Solar Overview



Solar Turbines
A Caterpillar Company



Solar Turbines

- Who are we?
- Energy Solutions provider
- 94 Years in San Diego, California
- Global exporter to over 100 countries
- Subsidiary of Caterpillar Inc. since 1981
- Global Footprint: Customers, Products, People, Service
- Over 16,000 gas turbines and 6,500 gas compressors shipped

- What do we do?
- Power and heat for hospitals, universities, industrial facilities…
- Power and compression for gas transmission, offshore platforms…

- What do we make?
- Industrial gas turbines, compressors, electric motor drives, energy storage, digital solutions accompanied by service through the lifecycle

Caterpillar: Non-Confidential

World's Largest Manufacturer of Industrial Gas Turbines
(1 to 23 MW)

Subsidiary of Caterpillar Inc.
Since 1981

16,000+
Gas Turbines Sold

6,500+
Gas Compressors Sold

Installations in
100+
Countries

Direct
End-to-End
Sales and Service

65
Sales and Service Locations

Global Workforce
8,000+
Employees

Caterpillar: Non-Confidential

This is Caterpillar



CONSTRUCTION INDUSTRIES

1.8M

active construction machines globally



RESOURCE INDUSTRIES

2.6B

metric tonnes moved autonomously with zero lost time injuries
(as of 11/30/20)



ENERGY & TRANSPORTATION

>20M

engines built



SERVICES, DISTRIBUTION & DIGITAL

1M

connected assets
(reached in 2019)

Caterpillar: Confidential Green

Caterpillar: Non-Confidential

Solar Turbines

A Caterpillar Company

Over 94 years of innovation and entrepreneurial spirit





1927

A pioneering San Diego Company, Solar Aircraft, designed and manufactured aircraft at the dawn of air travel.



1937

Solar leased a plant in National City, CA housing an industrial products company that manufactured automotive air cleaners.



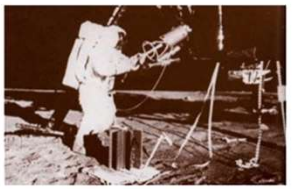
1946

With the end of the war came new efforts to diversify the company's product line, including milk truck tanks, dairy pasteurizers, film processing machines, coffee brewers, kitchen sinks, popsicle trays, and mini race cars.



1956

Solar developed the Jupiter engine and the 50-hp Mars gas turbine.



1969

Solar went to the moon! The company's research department crafted exotic metal beryllium cases for the GE 26 System for Nuclear Auxiliary Power 70W electric generators. Five of these cases were placed on the moon by Apollo 12.



1973

Solar developed Solimide high-temperature non-toxic foam. The company also changed its control system to employ integrated circuit and began development of the 10,000 hp Mars engine. This was also the year that Solar phased out the aerospace components and subcontracting business.



1978

The company developed a trailer mounted Saturn 1000 generator, which was capable of providing dual frequency and voltage for use anywhere. It was built for the U.S. Air Force.



1984

After being named an official subsidiary of Caterpillar Inc., the first Turbotronic control console was introduced. Two years later Solar placed a Turbotronic control system on a Mars engine.



1987-94

Solar launches three new gas turbine models in the late 80s and early 90s: Taurus™ 60, Taurus™ 70, Mars® 100. All three models each have more than 1000 installations and today are part of Solar's core product lineup.



1997

Solar introduced the 18,300-hp Titan 130 engine featuring new blade and combustion technology, improving part-load heat rate performance and achieving thermal efficiency above 35% on both the single and dual-shaft configurations.



2005

Solar launched Equipment Health Management, known today as InSight Platform™. It has evolved into an entire ecosystem of digital tools, capabilities and analytics for maximizing machinery uptime and lower lifecycle costs.



2008

Solar introduced the 30,000-hp Titan 250 gas turbine. This design features a compact engine footprint, delivering an impressive power density in a package.



2015

The company installed a 3D virtual immersion lab to assist in rapid development, design and prototype of packaged products.



2018

Solar adds Power Generation Module (PGM) to its product line-up. A simplified design to minimize maintenance and maximize productivity, these factory pre-assembled modules reduce installation and commissioning time on-site.



2019

Solar introduces Solar Mobile Turbomachinery (SMT), a complete mobile power plant for short-term power generation. SMT is ideal for oil field power, remote power, trailer power, and in emergencies, such as natural disasters.

Caterpillar: Non-Confidential

History and Heritage

- Over 94 years in San Diego, founded in 1927 as Prudden-San Diego Airplane Company
- Sprit of Saint Louis was built at the Harbor Drive facility.
- Approximately 70% of employees have been employed at Solar for over 20 years.

Fun Facts:

- Solar has had a choir for over 60 years. They perform at Solar and for the homeless.
- Solar has an all faith chapel on Harbor Drive facility.





Betty Reed – Solar's Rosie the Riveter



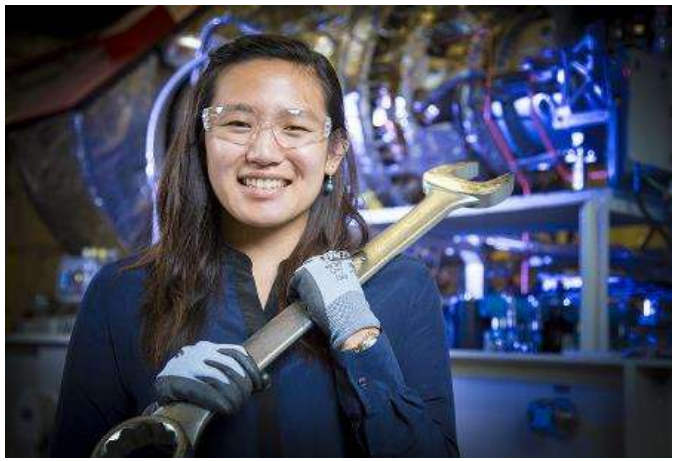
Building the Solar Chapel

Caterpillar: Non-Confidential

Employment and Economic Impact

Employment

- Over 4300 employees in San Diego, over 1500 in Tijuana Mexico
- Family sustaining employment for production and professionals
- Active Apprenticeship program partners with local community colleges
- Solar Young Women's Academy – works with local high schools to help young women along the path to their careers





Overall Impact to Region

- Generate $3.8b in regional economic activity
- Contribute roughly $110.8m to state and local taxes base
- Invest over $1m annual in nonprofit & civic organizations

Caterpillar: Non-Confidential

Environmental, Health & Safety

Solar Turbines is committed to protecting the safety and health of people and the environment in our communities and everywhere we conduct business.



- Our Safety Culture is lead by grassroots teams embedded in our facilities and factories.
- EHS covers approximately 76 locations around the globe.

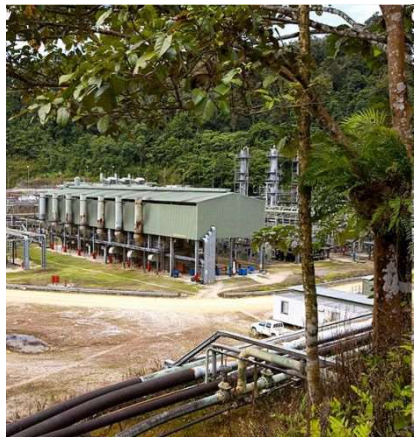
Caterpillar: Non-Confidential

Reliable Gas Turbine Operating Experience

Solar Turbines Gas Turbine Experience by Package	Units Sold	Estimated Hours (000's)
Compressor Sets	5,008	1,090,765
Mechanical Drives	2,735	651,465
Generator Sets	8,387	1,375,570
Total	16,130	3,117,800

January 2021 © Solar Turbines Incorporated | Note: Total includes >1,200 Spartans | Hours reflect new unit sales only



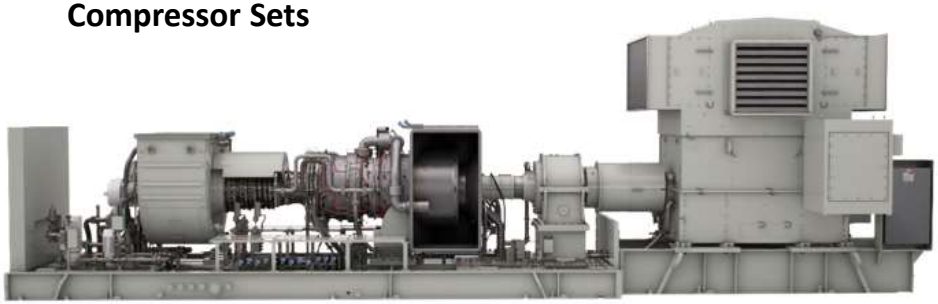
Caterpillar: Non-Confidential

Complete Package Systems

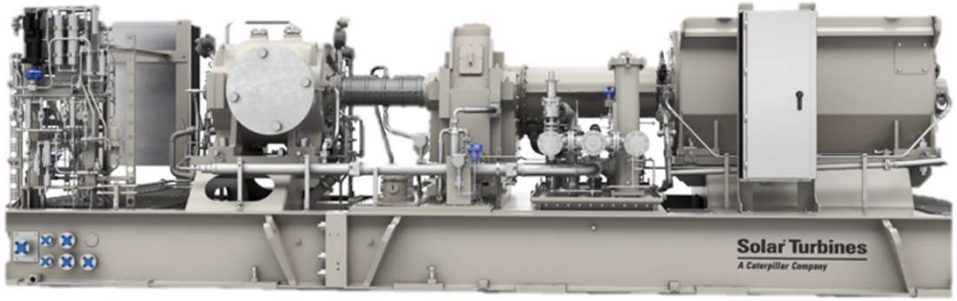
- Saturn 20
- Centaur 40 and Centaur 50
- Mercury 50 and Taurus 65
  - Generator Set Only
- Taurus 60 and 70
- Mars 90 and Mars 100
- Titan 130 and Titan 250
- Spartan™ Electric Motor Drive (EMD)



Compressor Sets



Generator Sets

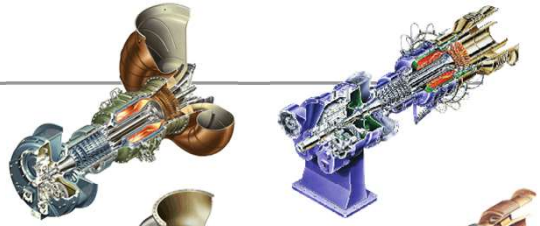


Spartan™ EMD Compressor Sets

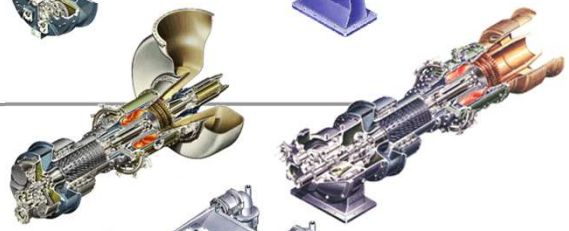
Caterpillar: Non-Confidential

Solar Gas Turbine Family

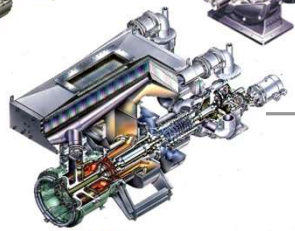
Saturn 20
1590 hp / 1210 kWE



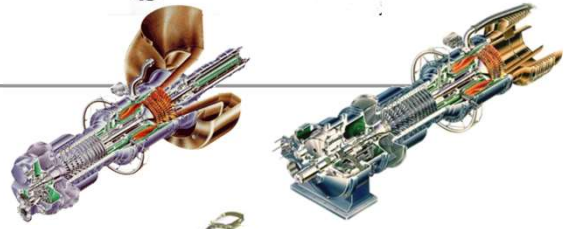
Centaur 40 & 50
4700 - 6130 hp
3515 - 4600 kWE



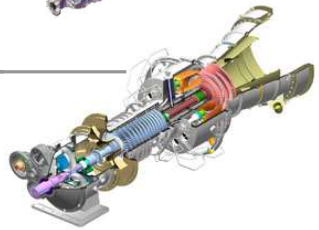
Mercury 50
4600 kWe



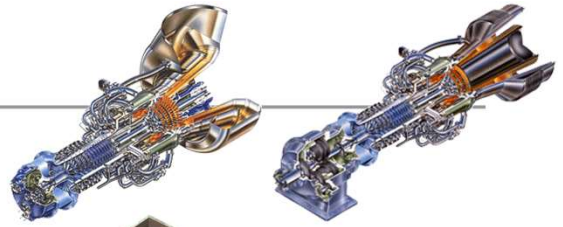
Taurus 60
7700 hp / 5670 kWe



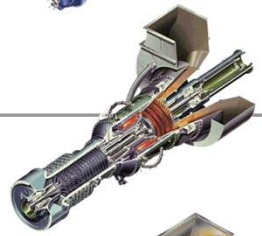
Taurus 65
6500 kWe



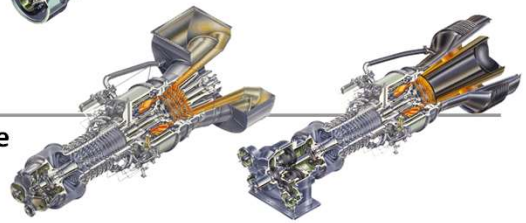
Taurus 70
11,110 hp / 8180 kWe



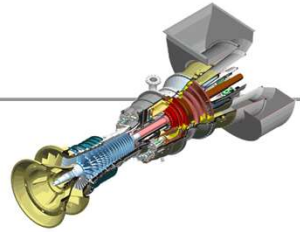
Mars 90 & 100
13,220 - 15,900 hp
9450 - 11,350 kWe



Titan 130
23,470 hp / 16,530 kWe



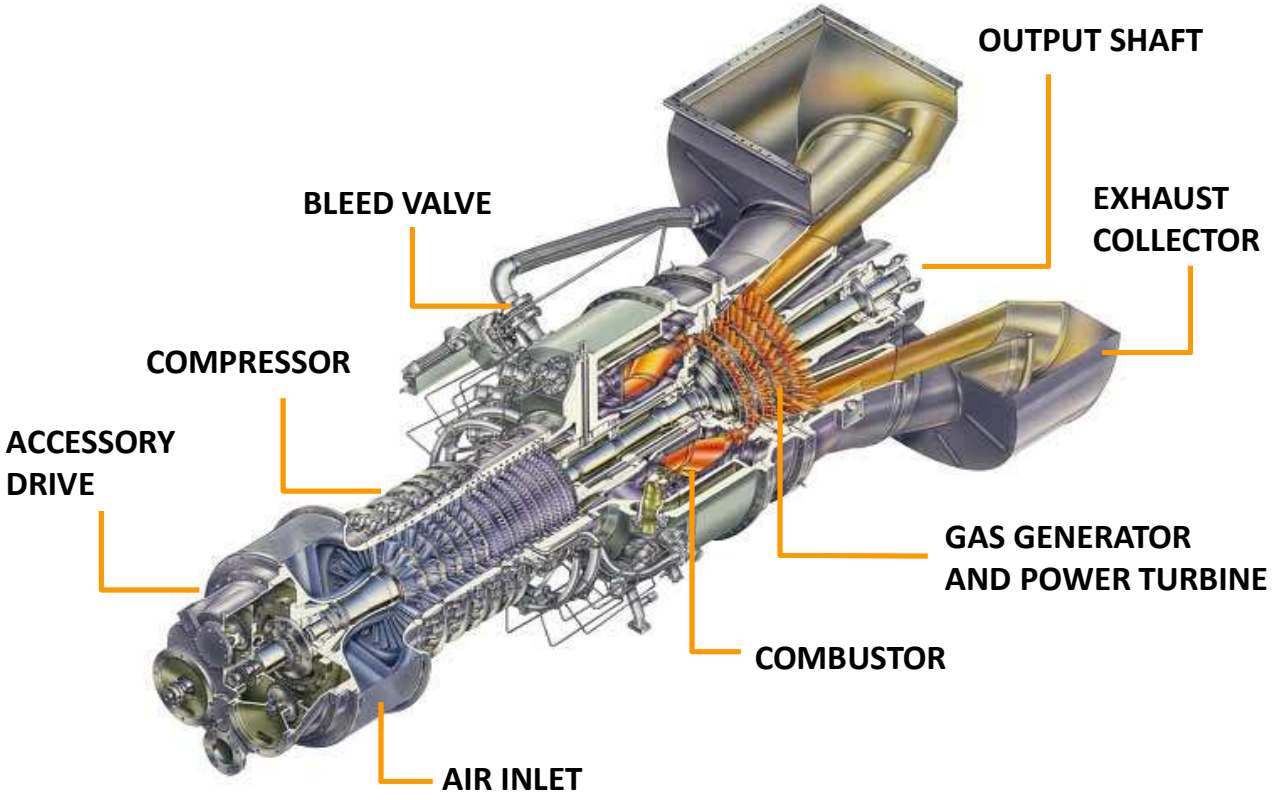
Titan 250
31,900 hp / 23,100 kWe



Updated Apr 2019

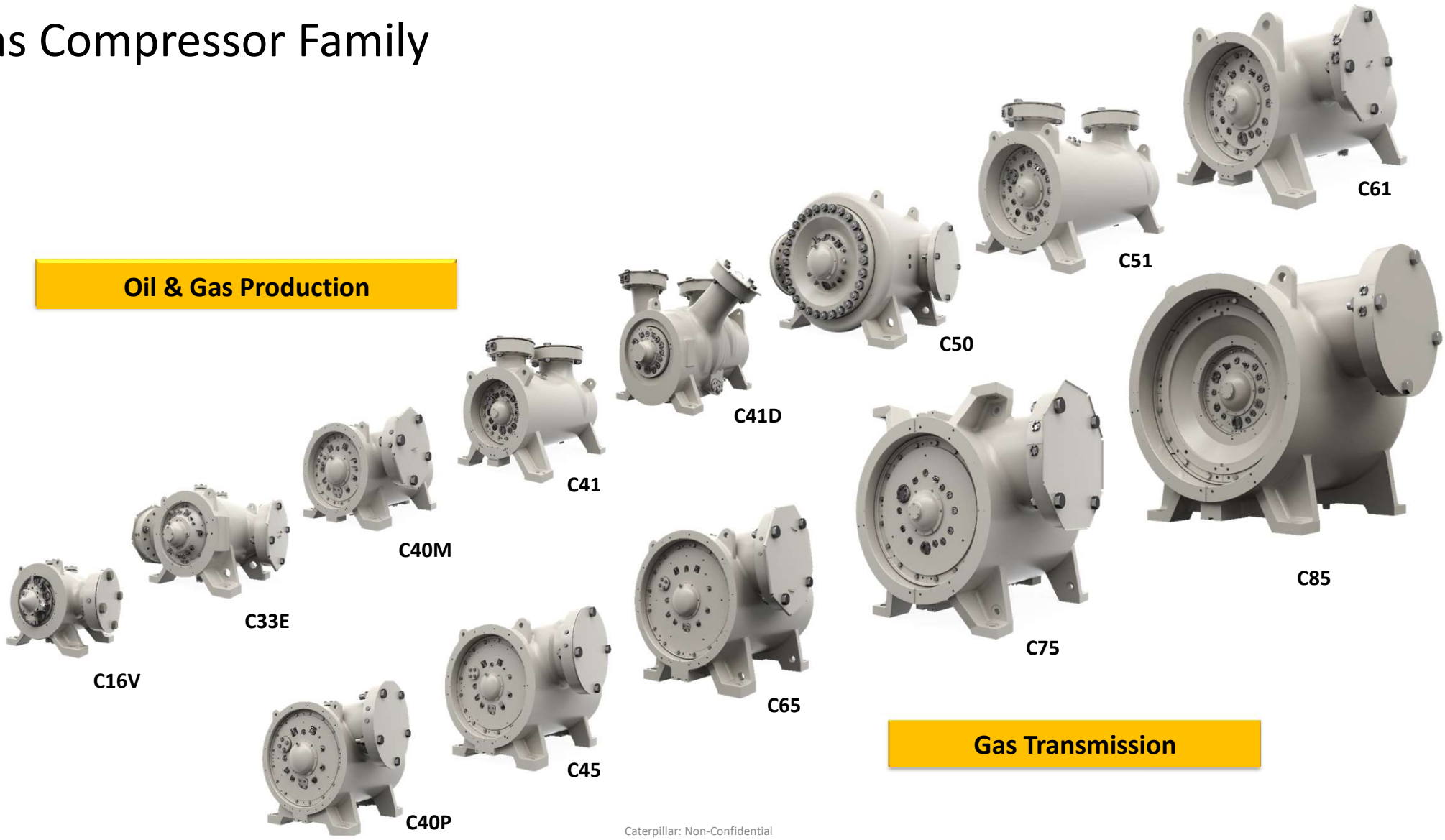
Caterpillar: Non-Confidential

Typical Gas Turbine Components



Caterpillar: Non-Confidential

Gas Compressor Family



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Centrifugal Gas Compressors

- Match speed and power of Solar gas turbines
- First installed 1960
- Over 6500 units shipped
- Handle wide variety of applications and power requirements



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Oil and Gas Applications

- Gas Transmission
- Storage and Withdrawal
- Gas Gathering
- Gas Injection
- Gas Lift
- Waterflood
- LNG
- Field Pressure Maintenance
- Air, Process, and Refrigeration Applications
- Electrical Power Generation







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Oil and Gas Modular Solutions

Open Ground Modular



Modular Buildings and Enclosures



Offshore Single Lift Modules



Safer **Faster Execution** **Cost Certainty**

Caterpillar: Non-Confidential

Spartan Electric Motor Drive



Key Design Aspects

- 2-Piece Skid for Transportability
- G/B Driven Main / AC Pre-Post Lube Oil Pump, No DC Backup
- Single Integrated Lube Oil Tank
- Maximizes Component Accessibility for Serviceability
- Common Control System
- Current Driven Skid Design for All Compression Applications

Caterpillar: Non-Confidential

Customers

Upstream | **Midstream** | **Power Generation**

Oil & Gas Production

Chevron

TOTAL

CNOOC

PEMEX

ExxonMobil

Gas Transmission

PETROBRAS

Williams

Kern River GAS TRANSMISSION COMPANY

e·on

KINDER MORGAN ENERGY PARTNERS, L.P.

ENBRIDGE

Cornell University

MICHELIN

NUON

Kimberly-Clark

THE UNIVERSITY OF UTAH

HARVARD UNIVERSITY

Power Generation Applications

- Cogeneration
- Industrial Power
- Standby Power
- Peaking Power
- Mobile Power



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Industrial and Processing Facilities

- Pulp and Paper
- Ceramics
- Food and Beverages
- Breweries
- Chemical Plants
- Cement / Gypsum
- Dairies and Dairy Products
- Pharmaceuticals
- Plastics
- Refineries
- Tires and Rubber



Caterpillar: Non-Confidential

Commercial and Institutional Facilities

- Universities
- Hospitals
- Commercial Buildings
- Data Centers
- District Heating and Cooling Plants
- Resorts and Hotels





Caterpillar: Non-Confidential

Distributed Power

Small Utilities | Load Management | Remote Locations | Mobile Power







Caterpillar: Non-Confidential

Alternative and Renewable Fuels



Landfill Gas Project in California

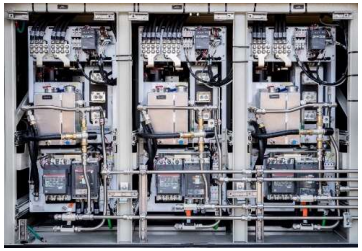


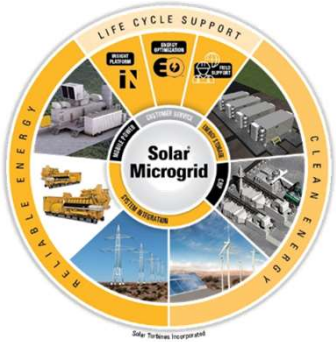
Coke Oven Gas Project in China

Caterpillar: Non-Confidential

Solar® Energy Storage









Name	Storage Technology	Power @ 480V	Duration
LS1000-0.5	Li-Ion	1000 kVA	0.5 Hour
LS1000-1	Li-Ion	1000 kVA	1 Hour
LS1000-2	Li-Ion	1000 kVA	2 Hours
LS1000-4	Li-Ion	1000 kVA	4 Hours

From Solar Experience as Packager/System Integrator of Complex Industrial Equipment

- Fully self contained system for high energy density
- Control system and fire protection direct carry-over from GT products
- Rugged Design for 25+ yr Life
- “Plug & Play” features for Simplified Installation
- UL 9540 Compliant
- Redundant HVAC
- Seismic Certification through Zone 4
- Offshore features available
- InSight Platform-enabled

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Total Life Cycle Support



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Measurable Performance

Risk Sharing

Predictive Analytics

Real Time Troubleshooting

Condition Based Maintenance & Overhaul

Operational Support

INSIGHT CONNECT

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Connectivity

Solar DIGITAL



Commissioning



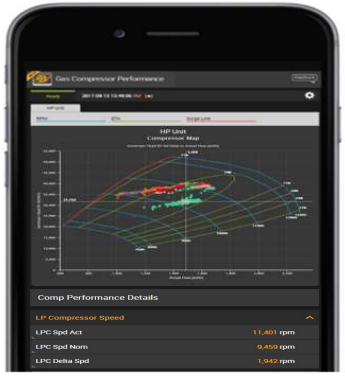
Operation



Beyond

Capable





Immediate

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Connected Products Deliver Superior Customer Value

SECURE CONNECTION HARDWARE



INSIGHT CONNECT

The secure, purpose-built, machine-to-business connectivity solution for customer equipment operating in the field.

DIGITAL SOLUTIONS



InSight Platform

The technology foundation for service delivery. InSight Platform is an entire ecosystem of tools and capabilities for managing connected equipment.

Solar DIGITAL

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Construction Services

- Provides Range of Services
  - System Engineering
  - Equipment Supplier (Boilers, Switchgear)
  - Construction Drawings
  - Procurement
  - Construction Supervision
  - Complete Turnkey Installations
- More than 1000 Projects



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Solar Customer Services Global Organization

3 Global Customer Services Facilities

Sales

Field

Overhaul

Digital

PR&U

Customer Services

2,600+ Employees

1,000+ Field Service Representatives

SAFETY

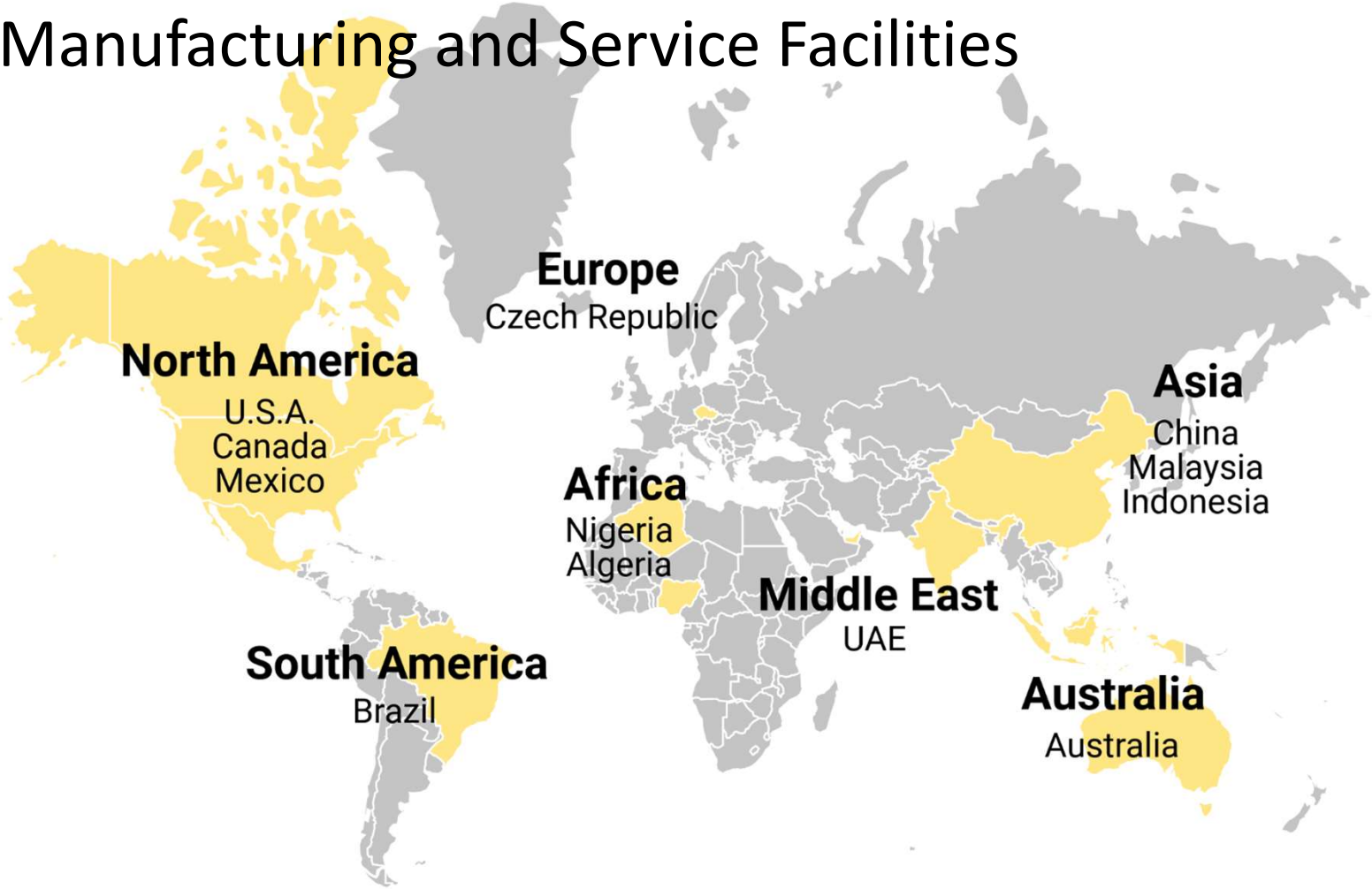
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Sales and Support Facilities



Global Manufacturing and Service Facilities



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SUMMARY

- Broad products and services portfolio
- Extensive experience and expertise
- Relentless customer support
- Worldwide support facilities
- Single-source solution provider
- Global leader in industrial turbomachinery

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Caterpillar: Non-Confidential

SUSTAINABILITY: Making the Future our Purpose for Today

Sustainability is part of who we are and what we do every single day. Progress involves a balance of environmental stewardship, social responsibility and economic growth.



COMMUNITY

- People matter
- External corporate narrative
- Corporate social responsibility



BUSINESS

- Culture of sustainability
- Operational excellence
- Long-term reinvestment



ENVIRONMENT

- Low impact energy solutions
- Resource management
- Material recovery and reuse solutions

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THANK YOU

Solar® Turbines
A Caterpillar Company