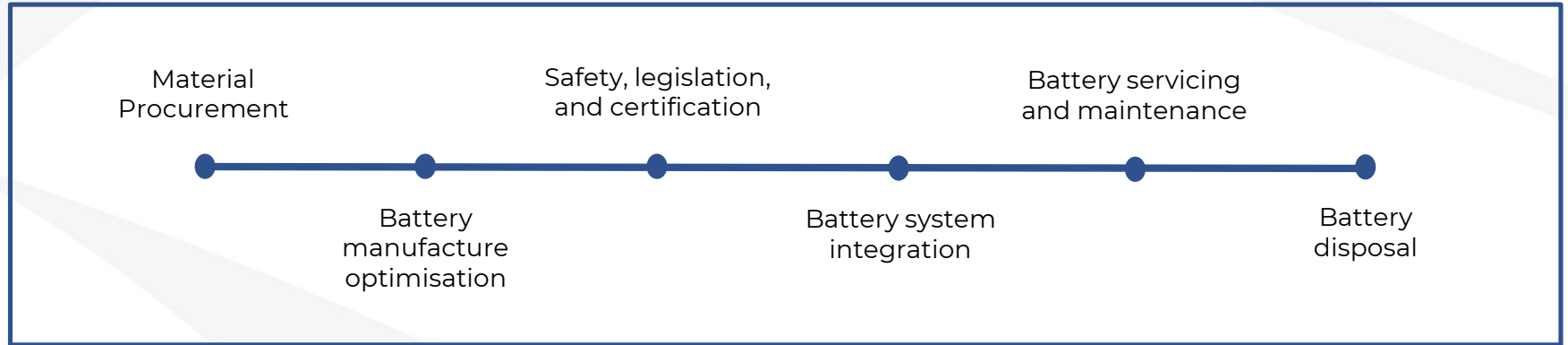


Horizon 2020 Framework Programme (H2020)
“Reducing the cost of large batteries for waterborne transport”
LC-BAT-11-2020
Project details and HSSMI’s contribution

The Project - Reducing the cost of large batteries for waterborne transport

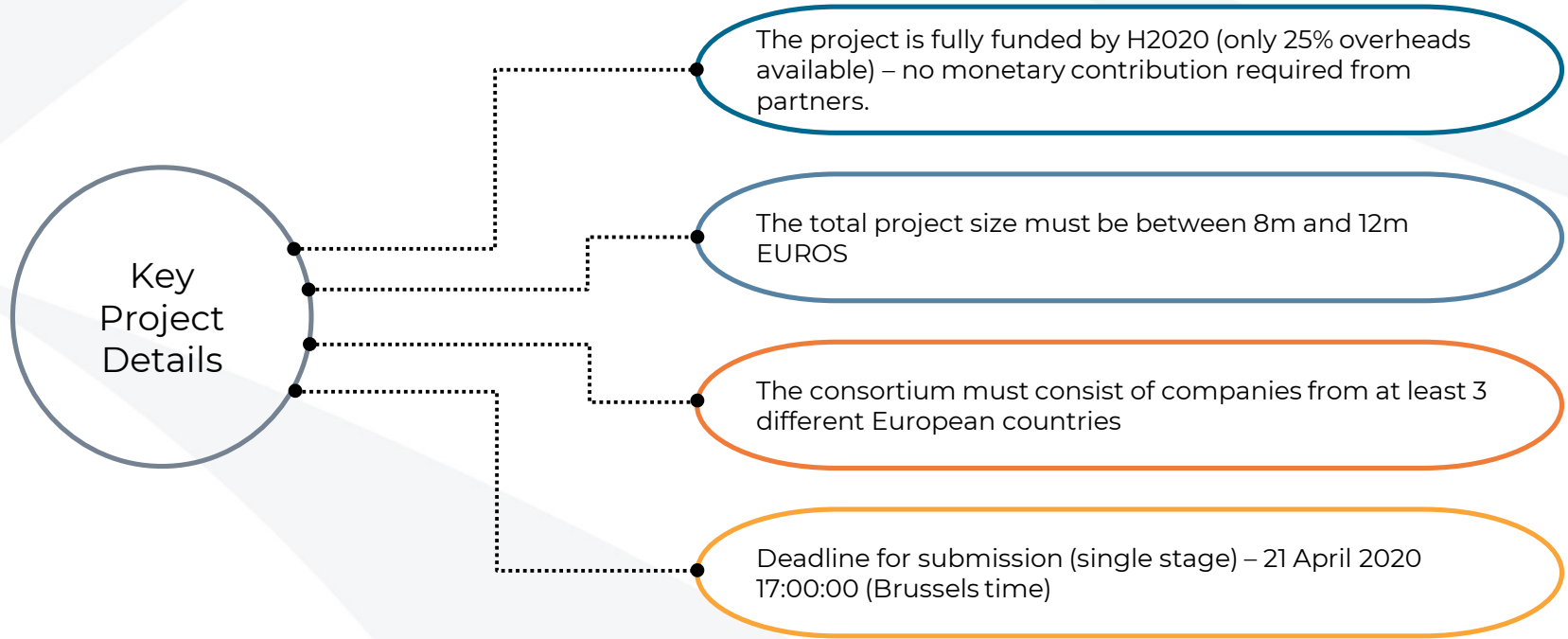
- Significant cost reductions must be achieved across the full lifecycle of the battery system. This includes:



- The H2020 waterborne battery call presents an opportunity to bring together experts from different sectors within Europe, address these challenges, and take a large step towards the electrification of the marine industry.

[Link to H2020 funding page](#)

Project Details



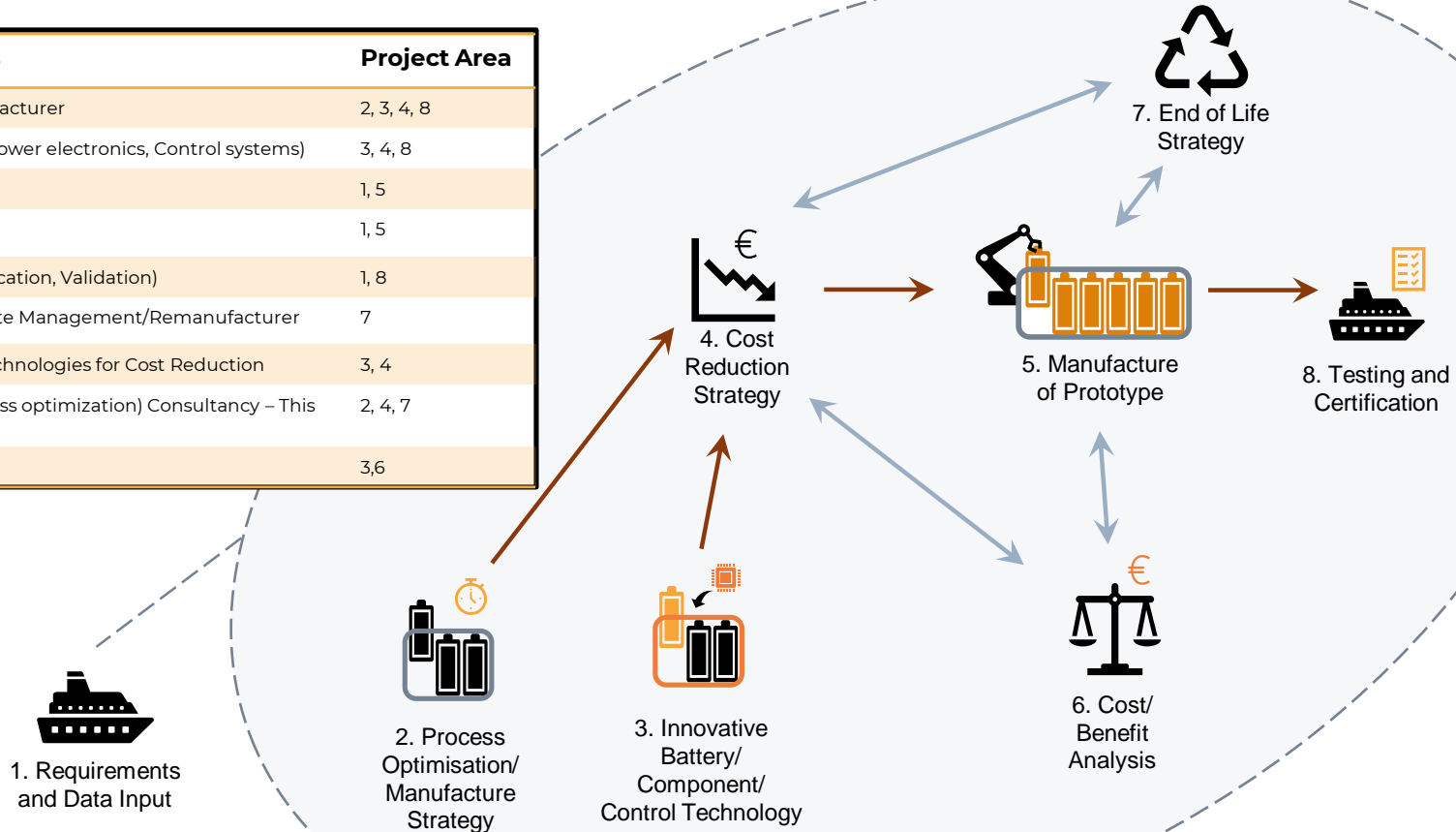
Project Scope

- There are ten requirements that the project must address. These are listed below along with the type of partners required to achieve them.

Project Requirement	Potential Partners
Research and develop a large battery system and/or specific battery cells that are substantially cheaper on a total cost basis with respect to existing system	Marine battery manufacturer, ship builder, systems integrator
Work should be applicable to battery systems of at least 1 MWh capacity.	Marine battery manufacturer, systems integrator
Prove the technology and manufacturing processes through system trials and testing	Marine battery manufacturer, ship builder, fleet operator
Address production process efficiency	HSSMI, marine battery manufacturer
Address the requirements for type approval from relevant authorities including a comprehensive risk-based safety assessment.	Flag authority, ship builder, marine battery manufacturer
Development of a marine battery certification methodology with the objective of validating and verifying safety, including the standardisation of test methods and tools for certification cost reduction.	Flag authority, ship builder, marine battery manufacturer, systems integrator
Considering of different vessel types, address the integration of battery systems into Energy/Power management system of vessel	Systems integrator, marine battery manufacturer, ship builder
Undertake a cost benefit analysis to convincingly demonstrate the cost savings in comparison to current state of the art waterborne battery technology	University
Assess end of life and disposal strategies.	HSSMI, battery recycling co.
Develop a convincing business case and consider potential financing models.	HSSMI, marine battery manufacturer, ship builder, fleet operator

Project Scope

Project Partners	Project Area
Marine Battery Manufacturer	2, 3, 4, 8
Systems Integrator (power electronics, Control systems)	3, 4, 8
Ship Builder	1, 5
Fleet Operator	1, 5
Flag Authority (Certification, Validation)	1, 8
Battery Recycler/Waste Management/Remanufacturer	7
Innovative battery Technologies for Cost Reduction	3, 4
Manufacturing (process optimization) Consultancy – This is HSSMI	2, 4, 7
University	3,6





HSSMI

HSSMI Experience and Contribution

HSSMI's Relevant Experience for this Project

- HSSMI's core expertise is in **manufacturing engineering**.
 - HSSMI have worked with the **automotive industry** for over 5 years, improving **manufacturing efficiencies**, incorporating **circular economy** principles, and supporting the transition from ICE engines to battery systems.
 - HSSMI have established a strong understanding of the battery industry.
 - HSSMI have successfully delivered 3 **marine** focussed research projects
- This expertise has been developed through extensive experience delivering manufacturing and battery focussed research projects, both from European funding bodies (H2020), and from UK funding bodies (Innovate UK, APC, Faraday Institution).

The insights and lessons learnt from our experience will be imperative for supporting the electrification of the marine industry



UK REEV Project - To develop the UK manufacturing and supply chain capability to re-shore the production of electric powertrains for the next generation London Taxi vehicles



Gigafactory Feasibility Study - To assess the feasibility of establishing a UK based, scalable battery cell manufacturing facility, with the capability to ramp up to a Gigawatt hour worth of cell production

HSSMI's Relevant Experience for this Project

- HSSMI have also delivered multiple marine focused research projects, developing strong relationships with leading innovators such as **Ferguson Marine** and **Thames Clippers**, as well as certification authorities such as **Lloyds Register** and the MCA.
- Our experience in the marine industry ranges from projects focussed on how to bring the shipbuilding industry into the fourth industrial revolution (IN 4.0 – **an Interreg funded project**), to projects concerned with the integration of **alternative propulsion technology** with vessels (HyDIME).
- HSSMI have ambitions to continue supporting the marine industry by **leveraging and transferring our manufacturing expertise** that we have developed through our experience within the automotive industry.



MV Shapinsay – the Orkney vessel that was fitted with a hydrogen injection system on HyDIME project



Thames Clipper – the vessel that HSSMI developed a holistic energy and asset management system for

HSSMI's Contribution to the Project

- Of the ten requirements that the project must address throughout its duration, HSSMI have the capability to lead and/or contribute to the delivery of the following 3 points:



Address production process efficiency.

- Supply chain analysis and optimisation
- Facility design and layout
- **Process flow optimisation**
- Waste stream analysis (materials and NVA processes)
- Assess economies of scale
- Assess opportunity of implementing **innovative** and **future focussed solutions** to enhance efficiency and productivity (e.g. automation, digital twins, advanced simulation, VR modelling, predictive maintenance)



Assess end of life and disposal strategies.

- Second life and EoL market and supply chain analysis
- Design and definition of strategies
- Second life process design and definition
- Implementation of design principles for **remanufacture**
- **Circular business model** development
- LCA analysis



Develop a convincing business case and consider potential financing models.

- Creation of detailed business case report built on the findings of the project
- Business opportunity (WHAT and WHY?)
- Business operation (HOW?)
- Financial model demonstrating any required investment, ROI, profit/loss etc.
- Environmental and social benefits – emissions reductions, job creation etc.

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