

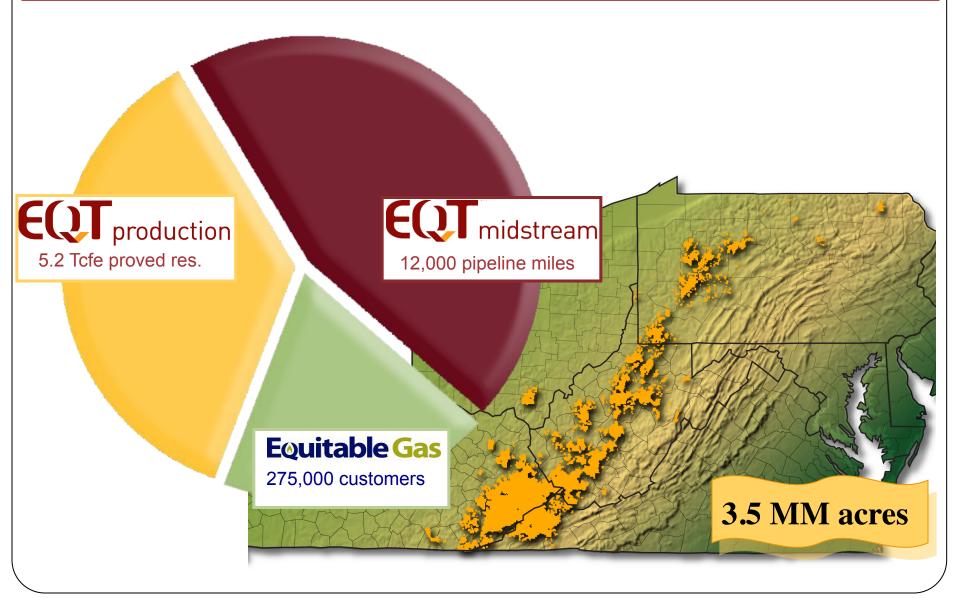
Where energy meets innovation.

Social License to Operate: Standards, Validation, Collaboration

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Who we are:





IEA: Golden Rules for a Golden Age of Gas

- Measure, disclose and engage
- > Watch where you drill
- Isolate wells and prevent leaks
- > Treat water responsibly
- > Eliminate venting, minimize flaring and other emissions
- \succ Be ready to think big
- > Ensure a consistently high level of environmental performance

SEAB Shale Gas Production Subcommittee

- Infor industry to increase their best practices process for field engineering and environmental control activities by adopting the objective of <u>continuous improvement</u>, <u>validated by measurement and disclosure of key operating</u> <u>metrics</u>
- Best practices involves the <u>entire range of shale gas</u> <u>operations</u>
- Sumplement in the importance of involving non-industry stakeholders

Center for Sustainable Shale Development Groundwater Protection Standards

- Zero discharge of wastewater until CSSD adopts a standard for treating wastewater.
- > Wastewater recycling > 90%.
- > Closed loop containment of drilling fluids, eliminating the use of pits.
- > Use of double-lined impoundments equipped with leak detection.
- Establishment of a predrill Area of Review, including subsurface geology and corresponding risk analysis.
- Groundwater monitoring– pre and post operations.
- > Casing and cement standards that ensure complete isolation from groundwater.
- > Public disclosure of well stimulation fluids.
- > Well pad design that minimizes risk of contamination to water sources.
- > Spill response and public notification plans.

Center for Sustainable Shale Development Regional Air and GHG Standards

- Removal of free hydrocarbons from flowback and produced water before storage.
- "Green Completions" Capture of pipeline-quality gas, with certain exceptions.

> Gas not captured must be flared; not vented.

- Flaring requirements 98% destruction efficiency and a prohibition on pit flaring.
- Emissions standards for:
 - > diesel drilling rig engines and fracturing pump engines
 - > compressor engines
 - on-road truck engines
- > Control of VOC emissions from storage vessels (> 95% reduction).
- Standards for reciprocating compressors and pneumatic controllers.

Center for Sustainable Shale Development Founding Members

- Chevron
- Clean Air Task Force
- CONSOL Energy
- Environmental Defense Fund
- > EQT Corporation
- Group Against Smog and Pollution (GASP)
- Heinz Endowments

- Citizens for Pennsylvania's
 Future (PennFuture)
- Pennsylvania Environmental Council
- > Shell
- William Penn Foundation

Center for Sustainable Shale Development Board of Directors

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- Christine Todd Whitman, former Administrator of the U.S.
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