2018 FALL WORKSHOP
Gas Turbine Energy Systems:
Clean and Reliable Energy on Demand
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Reducing Emissions – An Operator's Perspective

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Transmission and Storage Options

- Compression alternatives
- Retiring old technology
- Methane is good, leaks are bad
- Greening the pipeline

Retiring Old Technology

- Low $N0_x$ turbines and lean burn reciprocating engines
- Replace wet seals with dry gas seals
- Replace reciprocating engines with turbines
- Replacing high bleed valves with low or non-bleed valves - mandated
- Convert pneumatic valve operators to electric or zero emissions oil over gas systems

Compression Alternatives – Technology and Infrastructure

- Blowdown recovery compression at stations and for pipeline work
- Replace NG pneumatic drives with electric or electrohydraulic
- Pipeline looping to mimic compression without losses
- Using high pressure and high deliverability storage pools as virtual compression

Methane is good, leaks are bad

- Waste heat from generating turbines being used to power greenhouse boilers and prolong the growing season
- Waste $C0_2$ from turbines being used in greenhouses to prolong the daily growing cycle
- Methane as an alternate fuel source in areas where grid reliability is low
- Methane supplement to low wobbe index coke oven gas to power steel plant processes and prevent emissions
- Micro-CHP installations in large commercial buildings

Greening The Pipeline

- Renewable Natural Gas (zero carbon additive)
- Using excess / inexpensive electricity to produce hydrogen or methane – Power to Gas
  - Inject H_2 into the gas stream producing a lower carbon intensity fuel
  - H_2 combined with $C0_2$ from waste to produce methane
- Using excess / inexpensive electricity to power compressors to store gas, rather than gas powered compression – Pseudo Battery