

Meeting the Moment – Tapping the Potential of Installed Gas Turbines with UltraFlex Retrofits & Upgrades

Innovative Clean Energy Solutions for Future Generations

Jeff Benoit

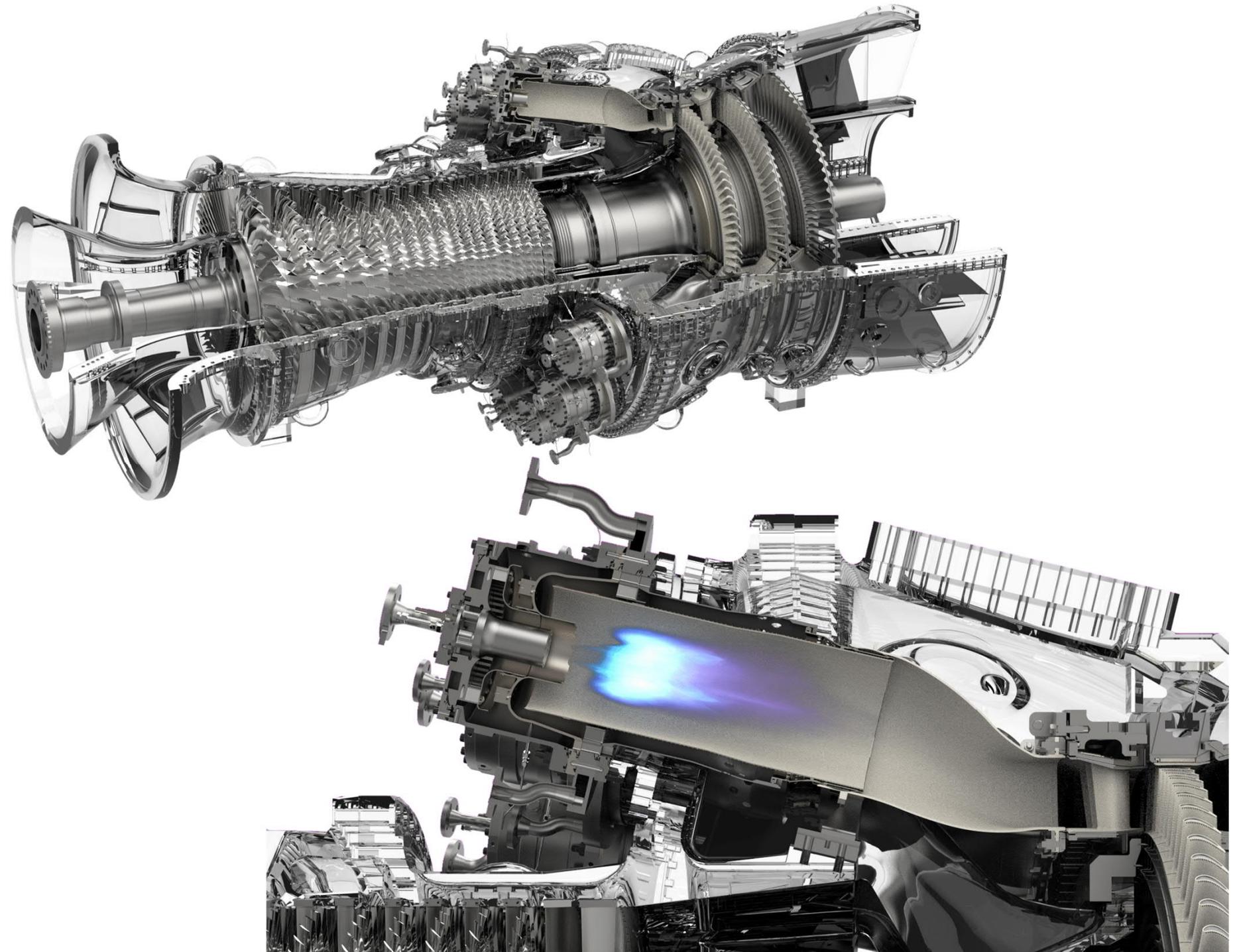
Vice President, Clean Energy Solutions

11 February 2026

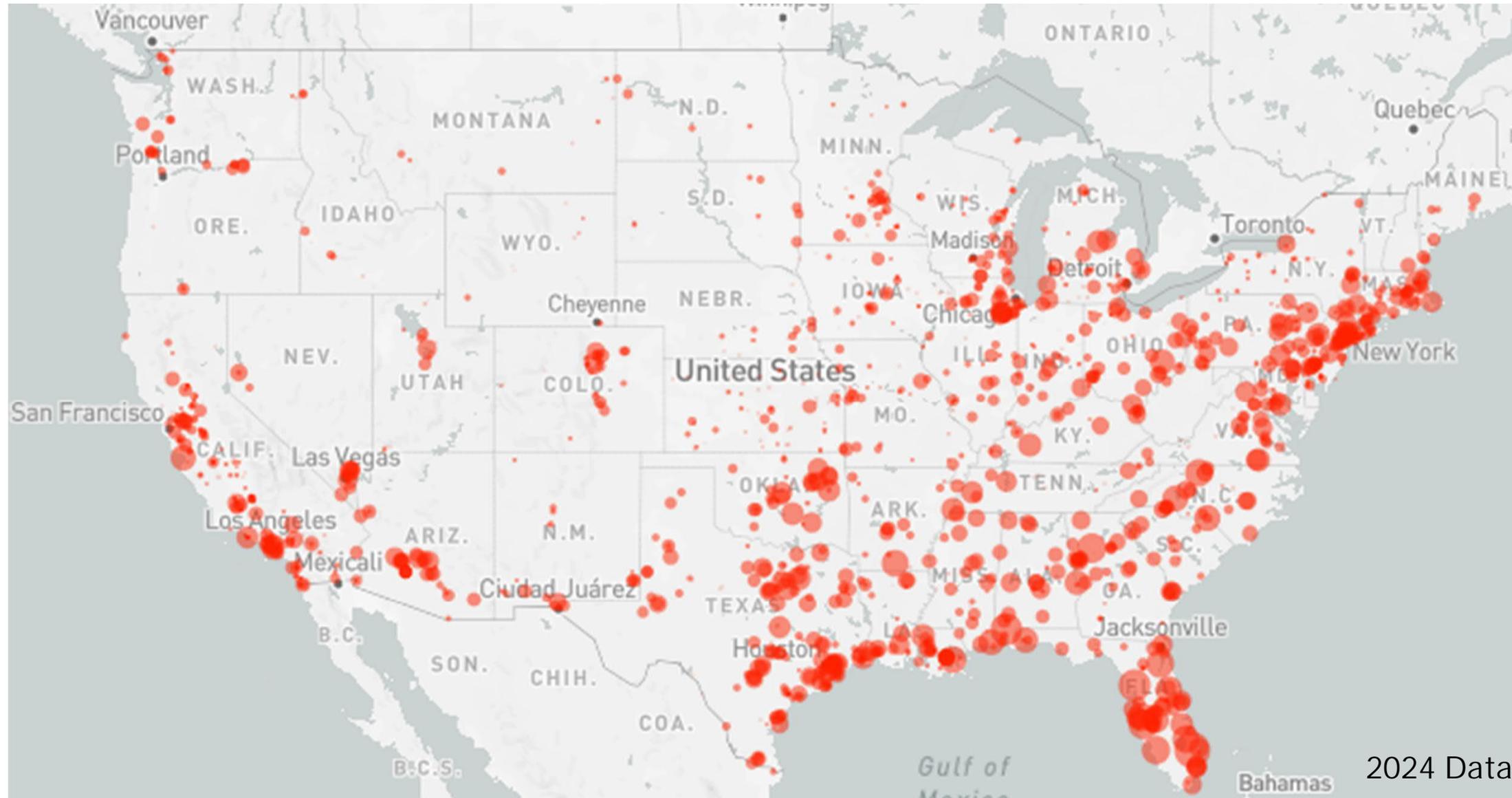
PSM
a Hanwha company

Value Drivers

- Reliable
- Dispatchable
- Op Flexible (↑ ↓)
- Grid Stability
- Complement RE
- Retrofittable (Tech)
- Sustainability (Fuel)
- Circular Economy
- Damn Inexpensive!



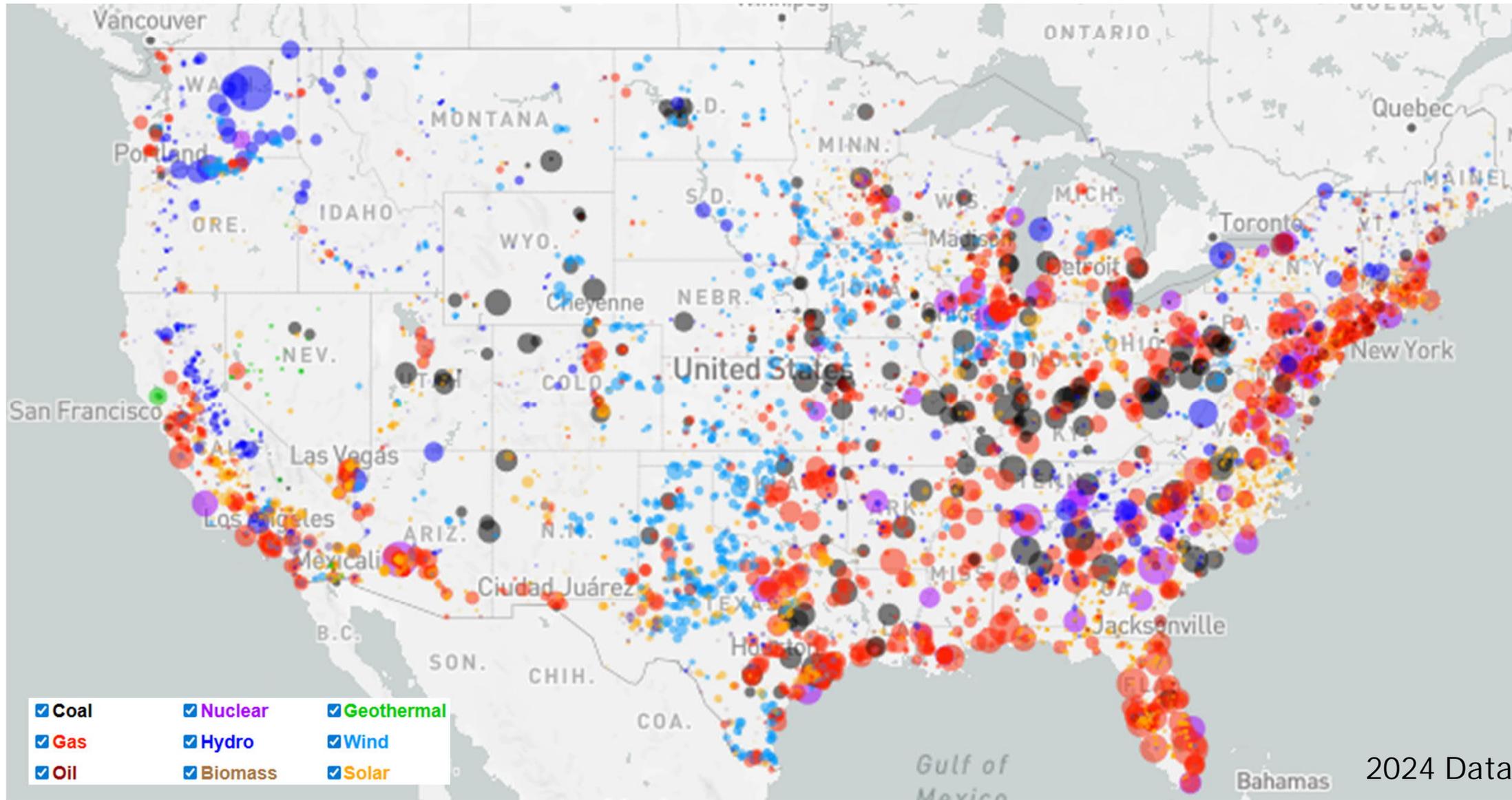
Power Plant Generation Inventory & Capacity



[source: physics.weber.edu](https://physics.weber.edu)

Gas Turbine Installed Capacity **578 GW**

Power Plant Generation Inventory & Capacity



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Gas Turbine Installed Capacity

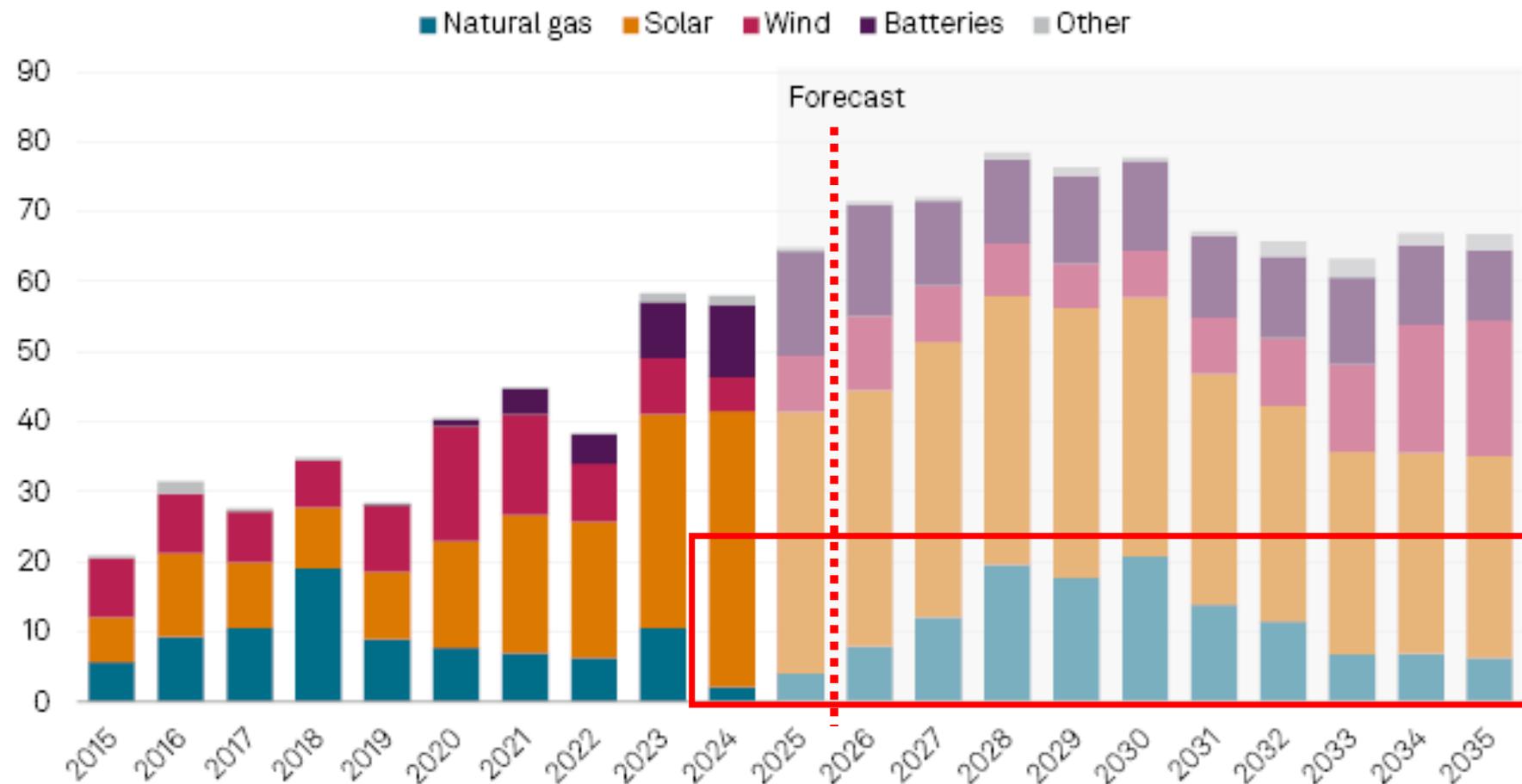
578 GW

Total Installed Capacity

1,317 GW

Renewables, batteries and gas to fuel new US power supplies over next decade

Annual capacity additions in Lower 48 (GW)



Data accessed Jan. 7, 2026.

Data is excerpted from S&P Global Energy CERA's North American power outlook, integrated house view, last updated December 2025.

The outlook includes behind-the-meter solar, but not behind-the-meter batteries.

Source: S&P Global Energy.

© 2026 S&P Global.

Expected Global (McCoy verbal)

- ~90GW+ of GT's expected orders in 2025
- ~30GW expected in 4Q alone!!
- (2024) – “Only” 57GW
- (2023) – “Only” 44GW

Unfortunate Reality

- HA/JAC CCGT - \$3,000/kw+ installed
- “Favorable Up Pricing Environment”

Installed B/E/F Fleet – Valuable Participation!

- E/F showing their ‘true colors’ for upgrades
- There is no “End of Life” Assets
- Circular Economy – Relocate/Refurbish

Incredibly Modest investments for upgrades

Gas Turbine Service – Global Footprint

Integrated Service Network to Provide Dedicated Local Support



PSM North (Q4 2025)
185,000 ft² Workshop Expansion,
Warehousing, & Logistics
Stuart, Florida, USA

Product Center & HQ
50/60Hz Gas Turbines
10,000 m² Workshop
5,500 m² Warehouse
Jupiter, Florida, USA



Expanded Service Center
60Hz Gas Turbines
Services & M&D

Tooling Facility
1,800 m²
Houston, Texas, USA



Thomassen Energy
a Hanwha company

Product Center
50Hz Gas Turbines
5,000 m² Workshop
Rheden, Netherlands



PSM
Thomassen Gulf
a Hanwha company

Execution Center
50/60Hz Gas Turbines
1,100 m² Workshop
Abu Dhabi, UAE



Hanwha

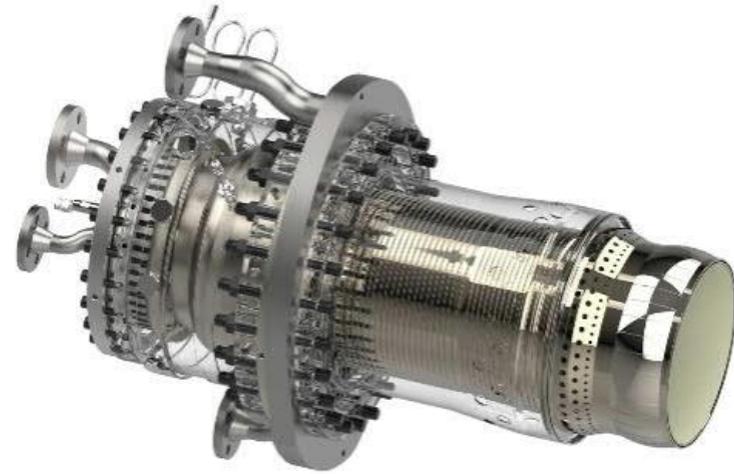


Hanwha
Power Systems

Execution Center
50Hz/60Hz Gas Turbines
Workshop
Pangyo & Changwon, Korea

- PSM Headquarters
- Thomassen Headquarters
- Branches and Offices





Retrofit Combustion Systems for Operational and Fuel Flex



Digital Products for Improved Reliability



Flexible Turbine Upgrades for Maintenance and Performance



Rotor Assessments, Repair, Manufacturing and Lifetime Extensions



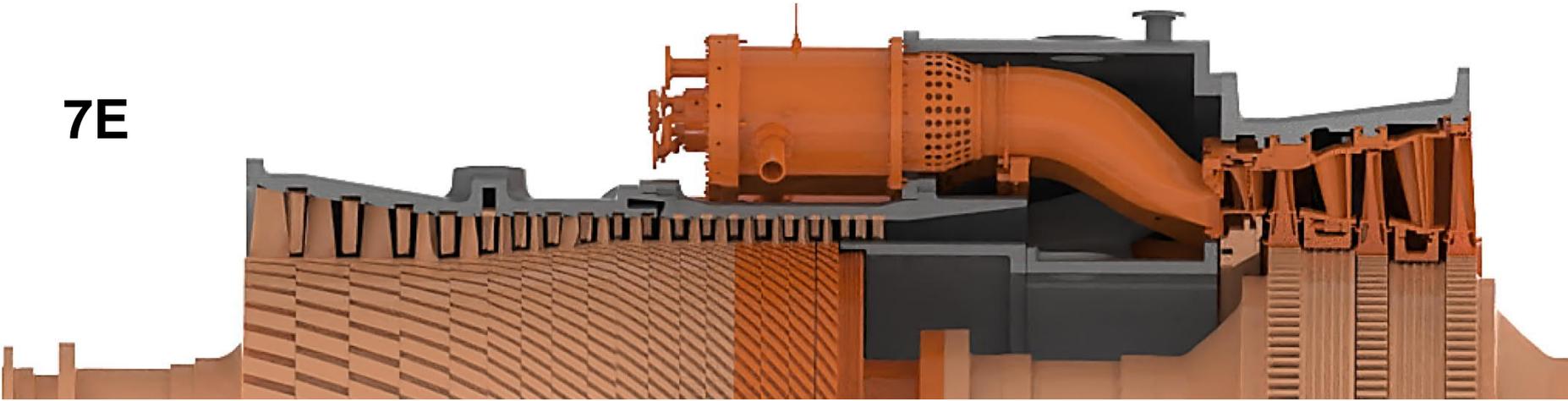
Manufacturing & Repair



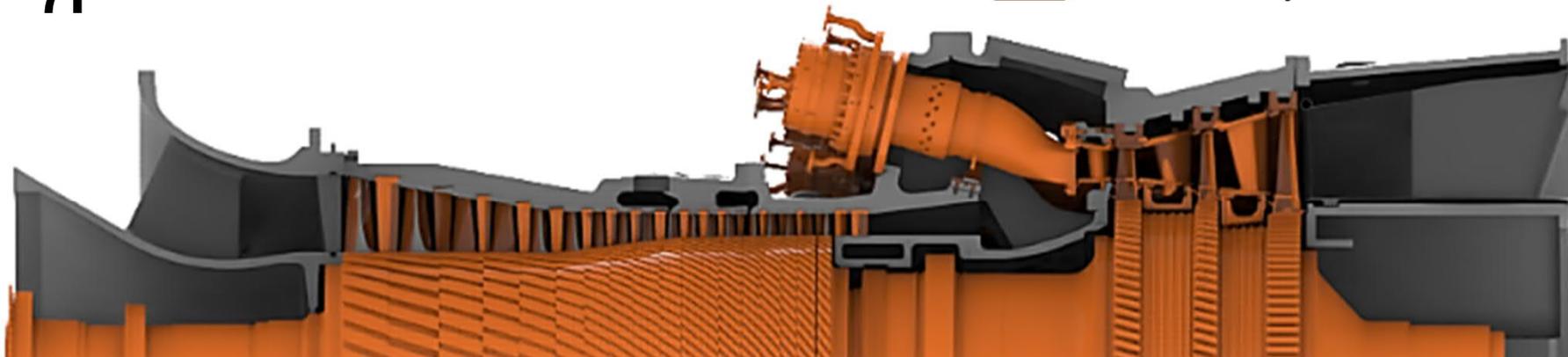
Conversions

The Proven Alternative

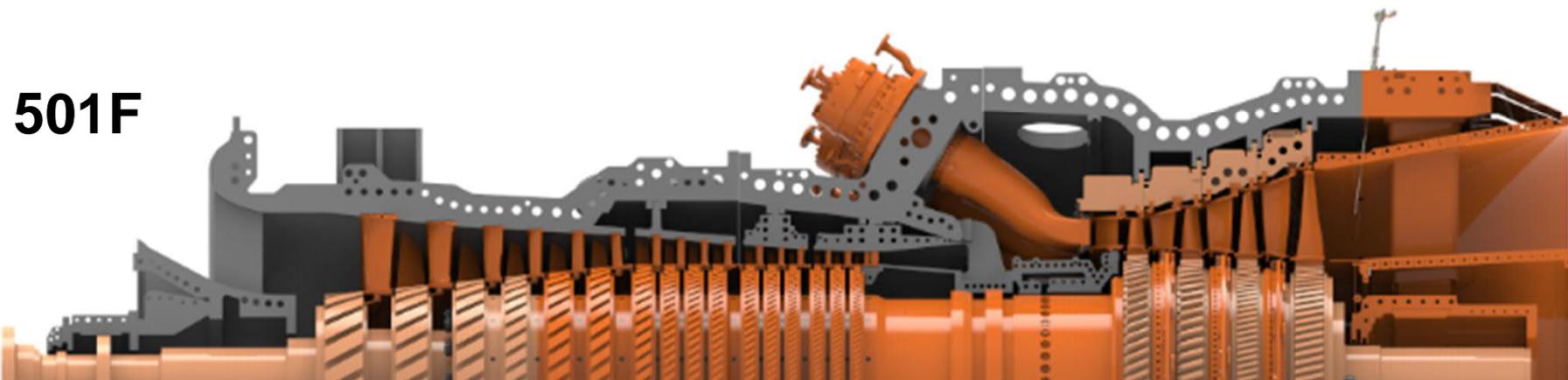
7E



7F



501F

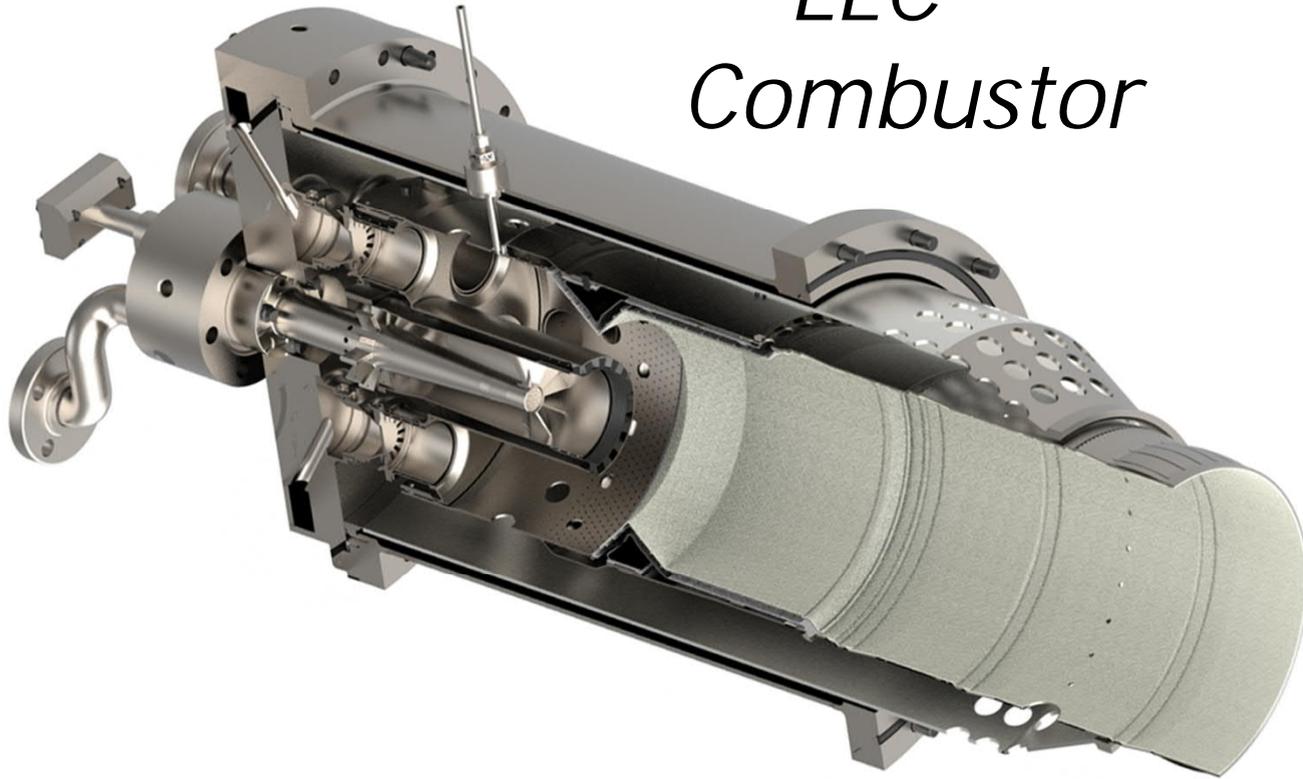


█ Supplied by PSM
█ Serviced by PSM

	B/E Class	GE F Class	S/M F Class
Units under LTA	15	32	25
Upgrades & Conversions	140+*	50+	30+
AutoTune™ Installations	20+	55+	25+
Combustion Fleet Hours	2.5M+	4.0M+	8.0M+
Turbine Fleet	~1000 sets	9.0M+ Hours	12.0M+ Hours
Compressor	Full Product Line (PL)	Full PL w Upgrades	Full PL w Upgrades
Rotor	New & Seed Rotors	New & Seed Rotors	Seed Rotors

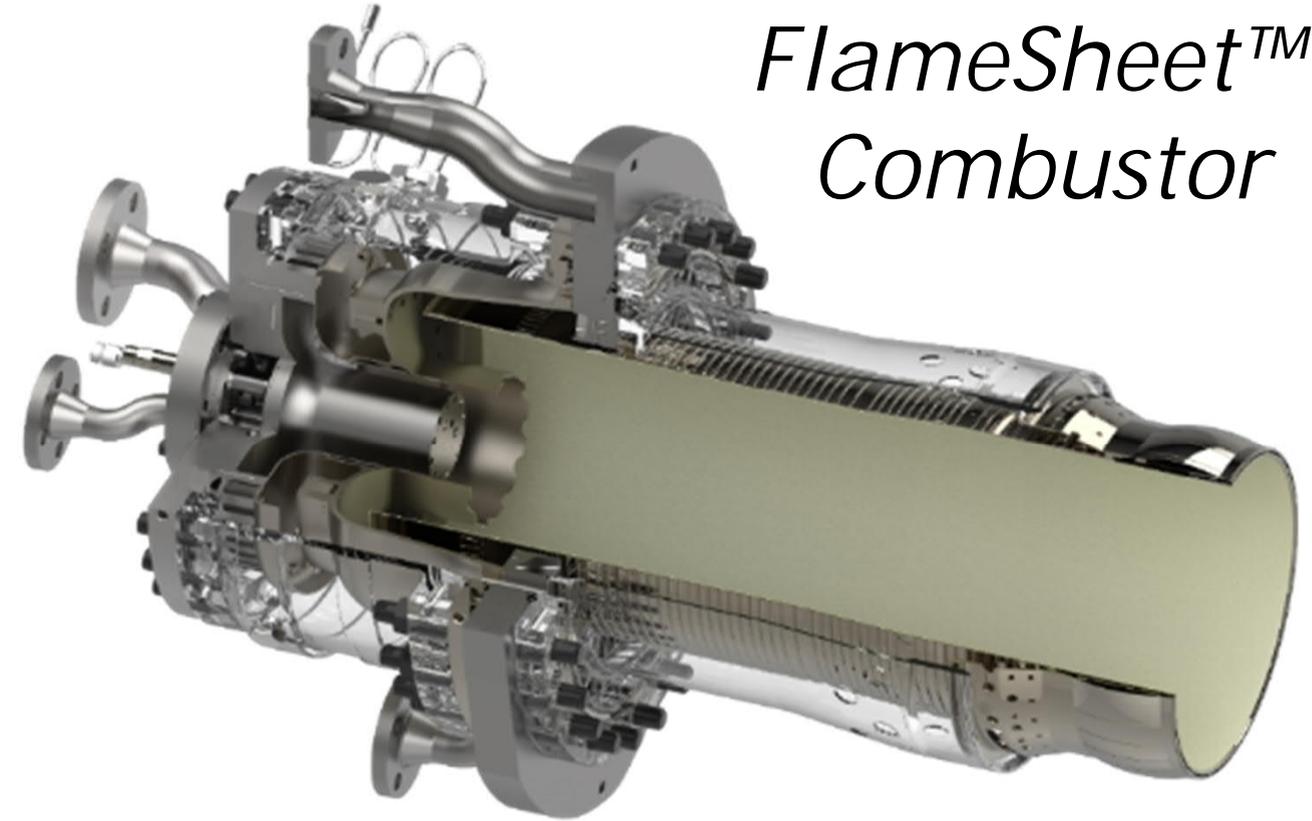
- Indicates sold and contracted units
- Data as of Q3 2025

*LEC™
Combustor*



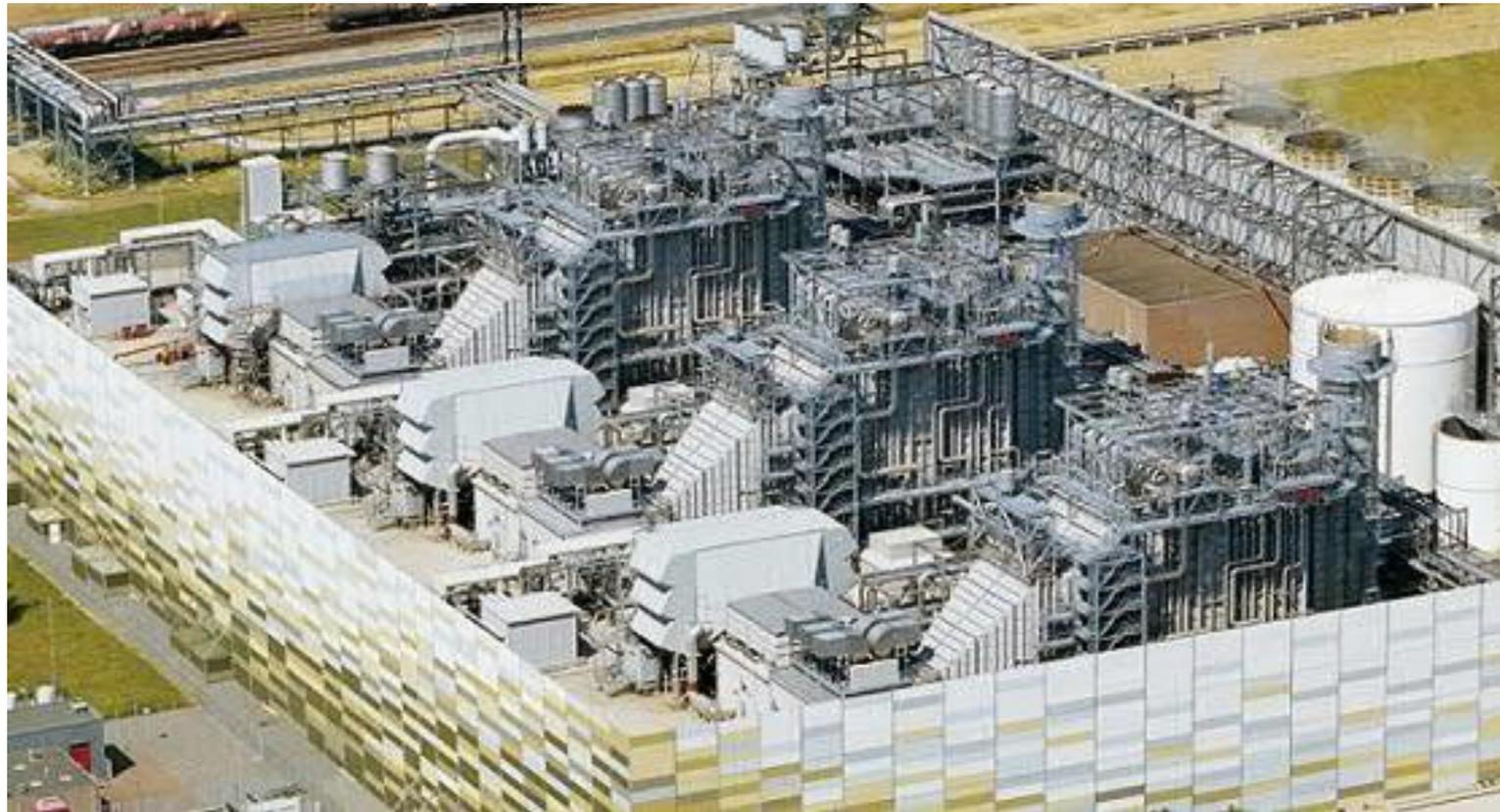
GE B and E-Class (50hz / 60hz)
Siemens B and D-Class (60hz)
Installed in **109** Gas Turbines
Up to 45% H2/vol Available

*FlameSheet™
Combustor*



GE B, E and F-Class (50hz / 60hz)
Mitsubishi F/G-Class (50hz / 60hz)
Siemens Energy F-Class (60hz)
Up to 80% H2/vol today....

“Future-Proofing” Gas Turbines – All with Single Digit NOx Emissions, Dry Lean Premix



Terneuzen Power Plant

3 x GE Frame 9E Turbines (2018)
25% H2/vol, up to 35% H2/vol
Single Digit NOx, More Turndown

Rotterdam Capelle Power Plant (RoCa3)

1 x GE Frame 9E (2024)
Up to 30% H2/vol planned



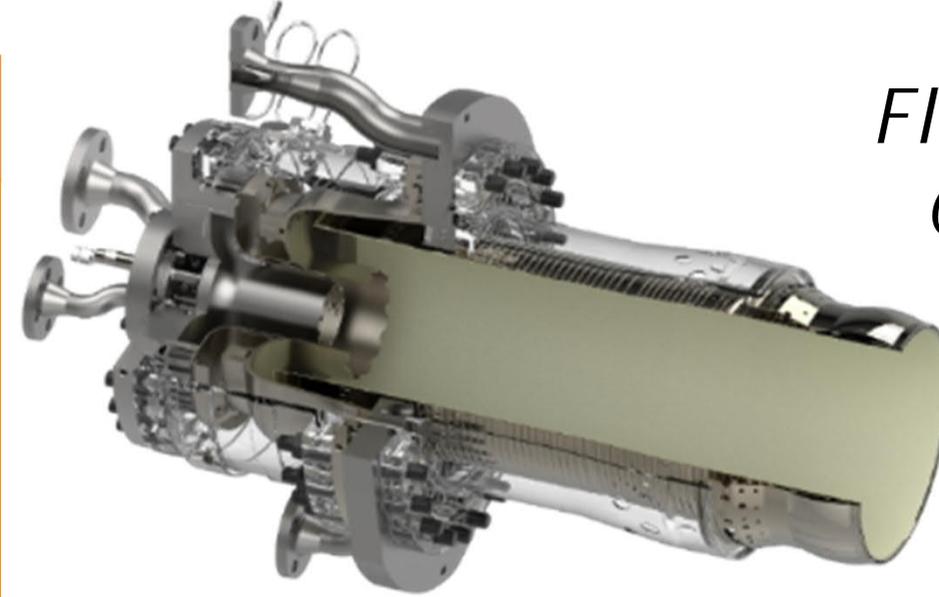
Single Digit NOx
Emissions



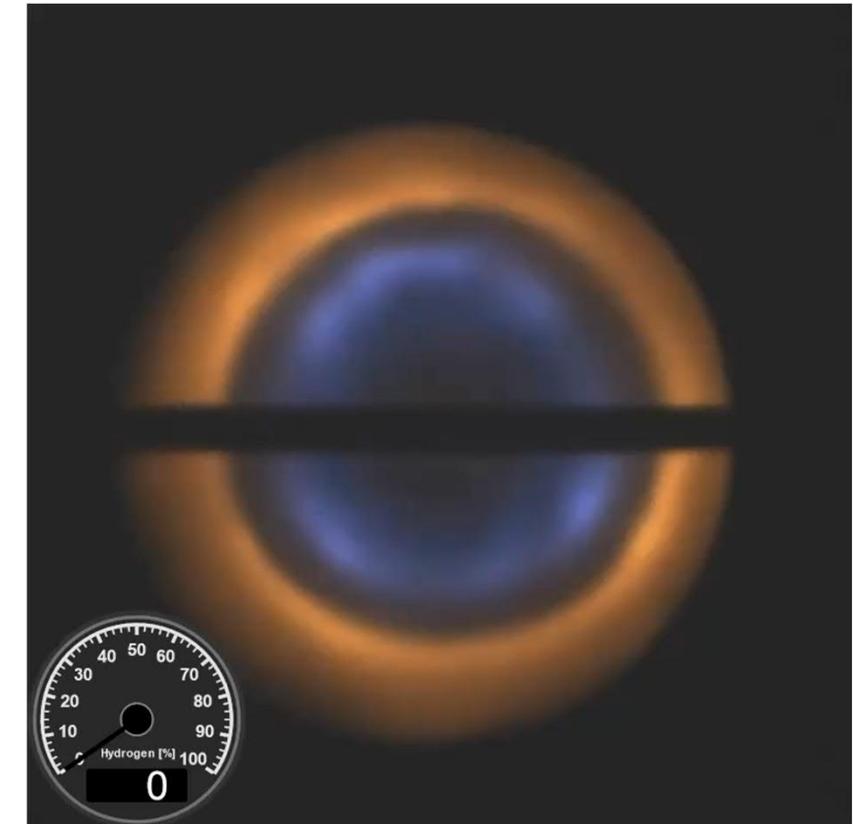
[Thomassen Energy provides Hydrogen fuel-flexible retrofit solution - Gas Turbine World](#)

Performance Overview

- Step Change Operational Range Increase
- Ultra Low Emissions (NO_x, CO)
- Extended Maintenance Interval
- **33** Global Installations – B/E/F
 - ½ Million Operational Hours
 - 4 units on blend of H₂ (GE Fr5, 7E, 7F)
- Extended Fuel Flexibility
 - H₂ Startup & 100% H₂ FSNL proven
 - Up to 80% H₂/vol capable today
 - Near Term Roadmap to 100% H₂



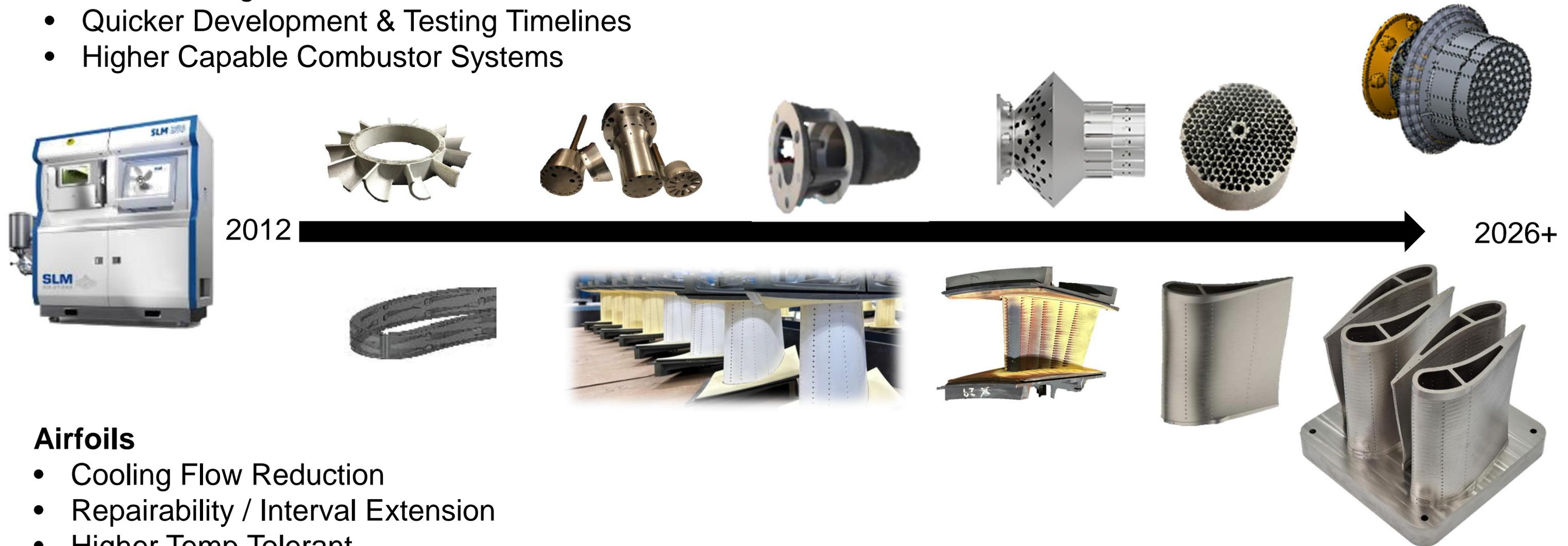
*FlameSheet™
Combustor*



Key to FlameSheet™ and GTOP Growth!

Combustion

- Better Mixing
- Quicker Development & Testing Timelines
- Higher Capable Combustor Systems



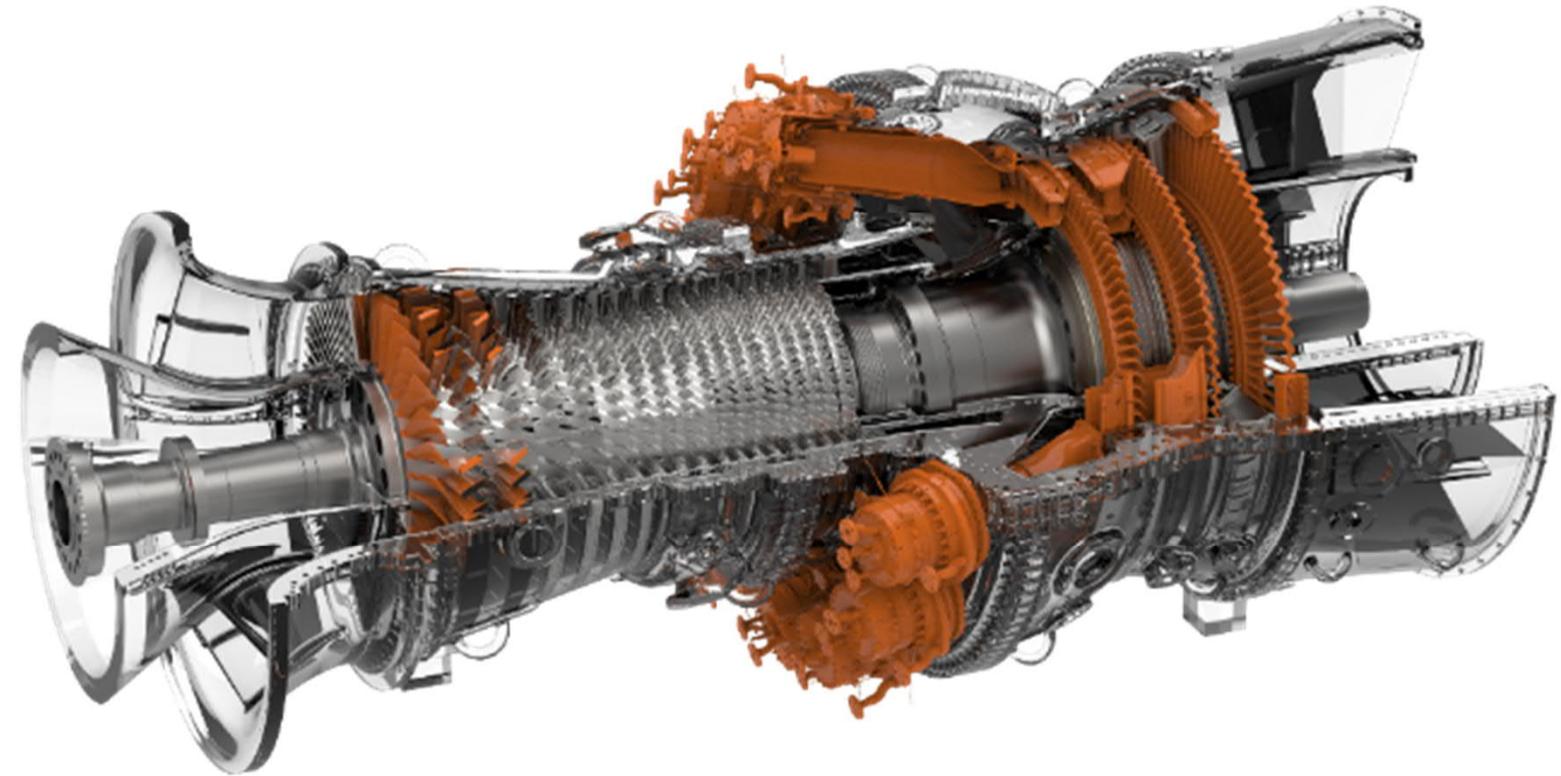
Airfoils

- Cooling Flow Reduction
- Repairability / Interval Extension
- Higher Temp Tolerant

Only Non-OEM Service Provider Offering Complete GT Upgrade Packages

Program Overview

- Up to 15% increase GT output
- PSM Intellectual property replacing OEM parts
- Executed within standard maintenance
- Targeted packages to minimize scope
- Over 50 implementations of GTOP to date



GTOP4 – PSM's Latest Performance Upgrade Package

Redesigned 3-D aerodynamic hot gas path for improved efficiency and output

S1B single crystal alloy, advanced coatings improve metal temperature

S1S / S1B advanced abradable coating improves clearances

S3B airfoil & shroud geometry for flutter and creep margin.

S3B backward compatible to GTOP3, 7F.03/.04 for cold day output

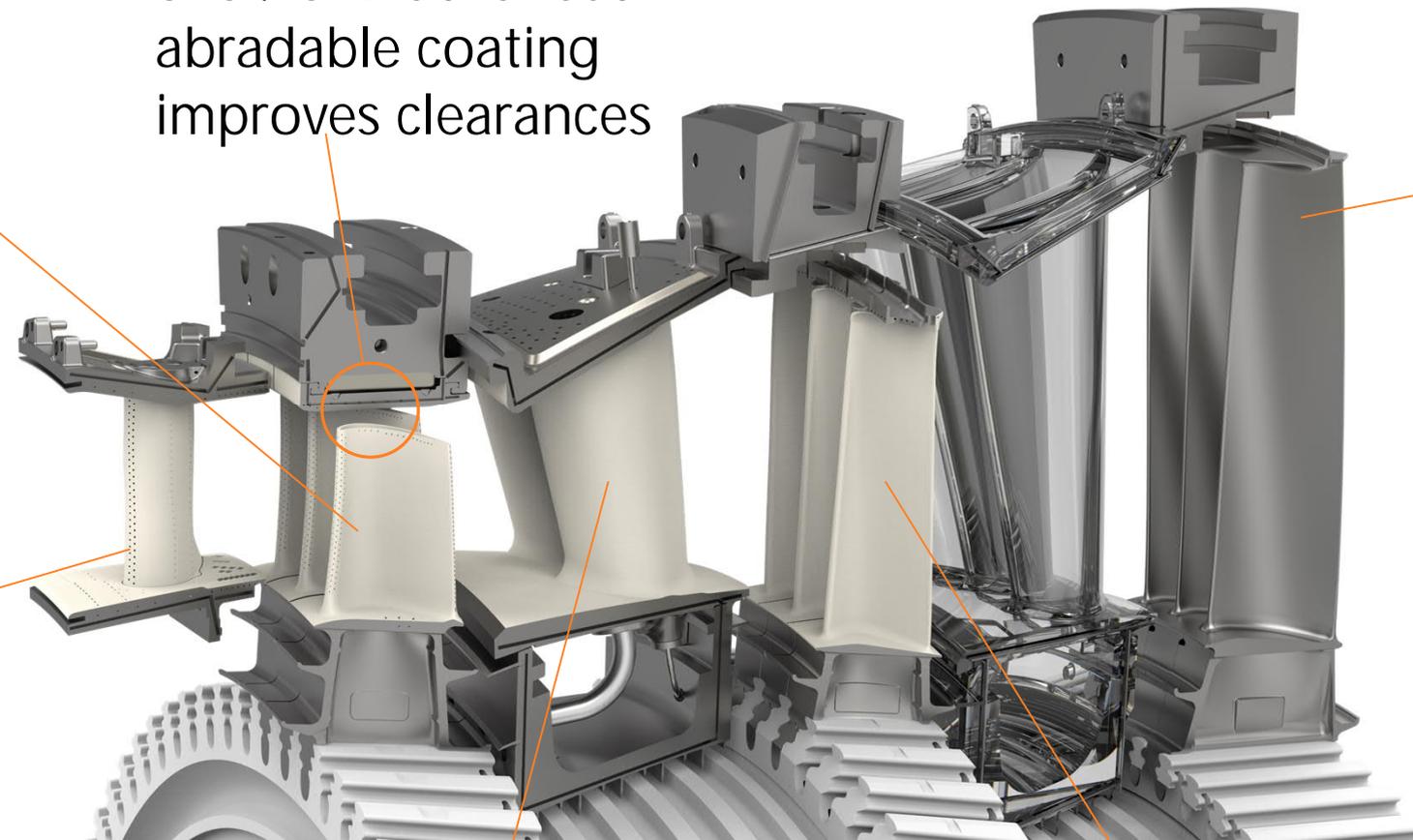
S1N modular design, **additive manufacturing** requires less cooling



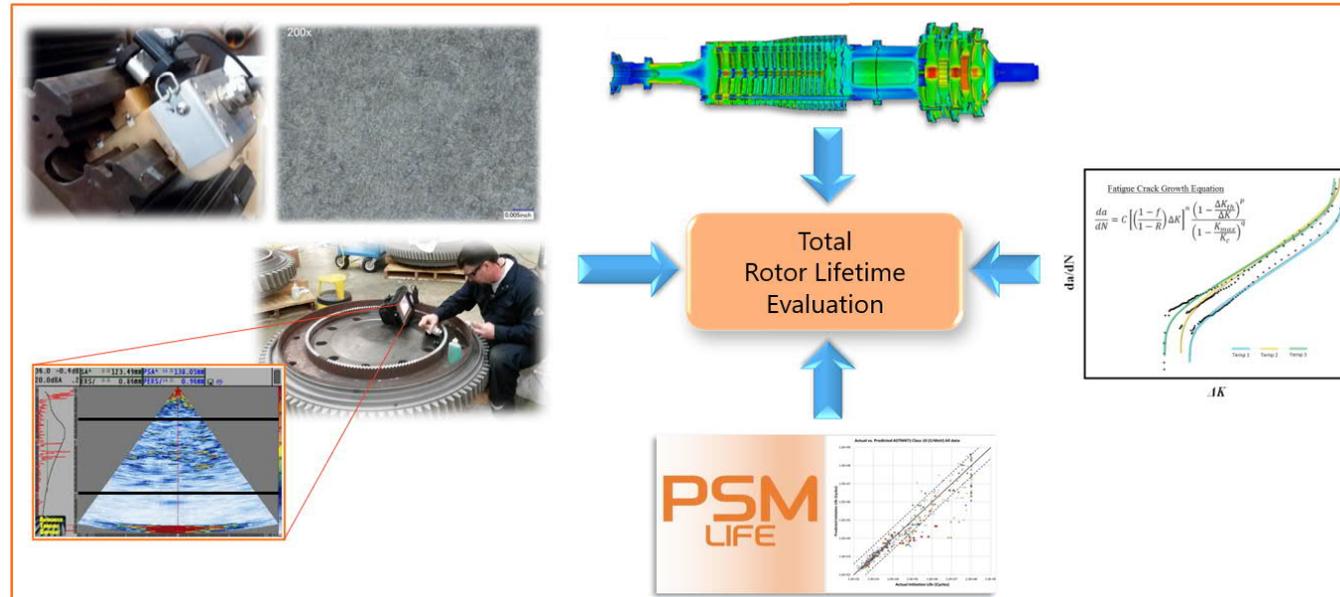
S2N repairable allow with TBC, improved sealing

S2B improved material, TBC, active cooled shroud improves creep margin

Set-wise compatible with OEM AGP HGP hardware



7F Rotor Program Overview – Full New Make in 2027!!



Advanced Nickel Alloy Forgings



Repairs / Exchanges

Compressor Upgrades

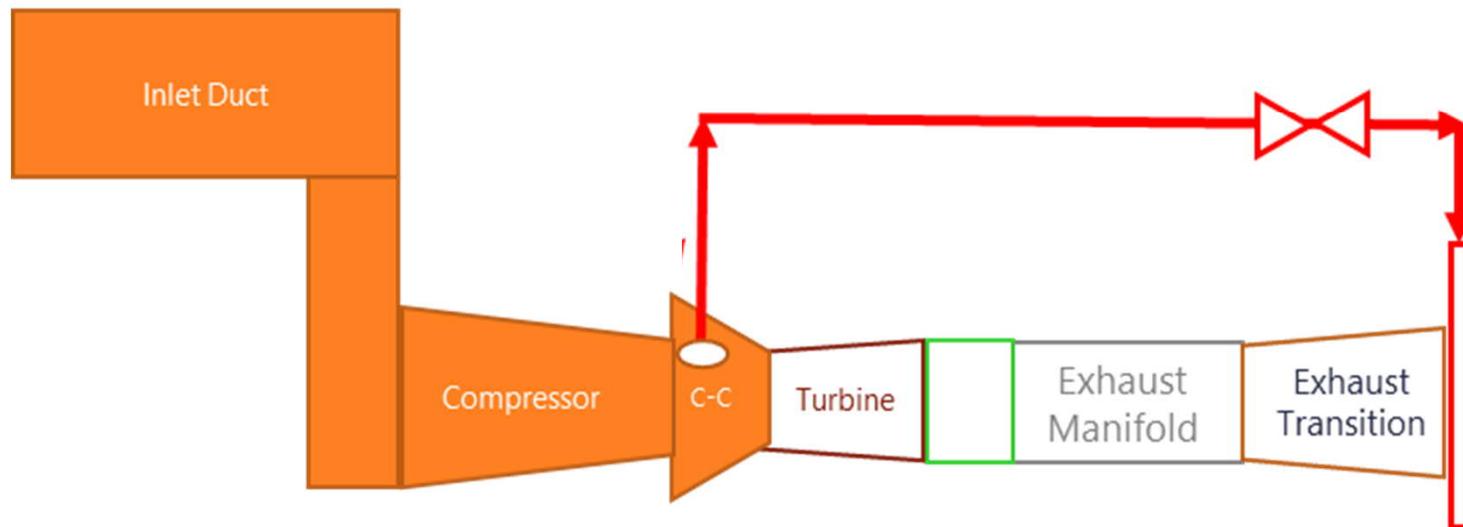
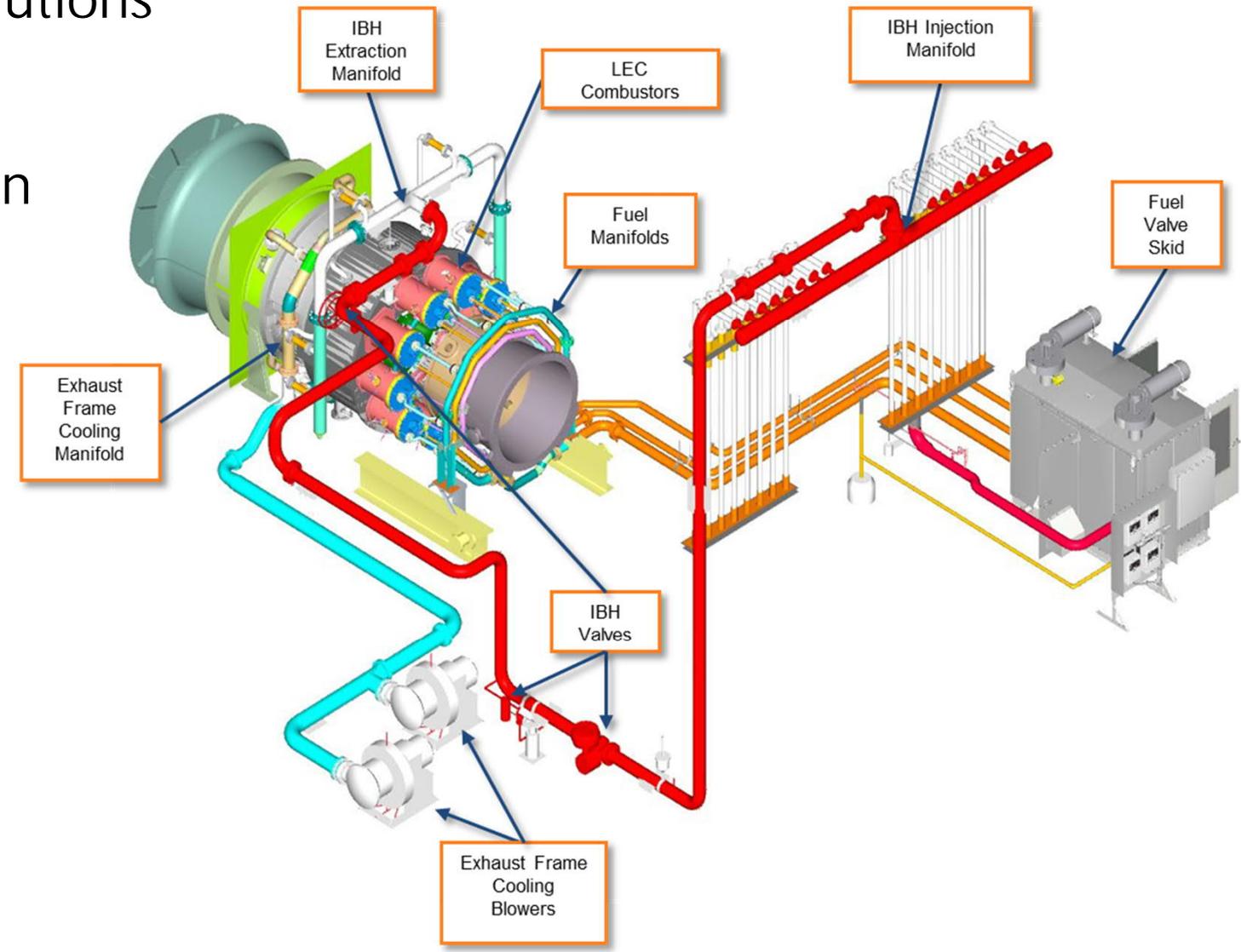
Turbine Upgrades

Lifetime Evaluation

Rotor Manufacturing

Combined Packages Can Achieve Sub 30% load in emissions compliance

- Implemented with Combustor Retrofit + Digital Solutions
- Inlet Bleed Heat (IBH): ~20-30% improvement
- ExB provides further reduction and HRSG protection



Mature Frame Flexibility

- 1x 7EA Simple Cycle

Issue

- *Monetizable* market demand for more output, flexibility, & emissions compliance requirements

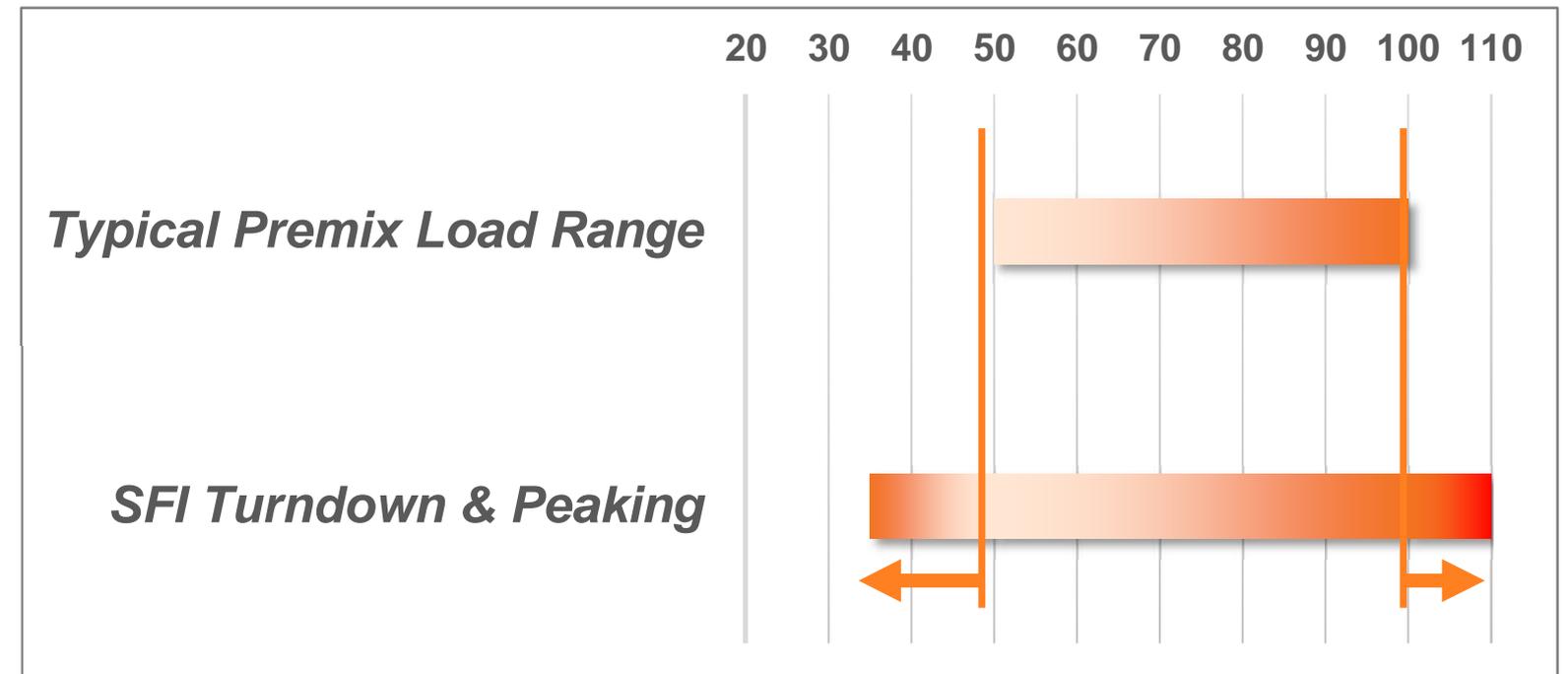
Execution

- PSM LEC™ NexGen +SFI Technology
- Sub 9ppm NOx



Results (w/in compliance to <9ppm NOx, <25ppm CO)

- Baseload & Peaking to >108% w/in compliance
- Up to 25% increased load flexibility top to bottom
- Turndown to 35% load



Increase both Turndown and Baseload Output (peaking)

Tailored Solution to Maximize Operating Range – Available on Frame 9E Turbine as Well

Case Study #3 – Northwestern US (RENEW)

Mature Frame Rejuvenation – 1970's B-Class GTs

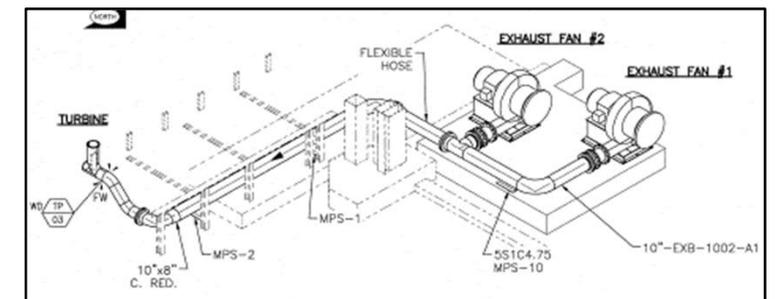
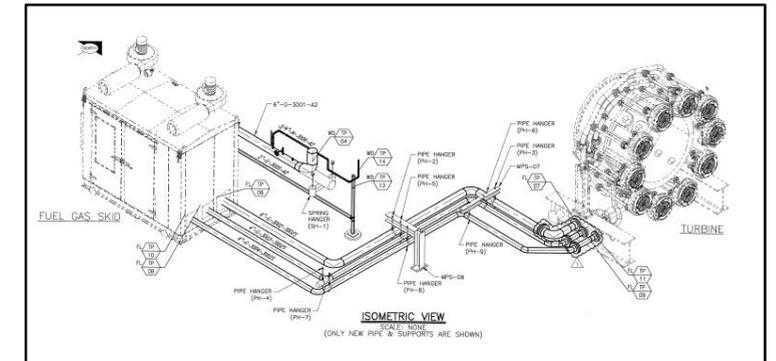
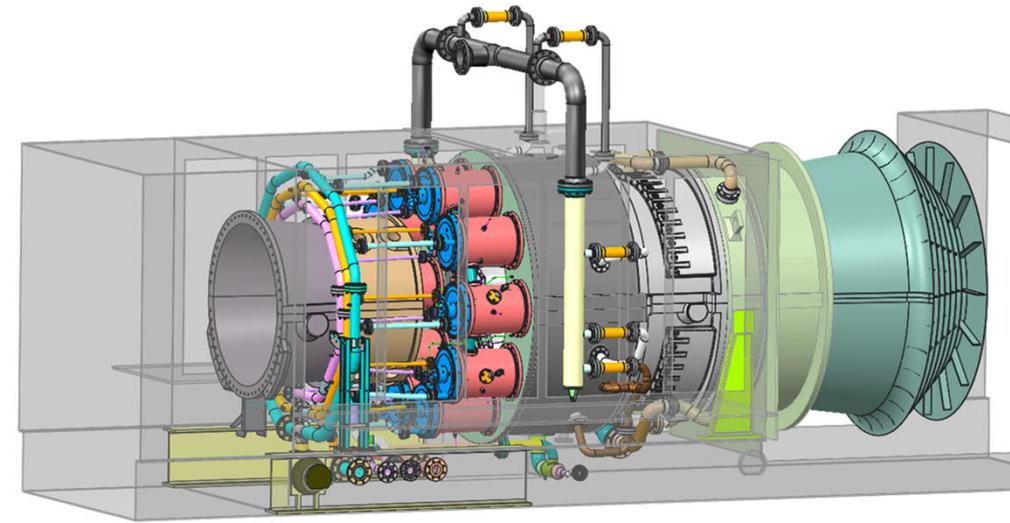
- Previous minimal maintenance or investment
- Regionally, new construction only with renewables
- Requirement for emissions reduction

Scope

- LEC-III™ (dry ultra low emissions combustion)
- AutoTune & Controls Integration
- IBH/ExB and Exhaust upgrades

Results

- NOx from 42ppm to sub 5ppm across load range
- w/ IBH or ExB, dry system turndown to 50%
- Rejuvenated & relevant for long term reliability

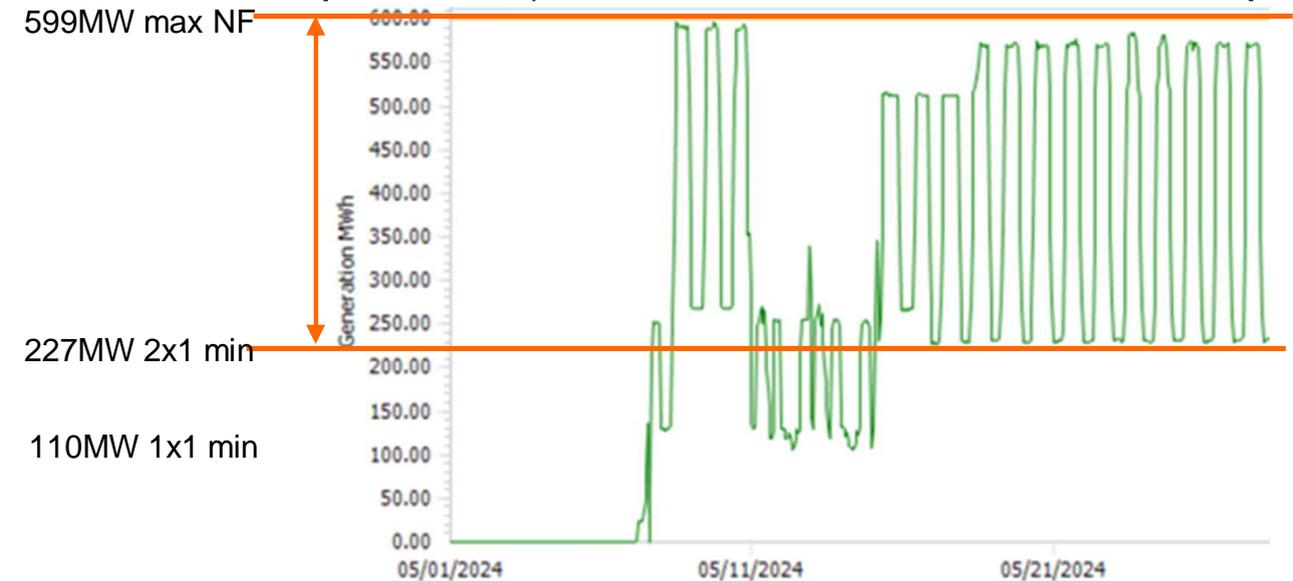


Upgrades Across 6 Units Through 2026 – Applicable to Frame 9E Turbines



Post Upgrade: Large Operating Window

2x1 Operation (Minimal Starts, Better Grid Response)



After PSM Upgrade:

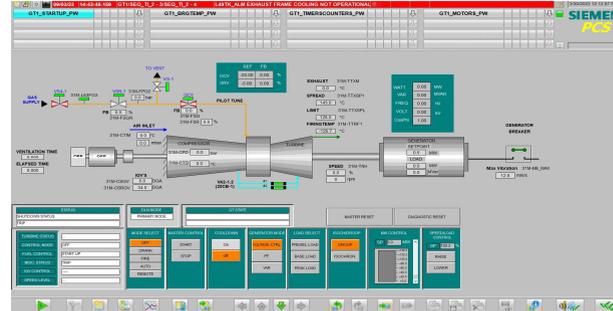
- 402MW operating range: 629MW – 227MW possible with all operating modes
- #2 in Customer Florida dispatch, 2nd only to H-class plant
- 20MW/minute ramp rate (Steam turbine limited)
- Sub-9ppm NOx/CO across load range (3.4ppm after SCR) – *Huge ammonia savings from 23ppm NOx pre-SCR!*
- Multiple operating modes / choices for load following to meet specific market changes now and coming
- 300+ starts/year to <5 starts/year

PSM Advanced Digital Solutions Overview



AutoTune

- Eliminates seasonal tuning
- Power+; 1MW in Compliance
- Peak+; with EBH factor



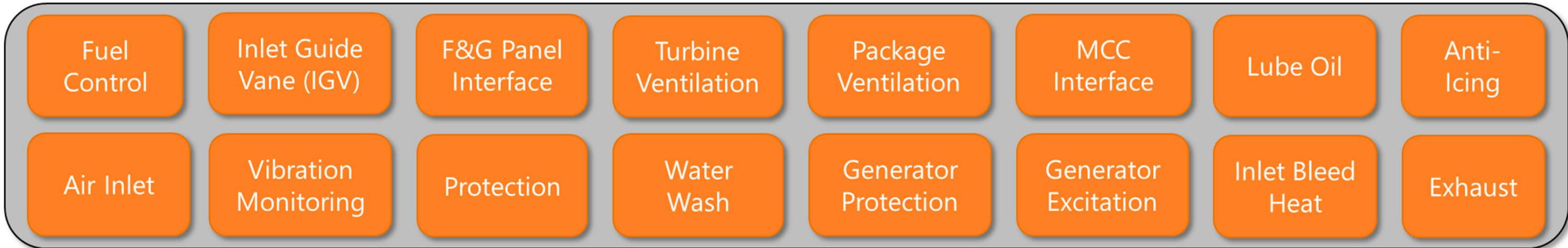
FlexSuite

- FlexStart, FlexRamp
- Virtual Flame Scanner
- FlexSuite Universal Logic



Advanced M&D

- 24/7 expert monitoring
- Performance optimization
- Data driven decisions



Streamlined Commissioning

Model Based Control (MBC) Alternative

Modular & Open Architecture

Optimized User Experience

Control & Combustion System Agnostic

Gas Turbine Platform and Combustor

Small-size GT Technology by Baker Hughes



Innovative Technology of PSM Ammonia Combustor

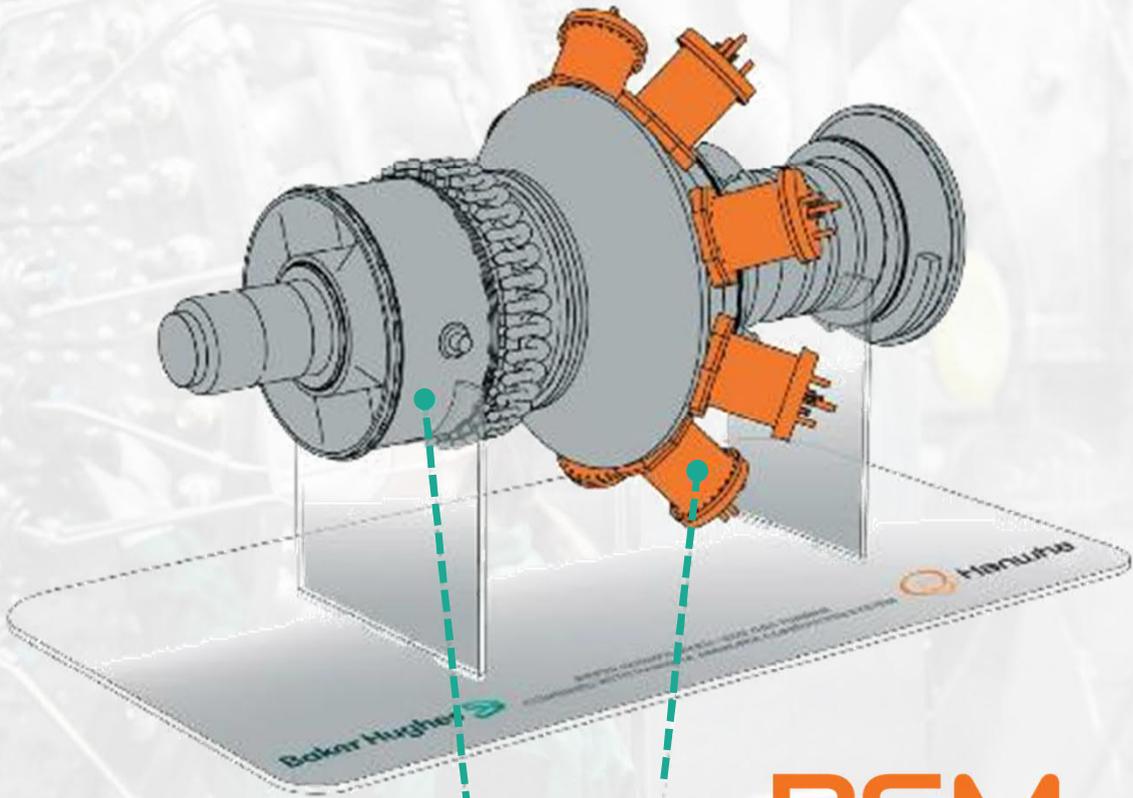


Reliable Design of Hanwha Power Systems Package



Ship Builder in Hanwha Ocean

Baker Hughes  &  **Hanwha**



Baker Hughes
Small - Size Gas Turbine
Platform

PSM
a Hanwha company
Can Combustion System

Thank You!

Questions / Discussion

