

Solar Turbines

A Caterpillar Company

Enabling the Path to a Low Carbon Future

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The Changing Energy Landscape

Decentralized Power
Clean Energy
Renewables
Biomethane
Energy Storage
Sustainability
Optimization
Natural Gas
Hydrogen
Electrolysis
Resiliency
Energy Efficiency
Carbon Neutral
Digitalization
Carbon Capture & Sequestration
Electrification
Methane Abatement
Steam Methane Reforming
Curtailment



Gas Turbines are Part of the Carbon Reduction Strategy

Gas Turbines...

- Enable **renewables**
- Address **thermal energy** needs
- Are **affordable**
- Offer **resiliency**
- Provide **grid support**

Lower carbon intensity through:

- Fuel **flexibility**
- Energy **efficiency**
- Carbon **capture**

Solar's Carbon Reduction Solutions



Operational Efficiency



Methane Abatement



Fuel Flexibility



Carbon Capture, Use & Storage

Solar's Hydrogen Technology Experience

55 units in operations with over 2M operating hours including five Titan 130 SoLoNOx units

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**Dry Low Emission
(SoLoNOx™)**

capable up to 20% H₂

Dry Low Emissions
(SoLoNOx™) introduced



1989

Titan 130 SoLoNOx run at
9% H₂ (tested to 15%)



2003

Partnered with DOE for high-
H₂ rig testing & analysis



2013

5 Titan 130 DLE units
running on high-H₂



2021

Conventional

capable up to 100% H₂

1985



First high-H₂ experience
at 40% H₂ (wet)

1995



U.S. refinery runs
Centaur 50 at 80% H₂

2005



First Taurus 60
at 60% H₂

2018



46 Coke Oven Gas
packages reached

Hydrogen Field Demonstration Projects

Italy



Units: Mars 100-16000S (DLE)
Timeline: Q2-Q3 2022

Germany

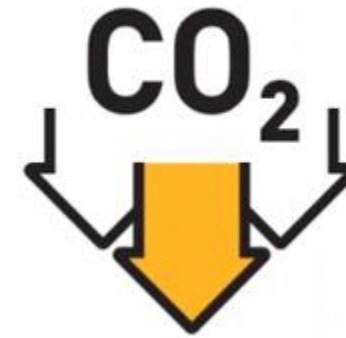


Units: Titan 130-20502S (DLE)
Timeline: Q2-Q4 2022

Reducing Emissions



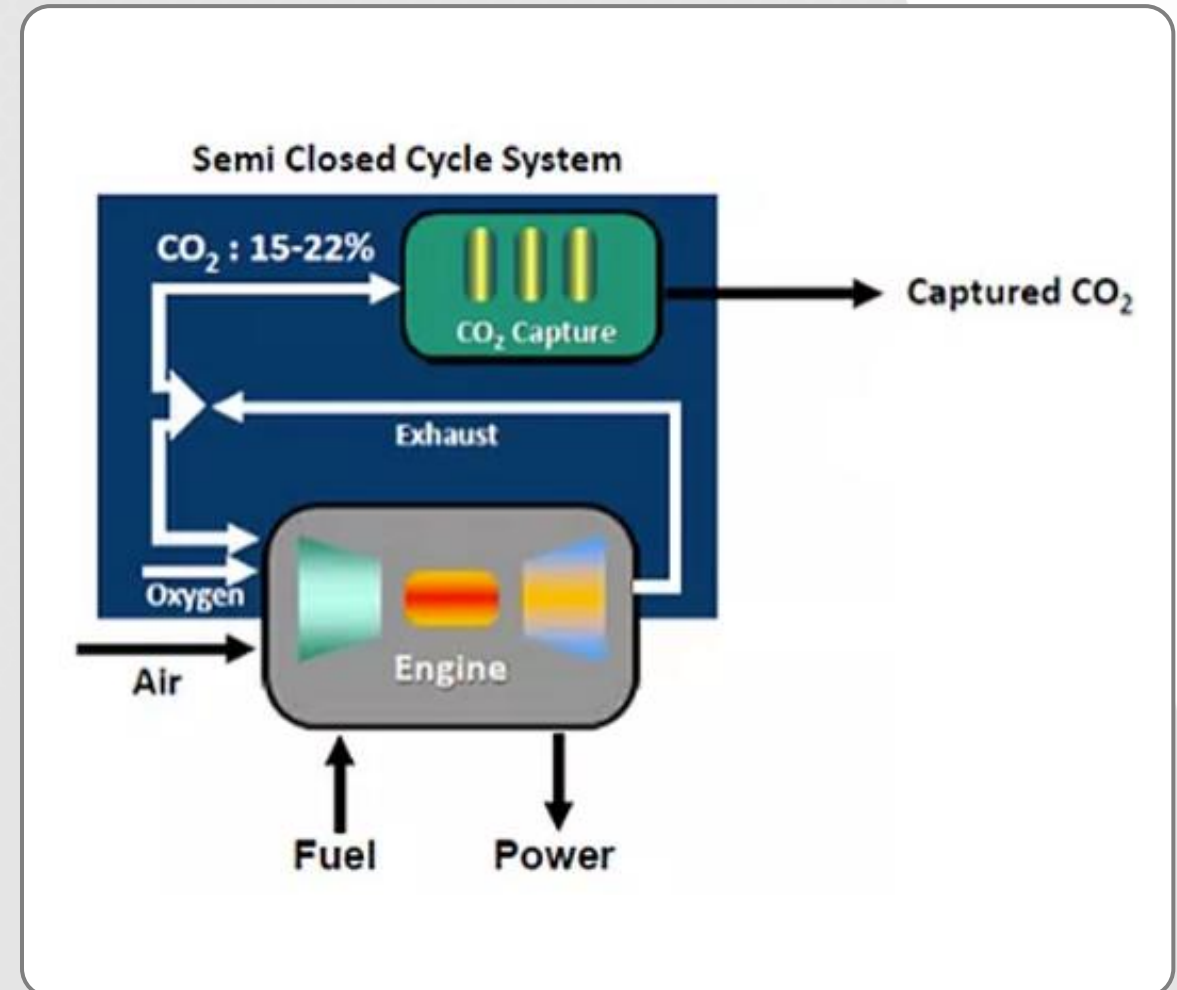
History of continuous emissions reduction stewardship for our customers



Caterpillar & Solar investing in carbon reduction

Carbon Capture for Gas Turbines

- Carbon capture is a huge opportunity but currently economically challenging.
- Exhaust gas recirculation (EGR) will make capture more economical.
- We aim to have EGR technology operational in 2022.

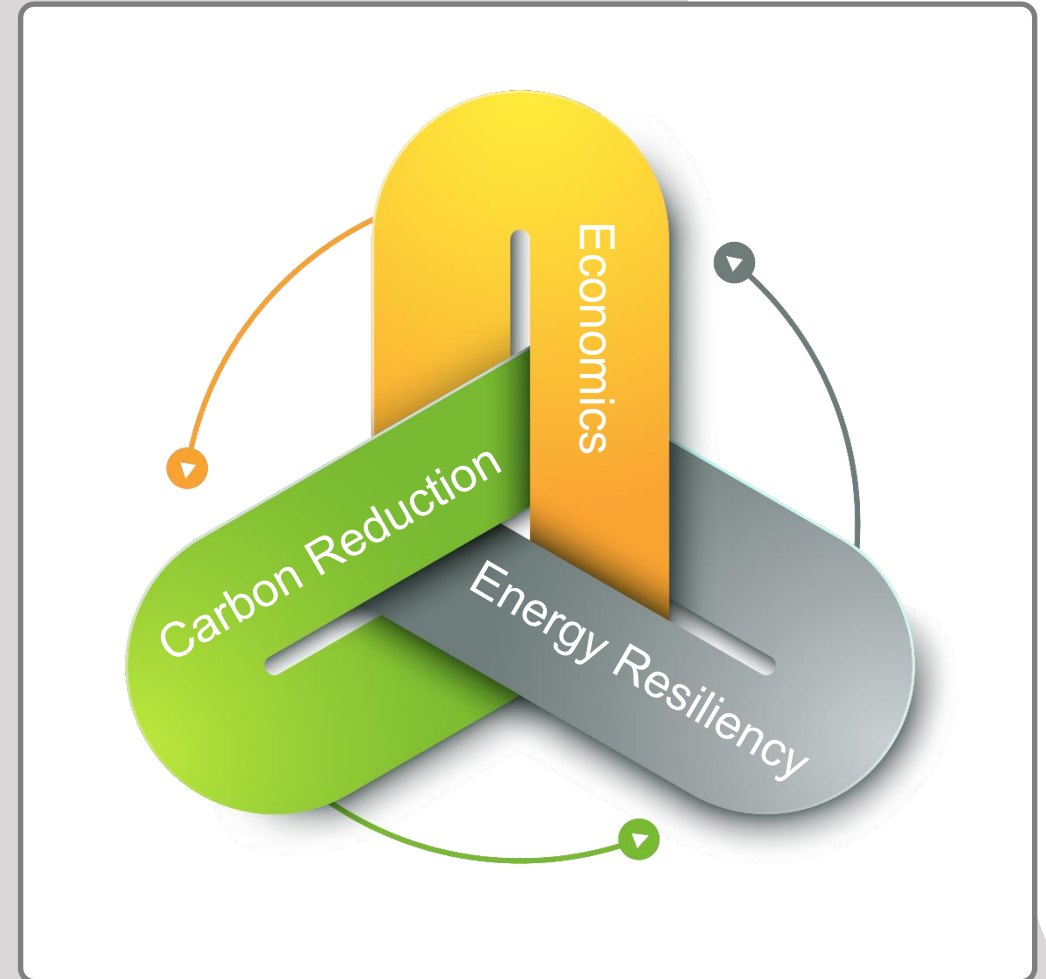


Summary

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- Gas turbines are essential part of low carbon energy solutions
- Gas turbines:
 - Support grid resiliency
 - Provide heat efficiently
 - Future proof solution
- Solar's development focus areas:
 - Low carbon fuels
 - Carbon capture from exhaust
- Solar has vast hydrogen experience and continues to expand H₂ capabilities
- Exhaust gas recirculation will reduce cost of carbon capture



Solar Turbines is powering the future through sustainable, innovative energy solutions



THANK YOU

Growth Through Customer Success