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Temporary Generation for North Sea Oil & Gas

Aggreko & Katoni Engineering

Foreword: Aggreko & Katoni Engineering

As the North Sea oil and gas sector enters a defining phase of offshore decommissioning, operators face mounting pressure on emissions, equipment availability, and operational integrity. In this evolving landscape, reliable, compliant, and low-emission temporary power is no longer optional — it's a critical path item.

At Aggreko and Katoni Engineering, we've witnessed firsthand how early engagement, technical foresight, and strong partnerships can unlock safer, cleaner, and more cost-effective outcomes. This white paper brings together our joint insights into the evolving demands of offshore decommissioning, the realities of generator availability, and the practical steps needed to maintain operational continuity while responsibly winding down assets.

We hope this paper serves not only as a technical reference, but also as a catalyst for broader industry collaboration — encouraging operators, regulators, and suppliers to work together in shaping a more sustainable and resilient offshore energy future.

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Executive Summary

This white paper summarises the key challenges facing the sector and how operators can respond.

- **The current and future demands for temporary generation in offshore decommissioning**
- **The regulatory and operational challenges associated with evolving generator emissions standards**
- **The practical trade-offs between legacy Stage I–III and newer Stage V diesel generators**
- **A real-world case study from a recent North Sea Turnaround (TAR)**
- **Forward-looking recommendations for project planning and supply chain resilience**

By leveraging Aggreko's leading generator fleet and logistics capabilities, alongside Katoni's proven engineering integration expertise, offshore operators can meet the technical and environmental demands of decommissioning head-on.

Industry Context: A Surge in Decommissioning

The UK Continental Shelf (UKCS) is entering a period of intense decommissioning activity. According to the Offshore Energies UK (OEUK) 2024 Decommissioning Report, between 4 and 20 topsides facilities will be decommissioned annually through 2032. More than 2,000 wells are forecast for abandonment by 2034.

Decommissioning scopes increasingly rely on temporary diesel generation to power:
- Life support systems in hotel mode
- Plug and Abandonment (P&A) campaigns
- Drilling and well intervention loads
- Drain, flush, purge and cleaning systems
- Topsides removal preparations

As fuel gas becomes unavailable post Cessation of Production (CoP), the need for containerised, compliant diesel generators is expected to peak by 2030, **precisely when** availability will be most constrained.

Emissions Standards & Compliance Challenges

The transition from legacy Stage I-III diesel generators to Stage V-compliant equipment is reshaping offshore generation strategy.

Regulatory Context:

• MCPD Compliance: While non-road diesel engines are regulated under the EU Medium Combustion Plant Directive (MCPD), offshore platforms remain exempt under Article 2(3)(h).

• Stage V Enforcement: For new equipment, Stage V standards apply across Europe, requiring particulate filters and NOx-reduction systems such as Selective Catalytic Reduction (SCR) and AdBlue injection.

Operational Implications:

• Stage V units require AdBlue (Diesel Exhaust Fluid - DEF) at approximately 10% of diesel volume

• Load profile constraints: Minimum operating loads (~30%) must be maintained to prevent Diesel Particulate Filter (DPF) clogging

• Space and handling: Additional deck area, tankage, and bunkering procedures are required

Offshore deployment of Stage V units remains challenging due to footprint constraints, safety system integration, and logistics.

European Emission Standards (Stage I to Stage V)

The European Union has progressively tightened its emission standards for non-road mobile machinery (NRMM), including diesel generator sets. These standards are grouped into “Stages”, starting with Stage I in 1999 and reaching Stage V, finalised in 2016 and enforced from 2019 onwards for high-power generators.

Each stage introduces stricter limits for the main pollutants:

- CO (Carbon Monoxide)
- HC (Hydrocarbons)
- NOx (Nitrogen Oxides)
- PM (Particulate Matter)
- PN (Particle Number – for certain power bands)

For generators above 560 kW (Category NRG), Stage V imposes the following maximum emission levels:

Category	Ign.	Net Power	Date	CO	HC	NOx	PM	PN
		kW		g/kWh				1/kWh
NRG-v/c-1	all	P>560	2019	3,50	0,19	0,67	0,035	-

Table 1 - Stage V emission standards for generator set engines above 560 kW (NRG) [1]

These limits require advanced emission control technologies such as particulate filters and urea injection systems (DEF/AdBlue), especially in large generator sets. While highly effective at reducing pollutants, these systems also introduce new operational requirements — including stricter load thresholds and the need for consumables and regular maintenance.

While Stage V engines represent a leap forward in emissions compliance, their offshore deployment is not without challenges. These are addressed in the next section.

Generator Types and Trade-Offs

Although legacy Stage I–III engines can no longer be produced or imported for UK onshore use due to Medium Combustion Plant regulations, they remain permitted offshore under current exemptions. However, with parts availability declining and fleets ageing, Stage V generators are becoming the default - bringing both emissions benefits and new operational considerations. The key differences between legacy Stage I-III and Stage V generators are detailed in Table 2

Feature	Stage I,II, III Generators	Stage V Generator
Emissions Compliance	Legacy units, higher NOx/PM	Full MCPD compliance with lower emissions
Fuel Requirement	Diesel only	Diesel + AdBlue (DEF)
Operating Load Flexibility	Wide tolerance across varying loads	Requires >30% load for optimal function
Maintenance & Reliability	Simple, robust, well-understood	More complex systems (DPF, SCR, sensors)
Container integration	Proven offshore containerised packages	Limited space for fire/gas systems
Offshore Suitability	Mature, NORSOK/Rigsafe-compliant packages	Few offshore-ready models currently available
Supply Chain Availability	Declining fleet, refurbishment underway	Expanding fleet, but immature for offshore use

Table 2 - Key differences between legacy and Stage V generators

Hybrid & Battery Solutions (BESS)

While diesel generation remains essential for offshore decommissioning, Battery Energy Storage Systems (BESS) are emerging as a valuable complement. Hybrid strategies combining generators with battery storage can reduce fuel consumption, lower emissions, and improve operational flexibility.

Key benefits of BESS in offshore applications include:

- Load smoothing and reduced generator runtime during variable loads
- Fuel and emissions savings – especially under UK ETS
- Noise reduction for sensitive operations
- Fast deployment – containerised and modular
- Potential for silent night-time or standby operation

Katoni & Aggreko Hybrid Capability

Drawing on Katoni's proven expertise in offshore package integration — from fuel and power tie-ins to safety and structural compliance — and Aggreko's expanding fleet of containerised BESS and Stage V generators, hybrid systems can be deployed with minimal disruption to operations.

As offshore-certified battery technologies mature, these integrated solutions offer a practical pathway towards lower-carbon, regulation-ready decommissioning, while ensuring operational resilience during peak demand periods.

Battery Energy Storage Systems - Solution of Aggreko

Case Study

Emissions and Cost Savings from Temporary Power Generation

Katoni Engineering specialises in solving the practical challenges of offshore temporary power - not just on paper, but in the field too.

Katoni has extensive experience providing the design and managing the installation of temporary diesel generation solutions for Turn Around (TAR), plug and abandonment and decommissioning. The generation package shown in the 3D model in Figure 1 below was specified by Katoni in a previous scope along with platform tie-ins (fuel demand and supply, electrical integration and safety systems) and grillage to provide the simplest and safest integration of the package.

DURATION
50 days

OBJECTIVE
Maintain life support systems and critical operations during TAR

CHALLENGE
Avoid running gas turbines on diesel at low load, which is inefficient and emissions-intensive

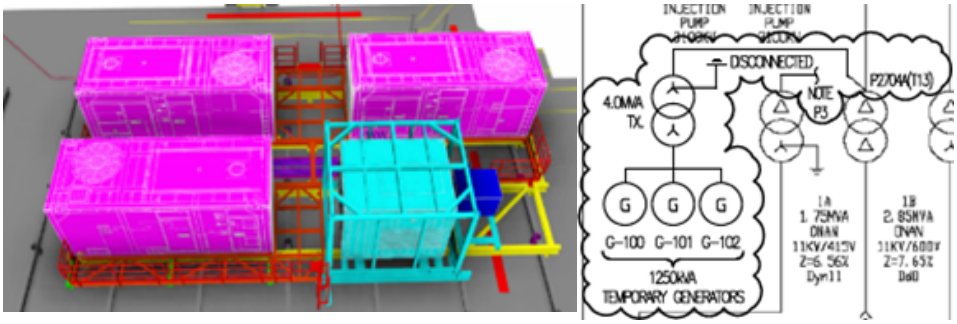

Figure 1 - Temporary Generation solution 3D model & SLD Tie-in Snapshot

Solution

Katoni engineered and integrated a temporary diesel generation package tailored to the platform's reduced TAR load profile ensuring the correct sizing prior to deployment. The system was designed to:

- Specification of diesel generation to meet reduced load profile for the TAR
- Package included tie-ins for fuel, power, and safety systems
- Generators operated at optimal load to maximise efficiency

Outcomes

- CO_2 Emissions Reduction: ~4.5 tonnes avoided
- Fuel Savings: ~£877,000
- CO_2 Tax Savings (UK ETS): ~£192,000

These results were achieved by avoiding inefficient operation of the platform's gas turbines and instead using right-sized temporary generators that matched the platform's reduced power demand during the TAR.

Future Outlook & Recommendations

As the UKCS approaches a peak in decommissioning activity, offshore operators must act now to:

- Secure access to compliant temporary generation equipment
- Develop platform-specific integration plans that consider space, load profiles, and safety standards
- Anticipate regulatory shifts and environmental cost exposure (e.g. ETS pricing)

What Aggreko Brings:

- One of the largest and most modern rental fleets in Europe
- Stage I-III and Stage V generators with robust maintenance support
- Modular containerised systems with logistics and bunkering expertise

What Katoni Brings:

- End-to-end engineering integration of temporary power systems
- Experience across electrical, structural, process, and safety disciplines
- Proven offshore delivery in TARs, P&A campaigns, and full decom scopes

Combined Advantage:

Aggreko and Katoni provide a seamless solution from fleet mobilisation to field integration, ensuring:

- Reduced risk in package deployment
- Improved emissions and cost outcomes
- Confidence in meeting both operational and regulatory targets

References
1. *Offshore Energies UK Offshore Decommissioning Report 2024*
2. *https://dieselnet.com/standards/eu/nonroad.php*
3. *https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L2193&from=EN*

Questions for the Industry

As offshore decommissioning accelerates and environmental regulations tighten, the industry must engage in smarter, earlier collaboration. These aren't just technical problems - they're planning, policy, and procurement challenges too.

Here are some of the questions we believe the sector should be asking now:

For operators:

- How early are you engaging supply chain partners to ensure generator availability and compliance?
- Could cross-operator collaboration reduce the logistical and financial burden of temporary power deployment - particularly for bunkering and staging?
- Are you assessing alternative fuels and hybrid strategies, or still relying solely on legacy models?

For regulators:

- Are current offshore exemptions for legacy generators still tenable beyond 2030?
- What support mechanisms exist to encourage lower-emission solutions for short-term campaigns?
- How can offshore energy and offshore wind policies be better aligned to optimise infrastructure use?

For the industry as a whole:

- What frameworks could support shared AdBlue logistics or hybrid system standardisation?
- How can lessons learned from TARs be better captured and shared across assets?

Let's start the right conversation

At Aggreko and Katoni Engineering, we don't just deliver power — we plan and integrate resilient, future-ready solutions safely, efficiently, and with an eye on future compliance. Whether it's a TAR, a P&A phase, or full decommissioning, we bring together fleet availability, engineering design, and offshore execution.

The right solution starts with the right conversation — talk to us early before generator shortages, emissions penalties or regulatory changes limit your options.