

Transitioning towards a Net Zero



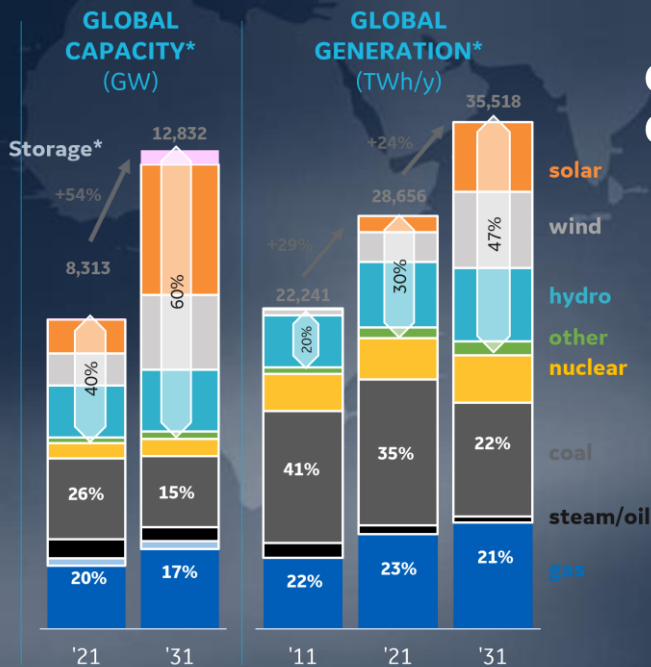
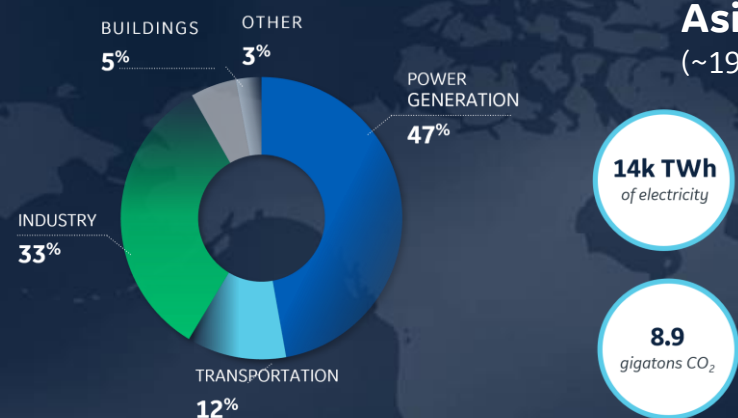
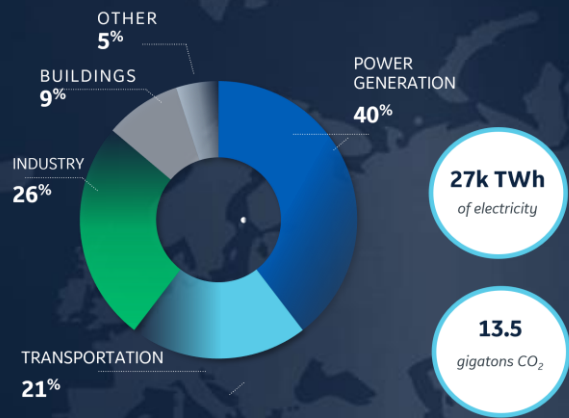
GE Gas Power CCS

13th March 2023

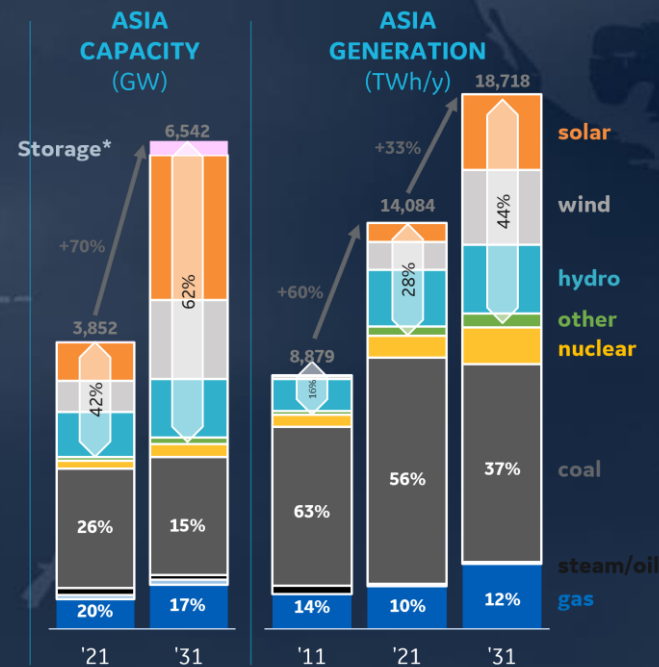
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Sustainability.. Transition to a lower carbon future



Global Capacity vs generation

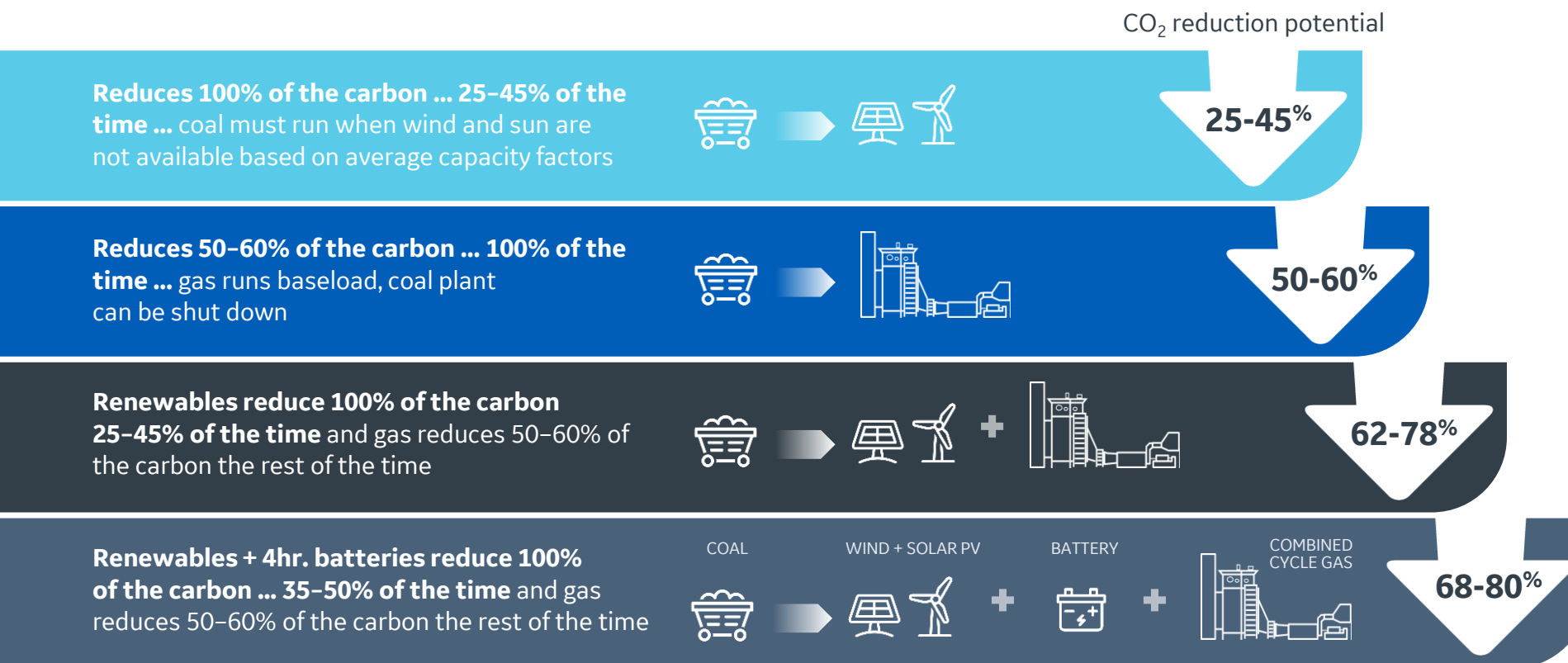


Asia Capacity vs generation

Renewables + Gas has greater carbon reduction together vs. alone



Potential for **reducing coal emissions** by using renewables + gas power



“Given the time it takes to deploy new renewables and to implement energy efficiency improvements, coal-to-gas switching represents a potential quick win for emissions reductions.”

*International Energy Agency,
2019 World Energy Outlook*

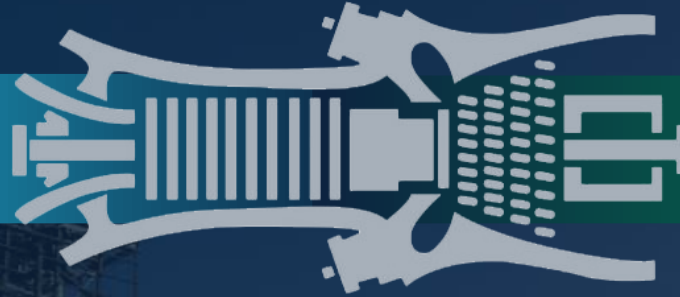
Multiple ways to decarbonize* existing and future gas power plants



PRE-COMBUSTION

Use a near zero or carbon neutral fuel

- Hydrogen (blue, green, pink)
- Synthetic (renewable) methane
- Ammonia (NH_3)
- Biofuels



POST-COMBUSTION

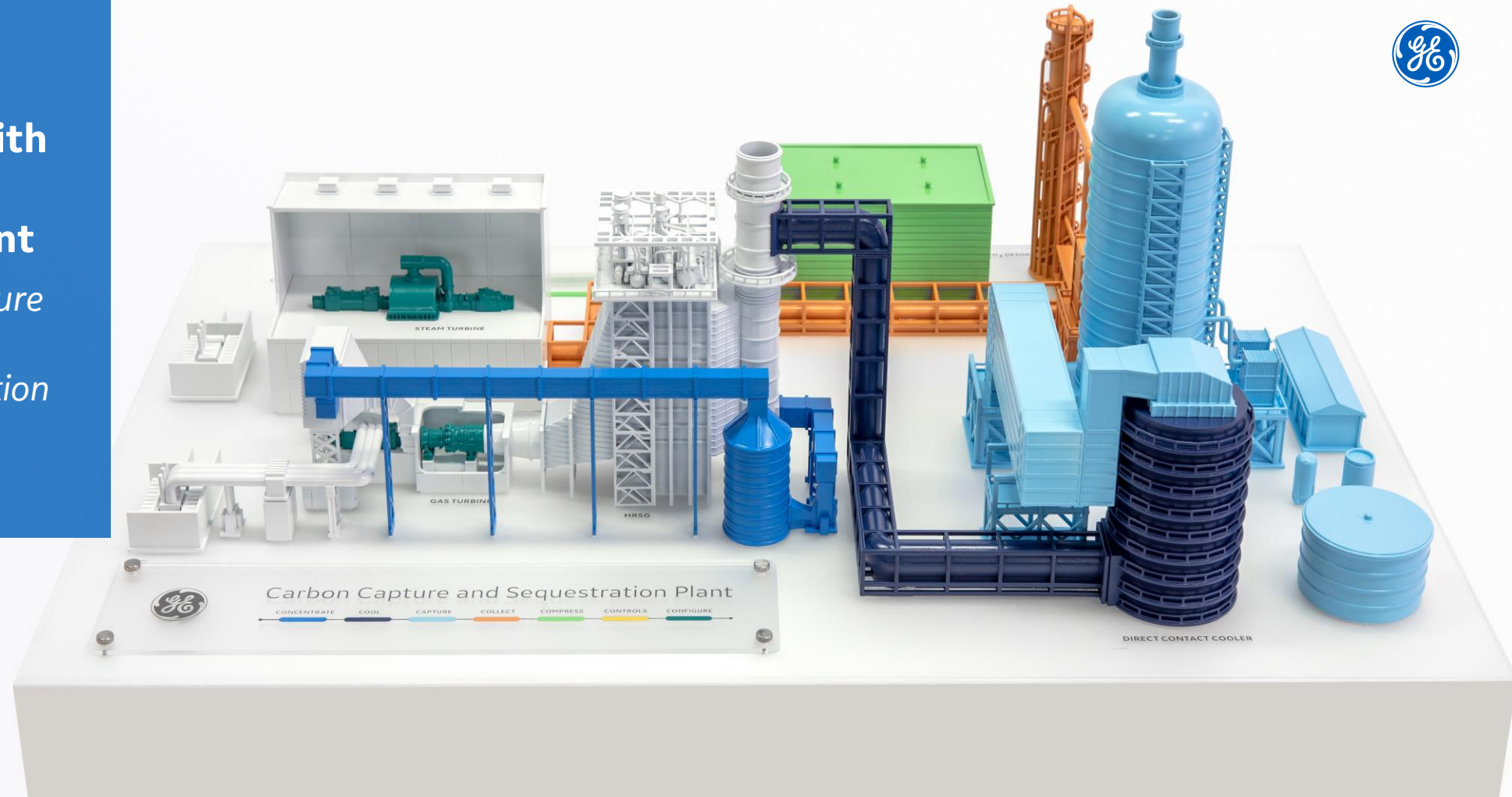
Remove carbon from the plant exhaust

- Carbon capture (liquid solvents)
- Carbon capture (solid sorbent) - GRC

*Decarbonization as used herein is intended to mean the reduction of carbon emissions on a kilogram per megawatt hour basis.

Natural Gas Combined Cycle plant configured with post-combustion carbon capture plant

Integrated solvent capture system design enables thermal cycle optimization and plant flexibility.



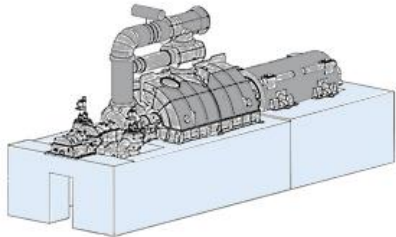
- GE Gas Power plans to **complete FEED study to integrate a 95% CCS commercial solution** into an existing F-Class NG CC site. GE anticipates that their commercial solution will provide advanced operability for a NGCC/CCS site, with a high-level of system integration that achieves lower cost and high efficiency and is scalable to other commercial sites.
- BP award for CCS FEED Study ... Technip Energies and GE Gas Power Awarded FEED Study for Teesside Power, Carbon Capture and Compression Project in the UK

GE's Carbon Capture Product Offerings

Decarbonize* at lowest overall cost while maintaining availability and reliability



Steam Integration



- ✓ Leveraging steam produced in HRSG results in lower capital costs
- ✓ HRSG can provide reliable steam for the capture plant
- ✓ GE fine tunes steam path and steam turbine controls to reduce-costs

– Capex
+ Efficiency

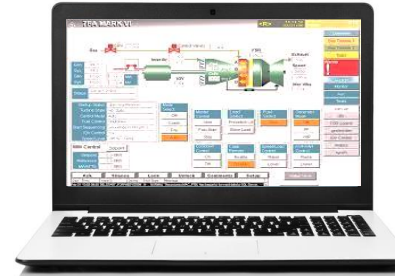
Enhanced CO₂ Intensity



- ✓ Leveraging GE's GT combustions' capabilities to increase CO₂ levels
- ✓ Increased CO₂ concentration helps reduce size of capture plant
- ✓ GE manages the risk of elevating the CO₂ in our GTs

– Capex
– Risk Exposure

Advanced Controls



- ✓ Extending predictive model-based controls into the CCUS plant
- ✓ Advanced simulation of integrated NGCC & CCUS improves commissioning time and training
- ✓ GE can manage the risk of GT & ST operability as well as CCUS (e.g. Grid, response, fast ramp, etc.)

+ Reliability

Improve Value



- ✓ Leveraging proven GT modifications to improve functionality
- ✓ Recover MW to compensate for CCUS operation
- ✓ Potential increase in GT operability (e.g. grid response, fast ramp, etc.)

+ Reliability + Output
+ Operability + Efficiency

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U.S. Department of Energy Awards CCS FEED Study to GE-Led Team



Study will serve as a template for lowering carbon emissions for 1,500 7F gas turbines worldwide

**SOUTHERN COMPANY,
LINDE, BASF, KIEWIT**

+

**GE'S INTEGRATION
TECHNOLOGY**

will maintain NGCC operability
and flexibility for better synthesis
with future renewable-led grid

=

95%

CARBON CAPTURE



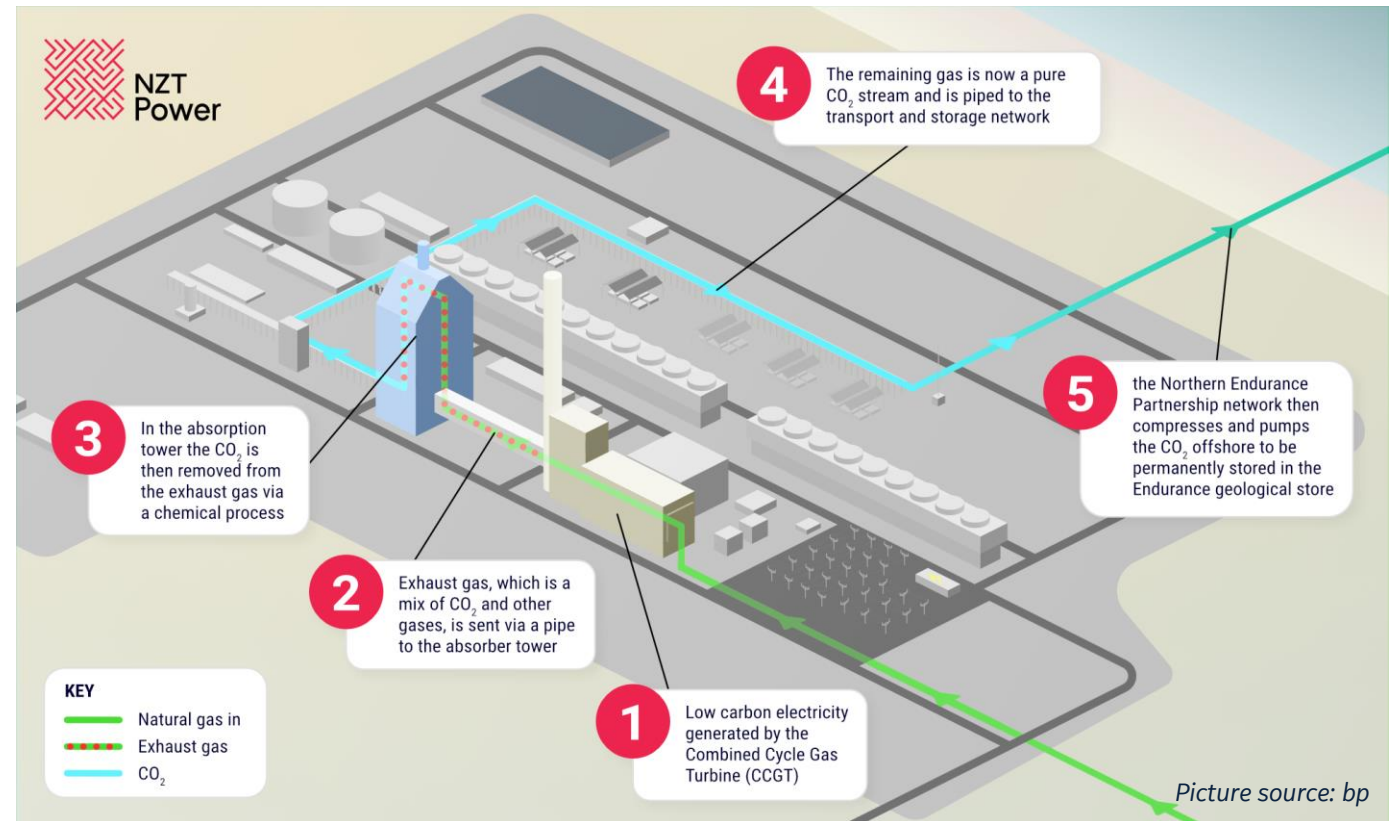
Front-End Engineering Design (FEED) study with advanced technology and control concepts to integrate Southern Company subsidiary Alabama Power's James M. Barry Electric 2x1 7F combined cycle power plant with Linde's Gen 2 carbon capture solution based on BASF's OASE® blue gas treatment technology

bp Award for CCS FEED Study

Technip Energies and GE Gas Power Awarded FEED Study for UK's Teesside Power Carbon Capture Project



- Technip Energies and GE Gas Power will develop a front-end engineering design (FEED) study for a 'first of a kind' carbon capture solution to integrate with a proposed H-Class natural gas fired power plant
- GE Gas Power will provide expertise in combined cycle plant engineering, operability, and plant integration while Technip Energies will focus on carbon capture and compression plant using Shell's Cansolv carbon capture technology.



Source: <https://www.ge.com/news/press-releases/technip-energies-and-ge-gas-power-awarded-feed-study-for-teesside-power-carbon>

Carbon Capture has a role to play in achieving deep decarbonization*

GE is committed to leading a global decade of action in the energy transition



Industry leadership + breadth

- **125+ years** in the power industry innovation
- **~1/3 of the world's electricity is produced by GE equipment**
- **~50% of the world's installed base of gas power**
- **90+ countries with GE Gas Power presence**

Technology leadership

- **Two Guinness World Records** for power plant efficiency
- **1st industrial gas turbine for power generation**
- **70+ years** of combined cycle design experience
- **1st F-class and H-class gas turbines**
- **100+ Combined Heat and Power (CHP) projects**

Strong global relationships

- **Carbon Capture:** CARBONCO / Linde/BASF, Technip/Shell
- **EPC:** DL E&C + CARBONCO, Kiewit, Technip, Balfour Beatty
- **Research:** US Department of Energy (DOE), Southern Company
- **Regional CO₂ transportation and storage partners with decades of CO₂ experience**

GE can help

- **Improved capture economics through:**
 - Thermal integration
 - Controls integration and operability
 - Hardware integration
 - Strategic upgrades
- **Regulatory support and engagement**
- **Phased approach allows customers to pace their decarbonization journey**

GE's global references

- **8 active CCUS feasibility studies** in Europe and North America
- **Teesside, UK: 2021 award, industrial cluster FEED study**
- **DOE Study: 2021 award, Retrofittable Advanced Combined Cycle Integration for Flexible Decarbonized Generation**

GE is a proven technology integrator ready to support your decarbonization journey.



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