



**Marcellus Shale Natural Gas Extraction Study
2011 Addendum**

**Pipelines
Transmission of Natural Gas
from Marcellus Shale**

Leagues of Women Voters of Southeastern Pennsylvania
and
Indiana County

Study Committee

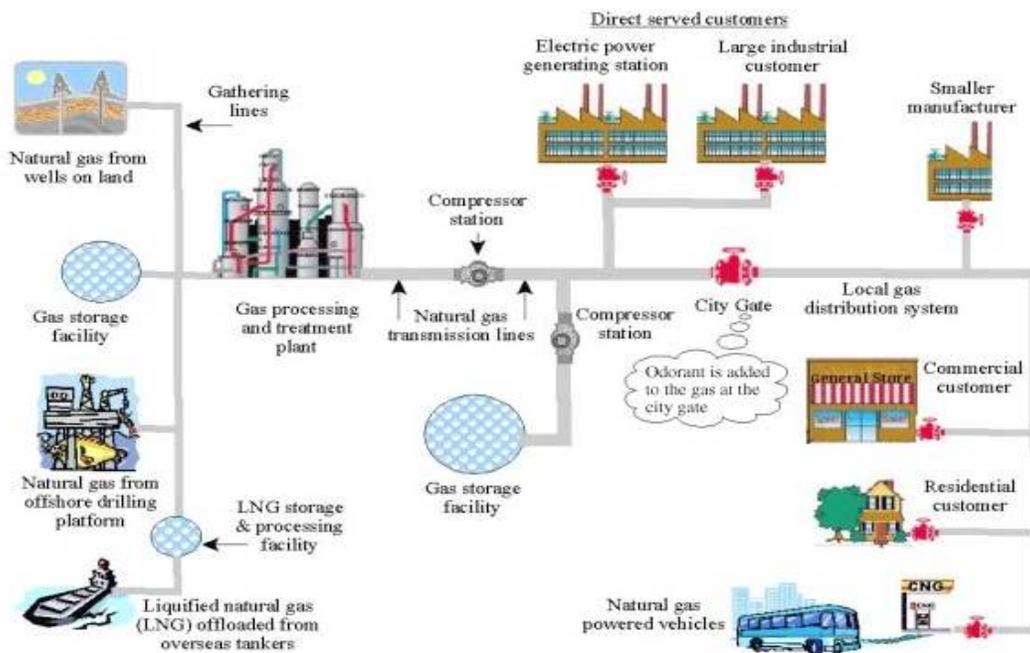
Roberta Winters, Chair
Alma Forsyth, LWV of Chester County
Barbara Schraudenbach, LWV of Radnor Township
Linda Sall, LWV of Radnor Township
Bonnie Kauffman, LWV of Lower Merion and Narberth
John Shaw, LWV of Central Delaware County
Mary Beth Sweeney, LWV of Indiana County
Susan McClure, LWV of Indiana County

**League of Women Voters of Southeastern Pennsylvania
Extracting Natural Gas from Marcellus Shale Addendum Study
2011
Study Guide I**

**PIPELINES
Transmission of Natural Gas from the Marcellus Shale**

Pennsylvania is part of a highly efficient, integrated transmission system that includes more than 305,000 miles of transportation pipelines and related facilities. Given the ever-increasing number of wells to be drilled in the Marcellus Shale, our existing infrastructure for natural gas transportation must be expanded. The LWVPA position adopted on May 1, 2010 supports the maximum protection of public health and the environment in all aspects of Marcellus Shale gas production and delivery to the customer. However, what does this mean in terms of pipeline regulation and safety? Our existing study guides on the extraction of natural gas from Marcellus Shale require expansion to include a more thorough understanding of the pipeline network, its regulation, and its safety. The following diagram provides a useful overview of the natural gas transmission system.¹

**The Natural Gas
Transmission System**



¹ <http://primis.phmsa.dot.gov/comm/NaturalGasPipelineSystems.htm?nocache=2717>

Each of the transmission components is a part of the computerized Supervisory Control and Data Acquisition (SCADA) that monitors and regulates the overall flow of gas throughout the nation.² The fundamental principle of the system is that gas and liquids flow from areas of higher pressure to lower pressure as measured in pounds per square inch (psi). The following chart lists the major components of the transportation system, their description, and their functions³.

Pipeline Transportation System Components

COMPONENT	DESCRIPTION	FUNCTION
Pipelines Gathering Transportation/ Midline Transmission Interstate Intrastate Distribution Lines	Small, interconnected networks of steel tubes with diameters ranging from 6 to 16 inches Large, interconnected steel tubes with diameters from 42 to 48 inches; complex networks can exist with 5 or 6 side-by-side; may be connected with loops A network of steel or plastic pipes ranging in diameter from 6 to 16 inches with some as small as ½ inch	Transport gas from wells to processing facilities Move natural gas across long distances; connected with other facilities needed for monitoring and adjusting pressure, insuring safety, and removing impurities Cross state/national boundaries Remain within state boundaries Serve as feeder lines from transmission lines to homes, businesses, storage facilities, and power generating stations
Storage Facilities Underground Above Ground	Depleted gas reservoirs, aquifers, leached out salt domes, capped wells, pipelines (line pack ⁴) Liquefied natural gas (LNG) tanks with compressed natural gas	Hold natural gas safely until demand requires Contain gas that is readily distributed during peak periods of use and/or used for transport to places not accessible by pipelines

² <http://www.naturalgas.org/naturalgas/transport.asp>

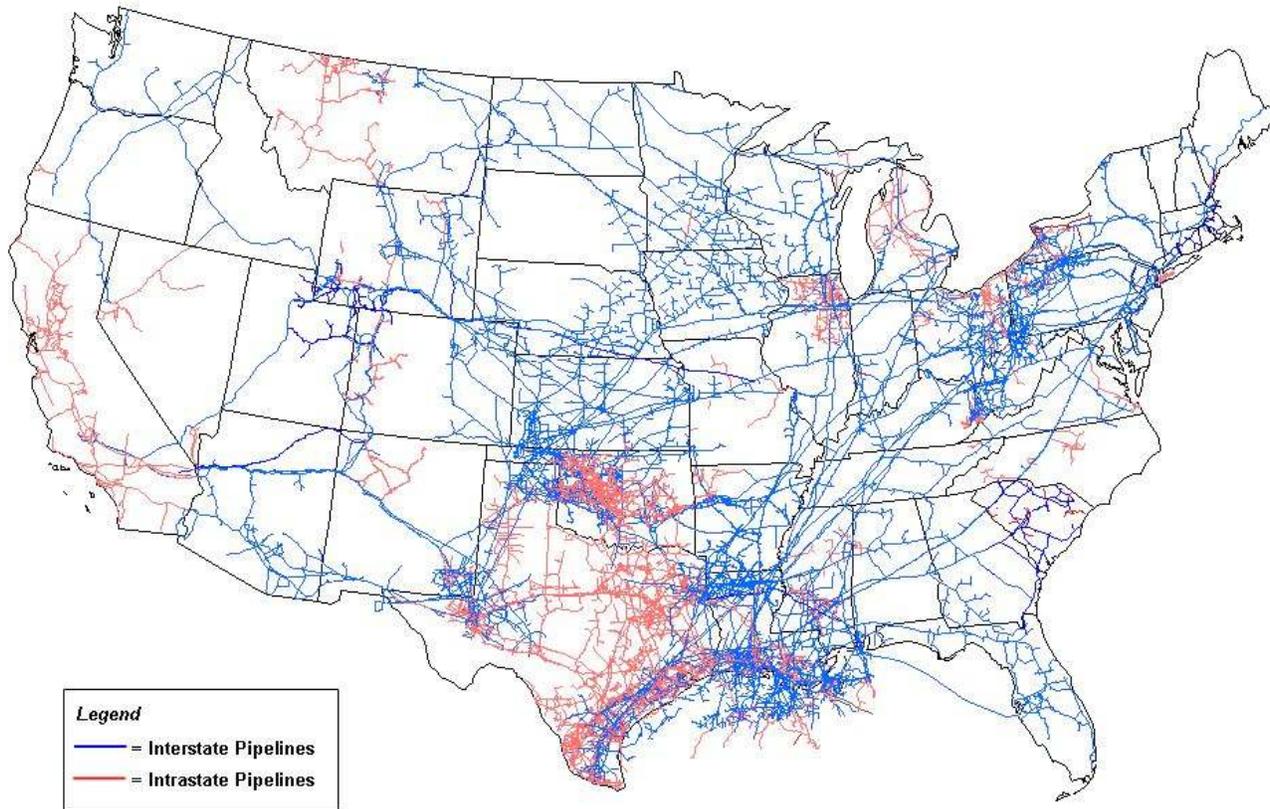
³ <http://primis.phmsa.dot.gov/comm/NaturalGasPipelineSystems.htm?nocache=2717>;
<http://www.pipeline101.com/>; and
<http://www.aga.org/Kc/aboutnaturalgas/consumerinfo/Pages/NGDeliverySystem.aspx>

⁴ *The ability of a natural gas pipeline to effectively "store" small quantities of gas on a short-term basis by increasing the operating pressure of the pipe.*
<http://www.spragueenergy.com/pages/content.aspx?p=Natural Gas Marketwatch Glossary>

Pipeline Transportation System Components (cont.)

COMPONENT	DESCRIPTION	FUNCTION
Gas Processing Facilities	A multi-unit complex including sulfur units, incinerators, dehydration towers, removal systems, recovery tanks, fractional distillation units, and pipeline networks	Produce “pipeline quality” natural gas and other useful products; Remove impurities such as oil, sulfur, water, carbon dioxide, mercury, and other unwanted hydrocarbons
Compressor Stations	Units every 40 – 100 mile on pipe lines with 1 to 16 compressors (engines, motors or turbines) that run 24/7; may include dehydration towers and separators w/ scrubbers and filters	Boost pipeline pressure periodically by squeezing incoming gas and forcing it out at higher pressures; remove water and other contaminants for disposal
City Gate or Gate Stations	A series of pipes, machines, and meters connecting transmission lines to distribution lines; a hub of intersecting pipelines	Reduce pressure of natural gas (from 500 to 1800 psi to 2 to 3 psi); add mercaptan (rotten-egg odor) for leak detection purposes; transfer gas from larger to smaller pipelines
Local Distribution Companies (LDCs)	Businesses with men, machines trucks, and pipelines in local communities	Operate and service a network of small pipelines for residences, commercial areas, and other companies
Metering Stations (not on diagram)	Above ground in secure monitoring sites with orifice, turbine, ultrasonic, and/or positive displacement meters with communications links to control facilities remotely	Measure flow of natural gas, temperature, pressure, and track its operating status without impeding its movement; report problems and monitor safety; can be combined with regulating or compressor stations
Valves Ball, Gate, and Plug	Above ground, secured sites Metal devices that rotate into, slide across, or block a pipeline	Block, control and check natural gas flow

Maps and related information on the pipeline network and its components are available at the Energy Information Administration.⁵



Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

To find pipelines in your area, use the National Pipeline Mapping System.⁶

⁵ http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/index.html

⁶ <https://www.npms.phmsa.dot.gov/>

References

- American Gas Association. (August 2005). How does the natural gas delivery system work? Retrieved from <http://www.aga.org/Kc/aboutnaturalgas/consumerinfo/Pages/NGDeliverySystem.aspx>
- American Petroleum Institute. (N.D.) Pipeline 101: Welcome to pipeline 101. Retrieved from Natural Gas Organization. (2010). The transportation of natural gas. Retrieved from <http://www.naturalgas.org/Naturalgas/transport.asp>.
- PHMSA Stakeholder Communications. (2010). Natural gas pipeline systems: From the wellhead to the consumer. Retrieved from <http://primis.phmsa.dot.gov/comm/NaturalGasPipelineSystems.htm?nocache=5297>
- Sprague Energy Corp. An Axel Johnson Inc. Company. (2004): Natural Gas Marketwatch Glossary. Retrieved from [http://www.spragueenergy.com/pages/content.aspx?p=Natural Gas Marketwatch Glossary](http://www.spragueenergy.com/pages/content.aspx?p=Natural%20Gas%20Marketwatch%20Glossary)
- U.S. Energy Information Administration (2010). About U.S. Natural Gas Pipelines: Transporting Natural Gas. Retrieved from http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/index.html