

IGTC 2023

Pathway Forward: Gas Turbine OEM Tech Update

A pathway to clean power generation

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October 10th/11th 2023

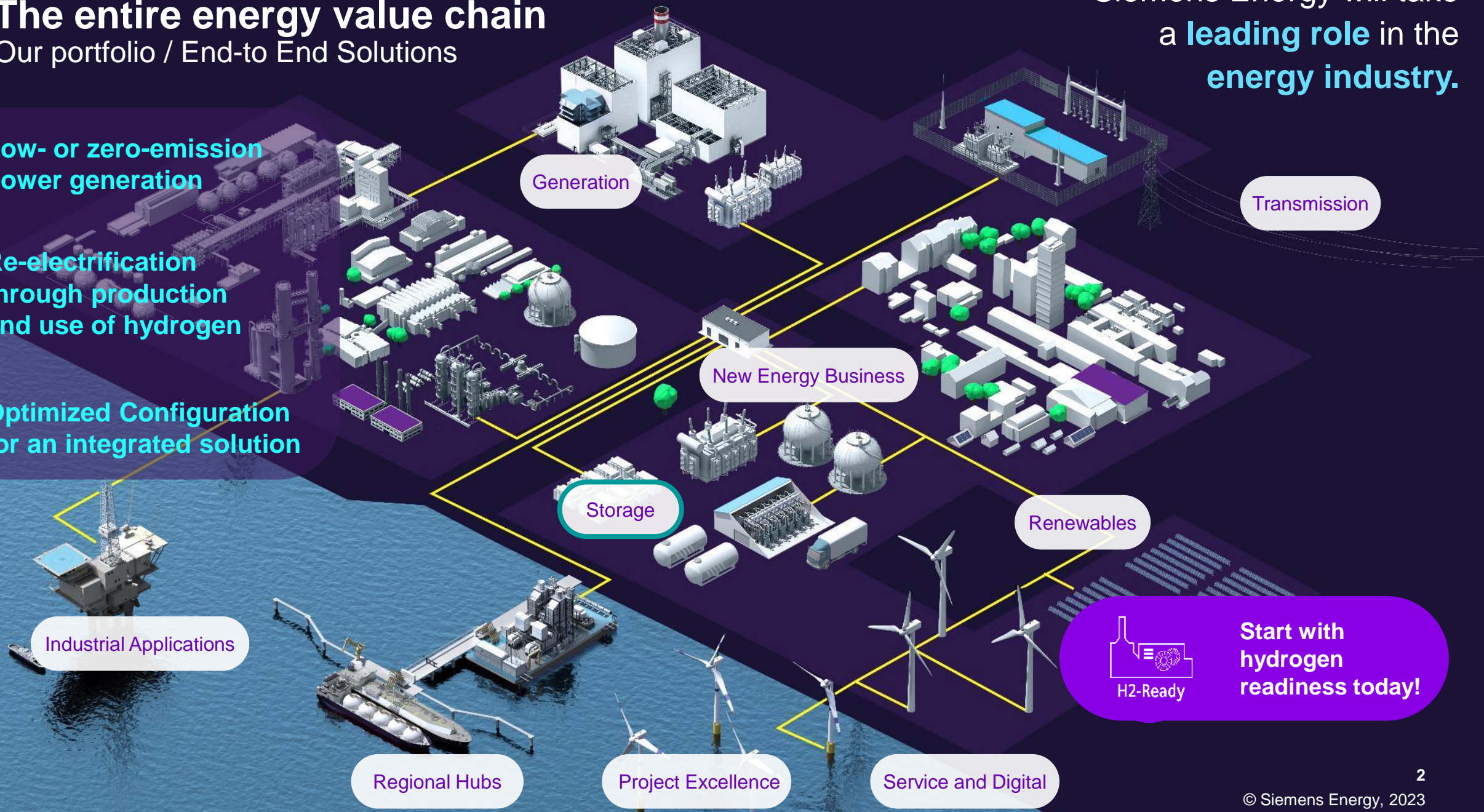


The entire energy value chain

Our portfolio / End-to End Solutions

Siemens Energy will take a **leading role** in the **energy industry.**

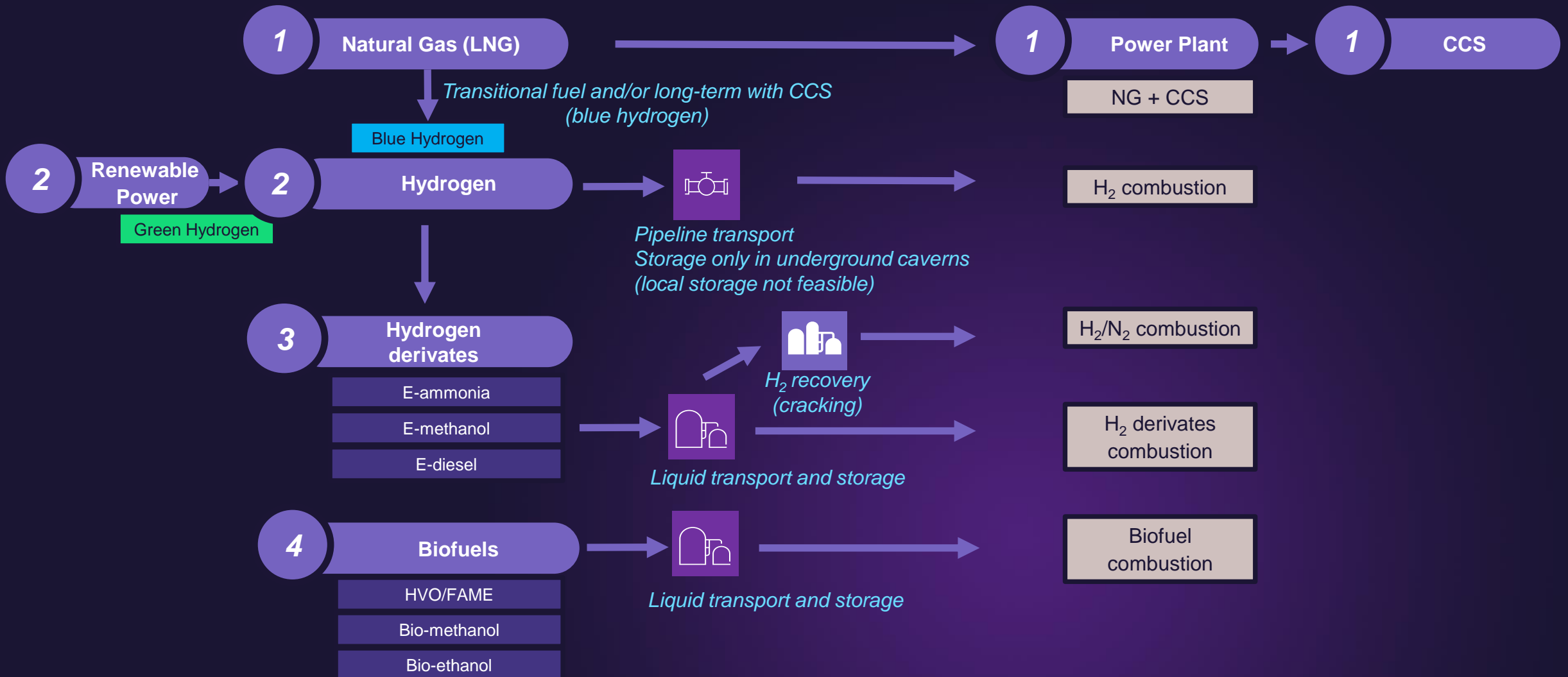
- Low- or zero-emission power generation
- Re-electrification through production and use of hydrogen
- Optimized Configuration for an integrated solution



H2-Ready

Start with hydrogen readiness today!

Several technologies are available for decarbonizing the residual load in a RES-based energy landscape



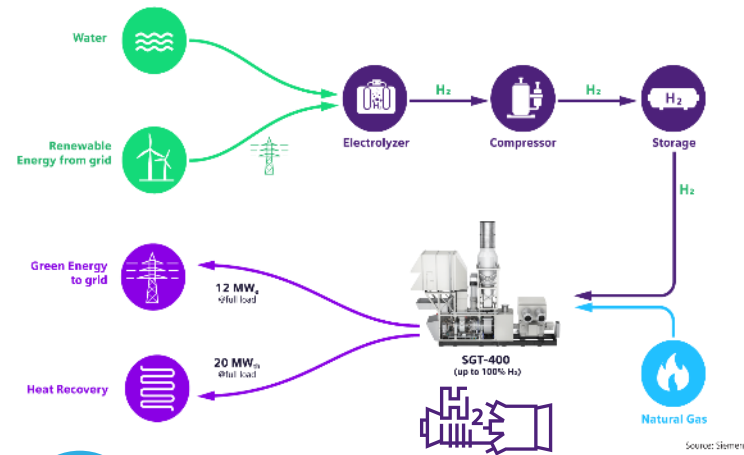
EU-funded HYFLEXPOWER Project

CO₂ free pilot demonstration using 100% H₂ DLE gas turbine



World-first demonstration of a power-to-H₂-to-power path for CO₂-free power generation pilot including an advanced DLE H₂ gas turbine

- Decarbonizing papermill by modernizing combined heat and power plant in Saillat-sur-Vienne, France.
- Siemens Energy led consortium of EU funded 4-year project until 2024



Source: <http://www.hyflexpower.eu/>

Milestones

- 2021**
 - Installation of the H₂ production, storage & supply facility at site
- 2022**
 - Initial demonstration of advanced plant concept with NG/H₂ mixtures
- 2023**
 - Pilot up to **100% H₂ for carbon-free energy production** from stored excess renewable energy (CO₂ saving 65,000t/yr.)

Bio-diesel in gas turbines

HVO100 & FAME

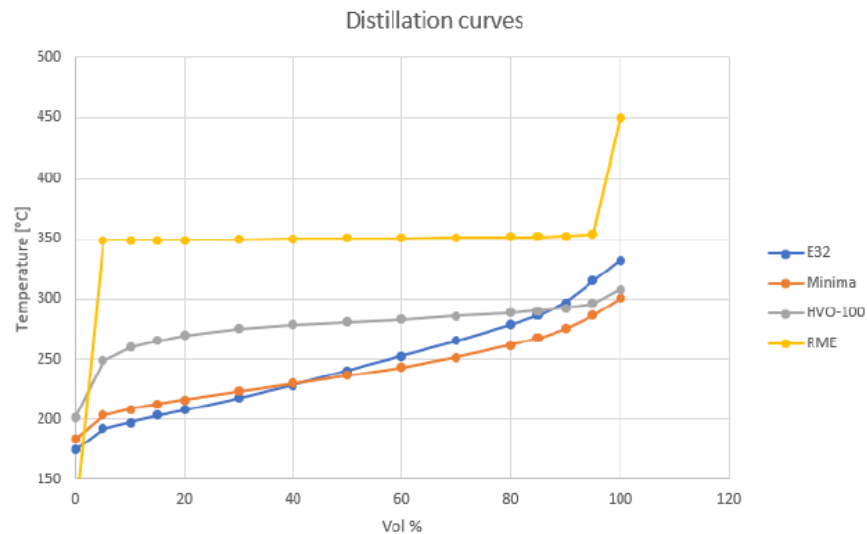
Testing

In 2021 HVO100 was tested in SGT-800 at customer Göteborg Energi's site Rya CHP.

HVO100 has since been released as an approved gas turbine fuel

Characteristics

HVO100 behaves closer to an ordinary diesel fuel and is within our current fuel specification whereas FAME differs more, especially regarding the distillation curve and viscosity.



Oct. 10th/11th 2023

HVO: Hydrogenated Vegetable Oil
FAME: Fatty Acid Methyl Ester

Cooperation

Göteborg Energi and Siemens Energy operated gas turbines 2021 on bio-diesel at Rya CHP

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Portfolio Elements
3 x SGT-800 gas turbine

Reference

Stockholm Exergi power plant on HVO100
Commercial operation 2023

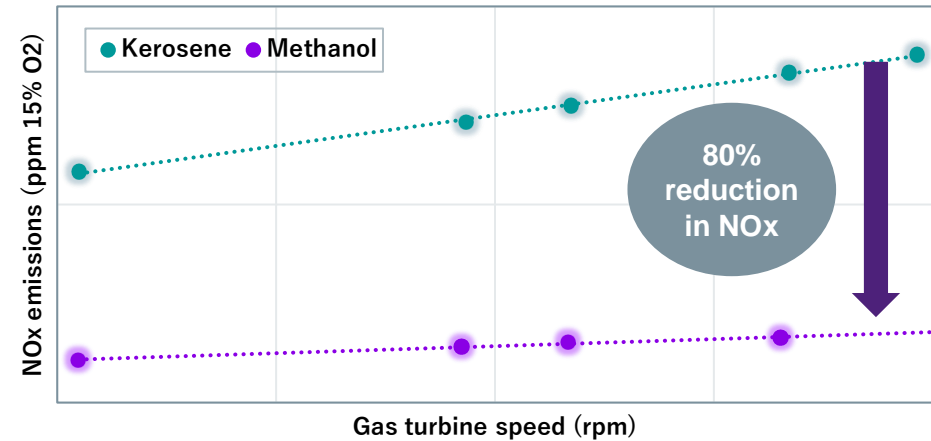


Portfolio Elements
1 x SGT-800 gas turbine

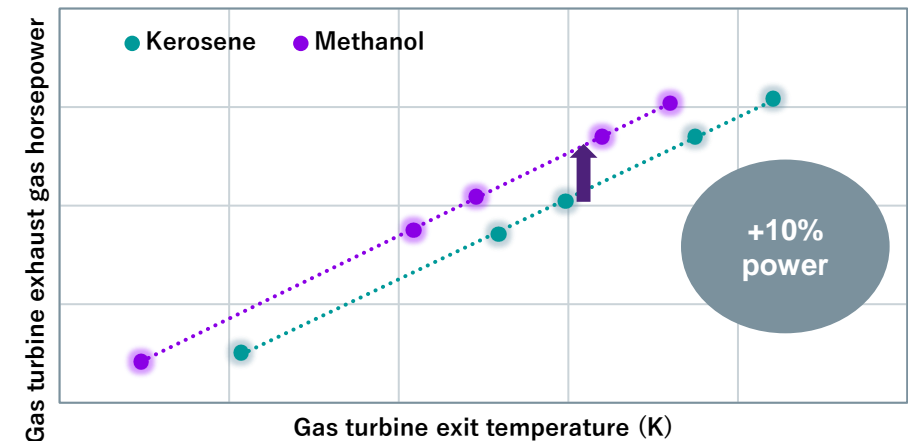
Successful performance tests on HVO100 performed at customer site

SGT-A20 Bio-methanol demonstration test

SGT-A20 non-DLE NOx emissions



SGT-A20 non-DLE exhaust gas power vs exit temperature



World first liquid bio-methanol pilot could reduce offshore emissions by 75%
Green methanol could cut carbon dioxide emissions, compared to conventional fuels across the UK Continental Shelf

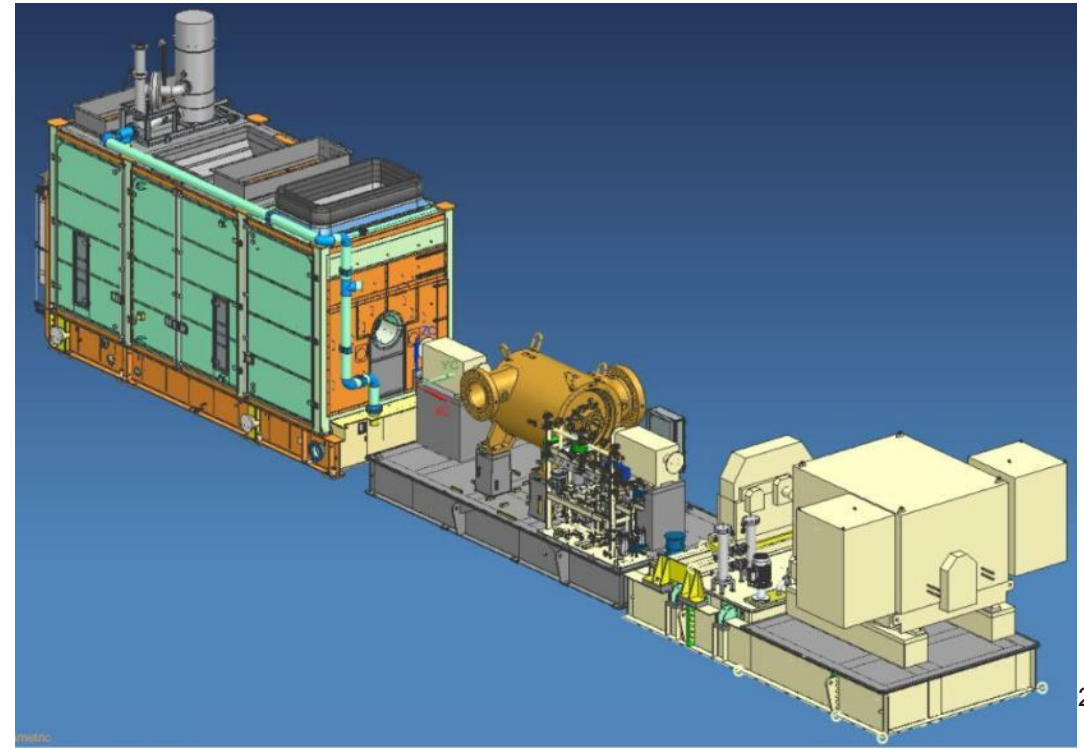
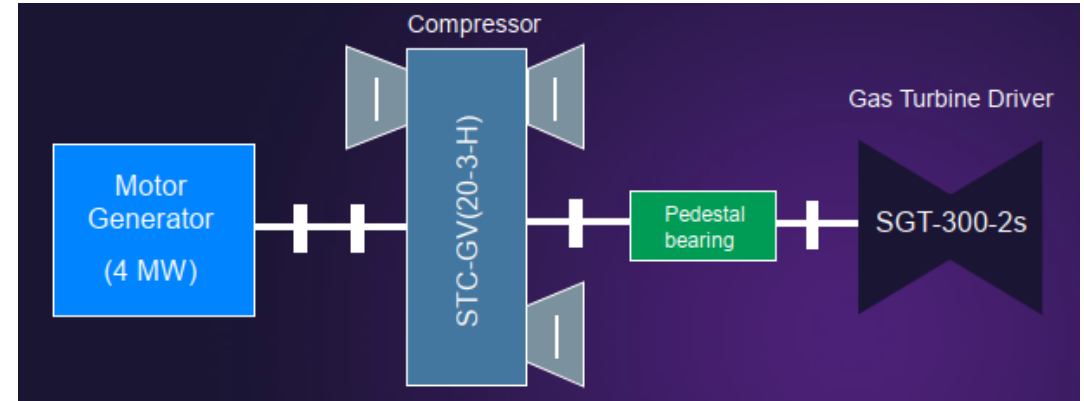


- **Worlds first** demonstration of SGT-A20 operating on Bio-methanol at RWG test facility, Aberdeen.
- **Emissions reductions** - 80% reduction in NOx, reduced CO, no SO₂ and smoke due to cleaner combustion and lower flame temperature.
- **10% power** improvement at same operating temperature and **4% increase in thermal efficiency**.
- **Safe** gas turbine handling including, start up, full power, shut down and transient operation
- Easy to handle liquid fuel at atmospheric conditions, ideal alternative to diesel.

Hybrid / Dual Drive (Compressor Drive)

Ability to use Renewables & provide secure energy supply

- *Grid Reliability:* Use Electric Motor Drive (EMD) for Normal operation and switch to Gas Turbine when grid power is not available / reliable.
- *Permitting:* Site is permitted as EMD, with Gas Turbine for Emergency purposes.
- *Opex:* Switch between EMD or Gas Turbine based on Electricity Usage Charges.
- *Right Sizing:* Optimal Train design for lowest Emissions and fuel consumption.
- *Using GT Power on Cold Days:* Use additional power from the GT on cold days for site duty or selling it back to the Grid.





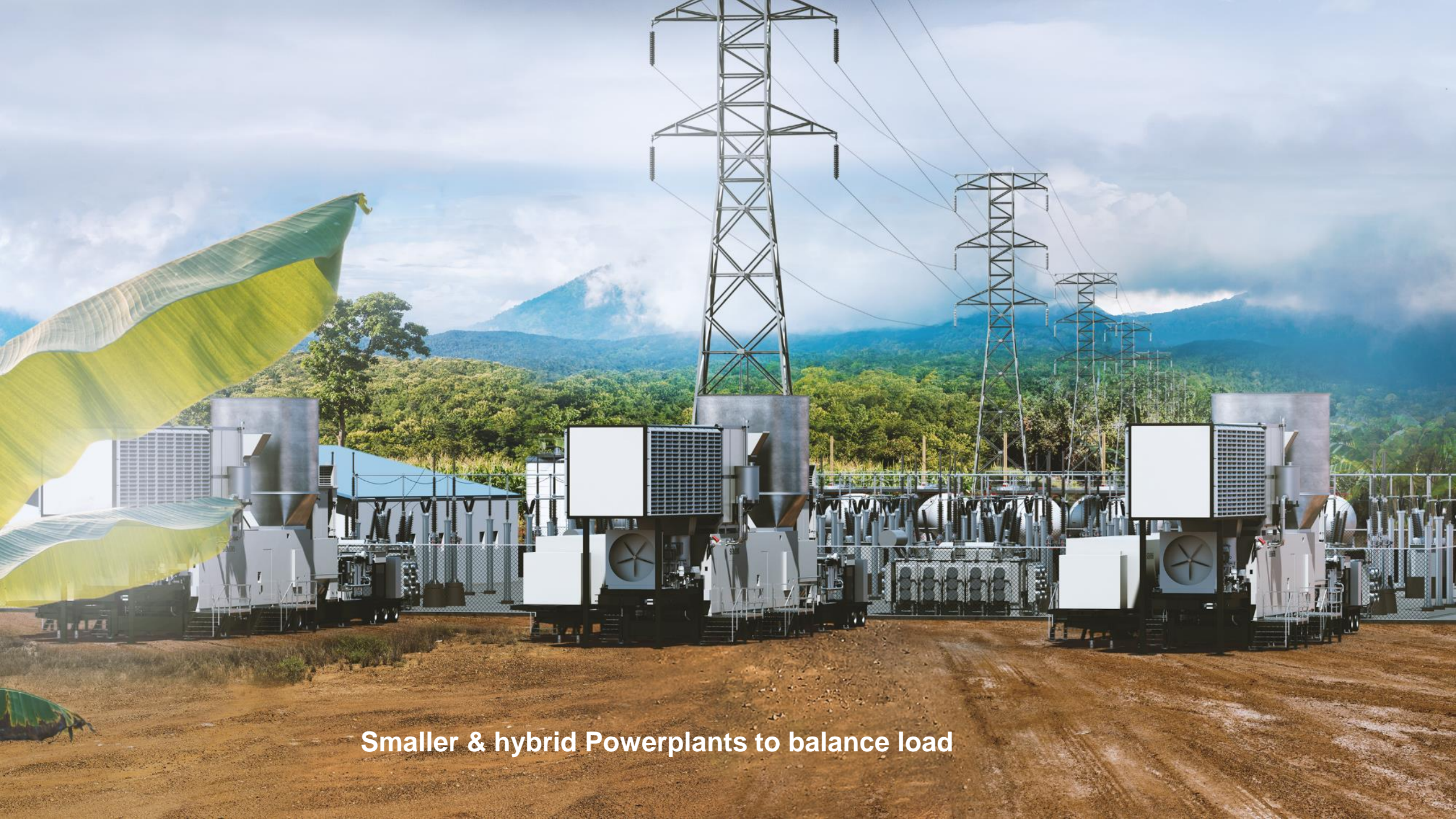
Gas is here to stay



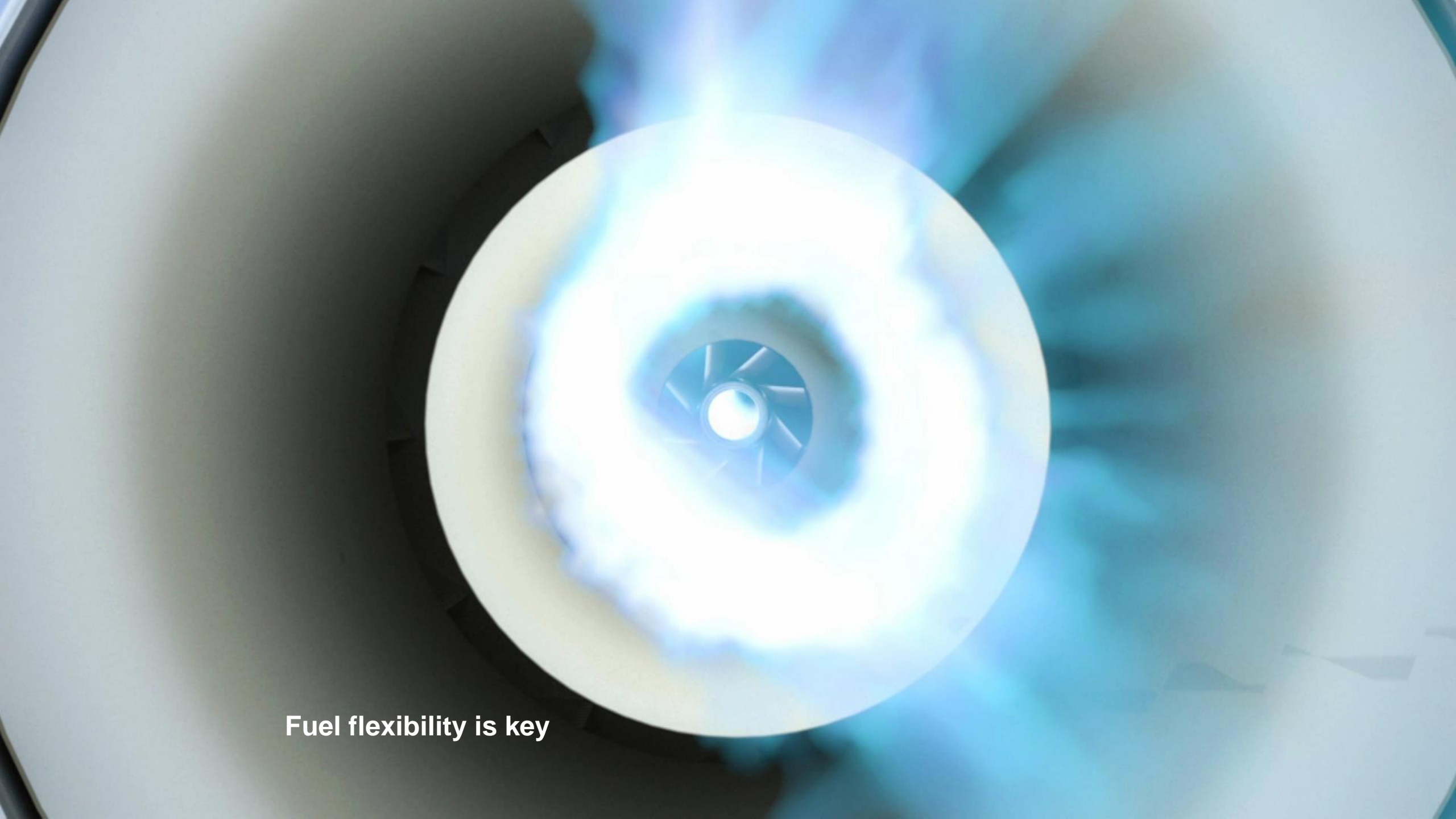
GTs in Offshore O&G

Different Regions will have different solutions





Smaller & hybrid Powerplants to balance load



Fuel flexibility is key

Contact page



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