

GE Energy



# Company Presentation

## Jenbacher gas engines



GE imagination at work

*“I find out what the world needs,  
then I proceed to invent it.”*

*Thomas Edison*



# This is GE ...

- Founded in 1892 by Thomas Edison
- Innovative and diversified technology group
- Operations in more than 100 countries
- More than 300,000 employees worldwide  
85,000 in Europe

## GE Financials 2008

Sales	\$183B
Net earnings	\$18.1B
Cash flow/Operations	\$19.1B



# GE's broad portfolio

## Energy Infrastructure



- Power & Water
- Energy Services
- Oil & Gas

## Technology Infrastructure



- Aviation
- Enterprise Solutions
- Healthcare
- Transportation

## GE Capital



- Aviation Financial Services
- Energy Financial Services
- Commercial Finance
- GE Money
- Treasury

## NBC Universal



- Cable
- Film
- International
- Network
- Sports & Olympics

# GE Power & Water

2008 revenue \$23 billion

## Power



- Heavy duty gas turbines
- Aeroderivative gas turbines
- Generators
- Steam turbines
- Combined cycle systems
- Jenbacher gas engines
- Wind turbines
- Photovoltaic solar
- Gasification
- Nuclear

## Water



- Process chemicals
- Water chemicals
- Equipment & membranes
- Residential
- Mobile water
- Structured projects

# About Jenbacher gas engines

*“Our aim is to offer tailored solutions worldwide for the benefit of our customers.”*

*Prady Iyyanki  
CEO of GE Energy's gas engine business*



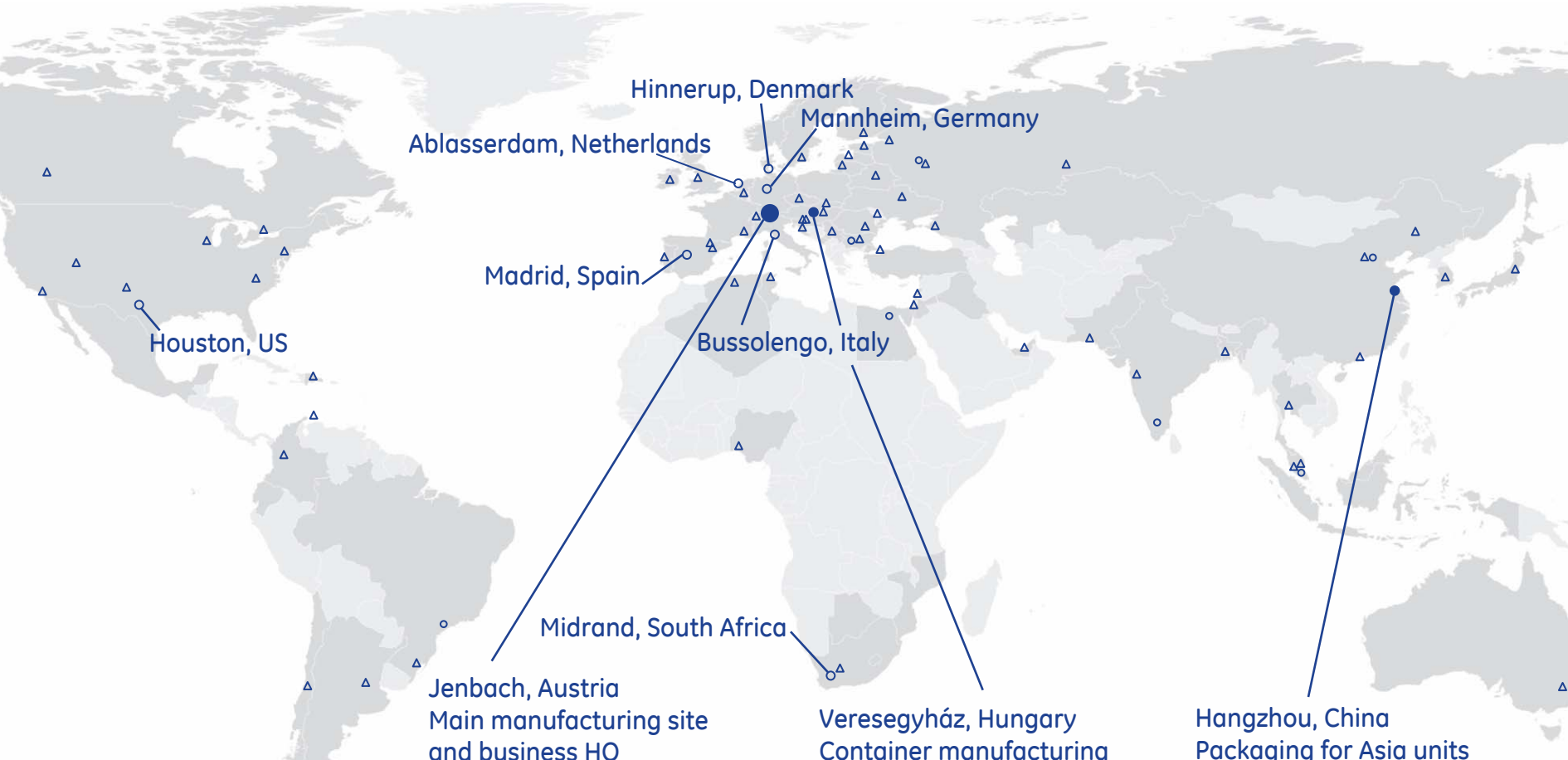
# A leading manufacturer of gas engines

## GE's Jenbacher gas engines

- 9,500+ engines delivered in more than 70 countries
- 11,500+ MW worldwide
- Power range from 0.25 MW to 4 MW
- Overall efficiency up to 95%
- 1,800 employees worldwide
- Manufacturing facilities in Austria, Hungary and China
- 7 subsidiaries plus global distributor and service provider network of 60+ companies
- Value-added service offerings throughout the entire life-cycle of the engines



# Everywhere in the world



- Headquarter
- Manufacturing facility
- Subsidiary/ GE office
- △ Distributor/Service Provider



# Experience & Innovation

*“Our efforts in innovation are focusing on what our customers need to work more efficiently.”*

*Prady Iyyanki*



# Outstanding technology

## More than 50 years of experience in gas engine technology

- Leading in all special gas applications (e.g., coal mine gas, waste gases from steel and chemical industry, synthetic gases from gasification)
- Setting standards regarding specific output and efficiency
- Development of optimized engine components and service technologies
- Continuous investments in R&D



# Five decades of experience with gas engines

1948

Serial production of diesel engines and compressors

1951

Start with production of diesel locomotives

1957

1<sup>st</sup> gas engine

1979

1<sup>st</sup> cogeneration module

1985

1<sup>st</sup> LEANOX<sup>®</sup> gas engine

1994

1<sup>st</sup> 20 cylinder gas engine J320

1997

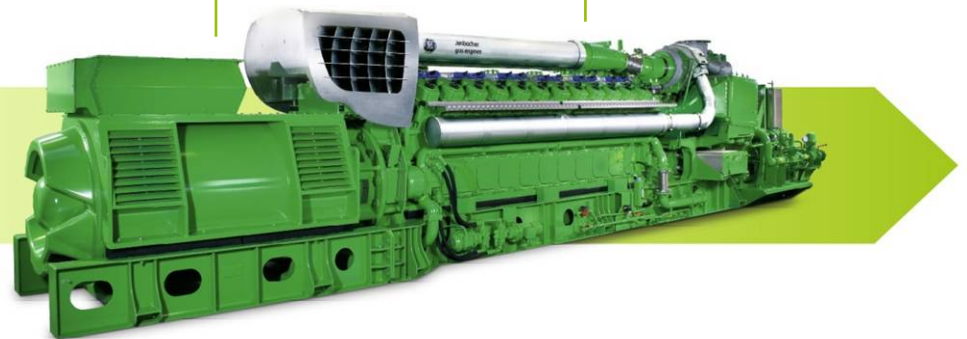
World's smallest 20 cylinder gas engine in the 3 MW power range J620

2000

Presentation of "High Efficiency Concept" J420

2007

World's 1<sup>st</sup> 24-cylinder 4 MW engine J624



# Outstanding products

*“We focus on innovative products and creative solutions to ensure a successful future for both – our customers and our company.”*

*Prady Iyyanki*



# A broad range of gas engines

## Find the best solutions for your business

- Power range from 0.25 MW to 4 MW
- 4 engine platforms, 11 products
- Different configurations:  
Generator Set, Cogeneration systems, Container Solutions
- Sophisticated components and service products for gas cleaning, engine and plant management and remote control



# Four types of gas engines

## Type 2



- Electrical output from 250 to 330KW
- 8 cylinder
- 1,500 rpm (50Hz) / 1,800 rpm (60Hz)
- Delivered engines: more than 850
- Since 1976 in the product program

## Type 3



- Electrical output from 500 to 1,100KW
- V12, V16 and V20 cylinder
- 1,500 rpm (50Hz) / 1,800 rpm (60Hz)
- Delivered engines: more than 5,000
- Since 1988 in the product program

## Type 4



- Electrical output from 800 to 1,500KW
- V12, V16 and V20 cylinder
- 1,500 rpm (50Hz) / 1,800 rpm (60Hz)
- Delivered engines: more than 750
- Since 2002 in the product program

## Type 6

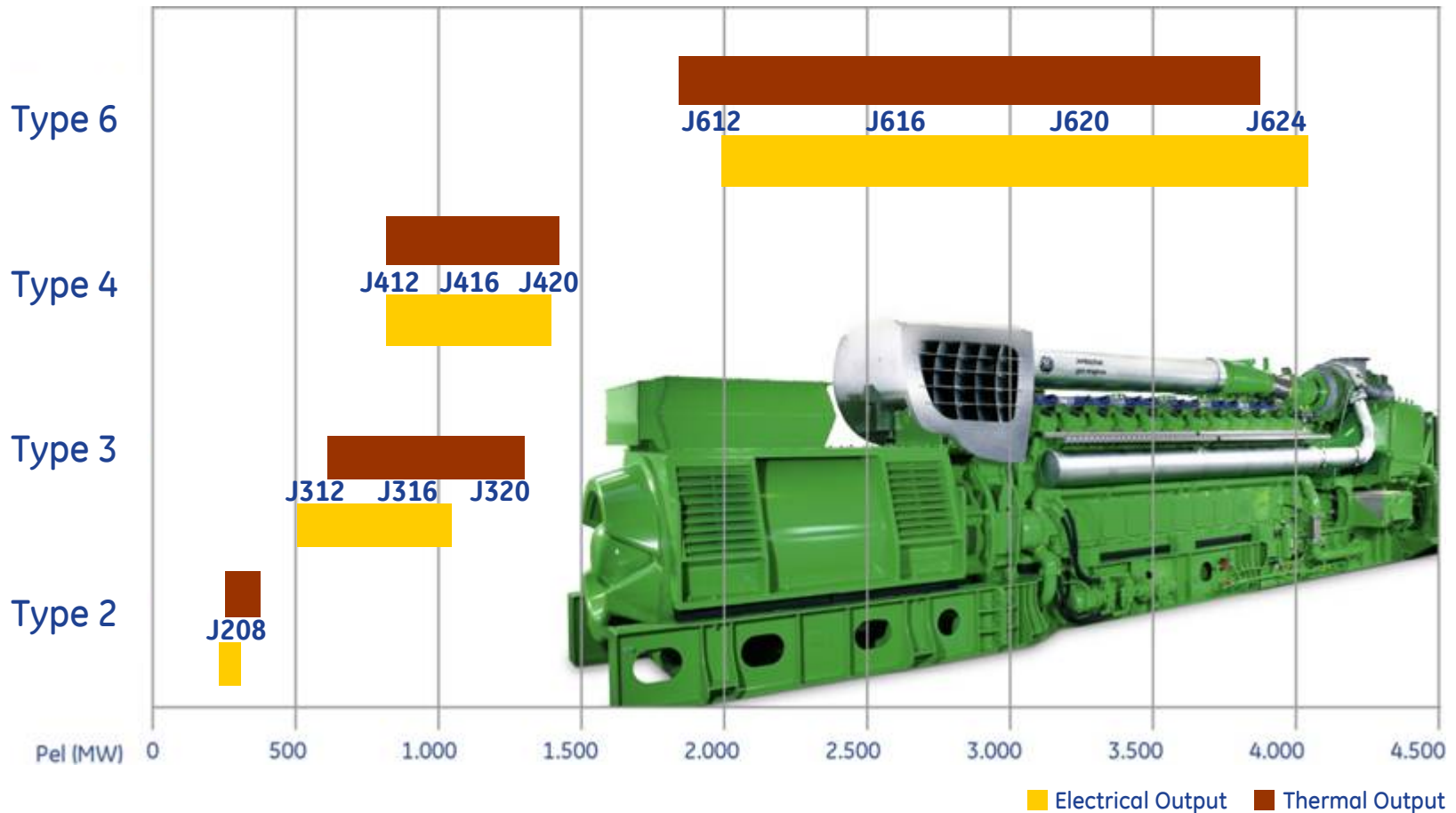


- Electrical output from 1.5 to 4MW
- V12, V16, V20 and V24 cylinder
- 1,500 rpm (50Hz, 60Hz with gear-box)
- Delivered engines: more than 2,200
- Since 1989 in the product program

# Output range per engine type

Product line 2009 (50Hz) – Natural gas  $\text{NO}_x \leq 500 \text{ mg/m}^3_{\text{N}}$

Electrical Efficiency up to 45% Thermal Efficiency up to 50%



# Two main areas of use

## Waste-to-energy/Renewables & Waste gas utilization



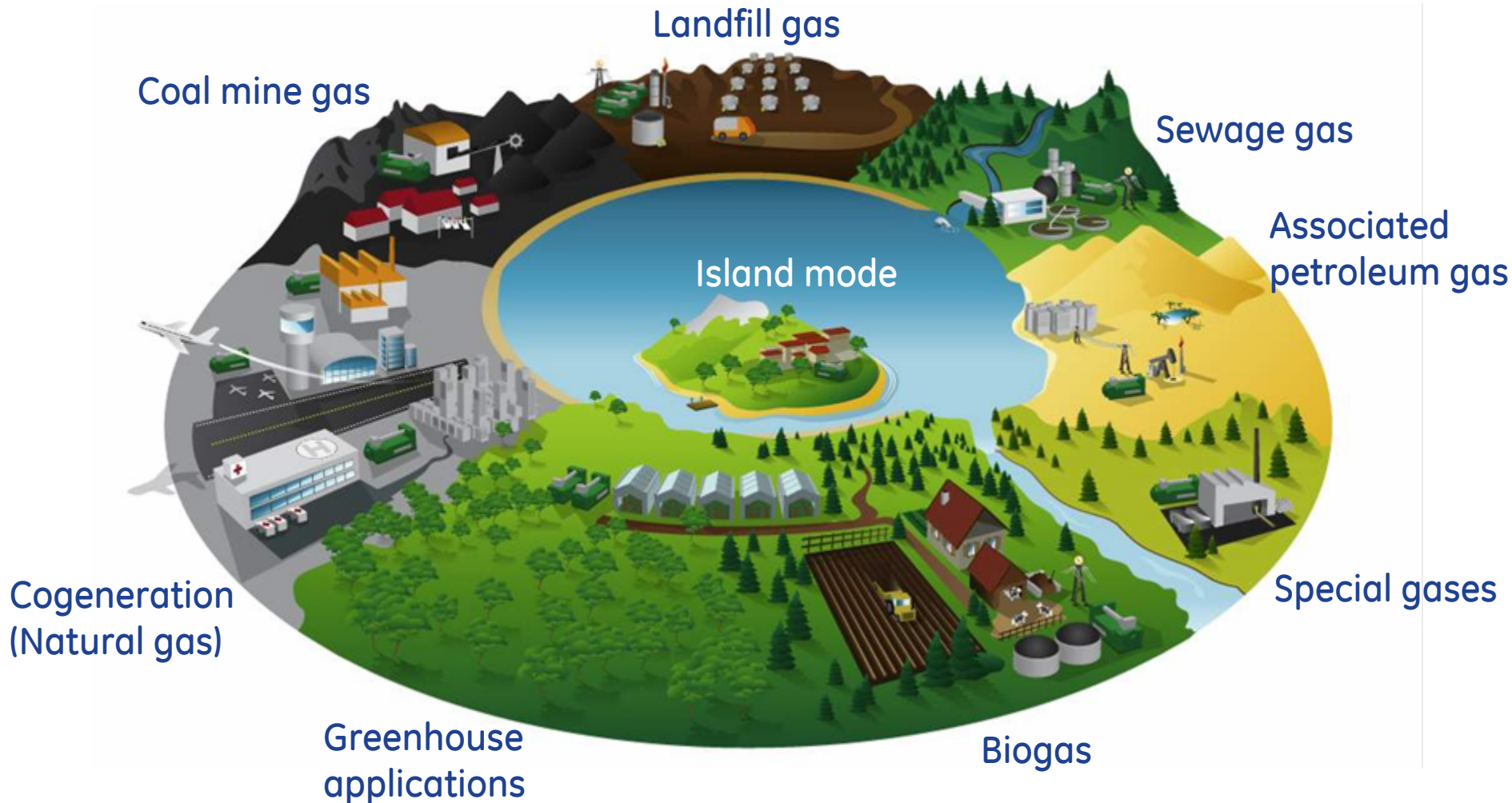
- Reducing CO<sub>2</sub>-emissions
- Alternatives to fossil fuels
- Landfill gas, Biogas (e.g., organic waste, agricultural waste, waste water), coal mine gas, industrial waste gases, waste gases from steel industry, Associated petroleum gas

## Decentralized power generation and cogeneration (natural gas)



- Reliable energy supply for remote areas
- Supporting local power needs
- Avoiding transport and distribution losses
- Enhanced total efficiency
- Reducing fossil fuel use and greenhouse gas emissions

# Fuel flexibility and tailor-made solutions



# Multiple values for our customers

## Fuel flexibility

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- Natural gas
- Renewable gases
- Waste gases and special gases

## Top efficiency & service

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- Electrical efficiency up to 44%
- Overall efficiency up to 95%
- High performance density
- Long service intervals
- Low life-cycle costs

## Environmental benefits

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- Low emissions (NO<sub>x</sub>, CO, SO<sub>x</sub>, etc.)
- Ability to reduce CO<sub>2</sub> footprint:
  - Use of renewable gases
  - High overall efficiency

## Durability

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- Established, field-tested designs
- Optimized, robust engine components
- Stationary engine concept

## High reliability

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- Maximum operational safety and availability
- High degree of maturity
- Proven control and monitoring concept
- Continuous focus on product development



GE imagination at work








# ecomagination

## Innovative solutions to environmental challenges

Ecomagination is a GE commitment to use and develop new technologies to help customers around the world meet escalating environmental challenges.

The following Jenbacher applications have been approved as GE “ecomagination” products by an independent agency:

-  Associated petroleum gas
-  Biogas
-  Coal mine gas
-  Cogeneration (CHP)
-  Landfill gas



# Lifetime Services Plus for Jenbacher gas engines

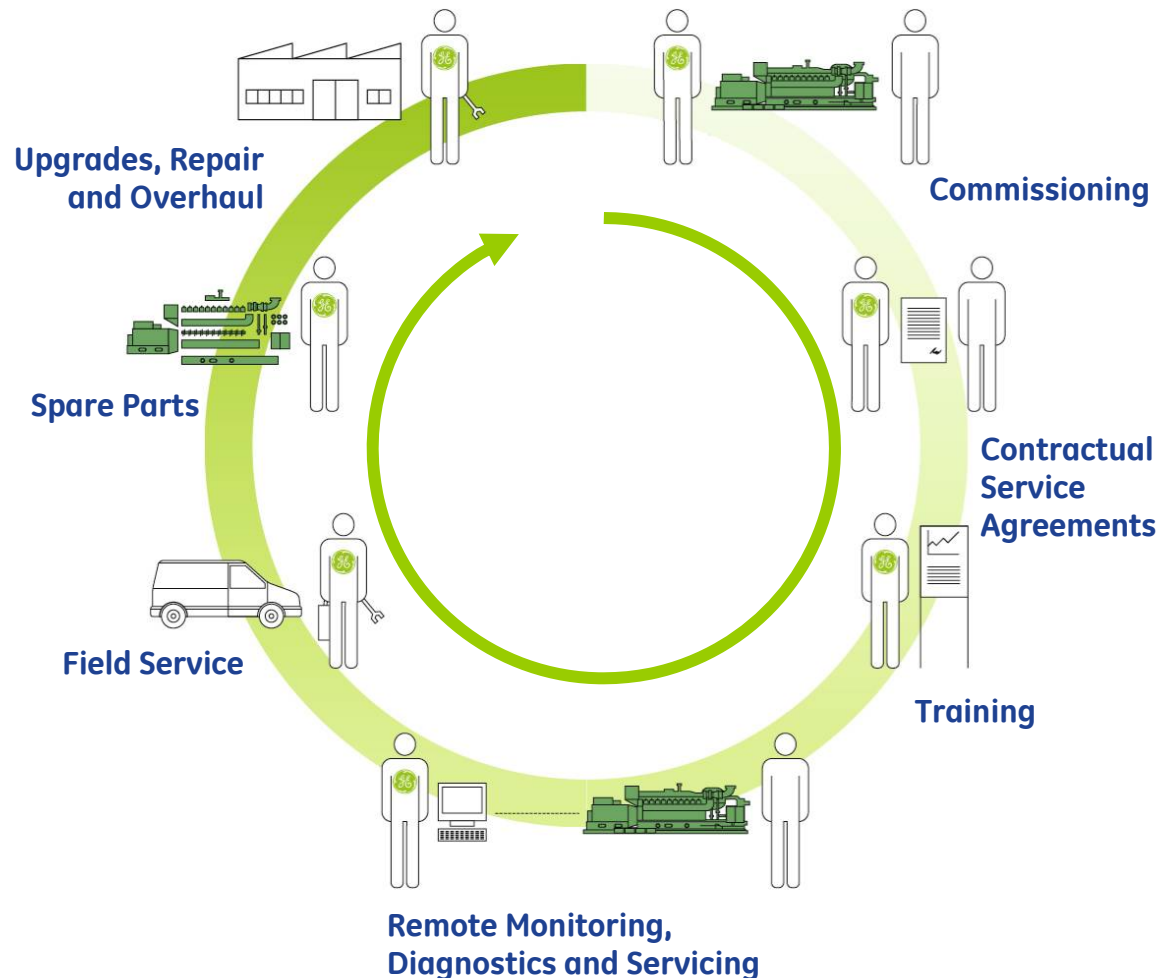
*“The Jenbacher Service team provides world-class service solutions in the global gas engine industry. Customers will benefit from ongoing innovative service solutions throughout the life cycle of our products.”*

*Prady Iyyanki*



# Lifetime Services<sup>+</sup> plus

Life-cycle management: The right service at the right time – throughout the lifetime of your engine



# Comprehensive portfolio with numerous benefits

- Low maintenance cost and cost control
- Maximum plant availability
- Professional technical support in more than 60 countries worldwide
- Original spare parts for highest quality standards
- Engines constantly kept at latest technology at Jenbacher



Lifetime Services<sup>+</sup> plus  
for Jenbacher gas engines

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