



Professional Engineers. Regulatory Experts. Trusted Partners.

Natural Gas Pipeline Construction and Operation

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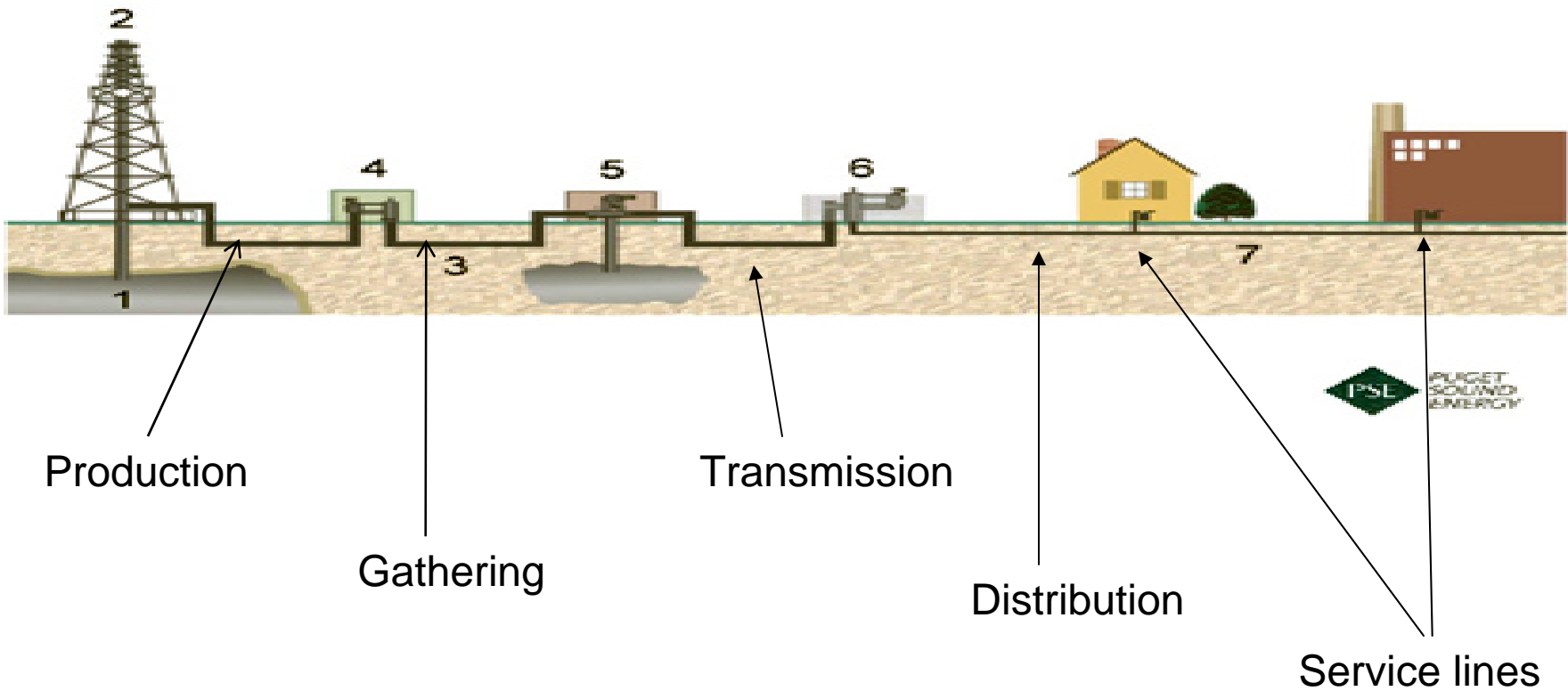
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My Qualifications

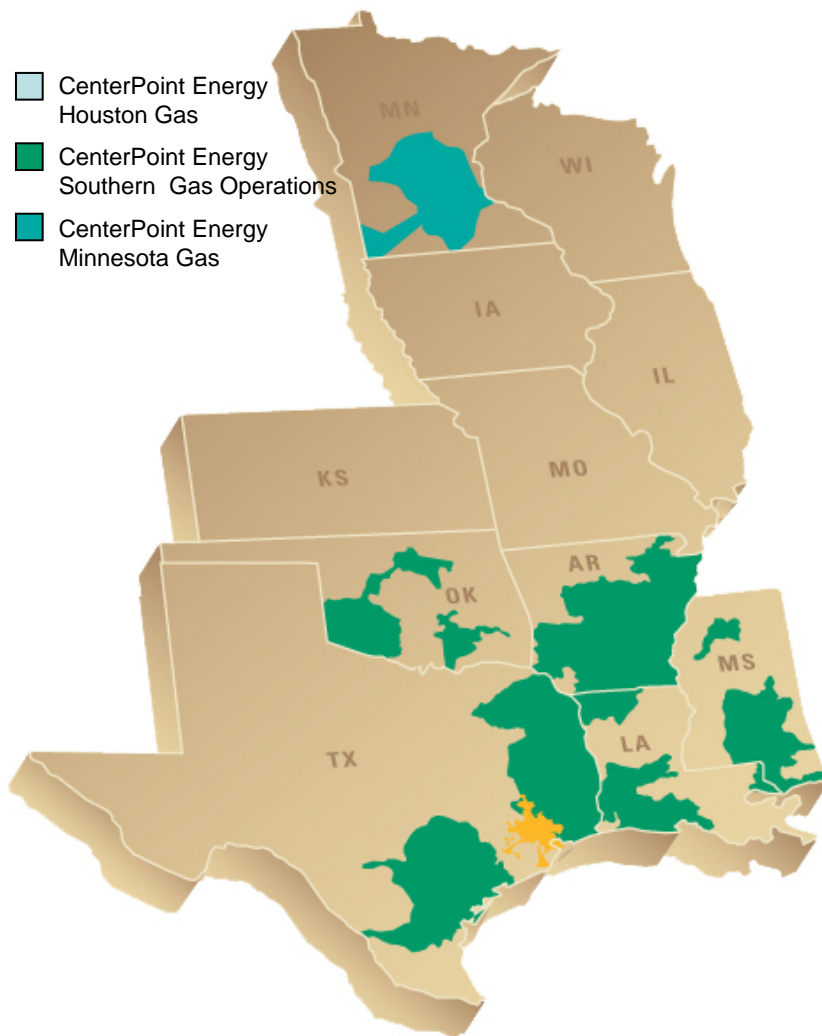
- Professional Engineer in Texas and others
- Summa Cum Laude graduate of the Georgia Institute of Technology
- Masters Degree in Mechanical Engineering
- 26 years of experience in oil and gas production and transportation; Area Manager of a large pipeline company;
- Professional Member of the National Association of Corrosion Engineers
- Actively involved in the Pipelines and Informed Planning Alliance (PIPA) / Protecting Communities task force



How Natural Gas is Delivered from wellhead to meter



Example relationship: Transmission, Distribution, Service



- 740 miles of Transmission Pipeline
- Over 65,000 miles of Distribution Mains
- 3+ million Service Lines

The Pipeline Safety Record

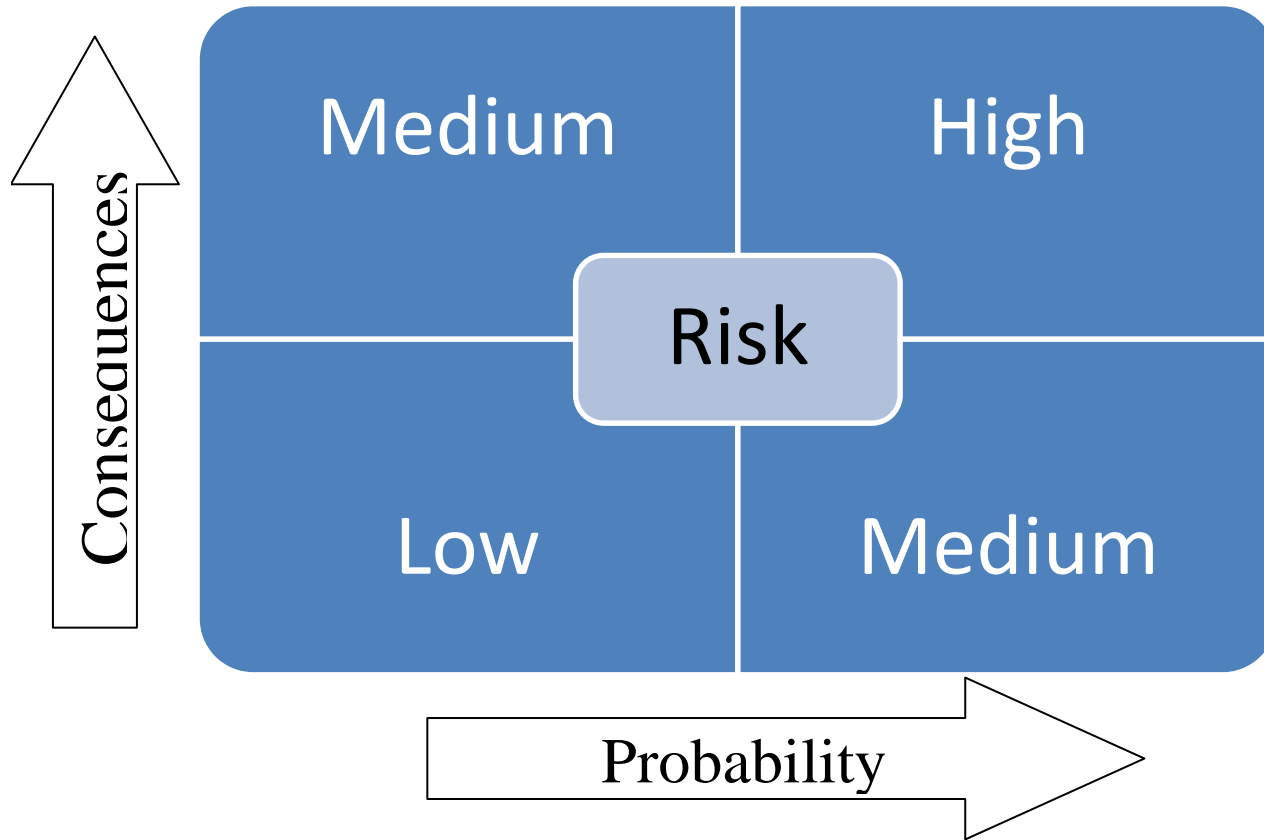
- Significant pipeline accidents are very rare, as are injuries and fatalities to the public due to pipeline accidents.
 - Easily outnumbered by the number of annual drownings in bathtubs, deaths due to bee stings, etc.
 - Within the Department of Transportation, pipeline-related fatalities can't even be seen on the graph
- This is so, even though the median decade of construction for US pipelines is the 1950s!
 - Modern pipelines will be even safer than average

Pipelines and Protecting Communities

- Pipelines are by nature “dispersed” assets that may be in or near populated areas
- Transportation Research Board called for a “Risk Informed” planning approach for pipeline and community development
- PIPA is currently working to develop guidelines that are risk informed, to protect both pipelines and the communities in which they operate



Risk



Gas Pipeline Risk Factors

- Probability Factors
 - Design and construction methods / age
 - Operations and maintenance practices
 - External damage
- Consequence Factors
 - Size
 - Pressure
 - Contents (flammable? toxic? corrosive?)

Barnett Shale Gas Pipelines

Probability Factors

- Design and construction methods / age
 - Modern design / modern specifications for pipe, materials, coatings, welding, burial, testing, etc.
- Modern operations and maintenance practices, including cathodic protection
- External damage
 - Covered by the State of Texas' recently enhanced and widely admired damage prevention regulations



Barnett Shale Gas Pipelines

Consequence Factors

- Size
 - small (mostly 4", some up to 24"; typical gas transmission is up to 42")
- Pressure
 - low (mostly 200 – 300 psi; typical gas transmission is 1,000+)
- Contents
 - Normal natural gas
 - Very low H₂S (within sales spec)
 - Low CO₂ / low partial pressure CO₂

Conclusion

- In general, these pipelines pose no unusual risk factors, and rate very well on many important factors
- Development of these types of pipelines can be compatible with urban and suburban residential and office developments