



# A New Way of Doing Business

February 19, 2019

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# Baker Hughes, a GE company

**Only BHGE has a fullstream capability: the portfolio, technology, and people to radically transform the oil and gas industry, and deliver unparalleled improvement in industrial yield for our customers.**

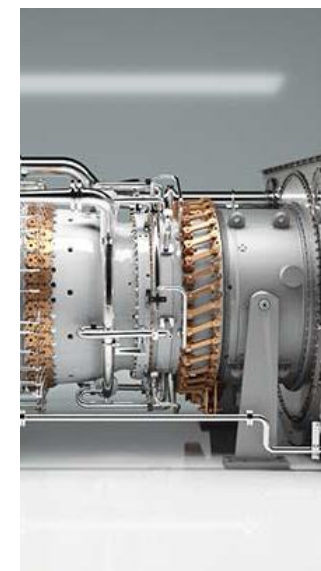
- Serving Upstream, Midstream, Downstream, and Industrial sectors
- Global presence in all regions, including: Africa, Middle East, Asia Pacific, Europe, and the Americas
- 64,000+ employees



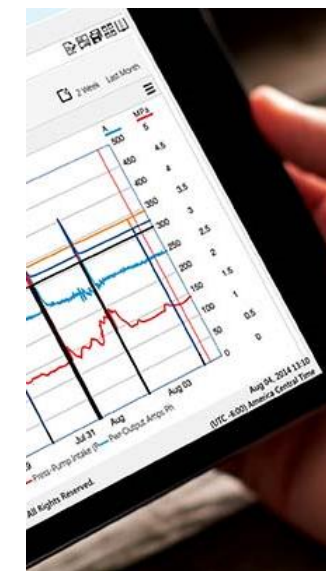
**Oilfield Services**



**Oilfield Equipment**

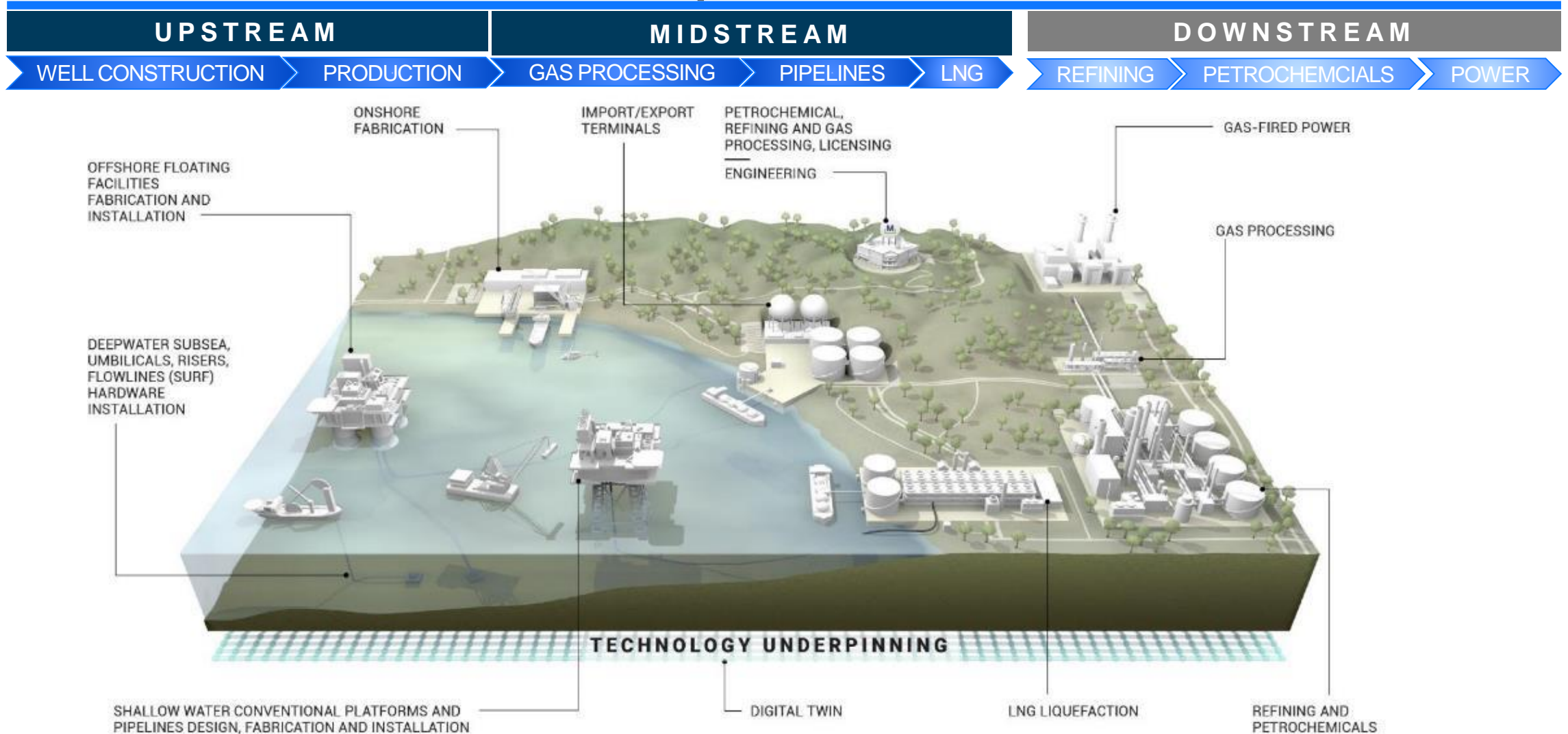


**Turbomachinery & Process Solutions**



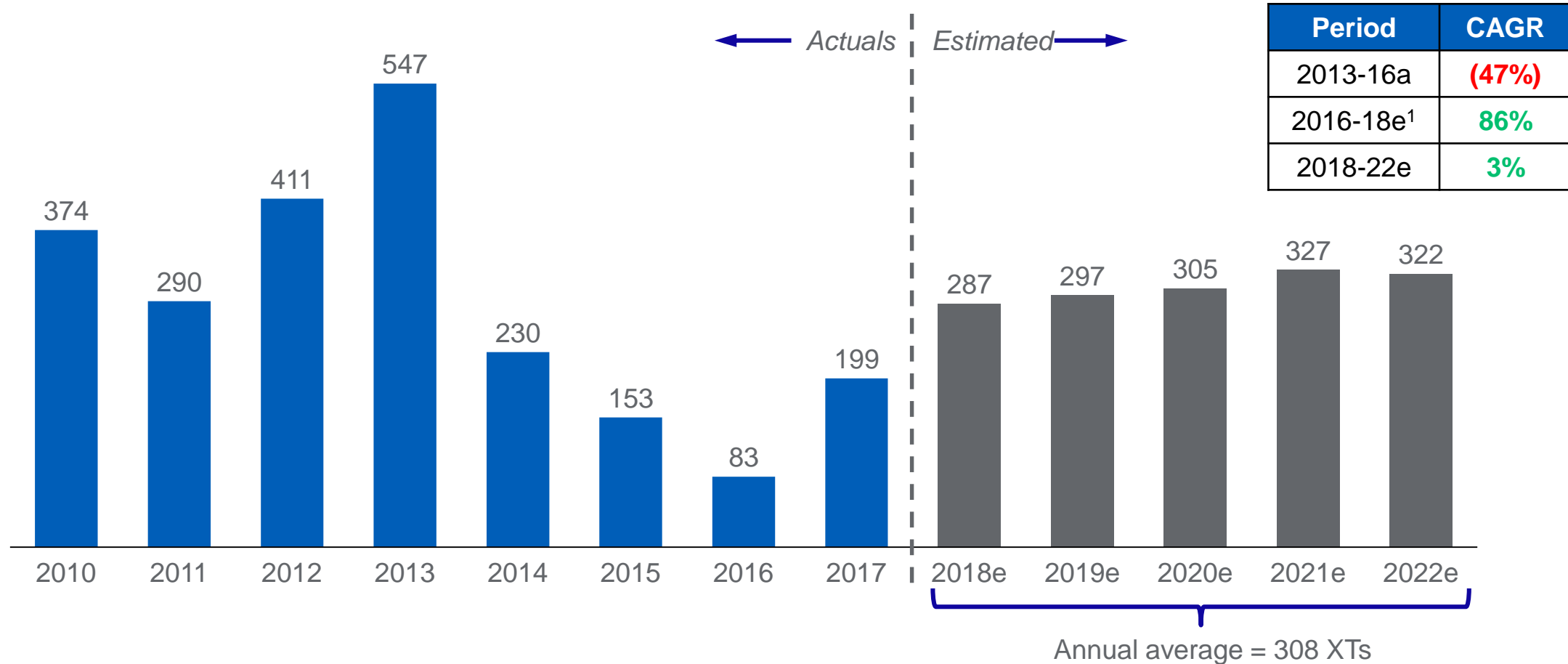
**Digital Solutions**

# BHGE: a Fullstream portfolio



# The global subsea market is seeing a healthy & stable recovery; average XT awards have risen to 300+ XTs every year from a low of 83 XT awards in 2016

Global XT awards (number of XTs<sup>1,2</sup>)





# Large offshore projects expected to be awarded - 2019-2021<sup>1,2</sup>

## USA

**2020:** Anchor/Green Canyon (Chevron) 12 XTs

**2021:** Garden Banks (Total) 13 XTs

## Guyana

**2019:** Payara (EOM) 13 XTs

## Mexico

**2021:** Trion (BHP) 11XTs

## Brazil

**2020:** Mero 2 (Petrobras) 16 XTs

**2021:** Caracara (Equinor) 16 XTs

**2021:** Mero 3 (Petrobras) 16 XTs

**2021:** Buzios (Petrobras) 16 XTs

## Falkland Islands

**2019:** Sea Lion (Premier Oil) 23 XTs

## UK

**2019:** Cheviot (Alpha Petroleum) 18 XTs

## Norway

**2019:** Johan Sverdrup ph2 (Equinor) 19 XTs

**2019:** Balder (Point Resources) 17 XTs

## Nigeria

**2020:** Zabazaba OPL245 (Eni) 22 XTs

**2021:** Owowo West (EOM) 22 XTs

**2021:** Bonga SW (Shell) 20 XTs

## Senegal

**2019:** SNE (Woodside) 24 XTs

## Mozambique

**2019:** Golfinho (Anadarko) 15 XTs

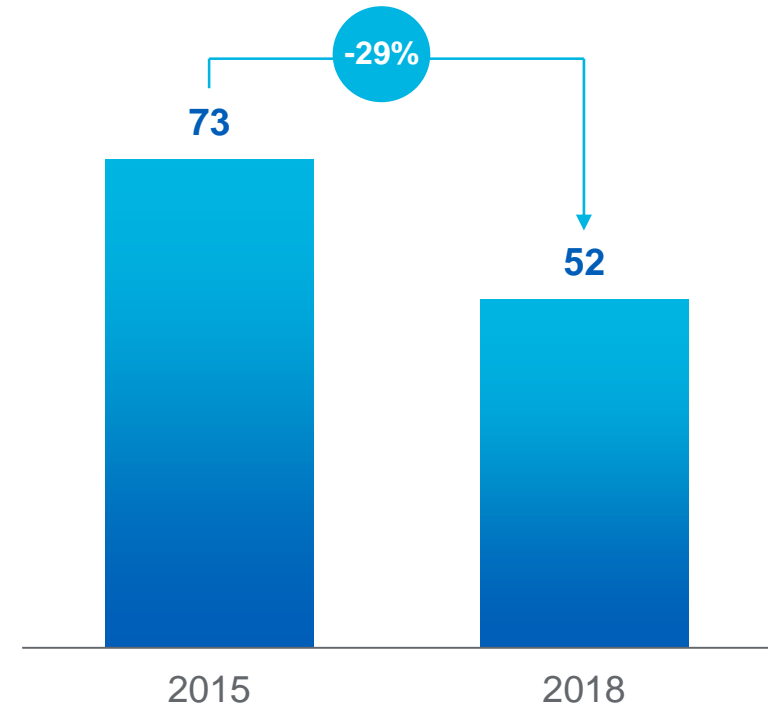
**2020:** Mamba North (Eni) 16 XTs

**Global offshore capex  
is increasing.**

**Breakeven costs have  
come down.**

**Development costs for  
subsea projects have  
fallen ~29% since  
2015.**

### Average breakeven prices (\$/bbl)



Source: analysis covering the same 3 major greenfield subsea projects over time using data from Rystad Energy

An aerial view of an offshore oil field at sunset. The scene shows a large, dark, rugged seabed with numerous yellow subsea structures and pipelines. Several offshore platforms and support vessels are visible on the water's surface. The sky is filled with colorful clouds from the setting sun, and the water reflects the light. The text "We believe there is more to do." is overlaid in white on the left side of the image.

**We believe there is more to do.**





# Introducing Subsea Connect





# Subsea Connect

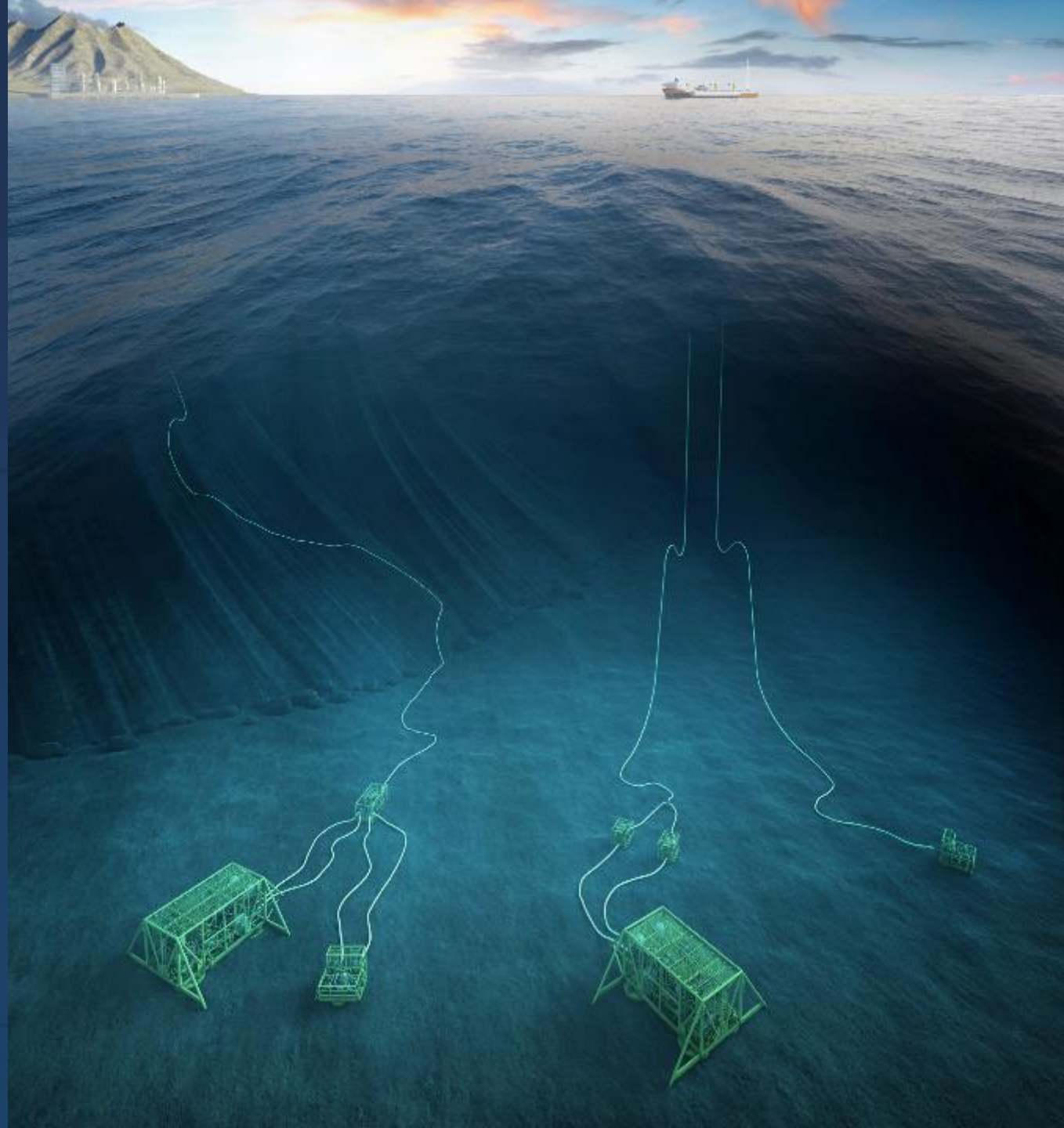
Influences

**80%** of project  
development costs  
and value drivers

Reduces the  
economic  
development point  
by an average of

**30%**

**BAKER  
HUGHES**  
a GE company



# This is Subsea Connect



**Project  
Connect**



**Reservoir to  
topsides  
technology  
solutions**



**Flexible  
partnerships  
and  
commercial  
models**



**Digital  
enablement**

**Radically  
optimized**

**Outcome  
engineered**

**Life-of-field  
solutions**



# Aptara™ TOTEX-lite subsea system

Delivers up to 50% lower total cost of ownership.  
Life-of-field design brings increased flexibility

- Modular and structured portfolio
- Compact and up to 50% lighter
- 30% lower lead times
- Simpler and easier installation, operation, and





# Aptara™ lightweight compact tree

- Can **reduce total cost of ownership (TCO)** of your subsea production system by up to **50% over the life of field**
- **Innovative new flowpath** reduces number of valves for same functionality whilst complying with **API 17D 2<sup>nd</sup> edition**
- Patented **tree caps** eliminate need for HIPPS and subsea boosting; **can be leased and reused**
- **Modular, 50% lighter** and with a considerably smaller footprint



Winner  
Best Deepwater  
Technology



# BHGE & LNG

## 30+ YEARS

of innovation & excellence

BHGE designs and delivers industry-leading systems that continually increase performance in LNG production, liquefaction, regasification, and storage — both onshore and offshore.

Our approach combines proven in-field experience with new technology injection and rigorous testing — all focused on solving our customers' biggest challenges in the industry's most extreme operating conditions.

### Comprehensive Capabilities

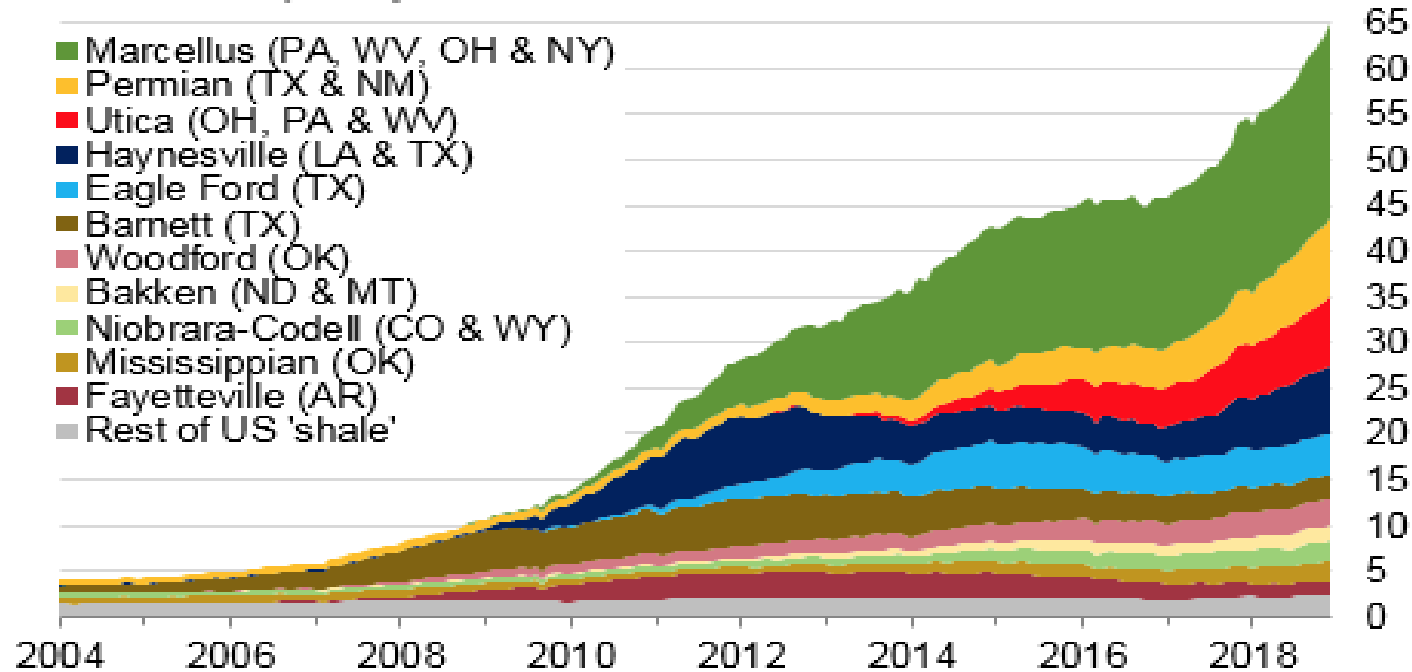
- Compression
- Gas turbines
- Controls
- Modules
- Floating LNG
- Small-scale LNG
- CO<sub>2</sub> liquefaction
- Gearing technology
- Pumps



# Monthly dry shale gas production from 2004-2018

## Monthly dry shale gas production

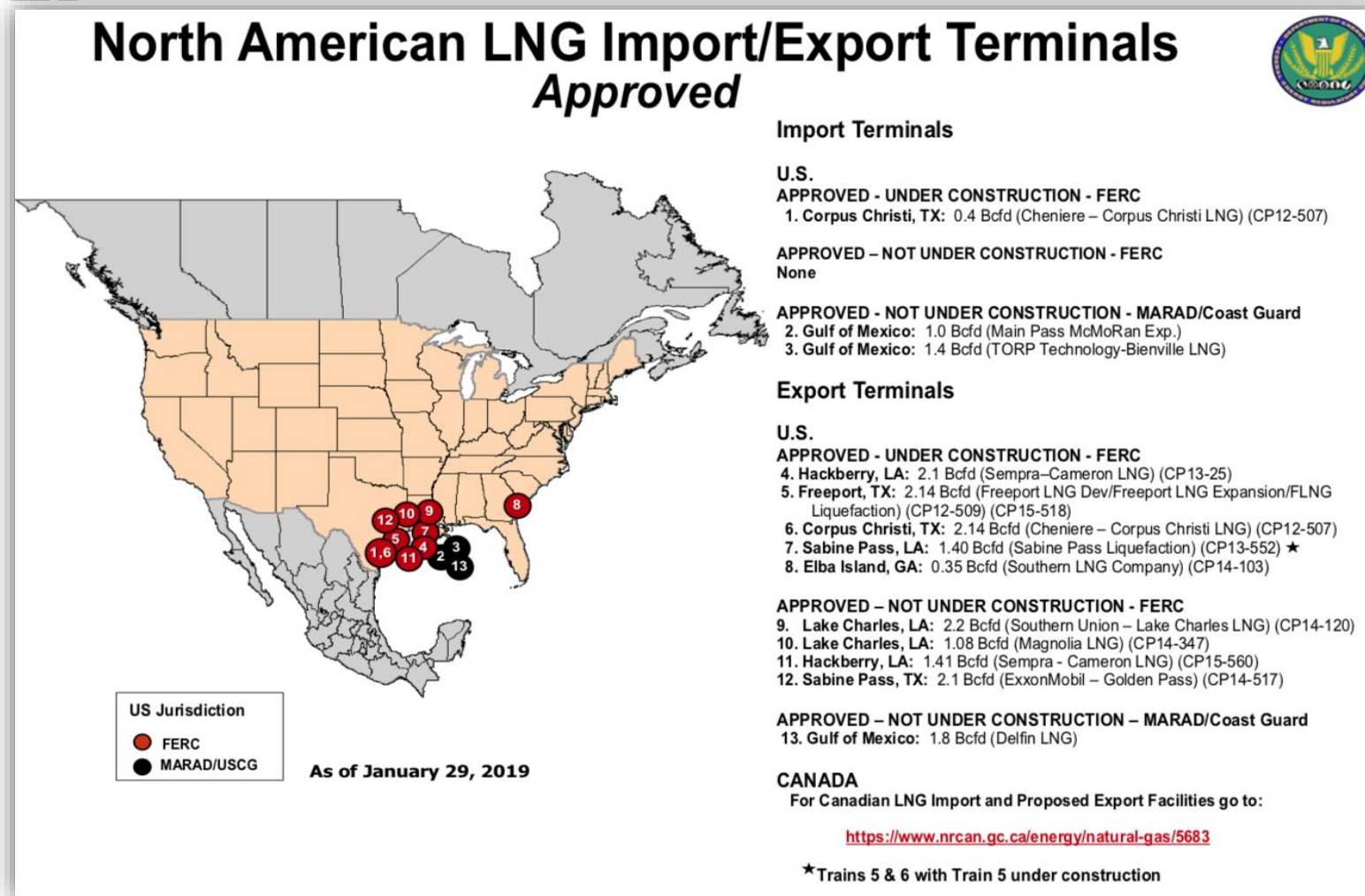
billion cubic feet per day



Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through December 2018 and represent EIA's official tight gas estimates, but are not survey data. State abbreviations indicate primary state(s).

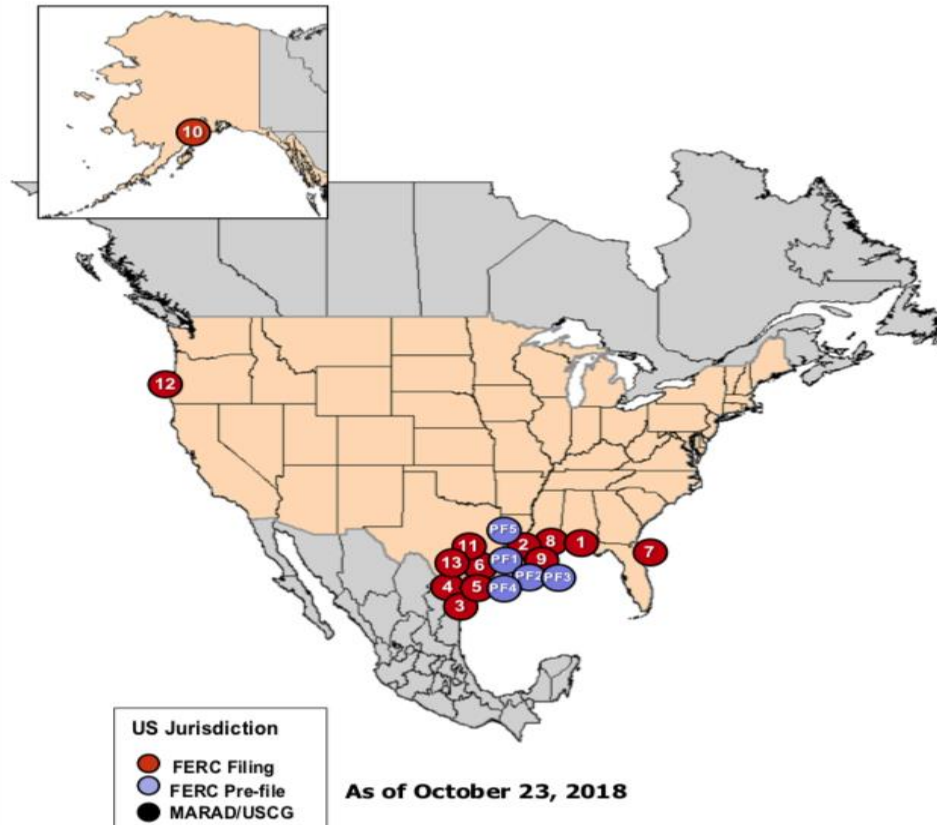


# FERC – Federal Energy Regulatory Commission - APPROVED



# FERC – Federal Energy Regulatory Commission - PROPOSED

## North American LNG Export Terminals *Proposed*



### PROPOSED TO FERC

#### Pending Applications:

1. Pascagoula, MS: 1.5 Bcfd (Gulf LNG Liquefaction) (CP15-521)
2. Cameron Parish, LA: 1.41 Bcfd (Venture Global Calcasieu Pass) (CP15-550)
3. Brownsville, TX: 0.55 Bcfd (Texas LNG Brownsville) (CP16-116)
4. Brownsville, TX: 3.6 Bcfd (Rio Grande LNG – NextDecade) (CP16-454)
5. Brownsville, TX: 0.9 Bcfd (Annova LNG Brownsville) (CP16-480)
6. Port Arthur, TX: 1.86 Bcfd (Port Arthur LNG) (CP17-20)
7. Jacksonville, FL: 0.132 Bcf/d (Eagle LNG Partners) (CP17-41)
8. Plaquemines Parish, LA: 3.40 Bcfd (Venture Global LNG) (CP17-66)
9. Calcasieu Parish, LA: 4.0 Bcfd (Driftwood LNG) (CP17-117)
10. Nikiski, AK: 2.63 Bcfd (Alaska Gasline) (CP17-178)
11. Freeport, TX: 0.72 Bcfd (Freeport LNG Dev) (CP17-470)
12. Coos Bay, OR: 1.08 Bcfd (Jordan Cove) (CP17-494)
13. Corpus Christi, TX: 1.86 Bcfd (Cheniere – Corpus Christi LNG) (CP18-512)

#### Projects in Pre-filing:

- PF1. Cameron Parish, LA: 1.18 Bcfd (Commonwealth, LNG) (PF17-8)
- PF2. LaFourche Parish, LA: 0.65 Bcfd (Port Fourchon LNG) (PF17-9)
- PF3. Sabine Pass, LA: NA Bcfd (Sabine Pass Liquefaction) (PF18-3)
- PF4. Galveston Bay, TX: 1.2 Bcfd (Galveston Bay LNG) (PF18-7)
- PF5. Plaquemines Parish, LA: 0.9 Bcfd (Pointe LNG) (PF18-8)

### CANADA

For Canadian LNG Import and Proposed Export Facilities go to:

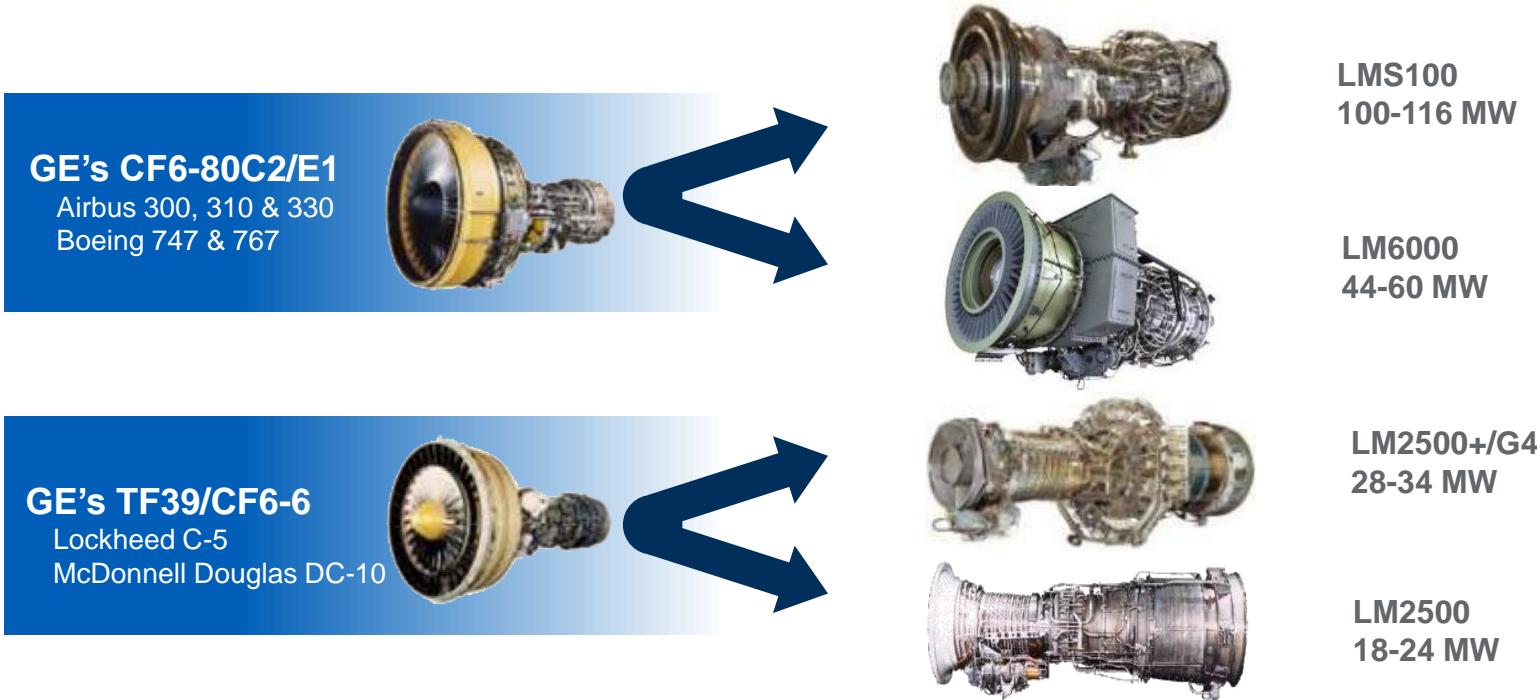
<https://www.nrcan.gc.ca/energy/natural-gas/5683>







# World's leading family of aeroderivative gas turbines



Over 4,000 gas turbines with 100+ million fleet hours

# The evolution continues...

## GE90-115B

- Boeing's 777 aircraft engine
- 2,240 engines in service
- Most powerful commercial flight engine – over 120,000 lbs of thrust
- Used for longest-range, twin-engine flights
- More than 20 years in commercial service

57

**MILLION**  
FLIGHT HOURS

50

**MILLION**  
INVESTING/YEAR

99.98 %

**DEPARTURE**  
RELIABILITY



# LM9000

Best in Class \$/kW  
Highest Reliability/Availability

Optimized for: Baseload operators with  
Longer Maintenance & Lower Emissions

AERODERIVATIVE  
GAS TURBINE

## PROVEN



Based on the GE90-115B (777 jet engine)  
> 2,240 units  
> 57 million operating hours



## EMISSIONS

15 ppm NOx 25 ppm CO



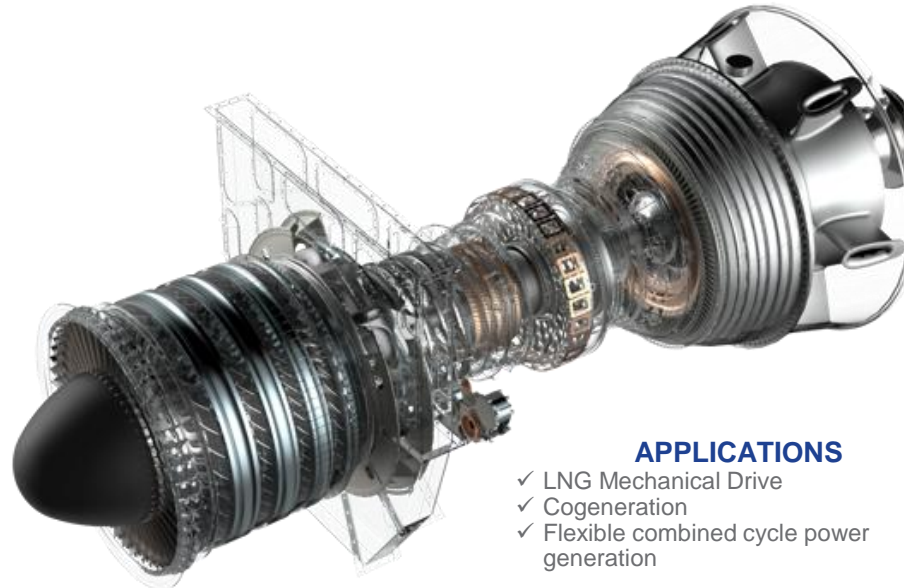
## LONGER MAINTENANCE INTERVALS

36K  
HRS  
hot section

72K  
HRS  
overhaul



2019  
ready to ship



## APPLICATIONS

- ✓ LNG Mechanical Drive
- ✓ Cogeneration
- ✓ Flexible combined cycle power generation

67 MW  
POWER

42.0%  
EFFICIENCY

ISO Gross rating @ Generator Terminal



## No Water

Dry Low Emissions  
solution



## Fast Start

On-demand  
start in 10 mins



## Fuel flexibility

Can operate on gas and/or  
distillate liquid fuel



## Online Fuel Transfer

Gas → Liquid → Gas



## Free Power Turbine

2400 → 3780rpm  
No gearbox needed  
for 50/60 Hz



20% more power  
50% longer maintenance interval  
40% lower NOx emissions



# Net-zero emissions by 2050

Commitment to cut carbon emissions by 50% by 2030. Investing in a portfolio of new technologies and partnering with customers for a new energy future.



### ACCELERATING CARBON EMISSION REDUCTION

BHGE has already achieved a 26 percent reduction in its emissions since 2012 . We are accelerating emissions reduction initiatives further across manufacturing, supply chain, logistics, energy sourcing and generation to reach our 2050 targets.

### CARBON MANAGEMENT EXPERTISE

BHGE's Gaffney, Cline and Associates is the first oil and gas consultancy to offer quantitative assessment of the carbon intensity of oil and gas assets, evaluation of carbon solutions, and the accreditation of emission reductions.

### TECHNOLOGY TO REDUCE EMISSIONS

BHGE's technologies to support operators' efforts to reduce their carbon footprint. including methane emission monitoring, modular carbon capture and storage, high efficiency turbines and compressors, as well as a range of digital solutions.

**Thank you!**