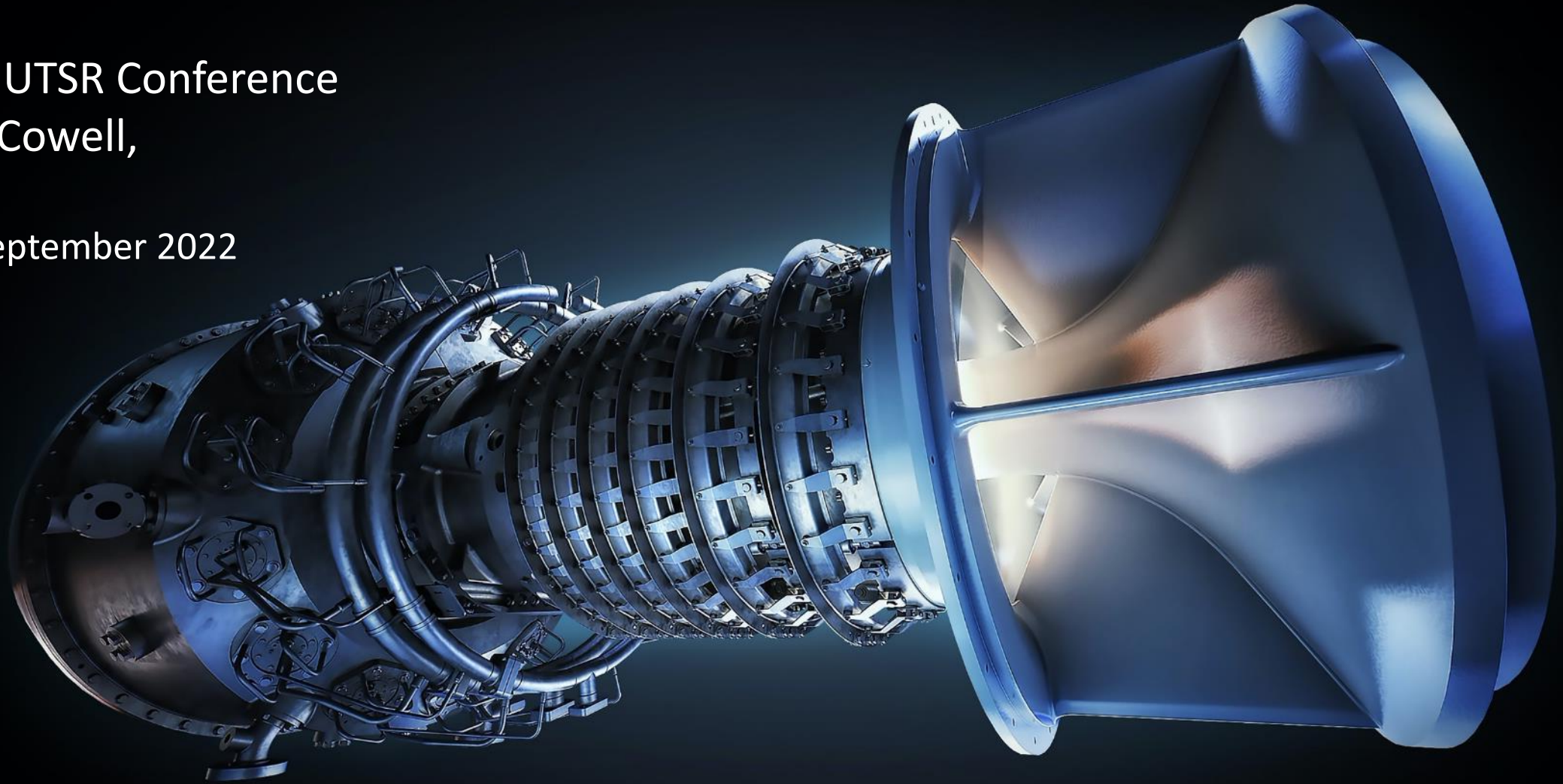


Low Carbon Fuels Panel

2022 UTSR Conference
Luke Cowell,

27th September 2022



Solar Turbines
A Caterpillar Company

Powering the Future

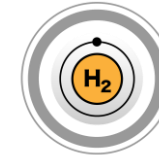
Carbon Reduction Solutions



Operational Efficiency



Methane Abatement



Fuel Flexibility



Carbon Capture, Use & Storage

Available Now

- Upgrades & retrofits
- Condition based overhaul
- Electrification
- Energy Optimization
- Cogeneration

- Flare reduction
- Methane capture and recompression

- Hydrogen fuels (pre-combustion carbon reduction)
- Renewable fuels
- Associated gases

- Supporting customer pilot projects

Developing

- Pipeline Optimization
- Spinning Reserve Optimization
- Power Boost
- Super-critical CO₂
- Part Load Eff Improvement

- “Virtual” pipeline
- Leak detection

- High-H₂ dry low emissions
- Gas comp. readiness
- H₂ package readiness
- Ammonia
- Biofuels

- Exhaust recirculation
- Carbon Capture
- CO₂ Compression

Lower Carbon Fuels for Gas Turbines

Solar® Turbines

A Caterpillar Company

<u>Fuel</u>	<u>Diffusion Combustion</u>	<u>DLE</u>
Hydrogen	100%	In Development
H2+NG	Full Range	Expanding Range
RNG	Drop-in (Alt Landfill & Digester)	
RDF	Drop-in	
Biodiesel	B100	Expanding Range
Ethanol / Methanol	100% Ethanol	Development Needed
Ammonia	Qualification Needed	Development Needed

Lower Carbon Fuels for Gas Turbines

Fuel

- Hydrogen, H₂+NG
- RNG & RDF(Drop-in)
- NG w/ Carbon Capture
- Biodiesel
- Ethanol / Methanol
- Ammonia

Needs

- FTF for Higher H₂, MMX Oscillation Models, NO_x Biasing Education, Flame Sensor & Fuel Blend Sensor Technology.
- None
- Low O₂ Combustion, CC Technology Effectiveness, Storage
- Carbon Deposition Mechanisms, NO_x Reduction Strategies
- Fuel System for Low LHV
- Material Analysis, Low NO_x Platform, Fuel Blending Strategy, Oscillation Models

For All Need Clear Policy & Market Direction, Fuel Cost Reduction, Production Capacity,Incentives