

# **NARUC, EWURA & ICC Partnership Activity**

## **Discussion of US and Tanzanian Transmission and Distribution Codes**

Presented by

**John T. Colgan, Commissioner  
Illinois Commerce Commission**

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# My thoughts

- These thoughts are my own and should not be interpreted as anything other than that
- I have consulted with and used information from numerous people, organizations and governmental agencies in developing this presentation:
  - ICC staff
  - US Energy Information Administration (EIA)
  - US Pipeline & Hazardous Materials Safety Administration (PHMSA)
  - NARUC
  - Dr. Cale Case – Energy Consultant
- But my comments are my interpretation of this information

From DOE <http://opsweb.phmsa.dot.gov/pipelineforum/facts-and-stats/pipeline-101/>

- **Pipeline 101**
- What are pipelines? Where are they? And why do we need them in the first place? Those are good, basic questions.
- The energy transportation network of the United States consists of over 2.6 million miles of pipelines.
- That's enough to circle the earth about 100 times.
- These pipelines are operated by approximately 3,000 companies, large and small.

# The Network Includes

- Based on data generated from annual reports to PHMSA from pipeline operators the network includes approximately:
  - 175,000 miles of onshore and offshore Hazardous Liquid pipeline;
  - 321,000 miles of onshore and offshore Gas Transmission and Gathering pipelines;
  - 2,066,000 miles of Natural Gas Distribution mains and service pipelines;
  - 114 active LNG Plants connected to our natural gas transmission and distribution systems; and
  - Propane Distribution System pipelines.

# Management Priorities

- Natural gas transmission and distribution have always included three major priorities:
  - 1) Safety, reliability, and system integrity
  - 2) Cost control and productivity enhancements
  - 3) Environmental stewardship

# Where are the Pipes?

- Although pipelines exist in all fifty states, most people are unaware that this vast network even exists.
- This is due to the strong safety record of pipelines and the fact that most of them are located underground.
- Installing pipelines underground protects them from damage and helps protect our communities as well.

# Where Are The Pipes?

- Most hazardous liquid and gas pipelines are buried underground. To ensure your safety and avoid damaging underground lines, you must call your state one-call center before digging. Call Before you Dig!
- Most hazardous liquid and natural gas transmission pipelines are located underground in rights-of-way (ROW).
- A ROW consists of consecutive property easements acquired by, or granted to, the pipeline company.
- The ROW provides sufficient space to perform pipeline maintenance and inspections, as well as a clear zone where encroachments can be monitored and prevented.

# Call before you dig

- Pipeline operators are required to post brightly-colored markers along their ROW to indicate the presence of – but not necessarily the exact location of – their underground pipelines.
- Markers come in a variety of shapes and sizes. They contain information about the nearby pipeline as well as emergency contact information for the company that operates it.

# Call Before You Dig!

- Natural gas distribution systems consist of distribution main lines and service lines.
- Distribution main lines are generally installed in underground utility easements alongside streets and highways.
- Distribution service lines run from the distribution main line into homes or businesses.
- Distribution main and service lines are not generally indicated by above-ground markers.
- To ensure safety and avoid damaging underground lines, anyone planning to dig or excavate is required by law to contact their state One-Call center 48 to 72 hours before digging.

# Why Do We Need Pipelines?

- In the US, pipelines play a vital role in our daily lives. Cooking and cleaning, the daily commute, air travel and the heating of homes and businesses are all made possible by the readily available fuels delivered through pipelines.
- These routine activities really add up, in terms of energy use. Natural gas provides for fully 24% of our country's total energy consumption, and petroleum provides for another 39%.
- Because such huge volumes of hazardous liquid and natural gas must be transported, the only feasible way to do so is through pipelines.
- Pipelines do not crowd our highways and waterways as trucks and barges would, nor do they contribute to traffic congestion or highway accidents.
- Pipelines, in short, are practical and safe.

# Pipeline Construction

- Pipeline companies constantly assess the growth and demand for energy to project when and where new capacity for transporting energy products is needed.
- Following is a general discussion of the steps involved in the placement of new energy transmission pipelines to serve growing population centers as well as commercial and industrial needs.

# Overview

- Planning for new capacity must begin far in advance of transporting the first cubic foot of natural gas.
- Pipeline companies must determine possible routes for the new pipelines;
  - acquire the rights-of-way (ROW) to build, operate and maintain the lines;
  - engineer the actual system designs; and, construct the lines.
- All of these steps are subject to rigorous regulatory reviews and approvals.
- Construction can only begin after the route selection receives regulatory approval, ROW is obtained, and the system design is completed.

# Regulatory Processes

- The Federal Energy Regulatory Commission, or FERC, exercises regulatory control over construction of natural gas pipelines.
- Once a gas pipeline company proposes the route or location, it is examined and considered by FERC.
- The company must study a number of alternative routes or locations to avoid or minimize damage to the environment.
- Then FERC, interveners, or any commenter may suggest alternatives and modifications.

# Cost recovery

Retail customers ultimately pay all the costs to get the gas from the well head to the burner tip. Those costs are recovered separately by the various segments.

- Production: producers are compensated at the market price.
- Transmission: pipelines enter into contracts to transport gas from the field to various markets, which includes utility citygates. Those contracts are constrained by tariffs.
- Distribution: LDCs recover their costs through distribution charges directly to customers

# Retail customers

- Gas LDCs typically have:
  - two different residential customer classes: heating and non-heating,
  - two commercial classes: small and large,
  - an industrial/manufacturing class (or perhaps two), and
  - a class for seasonal demand (in Illinois, farmers dry their grain using gas blowers; in other states, irrigation is pumped using gas motors; asphalt companies also have seasonal usage)

# Rates

Customers pay the utility's costs. Those costs are the cost of the distribution network, any other assets such as storage fields owned by the utility and operating costs such as labor. There are two ways that retail customers pay for the delivered gas commodity.

- If the LDC buys gas for its customers (also called sales customers) it imposes a separate charge, in Illinois called the Purchase Gas Adjustment or PGA, to recover the cost to purchase and transport the commodity to the citygate (where the transmission and distribution systems meet).
- If the customer purchases gas directly from a marketer (not a utility), then it enters into a contract directly with that marketer for delivered gas, and the customer continues to pay the LDC the delivery rates in its tariffs.

# Residential rate structures

- Residential customers
  - For delivery service: a per-month flat customer charge and per-therm rates
  - For commodity gas, either
    - PGA to recover the utility's gas costs, or
    - Rates in contract with supplier.

# Commercial/Industrial rate structures

- Commercial and industrial customers
  - Meter charge to recover cost of the meter; larger meters are more expensive.
  - Demand charge per therm of demand; demand is determined by the maximum daily usage. In Illinois that is often in the winter.
  - Per therm charge
  - For commodity costs, either
    - PGA to recover the utility's costs, or
    - Rates in contract with supplier.

Most large commercial and industrial customers purchase their commodity from unregulated suppliers.

# Basic features of US gas industry

- Competitive production sector – several thousand producers
- Imports, mostly from Canada, are available. However with the rise of shale gas, the share of gas consumed in the US that comes from Canada is falling.
- Interstate pipelines carry gas long distances from gas fields to market areas (about 90 pipelines, with more than 250,000 miles of pipes)
- Market centers and hubs allow trading of gas supply away from production areas/wellhead and toward pipeline interconnections and storage areas and major market areas

# Basic features of US gas industry

- Storage facilities (many owned by pipelines and LDCs, but also by marketers and other independent entities) serve important functions
  - Reduce short-run market price fluctuations
  - Help marketers, pipelines and LDCs to manage the price and availability of gas year-round
  - Marketers also use storage as a financial tool, relying on price fluctuations in the spot and futures markets to create arbitrage opportunities
  - With storage, the market-clearing price is determined not only by current production and consumption, but also by changes in the storage level

# Basic features of US gas industry

- Interstate pipelines have open access tariffs, which means that the pipeline cannot discriminate or charge different prices at different terms and conditions for different customers; also the pipelines do not buy and sell gas, just transport other entities' gas.
- Wholesale gas markets are well-developed. There are liquid long-term, spot and futures markets nationwide. NYMEX futures market since 1990, options on futures contracts since 1992.
- Large customers, such as industrials and electric generators, can bypass of local distribution systems
- Most large customers buy only transportation service from the local gas utility

# Basic features of US gas industry

- Small customers are able to purchase gas from third parties in many states (in Illinois that program is growing)
- However, the local utility is typically the provider of last resort or the default supplier for customers that do not have a third party supplier.
- Industrials are the largest gas users (over 40% of total), but gas use for electric generation has grown rapidly and will continue to do so
- Primary markets for gas use: (1) direct energy source (primarily heat), (2) feedstock (industrial), and (3) fuel for electric generation
- Pipeline and LDC marketing affiliates are important players

# Gas Market Models

- **Vertically integrated monopoly** in which a single entity controls production, transportation and distribution.
- **Wholesale competition** in which the pipeline buys gas from competing wholesale suppliers for bundled sale to utilities.
- **Mixed system** in which each segment of industry is separately owned and regulated. In US, distribution is regulated as monopoly, transmission is regulated to some extent, while production and marketing is largely unregulated.
- **Customer choice** in which final customers obtain gas from competing retail suppliers. In this model each retail supplier must acquire its own transportation capacity and gas commodity supplies.

# Conditions to improve economic performance

- Services that have natural-monopoly characteristics, such as long-distance pipeline transportation and local distribution, should be regulated with regard to price and quality of service
- Regulated providers should be given a reasonable opportunity to recover their costs, including a return on investments that covers their cost of capital. This is important because it's fair, but also to ensure that providers can attract capital to sustain the business.
- Control of the major functions -- namely, production, pipeline transportation and distribution -- should generally lie with different entities. The participants in each major function has conflicting incentives, control over more than one function means that the firm will maximize its profits at the expense of customers.
- Unregulated affiliates of regulated providers should be carefully monitored to ensure that it cannot overcharge customers to enrich shareholders. Consider not allowing regulated providers to have affiliates at all.

# Lessons learned from experience

- Open and non-discriminatory access to pipeline facilities is necessary for effective competition to develop in wholesale trading.
- Regulatory predictability and stability are important to attract new capital funds for the development of the network infrastructure.
- One should be careful to extrapolate experiences of one country to another. Each country is different and their gas infrastructure and markets are different.
- Regulatory institutions must have sufficient authority and resources to effectively control gas transportation providers – namely, pipelines and distributors – from exercising monopoly power.

# Lessons learned from experience

- The primary goals of a regulatory body should be: (1) attracting private capital for infrastructure development, (2) setting prices for regulated services at cost, where cost includes reasonable profits (see (1) above), (3) providing reasonable opportunities for financial viability of regulated entities, and (4) creating an environment for high productivity in the industry. The most difficult task regulators have is balancing the goals of low cost to customers with the need to attract capital.
- Regulatory agency independence, credibility and accountability are essential for effective oversight of sector activities

# Effective regulation features

- Up-front rules and guiding principles should be clearly established
- Responsive to the general public and utility consumers in particular; ratepayers pay the bills.
- Short-term politically expedient decisions should be avoided
- Transparent decision-making
- Accountability
- Independence

# There are many considerations to be made.

- Regulatory agencies consider the possible effects of the pipeline on buildings, fences, crops, water supplies, soil, vegetation, wildlife, air quality, noise, safety, landowner interests, and more, are taken into consideration.
- FERC also considers whether a pipeline can be placed near or within an existing pipeline, power line, or highway or railroad right-of-way.

- If a determination is made that the project will make no significant environmental impact, the project usually moves forward quickly.
- However, when it is determined that the project will make a significant environmental impact, a more in-depth environmental impact statement is developed, and acceptable mitigation efforts must be reviewed and approved prior to moving forward.
- FERC is required to publish informative materials concerning all of these issues concerning the siting and construction of natural gas pipelines.

# What FERC does and does not do.

- The Federal Energy Regulatory Commission is charged by Congress with evaluating whether interstate natural gas pipeline projects proposed by private companies should be approved.
- The Federal government does not propose, construct, operate, or own such projects.

# In the US, private property ownership is a big deal.

- **"Life, Liberty, and the pursuit of Happiness"** is a well-known phrase in the United States Declaration of Independence.
- The phrase gives examples of the various "unalienable rights" which the Declaration says all human beings have been given by their Creator and for the protection of which they institute governments.
- The Commission's determination whether to approve a pipeline project may affect property owners if their land is where a natural gas pipeline, other facilities, or underground storage fields might be located.
- Property owners have a right to know:
  - How the Commission's procedures work;
  - What rights they have regarding those procedures;
  - How the location of a pipeline or other facilities is decided; and
  - What safety and environmental issues might be involved.

# Background

- FERC (the Commission) approves the location, construction and operation of interstate pipelines, facilities and storage fields involved in moving natural gas across state boundaries.
- The Commission also approves the abandonment of these facilities.
- Interstate pipelines crisscross the United States, moving nearly a quarter of the nation's energy long distances to markets in the 48 contiguous states, and are vital to the economy.

# Pipelines and associated facilities

- Although pipelines generally are buried underground, they may have associated facilities that are above-ground such as taps:
  - valves,
  - metering stations,
  - pig launchers and pig receivers,
    - **Pigging** in the context of pipelines refers to the practice of using pipeline inspection gauges or 'pigs' to perform various maintenance operations on a pipeline.
    - This is done without stopping the flow of the product in the pipeline.
  - compressor stations

# Property Owners and Pipelines

- The property owner will probably first learn of the pipeline from the company concerned as it plans and studies the route during either the Commission's voluntary Pre-filing Process or in the application development process.
- Once a company files an application requesting the Commission to issue a certificate authorizing the construction of a pipeline project, the company will mail you a copy of this brochure and other information within three days of the Commission issuing a Notice of Application.

# Commission process

- In all US proceedings, the rules are set up so that all concerned parties are afforded due process.
- The Commission's staff will prepare an environmental study of the proposal; either an Environmental Impact Statement or an Environmental Assessment, depending on the scope of the project.
- For major construction projects, local media may be notified and public meetings may be held.
- Property owners have an opportunity to express their views and to have them considered.
- They also have the opportunity to learn the views of other interested parties.

# Commission process (continued)

- The Commission may approve the project, with or without modifications, or reject it.
- If it is approved and property owners fail to reach an easement agreement with the company, access to and compensation for use of your land will be set by a court.
- Understandably, the location of pipelines and other facilities may be of concern to landowners.
- The Commission's process for assessing pipeline applications is open and public, and designed to keep all parties informed.

## **How is the pipeline route, compressor station or storage field location selected?**

- The pipeline company proposes the route or location, which is then examined by the Commission.
- The applicant must study alternative routes or locations to avoid or minimize damage to the environment.
- The Commission, interveners, or any commenter may also suggest alternatives and modifications to reduce the effects on buildings, fences, crops, water supplies, soil, vegetation, wildlife, air quality, noise, safety, landowner interests and more.
- The Commission staff's Alternatives analysis will consider whether the pipeline can be placed near or within an existing pipeline, power line, highway or railroad right-of-way.
- Storage fields are usually located in depleted oil or natural gas production fields or in salt deposits.
- Therefore, (to some extent) their location is fixed by geologic conditions.

# How do pipelines obtain a right-of-way?

- The pipeline company negotiates a right-of-way easement and compensation for the easement with each landowner.
- Landowners may be paid for loss of certain uses of the land during and after construction, loss of any other resources, and any damage to property.
- If the Commission approves the project and no agreement with the landowner is reached, the pipeline may acquire the easement under eminent domain (a right given to the pipeline company by statute to take private land for Commission-authorized use) with a court determining compensation (immanent domain)
- The landowner pays taxes on the right-of-way unless a local taxing authority grants relief. The pipeline simply has an easement across a portion of the land.

# How large is the right-of-way and how is it maintained?

- It is generally 75 to 100 feet wide during construction, although extra space is usually required at road or stream crossings or because of soil conditions.
- The permanent right-of-way is usually about 50 feet wide. Routine mowing or cutting of vegetation is done no more than once every three years.
- A ten foot wide corridor, centered on the pipeline, may be mowed or cut annually.
- In cropland and residential areas the right-of-way is maintained by the landowner consistent with the presence of a pipeline.
- The decision making process would be a recommendation from the administrative law judge (ALJ) to the commissioners who make all of the final decisions.

# How large is a compressor station or storage field?

- Usually the pipeline purchases ten to forty acres for a compressor station, of which about five acres are actually used for construction.
- A storage field could encompass many hundreds or even thousands of acres, depending on the geologic structure.
- Storage fields also frequently include a buffer zone or protection area forming a halo of some hundreds of acres surrounding the storage field itself.
- If there are disputes, the company must obey local, county and state laws and zoning ordinances. If there is a conflict, however, between these ordinances and what the Commission requires; the Commission requirement prevails.

# How close can a property owner build to the facilities?

- For a pipeline, usually up to the edge of the right-of-way.
- For a compressor station, the site is usually owned by the company. If you own property adjacent to the site, you may build on it.
- For storage fields, unless there are surface facilities or pipelines, you may build anywhere on the surface.
- If you or someone else wishes to drill wells which would penetrate the storage formation, you must coordinate that activity with the company, and usually the state authority regulating well drilling.

# **To what depth would the pipeline be buried underground?**

- The depth of cover would vary from 2 feet deep (in excavated rock) to usually 3 feet deep in soils.
- In special cases, the trench could be up to 5 feet deep in agriculture fields where deep tilling or other issues warrant a deeper trench.
- If there are problems with erosion or other issues during restoration and/or maintenance of the right-of-way, the landowner should first contact the pipeline company to address and resolve the issue.
- If the landowner is not satisfied that the problem has been adequately addressed, he or she can contact the Commission for dispute resolution.

## **What is the property owner has problems with erosion or other issues?**

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- A. The landowner should first contact the pipeline company to address and resolve the issue.
- If the landowner is not satisfied that the problem has been adequately addressed, he or she can contact the Commission's for dispute resolution.

# Pipeline Installation Sequence

After a company has received authorization from FERC as well as all necessary permits, and has an easement on a property, construction would proceed as follows:

- 1) The civil survey (and any uncompleted environmental surveys) would be completed and the construction right-of-way would be marked/staked for the clearing crew.
- 2) The clearing crew would remove any trees or brush within the right-of-way that would interfere with construction.
- 3) Temporary erosion control devices would be installed as required.
- 4) Next, the right-of-way would be graded.
- 5) Topsoil would be separated from subsoil in agricultural/residential areas (or in other areas requested during the easement negotiations).
- 6) Heavy equipment, such as backhoes or trenching machines, would then dig the trench. In areas where bedrock is near the surface, blasting may be required.

# Pipeline Installation Sequence (continued)

- 7) The pipe would be delivered to the right-of-way in segments (called joints).
- 8) The pipe would be bent to fit the trench and welded together. All welds would be tested prior to placing the pipe in the trench.
- 9) The trench would be back filled and if topsoil was removed it would be returned.
- 10) Construction debris would be removed.
- 11) The right-of-way would be regraded; seeded; and temporary and permanent erosion control devices would be installed.
- 12) After the right-of-way has revegetated the temporary erosion control devices would be removed.
- 13) Prior to gas flowing, the pipeline would be pressure tested (normally with water) to ensure it does not leak.