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The competing demands of production reliability, economic viability, and environmental responsibility are increasing across all industry applications. But this doesn't necessarily mean plants constructed decades ago have to be ramped down or abandoned. Production life can be extended by injecting innovative technologies into your existing assets through our proven brownfield solutions.

With decades of experience and OEM expertise we inject advanced technologies that keep equipment running well beyond its original design life—with performance and efficiency enhancements. Our upgrades approach often requires small, incremental investments, minimizing your CAPEX needs and enables faster return on investment.

We have solutions to cover all your compression and power generation equipment, as well as plant optimization, rehabilitation, and decarbonization projects. Working closely with customers, we have successfully executed over 2,000 upgrade projects around the world—optimizing upstream oil and gas production, LNG production, pipeline transport volumes, refinery and petrochemical output, and much more.

Taking **energy forward**—with proven technology upgrades for industrial and energy equipment and associated plantwide solutions

LM2500+G4/G5 UPGRADE >

ADVANCED GAS PATH (AGP) >

STEAM TURBINE REJUVENATION >

LM2500+G4/G5 upgrade

Technology flow-down and injection into LM2500+/G4

Maintenance extension, power increase, and emission reduction

- Advanced aeroderivative technology from our LM2500+G4/G5 engine (including upgraded design, materials, coatings, and enhanced cooling) is integrated into the installed LM2500+ turbine (SAC and DLE 1.0 versions)
- It reduces NOx emission from 25 ppm to 15 ppm, and CO2 to 25 ppm— and can be extended in some cases down to single-digit emissions. Formaldehyde emission can be easily managed with newer DLE combustion hardware
- 3D automapping is also available for several engine models



LM2500+G4/G5 UPGRADE >

ADVANCED GAS PATH (AGP) >

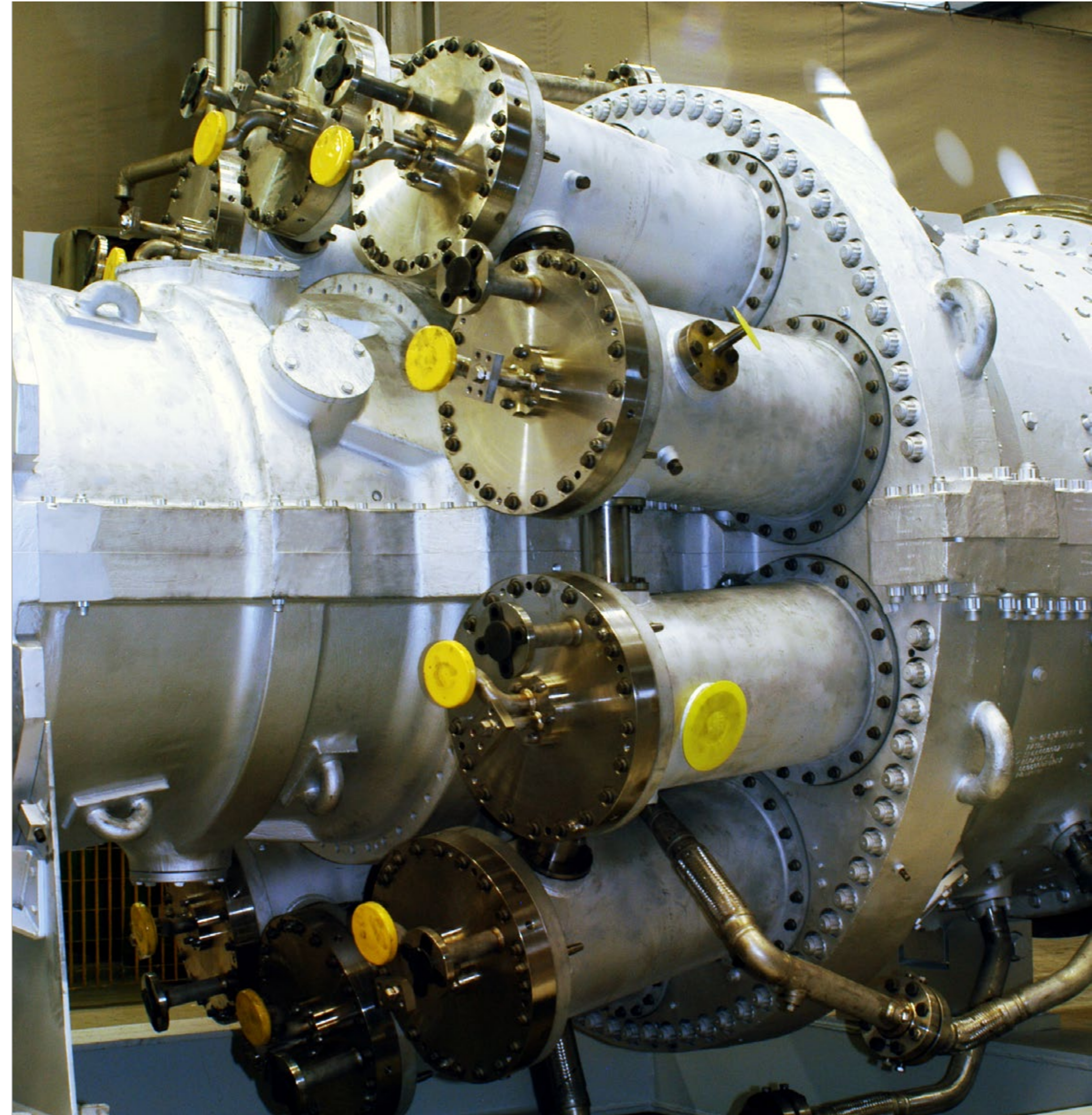
STEAM TURBINE REJUVENATION >

Advanced Gas Path (AGP)

Technology injection for hot gas path

Enhance performances of Frame 6, 7, and 9 gas turbines

- Technology injection for the advanced gas path of Frame 6, 7, and 9 turbines enables up to 10% power increase based on the starting version of each model, plus up to 2% heat rate improvement
- Key elements include improved cooling systems, hot section parts redesign, and sealing
- Extended mean time between maintenance can be considered based on specific needs



LM2500+G4/G5 UPGRADE >

ADVANCED GAS PATH (AGP) >

STEAM TURBINE REJUVENATION >

Steam turbine rejuvenation

From old Nuovo Pignone Series 2 to 2.5

Steam-path upgrade without impact on foundations/pipes

- Replacement of the existing Series 2 turbine's casing and stator blading (rotor replacement optional) with the more advanced Series 3 design
- Interchangeability: same foundations and process steam flanges
- Use of blade carriers: easier and faster maintenance/upgrade, easier management of spare parts
- State-of-the-art components: bearings, regulation system, barring gear, seals
- Reset to zero running hours—availability/reliability increase



AERO GAS TURBINES
XTEND UPGRADE >

FUEL GAS METERING
SYSTEM UPGRADE >

DLN EXTENDOR KIT >

ADDITIVE MANUFACTURING
SPARE PARTS >

Aero gas turbines Xtend upgrade

PGT25/PGT25+ and online rotor thrust regulating system

Extends maintenance intervals up to 50K running hours

- Technology from PGT25+G4/G5 to LM2500+ models
- Extends maintenance intervals up to 50,000 running hours including the new feature to control 4B bearing thrust load
- No need to shutdown the engine to adjust operating thrust for the 4B bearing—saving time and maximizing production



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Fuel gas metering system upgrade

Improved system for aero gas turbines

Increase engine availability and align to package maintenance interval

- All electrical and instrument components included for increased reliability
- All pressure components and manifolds included, decreasing risk of gas release
- Skid is pre-assembled and tested (electrical and leak)
- Skid replacement in hours vs. individual valve replacement in a day
- Skid swap saves about 12 hours on critical path vs. separate valve replacement
- Ergonomically improved, single-lift from under grating area



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DLN Extendor kit

Enhanced DLN combustion for Frame 5/1

Extension of MTBM with NOx emissions kept at 25 ppm

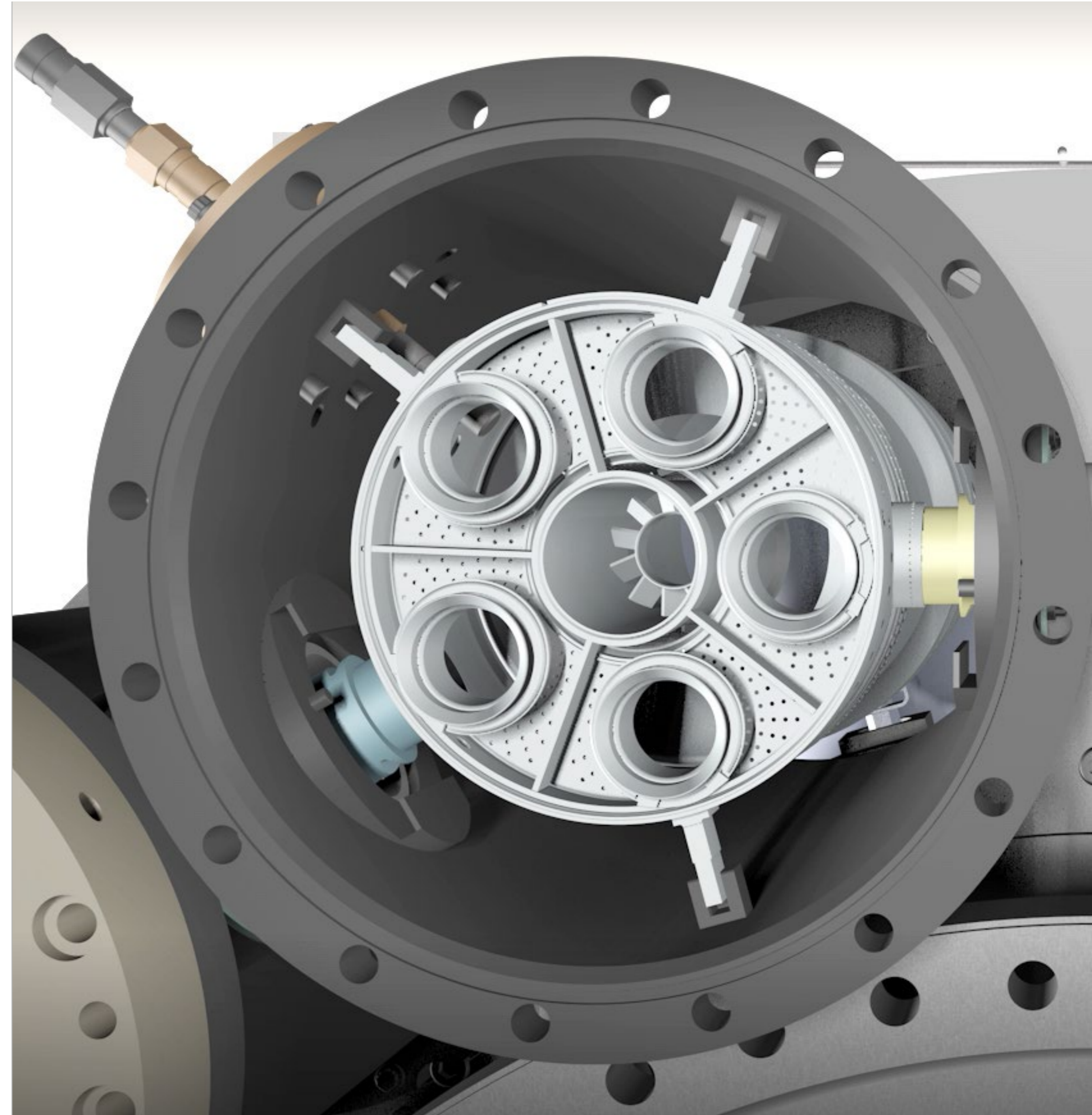
Baseline configuration: Frame 5/1P, PA

- Increased MTBM: LTPI to 24k FFH, MI to 48k FFH

Baseline configuration: Frame 5/1PA PEK dual-use option

- Power increase: LTPI to 24k FFH, MI to 48k FFH with 25 ppm NOx
- Life extension: LTPI to 35k FFH, MI to 70k FFH with 25 ppm NOx

Existing parts available at site (new or under certain operating conditions) can be modified from non-Extendor to Extendor; this optimizes the possibility to reduce CAPEX investment for the next maintenance cycle after the conversion of the parts



AERO GAS TURBINES
XTEND UPGRADE



FUEL GAS METERING
SYSTEM UPGRADE



DLN EXTENDOR KIT



ADDITIVE MANUFACTURING
SPARE PARTS



Additive Manufacturing Spare Parts

Freedom of redesign, improvement, and customization

Maintenance extension, performance improvement, emission reduction, obsolescence management

- Thanks to the high degree of freedom possible with production through additive manufacturing, spare parts (hot gas path component and combustion component) are redesigned, improved, and customized (if needed) to improve reliability and performance, extend life, and reduce lead time
- This innovative technology also enables the supply of obsolescent parts
- With a fully internal, smart, and more sustainable supply chain, Baker Hughes ensures tight control of quality and lead time



NOVALT™ REJUVENATION
AND DECARBONIZATION >

METHANE RECOVERY >

BROWNFIELD ELECTRIFICATION >

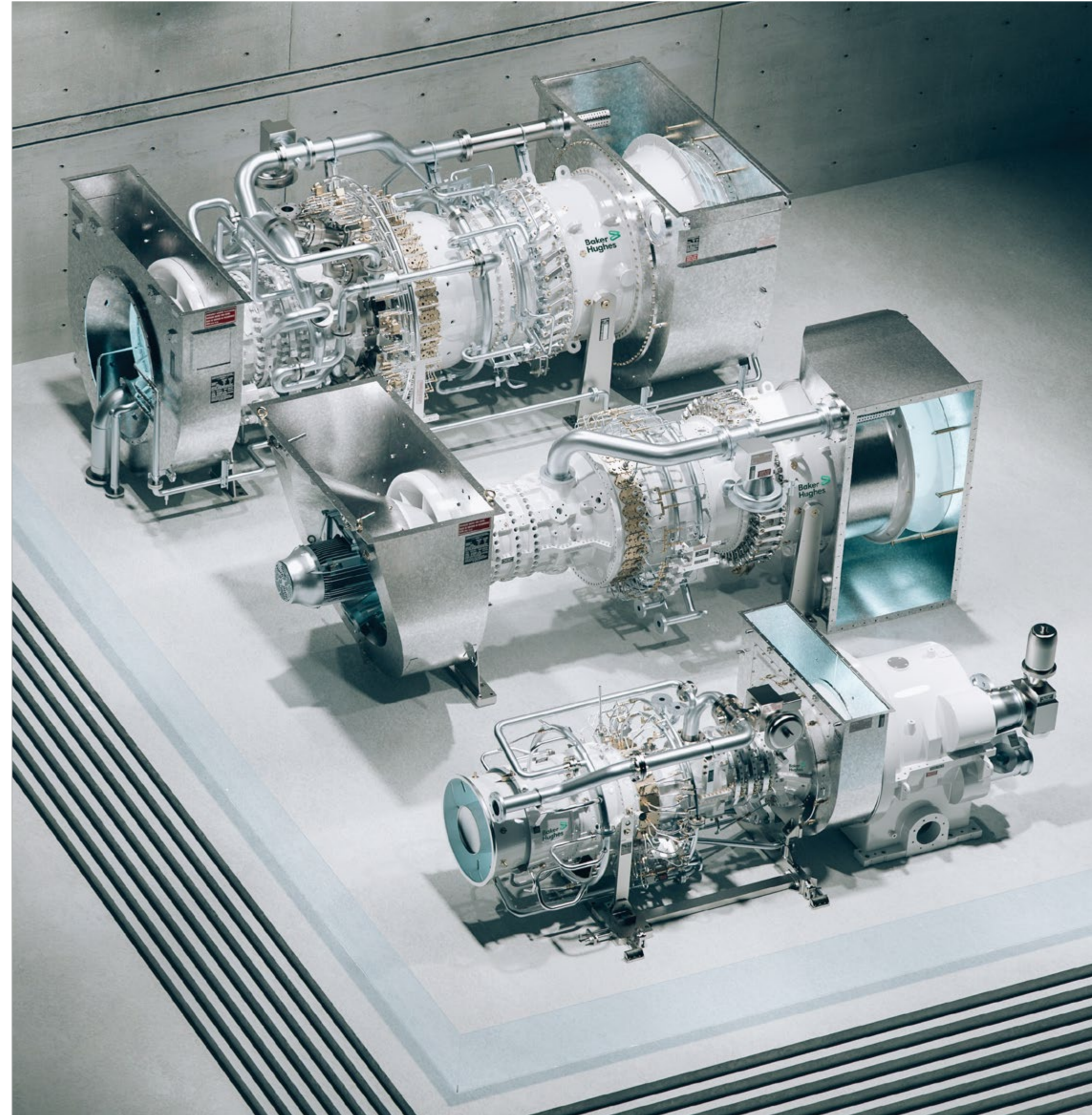
SPINNING RESERVE >

NovaLT™ rejuvenation and decarbonization

Replacement of 5-17 MW gas turbine with NovaLT™

Reduced CO₂ emission

- Directly reduce CO₂ emission through efficiency increase and/or H₂ fuel blending capabilities
- Best-in-class efficiency at partial loads, significantly higher than competition (+2%)
- Available for 5-17 MW power
- Stable and efficient at >50% turndown, 15 ppm NOx
- Robust: can process 50% C₂+ and 30% H₂ or able to start and run at 100% H₂
- Baker Hughes and SNAM successfully completed testing of the world's first hybrid hydrogen turbine designed for a gas network based on our NovaLT12



NOVALT™ REJUVENATION
AND DECARBONIZATION



METHANE RECOVERY



BROWNFIELD ELECTRIFICATION



SPINNING RESERVE



Methane recovery

Reduces gas venting and flaring

Emissions reduction

- Complete packaged single-lift solution made of vertical reciprocating compressor with driver and auxiliaries
- Can be fixed or mobile (i.e., on truck), very flexible solution tailored to customer requirements
- It recovers plant and machinery gases—decreasing flares and vents, in order to reduce plant emissions

CASE STUDY

Simple, cost-effective process gas recovery



NOVALT™ REJUVENATION
AND DECARBONIZATION



METHANE RECOVERY



BROWNFIELD ELECTRIFICATION



SPINNING RESERVE

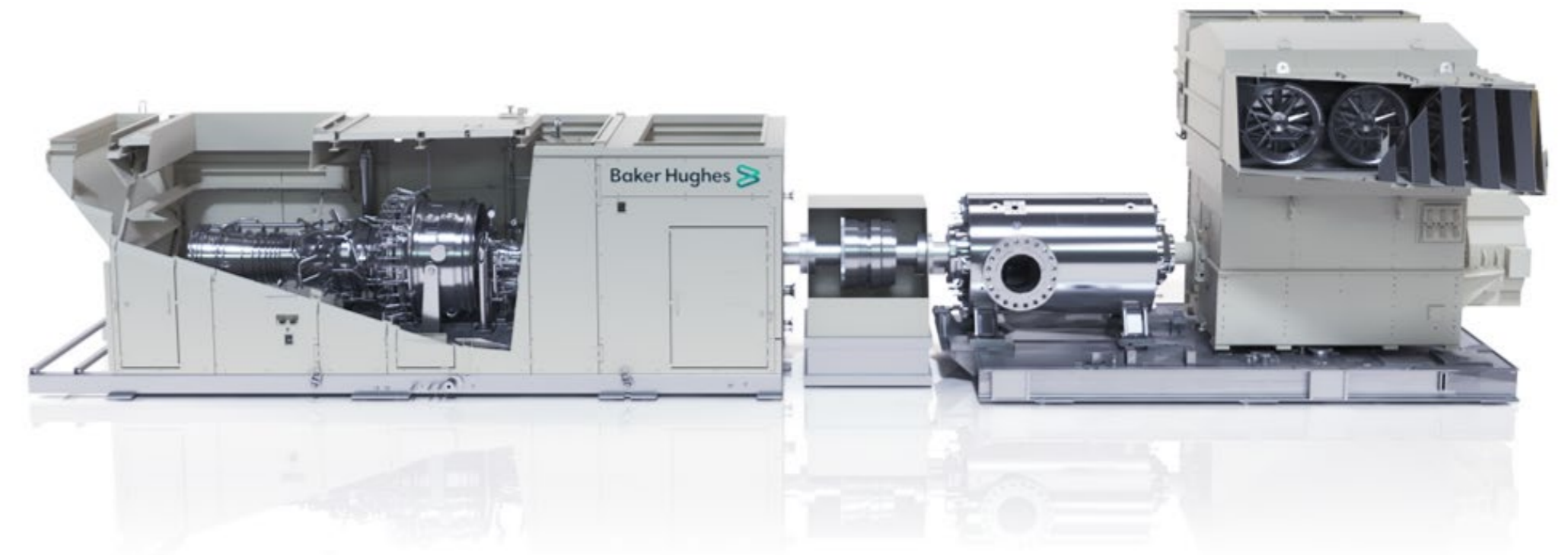


Brownfield electrification

Gas turbine replacement or hybrid solutions with electric motors

Reduce CO₂ emissions

- Reduce plant CO₂ emissions by replacing gas turbines with electric motors or a hybrid configuration with electric motor installation at centrifugal compressor shaft end
- Electrical standards design rules
- Multidisciplinary team for electro-mechanical system simulation
- Power plant integration
- Electric studies
- Baker Hughes has partnered with a major electric motor manufacturer on this solution
- Includes medium voltage motors and variable frequency drive, power generation trains and BOP, site support, and commissioning



NOVALT™ REJUVENATION
AND DECARBONIZATION



METHANE RECOVERY



BROWNFIELD ELECTRIFICATION



SPINNING RESERVE

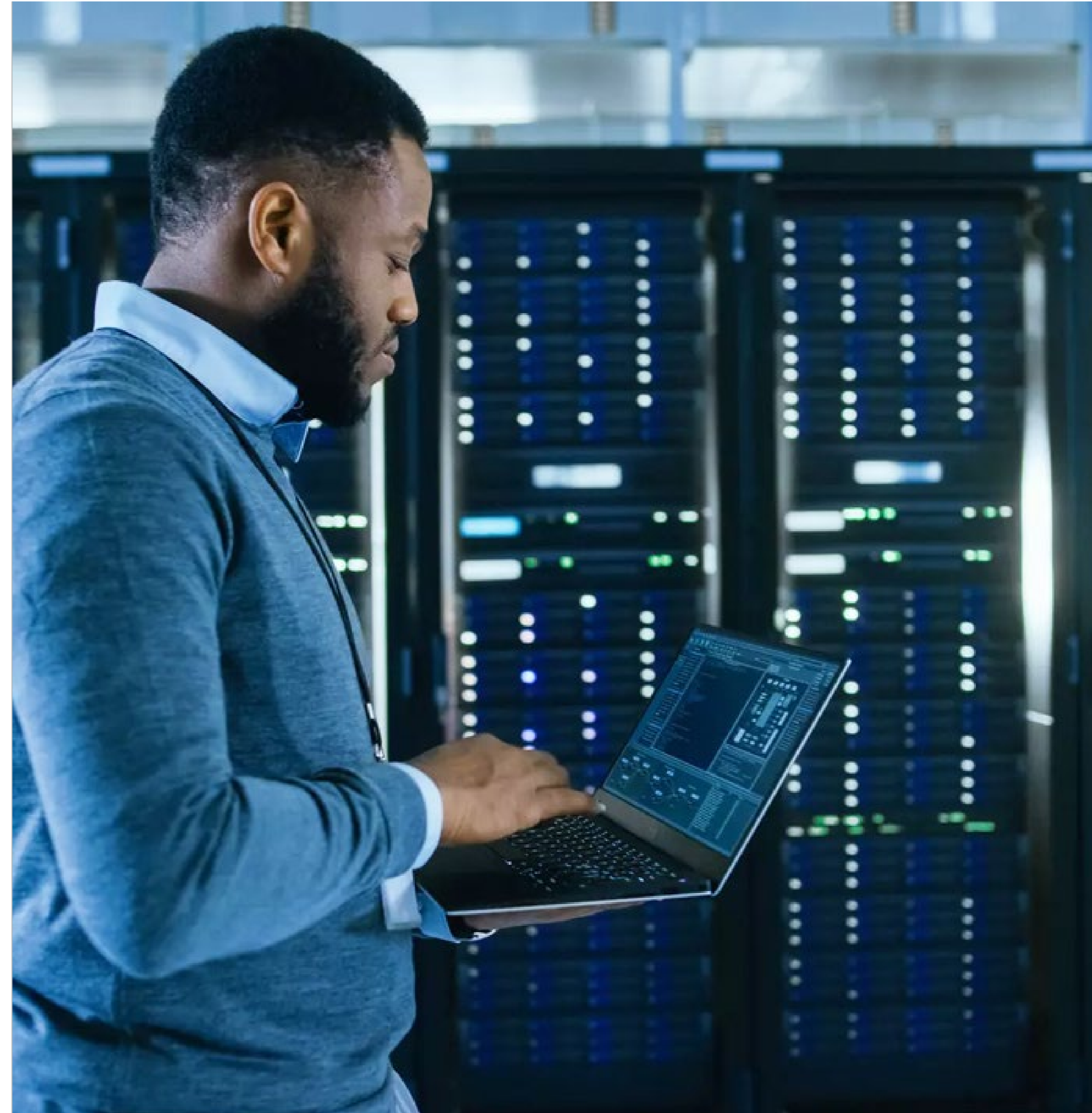


Spinning reserve

Battery system reduces the number of gas turbines in operation

Reduce CO₂ emissions by 10% or more

- Battery packages offset the necessary power to start one or more units—enabling optimization of load profile for the gas turbines
- Eliminate one or more gas turbines—remaining units operate at higher load and reduce CO₂ emissions by 10% or more
- Reduce fleet fired hours and maintenance by 30% or more
- Fast payback with \$50/CO₂ Tax, \$2/MMBTU fuel value, power fluctuation managed by battery package through Baker Hughes Digital Optimizer software
- Enables renewable energy storage

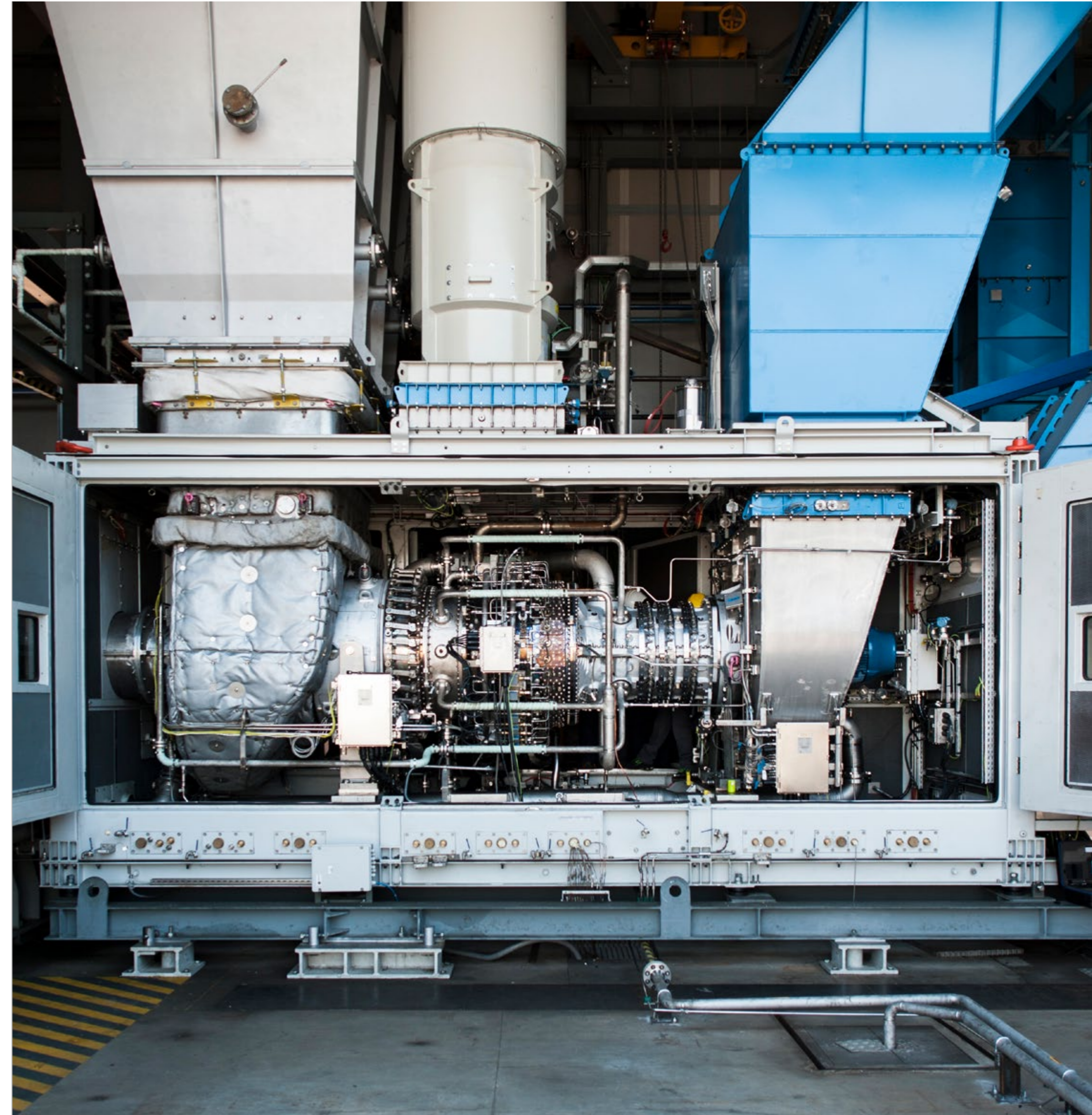


H₂ fuel blending solution

Upgrade for frame and aeroderivative gas turbines

Directly reduce CO₂ emissions

- Proven and available today—for gas turbine fuel blends from 10% to 100% hydrogen
- Our turbines are ready for integration and adaptation into existing gas infrastructure, specifically designed to facilitate deployment
- 70+ units installed highlighting experience with frame and aeroderivative designs burning H₂ rich fuel
- Complete turbine portfolio for current and future H₂ market needs. Full scale PGT10 demonstrative plant (100% H₂)



Compressor shaft-line upgrade

Replacement with HPRC

Enables H₂ fuel and reduce carbon intensity

- Baker Hughes has proven experience in H₂ gas mixtures (up to 100%) compression since 1960s, with reciprocating and centrifugal compressors
- Our High Pressure Ratio Compressor (HPRC) provides significant improvements in green-hydrogen applications—reducing footprint and weight, increasing reliability and availability
- Optimized for installation and maintenance: top-line compressor performance, up to 30% smaller footprint and 50% lighter weight
- Stacked rotor configuration enables higher rotating speed and maximizes pressure ratio
- Advanced high-efficiency, high-head impeller design with peripheral speed capability fully validated up to 500 m/s
- HPRC in H₂ service can handle large flow and high-pressure ratio with a single compression body, instead of multiple casings using standard compressors



MARK VIE MIGRATION KIT >

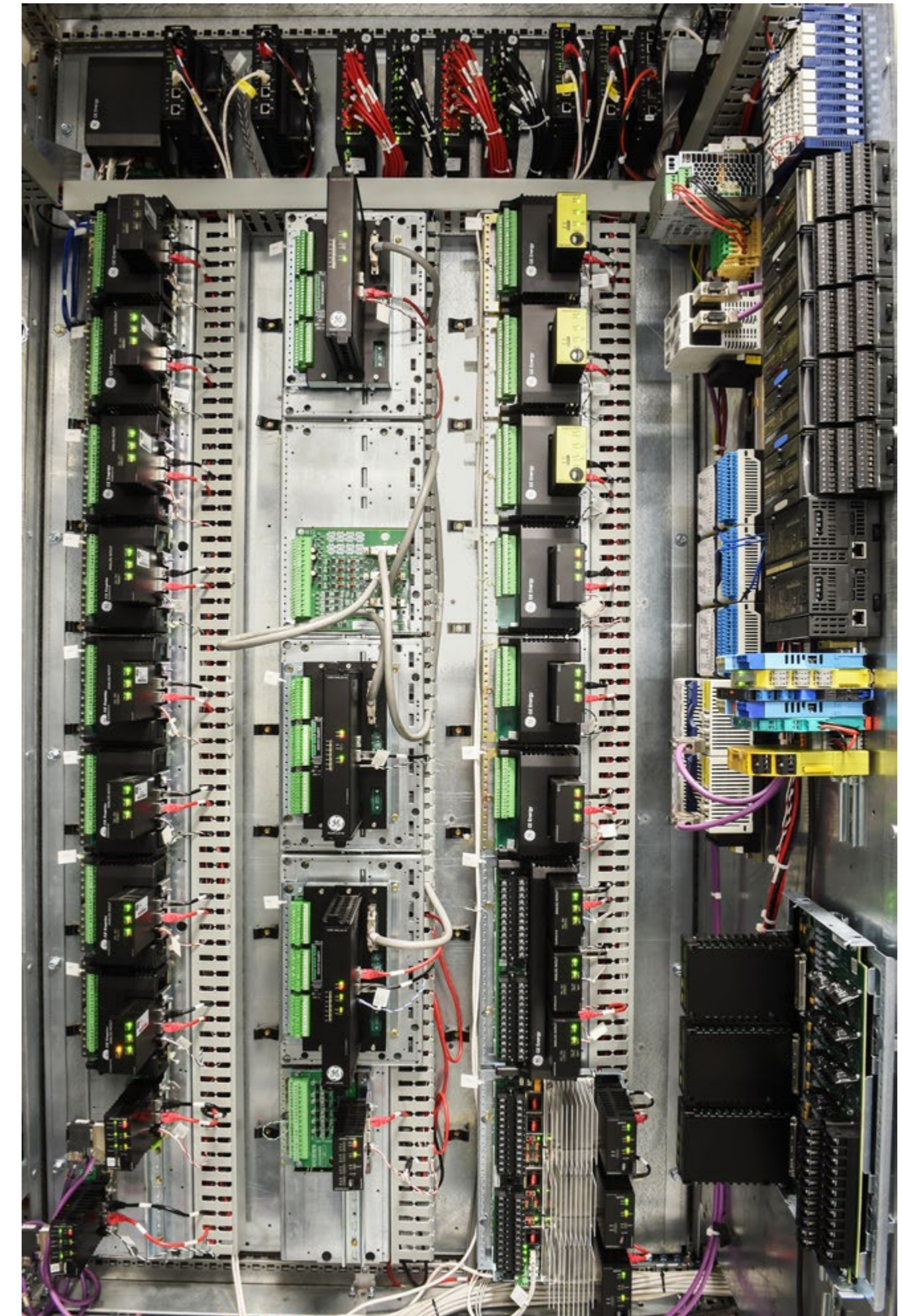
TORSIONAL VIBRATION
CONTROL SYSTEM (TVCS) >

Mark Vie Migration Kit

Controller platform upgrade

Improved availability and reliability

- Cost effective solution for the Mark Vie platform with third-party Safety Integrated Level certification
- Integrates MK Vie and MK VieS components in single cabinet
- Ready for advanced and remote Monitoring & Diagnostics services
- Minimal downtime and upgrade impact
- No modifications to cabinets and field connections are required
- Software porting qualification with high-fidelity model
- Delivers increased computing power and I/O capacity

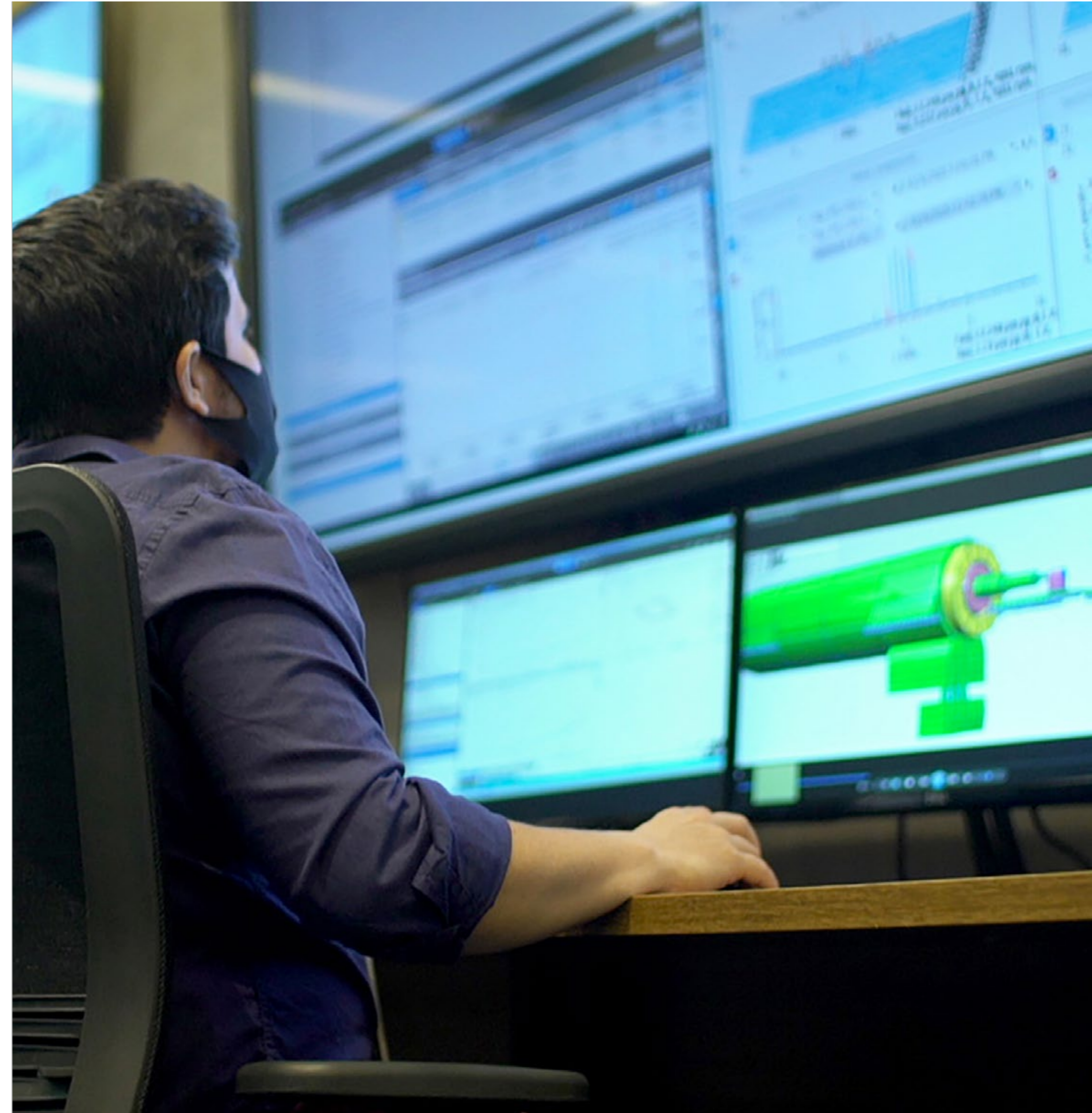


Torsional Vibration Control System (TVCS)

Manages unexpected torsional phenomena issues on shaft line

Increase shaft line availability

- Optimize plant availability: Active Torsional Damping avoids machine trips from torsional vibrations
- Avoid costly downtime: provides real-time data and insights about unit/plant operation against torsional vibration phenomena
- Minimize commissioning and startup time: prevents unexpected torsional phenomena



WASTE-HEAT RECOVERY >

DEFLARING SOLUTIONS >

PRESSURE LET-DOWN >

Waste-heat recovery

Heat recovery at gas turbine exhaust for power generation

Reduced emissions and OPEX with increasing power generation cycle efficiency

- Revamping with installation of heat recovery steam generator plus steam turbine power generator train or Organic Rankine Cycle installation in brownfield to recover wasted heat from gas turbine exhaust
- Power generation in power islands with reduced carbon footprint, optimizing the gas turbine operation profile
- Decreasing OPEX and carbon footprint



WASTE-HEAT RECOVERY >

DEFLARING SOLUTIONS

PRESSURE LET-DOWN >

Deflaring solutions

Installations to recover flared gas

Reduced CO₂ emission

- Range of solutions that can be implemented starting from the primary dry gas seal recovery on centrifugal compressor up to broader plant solutions, customized on specific services
- Different products including cold turboexpander, scrubber, and compressors can be involved to reduce the flared gas and consequently reduce CO₂ emissions by up to 90%
- Dedicated solution architecture will be developed based on the output streams necessary to achieve



WASTE-HEAT RECOVERY >

DEFLARING SOLUTIONS >

PRESSURE LET-DOWN

Pressure let-down

Energy recovery from gas pressure reduction

Reduced emissions and OPEX with increasing power generation cycle efficiency

- Product mainly focused to extract power from all the pressure reduction across different lamination process
- Perfect fit for pipeline application and reducing pressure application generating electrical power otherwise wasted from JT valve
- Small footprint for electricity generation introducing a perfect ratio between saved CO₂ vs Power
- No impact on normal pipeline operation

