katoni ENGINEERING

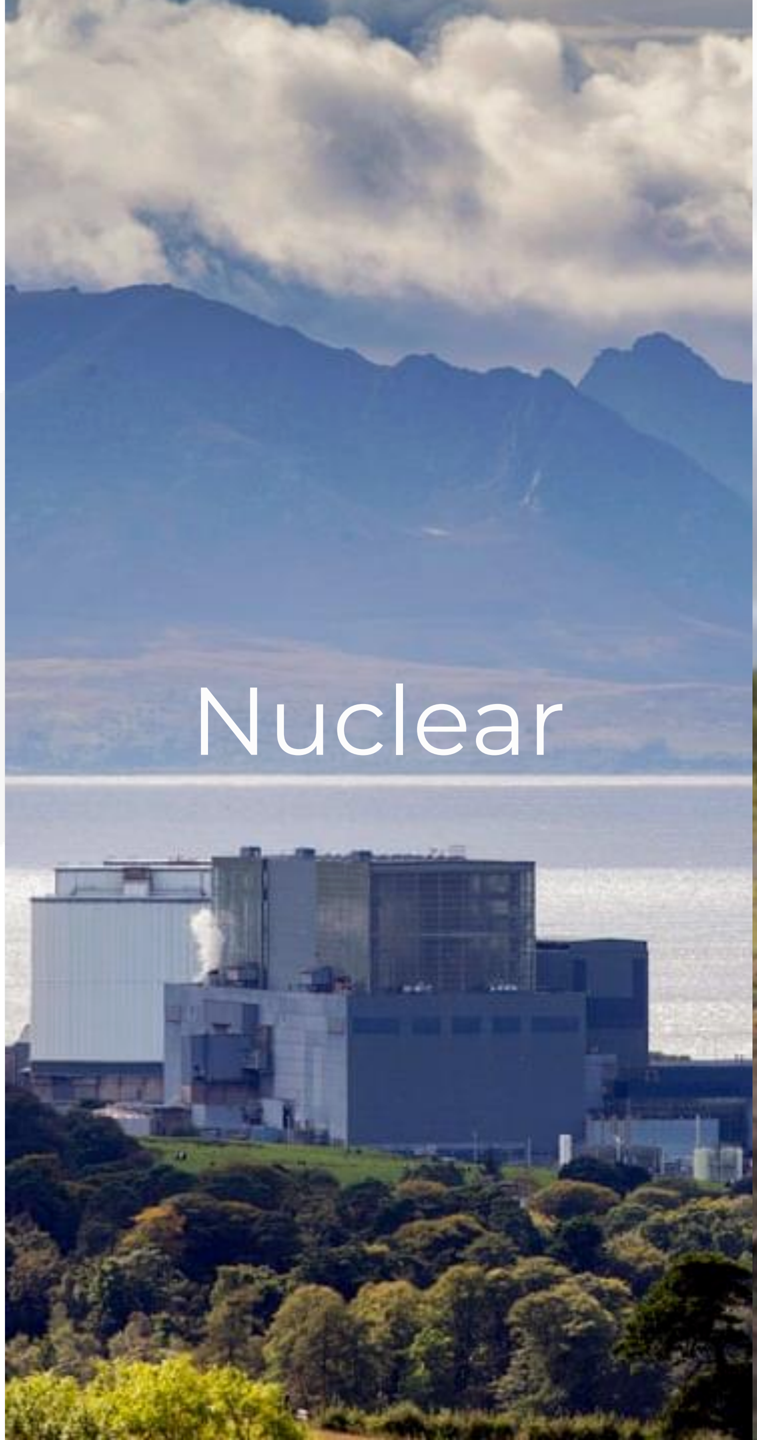
Safer | Greener | More efficient.

Temporary Power Generation, Cutting Costs, Carbon, and Future OPEX.

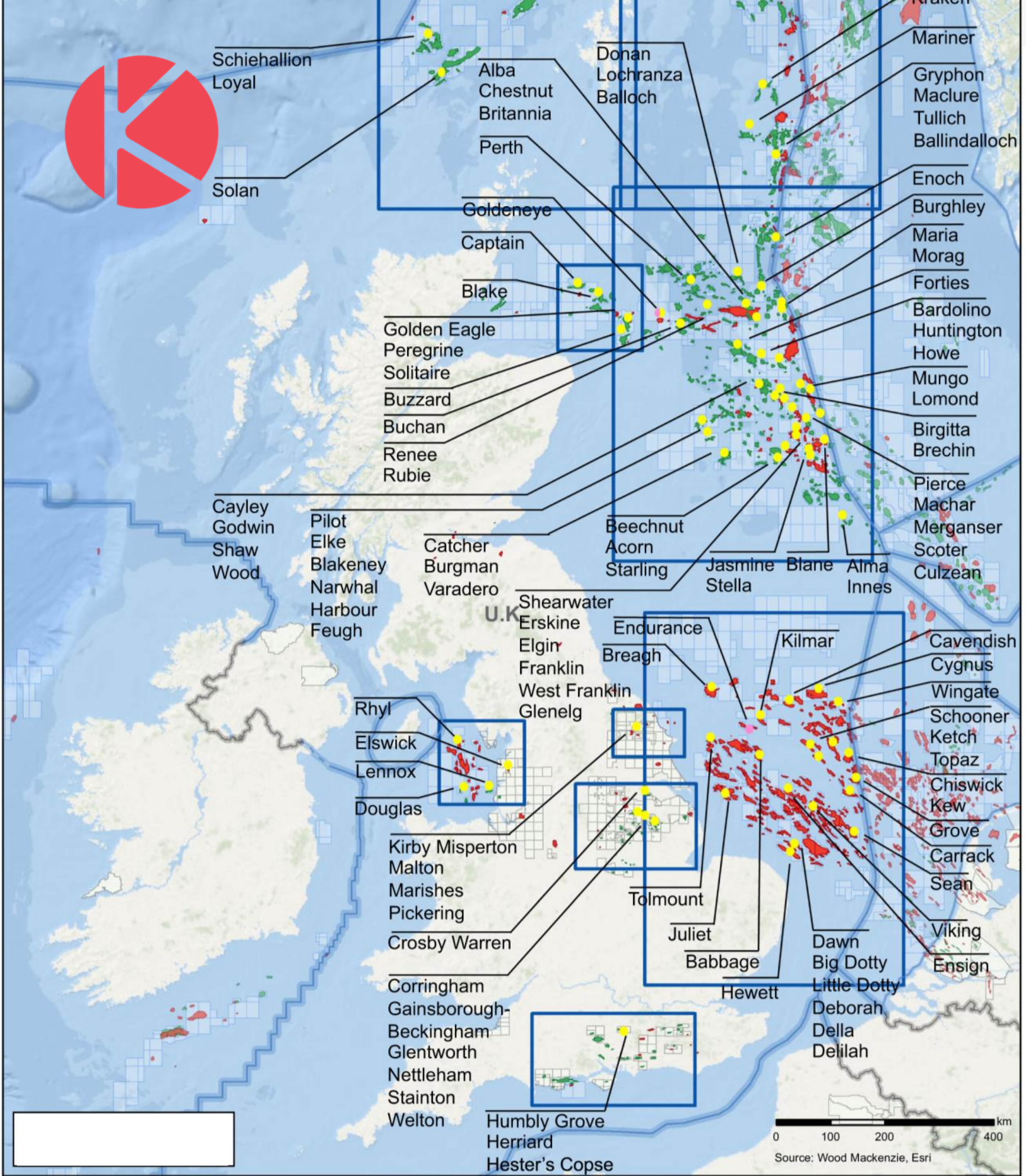
Fraser Kerr –Topsides UK
2024

Introduction to
Power Generation

Power Generation
in the UKCS



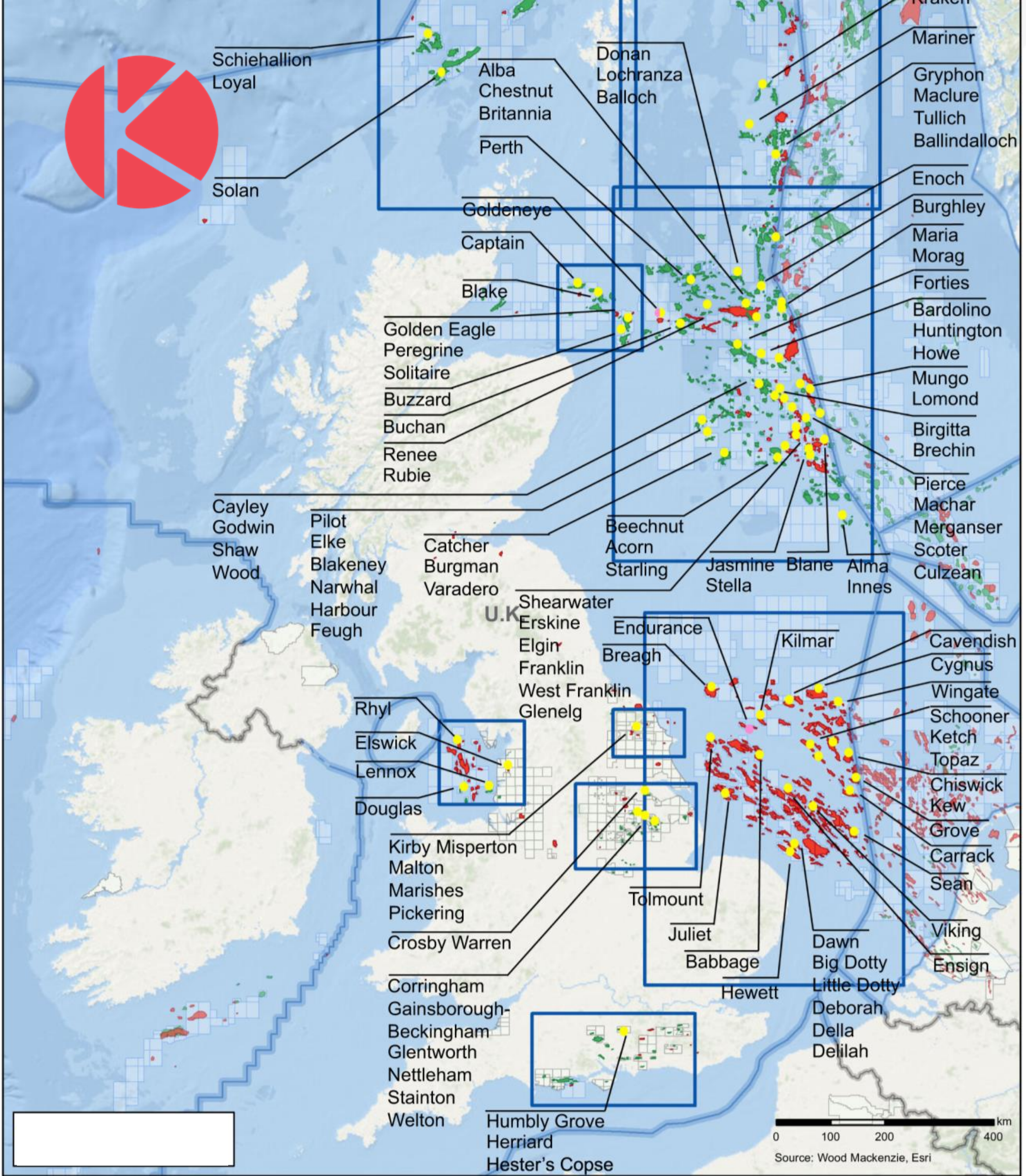
Power Generation
in the UKCS



The Key Role of the UKCS

It is a significant contributor to the UK's energy mix.

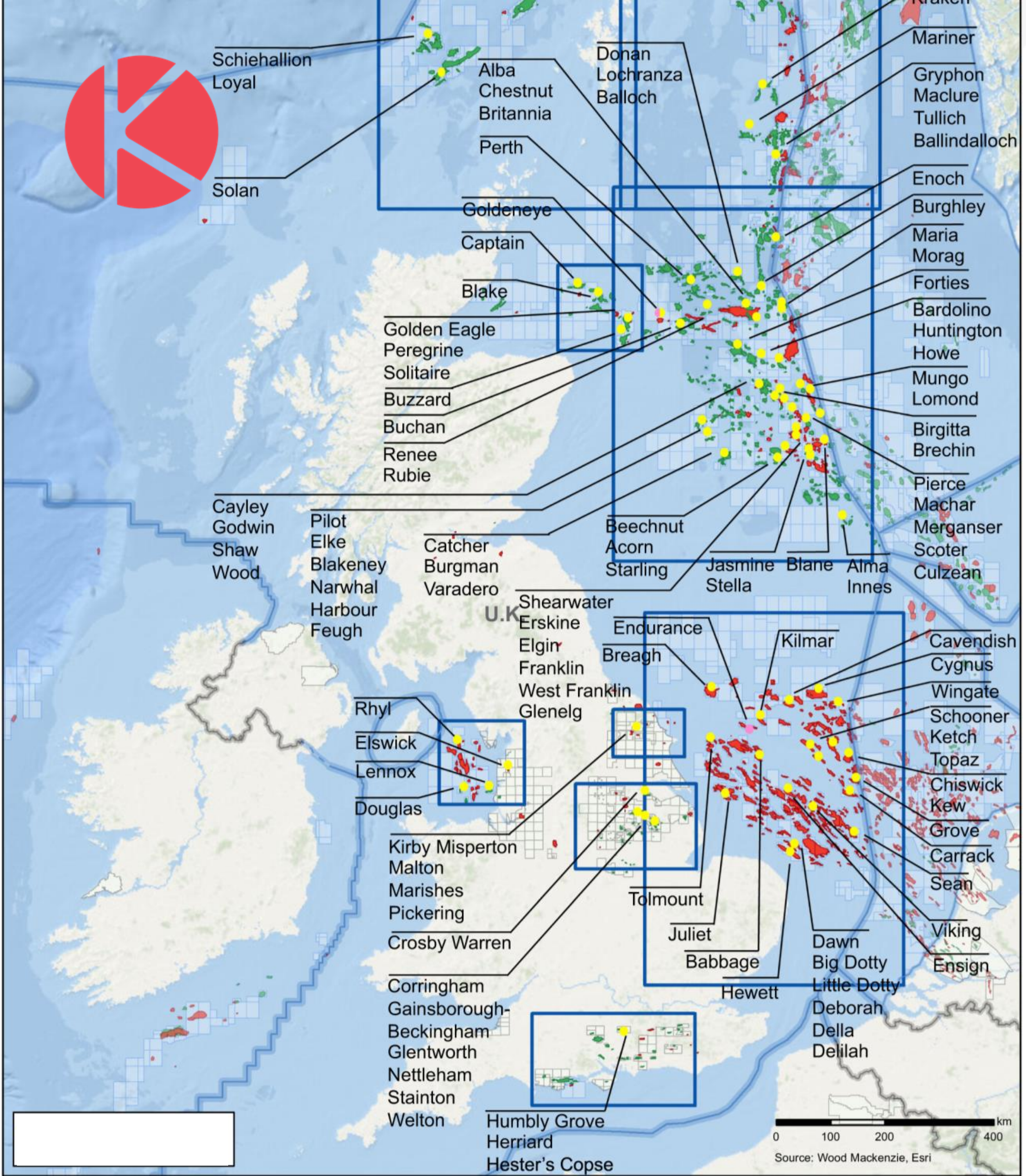
It has historically provided oil and gas production, with a growing capacity for renewable energy.



Challenges

Ageing infrastructure with declining oil & gas production

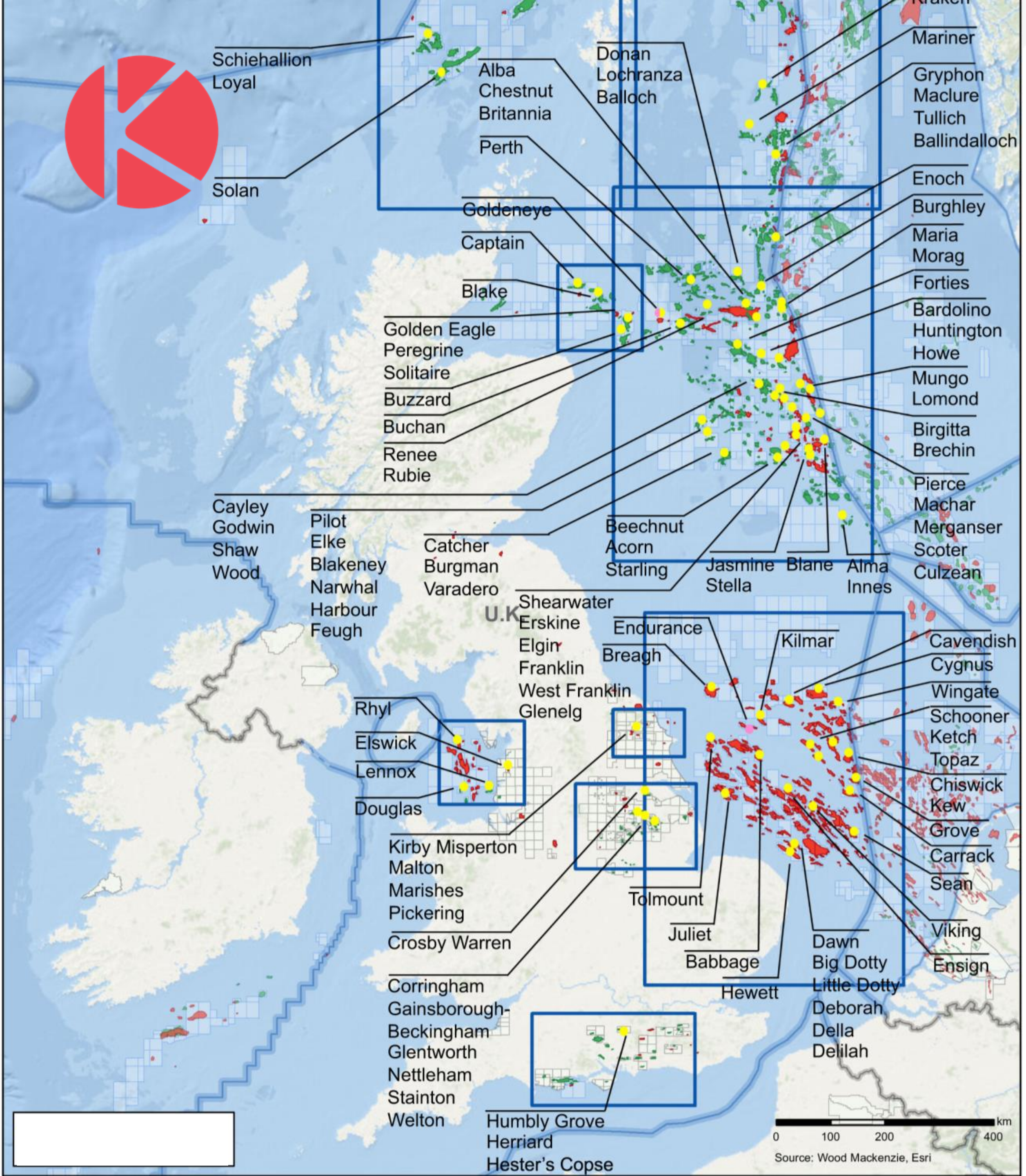
Rising operational costs, especially for maintaining legacy systems.



Transition to Renewables

Increasing integration of offshore wind and other renewable sources.

Government targets for carbon neutrality (Net Zero 2050).

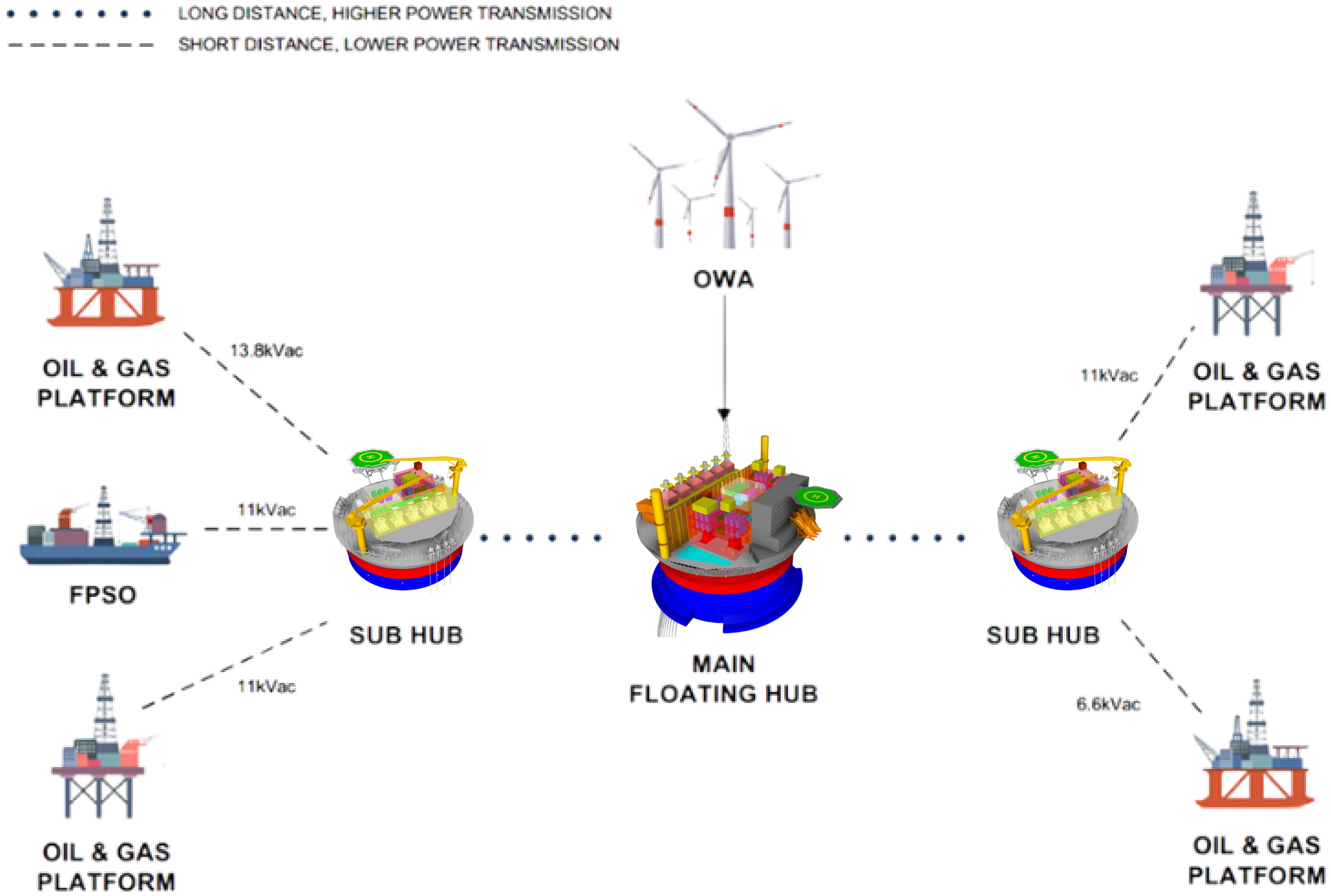


Environmental & Regulatory Pressures

Stricter emissions regulations (UK Emissions Trading Scheme).

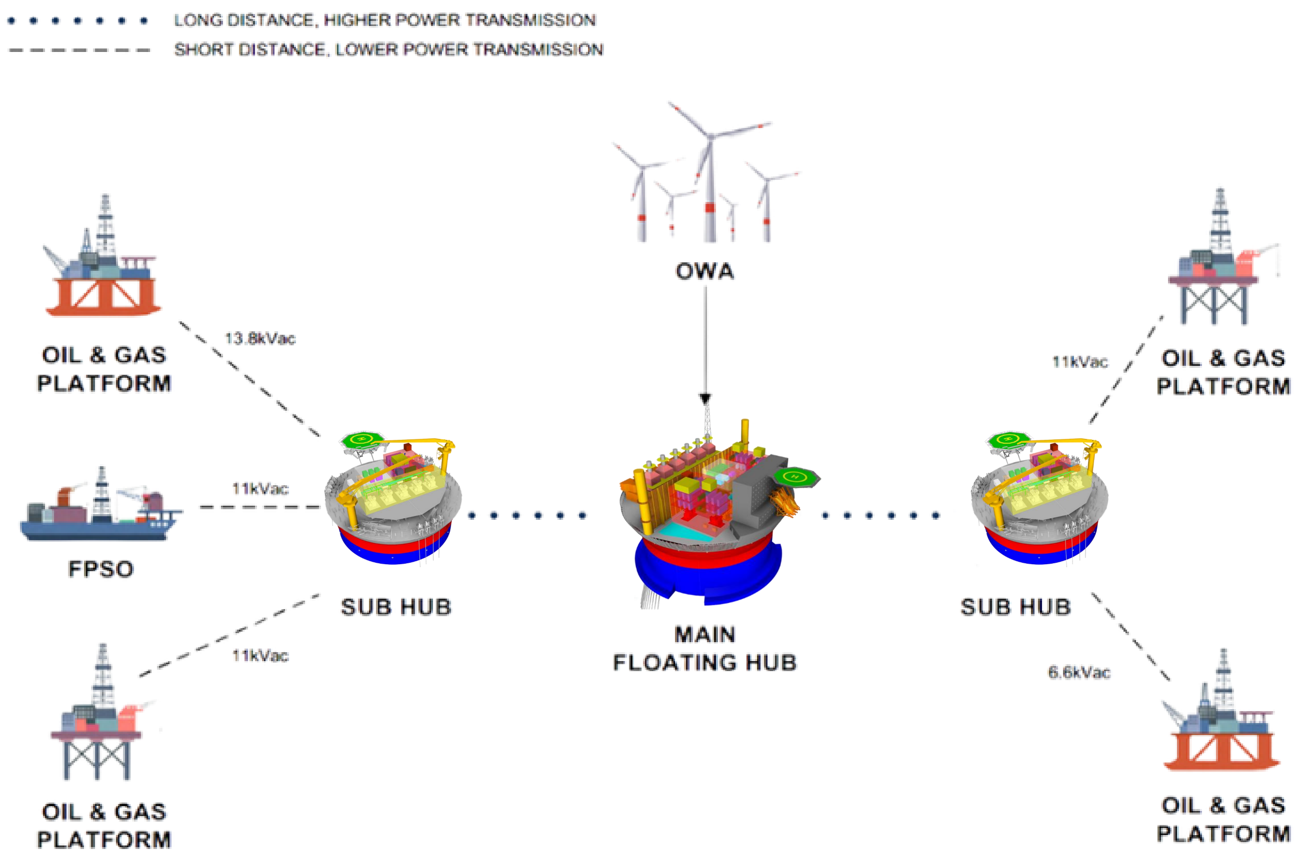
Incentives for reducing carbon emissions and improving efficiency.

Large Scale Infrastructure: Katoni Concept

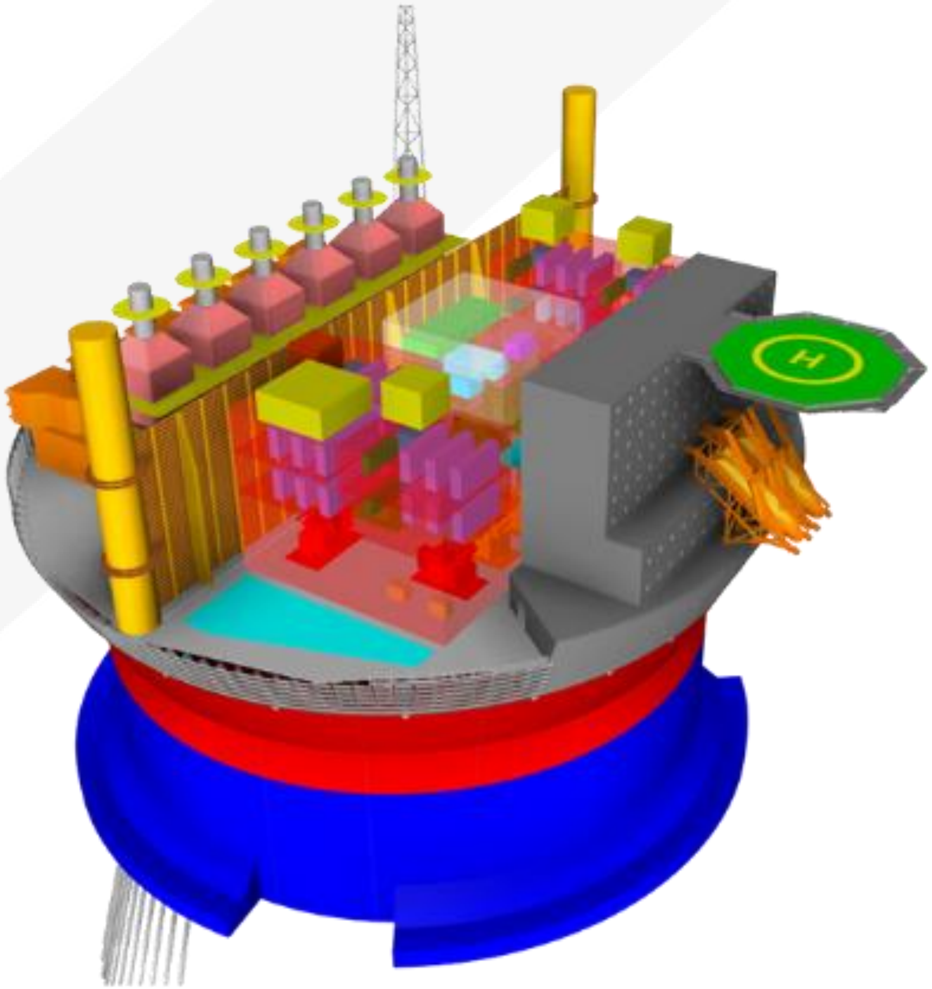


Large Scale Infrastructure:
Katoni Concept

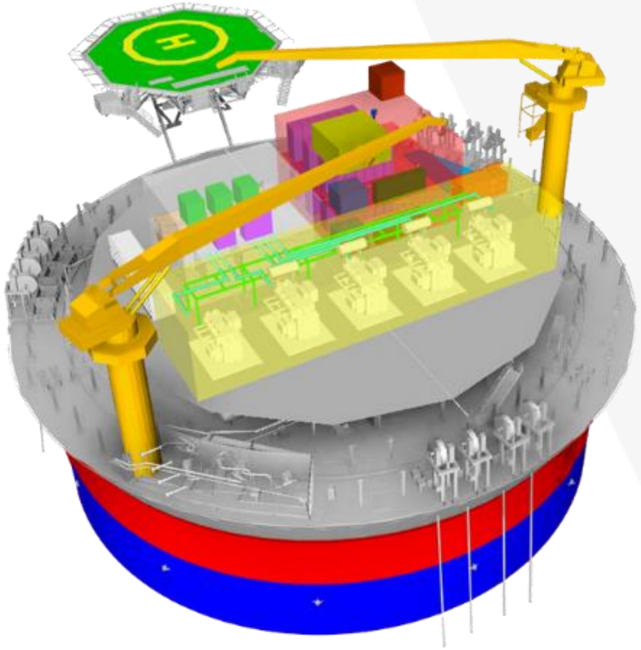
Developing designs of:
- Full electrical distribution networks
- Full 3D conceptual layouts for greenfield equipment
- Innovative mathematical techniques to optimise solutions
- To detailed data validation and analysis
- To platform evaluation and consequences of electrification



Main Hub & Sub Hub Designs

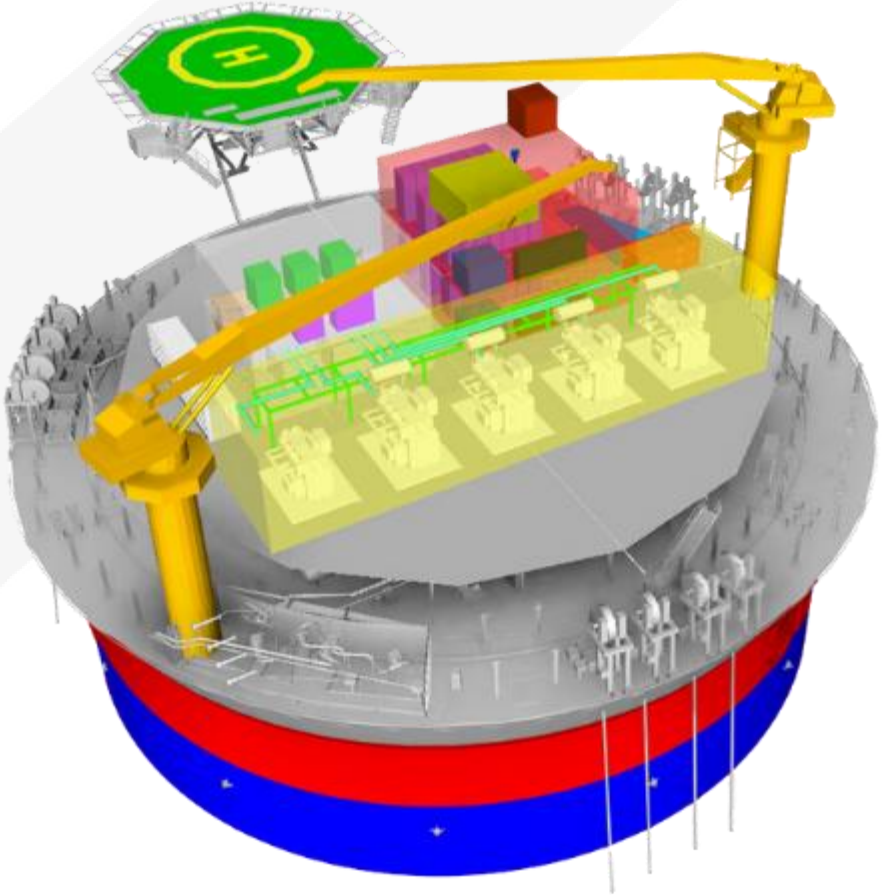


Main Floating Hub

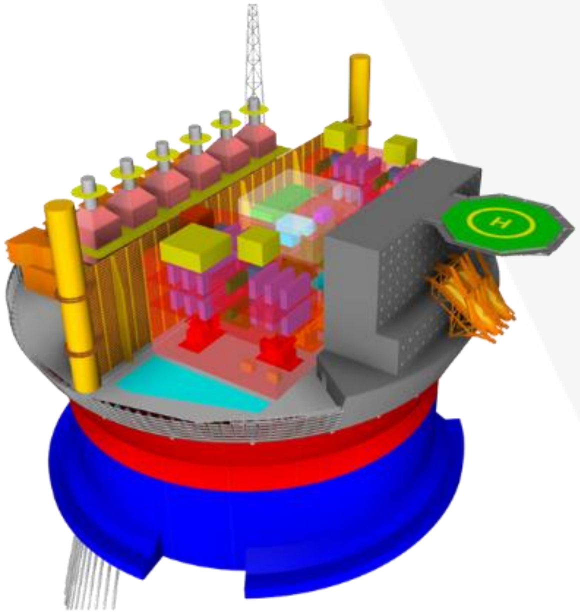


Sub Hub

Main Hub & Sub Hub Designs

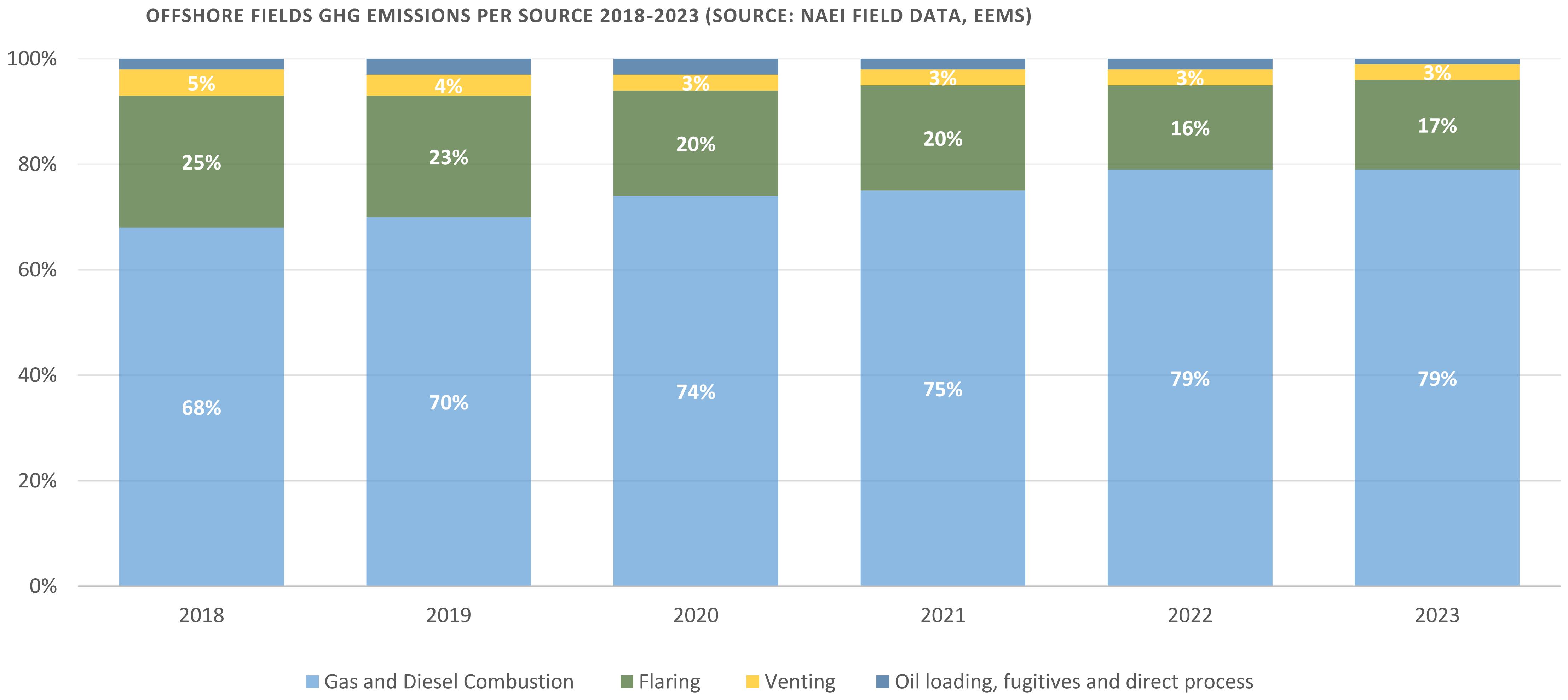


Sub Hub



Main Floating Hub

Power Generation in the UKCS – Emissions



*NSTA 2024 Emissions Monitoring Report

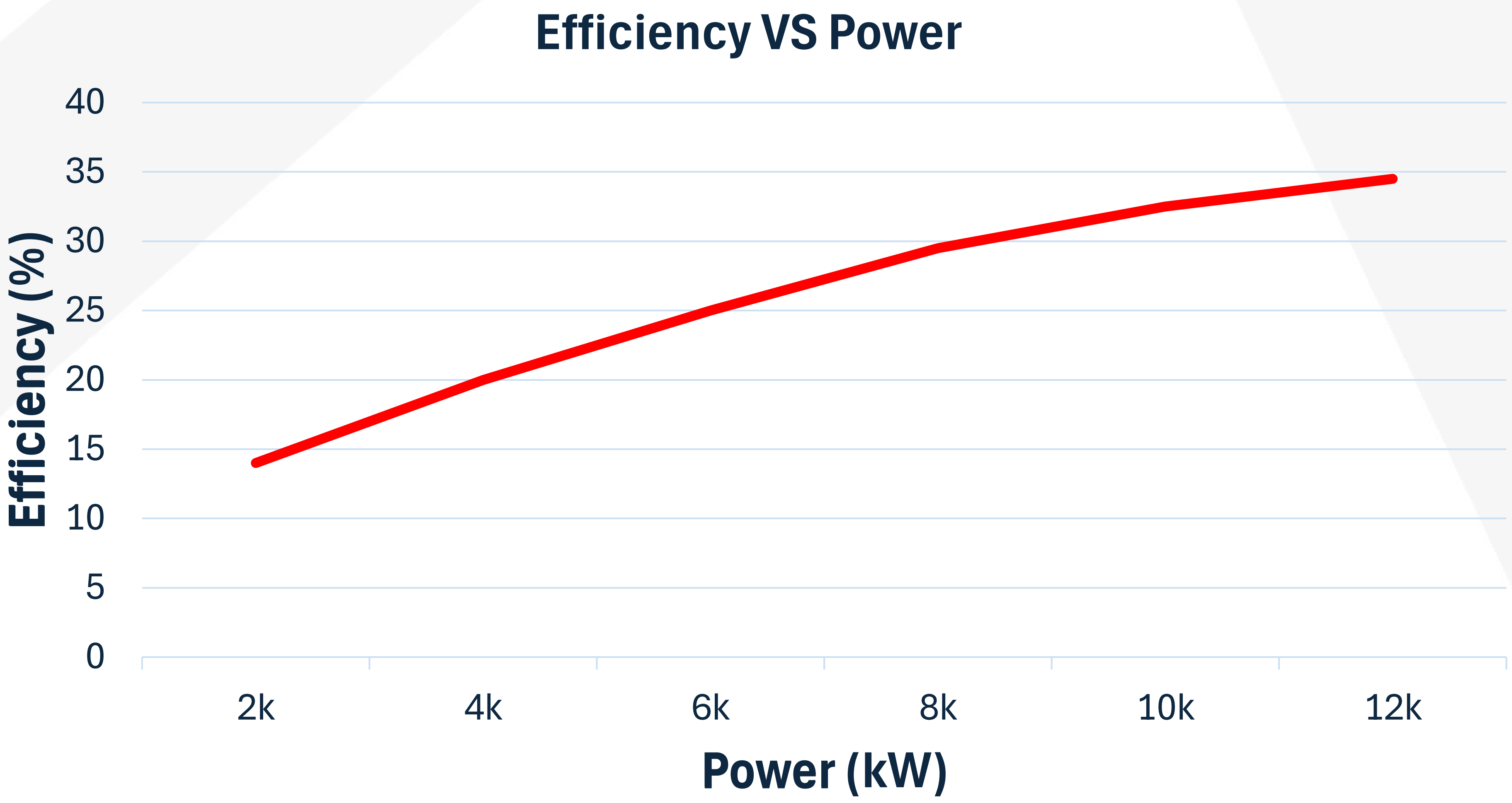
Power Generation
Hurdles/Blockers

Where do we **focus?**

Efficiency Basics

Efficiency	Efficiency in turbine generators measures how effectively fuel energy is converted into usable electrical power. Higher efficiency means less fuel is needed for the same output, reducing costs and emissions.
Power Demand	Power demand represents the amount of electricity required by the system or equipment at any given time. As demand rises, turbines must generate more power, which may affect their efficiency

Efficiency Basics

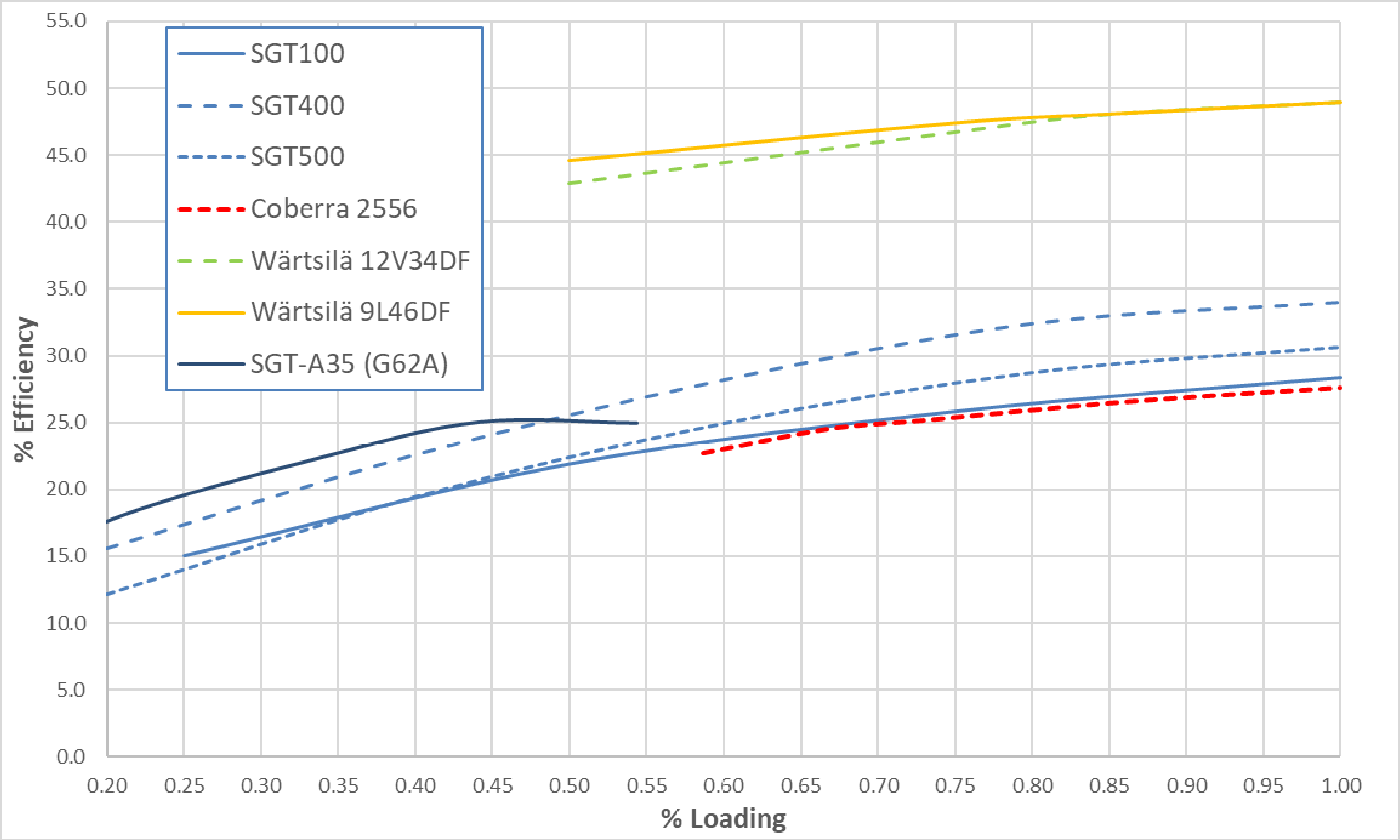


Efficiency Basics

A B
C D

Type

Fuel

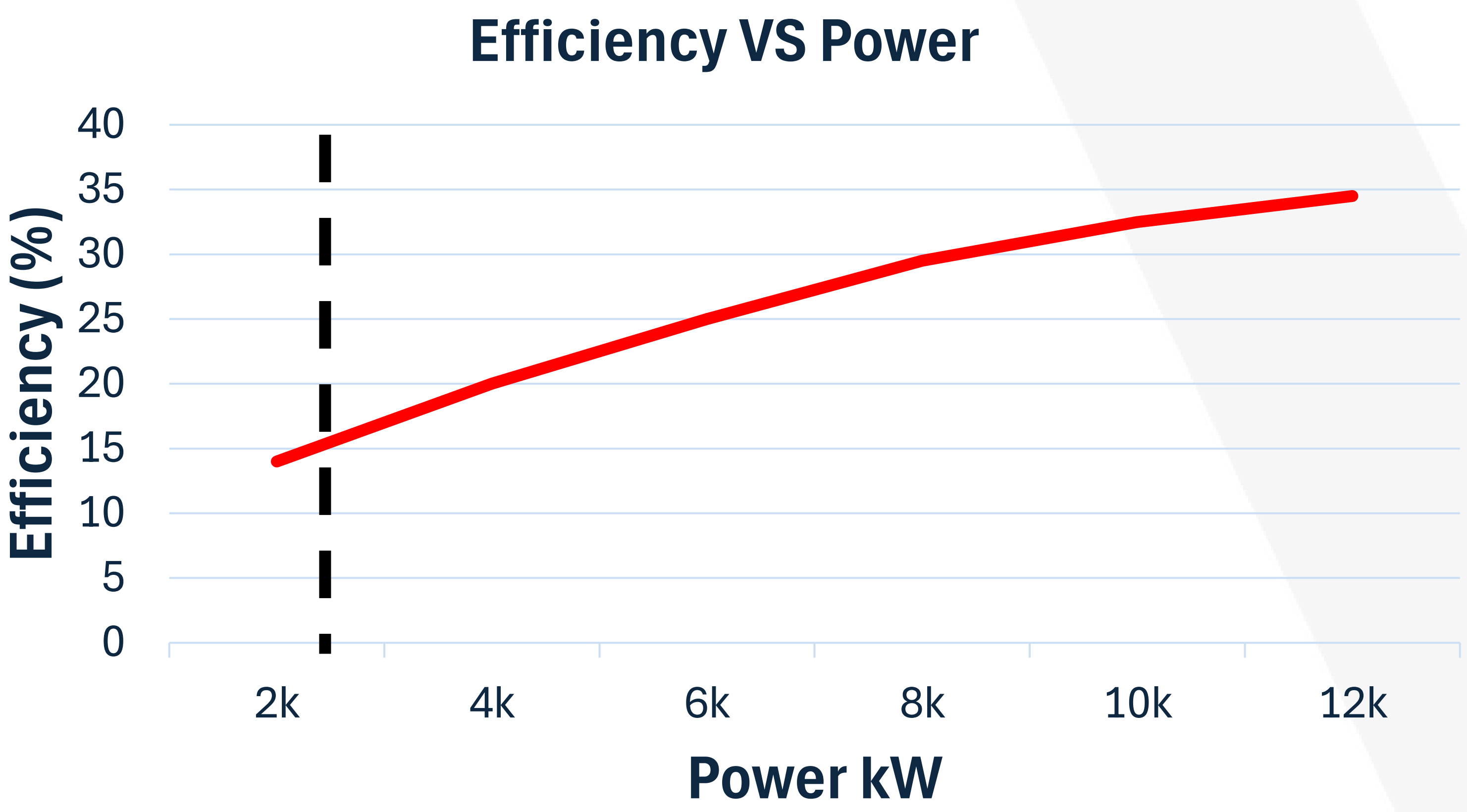


Efficiency Basics

Type

Fuel

Power Requirements



Bruce Case Study – Understanding the Problem

Project Goal: Reduce emissions and save costs during TAR (Turnaround) periods.
Challenge: Gas turbine generators are inefficient at reduced loads when using liquid fuel.
Traditional Practice: Gas turbines inefficiently operate on liquid fuel during TAR when fuel gas isn't available.
Proposed Solution: Use diesel engine generators, which are more efficient in fuel use and emissions for the TAR load profile.

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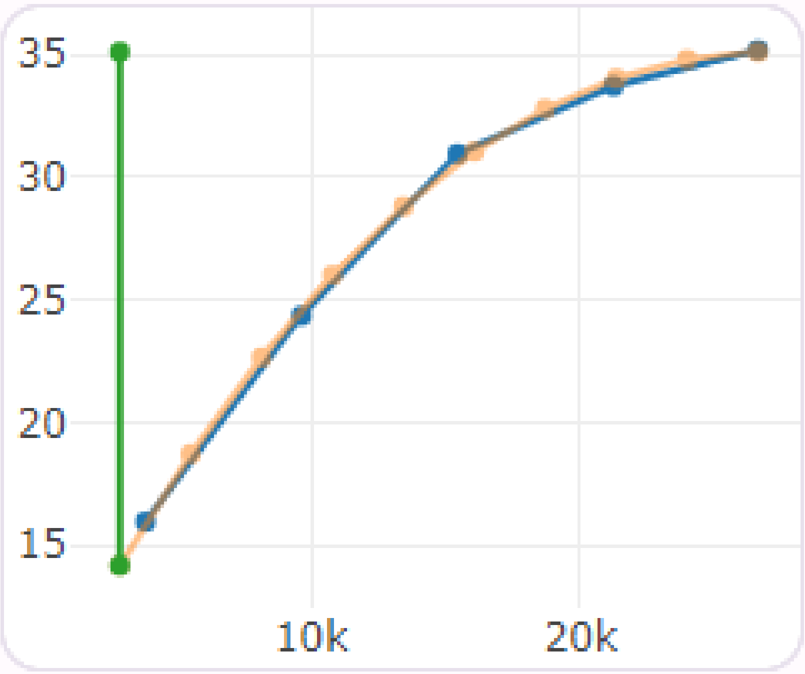
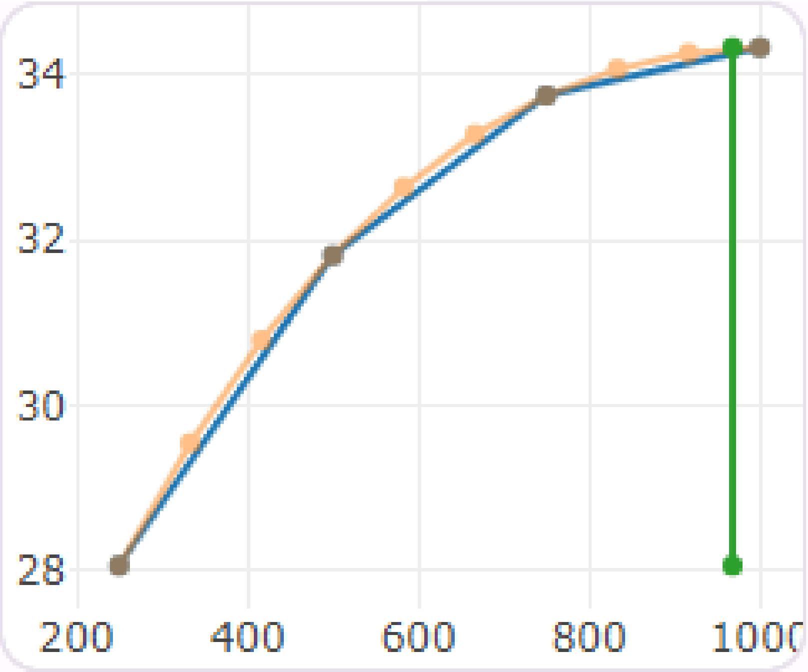
Bruce Case Study – Estimation of Benefits

2.9MW TAR load



Efficiency vs Loading (kW) for 29.4 MW GTG on Liquid

VS



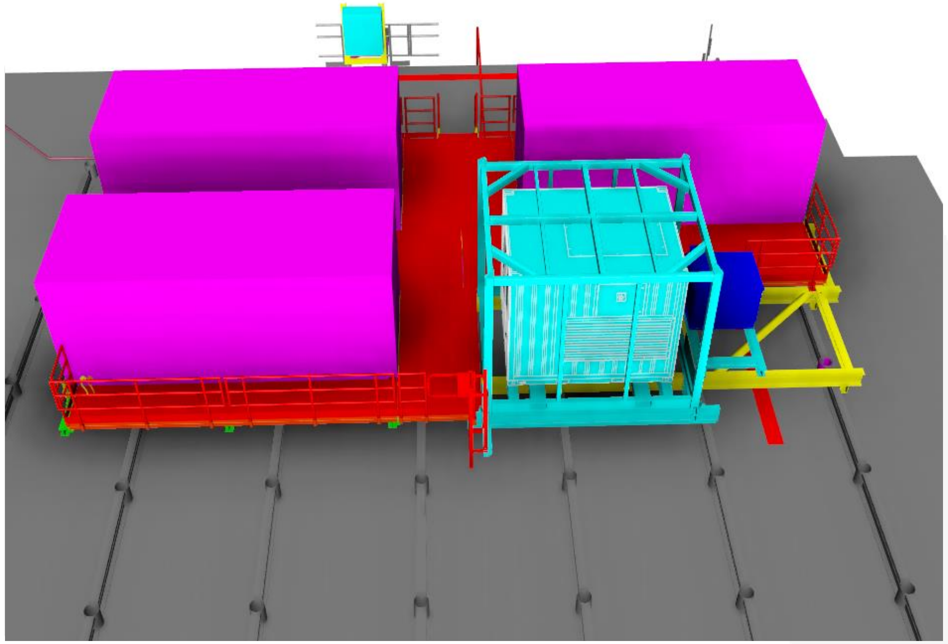
Efficiency vs Loading (kW) for single Diesel Temp Generator

Increasing Efficiency from ~14% for the GTG to 34% for the temporary generators

Bruce Case Study – Developing the Solution

Katoni provided a full suite of multi-discipline delivery of the Temporary Generation project from FEED through to the execute phase including the following discipline activities:

- **Electrical:** specification of generator package, switchgear and protection modifications, TAR load list, specification of CMS, ESD and Fire and Gas modifications.
- **Power systems:** ETAP modelling including load flow, short circuit, motor starting, protection coordination.
- **Structural:** design and specification of support grillage for generator package, lifting considerations and access walkway design.
- **Piping:** diesel supply manifold and drains hose design and specification.
- **Process:** Fuel package and level instrumentation specification, HAZOP.
- **Technical Safety:** design safety screening, HSE impact assessment study, HAZID, PUWER assessment.
- **Construction:** offshore project execution plan and vendor management.



Bruce Case Study – Developing the Solution

Emissions Reduction: 5,500 tonnes of CO_2 avoided

Diesel Savings: 2,000 m^3 saved during the 50-day TAR

Costs:

Diesel Fuel Savings: £1.6 million
Carbon costs Avoided: £270,000

The project engineering, procurement/hire and constructions were £1.6 million this included permanent brownfield modifications for future hook ups

Bruce Case Study – Developing the Solution

Repeatability & Long-Term Value: Initial setup enables more savings in future TARs.

Refinements in Efficiency: Exploring cooling and constructability improvements.

Alternative Fuels: Evaluating potential for HVO for lower emissions

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Thank You