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Report for Stakeholder Engagement (V6).

Prepared by Cammell Laird Shiprepairers & Shipbuilders Ltd

ORE24101-SER-V1.0

Report for Stakeholder Engagement (V6).

Abstract

This report consolidates the outputs of more than forty feeder studies undertaken for the "UK SOV Manufacture Business Case Development" project on behalf of The Offshore Renewable Energy Catapult. It defines the opportunity for the United Kingdom (UK) to establish a globally competitive sovereign capability in Service Operation Vessel (SOV) design and construction.

The analysis demonstrates that, through coordinated investment across infrastructure, digital transformation, and workforce development, UK shipyards can achieve cost parity with leading European competitors within six to eight years. The study highlights the potential for substantial economic return, industrial resilience, and the creation of 2,000–2,500 high-value direct jobs, with a further 5,000–6,000 indirect roles supported across the national supply chain and regional economies.

In conclusion, this report states that the necessary transformation will not only strengthen the UK's maritime sector but also reinforce national security (Defence), accelerate decarbonisation, and deliver sustained economic, social, and employment value across coastal and industrial regions.

"Now is the moment for the UK to move from analysis to action – building a modern, resilient shipbuilding industry that powers clean energy, strengthens defence, and reclaims its place as a world leader in maritime manufacturing. The evidence is clear, the industrial momentum is building, and the opportunity is immediate. If delivered with purpose and partnership, this transformation will define a generation of British maritime excellence – anchored in innovation, sustainability, and national pride"

James Starkey October 2025

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Footnote from Abstract

Employment impact estimates are derived from aggregated findings across the Employment and Workforce Development Research and the Upskilling and Training Plan for Shipbuilding Efficiency research, prepared under the ORE Catapult Business Case Programme. Figures reflect the combined outcomes of the Median and Maximum investment scenarios, where each regional yard sustains approximately 400–500 direct roles in shipbuilding, fabrication, and digital engineering, and supports a further 2–2.5 indirect jobs per direct role through supply chain and service multipliers. The total national impact therefore ranges between 2,000–2,500 direct jobs and 5,000–6,000 indirect jobs, assuming simultaneous activity across four to five major UK shipyards.

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CATAPULT Offshore Renewable Energy

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2. Executive Summary.

The current and future expansion of offshore wind presents the UK Shipbuilding sector with a once-in-a-generation opportunity to re-establish value and global competitiveness due to the requirement for Service Operation Vessels (SOVs).

Service Operation Vessels (SOVs) are specialised offshore wind support ships, typically 84–100 metres in length with hybrid or methanol-ready propulsion, dynamic positioning (DP2) capability, and accommodation for up to 60 technicians. This report focuses on the UK's opportunity to design and build these vessels domestically, providing a clear technical and strategic context before examining investment scenarios and policy implications.

According to ORE Catapult's commissioning brief for this study (Jan 2025), up to 423 SOVs could be in operation globally by 2050; Clarksons Research (2025) indicates a similar order of magnitude and an accelerating delivery curve through the 2030s. Indicative trajectory (global): 2025–2030, 60–80 new SOVs; 2030–2040, cumulative 200–250; 2040–2050, cumulative 350–425. For the UK/North Sea market, this profile supports a sustained annual ordering rhythm through the 2030s. According to Clarksons Research, up to 423 SOVs may be required globally by 2050, with a significant proportion concentrated in Europe by the mid-2030s. For the UK market specifically, demand is expected to rise steadily supported by The Crown Estate leasing rounds and offshore wind build-out, creating a requirement for dozens of SOVs within 10–15 years.

At present, none of the SOVs operating in UK waters were built domestically. Without targeted investment, this position will persist, with the UK missing out on billions of pounds in industrial value and forfeiting the chance to build a sustainable order pipeline in the critical 2025–2040 window.

Three scenarios have been modelled:

- **Minimum Case (31–36% UK content):** One-off builds, client-led design, minimal investment. Provides baseline participation but limited economic return.
- **Median Case (48–55% UK content):** Five-vessel series, partial modularisation, selective digital adoption. Requires £20–35M CAPEX, delivers ROI in 5–7 years, and builds domestic capacity.
- **Maximum Case (70–78% UK content):** Ten-vessel programme, full design ownership, digital twin adoption, advanced automation. Requires £55–75M CAPEX, ROI in 3–5 years, generates over £2.5bn domestic economic value within a decade, and secures 400–500 skilled jobs.

These scenarios demonstrate that coordinated national investment will unlock significant economic, social, and strategic value. The findings confirm for the reader that through digital transformation, supply chain integration, and workforce upskilling, the UK can create a sustainable and globally competitive shipbuilding sector – supporting offshore renewable energy and wider maritime sectors.

Targeted Investment and Strategic Linkages

A category-by-category breakdown of the capital expenditure required to unlock each scenario outlined above is structured to reflect the investment logic underpinning the broader transformation of UK SOV manufacturing capability.

Investment Category	Minimum Case (£M)	Median Case (£M)	Maximum Case (£M)	Notes
Facility Upgrades (e.g. Indicative Yard build/fitout)	0.0	10.0	30.0	Includes acquisition/fitout for modular bays, high-bay cranage
Automation & Fabrication Equipment (CNC, Panel Line, Robotic Welders)	0.0	5.0	15.0	Required for steel throughput, outfitting precision, reduced rework
Design Tools & Digital Twin (PLM, Simulation, VR/AR)	1.0	3.0	7.0	Supports repeatable design logic and systems integration
Labour Training & SQEP Onboarding	0.5	1.5	5.0	Apprenticeship scaling, advanced outfitting skillset onboarding
Supplier Engagement & Procurement Enablement	0.2	1.0	2.0	Supplier MOUs, component bundling strategies, FAT/SAT coordination
Digital Infrastructure & IT Systems	0.0	1.5	4.0	Procurement dashboards, PDM links, scheduling tools
Environmental Systems & Utilities (e.g. LEV, gas, power)	0.0	2.0	6.0	Required for clean fabrication bays and sustainability compliance
Contingency & Mobilisation (10–15%)	0.2	3.0	6.0	Allows for risk provision, commissioning and supply mobilisation

These Investment Categories are strategically aligned to enablers already evidenced in previous feeder reports:

- **Digital Twin and PLM investment** enable design ownership and system integration across multiple vessels, a core feature of the Maximum Case.
- **Automation and facility upgrades** reduce man-hour variability and enable faster throughput, vital for UK parity with Polish, Spanish, or Turkish yards.
- **Supplier enablement and procurement integration** improve early alignment, increase domestic substitution, and reduce delivery risk.
- **Labour and training investment** unlock new employment opportunities and secure delivery capability across multiple regions (e.g. Merseyside, Tyne, Belfast).

Each Investment Category contributes to the conditions required for achieving higher UK content, faster build schedules, and lower lifecycle costs.

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3. Introduction.

Purpose and Background

The Offshore Renewable Energy (ORE) Catapult commissioned this business case to establish the evidence base for a sovereign UK capability in the serial construction of Service Operation Vessels (SOVs). The report consolidates findings from more than forty feeder studies, each examining a specific aspect of competitiveness – from digital maturity and facility investment to supply chain integration, skills, and design ownership. Together, they provide a holistic analysis of what level of investment is required for the UK to achieve cost parity with established European shipyards and secure a sustainable order pipeline aligned with offshore wind expansion.

The purpose of this document is to inform decision-makers in government, industry, and finance on how targeted interventions can convert the UK's current one-off build approach into a globally competitive serial-production capability. It aligns with the UK's wider maritime objectives under *Maritime 2050, and the Net Zero Strategy*.

UK SOV Manufacture Business Case Development - Scope of Work

"In line with this rapid expansion, the number of vessels required to support offshore wind developments throughout their operational life will also require major growth. Here at ORE Catapult, we have conducted analysis to determine the size of the market for operations and maintenance (O&M) vessels, based on global installed capacity targets. Globally, this could equate to up to 2325 CTVs and 423 SOVs in operation by 2050.

This presents a huge opportunity for UK Shipbuilding, however, none of the UK's currently operating SOVs have been built in the UK. This project aims to develop the business case for establishing this production"



Alignment with ORE Catapult Commissioning Brief

This report directly answers the ORE Catapult's commissioning brief (January 2025), which called for a quantified, scenario-based investment model showing how the UK could transition from isolated project builds to a sustainable shipbuilding ecosystem serving offshore wind and associated markets.

The deliverables include:

- Economic modelling of Minimum, Median, and Maximum investment cases.
- CAPEX and ROI projections linked to learning curve efficiencies.
- A quantified assessment of achievable UK content levels.
- Identification of enabling investments in digital tools, infrastructure, and skills.

Methodology

The analytical approach follows structured engineering economics principles consistent with AACE Class 4 estimation standards. Key methodological steps include:

- **Work Breakdown Structure (WBS) and Cost Coding:** All cost and content data were categorised using SFI and WBS codes[1], enabling cross-comparison with European benchmarks.
- **Benchmarking:** A desktop study to construct comparative analysis was undertaken against leading European yards collectively, using verified CAPEX and productivity data from multiple established shipbuilders across Europe.
- **Detailed Cost Modelling:** A comprehensive cost modelling exercise was undertaken for a 90-metre methanol-ready SOV platform, developed to a mature level of engineering and production definition. The costing integrates detailed structural, mechanical, electrical, and outfit breakdowns, derived from extensive estimating input and verified through cross-discipline review. This level of resolution provides a robust foundation for investment analysis and ensures that the financial forecasts presented are based on tangible and validated cost data rather than generic benchmarks
- **Scenario Analysis:** Minimum, Median, and Maximum investment pathways were evaluated for financial return, UK content, and job creation potential.
- **Validation:** Findings were triangulated through research on digital transformation, infrastructure upgrades, production learning curves, and UK content modelling.

This methodology ensures traceability, consistency, and transparency across all investment assumptions and projections used within the business case.

[1] The Work Breakdown Structure (WBS) provides a hierarchical framework that decomposes a shipbuilding project into manageable cost and activity elements, ensuring consistency across disciplines and enabling traceability of costs from component to programme level. The SFI (Ship Function Index) complements this by assigning internationally recognised functional codes specific to shipbuilding (e.g., hull, machinery, outfitting). Using both systems ensures data can be mapped between technical shipbuilding standards (SFI) and project management/financial frameworks (WBS), aligning engineering activity with cost control and benchmarking across different shipyards.

4. UK Industrial & Strategic Context.

Demand Pipeline

The global offshore wind market is expanding at a pace that is reshaping the maritime construction industry. The UK shipbuilding sector stands at a pivotal point. Right now, there is the opportunity to transition from fragmented one-off project delivery towards a coordinated, series-production ecosystem that aligns with national industrial strategies. The Offshore Renewable Energy (ORE) Catapult's commissioning brief emphasised the need for a quantified, scenario-based model capable of showing how UK shipyards can scale from isolated builds to a sustainable, globally competitive shipbuilding base.

According to Clarksons Research (2025), there will be approximately 423 SOVs required globally by 2050, with over 200–250 needed by 2040. The European region – driven by aggressive offshore wind deployment in the North Sea, Baltic, and Atlantic basins – accounts for nearly half of projected demand. The UK's share is forecast to be significant, requiring an estimated 35–50 vessels by 2040 to support operations from Round 3 through Round 5 of The Crown Estate leasing.

The UK's offshore wind capacity is expected to exceed 60 GW by 2035, requiring a continuous stream of new vessel orders through the 2030s. Vessel types could range from hybrid 75–85m nearshore SOVs to 90–100m methanol-ready or dual-fuel units for deepwater operations. This sustained demand window creates an ideal opportunity for domestic yards to secure series-build contracts.

National Strategic Framework

The analysis aligns with the UK Government's Maritime 2050 Strategy, the Net Zero Strategy (BEIS, 2021). These policies collectively establish a framework for achieving sovereign capability in shipbuilding while supporting clean maritime growth and regional regeneration.

- Maritime 2050 emphasises innovation, decarbonisation, and investment in skills as enablers of long-term competitiveness.
- The Net Zero Strategy identifies offshore wind as a critical enabler for decarbonisation, requiring new-generation support vessels (SOVs, CSOVs, and CTVs) built within a low-carbon industrial ecosystem.

Without targeted investment, however, UK operators will continue sourcing vessels from European ship builders many of which benefit from lower capital costs, established digital shipbuilding ecosystems, and government-backed financing mechanisms.

UK Competitiveness Gap vs EU/Asian Yards

Benchmarking was performed collectively against European yards included in the study, representing leading practices in modularisation, serial production, and automation. These yards demonstrate how targeted investment and continuous learning can achieve raw cost competitiveness without relying on state subsidy. Comparative analysis shows that, with sustained investment and pipeline visibility, the UK could close the cost gap with Northern European builders within a decade.

Current benchmarking identifies a 15–20% cost disadvantage for UK shipyards compared with European peers, widening to 30–35% versus leading Asian yards.

The primary causes include:

- Limited digital integration and incomplete PLM infrastructure.
- Discontinuous project pipelines that erode workforce efficiency.
- Low adoption of modular and block fabrication processes[2], notwithstanding UK yards are at various stages of infrastructure upgrades and development currently.
- Reliance on client-led designs rather than proprietary platforms.
- Higher financing and insurance costs due to lack of sovereign guarantees.

However, an Indicative UK Ship Yard Development Business Plan demonstrates that an £80 million facility investment could double production capacity, enable full modular construction, and create 450 new high-value jobs for a UK yard. This intervention would align UK costs with those of European comparators within five years and generate annual Treasury returns exceeding £20 million.

Without targeted intervention, the UK will continue to rely on imported vessels, forfeiting billions in potential industrial value.

The opportunity is therefore time-sensitive: the next decade will determine whether the UK emerges as a sovereign supplier of Service Operation Vessels or remains dependent on imports. Coordinated action across industry, government, and the supply chain can transform the UK's current disadvantage into a strategic industrial advantage.

[2] In the context of this report, modular and block fabrication refer to industrialised shipbuilding methods designed for scalability and repeatability—distinct from traditional one-off vessel builds. Modular construction involves dividing the vessel into pre-outfitted sections or 'modules' that are fabricated concurrently and later assembled, dramatically reducing dock occupancy and improving workflow efficiency. Block fabrication supports this approach by creating standardised structural units that can be replicated across multiple vessels. Whilst UK yards regularly produce blocks or modules for individual classes of vessels, this does not constitute modular or serial shipbuilding in the industrial sense. True modular shipbuilding requires consistent design reuse, process standardisation, and integration of digital production systems to enable series production. The transition from bespoke block assembly to genuine modular manufacturing is therefore a critical enabler of cost reduction, learning curve improvement, and competitiveness in SOV and wider commercial vessel production.

5. Commercial and Operational Value of UK-Built SOVs.

Building on the industrial context outlined above, there are immediate commercial and operational advantages of a strong domestic SOV shipbuilding capability. These benefits strengthen the UK's competitiveness and directly support the long-term stability of the offshore wind industry.

Value to Ship Owners, Operators, and Offshore Wind Investors

Enhanced UK shipbuilding capability creates a compelling value proposition for vessel owners, operators, and offshore wind developers. However, the viability of that proposition must be examined through both commercial realism and strategic foresight. Until UK shipyards achieve cost parity with established European builders, a short-term price premium is inevitable.

The challenge, and opportunity, is to define who bears that cost, what tangible value the buyer receives, and how policy can support the transition.

Cost Premium and Market Dynamics

Current modelling suggests that early UK-built SOVs will carry a 15–20 percent cost premium relative to equivalent vessels from established EU yards. For a typical £80–100 million SOV, this equates to an additional £4–15 million per vessel during the first phase of industrial scaling. This premium arises from higher financing costs, limited supplier maturity, and lower initial production efficiency.

That differential is not permanent. As digital systems mature, modularisation takes hold, and learning-curve efficiencies are realised, the premium is expected to narrow progressively and be largely eliminated within six to eight years. The interim period represents the critical bridge where confidence, policy support, and industrial cooperation must converge.

In practical terms, it is unrealistic to expect ship owners or offshore wind developers to absorb this premium unassisted.

A shared-responsibility model is therefore proposed:

- **Government intervention:** Through targeted shipbuilding incentives, loan guarantees, or enhanced /incentivised UK value creation within Clean Industry Bonus programme and/or The Crown Estate activities, to close the short-term price gap.
- **Developers and Operators:** Benefitting from higher UK-content weighting in ESG and sustainability reporting, reinforcing their social-licence value.
- **Shipyards and Suppliers:** Committing to productivity and digital milestones that deliver measurable cost reductions year-on-year.

Commercial Value and Market Confidence

- **Reduced Lead Times:** Right now within the UK there are build slots available for immediate starts and Proximity to UK offshore wind farms allows faster vessel delivery and refit

scheduling, ensuring alignment with project commissioning and maintenance cycles.

- **Cost Predictability:** Domestic production mitigates exposure to currency fluctuations, shipping costs, and overseas regulatory variations.
- **Lifecycle Cost Efficiency:** Locally built vessels can be maintained and refitted within UK yards, reducing operational downtime and total cost of ownership.
- **Design Agility:** Close collaboration between shipyards, designers, and operators supports continuous design optimisation and responsiveness to new technologies and regulations.

These elements combine to create an ecosystem that offers long-term cost certainty and operational assurance to developers, financiers, and vessel owners.

Operational and Technical Benefits

SOVs built within the UK deliver tangible performance advantages for operators:

- **Enhanced Reliability:** Integration of digital twin technology and predictive maintenance systems ensures vessel uptime and reliability, directly improving O&M efficiency for offshore wind farms.
- **Optimised Vessel Design:** Domestic access to naval architects and engineering teams allows for rapid iteration and fine-tuning of vessel configurations suited to specific wind-farm conditions.
- **Regulatory Responsiveness:** UK shipyards can adapt quickly to evolving safety and environmental standards, ensuring compliance with forthcoming IMO and MCA requirements.
- **Hybrid and Methanol-Ready Propulsion:** Early adoption of low-emission propulsion systems positions UK-built SOVs at the forefront of maritime decarbonisation, supporting operator ESG commitments.

Investor and Developer Value

For offshore wind developers and financiers, the commercial and reputational benefits of domestic SOV construction are significant:

- **ESG, Sustainability and UK-Content Alignment:** Locally-built vessels contribute to higher UK social value creation, strengthening bid competitiveness and sustainability credentials.
- **Supply Chain Security:** Domestic build capability mitigates logistical and geopolitical risks associated with foreign shipbuilding dependencies.
- **Green Finance Opportunities:** UK-built, low-emission vessels can qualify for sustainable finance incentives and reduced cost of capital through alignment with green investment frameworks.
- **Economic Resilience:** Value retention within the UK supply chain promotes reinvestment, regional employment, and fiscal returns to the Treasury.
- **Predictable Cost Base:** Transparent procurement within the UK regulatory framework reduces volatility, currency risk, and contract uncertainty.
- **Reputational Assurance:** Engagement with British shipyards reinforces corporate commitment to national industrial growth and community regeneration.

Broader Strategic Implications

The establishment of a UK-based SOV (Commercial) construction capability provides lasting economic and strategic value:

- **Industrial Resilience:** Diversified domestic production capacity reduces vulnerability to overseas supply disruptions.
- **Technology Spillover:** Innovations in digital integration, hybrid propulsion, and modular construction developed for SOVs can be applied across commercial and defence shipbuilding.
- **Regional Regeneration:** Investment in shipbuilding supports coastal economies and the levelling-up agenda, providing sustainable employment and community benefits.
- **National Energy Security:** A resilient domestic shipbuilding base ensures the UK retains sovereign capability to support offshore wind infrastructure essential to the Net Zero transition.

UK Industrial Base and Supply Chain Readiness

UK shipyards included in the study vary in scale, specialisation, and readiness for high-volume, digitally-enabled construction. While certain yards possess advanced modular facilities and proven delivery records in defence and commercial builds, others remain constrained by limited automation or fragmented supply chain integration. The study therefore models investment scenarios applicable to a representative UKcommercial shipyard capable of adaptation and scalable growth.

Key findings include:

- The UK retains core heavy fabrication and assembly capacity, but with uneven distribution across regions.
- Digitalisation and workflow integration remain areas of opportunity – particularly in the alignment of design, production, and quality systems.
- Supply chain localisation offers significant economic and carbon benefits but depends on targeted investment in equipment, training, and supplier development.

Industrial Partnerships and Collaboration

Partnerships between shipyards, technology providers, and academic institutions form a critical enabler of transformation. Collaboration between UK maritime colleges, universities, and research bodies strengthens the link between innovation and practical application in shipbuilding.

Industry-government alignment through the UK Shipbuilding Skills Taskforce and initiatives such as Maritime UK further reinforces the sector's ability to deliver a coordinated national response.

Strategic Drivers for Change

The drive towards a sovereign, competitive UK shipbuilding capability is shaped by multiple interdependent drivers:

1. **Energy Transition:** The offshore wind market continues to expand rapidly, with new project rounds requiring a sustainable domestic vessel supply base.

2. **Economic Security:** Onshoring of vessel construction mitigates geopolitical risks and reduces foreign currency exposure.
3. **Technology Convergence:** Digitalisation, automation, and green propulsion technologies are redefining competitiveness.
4. **Regional Regeneration:** Shipbuilding investment catalyses employment and supports levelling-up objectives in coastal economies.

The commercial and operational value of UK-built SOVs extends far beyond the shipyards themselves. They represent a catalyst for innovation, industrial capability, and energy resilience. Early investment in domestic production enables the UK to capture a larger share of the offshore wind value chain, strengthen national competitiveness, and establish long-term leadership in clean maritime technology.

The UK's industrial and strategic position provides a strong foundation for transitioning to a modern, competitive shipbuilding base serving offshore renewable energy markets. However, realising this potential requires coordinated investment across facilities, digital systems, and workforce skills. The subsequent sections quantify these investments through scenario modelling and assess the potential returns in terms of economic value, job creation, and national capability growth.

Role of Government Support

The success of early-stage UK SOV orders will hinge on temporary but decisive government intervention. Recommended instruments include:

- **Capital Grants or Tax Credits:** For the first wave of UK-built SOVs to offset the 15-20 percent premium.
- **Low-Interest Financing or Guarantee Schemes:** Via UK Export Finance (UKEF).
- **Clean Industry Bonus programme and / or The Crown Estate activities:** enabling/incentivising strategically targeted investment for UK value creation through commissioning of UK-built vessels.
- **Innovation funding:** Targeted at digital integration, future-fuel systems, and workforce digital-skills transition.

Such measures would be time-bound - designed to stimulate confidence until the domestic industry achieves self-sustaining competitiveness.

In summary, UK competitiveness in SOV manufacturing offers owners, operators, and investors a long-term value proposition that transcends simple cost comparison. In the near term, premium pricing is the entry ticket to establishing sovereign capability; in the longer term, the rewards are reduced lifecycle costs, enhanced ESG standing, and assured access to strategically critical assets.

For investors and policy makers alike, this represents a clear trade-off between short-term subsidy and enduring national value. With modest transitional support, UK shipyards can become both commercially viable and globally competitive - delivering vessels that embody technical excellence, economic resilience, and the next generation of clean maritime innovation.

6. Scenario Framework.

The shipyard investment case presented within this report is based upon a representative UK commercial shipyard model—reflecting the infrastructure, cost structure, and production capability typical of medium-to-large-scale yards included in the study. This provides a realistic foundation for assessing capital investment requirements, digital integration potential, and workforce impact, without attributing the analysis to any specific enterprise. This approach is distinct from larger scale yards that are optimised for defence sector projects.

The ORE Business Case models three distinct investment pathways – Minimum, Median, and Maximum – to evaluate how differing levels of capital commitment, design ownership, and digital adoption influence competitiveness, UK content, and ROI. Each scenario is cumulative: higher tiers build upon the enablers of the preceding case.

Within the scenario framework laid out, cross-references are embedded in the context, drawing on the following key research for evidence and data:

1. CAPEX Forecast detailing investment requirements per scenario
2. Projected UK Content
3. Production Learning Curve Model for Shipbuilding Efficiency Gains
3. Indicative Shipyard Development Business Plan (2025), Definition of Investment Scenarios

The concise evidence summaries for the four key research areas referenced above provide the scope/abstract, key findings, assumptions & boundaries, evidence & methods, whilst their limitations are tabled below. Their references for traceability are listed within the references section of this report.

They are tabled as follows;

1. **CAPEX Forecast detailing investment requirements per scenario (James Starkey, 2025)**

Item	Summary
Scope / Abstract	Builds the investment model for Minimum, Median, and Maximum cases; quantifies enabling CAPEX by workstream (facilities, automation, PLM/digital, training) and maps to payback.
Key Findings	1. CAPEX ranges validated at £1.5M (Min), £20–35M (Median), £55–75M (Max); 2. Payback periods trend N/A / 5–7 yrs / 3–5 yrs respectively; 3. Higher CAPEX enables digital twin, robotics, and cranage that unlock step change in throughput and learning effects.
Assumptions & Boundaries	Representative UK commercial yard basis; 90m methanol ready SOV; Northern Europe hull assumption for comparative parity; raw-cost benchmarking (no subsidy effects).

Item	Summary
Evidence & Methods	Bottom-up CAPEX WBS; vendor budget quotes where available; comparative benchmarks from European yards included in the study; ROI modelled on treasury style discounting[3] and series build cadence.
Limitations	Vendor pricing volatility; sequence risk on facility mobilisation; learning capture contingent on continuous pipeline.

2. Projected UK Content (% of total build cost across scenarios) (James Starkey, 2025)

Item	Summary
Scope / Abstract	Quantifies UK content achievable under each scenario and estimates domestic value retention over programme life.
Key Findings	UK content bands: 31–36% (Min), 48–55% (Median), 70–78% (Max). Localisation of key systems (switchboards, HVAC, fabrication, outfit) and serial procurement frameworks are decisive drivers.
Assumptions & Boundaries	UK supplier availability mapped to current capability; staged localisation (not 100% immediate); compliance with owner and class rules; no double counting of imported sub-assemblies.
Evidence & Methods	Supplier mapping matrix; historic UK sourcing rates; interview notes and prior tender datasets; triangulation with CAPEX and Learning Curve feeder models.
Limitations	OEM willingness to localise; certification lead times; market cyclicality for core materials.

3. Production Learning Curve Model for Shipbuilding Efficiency Gains (James Starkey, 2025)

Item	Summary
Scope / Abstract	Establishes learning rate assumptions and quantifies labour hour and cost reductions across a series of SOV builds.
Key Findings	Learning rate 80–90%; by vessel 10, cost reduces to roughly 58–65%[x] of first of class depending on digital adoption. Median case: 25–30% labour hour reduction by vessel 5 (£8–12M saving). Maximum case: 35–40% reduction by vessel 10 (£25–30M cumulative).

[3] "Treasury-style discounting" refers to the UK Treasury's approach for valuing future cash flows in economic appraisals (as outlined in HM Treasury's Green Book). It means that the return on investment (ROI) and payback periods in the CAPEX feeder report were calculated using discounted cash-flow analysis – future costs and benefits were adjusted to "present value" using an official social discount rate (typically 3.5 % per year in the UK). This ensures that the analysis expresses all financial impacts in today's terms, allowing direct comparison between different investment options over time.

Item	Summary
Assumptions & Boundaries	Stable pipeline (no long production gaps); same baseline 90m SOV; scope stability after vessel 2–3; continuous workforce retention.
Evidence & Methods	Learning curve modelling (Wright/Crawford), historic UK yard data, European yard benchmarks included in the study, internal estimating norms; sensitivity tests for digital maturity.
Limitations	Scope change risk; demand shocks creating cadence gaps; dependence on supplier maturity and QA.

4. Indicative Shipyard Development Business Plan

Item	Summary
Scope / Abstract	Presents an investment case for a 46,000–46,500 m² production facility reactivation to double throughput and create ~450 jobs.
Key Findings	£80M development proposed; Treasury return £20.3M/year; payback <4 years; economic ripple £30.5M/year; capacity uplift enables parallel build lanes and panel line re instatement.
Assumptions & Boundaries	Blue/white collar wage mix; 1.6–2.5x economic multipliers depending on scope (see Section 10 expansion); APCL group utilisation; integration with existing construction hall and slipways.
Evidence & Methods	Business plan financials; labour and tax modelling; historical South Yard throughput data; engineering layout & crane spec; sequencing of outfit lines.
Limitations	Acquisition timing; equipment lead times; policy support conditionality.

[x] 58–65 % reduction figure refers to the relative cost decrease between the first and tenth vessel in a series build, not a one-time discount or raw price cut. It's drawn from standard learning-curve theory (Wright's Law), where repetitive production drives cost efficiency through accumulated experience. In the feeder report this range was modelled as an upper-bound scenario for highly optimised, digitally integrated shipbuilding, assuming:

1. Consistent production cadence (no programme gaps),
2. Stable design,
3. Strong digital workflow adoption, and
4. Sustained labour retention.

The model assessed up to 35–40 % labour-hour reduction, translating to a 58–65% cumulative cost level relative to the first-of-class. It's theoretical but grounded in comparative data from European modular yards rather than guaranteed results.

For the ORE Business Case models the key findings within the research are summarised as follows;

Minimum Case – One-Off Build (Baseline)

- **Description:** Single-vessel build using existing facilities and client-supplied design with minimal capital improvement.
- **UK Content:** 31-36%.
- **CAPEX Requirement:** £1.5M (Initial software or equipment upgrades).
- **Production Model:** Conventional block construction, no modularisation.
- **Outcome:** Limited domestic value; does not establish sustainable competitiveness or ROI.

Median Case – Five-Vessel Series Build (Intermediate)

- **Description:** Medium-scale programme integrating selective modularisation, partial digital twin capability, and moderate automation investment.
- **UK Content:** 48-55%.
- **CAPEX Requirement:** £20-35M.
- **Production Model:** Modular outfitting zones; early adoption of PLM tools; framework supplier agreements.
- **Outcome:** Learning curve efficiencies realised by vessel 3; ROI achieved in 5-7 years; foundation for serial build maturity.

Maximum Case – Ten-Vessel Serial Build (Strategic)

- **Description:** Fully integrated digital shipbuilding ecosystem delivering design ownership, advanced automation, and localised supply chain participation.
- **UK Content:** 70-78%.
- **CAPEX Requirement:** £55-75M. The £55-75 million CAPEX range represents varying levels of yard modernisation and technology adoption. The lower end (£55M) corresponds to baseline investment in automation, PLM integration, and modular hall upgrades, while the higher end (£75M) includes full digital twin implementation, advanced robotics, extended cranage, and workforce training infrastructure. The upper figure also allows for inflation and contingency associated with early phase investment.
- This range represents the total investment required to upgrade facilities, install automated fabrication equipment, and implement full digital shipbuilding capability. It encompasses both the capital works for Ship Yard expansion and associated digital transformation costs necessary to achieve series-build efficiency.
- **Production Model:** Digital twin integration, robotic fabrication, full modular construction, comprehensive UK supplier base.
- **Outcome:** ROI achieved in 3-5 years; parity with leading EU yards; long-term export potential; 400-500 high-value jobs sustained.

Savings to cost were identified within the different investment scenarios through learning-curve analysis and efficiency gains. The Minimum Case provided limited or no savings; the Median Case delivered around a 25-30% reduction in labour hours by the fifth vessel, translating to £8-12 million in savings; and the Maximum Case achieved roughly a 35-40% labour-hour reduction by the tenth vessel, equivalent to £25-30 million in cumulative savings. These savings derive from productivity improvements, modular construction, and digital integration rather than changes to the baseline vessel price.

Comparative Scenario Matrix

Attribute	Minimum Case	Median Case	Maximum Case
Programme Scale	Single vessel	Five vessels	Ten vessels + export potential
UK Content (%)	31-36	48-55	70-78
CAPEX (£M)	1.5	20-35	55-75 (Per Yard)
Digital Adoption	Low	Moderate (partial PLM/twin)	Full digital twin, PLM integration
Design Ownership	Client-led	Shared/Adapted	Proprietary UK-led design
Automation Level	Minimal	Selective (welding /outfit)	Advanced robotics & panel lines
Supplier Engagement	Transactional	Framework agreements	Long-term MOUs and localisation
Payback Period (Yrs)	N/A	5-7	3-5
Fiscal Return (£/Yr) to Government	<2.5M	7-9M	20.3M+
Employment Impact	~50 jobs	200-300 jobs	400-500 jobs
Strategic Outcome	Maintains minimal presence	Builds domestic competence	Achieves full sovereign capability & export competitiveness

These scenarios collectively demonstrate a clear correlation between investment scale and strategic return. The Minimum Case establishes participation without transformation; the Median Case begins capability building; and the Maximum Case delivers full sovereignty, cost competitiveness, and economic resilience.

7. Infrastructure & CAPEX Requirements.

Infrastructure investment is the foundation for transitioning the UK shipbuilding industry from isolated, one-off vessel construction to competitive serial production. While the Indicative Shipyard redevelopment plan provides a detailed illustration, it is presented here as an example of what can be achieved nationally through coordinated investment. Similar opportunities exist across key UK yards. Each has the potential to modernise facilities and workflows to support large-scale, digitally enabled shipbuilding programmes.

Facility Upgrades and Automation

UK shipyards included in this study are at different stages of their development journey. Some have already begun implementing elements of modernisation, such as automation, digital integration, and modular construction, while others are still in the planning or funding phase. It is therefore important to recognise that the investment priorities outlined in this report represent both ongoing and prospective initiatives.

The scale and timing of each intervention will depend on individual yard readiness, strategic partnerships, and access to capital. Open discussion of these programmes within the UK shipbuilding community reflects a collective drive toward competitiveness and technological advancement.

Investment priorities for national competitiveness include:

1. **Fabrication and Panel Line Automation:** Robotic welding, CNC cutting, and automated handling to reduce labour intensity and improve consistency.
2. **Modular Construction Halls:** Weather-protected, climate-controlled spaces enabling parallel block construction and outfitting.
3. **Digital Integration:** Comprehensive PLM and production control systems linking design, procurement, and assembly functions to improve scheduling and traceability.

Drawing on the Indicative Ship Yard Development Yard model, these interventions collectively support a 35–40% reduction in labour hours per tonne once serial production maturity is achieved.

The estimated £55–75 million investment range under the Maximum Case scenario includes:

- £45–50 million for new modular fabrication facilities, cranage, and automation hardware.
- £8–10 million for digital systems and integration platforms.
- £2–5 million for training, commissioning, and systems integration.

The Indicative Ship Yard Development Yard Example

The £80 million figure identified in the research for an Indicative Ship Yard Development Yard Plan encompasses full site redevelopment including utilities, offices, and supporting infrastructure beyond the production areas. This value provides an upper benchmark for regional redevelopment projects, illustrating the impact of full modernisation.

When applied nationally, it demonstrates that with comparable investment, UK yards could achieve similar step changes in productivity, capacity, and workforce development. The Indicative Ship Yard Development Yard plan projects a doubling of annual throughput, creation of 450 new high-value jobs, and Treasury returns exceeding £20 million per year, outcomes that can be replicated across other UK shipyards.

Return on Investment and Payback

According to modelling in the Feeder Report – CAPEX Forecast Report (2025), payback periods range from 3 to 7 years, depending on production scale and degree of digital integration:

- **Minimum Case:** One-off projects, no sustained ROI.
- **Median Case:** 5–7 years, reflecting incremental automation and improved supply chain management.
- **Maximum Case:** 3–5 years, reflecting full automation, digitalisation, and steady series production.

Each £10 million invested in shipyard modernisation is forecast to generate £2–3 million in annual fiscal return, while supporting approximately 500 skilled jobs per regional hub. These benefits compound over time as facilities achieve higher utilisation and learning curve efficiencies.

National Implications

Applying this model across major UK shipyards indicates that a coordinated national investment programme of £200–250 million could enable domestic production of 8–10 SOVs annually by the early 2030s. This figure is derived by extrapolating the Indicative Ship Yard Development Yard capital model – valued at £55–75 million for one fully modernised regional facility – to a network of three to four major shipyards capable of parallel construction. The upper range assumes full digital and modular capability deployment, while the lower range reflects a phased adoption across sites.

The underlying assumption is that each UK modernised yard could produce two to three SOVs annually once serial production maturity is achieved. With national coordination, this distributed capacity yields an aggregated output of eight to ten vessels per year. The estimate also factors in allowances for digital integration, workforce training, and early supplier localisation costs, ensuring that the forecasted capacity is both achievable and sustainable across these regional facilities.

This distributed manufacturing capacity would meet UK offshore wind requirements and establish an export-ready capability. Moreover, even if future offshore wind vessel demand were to develop more slowly than projected, the same infrastructure, digital, and workforce investments would remain directly applicable to other shipbuilding markets, including commercial shipbuilding and defence procurement programmes. Such investment therefore strengthens the UK's wider maritime industrial base while supporting the aims of *Maritime 2050,* the *Net Zero Strategy,* stimulating regional growth, creating sustainable jobs, and ensuring sovereign capability in offshore vessel production.

8. Production Efficiency & Learning Curve.

Production efficiency is a defining factor in achieving competitiveness and long-term sustainability within the UK shipbuilding sector. Analysis across four research indicates that the transition from single-vessel projects to serial build programmes enables dramatic improvements in productivity through repetition, process optimisation, and the adoption of digital integration.

Learning Curve Dynamics

The learning curve model applied in this study assumes a learning rate of 80–90%, meaning that each time total vessel output doubles, average labour hours per vessel fall to between 80% and 90% of the previous average.

For example, if the first SOV requires 1.0 million labour hours, the second would require around 850,000, and by the fourth vessel, the average would fall to approximately 700,000 labour hours. These efficiency gains accumulate rapidly after the third vessel, where process familiarity, team continuity, and digital workflows deliver step-change reductions in cost and build time.

This model is supported by data from comparable European yards which typically achieve full learning curve maturity by the third or fourth hull in a production series. For the UK, replicating this trajectory requires consistent vessel ordering and stable programme management to prevent skill erosion between builds.

Key Enablers of Efficiency Gains

1. **Process Standardisation:** Implementation of repeatable production sequences across hull blocks and outfitting modules.
2. **Digital Integration:** Use of PLM, ERP, and digital twin systems to enable real-time design-manufacture feedback, reducing rework and downtime.
3. **Workforce Continuity:** Retention of skilled trades and design teams across successive projects to preserve knowledge capital.
4. **Modular Construction:** Offsite (away from berth) pre-outfitting and just-in-time assembly, shortening Building Berth occupancy and enabling parallel operations.
5. **Supply Chain Alignment:** Early engagement with OEMs to ensure just-in-sequence delivery and consistent component quality.

Quantified Benefits

Applying the 80–90% learning curve to the Median and Maximum investment cases produces the following indicative outcomes:

- **Median Case (Five-Vessel Programme):** Cumulative labour-hour reduction of approximately 25–30% by the fifth vessel, equivalent to savings of £8–12 million per series.
- **Maximum Case (Ten-Vessel Programme):** Labour-hour reduction of 35–40% by vessel ten, equivalent to £25–30 million in cumulative savings over the programme.

These savings directly support the CAPEX payback periods modelled in Section 6 and are instrumental in achieving cost parity with leading European competitors.

Strategic Implications

These learning efficiencies also align with the UK's Green Shipbuilding Initiative and UK Export Finance sustainability goals, reflecting the government's current focus on green growth, decarbonisation, and expanding export capability for clean maritime technologies.

The productivity uplift generated through learning curve maturity underpins the UK's pathway to competitiveness. It allows domestic yards to match European cost benchmarks within 6–8 years when coupled with targeted infrastructure and digital investment. Moreover, these efficiency principles apply equally to commercial and defence shipbuilding programmes, providing shared benefits across the national industrial base.

Alignment is therefore not limited to *Maritime 2050* but also complements current cross-sector initiatives such as the UK Shipbuilding Enterprise for Growth (UKSEOG, 2024) and the Offshore Wind Industrial Growth Plan (2024)—both of which advocate collaborative innovation, sustained order pipelines, and long-term workforce development as central enablers of industrial competitiveness.

9. Global Competitiveness Timeline.

This section presents a phased roadmap demonstrating how the UK can achieve global cost parity in Service Operation Vessel (SOV) construction within an 8-year horizon. The model draws on evidence from our research and benchmarking against European leaders.

These yards have achieved competitive advantage through sustained investment in automation, stable order books, and integrated digital ecosystems. The UK can replicate this trajectory through coordinated infrastructure, digital, and workforce investment.

Phased Competitiveness Roadmap (Years 1–8)

1. **Phase 1 – Foundation (Years 1–3):**
   - Implement infrastructure upgrades, digital baseline systems, and supplier onboarding.
   - Deliver the first 1–2 vessels under the Minimum or Median investment cases.
   - Establish consistent production planning and performance metrics.
   - Begin cross-yard collaboration to share design data and standardise modules.
2. **Phase 2 – Consolidation (Years 3–6):**
   - Expand production to a five-vessel series across multiple UK yards.
   - Achieve initial learning-curve maturity (80–85%) by vessel 3.
   - Introduce full modular outfitting and digital twin integration.
   - Secure repeat orders from wind farm developers and offshore operators.
3. **Phase 3 – Competitiveness and Export (Years 6–8):**
   - Reach cost parity with European yards included in the study—where cost competitiveness is assessed on a raw cost basis without allowance for state-backed or subsidy advantages and assuming hull construction within Northern Europe
   - Attain 70–78% UK content levels and export readiness.
   - Scale production to 8–10 SOVs annually through national collaboration.
   - Embed continuous improvement frameworks for future vessel generations.

The roadmap ensures the UK's approach remains resilient to changing market conditions and transferable across other vessel types. This strategy reinforces policy goals within Maritime 2050 and the Clean Maritime Plan.

Benchmarking Against Global Competitors

European yards typically sustain competitive advantage through four key attributes: high workforce productivity, lower wages, efficient modular processes, and digital integration. UK benchmarking shows that adopting these practices – combined with regional investment – reduces the unit cost gap from approximately 20% to under 5% within eight years.

Globally, Eastern yards, maintain lower labour costs but face longer delivery cycles and reduced flexibility in specialised offshore builds, giving the UK a potential niche in high-complexity, low-emission SOV markets.

High Level Overview of Automation and Modularisation Levels

Automation (robotic welding, CNC cutting, automated panel lines) and modular construction (pre-outfitted block assembly) are core enablers of modern shipyard efficiency.

Region	Automation Level (% Key Processes)	Modularisation Level	Notes
South Korea	60–80%	Extensive	Robotic welding, AI inspection
China	40–60%	Extensive	Rapid modularisation expansion
Western Europe	20–40%	Moderate	High quality but limited scaling
United Kingdom	10–30%	Limited	Heavy reliance on manual trades; limited modular adoption

UK yards trail on automation and modular construction adoption, increasing man-hours per vessel and extending production timelines

Resilience to Market Shifts

This competitiveness model is designed to remain robust under varying market conditions. Even if offshore wind development schedules fluctuate, the core capabilities - modular fabrication, automation, and advanced design – are transferable to adjacent markets such as defence support vessels, research ships, and offshore energy construction platforms.

This cross-sector adaptability ensures sustained utilisation of the upgraded facilities and mitigates exposure to single-sector volatility.

Alignment with Current Policy and Industrial Strategy

In addition to the listed frameworks, this section also aligns with the UK Defence and Security Industrial Strategy (DSIS, 2021), which promotes dual-use shipbuilding infrastructure and collaboration across defence and commercial sectors.

It also supports the objectives of the Levelling Up White Paper (2022), emphasising regional regeneration and skilled employment creation within coastal and industrial communities—core outcomes of the UK shipbuilding modernisation agenda. The proposed competitiveness roadmap aligns with key government frameworks beyond the *National Shipbuilding Strategy Refresh (2023)*.

It directly supports:

- **UK Shipbuilding Enterprise for Growth (UK SEG, 2024):** Promoting export-led

industrial collaboration.

- **Offshore Wind Industrial Growth Plan (2024):** Advancing UK manufacturing participation in offshore supply chains.
- **Clean Maritime Plan Refresh (2024):** Driving adoption of low-emission vessel technologies.
- **Maritime Decarbonisation Innovation Roadmap (2024):** Supporting innovation in green shipbuilding and propulsion.

Collectively, these frameworks provide policy continuity for the UK's journey toward global cost parity while reinforcing the link between clean growth, industrial resilience, and export competitiveness.

10. Digital Transformation & Design Ownership.

Digital transformation and control of intellectual property (IP) in ship design are key enablers of competitiveness and value retention. Across all three investment scenarios, the degree of digital integration directly influences productivity, quality assurance, and long-term capability development. Ownership of vessel design, combined with data-driven build processes, ensures that lessons learned are captured within the UK supply chain rather than exported through foreign design houses.

Digital shipbuilding can also contribute directly to the UK's decarbonisation goals. Through the adoption of digital twin technology, advanced design-for-production modelling, and integration of hybrid or methanol-ready propulsion systems, shipyards can significantly reduce lifecycle emissions from design through to operation. Digital tools enable optimisation of hull forms and propulsion configurations, minimising resistance and improving fuel efficiency. By embedding energy performance data into design workflows, each vessel becomes part of a feedback-driven improvement cycle. This approach supports the Clean Maritime Plan and Maritime Decarbonisation Innovation Roadmap, ensuring that new builds not only meet regulatory standards but actively accelerate the transition to low- and zero-emission operations.

Harmonised Hybrid Design Strategy

The proposed design approach for UK shipyards is a hybrid model, combining in-house naval architecture and engineering oversight with selective collaboration from specialist design partners. This allows domestic builders to retain critical design authority and IP while accessing niche expertise for advanced systems such as propulsion integration and offshore access technology.

The model emphasises the development of standardised SOV platforms – configurable for multiple clients – rather than bespoke one-off designs. This approach mirrors successful European practices where a single parent design supports multiple vessel variants, creating efficiency and brand recognition. Examples of European parent design strategies include Damen's 90-100m Service Operation Vessel (SOV) series, Ulstein's SX series with X Bow hull form, and VARD's 4 19 and 4 12 designs. Each uses a core platform architecture that supports multiple variants (e.g., hybrid, battery ready, and methanol ready), reducing non-recurring engineering costs and accelerating time to market. Their relevance lies in proving that design standardisation across client types (wind, subsea, and offshore support) can yield substantial savings, brand recognition, and lifecycle maintainability—principles directly transferable to the UK's ambition for a scalable SOV design family.

Role of Digital Systems and Integration

1. **Product Lifecycle Management (PLM):** A centralised digital backbone connecting design, procurement, and production, enabling real-time coordination between engineering and manufacturing teams.

2. **Digital Twin Technology:** Live digital replicas of each vessel used to simulate construction sequences, system performance, and maintenance profiles. These enable predictive maintenance, improved quality control, and shorter commissioning times.
3. **Enterprise Resource Planning (ERP) and Data Analytics:** Integration of ERP systems ensures traceability across procurement, production, and cost control. Data analytics provide continuous feedback loops for process optimisation.
4. **Design-for-Production (DfP):** Embedding manufacturing constraints into design workflows to minimise rework and engineering change orders.

These technologies, implemented in a phased manner, underpin the transition from traditional build methods to a fully digital shipyard ecosystem. Under the Maximum Case, digital twin and PLM systems are fully integrated across design and build stages, ensuring cross-yard data consistency and enabling remote design collaboration between UK facilities.

Intellectual Property (IP) Retention and Value Creation

Owning the vessel design and associated digital models is critical to establishing sovereign capability.

IP retention allows UK yards to:

- Protect and reuse digital assets for future projects.
- License proven designs to allied or commercial partners.
- Support lifecycle service contracts, creating long-term revenue streams beyond construction.

By contrast, reliance on client-supplied designs typically results in IP loss and limited downstream value. The proposed model prioritises UK-led concept development, with shared risk/reward structures for foreign design partners where necessary. This ensures that core vessel data, including digital twins, remain within UK ownership.

Enabling Conditions

To achieve this transformation, several enabling conditions must be met:

- **Investment in Digital Infrastructure:** Establish national standards for data interoperability between shipyards, OEMs, and classification societies.
- **Training and Upskilling:** Expand digital literacy programmes for engineers, naval architects, and production managers. Paving the future towards design ownership.
- **Cybersecurity and Data Governance:** Implement robust systems to secure proprietary design data across connected facilities.

Together, these measures form the digital foundation for a sustainable, competitive UK shipbuilding sector. They create the conditions for future innovation – linking design, production, and operational feedback in a closed-loop system that maximises efficiency, quality, and export potential.

11. Workforce Development & Employment Impact.

A skilled, adaptable, and future-ready workforce is central to achieving the UK's long-term competitiveness in shipbuilding. The transition from traditional, project-based construction to digitally enabled serial production requires a substantial shift in both the scale and composition of the national workforce. Investment in people – through training, apprenticeships, and digital literacy – is as vital as investment in infrastructure.

Digital literacy and workforce development combined also have the potential to influence the UK's maritime decarbonisation strategy. Upskilling initiatives must include specialised training in alternative fuels, hybrid propulsion integration, and sustainable construction practices. New curricula can cover methanol handling, battery safety, emissions monitoring, and energy management, ensuring that engineers, fabricators, and system technicians have the capabilities to support clean vessel technologies. Establishing regional training hubs for digital and green shipbuilding will embed sustainability awareness across all skill levels. This ensures that the national workforce transformation aligns directly with decarbonisation objectives, linking human capital investment with environmental outcomes and creating a culture of innovation and responsibility throughout the maritime supply chain.

Jobs Created and Safeguarded

The employment impact varies across the investment scenarios[5]:

- **Minimum Case:** Maintains approximately 50 direct jobs per yard, focused on sustaining existing operations.
- **Median Case:** Supports 200–300 high-value roles across production, engineering, and supply chain management, driven by moderate automation and modularisation.
- **Maximum Case:** Generates and sustains 400–500 direct, high-value jobs per yard, with additional 1,000–1,500 indirect jobs created across the UK supply chain.

Applying these outcomes nationally across four to five participating shipyards equates to 2,000–2,500 direct jobs and up to 6,000 total jobs when including the extended supply chain, logistics, and support services. These roles span skilled trades, digital engineering, project management, and quality assurance, ensuring a diverse employment base that supports regional regeneration.

[5] The employment figures presented across the three investment scenarios were derived through proportional scaling of workforce requirements based on man hour intensity, automation levels, and facility throughput assumptions. The modelling used established productivity ratios for medium complexity commercial vessel builds, with workforce scaling adjusted according to the degree of modularisation and digital integration. The Minimum Case reflects a static maintenance workforce to sustain current output; the Median Case incorporates incremental demand for multi trade labour, supervisors, and engineers as modularisation increases; and the Maximum Case assumes a fully serial production environment with concurrent vessel assembly and expanded supply chain participation. Indirect employment multipliers of 2.5–3.0× were applied in line with UK maritime economic benchmarks to estimate broader job creation effects.

Skills and Training Hubs

A coordinated approach to workforce and academic collaboration will remain vital to sustaining shipbuilding modernisation in the UK. Partnerships between UK maritime colleges, universities, and specialist training institutes – collectively recognised as national Centres of Excellence or hubs in engineering, and digital manufacturing – will continue to drive training, research, and innovation. Together, these institutions work closely with industry to align education and apprenticeship programmes with emerging technologies such as automation, robotics, digital twin systems, and alternative fuel propulsion.

This collaborative framework ensures that the national skills pipeline remains responsive to the changing demands of the sector, enabling UK yards to develop the specialist competencies required for a modern, competitive, and sustainable shipbuilding workforce. It also strengthens the UK's position as a leader in advanced manufacturing and supports regional regeneration through the creation of high value, future ready employment opportunities.

The hubs would deliver:

- Apprenticeship expansion and upskilling for existing workers.
- Joint industry-academic research placements.
- Continuous professional development in digital shipbuilding tools.

Workforce Transition and Inclusion

A managed transition strategy is required to ensure the existing workforce adapts to new digital systems, automation technologies, and the adoption of future vessel technologies. This includes training for systems related to alternative fuels, offshore charging infrastructure, and digital and remote vessel management - ensuring that engineers and operators are prepared for the next generation of low-emission and smart shipping solutions.

Training programmes must focus on:

- Digital literacy for supervisors, production planners, and engineers.
- Integration of AI-assisted design and production tools.
- Promoting diversity and inclusion, ensuring women and under-represented groups gain access to maritime careers.

Economic and Social Value

Investment in workforce development not only generates direct employment but also drives measurable long term economic returns. The multiplier of £2.5 million in long term value for every £1 million invested is derived from recognised economic impact models such as HM Treasury's Green Book and the ONS Input Output tables.

These frameworks quantify how each unit of investment circulates through the economy via three linked effects:

1. **Direct Impact:** The immediate value created within shipyards and training centres through wages, materials, and local procurement.

2. **Indirect Impact:** Additional output generated within the supply chain – such as steel, fabrication, accommodation, and service providers – that support shipyard operations.
3. **Induced Impact:** Wider economic activity stimulated when employees and suppliers spend their earnings locally, supporting retail, transport, and community services.

For illustrative purposes, these mechanisms create a composite multiplier of approximately 2.5 times, meaning that for every £1 million spent on workforce and capability development, £2.5 million in total economic activity is generated.

Worked Example 1 – £1 Million Investment

- **Direct impact:** £1.0M spent on salaries, training programmes, and equipment.
- **Indirect impact:** £0.9M generated through supply chain procurement and subcontracted services.
- **Induced impact:** £0.6M generated by employee spending and local business growth.
- **Total Economic Value:** £2.5M.

Worked Example 2 – £55 Million Investment (Baseline Yard Modernisation)

£55M initial investment in facilities, training, and automation creates:

- £55M direct impact (construction, machinery, wages).
- £49.5M indirect supply chain effect.
- £33M induced effect through wider economic activity.
- **Total Value to UK Economy:** Circa £137.5M.

Worked Example 3 – £75 Million Investment (Full Modernisation and Digital Integration)

£75M direct expenditure on infrastructure, robotics, and digital systems produces:

- £75M direct value.
- £67.5M indirect effect through supplier engagement.
- £45M induced effect from reinvestment in the regional economy.
- **Total Value to UK Economy:** Roughly £187.5M.

These examples are indicative and demonstrate that workforce and capability investments deliver disproportionate national benefits, supporting the Treasury's fiscal return forecasts cited in this report. The multiplier reflects sustainable, traceable impacts rather than speculative modelling, aligning with established national guidance for evaluating industrial programmes.

Alignment and Strategic Relevance

While this section avoids reiterating previously referenced policy frameworks, workforce development aligns naturally with broader national objectives for industrial skills growth, regional levelling, and STEM education enhancement. The approach directly complements initiatives led by the Department for Education and Innovate UK focused on high-value manufacturing and digital upskilling.

In summary, the UK's shipbuilding renaissance depends as much on its people as on its facilities. A coordinated investment in workforce capability will ensure that modernised shipyards not only meet current SOV demand but also position the UK for future commercial and defence opportunities, underpinning long-term economic resilience.

12. UK Content & Supply Chain Integration.

Maximising UK content across the Service Operation Vessel (SOV) build programme is fundamental to achieving both economic return and national industrial resilience. The proportion of UK-sourced materials, components, and labour directly correlates with the scale of investment in facilities, digital systems, and supplier development. This section summarises how UK content can grow from its current baseline to levels comparable with European leaders through a structured localisation strategy.

UK Content Across Scenarios

The analysis presented in the Projected UK Content Feeder Report (2025) identifies clear growth potential across the three investment cases:

- **Minimum Case:** 31–36% UK content. Limited domestic manufacturing and high import reliance for propulsion, automation, and outfitting systems.
- **Median Case:** 48–55% UK content. Introduction of modular construction, early supplier framework agreements, and partial localisation of electrical and accommodation systems.
- **Maximum Case:** 70–78% UK content. Full integration of OEM suppliers across hull fabrication, outfitting, and major systems such as propulsion, deck equipment, and control integration.

These percentages equate to an estimated £40–50 million per vessel retained within the UK economy under the Maximum Case, compared to £15–20 million under the Minimum Case.

OEM Supplier Opportunities

Supply chain analysis identifies substantial opportunities for domestic suppliers to increase participation across key system categories:

- **Propulsion and Power Systems:** UK OEM's have potential to localise assembly of hybrid and methanol-ready propulsion packages.
- **Electrical and Control Systems:** UK OEM's could expand production of switchboards, automation systems, and DP2 control equipment.

- **Accommodation and HVAC:** UK OEMs can deliver full turnkey interior outfitting from UK facilities.
- **Hull Fabrication and Outfitting Steelwork:** Many UK yards already possess the fabrication capacity required to execute modular steel block production.

Strengthening these supply chains will require early framework agreements, pre-qualification investment, and shared digital standards to ensure interoperability between yards and suppliers.

Regional Economic Impact

Enhancing UK content has a direct multiplier effect on regional economies. Every additional 10% increase in domestic supply chain participation contributes an estimated £80–100 million in gross value added (GVA) nationally over a five-year period[6]. The economic benefits extend to logistics, materials, professional services, and post-delivery support activities, amplifying social value across coastal regions.

Supply Chain Digitalisation and Collaboration

Digital integration between yards and suppliers is essential to unlocking full value from increased UK content.

The adoption of shared PLM and ERP systems across the supply chain will enable:

- Real-time design and production data exchange.
- Improved quality control and traceability of UK-sourced components.
- Reduced lead times through just-in-sequence delivery models.

A centralised UK Shipbuilding Supplier Portal should be considered to connect OEMs, and SME suppliers, improving visibility of upcoming contracts, certification requirements, and digital readiness. This aligns with ORE Catapult's objective to create an open, innovation-driven maritime ecosystem.

Strategic Summary

Achieving 70–78% UK content is both an industrial and strategic goal. It represents a shift from import dependency to domestic capability, ensuring that economic benefits are retained within the UK while building a resilient, digitally connected supply chain.

Beyond offshore renewables, this integrated supply base will support defence and commercial vessel projects, reinforcing national manufacturing strength and long-term competitiveness.

[6] The estimation that every additional 10% increase in domestic supply chain participation contributes approximately £80–100 million in Gross Value Added (GVA) nationally over a five year period is derived from applying industry standard economic multipliers from the UK Government's Maritime Sector Economic Impact Assessment (DfT, 2023) and the ONS Input Output Analytical Tables (2022). These datasets quantify the GVA elasticity of manufacturing and shipbuilding supply chains relative to incremental localisation. The analysis assumed an average domestic procurement value of £800 million across the five year investment window, with a sectoral multiplier of 1.8–2.0× for downstream economic effects in logistics, materials, and professional services. This approach aligns with the modelling principles in HM Treasury's *Green Book (2022)* and provides a conservative estimate of the wider economic and social value of increasing UK content.

13. Strategic Risk & Mitigation.

This section summarises the key strategic and operational risks identified across all of our research in narrative form, replacing the detailed tables for brevity. In addition, reputational risk to stakeholders is also recognised - drawing lessons from recent public-sector shipbuilding projects.

Poor programme delivery or communication could undermine public and investor confidence, damage political trust, and affect future funding access. Appropriate governance, transparent reporting, and independent oversight are therefore essential to protect reputational integrity.

The principal risks fall into seven overarching categories:

- **Financial:** Potential delays or shortfalls in funding, particularly in accessing government-backed guarantees. Mitigation focuses on early engagement with public finance bodies and diversified investment models.
- **Market:** Uncertainty in offshore wind development schedules could disrupt order pipelines. Proactive alignment with developer timelines and diversification into defence and commercial markets are essential.
- **Supply Chain:** Capability and capacity gaps within domestic suppliers present challenges to modular and digital production. Structured onboarding, digital readiness programmes, and framework agreements will reduce exposure.
- **Workforce:** Skills shortages in automation and digital shipbuilding, which require unique skills, remain a high-impact risk. Establishing regional training hubs, apprenticeship schemes, and partnerships with universities mitigates this threat.
- **Technology:** Slow adoption of digital systems and automation can impede efficiency gains. A phased roll-out with pilot projects and targeted training reduces this risk.
- **Policy and External Factors:** Shifts in government priorities, global material price volatility, or increased subsidies for competitors could affect long-term competitiveness. Maintaining policy engagement and building export capability ensure resilience.

Overall, these risks are well understood and manageable through coordinated governance and continuous monitoring.

A concise SWOT analysis is summarised below:

- **Strengths:** Established infrastructure, skilled workforce, and strategic location within the offshore wind supply chain.
- **Weaknesses:** Legacy facilities and fragmented digital systems.
- **Opportunities:** Expansion into low-emission vessel markets, regional regeneration, export growth, and the ability to manufacture vessels for the defence sector more efficiently using advanced modular and digital production techniques.
- **Threats:** Competitive subsidies abroad, potential policy instability, and increased cost of labour arising from government policy changes such as higher taxation or employment levies. For detailed quantitative assessments, the full risk register and SWOT matrix are provided in Appendix A.

14. Consolidated Findings & Implications.

This section brings together the findings from all preceding analyses – economic modelling, workforce development, digital transformation, and supply chain localisation - to present a holistic view of the UK's opportunity to establish competitive, sustainable SOV manufacturing. It evaluates the comparative outcomes of the Minimum, Median, and Maximum investment scenarios, identifies the wider economic and social implications, and defines the strategic consequences of inaction.

Comparative Outcomes of Investment Scenarios

- **Minimum Case:** Represents continuity with the status quo. Without significant investment, UK yards remain dependent on foreign designs and imported systems, with limited domestic job creation. UK content plateaus at around 30–35%, and global competitiveness remains out of reach.
- **Median Case:** Demonstrates tangible progress toward competitiveness. A moderate investment of £20–35 million per yard delivers a five-vessel series programme, 48–55% UK content, and ROI within 5–7 years. This case establishes a foundation for digital adoption and workforce development but still relies partly on imported systems.
- **Maximum Case:** Unlocks full strategic potential. With £55–75 million investment per yard, the UK achieves 70–78% UK content, full digital and modular integration, ROI in 3–5 years, and cost parity with leading European builders. It sustains 400–500 high-value jobs per yard and underpins long-term export capability.

Consequences of Inaction

Failure to invest carries measurable industrial, economic, and reputational costs:

- Continued reliance on imported vessels and loss of domestic capability.
- Missed opportunity to capture up to £2.5–3 billion of UK value across future SOV builds.
- Declining relevance in global shipbuilding supply chains.
- Reduced employment and skills erosion in key maritime regions.
- Damage to the UK's credibility as a maritime manufacturing nation.

The consequences of inaction would not only forfeit near-term economic gains but also erode the UK's strategic autonomy in delivering offshore renewable infrastructure. In addition, it would reduce or limit sovereign capability for future critical infrastructure which is particularly relevant in todays fractured geopolitical landscape. Furthermore, it will undermine broader national objectives outlined in the UK's published growth strategies – weakening future economic development, reducing industrial resilience for defence capability, and constraining progress in environmental and socio-economic regeneration. The absence of coordinated investment would therefore risk both the nation's competitiveness and its ability to deliver on long-term industrial and sustainability goals.

Integrated Implications

1. **Economic:** The Maximum Case delivers the greatest fiscal and industrial returns, generating over £20 million in annual Treasury revenues per regional yard and creating resilient local supply networks.
2. **Social:** Workforce expansion, training investment, and community regeneration contribute to the levelling-up agenda and strengthen coastal economies.
3. **Technological:** Digitalisation accelerates productivity and facilitates cross-sector innovation in ship design, automation, and future-fuel systems.
4. **Strategic:** Sovereign design and manufacturing capacity provide flexibility for future commercial, research, and defence vessel programmes, reinforcing the UK's maritime security and industrial resilience.

Conclusion

The evidence across all analyses demonstrates that the UK can achieve European cost parity and sustainable competitiveness within 6-8 years under the Maximum investment scenario.

This outcome depends on coordinated action between government, industry, and financial stakeholders to deliver the required infrastructure, digital capability, and workforce transformation. The investment will position the UK not only as a self-sufficient builder of SOVs but also as an exporter of advanced, low-emission maritime technology.

15. Conclusion and Forward Outlook.

The culmination of this business case demonstrates that a competitive, digitally enabled UK shipbuilding sector is both technically achievable and economically compelling. By integrating strategic investment across infrastructure, digital systems, and workforce capability, the UK can secure its position as a sovereign leader in offshore renewable vessel construction while diversifying into adjacent commercial and defence markets.

Key Takeaways

1. **Industrial Competitiveness:** The UK is positioned to reach cost parity with leading European yards within the next decade under the Maximum investment scenario.
2. **Economic Return:** Nationally coordinated investment could yield over £3 billion in domestic value creation, significant Treasury returns, and long-term fiscal resilience.
3. **Sovereign Capability:** Establishing design ownership, IP retention, and advanced manufacturing facilities enhances national security and reduces dependency on imported assets.
4. **Cross-Sector Benefits:** The same infrastructure and workforce improvements underpin future commercial and defence vessel production, contributing to national resilience and export growth.
5. **Sustainability and Innovation:** Digital transformation and clean maritime technologies will enable compliance with future decarbonisation targets while supporting innovation in low-emission propulsion and autonomous systems.

Forward Outlook

The next phase of this work should focus on converting these findings and any further findings from stakeholder engagement into an actionable National Implementation SOV Plan. This would define governance structures, investment sequencing, funding mechanisms, and regional delivery frameworks.

Immediate priorities include:

- Establishing a central coordinating body between government, industry, and finance to oversee SOV programme delivery.
- Expanding supplier engagement and regional workforce programmes to ensure readiness for scale-up.

Now is the moment for the UK to move from analysis to action – building a modern, resilient shipbuilding industry that powers clean energy, strengthens defence, and reclaims its place as a world leader in maritime manufacturing. The evidence is clear, the industrial momentum is building, and the opportunity is immediate. If delivered with purpose and partnership, this transformation will define a generation of British maritime excellence – anchored in innovation, sustainability, and national pride.

Appendix A. UK Government Policy Frameworks Referenced.

Policy / Strategy	Year	Publishing Department / Organisation	Key Relevance to Report
Defence and Security Industrial Strategy (DSIS)	2021	BEIS / MOD	Promotes dual-use industrial capacity and cross-sector collaboration between defence and commercial shipbuilding.
Offshore Wind Industrial Growth Plan	2024	The Crown Estate / RenewableUK / Crown Estate Scotland / Offshore Wind Industry Council	Supports domestic participation in offshore wind supply chains and vessel construction through incentivised UK social value creation.
Clean Maritime Plan Refresh	2024	Department for Business and Trade	Establishes decarbonisation and clean fuel priorities for maritime transport.
Maritime Decarbonisation Innovation Roadmap	2024	Department for Business and Trade	Provides a framework for R&D in low-emission vessel technology and innovation funding.
Levelling Up White Paper	2022	Department for Levelling Up, Housing and Communities	Outlines regional regeneration and coastal economy development objectives.
UK Shipbuilding Enterprise for Growth (UKSEOG)	2024	Department for Business and Trade	Promotes export-led industrial collaboration and competitiveness.
High Value Manufacturing and Digital Upskilling Strategy	2024	Innovate UK	Provides national framework for advanced manufacturing skills and digital transformation.

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