



Connecting For Success...

ELECTRIC POWER DAYS 2017

BUILT FOR IT.

CATERPILLAR®

AGENDA

- Health and Safety
- Introducing Caterpillar Electric Power
- *Break*
- Break out Sessions and Groups
- Power Challenges

Connecting For Success...

Introducing Electric Power

JOHN SWANSON

Marketing and Dealer Support Manager

BUILT FOR IT.

CATERPILLAR®

ATTENDEES – SESSION ONE

28 Countries represented



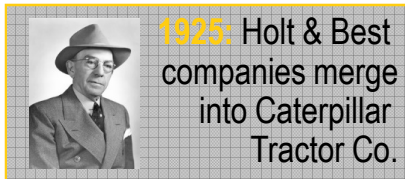
Dealer Representatives

Consulting Engineers

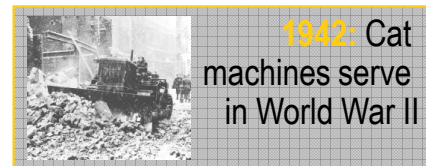
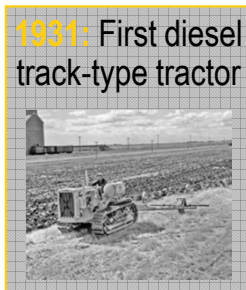
Contractors

End Users

A History of Progress



1925	1930	1940	1950	1960	1970	1980*	1990	2000	2010	2016
\$13.8 Million	\$45.4 Million	\$73.1 Million	\$337.3 Million	\$716 Million	\$2.1 Billion	\$8.6 Billion	\$11.4 Billion	\$20.2 Billion	\$42.5 Billion	\$38.5 Billion



* In 1978, the company began reporting Sales & Revenues

Connecting For Success...




SINCE 1925...

Construction Industries

Caterpillar Inc. Overview:


- Fortune 100 Company
- Dow Jones 30 Company
- Top 100 Global Brands
- 3 Million+ Cat Products Working Worldwide



Energy & Transportation

World's Leading Manufacturer:

- Construction and mining equipment
- Diesel and natural gas engines
- Industrial gas turbines
- Diesel-electric locomotives



Resource Industries

Connecting For Success...

ENERGY AND TRANSPORTATION



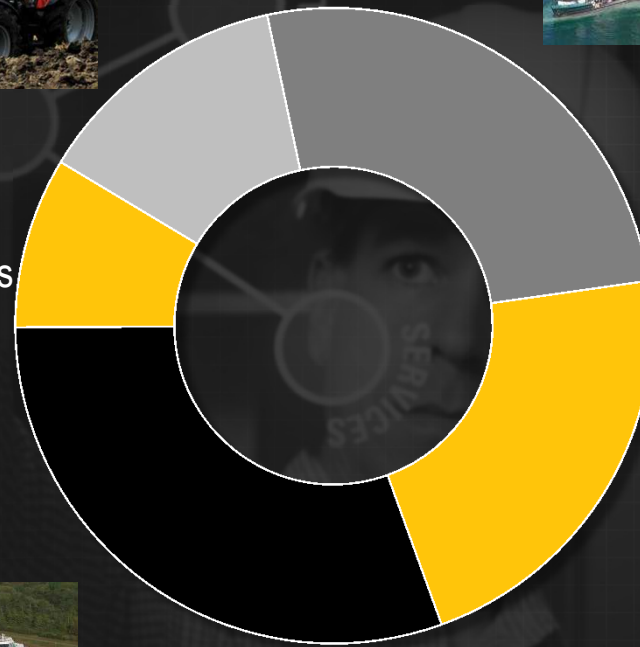
Industrial



Oil & Gas



Cat®
Machines



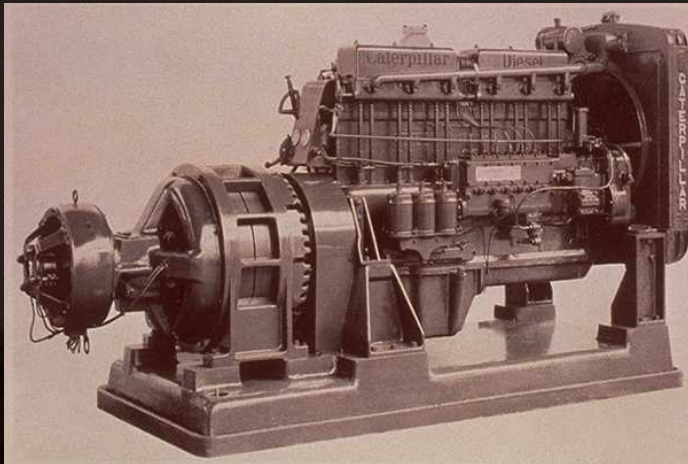
Power Generation



Transportation



PROVEN ELECTRIC POWER PROVIDER



Cat D13000
60 kW Diesel Generator Set (8,000 lbs.)

76 years in the business.

500,000+ installations > 300 kW.

1 million+ installations < 300 kW.

Over 1,300GW installed worldwide

Two new popular-size CATERPILLAR DIESEL-ELECTRIC SETS

THAT GENERATE Electricity at Rock-Bottom Cost

CATERPILLAR DIESEL POWER

"CATERPILLAR" 77-40E DIESEL


"CATERPILLAR" D13000 DIESEL ELECTRIC SET

Specifications

Model	Power (kW)	Weight (lbs.)
77-40E	40	4,000
D13000	60	8,000

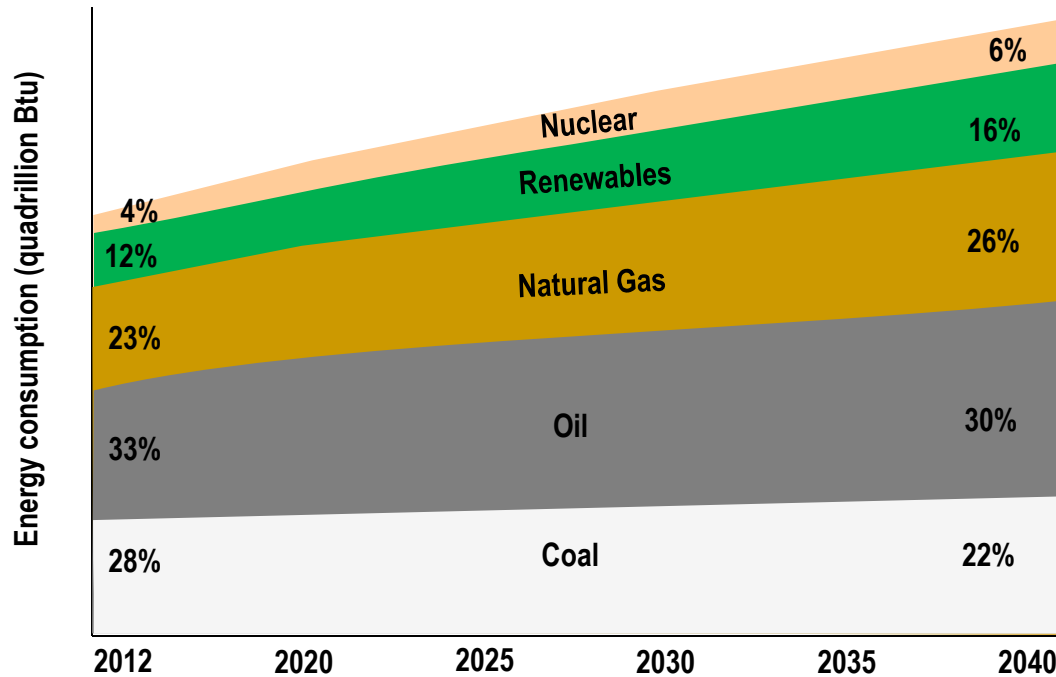
Specifications

Model	Power (kW)	Weight (lbs.)
D13000	60	8,000

The image features a large construction crane as the central subject, set against a bright blue sky with a prominent sun flare on the right side. The crane's lattice structure is silhouetted against the sky. In the background, another smaller crane is visible. A semi-transparent stock market ticker is overlaid on the image, displaying various numerical values in red and green. The text "May you live in interesting times" is written in a white, handwritten-style font across the middle of the image.

"May you
live in
interesting
times"

GROWTH IN GLOBAL ENERGY CONSUMPTION



Source: EIA International Energy Outlook 2016

38%

Increase in
FOSSIL FUEL
consumption

70%

Increase in
**NATURAL
GAS**
consumption

Connecting For Success...



3 x world population

Growth in Global IP Traffic Forecast

More Devices and connections

**16.3 billion
to 26.3**



Faster Broadband speeds

**From
24.7mbps
to 47.7**



More Internet users

**From 3.0
billion to 4.1**



More video watching

**From 70%
to 82% of
traffic**



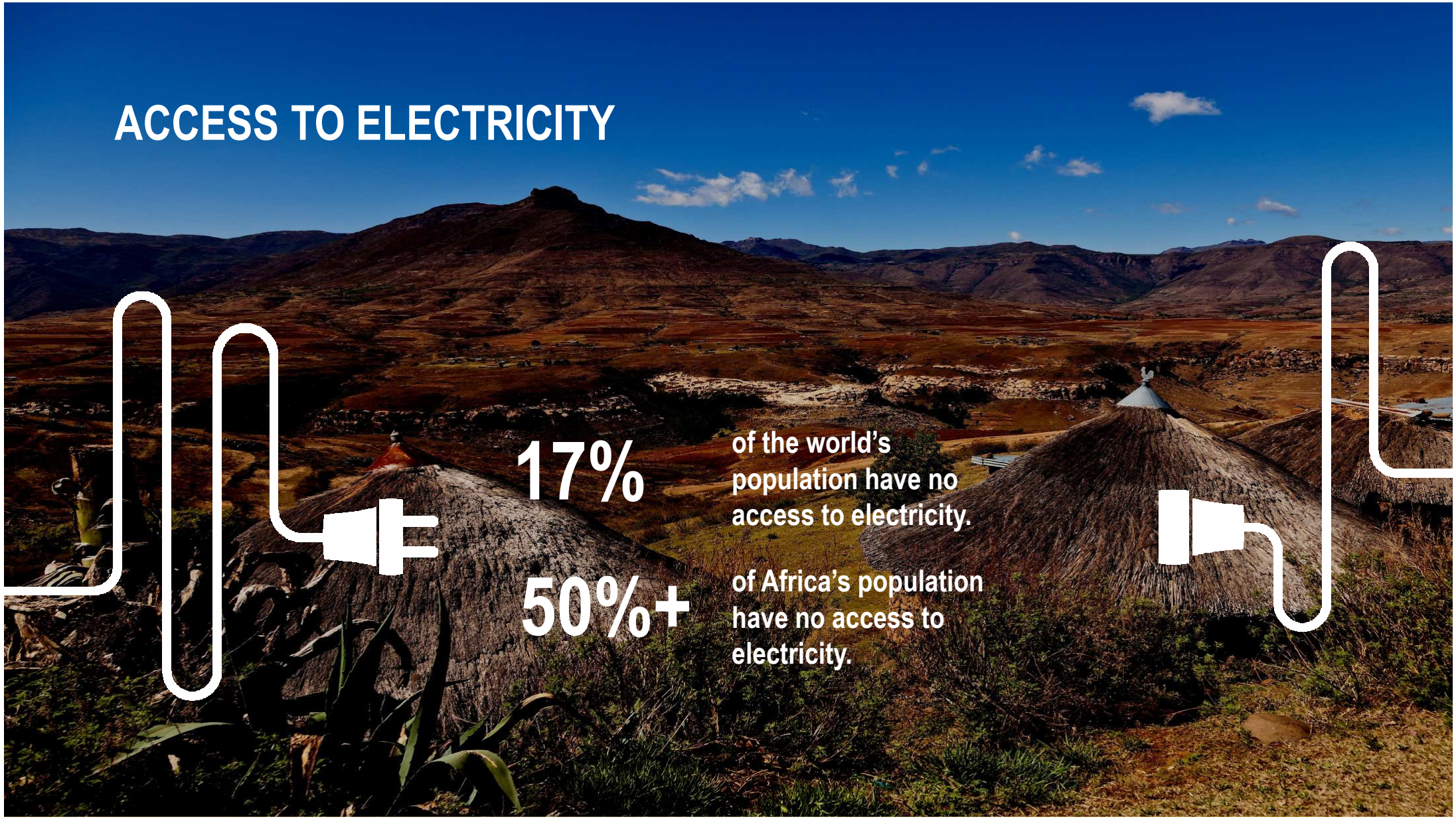
ACCESS TO ELECTRICITY

17%

of the world's
population have no
access to electricity.

50%+

of Africa's population
have no access to
electricity.





1.2 Billion without access to electricity

Caterpillar's Vision

Making Reliable Power a Global Reality

Connecting For Success...

CUSTOMERS AND APPLICATIONS



CUSTOMERS

- Data Centre
- Utilities
- Municipal
- Telecommunications
- Healthcare
- Commercial
- Industrial
- Mining
- Construction
- Landfill
- Bio renewables

APPLICATIONS

Emergency Standby
Prime / Continuous
Mission Critical CHP

Permanent Installation
Temporary Power

Fuel Flexibility

1.5m GENERATOR SETS INSTALLED WORLDWIDE
541,000 in the last 20 years alone

OUR ELECTRIC POWER PRODUCT PORTFOLIO

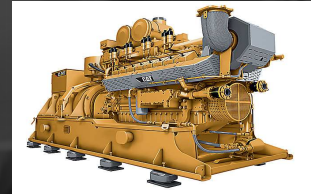
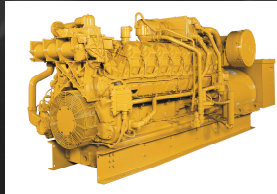
DIESEL GENSETS

7kW – 14.7MW



GAS GENSETS

68 kW – 14MW



RENTAL GENSETS

20 kW – 2 MW



HOME AND OUTDOOR

2300 - 4400 Watts



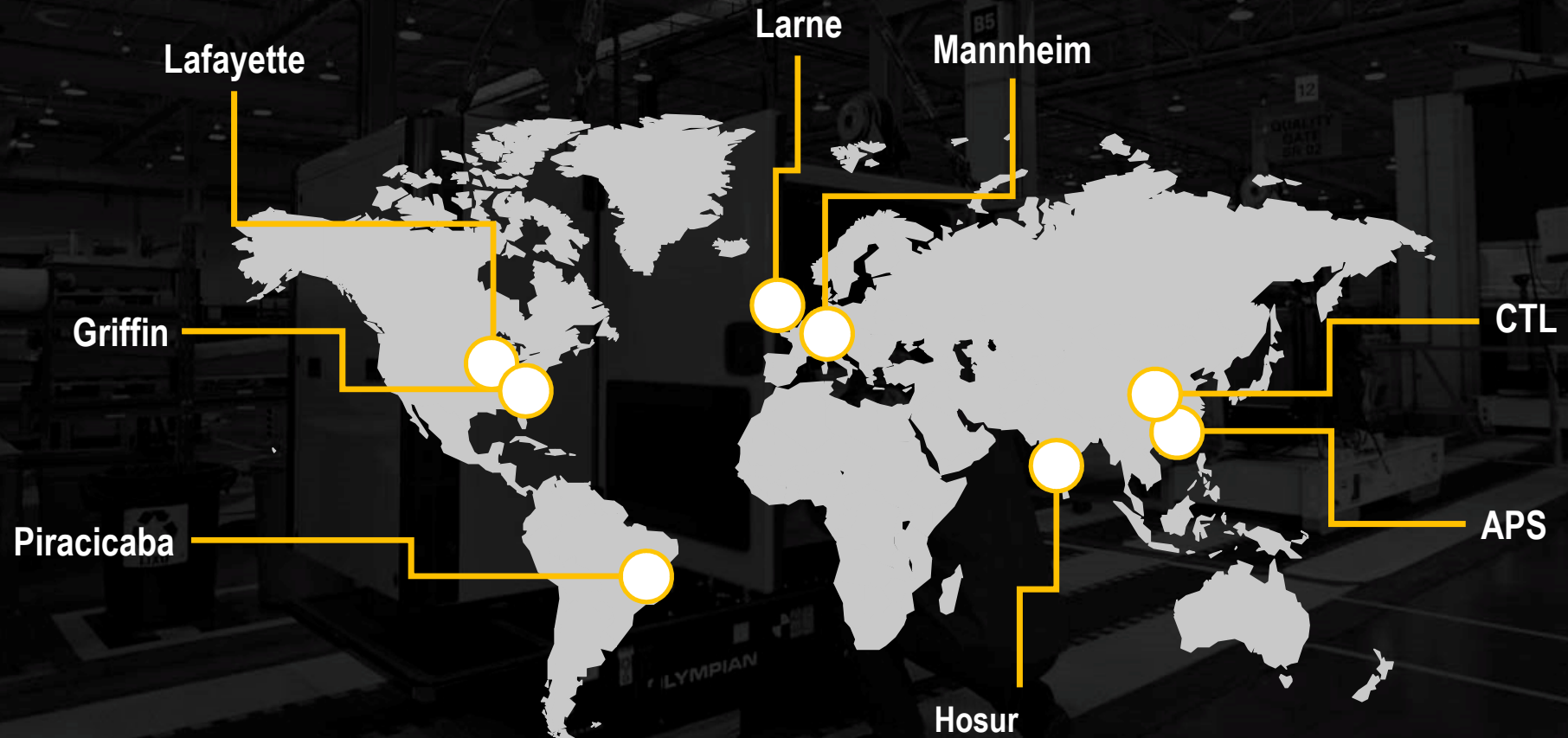
Total Electric Power Solutions Provider

- Custom Gensets
- Switchgear and Synchronising controls
- Custom enclosures
- 3rd party Certification
- Engineering Services



Connecting For Success...

GLOBAL MANUFACTURING



CUSTOMER NEEDS

- Emergency standby
- Price sensitive
- Emissions sensitive
- Space constraints
- Lower installed transportation costs
- Lower owner and operating costs
- Reduced risk
- Data Center
- Municipal
- Healthcare
- Commercial
- Industrial

PRODUCT DEVELOPMENT

**Upgraded Power
Dense Products**



**Enhanced Emissions
Capability for Select
Customers & Ratings**



**Digital as a competitive
advantage**



3500 BY THE NUMBERS

Cat 3500 Engine Platform

the gold standard in high horsepower heavy-duty engines

3B
operating hours

190,000+
engines shipped since 1981

10,000+
global customers

250M HP
(170M kW)
in the field

4 design/development
locations

2 manufacturing
locations

4 component manufacturing
locations

- ✓ Electric Power
- ✓ Oil & Gas
- ✓ Marine
- ✓ Rail/Industrial
- ✓ Cat Machine

722
global suppliers

- ✓ Gas
- ✓ Diesel
- ✓ Dual Fuel
- ✓ Bio-Fuel

1 global
brand

500,000+
part numbers

13,000+
remanufactured 3500s

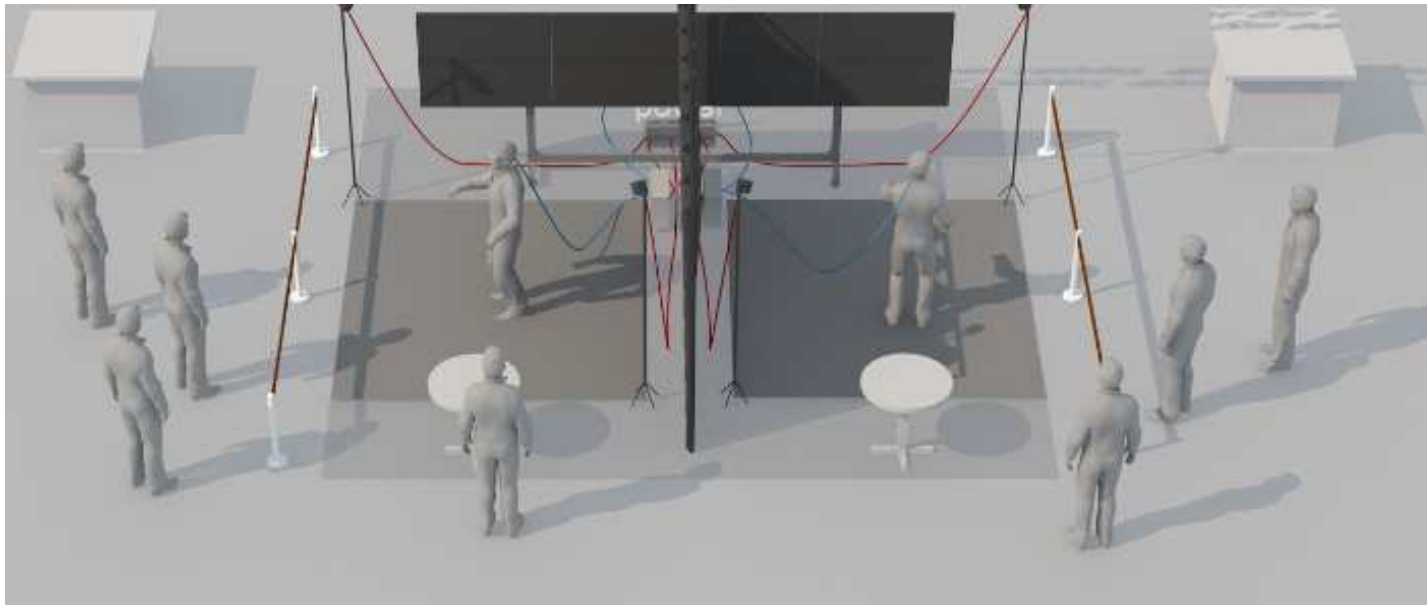
500-3500 HP
391-2747 bkW power range

8, 12, 16, 20
cylinder configurations



Connecting For Success...

Product Review at the Village through Virtual Reality



3516E – 3000 KVA
Available now

C32 – 1500KVA
Coming Q4 2017

Also Break Out Session

Connecting For Success...

Microgrids

Francois-Xavier Saury

Business Development Manager

BUILT FOR IT.

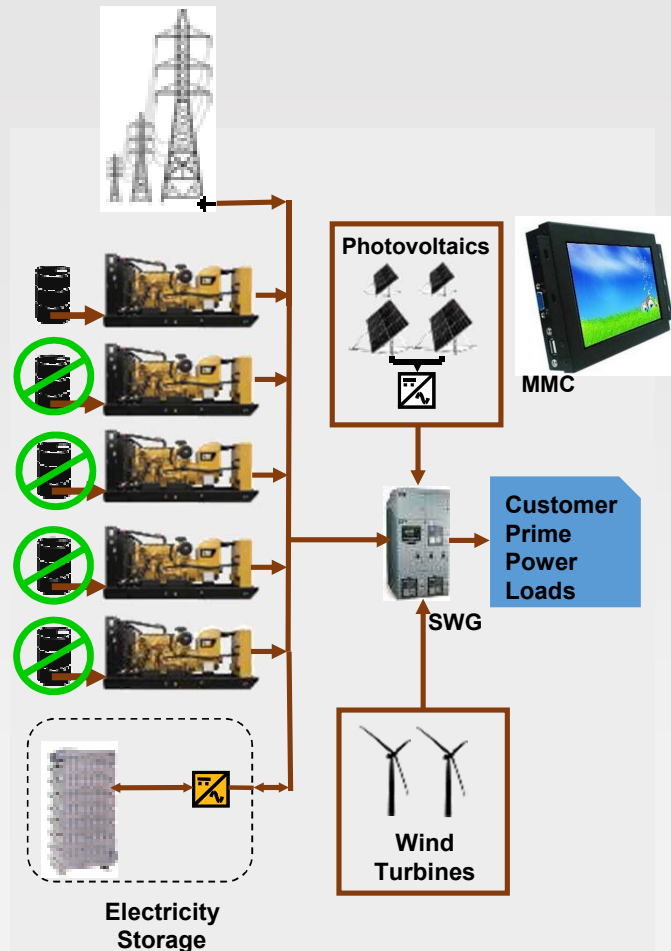
CATERPILLAR®

Caterpillar has been supplying Microgrids for 60+ years.



Connecting For Success...

What is a Hybrid Microgrid?



Hybrid Microgrids are

Combining Traditional & New Energy Technologies

Objective = lower operating cost

- Fuel consumption can be reduced 10% - 50%+
- Combinations can achieve lowest life-cycle costs

Capture the Benefits of Each

- **reliable** and **fully dispatchable** generator sets:
- **Cheaper** (free) energy source: solar and wind:
- **Stabilization**, time-shifting, high-penetration: energy storage (batteries, ultra-caps, UPS)

Connecting For Success...

CUSTOMER NEEDS

- Price sensitive
- Emissions sensitive
- Lower owner and operating costs
- Reduced risk
- On Grid, off grid

- Mining
- Commercial
- Industrial
- Utilities
- Telecoms

PRODUCT DEVELOPMENT

**Diesel
Gas
Solar
Wind turbines**



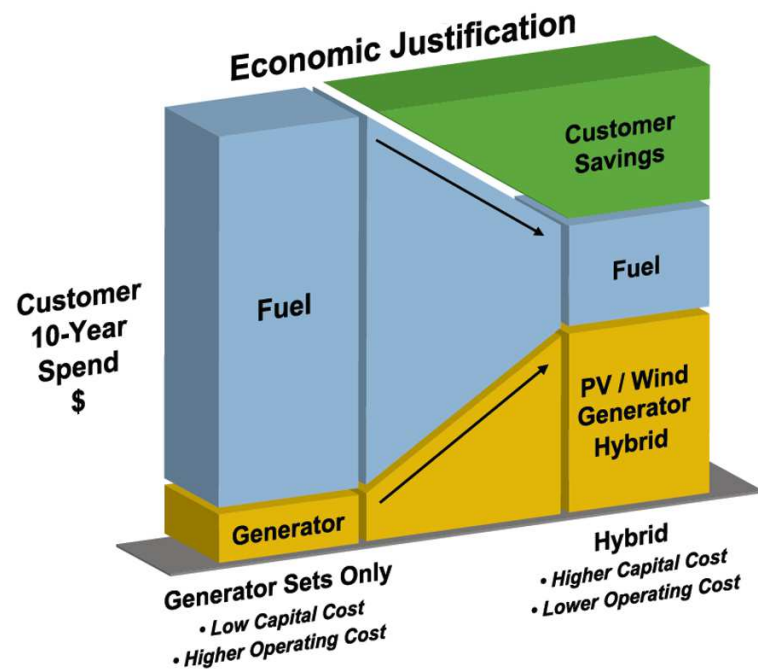
**Microgrid Controllers
Energy Storage
Solutions**



**Digital as a competitive
advantage**



MICROGRID DRIVES NEW ECONOMICS



Connecting For Success...

WHY HYBRID MICROGRID MAKES SENSE?

Rural Electrification

1.2 BILLION

without power
80% in Rural Areas



Telecom

3.5 BILLION

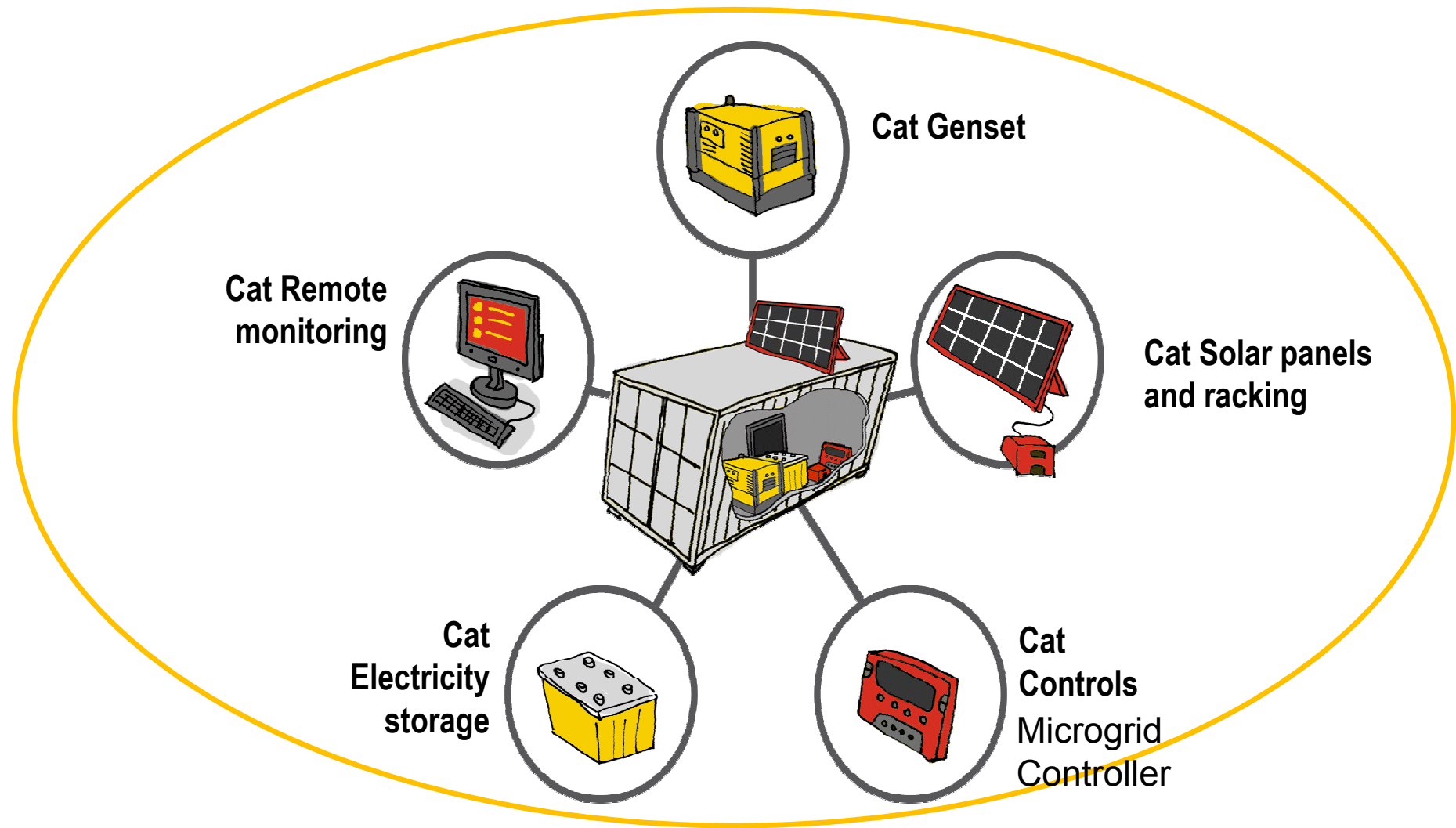
without mobile phones

Estimated increase of **22%** in off-grid
towers by 2020 (and 13% in poor-grid)





A simple concept

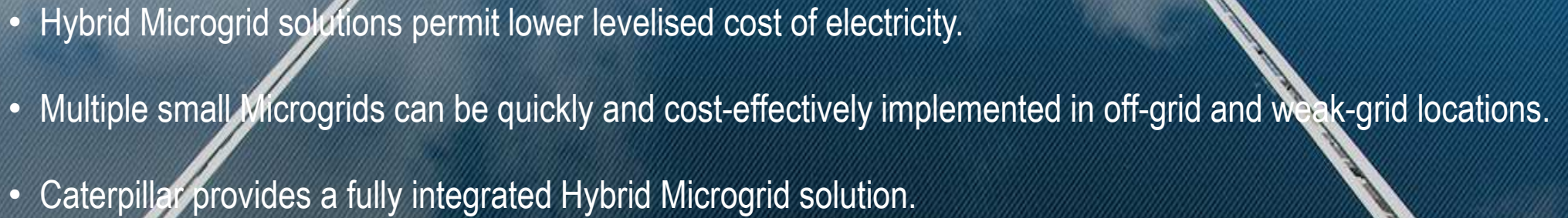


Connecting For Success...

IN REALITY...



Connecting For Success...

- 
- A close-up photograph of several solar panels mounted on a metal frame, showing the grid lines and mounting hardware.
- Hybrid Microgrid solutions permit lower levelised cost of electricity.
 - Multiple small Microgrids can be quickly and cost-effectively implemented in off-grid and weak-grid locations.
 - Caterpillar provides a fully integrated Hybrid Microgrid solution.

A photograph of five young children of African descent sitting on a black metal bench outdoors. They are all smiling and looking towards the camera. The background shows green grass and some trees.

SEE MORE OVER THE NEXT FEW DAYS

Cat Connect

Fabrizio Dotta

Product Support Manager

BUILT FOR IT.

CATERPILLAR®

CUSTOMER NEEDS

- Emergency standby
- Price sensitive
- Emissions sensitive
- Space constraints
- Lower installed transportation costs
- Lower owner and operating costs
- Reduced risk
- Data Center
- Municipal
- Healthcare
- Commercial
- Industrial

PRODUCT DEVELOPMENT

Upgraded Power
Dense Products



Enhanced Emissions
Capability for Select
Customers & Ratings




Digital as a competitive
advantage



TECHNOLOGY REVOLUTION

Today everything is connected...
networked in ways that once seemed
impossible, but are now expected.

Connecting For Success...



Caterpillar has been focused on digital technology for decades. Now is the time to accelerate – making our customers more efficient and profitable.

VISION BECOMING REALITY

Connecting For Success...

SUPPORTED BY HISTORY BUILD ON KNOWLEDGE



Training & Development

- Growth & Retention Plans
- Blended Training
- Foundational / Advanced / Expert



SOS Services

- Oil, Fuel and Coolant Analysis
- Dealer and Cat Labs
- Oil Condition & Cleanliness / Wear Rate

CAT INSPECT

- Cat, Cat Dealer and Customer
- SMART Inspection Tool
- Access for quick and effective support



Connecting For Success...

SOLUTIONS THAT CAN'T BE MATCHED

172

Cat[®]
Dealers

Located Strategically
Around the World

Analyze

5M

Fluid Samples
Annually

400K

Connected
Assets

100K

Electronic Inspections
Through Cat Inspect
Mobile App

Representing the
Largest Fleet
In the
WORLD

Connecting For Success...

EQUIPPING CUSTOMERS WITH ENHANCED DIGITAL CAPABILITIES



PRODUCTIVITY



SAFETY



SUSTAINABILITY



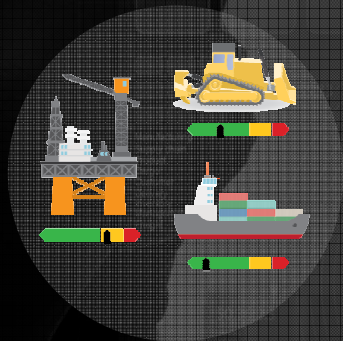
EQUIPMENT
MANAGEMENT



We're increasing our tempo and prioritizing digital offerings in four areas that are designed to help catapult customer success.

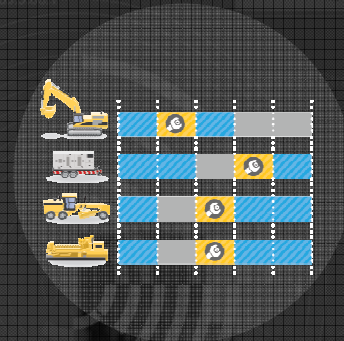
Connecting For Success...

HOW CUSTOMERS WILL BENEFIT



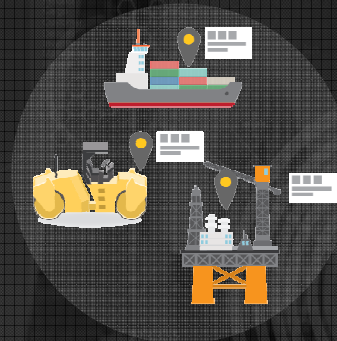
Reduce / Control **OPEX**

- Know the health and efficiency of assets
- Spot & Address problems before they affect Your business



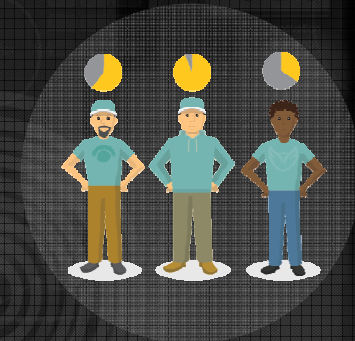
Optimize efficiency/ Improve **PERFORMANCE**

- Improve productivity
- Minimize Downtime



Simplify compliance/ Reduce **RISK**

- Reduce emissions
- Always Ready to RUN in critical situation



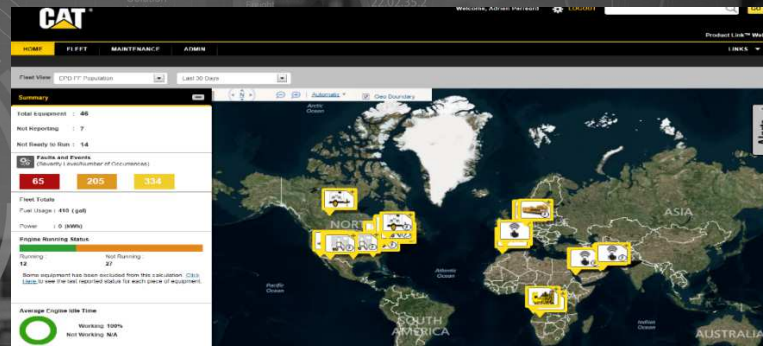
Keep people and equipment / Investment **SAFE**

- Improve processes
- Recover more value at the end of asset life

Connecting For Success...

CAT® CONNECT – FEATURES / VALUE

View equipment location on easy-to-use maps with location history on mobile assets



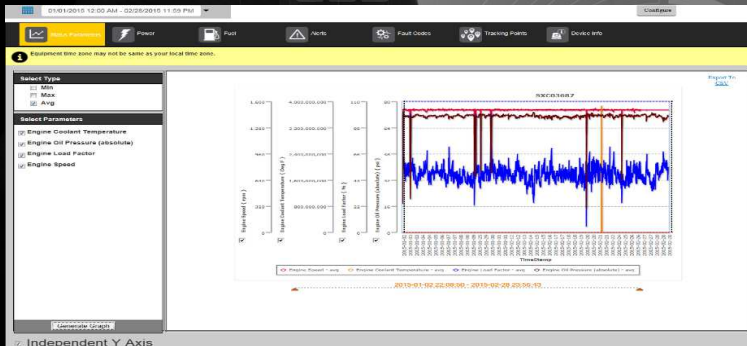
Get accurate information on Fleet Health and Maintenance Tracking and receive real-time alert notifications

The screenshot displays the CAT Connect web interface. The main view is a table of equipment data. The table has columns for Equipment ID, VIN, Make, Model, and a 'Fleet Life Cycle' column with various status indicators. The interface includes a sidebar with navigation options like Fleet, Maintenance, and Admin, and a top navigation bar with tabs for Fleet, Maintenance, and Admin.

Equipment ID	VIN	Make	Model	Fleet Life Cycle
NA	1L440001	CAT	9610C	1 31 9
NA	1L440002	CAT	9610C	1 0 0
NA	1L440003	CAT	9610C	1 400 00
NA	1L440004	CAT	9610C	1 010 10

Connecting For Success...

CAT® CONNECT – FEATURES / VALUE



Tracking of individual parameters to identify performance related inefficiencies

Cost of Prime Genset

Fuel
80%

Genset
7%

Overhaul
7%

Maintenance
6%

Connecting For Success...

CAT® CONNECT – CUSTOMER SUCCESS

Issue



Standby Generator
Set

ALARM-EVENT
“Not Ready to Run”

Resolution



Diagnosed an
alternator failure

Identified Root
Cause:
five-minute engine
run weekly test.

Value



Event to Resolution
Time Reduced for
increased **Availability**

Improved operation for
better **Productivity**

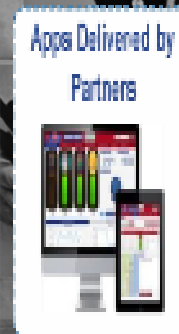
Connecting For Success...

CAT® CONNECT – LONG TERM VISION

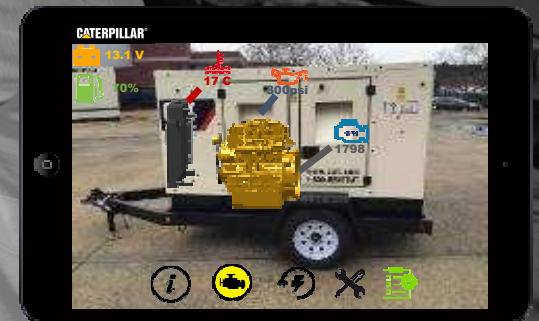


ADVANCED ANALYTICS
PREDICTIVE REPAIRS

CUSTOMER, DEALER, CAT
TAILORED APPS



AUGMENTED
REALITY
Service & Inspection



Connecting For Success...

SILICON AND STEEL

We're taking the products we're so well known for and making them smarter so customers can use resources more efficiently, increasing **sustainability performance.**

Come on this journey with us...

Today

400,000 connected assets

World Class Support (Traditional)

Into the future

Goal of 2,000,000 by 2018

World Class Support
combined with Digital Technologies

Connecting For Success...

EXPERT CUSTOMER SUPPORT

172 Cat Dealers

1,741+ Locations

157,000+ Dealer Employees

1,587 Cat Rental Outlets

- Design Expertise
- Parts
- Pre-sales Support
- Preventative Maintenance
- Project Management
- Rental
- Service
- Used equipment
- Warranty
- Cat Connect Services



The background image shows a Cat service technician in a white uniform and hard hat working on a yellow engine. A white service truck with the word "Service" in large yellow letters is parked nearby. The scene is set in an industrial or construction environment.

LONG PARTNERSHIPS and YEARS of EXPERIENCE

Average
60+ years

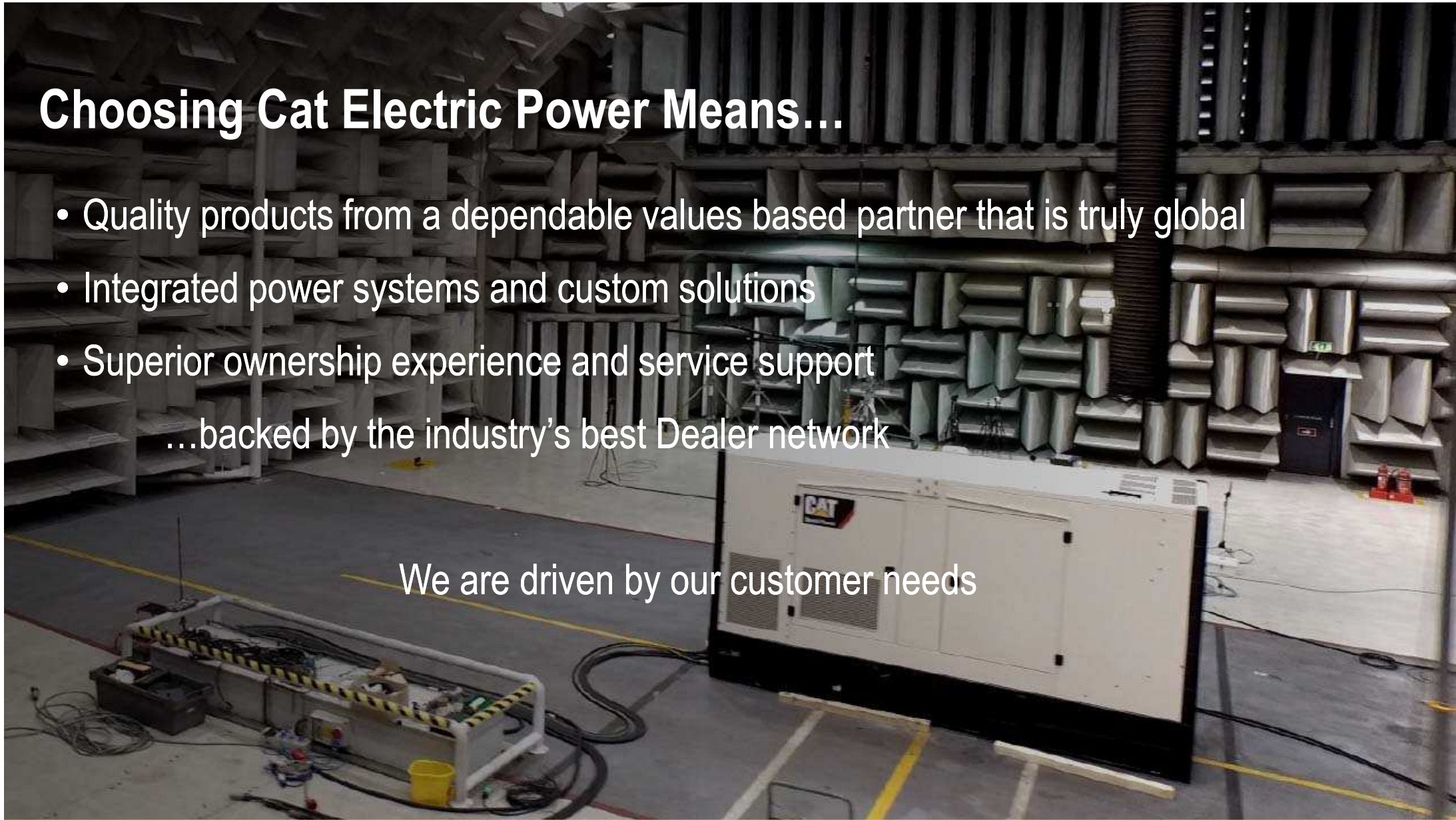
Total
2530+ years



Choosing Cat Electric Power Means...

- Quality products from a dependable values based partner that is truly global
 - Integrated power systems and custom solutions
 - Superior ownership experience and service support
- ...backed by the industry's best Dealer network

We are driven by our customer needs





Connecting For Success...

ELECTRIC POWER DAYS 2017

BUILT FOR IT.

CATERPILLAR®

