Project Britannia: Transforming North Sea Liabilities into Strategic Energy Assets

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Author s Statement & Disclaimer

This proposal is submitted by David Waugh, a retired Gas Engineer, as a concept-level contribution to policy and engineering discussion on UK Net Zero delivery and industrial decarbonisation. It argues that *select* offshore assets may be repurposed to reduce waste, preserve skilled jobs, and accelerate low-carbon hydrogen supply.

- **No financial stake:** The author holds no financial stake in any companies, technologies, or projects referenced and expects no financial benefit.
- **No formal affiliations:** The author has no formal links to OPRED, NSTA, ONR, HSE, the IAEA, or named operators.
- **Concept-level only:** This is not a substitute for operator data rooms, formal safety cases, EIA/SEA, or FEED.
- **Technology references are illustrative:** Any vendor mention (e.g., Rolls-Royce SMR) is illustrative and not an endorsement; selection would require ONR licensing and procurement.

Plain-language purpose

The industrial era has relied heavily on burning carbon. The proposal behind Britannia is to reduce that combustion by supplying firm low-carbon power offshore, producing hydrogen from water, and delivering that hydrogen to industrial clusters. Hydrogen use then returns to water, closing the chemical loop (though the precise return pathway depends on end use).

Important clarification on counts: Publicly cited numbers vary by definition and geography. This paper avoids claiming exact totals without a referenced database. As a working public estimate, there are on the order of **~600 production platforms across the entire North Sea basin**, with **~470 in the UK sector of the North Sea** (platforms, not drilling rigs). Wider counts that exceed 1,000 2,000 often refer to *all offshore installations and subsea infrastructure* (wells, templates, manifolds, pipelines, tie-backs, small structures), not platforms alone.

1. The North Sea Decommissioning Challenge

The United Kingdom Continental Shelf (UKCS) has reached a critical structural inflection point. As legacy oil and gas fields enter their twilight years, the nation faces a major decommissioning programme involving the management of aging infrastructure with substantial financial and industrial implications.

- **Financial liability:** Total decommissioning costs are often cited in the range of **044 billion to 082 billion** (commonly referenced as NSTA estimates and related analyses; exact totals depend on scope and timing).

- **Taxpayer exposure:** Long-standing tax relief mechanisms mean a material portion of decommissioning cost is borne by the UK taxpayer (often cited at ~ 024 billion, depending on assumptions and schedule).
- **Infrastructure scale:** The UK must manage a large inventory of offshore platforms and a much larger inventory of associated subsea infrastructure (pipelines, wells, tie-backs, and seabed equipment).
- **Risk of environmental and economic waste:** Full removal can be carbon- and vessel-intensive and permanently ends potential reuse pathways, though removal remains appropriate for many assets.

2. Legal and International Mandates for Site Restoration (tightened wording)

Decommissioning is a regulated requirement under UK law and international arrangements. Repurposing does not bypass these requirements; rather, it would need to be justified within existing regulatory pathways and agreed with the relevant authorities.

Domestic law (Petroleum Act 1998)	International framework (OSPAR)
Requirement: Operators must submit a decommissioning programme to the relevant UK authorities. Programmes typically aim for removal and safe management of residues and debris, with long-term monitoring where applicable. **Enforcement:** Relevant UK bodies (including NSTA as part of the approvals ecosystem) and the UK Government s decommissioning process via OPRED.	**Requirement:** OSPAR Decision 98/3 establishes a strong presumption against leaving disused offshore installations in place, with *limited derogations* for certain large or specific structures subject to strict conditions. **Enforcement:** OSPAR Commission and contracting parties through national implementation.

3. The Project Britannia Solution: Offshore Nuclear-Powered Hydrogen

Project Britannia is presented as a long-term programme to repurpose *select* offshore assets into energy hubs. The core concept is to site a nuclear Power Hub offshore and supply nearby satellite platforms with firm electricity for 24/7 hydrogen production via electrolysis, exporting hydrogen to shore (subject to pipeline suitability and conversion constraints).

Vendor example (UK): Rolls-Royce SMR is one example of an SMR programme relevant to UK supply chain discussions. Any offshore deployment would require ONR licensing and an offshore-specific safety case; final design selection is a separate process.

4. Technical Feasibility and Safety Systems (tightened claims)

Offshore nuclear power is not purely theoretical: marine nuclear propulsion has operated for decades, and floating nuclear power plants exist. However, applying nuclear technology to a new offshore industrial configuration would be first-of-a-kind and must be treated conservatively.

- **Safety philosophy:** Defence-in-depth, robust containment, conservative design margins, and clear hazard separation between the nuclear island and hydrogen systems.
- **Heat removal:** The surrounding sea can act as a large heat sink, but engineered heat removal systems must still be designed, validated, and licensed; avoid implying infinite capability without qualification.
- **Passive + active safety:** Modern SMR designs typically use combinations of passive and active safety systems; avoid implying that safety depends on a single mechanism.

5. Engineering Requirements for Platform Repurposing

Repurposing a legacy asset for extended life would require a rigorous engineering programme and may only be viable for a subset of installations.

- **Structural integrity:** Jacket and topside assessments to confirm fatigue life, corrosion condition, and suitability for modified loads.
- **Topside reconfiguration:** Remove hydrocarbon equipment and replace with new modules; ensure hazardous-area zoning, blast and fire protection, and escape/evacuation pathways.
- **Workforce:** Leverage existing offshore competence with a structured skills passport and nuclear-adjacent training where required.
- **Pipeline integration:** Reuse of existing corridors may reduce cost, but hydrogen service requires integrity management (compatibility testing, potential lining, valve/compressor changes, monitoring, and leak management).

6. The Economic Case: Liability-to-Asset Conversion (tightened)

Britannia argues that selected repurposing could offset a portion of decommissioning cost while creating domestic low-carbon hydrogen supply. However, precise billions figures should be treated as scenario outputs that depend on hydrogen price, utilisation, CAPEX, regulatory pathway, and delivery schedule.

Metric	Status quo (full decommissioning)	Britannia concept (repurposing)
Net cost	044bn 082bn (programme cost; scope dependent)	New CAPEX; potential offset from avoided removal for selected assets
Revenue potential	None (pure liability)	Hydrogen sales and services (range depends on market and offtake)
Asset life	Terminated	Potential extended operational life for viable assets (subject to integrity and licensing)

Note: UK hydrogen market worth projections vary by methodology. Use ranges and cite specific sources in final versions.

7. Circular Economy Dividend: Brine, Oxygen, and Optional Mineral Recovery (tightened)

- **Oxygen co-product:** Electrolysis produces oxygen; capturing and selling it may be possible where there is local demand and logistics support. Otherwise, it must be managed safely.
- **Brine management:** Desalination produces brine. Options include engineered discharge under permit and/or evaluation of shore-based offtake where practical (e.g., seasonal de-icing brine, certain industrial uses). Claims of zero discharge should be avoided unless engineered and permitted.
- **Lithium / DLE:** Treat as optional upside. Avoid hard production claims until demonstrated at scale in a pilot. The core case should stand without lithium revenue.

8. Regional Socio-Economic Impacts (reframed)

Britannia positions Teesside and the Humber as priority demand centres for hydrogen, and emphasises UK ports and offshore supply chains (including Aberdeen) as execution enablers. The intention is to avoid abrupt industrial decline by keeping skilled work in coastal communities as oil and gas production declines.

9. Environmental Policy and Net Zero Alignment

- **Low-carbon hydrogen:** Hydrogen produced using low-carbon electricity can reduce emissions in hard-to-abate sectors, subject to full lifecycle assessment.
- **Reuse of steel and corridors:** Where safe and permitted, reusing structures and pipeline corridors may reduce new-build carbon and preserve embodied value.

10. Strategic Roadmap and Stakeholder Engagement (timeline tightened)

As a first-of-a-kind offshore nuclear + hydrogen concept, delivery would likely be multi-year. A conservative planning assumption aligns more with a phased pathway towards the early 2030s for first hydrogen, depending on licensing, supply chain readiness, and asset selection.

11. Concluding Strategic Imperative

Project Britannia is a proposal to convert a portion of the North Sea s end-of-life challenge into an energy-transition asset, through disciplined selection of suitable installations, conservative safety case development, and a just transition plan for the workforce.

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