Uprate	7.2
MB Loop Extension (phase 1)	41.0
System Reliability – Compressor	
Seneca Horsepower Replacement	34.0
Frametown Horsepower Replacement	26.0
Lost River Horsepower Replacement	40.0
Control System Replacements	22.4

TOTAL \$299.7

Bare Steel in High Consequence Areas – \$24.4 million

The Bare Steel in High Consequence Areas consists of pipe replacements along five different high pressure trunklines.

1	Line 1655 – Replace 1.7 miles of Bare in HCA	\$5,200,000
2	Line 1711 – Replace 3 miles of Bare in HCA	\$9,000,000
3	Line 1570 – Replace 5.9 miles of Bare in HCA	\$5,000,000
4	Line 14 – Replace 1.1 miles of Bare in HCA	\$1,600,000
5	Line 5 – Replace 1.9 miles of Bare in HCA	\$3,600,000

Total \$24,400,000

Eligible Facilities Plan

Wrought Iron Pipe Replacements – \$28.7 million

The Wrought Iron Pipe Replacements consist of pipe replacements along six different wrought iron pipelines.

1	Line 36 - Replace 13.5 miles of Wrought Iron	\$8,800,000
2	Line 23 – Replace 13 miles of Wrought Iron	\$6,000,000
3	Line 3662 - Replace 5.3 miles of Wrought Iron	\$2,400,000
4	Line 40 - Replace 4.3 miles of Wrought Iron	\$3,400,000
5	Line A120 / A117 - Replace 15.68 miles of Wrought Iron	\$7,800,000
6	Line 3874 - Retire 4383 feet of Wrought Iron	\$400,000
Total		\$28,700,000

Line PM-117 – \$14 million

The Line PM-117 project consists of pipe replacement along a 10-inch diameter pipeline with MAOP of 295 psig. PM-117 is similar in operating characteristics to Line P, which experienced a rupture in 2010 that resulted in a compliance order from PHMSA and a mandatory pipeline replacement. Line PM-117 consists of 6.7 miles of 10-inch diameter pipe that was originally constructed in 1912 as a bare, coupled pipeline without cathodic protection.

Line PM-17 – \$20 million

The Line PM-17 project consists of pipe replacement of approximately 9 miles of bare steel with MAOP of 180 psig. PM-17 contains multiple diameters of 12-inch, 16-inch, and 20-inch bare, coupled pipe. Line PM-17 serves as the suction line for Boldman Compressor Station and contains approximately 9 miles of bare pipeline.

Line SM-81 – \$9 million

The Line SM-81 project consists of replacing 1.7 miles of 20-inch diameter pipe that has an MAOP of 1000 psig. A leak caused by internal corrosion occurred on SM-81 in 2011 that led to a shut-in of the line. As a result of the PHMSA order, the operating pressure of the line is restricted to 480 psig until it is replaced. As part of the replacement project, launchers and receivers will be installed in order to enable pigging of this system to allow for monitoring and prevention of future internal corrosion.

WB Pipeline System Efficiency – \$33 million

The WB System Efficiency project consists of a project aimed at maximizing the efficiency of the WB mainline system. The project consists of the installation of launchers and receivers on currently unpiggable sections of the WB System. Pigging can be used to maintain higher levels of efficiency and will also serve to modernize the assets for future integrity assessment. A summary of the key project components is provided below:

1. WB Efficiency- install launchers & receivers, replace valves for pigging and cleaning (\$25MM)
Installing launchers and receivers for pigging operations has historically been considered a pipeline and integrity function. From a system reliability perspective, there are significant pipeline efficiency yields from cleaning and pigging high capacity lines. Pipeline efficiency gains can free up inherently available capacity, resulting in the reduction of horsepower constraints.

Eligible Facilities Plan

Cleaning strategic segments of our pipeline will yield increased reliability increase across the WB system and will alleviate constraints.

- a. WB 5 (36" line) from Panther Mt. to Frametown CS – Install launcher/receiver, replace 2 tees, install filter / separator at Frametown
- b. WB Loop (26" line) from Panther Mt. to Frametown CS – Install launcher/receiver, replace 2 plug valves and 1 tee, install filter / separator at Frametown
- c. WB Loop (36" line) from Seneca CS to Smoke Hole VS – Install launcher/receiver, remove plugged drip, increase capability of filter/separator at Seneca CS
- d. WB (26" line) from Smoke Hole VS to Moorefield VS - Install permanent launcher/receiver at the temporary valve sets
- e. WB (26" line) from Cobb CS to Big Otter Creek VS – Install launcher/receiver, replace 1 plug valve and 3 tees
- f. WB Loop (26" line) from Frametown CS to Cleveland CS – Install launcher/receiver, replace 2-3 plug valves and 1 tee
- g. WB (26" line) from Hemlock Gate to Files Creek CS – Install launcher/receiver

MB Uprate – \$7.2 million

The MAOP of the existing Line MB is restricted due to a short section of pipe located downstream of Linden Church. The project will result in the restoring of MAOP to 1000 psig between Linden Church and Granite by replacing 1.08 miles of 26" pipe (1435+85 - E. Side of Route 40 to 1492+76 - Turf Valley Golf Course) and some piping at Linden Church. The MB Uprate will support the MB Looping project described below by enabling greater ability to perform maintenance and mitigate both planned and unplanned outages along the parallel Line MA.

MB Looping (phase 1) – \$41 million

Line MB is a critical mainline that serves the Eastern market. Line MB runs parallel to Line MA for a portion of its length but ends at Owings Mills, leaving a single line (Line MA) from Owings Mills to Rutledge Compressor Station. Line MA and MB are of particular importance to Baltimore Gas and Electric (BGE), as they provide the sole source of supply for several critical markets. BGE has raised concerns with the lack of redundancy for the single line section of Line MA. Line MB and MA share right of way with power lines for part of the route and there is history of AC interference issues that elevate the risk of corrosion.

Line MA is a single line for approximately 20 miles, from Owings Mills to Rutledge Compressor Station. The 26-inch diameter Line MB will be extended for 20.41 from Owings Mills to Rutledge, providing additional service to three critical points of delivery. In 2013, the first six miles of the project will be completed from Rutledge to the Manor Road point of delivery.

Critical Horsepower Replacements (3 Projects, \$100 million total)

Areas along the NG&TS system with the highest constraints at design day conditions were identified and overlaid with opportunities to modernize compression equipment and provide for increased reliability, flexibility and efficiency. Horsepower replacements at three facilities along the WB system were identified as the most beneficial from a customer reliability perspective. Each of these facilities has

Eligible Facilities Plan

antiquated horsepower that is not considered fuel efficient and may not comply with emerging air emissions requirements. During winter operations at two of the facilities, if a single unit is taken offline, design day requirements cannot be met.

Horsepower Driver Selection Process: There are three (3) primary drivers for compression: turbine engines, reciprocating engines, and electric motors. Each has their own advantages and disadvantages. As shown below, a stepped approach was used to identify the appropriate driver for each facility.

1. Identify potential replacement horsepower at the existing facility
2. Verify FERC certificated horsepower limits
3. Reciprocating Engines
 - a. Horsepower requirement < 6,500 HP
 - b. Large compression ratio required
4. Electric Motors
 - a. Determine feasibility based on distance from facility location to reliable main line electrical transmission.
5. Turbine Engines
 - a. Horsepower requirement > 6,500 HP
 - b. High flow/Low compression ratio

- Seneca CS Horsepower Replacement – \$34 million

To increase the overall reliability of Seneca station, the current GE Frame 3 (13,750 HP) will move to emergency standby and be replaced by a Solar Mars 100S turbine (15,000 ISO HP / 13,750 HP at site conditions). This driver was selected because the required horsepower was greater than 6,500 HP and the station is located approximately 7.5 miles away from mainline electrical transmission. Also, this facility serves the Eastern market (i.e., WB System) which is a high flow/low compression ratio mainline transmission pipeline. This unit will be a Section 2.55(b) filing to ensure a 1:1 horsepower replacement.

An additional unit (Solar Saturn) will be installed at Seneca to add throughput for the Terra Alta storage field during the injection season by increasing the suction pressure on WB-3. This unit will be moved from the Adaline CS and sent to Solar for repair/uprating, prior to installation at Seneca.

Current Horsepower				Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	ISO HP
Solar	Taurus 60	2008	7,700	Solar	Taurus 60	2008	7,700
Solar	Taurus 60	2008	7,700	Solar	Taurus 60	2008	7,700
GE	Frame 3	1981	13,750	Solar	Mars 100	2013	13,750
Stand-by HP			6,200	Solar	Saturn	2013	1,360
				GE	Frame 3	1981	13,750
Total Certificated HP			29,150	Total Proposed HP			30,510

Orange = Emergency Standby Blue = Separate filing Gray = Stand-by

Eligible Facilities Plan

- Frametown CS Horsepower Replacement – \$26 million

Frametown’s current certificated horsepower is 18,665 NEMA rated. The NEMA rating was common practice when industrial turbines came to market in the late 1960’s. It is the amount of work the turbine can produce at 80 deg F at 1000 feet above sea level. Today, most turbines are rated using the ISO standard which is at 59 deg F at sea level. A NEMA rated turbine will have more horsepower when converted to the ISO standard. Thus, the current certificated horsepower converted to ISO rating is 21,200. To increase the overall reliability of the station, the current Rolls-Royce Avon turbine (14,640 ISO HP), installed in 1973, will move to emergency standby. This unit will be replaced by a Solar Mars 100S (14,640 ISO HP) turbine. This driver was selected because the required horsepower was greater than 6,500 HP and the station is located approximately 7.7 miles away from mainline electrical transmission. Also, this facility serves the Eastern market (i.e., WB System) which is a high flow/low compression ratio mainline transmission pipeline.

Frametown Current Horsepower				Frametown Proposed Horsepower			
Make	Model	Install Date	HP (ISO)	Make	Model	Install Date	ISO HP
Solar	Centaur	1971	3,280	Solar	Centaur	1971	3,280
Solar	Centaur	1973	3,280	Solar	Centaur	1973	3,280
RR	Avon	1973	14,640	RR	Avon	1973	14,640
				Solar	Mars 100S	2013	14,640
Total Certificated HP			21,200	Total Proposed HP			21,200

Orange = Emergency Standby

- Lost River CS Horsepower Replacement – \$40 million

Lost River Compressor Station is located at the end of the WB System and splits into the WB2VA (South Operation) and VB (East Operation) systems. In 2010, a failure occurred on a Clark TLA-8 during peak day conditions, resulting in a force majeure. The station consists of multiple reciprocating units ranging in size to create greater flexibility due to the split discharge flow conditions. A smaller turbine with large turndown capability is recommended to handle the base load conditions while fine adjustments and flexibility will be achieved by utilizing the smaller reciprocating units.

To increase the overall reliability of the station, One (1) Clark TLAD-10 (4,000 HP) and three (3) Clark TLA-8 (2,700 HP) reciprocating units will move to emergency standby, and three (3) Clark HSRA-8T (1,320 HP) units will be retired. These units will be upgraded by two (2) Solar Taurus 70 (10,320 ISO HP). It is important to note that reciprocating units are not typically rated at either NEMA or ISO standard. They are rated at 80-100 deg F at 1000 feet above sea level. Thus, the replacement horsepower must deliver 8,030 HP at 80 deg F to remain below the FERC total certificated horsepower. This driver was selected because the required horsepower was greater than 6,500 HP and the station is located approximately 7.5 miles away from mainline electrical transmission. Also, this facility serves the Eastern market (i.e., WB2VA and VA), which is a high flow/low compression ratio main line transmission pipeline. This base load turbine will also aid

Eligible Facilities Plan

during winter operations by providing more throughput to the VA System. Currently, it is difficult to maintain a differential across the station when the downstream facility (Strasburg) units are online.

Due to nearby noise sensitive areas (NSAs) exceeding the recommended threshold of 55 Ldn dBA, noise abatement at the facility will be necessary prior/during installation of new horsepower. In an earlier FERC proceeding, NGT&S stated that "in lieu of immediate implementation of sound attenuation measures, Columbia will incorporate sound attenuation measures as facility components are replaced during the normal maintenance process. Similarly, if and when it becomes necessary to make structural repairs to the existing compressor building, Columbia will replace applicable portions of the roof and wall systems at that time. Thus, sound attenuation measures will be incorporated into future compressor station normal maintenance and repairs."

The installation of new horsepower will require that a noise study of the facility be conducted along with potential attenuation strategies. After the study is conducted, the existing conditions will be conveyed to the turbine manufacturer to provide noise level estimates after the unit is installed. This may require additional insulation of the intake and exhaust ducts of the unit. It must be noted that per the replacement horsepower strategy detailed above, several of the old reciprocating engines will move to emergency standby, potentially reducing the overall noise footprint of the station. Additionally, the new turbine will be located opposite the nearest NSA.

Lost River Current Horsepower				Lost River Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
Clark	HSRA-8T	1953	1,320	Clark	HSRA-8T	1953	1,320
Clark	HSRA-8T	1953	1,320	Clark	HSRA-8T	1953	1,320
Clark	HSRA-8T	1953	1,320	Clark	HSRA-8T	1953	1,320
Clark	HSRA-8T	1953	1,320	Clark	HSRA-8T	1953	1,320
Clark	HSRA-8T	1954	1,320	Clark	HSRA-8T	1954	1,320
Clark	HSRA-8T	1954	1,320	Clark	HSRA-8T	1954	1,320
Clark	TLA-8	1970	2,700	Clark	TLA-8	1970	2,700
Clark	TLA-8	1970	2,700	Clark	TLA-8	1970	2,700
Clark	TLA-8	1970	2,700	Clark	TLA-8	1970	2,700
Clark	TLAD-10	1991	4,000	Clark	TLAD-10	1991	4,000
CAT	G3616	2009	4,735	CAT	G3616	2009	4,735
				Solar	Taurus 70	2013	8,030
				Solar	Taurus 70	2013	8,030
Total Certificated HP			22,115	Total Proposed HP			22,115

Orange = Emergency Standby Gray = Retired

Eligible Facilities Plan

Control System Replacements (\$22.4 million)

The Control System Upgrade Project consists of replacing outdated and unreliable control systems at the highest risk facilities from a customer reliability perspective. In 2013, projects include replacement of control systems and related reliability enhancements at nine (9) locations.

The 2013 projects support a strategy to deliver quick and significant reliability improvements while also supporting remote monitoring, advanced analysis and preventive maintenance. In conjunction with control system upgrades, an advanced reliability monitoring system is being implemented to enable the prevention of failures, the optimization of equipment and the measurement of performance in real time.

1	Adaline CS – Replace unit control panels	\$470,000
2	Artemas CS – Replace unit control panels	\$2,000,000
3	Easton CS – Replace unit, station and generator control panels	\$1,300,000
4	Salisbury CS – Replace unit and station control panels	\$3,200,000
5	Louisa CS – Replace unit, station and generator control panels	\$2,000,000
6	Lucas CS – Replace unit, dehy and generator control panels	\$2,100,000
7	Terra Alta CS – Replace station control panel	\$150,000
8	Bickers CS – Replace station panel and gas detection	\$235,000
9	Loudoun CS – Replace unit, station and generator control panels	\$5,200,000
10	Real time reliability system implementation	\$5,700,000
Total		\$22,355,000

Project Overview – 2014

In 2014, modernization projects continue the focus on high risk pipelines and system reliability compression projects. The 2014 pipeline projects consist of replacing bare steel along critical mainlines and the compression projects consist of continuing to modernize compression infrastructure along key mainlines that serve a broad customer base and provide for significant increases to reliability and efficiency. These investments, as a by-product, will also increase system flexibility. A summary of the investment for 2014 is provided below, followed by a brief overview of each project. **Projects and costs represent the investment placed in service between the period beginning November 1, 2013 and ending October 31, 2014.**

2014 Capital (\$ million)	
System Reliability – Pipeline	
Line 1570 – Waynesburg North	75.0
R-System Looping	22.0
MB Loop Extension (phase 2)	73.6
Line 1655	28.0
WB5 Uprate	6.0
System Reliability – Compressor	
Waynesburg Horsepower Replacement	20.0
Gettysburg Horsepower Replacement	20.0
Greencastle Horsepower Replacement	20.0
Rockport Horsepower Replacement	18.4
Control System Replacements	17.0
TOTAL	\$300.0

Line 1570 – Waynesburg North – \$75 million

Line 1570 is a mainline that moves gas throughout the Pittsburgh supply basin to various markets and mainlines with MAOP of 920 psig. This project includes the replacement of 25 miles of 20-inch diameter bare steel north of the Waynesburg compressor station.

R-System Looping – \$22 million

The R-System is a critical mainline system that transports gas into and throughout the Ohio market. Most of the R-System has been looped to create flexibility and reliability for Ohio customers; however, several short sections of remaining looping are required to further ensure reliability. This project includes the installation of 5.5 miles of 24-inch diameter pipe, extending R-701 north of Macarthur Compressor Station.

MB Looping (phase 2) – \$73.6 million

Line MB is a critical mainline that serves the Eastern market. Line MB runs parallel to Line MA for a portion of its length but ends at Owings Mills, leaving a single line (Line MA) from Owings Mills to Rutledge Compressor Station. Line MA and MB are of particular importance to Baltimore Gas and Electric (BGE), as they provide the sole source of supply for several critical markets. BGE has raised concerns with the lack of redundancy for the single line section of Line MA. Line MB and MA share right

Eligible Facilities Plan

of way with power lines for part of the route and there is history of AC interference issues that elevate the risk of corrosion.

Line MA is a single line for approximately 20 miles, from Owings Mills to Rutledge Compressor Station. The 26-inch diameter Line MB will be extended for 20.41 from Owings Mills to Rutledge, providing additional service to three critical points of delivery. In 2014, the remaining 14 miles of the project will be completed from Owings Mills to the Manor Road point of delivery.

Line 1655 – \$28 million

Line 1655 serves the Hanover and Harrisburg markets in Southwestern Pennsylvania. This project consists of replacing 14 miles of 8-inch diameter bare pipe with MAOP of 500 psig.

WB5 Uprate – \$6 million

The WB5 Uprate project consists of a reconfiguration in order to segregate the WB5 loop to enable it to operate at its full MAOP of 1000 psig. Due to current configuration, WB5 is limited to the 800 psig MAOP of the two parallel pipelines.

Critical Horsepower Replacements (4 Projects, \$78.4 million total)

Areas along the NG&TS system with the highest constraints at design day conditions were identified and overlaid with opportunities to modernize compression equipment and provide for increased reliability, flexibility and efficiency. Each of these facilities has antiquated horsepower that is not considered fuel efficient and may not comply with emerging air emissions requirements.

- Waynesburg Horsepower Replacement – \$20 million

Waynesburg Compressor Station is located at the beginning of the 1804 system and has four Solar Saturn compressors. This project will include the installation of a 4,700 HP unit and the conversion of three (3) Saturns to standby service.

Waynesburg Current Horsepower				Waynesburg Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
Solar	Saturn	1967	1,080	Solar	Saturn	1967	1,080
Solar	Saturn	1967	1,080	Solar	Saturn	1967	1,080
Solar	Saturn	1968	1,080	Solar	Saturn	1968	1,080
Solar	Saturn	1970	1,080	Solar	Saturn	1970	1,080
Solar	Saturn	1970	1,080	Solar	Saturn	1970	1,080
				Solar	Centaur	2014	3,240
Total Certificated HP			5,400	Total Proposed HP			5,400

Orange = Emergency Standby

- Gettysburg Horsepower Replacement – \$20 million

Gettysburg Compressor Station is located along the 1804 system and is a critical facility for deliveries from West to East. This project will include the installation of a 4,700 HP unit and the conversion of three (3) Saturns to standby service.

Eligible Facilities Plan

Gettysburg Current Horsepower				Gettysburg Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
Solar	Centaur	1971	3,280	Solar	Centaur	1971	3,280
Solar	Saturn	1967	1,080	Solar	Saturn	1967	1,080
Solar	Saturn	1967	1,080	Solar	Saturn	1967	1,080
Solar	Saturn	1968	1,080	Solar	Saturn	1968	1,080
				Solar	Centaur	2014	3,240
Total Certificated HP			6,520	Total Proposed HP			6,520

Orange = Emergency Standby

- Greencastle Horsepower Replacement – \$20 million
 Greencastle Compressor Station is located along the 1804 system and is a critical facility for deliveries from West to East. This project will include the Installation of 4,700 HP and conversion of three (3) Saturns to standby service.

Greencastle Current Horsepower				Greencastle Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
Solar	Centaur	1980	3,830	Solar	Centaur	1980	3,830
Solar	Saturn	1969	1,080	Solar	Saturn	1969	1,080
Solar	Saturn	1969	1,080	Solar	Saturn	1969	1,080
Solar	Saturn	1969	1,080	Solar	Saturn	1969	1,080
				Solar	Centaur	2014	3,240
Total Certificated HP			7,070	Total Proposed HP			7,070

Orange = Emergency Standby

- Rockport Horsepower Replacement - \$18.4 million
 Rockport compressor station is the site of the last remaining horizontal compressors throughout the NGT&S fleet. Horizontal compressors are obsolete technology and the three units at Rockport will not comply with air emissions requirements that go in effect in 2014. This project includes the replacement of the three horizontal units with modern electric or reciprocating units. To reduce the overall cost and footprint of the installation, it is recommended that two replacement units be installed. Since this station services a storage facility, the operational range the units need to provide is substantial. At the start of the injection cycle (i.e., summer,) the compressor differential pressure is lower (i.e., less injection resistance) and as the injection season progresses, the differential pressure grows incrementally once the field begins to fill (i.e. more injection resistance).

If reciprocating units are installed, an advanced unloading system will be required to provide the necessary operating range. Additionally, due to the horsepower constraints of reciprocating units, two 1,750 HP Caterpillar G3606 are recommended, which would increase the total certificated horsepower of the facility from 3,300 HP to 3,500 HP, requiring re-certification of station horsepower. Electric VFD motors have the potential to deliver the range needed for operation and two Siemens ROBICON Perfect Harmony rated at 1,650 HP/each would be

Eligible Facilities Plan

recommended (3,300 HP total). A preliminary study has located mainline electric transmission approximately three miles away from the facility. Electric units would require a mainline electric transmission line to be constructed and a substation constructed at the facility to power the electric motors. Unit selection will be finalized during the engineering of the replacement project.

Rockport Current Horsepower				Rockport Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
C-B	Twin Horiz.	1955	1,000	C-B	Twin Horiz.	1955	1,000
C-B	Twin Horiz.	1955	1,000	C-B	Twin Horiz.	1955	1,000
C-B	Twin Horiz.	1955	1,000	C-B	Twin Horiz.	1955	1,000
				TBD		2014	1,500
				TBD		2014	1,500
Total Certificated HP			3,000	Total Proposed HP			3,000

Gray = Retired

Control System Replacements (\$17.0 million)

The Control System Replacement Project consists of replacing outdated and unreliable control systems at the highest risk facilities from a customer reliability perspective. In 2014, projects include replacement of control systems and related reliability enhancements at 12 locations.

The 2014 projects support a strategy to deliver quick and significant reliability improvements while also supporting remote monitoring, advanced analysis and preventive maintenance. In conjunction with control system upgrades, an advanced reliability monitoring system is being implemented to enable the prevention of failures, the optimization of equipment and the measurement of performance in real time.

1	Boldman CS – Replace unit, station and generator control panels	\$700,000
2	Bruceton Mills CS – Replace unit, station and generator control panels	\$3,200,000
3	Downingtown CS – Replace unit and station control panels	\$400,000
4	Flat Top CS – Replace unit, station and generator control panels	\$400,000
5	Huff Creek CS – Replace unit, station and generator control panels	\$400,000
6	Lanham CS – Replace unit, station and generator control panels	\$1,600,000
7	Pavonia – Replace unit, station and generator control panels	\$1,000,000
8	Petersburg CS – Replace unit, station and generator control panels	\$1,800,000
9	Weaver – Replace unit, station and generator control panels	\$1,500,000
10	Adaline CS – Replace station control panel	\$300,000
11	Lucas CS – Replace station control panel	\$300,000
12	Delmont CS – Replace unit, station and generator control panels	\$400,000
13	Real Time System & Other Reliability Enhancements	\$5,000,000

Total \$17,000,000

Project Overview – 2015

In 2015, modernization projects continue the focus on high risk pipelines and system reliability compression projects. An inventory of projects with initial scopes and estimates has been developed; however, detailed scope and estimates have not yet been prepared; therefore, the budgetary numbers reflected are rough estimates and will change as projects are further developed. As scopes and estimates are refined, projects may be moved to future years or additional projects may be added, depending on changes to budgets and estimates.

The 2015 high risk pipeline projects consist of replacements of high pressure bare steel along critical mainlines. The system reliability compression and pipeline projects consist of continuing to modernize compression and pipeline infrastructure along key mainlines that serve a broad customer base and provide for significant increases to reliability and efficiency. These investments, as a by-product, will also increase system flexibility. A summary of the investment for 2015 is provided below, followed by a brief overview of each project. **Projects and costs represent the investment placed in service between the period beginning November 1, 2014 and ending October 31, 2015.**

2015 Capital (\$ million)	
System Reliability – Pipeline	
Line EKY	22.0
Line 1570 – Waynesburg South	80.0
WB2VA Looping	80.0
Line V100 / V30	23.0
System Reliability – Compressor	
Cleveland Horsepower Replacement	30.0
Files Creek Horsepower Replacement	30.0
Hellertown Horsepower Replacement	16.9
Control System Replacements	18.1
TOTAL	\$300.0

Line EKY – \$22 million

Line EKY is a mainline that is part of the KOT system and that provides critical service to the Cincinnati market. Line EKY is a 14-inch diameter pipeline with MAOP of 1000 psig. This project includes the replacement of 8.6 miles of bare pipe with 14-inch diameter coated pipe and the installation of pigging facilities along Lines EKY, E-Loop, and EM-7.

Line 1570 – Waynesburg South – \$80 million

Line 1570 is a mainline that moves gas throughout the Pittsburgh supply basin to various markets and mainlines with MAOP of 920 psig. This project includes the replacement of 25 miles of 20-inch diameter bare steel south of the Waynesburg compressor station.

WB2VA System Looping – \$80 million

Line WB2VA is a critical mainline that serves the Eastern market. It extends from Lost River Compressor Station to Bickers Compressor Station, connecting the WB system to the KA, VM and VA systems, enabling gas movement around critical markets. Much of the WB2VA system has been looped;

Eligible Facilities Plan

however, several short sections of single line remain and pose a risk to reliability. This project consists of completing the looping of the WB2VA system in order to provide enhanced reliability and flexibility.

The project consists of extending the existing 24-inch diameter loop for 6.28 miles at the discharge of the Lost River Compressor Station (approximately 0+00 to 331+56) (\$27MM). In addition, a 24-inch loop extension will be performed for 4.22 miles at the suction of the Shenandoah Compressor Station (approximately 1147+48 to 1374+87) (\$19MM). The project includes extending the existing 24-inch diameter loop for 3.79 miles at the discharge of the Shenandoah Compressor Station (approximately 1374+87 to 1569+46) (\$17MM). Finally, a 24-inch loop extension will be performed for 4.45 miles at the suction of the Bickers Compressor Station (approximately 2062+91 to 2327+36) (\$17MM).

Line V100 / V30 - \$23 million

Line V100 and V30 are pipelines located in Ohio that contain bare steel and have MAOP of 225 psig and 500 psig respectively. This project includes the replacement of 2.8 miles of 8-inch diameter bare pipe along V100, and the replacement of bare steel along Line V30, which contains a total of 16 miles of 10-inch diameter bare pipe.

Critical Horsepower Replacements (3 Projects, \$77 million total)

Areas along the NG&TS system with the highest constraints at design day conditions were identified and overlaid with opportunities to modernize compression equipment and provide for increased reliability, flexibility and efficiency. Each of these facilities has antiquated horsepower that is not considered fuel efficient and may not comply with emerging air emissions requirements.

- Cleveland Horsepower Replacement – \$30 million

Cleveland Compressor Station is located along the WB system and has multiple reciprocating engines that were installed from 1954-1969. This project will include the installation of a 6,600 HP unit and conversion of six (6) GMV's to standby service.

Cleveland Current Horsepower				Cleveland Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
C-B	GMVA-8	1954	1,100	C-B	GMVA-8	1954	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
Allison	501-K13C	1973	3,165	Allison	501-K13C	1973	3,165
				Solar	Taurus 60	2015	6,600
Total Certificated HP			17,765	Total Proposed HP			17,765

Orange = Emergency Standby

Eligible Facilities Plan

- Files Creek Horsepower Replacement - \$30 million

Files Creek Compressor Station is located along the WB system and has multiple reciprocating engines that were installed from 1951-1969. This project will include the installation of 6,600 HP and conversion of six (6) GMV's to standby service.

Files Creek Current Horsepower				Files Creek Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
C-B	GMVA-8	1951	1,100	C-B	GMVA-8	1954	1,100
C-B	GMVA-8	1951	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1951	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1951	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1952	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1952	1,100	C-B	GMVA-8	1953	1,100
C-B	GMWA-8	1957	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1968	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
				Solar	Taurus 60	2015	6,600
Total Certificated HP			14,600	Total Proposed HP			14,600

Orange = Emergency Standby

- Hellertown Horsepower Replacement – \$16.9 million

Hellertown Compressor Station is located at the intersection of the 1278 System and the N-JET System. This project will include the installation of a 2,200 HP unit and the conversion of two (2) White Superiors to standby service.

Hellertown Current Horsepower				Hellertown Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
W-S	W-S 8GTLB	1995	1,100	W-S	W-S 8GTLB	1995	1,100
W-S	W-S 8GTLB	1995	1,100	W-S	W-S 8GTLB	1995	1,100
				Solar	Saturn	2015	2,200
Total Certificated HP			2,200	Total Proposed HP			2,200

Orange = Emergency Standby

Control System Replacements – \$18.1 million

The Control System Replacement Project consists of replacing outdated and unreliable control systems at the highest risk facilities from a customer reliability perspective. In 2015, projects include replacement of control systems and related reliability enhancements at six (6) locations.

The 2015 projects support a strategy to deliver quick and significant reliability improvements while supporting remote monitoring, advanced analysis and preventive maintenance. In addition, an advanced reliability monitoring system is being implemented to enable the prevention of failures, the optimization of equipment and the measurement of performance in real time.

Project Overview – 2016

In 2016, modernization projects continue the focus on pipeline and compression reliability projects. An inventory of projects with initial scopes and estimates has been developed; however, detailed scope and estimates have not yet been prepared; therefore, the budgetary numbers reflected are rough estimates and will change as projects are further developed. As scopes and estimates are refined, projects may be moved to future years or additional projects may be added, depending on changes to budgets and estimates.

Projects consist of replacing high pressure bare steel along critical mainlines and continuing to modernize compression along key mainlines that serve a broad customer base and provide for significant increases to reliability and efficiency. These investments, as a by-product, will also increase system flexibility. A summary of the investment for 2016 is provided below. **Projects and costs represent the investment placed in service between the period beginning November 1, 2015 and ending October 31, 2016**

<u>2016 Capital (\$ million)</u>	
System Reliability – Pipeline	
Line 149	47.0
T-System	100.0
Line 1360 Smithfield to Glenville	100.0
System Reliability – Compressor	
Files Creek Horsepower Replacement	30.0
Gala Horsepower Replacement	23.0
TOTAL	\$300.0

System Reliability – Pipeline

- Line 149 – \$47 million
 - Replace approximately 20 miles of 20-inch diameter bare steel between the Majorsville and Waynesburg compressor stations with MAOP of 250 psig
- T-System – \$100 million
 - Replace 46 miles of 16 and 20-inch diameter bare steel and retire 16 miles of 16 and 20-inch diameter bare steel between the Glenville and Clendenin compressor stations with MAOP of 450 psig
- Line 1360 Smithfield to Glenville – \$100 million
 - Line 1360 is a mainline that moves gas throughout the Pittsburgh supply basin to various markets and mainlines with MAOP of 400 psig. This project includes the replacement of 45 miles of 16-inch diameter bare pipe with coated pipe from Smithfield to Glenville.

Critical Horsepower Replacements (2 Projects, \$53 million total)

Areas along the NG&TS system with the highest constraints at design day conditions were identified and overlaid with opportunities to modernize compression equipment and provide for increased reliability, flexibility and efficiency. Each of these facilities has antiquated horsepower that is not considered fuel efficient and may not comply with emerging air emissions requirements.

Eligible Facilities Plan

- Files Creek Horsepower Replacement – \$30 million

Files Creek Compressor Station is located along the WB system. This project will include the removal of six (6) Cooper GMV-8 units, the installation of one (1) 8,000 HP unit and conversion of four (4) Cooper GMWA-8 units to standby service.

Files Creek Current Horsepower				Files Creek Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
C-B	GMVA-8	1954	1,100	C-B	GMVA-8	1954	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
Solar	Taurus 60	2015	6,600	Solar	Taurus 60	2015	6,600
				Solar	Taurus 70	2016	8,000
Total Certificated HP			14,600	Total Proposed HP			14,600

Orange = Emergency Standby Gray = Retired

- Gala Horsepower Replacement - \$23 million

Gala Compressor Station is located along the VA system. This project will include the installation of 4,850 HP and conversion of three (3) White Superiors to standby service.

Gala Current Horsepower				Gala Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
W-S	8GTLA	1983	1,100	W-S	8GTLA	1983	1,100
W-S	8GTLA	1983	1,100	W-S	8GTLA	1983	1,100
W-S	16SGTB	1997	2,650	W-S	16SGTB	1997	2,650
				Solar	Taurus 50	2016	4,850
Total Certificated HP			4,850	Total Proposed HP			4,850

Orange = Emergency Standby

Project Overview – 2017

In 2017, modernization projects continue the focus on pipeline and compression reliability projects. An inventory of projects with initial scopes and estimates has been developed; however, detailed scope and estimates have not yet been prepared; therefore, the budgetary numbers reflected are rough estimates and will change as projects are further developed. As scopes and estimates are refined, projects may be moved to future years or additional projects may be added, depending on changes to budgets and estimates.

Projects consist of replacing high pressure bare steel along critical mainlines and continuing to modernize compression along key mainlines that serve a broad customer base and provide for significant increases to reliability and efficiency. These investments, as a by-product, will also increase system flexibility. A summary of the investment for 2017 is provided below. **Projects and costs represent the investment placed in service between the period beginning November 1, 2016 and ending December 31, 2017**

<u>2017 Capital (\$ million)</u>	
System Reliability – Pipeline	
Line 1360 – Majorsville to Smithfield	90.0
Line E-Loop	28.0
Line 1758	39.0
Line 1528	8.0
Line R515	13.0
Line K205	7.0
Line 138	42.0
System Reliability – Compressor	
Cleveland Horsepower Replacement	29.0
Strasburg Horsepower Replacement	44.0
TOTAL	\$300.0

System Reliability – Pipeline

- Line 1360 – Majorsville to Smithfield - \$90 million
 - Replace approximately 37 miles of 16-inch diameter bare steel pipe with MAOP of 400 psig.
- Line E-Loop – \$28 million
 - Replace approximately 18 miles of 20-inch diameter bare steel with MAOP of 1,000 psig.
- Line 1758 – \$39 million
 - Replace approximately 12 miles of 26-inch diameter bare steel with MAOP of 600 psig.
- Line 1528 – \$8 million
 - Replace approximately 4 miles of 14-inch diameter bare steel with MAOP of 800 psig.
- Line R515 - \$13 million
 - Replace approximately 5 miles of 16-inch diameter bare steel with MAOP of 750 psig.
- Line K205 - \$7 million
 - Replace approximately 3 miles of 24-inch diameter bare steel with MAOP of 800 psig.
- Line 138 - \$42 million
 - Replace approximately 40 miles of 6-inch and 8-inch diameter bare steel with MAOP of 125 psig.

Eligible Facilities Plan

System Reliability – Compression

- Critical Horsepower Replacements – \$73 million
 - Cleveland Horsepower Replacement – \$29 million
Cleveland Compressor Station is located along the WB system. This project will include the removal of six (6) Cooper GMV-8 units and the installation of one (1) 8,000 HP unit and conversion of four (4) Cooper GMWA-8 units to standby service.

Cleveland Current Horsepower				Cleveland Proposed Horsepower			
Make	Model	Install Date	HP	Make	Model	Install Date	HP
C-B	GMVA-8	1954	1,100	C-B	GMVA-8	1954	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMVA-8	1953	1,100	C-B	GMVA-8	1953	1,100
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1965	2,000	C-B	GMWA-8	1965	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
C-B	GMWA-8	1969	2,000	C-B	GMWA-8	1969	2,000
Allison	501-K13C	1973	3,165	Allison	501-K13C	1973	3,165
Solar	Taurus 60	2015	6,600	Solar	Taurus 60	2015	6,600
				Solar	Taurus 70	2017	8,000
Total Certificated HP			17,765	Total Proposed HP			17,765

Orange = Emergency Standby Gray = Retired

- Strasburg Horsepower Replacement – \$44 million
Strasburg Compressor Station is located along the VB system. This project will include the installation of two (2) 8,950 HP units and conversion of two (2) Siemens Tornado turbines to standby service.

Strasburg Current Horsepower				Strasburg Proposed Horsepower			
Make	Model	Install Date	HP (ISO)	Make	Model	Install Date	ISO HP
EGT	Tornado	1999	8,950	EGT	Tornado	1999	8,950
EGT	Tornado	1999	8,950	EGT	Tornado	1999	8,950
				Solar	Taurus 70	2017	8,950
				Solar	Taurus 70	2017	8,950
Total Certificated HP			21,200	Total Proposed HP			21,200

Orange = Emergency Standby

Eligible Facilities Plan

Modernization Plan – 2018 and beyond

The modernization plan includes an inventory of pipeline and facility projects that will be planned, prioritized and executed over a long term program. Pipeline replacements of bare steel and aging infrastructure will continue to be part of the program along mainline systems such as Line 1711, the 1804 System, the VM System, and the KA system. Projects to reinforce the reliability and integrity of Ohio trunklines and Marcellus and Utica mains will be performed in order to address aging pipelines and enable the expanding connection of new supply. In addition, horsepower replacements and modernization will continue in order to drive an increasingly reliable and energy efficient system that can meet the current and future needs of the customer base.