GLEAM NETWORK

GLEAM presents

Charting the Course: Manufacturing and Supply Chain Opportunities in Marine Renewables

Thursday 13th March | 10:00 - 14:30

The Bridge, University of Lincoln

Delivered by University of Lincoln · BRIDGE · Greater Lincolnshire · Business Lincolnshire · Humber Marine and Renewables

GLEAM NETWORK

Agenda

- 10:00 - 10:30: Optional Tour of the Bridge led by Dr Nick Riess & Dr Peter Eaton
- 10:30 - 11:00: Arrival, Coffee and Networking
- 11:00 - 11:10: Welcome and Introduction to the GLEAM Network by Dr Matthew Thornton, Commercial Manager, The Bridge
- 11:10 - 11:20: Introduction to Humber, Marine & Renewables by Camilla Carlbom Flinn, Director, Pentagon Marine Ltd
- **11:20 - 11:40: A Spotlight Session on Offshore Wind for Supply Chain Success by Helen Thomas, Team Lead for Supply Chain Development, RWE UK & Ireland**
- **11:40 - 12:00: The Experience of an Engineering SME in the Offshore Renewables Supply Chain by David Bacon, Managing Director, Bacon Engineering**
- 12:00 - 13:00: Lunch and Networking
- **13:00 - 13:20: Waste Heat: The Hidden Resource for Greener Maritime Transport by Dr Pouriya Niknam, Senior Lecturer, Lincoln University**
- **13:20 – 13:40: Green Kid: Championing Sustainability and Inspiring the Next Generation by Dr Robert McElroy, Senior Lecturer, Lincoln University**
- **13:40 - 14:00: Support for Innovation in the Sector, Trevor Durant, Manufacturing Advisor, Business Lincolnshire**
- 14:00 - 14:30: Optional Tour of the Bridge led by Dr Nick Riess & Dr Peter Eaton
- 14:00: Coffee and Networking
- 15:00: Close and Depart

GLEAM NETWORK

Creating a Manufacturing Community

GLEAM
NETWORK

- The Greater Lincolnshire Engineering And Manufacturing (GLEAM) Network is an initiative founded by the University of Lincoln, Greater Lincolnshire Local Enterprise Partnership (GLLEP), and Business Lincolnshire and managed by the Bridge.
- GLEAM provides a knowledge-intensive business corridor locally at the heart of the manufacturing business in Greater Lincolnshire and is open to all manufacturing businesses in Greater Lincolnshire. Members are able to join free of charge and gain access to a range of benefits, including Affiliate Partner Membership with Make UK.

Make UK Affiliate Membership Benefit

- Join Make UK as an Affiliate Member
- Make UK Affiliate Membership is open to members of Make UK partner organisations. You'll receive industry information and insight, contribute to Make UK's policy positions and have access to events, guidance and support on issues affecting our sector.
- To register for Affiliate Membership just complete the form at: https://www.makeuk.org/affiliate-member-registration

GLEAM NETWORK

GLEAM presents

Factory Tour of Eminox LTD: Exhaust Aftertreatment Systems

Wednesday 23rd April | 08:30am & 10:30am

Eminox LTD, Gainsborough, DN21 1QB

Delivered by University of Lincoln, BRIDGE, Greater Lincolnshire Local Enterprise Partnership, Business Lincolnshire The place to go for business growth, Eminox

Register Now at www.eventbrite.com/e/gleam-presents-factory-tour-of-eminox-tickets-1277812364179

BRIDGING BUSINESS WITH INNOVATION

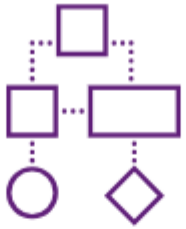
- Bridge operates from the University of Lincoln and has a dedicated team of R&D project specialists working alongside the University's academic community.
- We help businesses access technologies and methods at the forefront of research to create R&D solutions, and drive innovation.

UNIVERSITY OF LINCOLN
European Union
European Regional Development Fund
Greater Lincolnshire Local Enterprise Partnership
In partnership with
MIDLANDS ENGINE
BRIDGE

Bridge – Advanced Materials and Engineering R&D Centre

CONSULTATION AND 1-2-1 SUPPORT FOR BUSINESS DEVELOPMENT

Our process builds on an initial 1-2-1 consultation, roadmapping potential programmes from small-scale interventions to large-scale projects.



CREATION OF NEW PROCESS AND PRODUCT INNOVATION WITH OUR DEDICATED BRIDGE TEAM AND R&D PARTNERS

Bridge can address your advanced materials needs, assisting with new process creation and product innovation; providing access to world-class R&D at the interface of science and engineering through links to the University of Lincoln and a consortium of industry R&D partners.

MATERIALS RESEARCH AND INNOVATION

Bridge provides access to state-of-the-art instrumentation and laboratory workspaces. Our scientists and engineers are experienced in delivering cutting edge insight into materials

BRIDGE

Bridge – Advanced Materials and Engineering R&D Centre

EXPERT USE OF INSTRUMENTATION AND MATERIALS ENGINEERING LABORATORIES

Our dedicated team of specialists includes a community of expert Instrument Scientists. We can share that knowledge and help upskill your team by creating bespoke training packages.

BUSINESS NETWORKING AND COLLABORATION

Our dedicated innovation centre provides a quality environment for business interaction facilitating exchange of expertise and business opportunities. We host a range of networking events and seminars and our facilities are available for business-led events.

TRAINING AND PROFESSIONAL DEVELOPMENT

Bridge houses a dedicated training facility for on-site and remote learning alongside laboratory settings for at-instrument or in-lab training. Bridge gives you direct access to academic- and industry-experienced consultants to educate, develop and mentor your staff and they can upskill at our regular specialist courses.

BRIDGE

Bridge to…
Manufacturing Innovation

- With programmes designed to increase businesses' competitiveness, Bridge has delivered innovation to businesses and connected regional and international supply chains to cutting-edge materials science and engineering in the manufacturing and engineering sectors.
- Bridge has supported manufacturing businesses to access technologies at the forefront of research to deliver effective problem solving and to develop the workforce of tomorrow through accredited training.

BRIDGE

Watch the video at https://www.youtube.com/watch?v=MV4p10BlHJ0

- Visit our website for a virtual walkthrough of the Bridge at https://www.thebridge-lincoln.org/

- Follow us on:
  - https://www.linkedin.com/company/thebridge-lincoln
  - https://twitter.com/thebridge_linc
  - https://www.instagram.com/bridge_lincoln/

- E. mthornton@lincoln.ac.uk

BRIDGE

FUNDED BY:
European Union
European Regional Development Fund
MIDLANDS ENGINE
UNIVERSITY OF LINCOLN

Introduction to Humber, Marine & Renewables

by Camilla Carlbom Flinn,
Director, Pentagon Marine Ltd

GLEAM NETWORK

Join HUMBER MARINE AND RENEWABLES to develop and grow!

HUMBER MARINE AND RENEWABLES

Camilla Carlbom Flinn - Director

HUMBER MARINE AND RENEWABLES

OWC 2025 OFFSHORE WIND CONNECTIONS

Humber Renewables Awards 2025

Windy Millers

HUMBER MARINE AND RENEWABLES

ONE Voice.
ONE Ambition.

OWC 2025
OFFSHORE WIND CONNECTIONS

- Business development - creating a powerhouse of businesses working in the maritime and renewables sectors.
- Marketing – Exhibitions, conferences and events
- Identification of skills needs, sourcing of skills training provision, and linking education to employers.
- Relationship building between other Cluster organisations
- Encouraging research, development and innovation between businesses and across all sectors.
- Take a lead role in promoting the Humber’s interests on regional, national and international stages.

HUMBER MARINE AND RENEWABLES

Services offered by members

- Port and Portside Services
- Fabrication & Assembly
- Offshore Wind developers
- Offshore wind components mfg.
- Offshore Turbine Access & Maintenance
- Vessel operation & Charter
- Shipbuilding & Repair
- Offshore Engineering
- Subsea Engineering & Diving Support
- Marine Services & Consultants (Surveyors/Naval Architects/Coatings etc)
- Marine Electrical/Electronics Engineering (instrumentation/HVAC)
- Marine Equipment (doors/hatches/hydraulics/deck machinery/lifting & handling)
- Maritime, Safety & Offshore Training (also Safety equipment & clothing)
- Specialist Shipping & Logistics
- Legal & Professional Services
- Environmental Impact Assessment
- Satellite Services and Data
- Policy Issues and Influence

HUMBER MARINE AND RENEWABLES

"Some of our members"

UNIVERSITY OF LINCOLN

HUMBER MARINE AND RENEWABLES

UK Partners & Affiliations

NORTH YORKSHIRE COUNCIL

EAST RIDING OF YORKSHIRE COUNCIL

Hull City Council

NORTH EAST LINCOLNSHIRE COUNCIL www.nelincs.gov.uk

NORTH LINCOLNSHIRE COUNCIL

Grimsby Institute

aura

UNIVERSITY OF LINCOLN

MERSEY MARITIME

Engineering UTC Northern Lincolnshire

The Supply Chain Network

Department for International Trade

ergo the connected environment supporting businesses in renewables and environmental technologies

renewableUK The voice of wind & marine energy

MARITIME UK

EEEGR EAST OF ENGLAND ENERGY GROUP

HUMBER MARINE AND RENEWABLES

International Partners & Affiliations

ENERGY INNOVATION CLUSTER

RHODE ISLAND COMMERCE CORPORATION

BUSINESS NETWORK for OFFSHORE WIND

NYOffshore WindAlliance

North Sea Energy Gateway

AMSTERDAM IJMUIDEN OFFSHORE PORTS

New Bedford Wind Energy Center

wab windenergie agentur

germanwind

RHENUS CUXPORT

NovaVis Strategic Energy Innovation

Wind EUROPE

windcluster NORWAY

KEA 대한전기협회 KOREA ELECTRIC ASSOCIATION

KSNU KUNSAN NATIONAL UNIVERSITY

HUMBER MARINE AND RENEWABLES

Our Annual Conference & Exhibition OWC2025
www.offshorewindconnections.com 30th April - 1st May 2025

The Humber Renewables Awards and Gala Dinner will take place on the evening of 1st May after OWC.
www.humber-renewables.com

OWC2025 will be in it's twelfth year!

Humber Renewables Awards 2025

A Spotlight Session on Offshore Wind for Supply Chain Success

by Helen Thomas, Team Lead for Supply Chain Development, RWE UK & Ireland

GLEAM NETWORK

RWE

Spotlight Session:

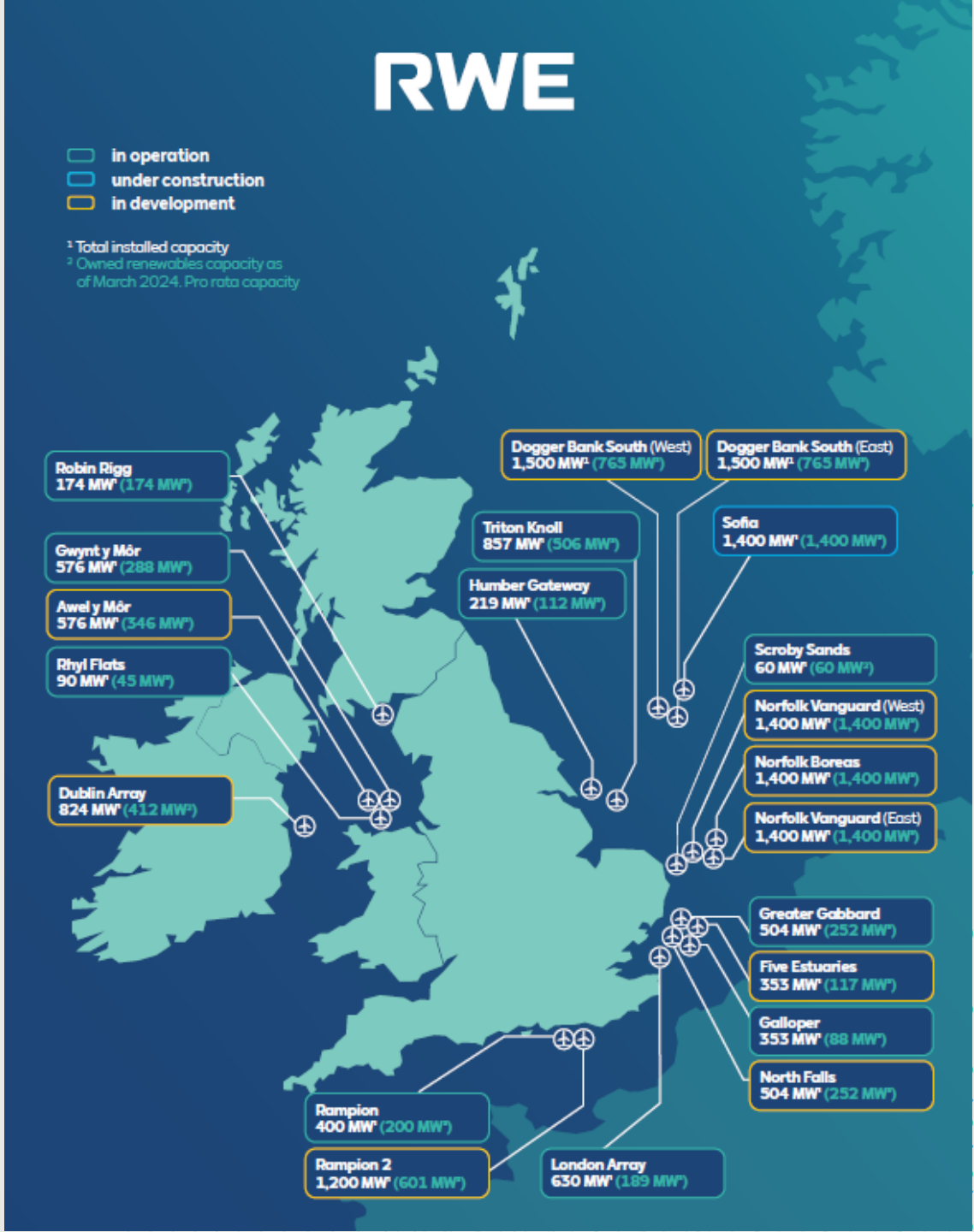
Offshore Wind Supply Chain Success

A presentation for GLEAM and Humber Marine and Renewables

RWE in the UK & Ireland

- 33 Onshore wind farms
- 10 Offshore wind farms in operation
- **10 Offshore wind farms in development**
- 21 Hydroelectric sites
- 1 Biomass plant
- 22 Solar farms in development

With further ambitions in Carbon Capture and storage, Airbourne wind and battery storage.



The Supply Chain Development & Skills Teams – UK & Ireland

Zoe Keeton – Head of Stakeholders & Local Markets

Helen K Thomas – Team Lead

Graham Wright – Senior SCDM Sofia & Dogger Bank South

Carla Diniz de Aguiar –

Senior SCDM Norfolk Projects

David Terry – SCDM

Five Estuaries

Jordan O'Neill – SCDM Awel y Mor & Dublin Array (Irish Sea)

Aitana ('T') Ramon Guillena – SCDM for Norfolk Projects

Hannah Woodgate – SCDM Rampion 2 & Skills

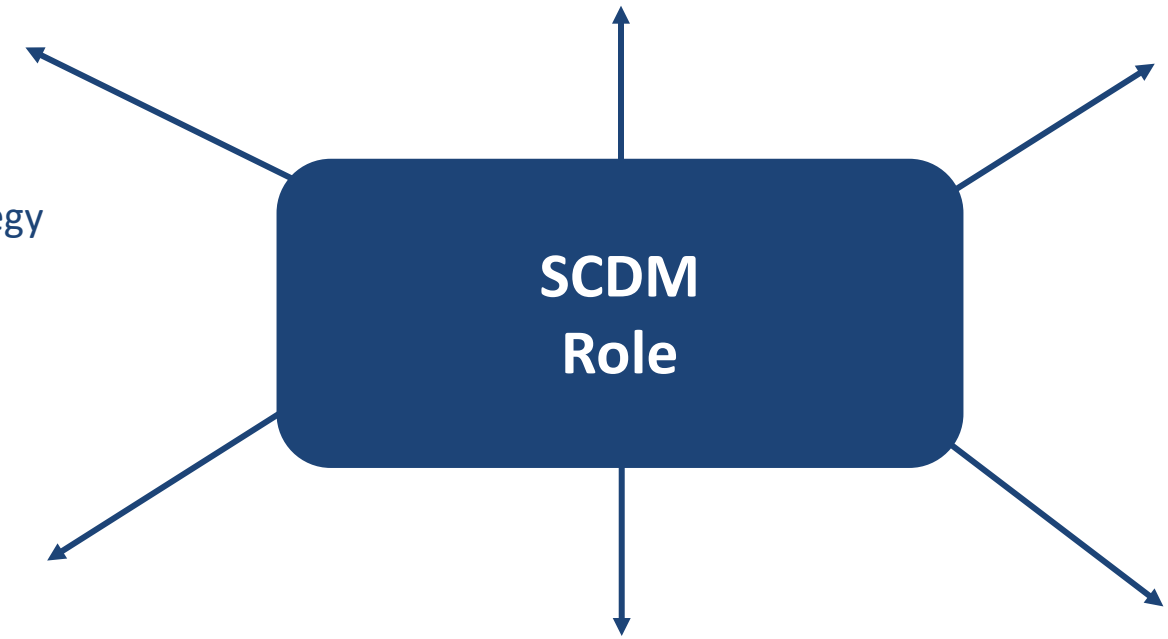
Celia Anderson – Skills Strategy Lead UK & Ireland

Michelle Russell – Skills Support Manager

Supply Chain Development Managers (SCDM) Role at RWE

Supply chain policy development
- Shaping and lobbying
- Industrial Strategy input
- Non-price factor activities

Build developer-supplier relationships & others
- OEMs
- Tier 1s
- Tiers 2&3
- SMEs
- R&D/Innovation
- Skills bodies (via Skills Strategy Manager)
- Trade Bodies
- Supply Chain Clusters



Auction eligibility
- Local content & regulatory requirements
- Clean Industry Bonus (CIBs)
- Other linked activities

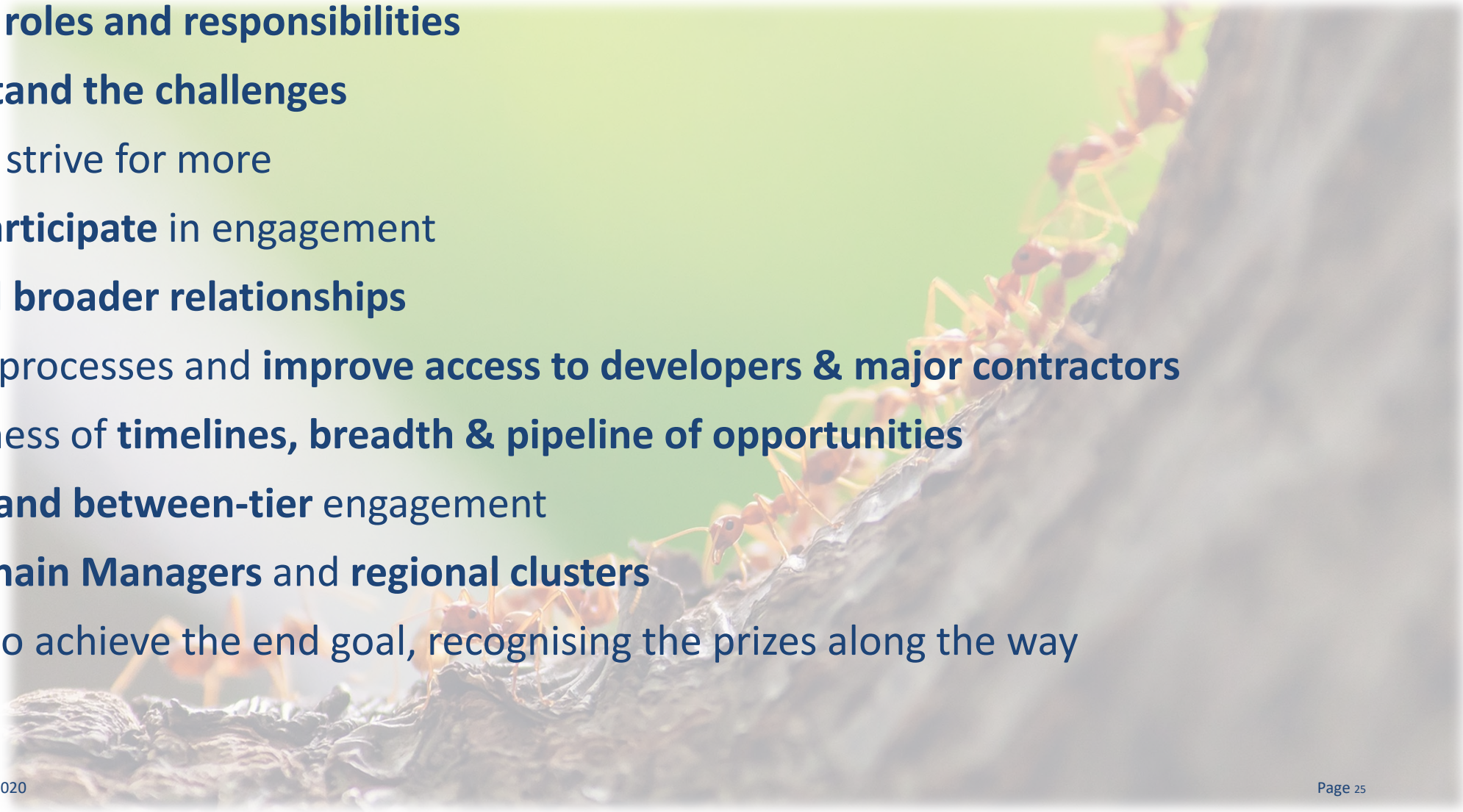
Strategic approach to supplier engagement
- Shape new RWE approaches
- **Introduce new initiatives e.g. STEP / O&M STEP**
- Work with other markets
- New technology cross-over opportunities

Compliment Procurement activity
- New approaches / ways of working
- Earlier supplier engagement
- Flagging/funnelling new suppliers
- Support with tender processes and contracts
- Support suppliers' own Supply Chain Plans

Increase awareness of local market requirements, processes, supplier-related issues and needs
- Internally
- Externally
- Range of stakeholders

Developers working with the supply chain
to maximise mutual benefits

- Be aware of our **roles and responsibilities**
- Work to **understand the challenges**
- Are **realistic** but strive for more
- Facilitate and **participate** in engagement
- Build **better and broader relationships**
- Review internal processes and **improve access to developers & major contractors**
- Increase awareness of **timelines, breadth & pipeline of opportunities**
- Improve **across and between-tier** engagement
- Utilise **Supply Chain Managers** and **regional clusters**
- **Work together** to achieve the end goal, recognising the prizes along the way



RWE

Guidance for supply chain success in Offshore Wind

How can the supply chain prepare itself?

- Developers are the ‘Project Managers’ of OSW – tend to procure **8-12 packages max**
- - Tier 1s / OEMs are responsible for **85+% of all sub-contracting**

1

Understand that solid growth pipelines means opportunities – support and lobby for making this happen

2

A strong and collaborative supply chain is vital to investment

3

Understand where you fit in the supply chain and align your offering with requirements suited to the party you contract with

4

Green growth | Innovation

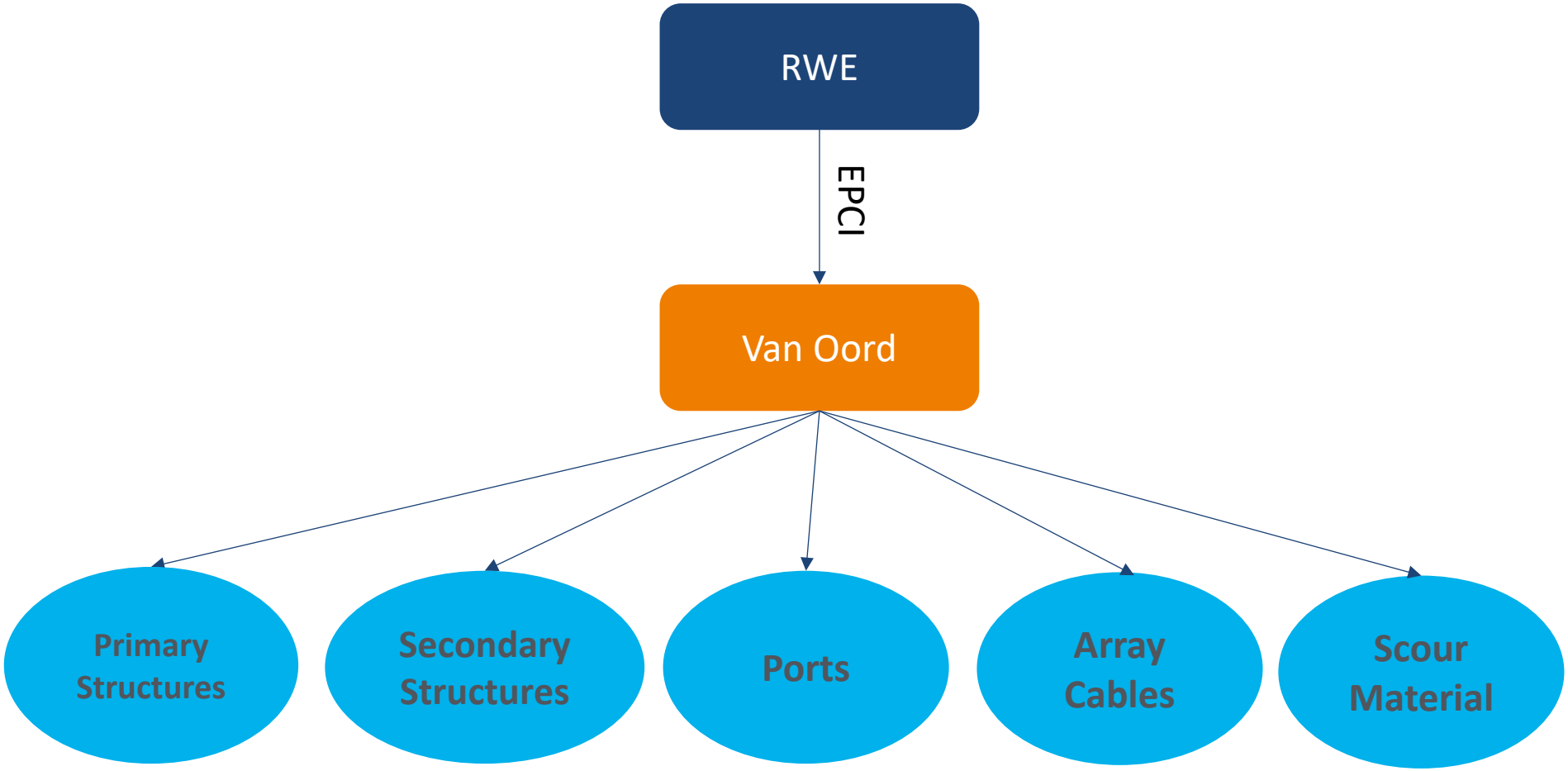
Infrastructure | Skills

Familiarise yourself with the supply chain policy scene new requirements, industry challenges, ambitions and criteria

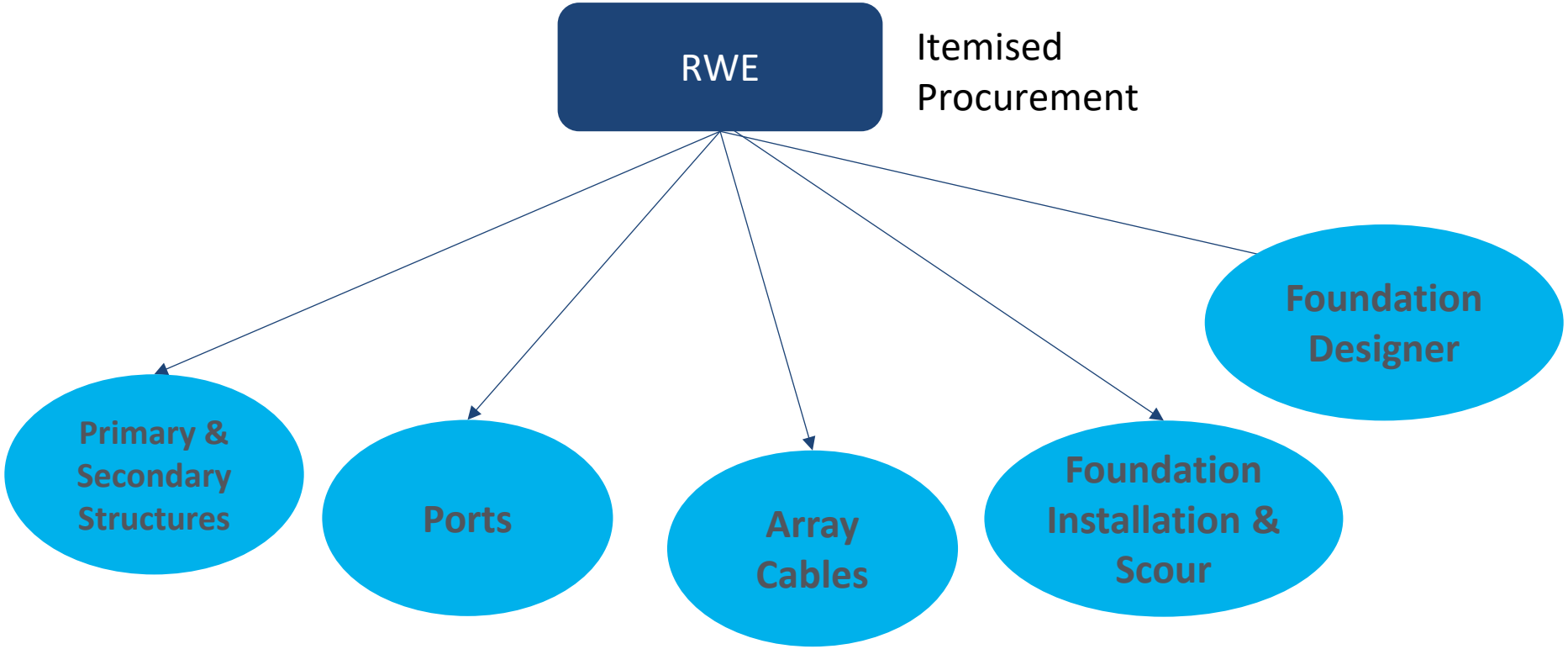
5

To maximise opportunities, be prepared to work with developers and Tier 1s and feed in challenges, suggestions, ideas

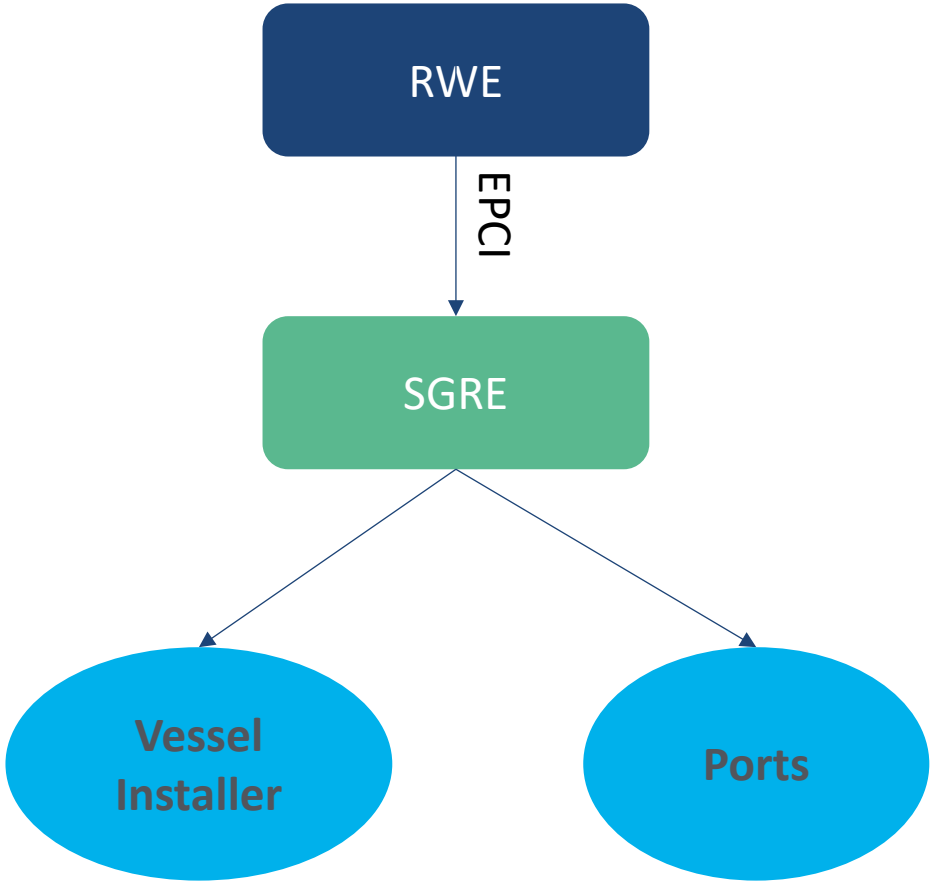
RWE's Sofia Tier 1 trading model (foundations)



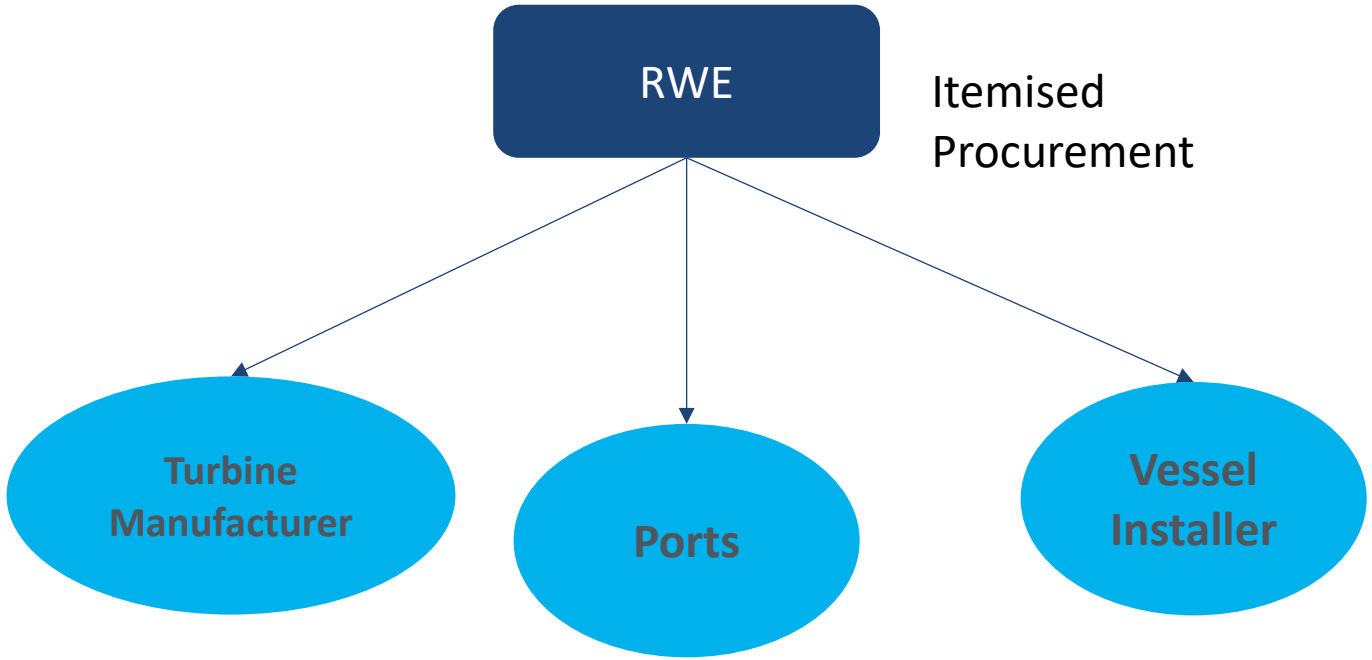
RWE's Triton Knoll Tier 1 trading model (foundations)



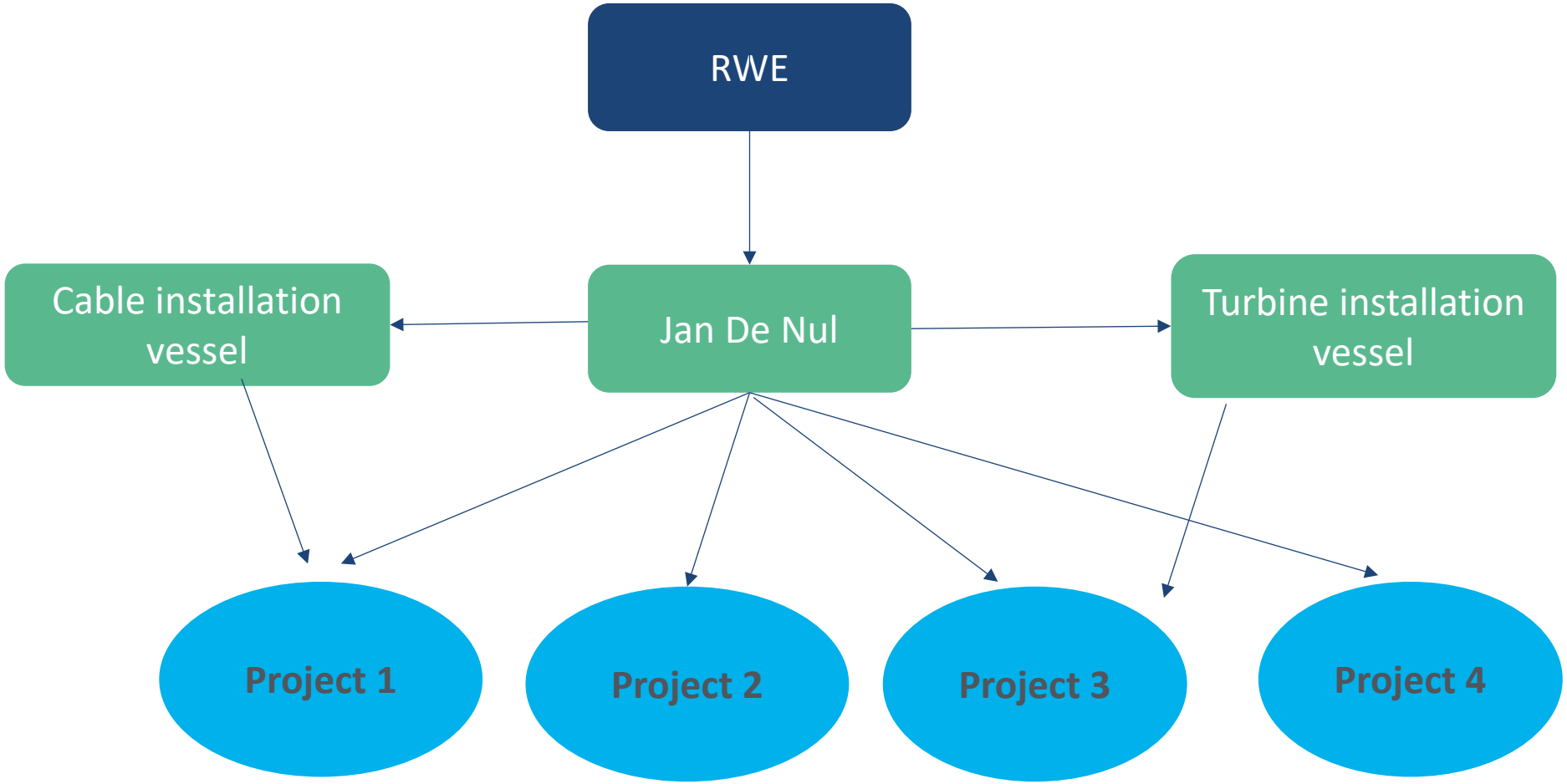
Sofia Tier 1 trading model (Turbines)



Triton Knoll Tier 1 trading model (foundations)



General Tier 1 trading model (Vessel Framework Agreement)



Green Port Hull & BVG Associates: Job Roles in Offshore Wind

RWE

The offshore wind industry needs a diverse, innovative, expansive workforce

Wind farm life cycle and component related roles

- Development surveys & studies – port, geotechnical, geophysical, wildlife
- **Turbine Tower supply** – Ladders, Coatings, H&S
- **Foundation supply** – Platforms, Secondary Steel, Green Steel, Training
- Cable supply – splicing, ancillaries, storage
- **Substation supply** – architectural steel, navigation lights, cable route systems
- **Turbine and foundation installation** – mobilisation, crewing services, vessel provision and maintenance
- Cable installation – termination & testing, ROVs, cable protection systems
- Installation support – UXOs, guard vessels, oil-spill clean up
- Wind Farm Operations – Operations, supervisory control, data acquisition and network communications, comms tools
- Turbine Maintenance – Blade Inspection & Repair, turbine electrical and mechanical maintenance, statutory inspections and maintenance/repair (foundation cleaning, port & harbour services)
- **Maintenance and service logistics** – marine coordination, warehouse and spares, vessel operations and maintenance
- Decommissioning – a new and emerging space

Other/ cross-cutting roles

- **Project Management**
- **Digital & IT capability**
- **Artificial Intelligence**
- **Commercial & Bid Management**
- **Communications & Stakeholders**
- **Admin support**
- **Team leadership**
- **Sustainability**
- **Supply Chain Management**
- **Innovation**
- **Business acumen**
- **Engineering & mathematics**

The UK Offshore Wind Industrial Growth Plan – launched April 2024

Can you (or could you provide any of these UK priority components/services?
Could you diversify? How could you play a role?
What are this regions strengths?

Make – The UK's Priorities

Advanced Turbine Technology
- Blades
- Towers

Industrialised Foundations & Substructures
- Deeper water foundations
- Moorings and anchors

Future Electrical Systems & Cables
- Static and dynamic array cable
- Offshore export cable
- Offshore substation foundation

Smart Environmental Services
- Environmental surveys

Next Generation Installation, Operations & Maintenance
- Wind turbine installation vessels
- Landfall HDD and cable pull
- Operations
- Asset management services
- Schedule maintenance and repairs
- O&M vessel

Additional strength not identified for intervention
- Commercial and insurance

Nurture to Make

- Turbine drive train
- Steel semi-submersible
- Concrete semi-submersible & gravity foundation
- Onshore export cable
- Electrical system design
- Floating turbine installation
- Floating assembly
- Cables installation vessels
- Decommissioning services

Buy

- Nacelle assembly
- Turbine yaw and electrical system
- HVDC offshore substation topside
- Development services
- Jacket installation
- Foundation installation vessels
- Array and offshore export cables installation
- Onshore export cables installation
- Offshore substation (OSS) installation

Protect

- Monopile foundation manufacturing
- Monopile transition piece manufacturing
- Wind turbine installation equipment and transportation frames
- Monopile installation

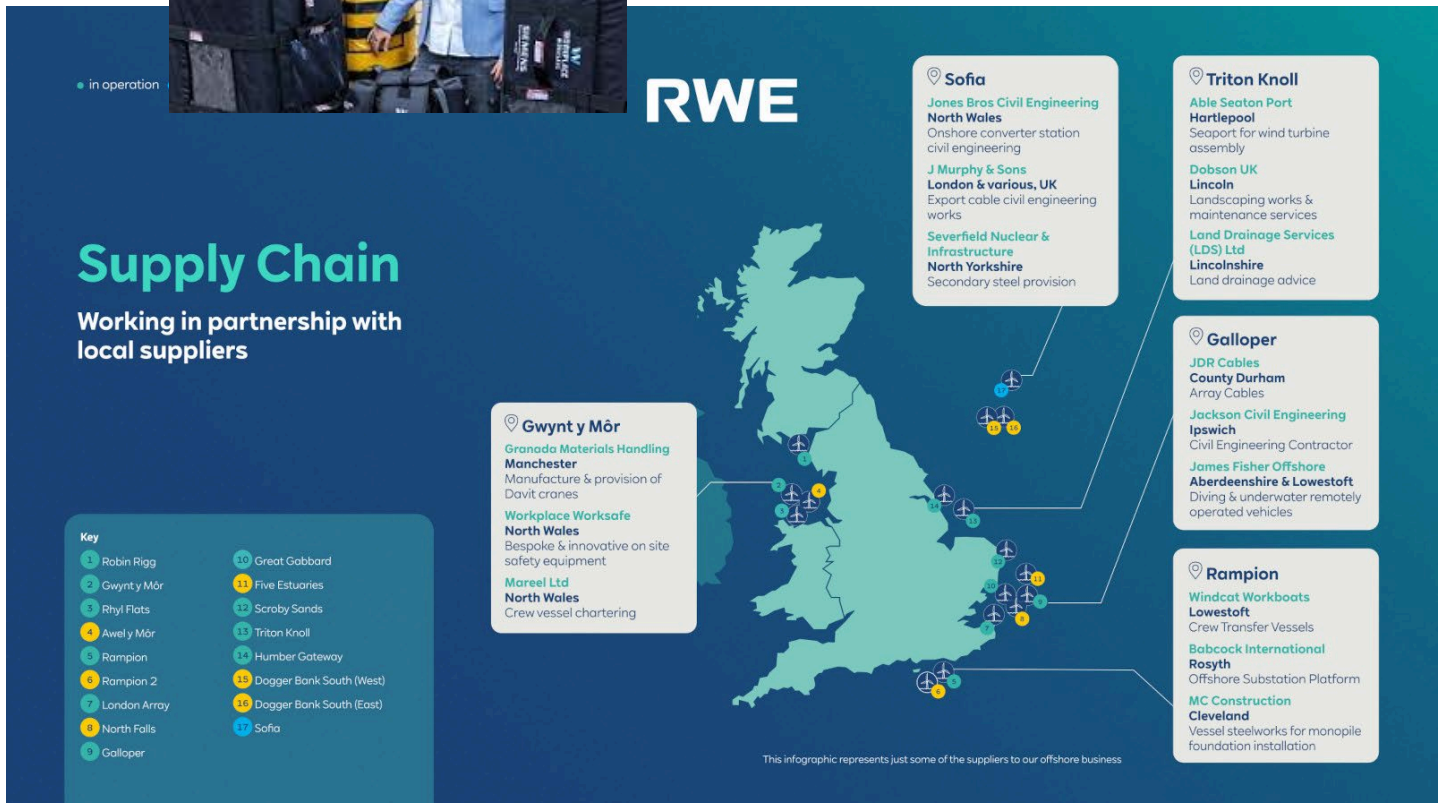
"The more we can align our collective investment, innovation and growth activities to the Industrial Growth Plan, the stronger the UK offering will be"

Case Studies to inspire

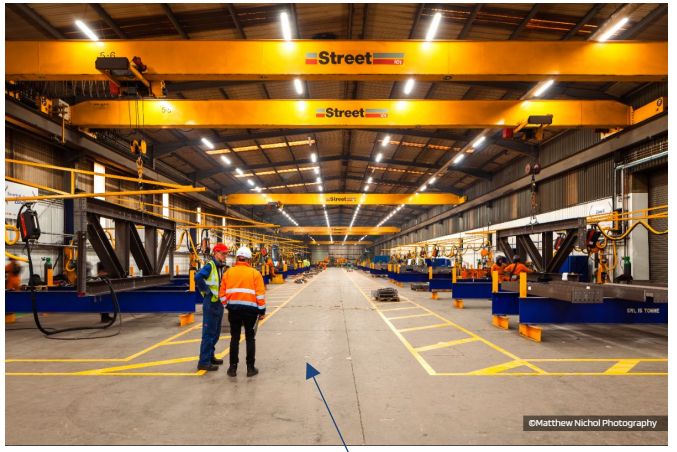
Be patient, diversify & know the industry

Workplace Worksafe, North Wales, Bespoke & innovative on site safety equipment
Local company was awarded a contract to provide safety equipment to meet the specific safety needs of the onsite team. It included the challenge of developing a safer and simpler solution for exchanging and moving the power inverter on site and offshore. The result was the creation of the Deltasafe, now being provided by the company to wind farm sites across the globe.

Workplace Worksafe



Severfield



Hutchinson Engineering

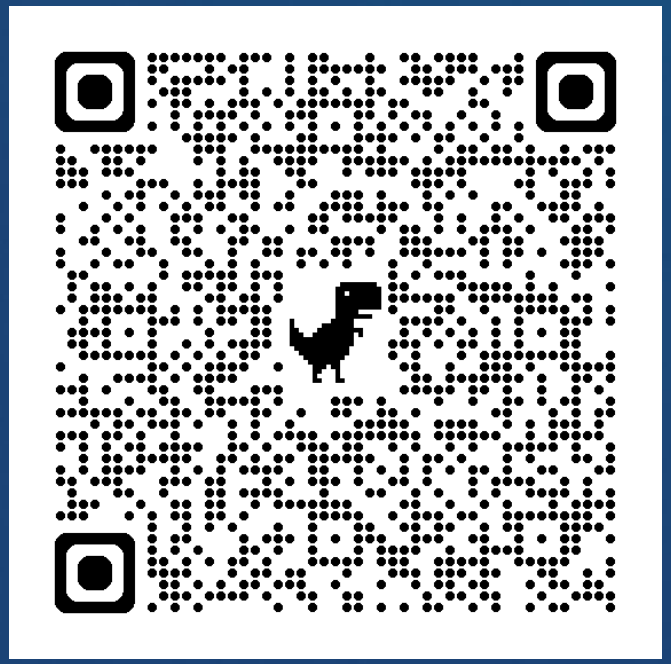
Severfield, headquartered in York, is the largest steel fabricator in the UK but this is their first contract on an offshore renewables energy project, marking an important step in their journey into the sector. Severfield will work with their strategic key contractor Hutchinson Engineering in Widnes, site of the recent Great British Energy launch, and will undertake final assembly of key components at the Teesworks Port in Teesside. Smulders is a leading steel fabricator in the offshore wind industry, and since 2016, has operated the UK based facility in Wallsend (Newcastle).

ARC Marine

TechWorks Marine

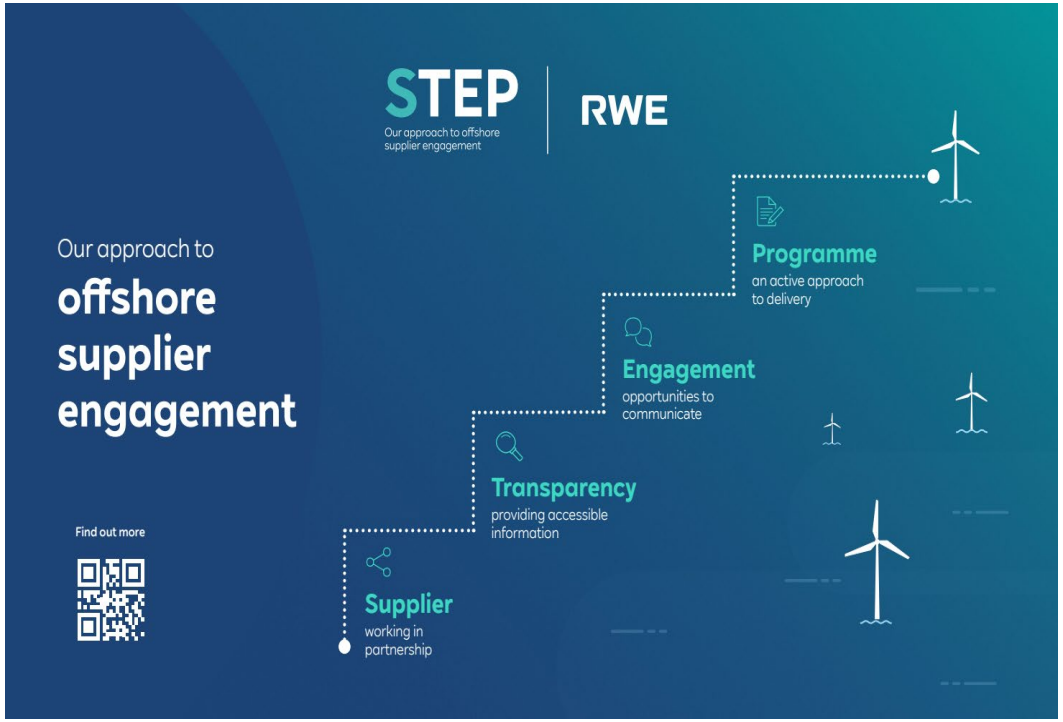
RWE

Supplier Transparency & Engagement Programme



Introducing RWE's Offshore UK & Ireland STEP Initiative

- The Supplier Transparency & Engagement Programme (STEP) is RWE's proactive approach to supplier engagement
- Following a review of our existing approach to supplier engagement, we introduced new practices to increase opportunities for dialogue with our supplier network in an ongoing manner, irrespective of tender processes
- Four initial 'steps' have been developed so far - aimed at improving transparency, engagement and information exchange regarding our projects progressing through development in the UK and Ireland



Step 1

Dedicated project websites that provide up to date and relevant information for suppliers regarding project timescales and other key aspects

Step 2

The rollout of new and easy to register/use Supplier Engagement Platforms with 'open search' functionality

Step 3

Regular themed Supplier Engagement Days to raise awareness of supplier capabilities and solutions with a view to solving industry challenges

Step 4

A new Supplier Engagement Booking Tool that enables managed but regular calls with relevant RWE teams and team members


RWE
About RWE
Suppliers
Contact
Register Now
Register for the RWE Offshore Wind Supplier Engagement Platform
The RWE Offshore Wind Supplier Engagement Platform has been created to provide awareness of companies who are interested in working with us on our offshore wind projects in the UK, Ireland and globally.
Register now

RWE

The difference between STEP Engagement Platform & RWE's Procurement Portal

1. STEP stands for Supplier Transparency & Engagement Programme (UK & Ireland)
2. RWE's approach to early, ongoing and proactive engagement across the supplier tiers
3. Helps us keep up to date on supplier capabilities, innovative solutions etc
4. Takes place regardless of procurement/tender bid activity
5. Occurs via the 4 areas of STEP activity:
    1. **Supplier web pages**
    2. Project Supplier **Engagement Portals** (open-search functionality)
    3. Supplier **Engagement Days**
    4. Quarterly supplier drop-in calls

1. RWE's global procurement portal
2. Suppliers must complete pre-qualification process
3. Used to search for suppliers when tenders are live
4. Complimented by STEP which should feed relevant suppliers through
5. Works alongside STEP to raise awareness to procurement of potential new suppliers out there

Please ask, understand the difference and register for both ☺

The Experience of an Engineering SME in the Offshore Renewables Supply Chain

by David Bacon, Managing Director, Bacon Engineering

GLEAM NETWORK

BACON ENGINEERING
Est.1899
125 years delivering engineering excellence

The Experience of an Engineering SME in the Offshore Renewables Supply Chain

Constructionline Gold Membership

UKCA 0513

SCCS UKAS PRODUCT CERTIFICATION 0021

ISO 9001 – Cert No Q4282
BS EN 1090 – Cert No 2273 – CPR – 0976
BS EN ISO 3834-2: 2021– Cert No W4282

Alcumus SafeContractor

Bacon Engineering - Est 1899

- Originally formed as **E. Bacon & Co Ltd** in 1899, now trading as Bacon Engineering, we have a long, fascinating history from being a major trawler operator at the heart of the world renowned Grimsby fishing industry to providing Spitfires to the British government during WWII and having the last recording act of piracy in British waters onboard one of our boats.
- Our innovative and progressive evolution has seen us endure despite the loss of our original primary industry.
- In late 2021 David Bacon took over as Managing Director to become the 5th generation of the family to lead the business, joined shortly after by Darren Glew as Operations Director, forming a new ambitious leadership team.
- In April 22 we completed our relocation after over 123 years on Grimsby Docks to a modern facility on the outskirts of the town, moving the company into a new exciting era.


Grimsby Evening Telegraph

SHIP'S SEIZURE A PLOT—POLICE

Five from Loveden charged with piracy

BANK RATE UP—BUT HOME LOANS SAFE AT PRESENT

BACON ENGINEERING Est.1899

Our Business

Our Vision

Be a leading, innovative and progressive engineering company

Our Mission

Provide premium engineering solutions to a broad range of sectors, taking pride in delivering a first-class customer service

BACON ENGINEERING Est.1899

Range of Services

Precision Machining.

- Based in our purpose built 3,900 sq/ft unit
- The team operates:
  - 5 Axis large gantry miller (see above)
  - 3 Vertical Machining Centres and a bed miller
  - A range of CNC lathes
  - 2 Large horizontal borers
  - Large facing lathe

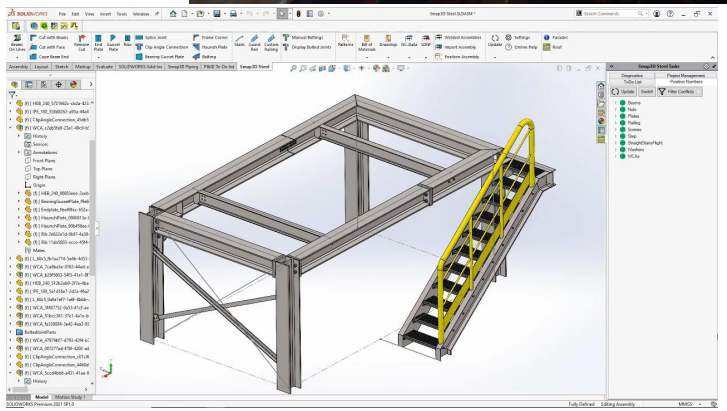
Fabrication & Welding.

The team based in a 3,500 sq/ft facility, are fully equipped to carry out a wide range of work:

- Sheet metal work
- Large fabricated platforms
- Overhaul of mechanical equipment
- Coded welding in Stainless Steel, Mild Steel and Aluminium
- All forms of access metal works, fire escapes, gantries etc
- Structural work
- On site maintenance fabrication and welding services

Drone & Laser Scanning Service.

We provide survey, inspection, 3D mapping (see above) and reality capture services with a bespoke engineering support solution.



Engineering Design.

We can provide full CAD support designing and detailing for machined, structural and fabricated projects.

BACON ENGINEERING Est.1899

Current Certifications

ISO 9001 - Cert No Q4282
BS EN 1090 - Cert No 2273 - CPR - 0976
BS EN ISO 3834-2: 2021 - Cert No W4282

Our BSEN 1090 structural steel certification is to Execution Class 3

BSEN ISO 3834-2: Welding Quality Management System

Certified by the Steel Construction Certification Scheme (SCCS)

Our Journey in Offshore Renewables

GRP Grimsby Renewables Partnership

HUMBER MARINE AND RENEWABLES

OWC 2025 OFFSHORE WIND CONNECTIONS

2025 Humber Renewables Awards

BACON ENGINEERING Est.1899

Offshore Projects

BACON
ENGINEERING
Est.1899

Offshore GWO Renewables Training Equipment

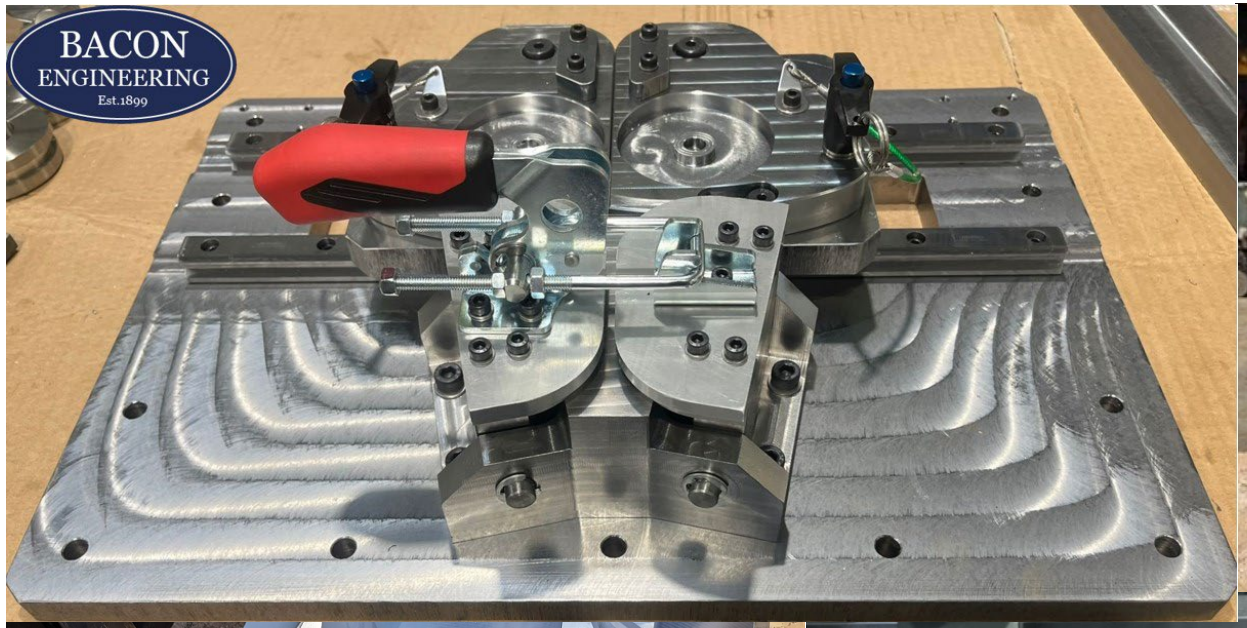
Humberside Offshore Training Association (HOTA) Training System in Hull

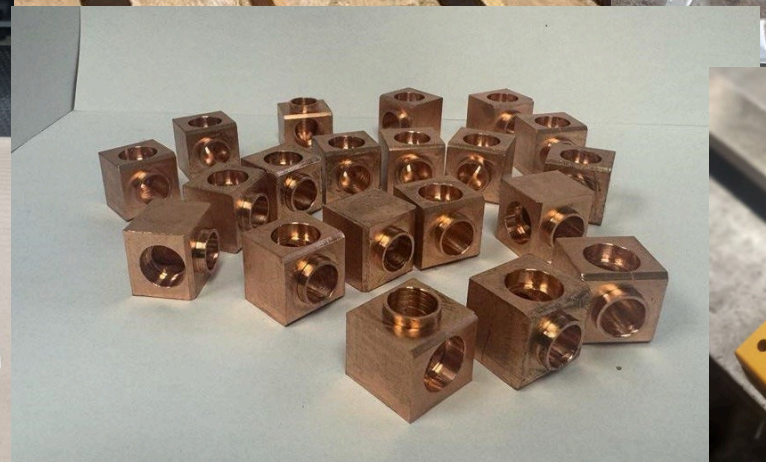
Offshore Training Centre (OTC) Turbine Training Tower in Grimsby

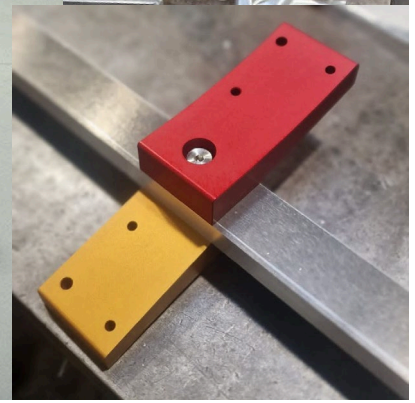
Offshore Training Centre (OTC) Training Platform in Grimsby

BACON
ENGINEERING
Est.1899

Challenges Faced







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Lunch & Networking

Waste Heat: The Hidden Resource for Greener Maritime Transport

by Dr Pouriya Niknam, Senior Lecturer, Lincoln University

GLEAM NETWORK

Waste Heat: The Hidden Resource for Greener Maritime Transport

13 March 2025

Dr Pouriya Niknam – Senior lecturer in Engineering
University of Lincoln
phniknam@lincoln.ac.uk

UNIVERSITY OF LINCOLN

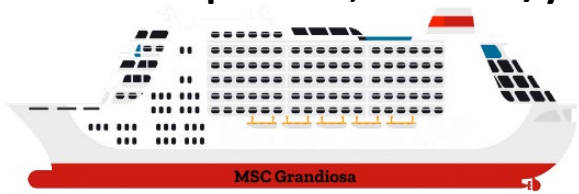
BRIDGE

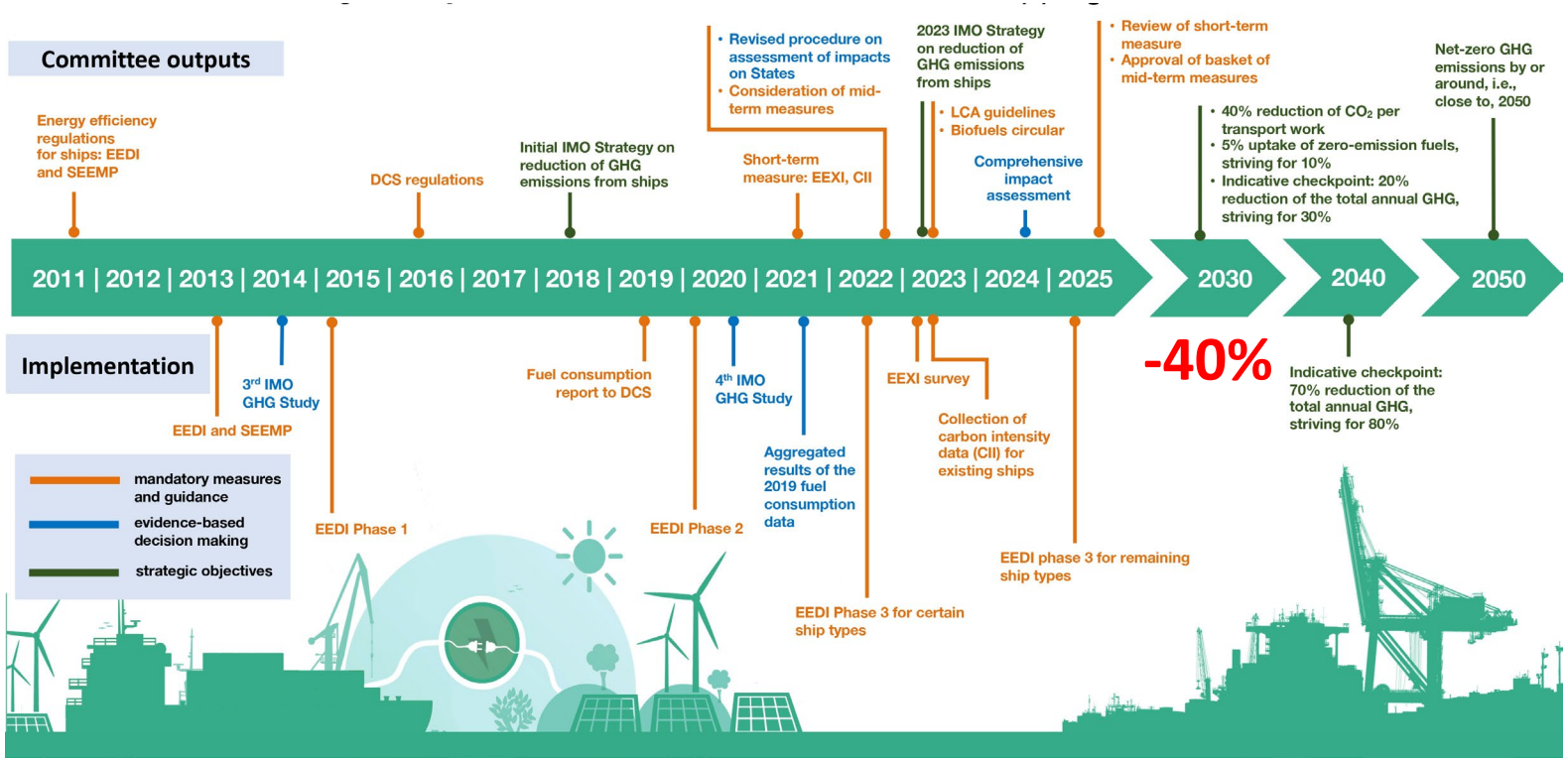
GLEAM NETWORK

Maritime sector NetZero pathway

1. Maritime accounts for about 3% of Global emissions
2. It is identified as a hard-to-abate sector
   - Scale of Industry
   - Economic Considerations
   - Technological Challenge
   - Long lifespans

Up to 130,000 tCO2/y equivalent to 67,000

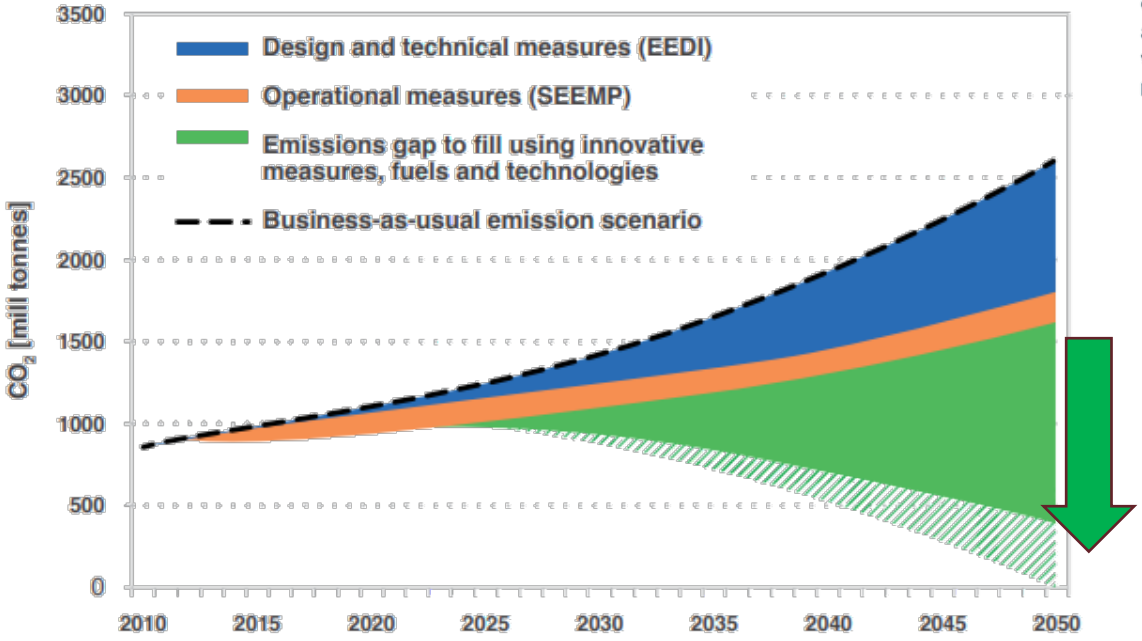




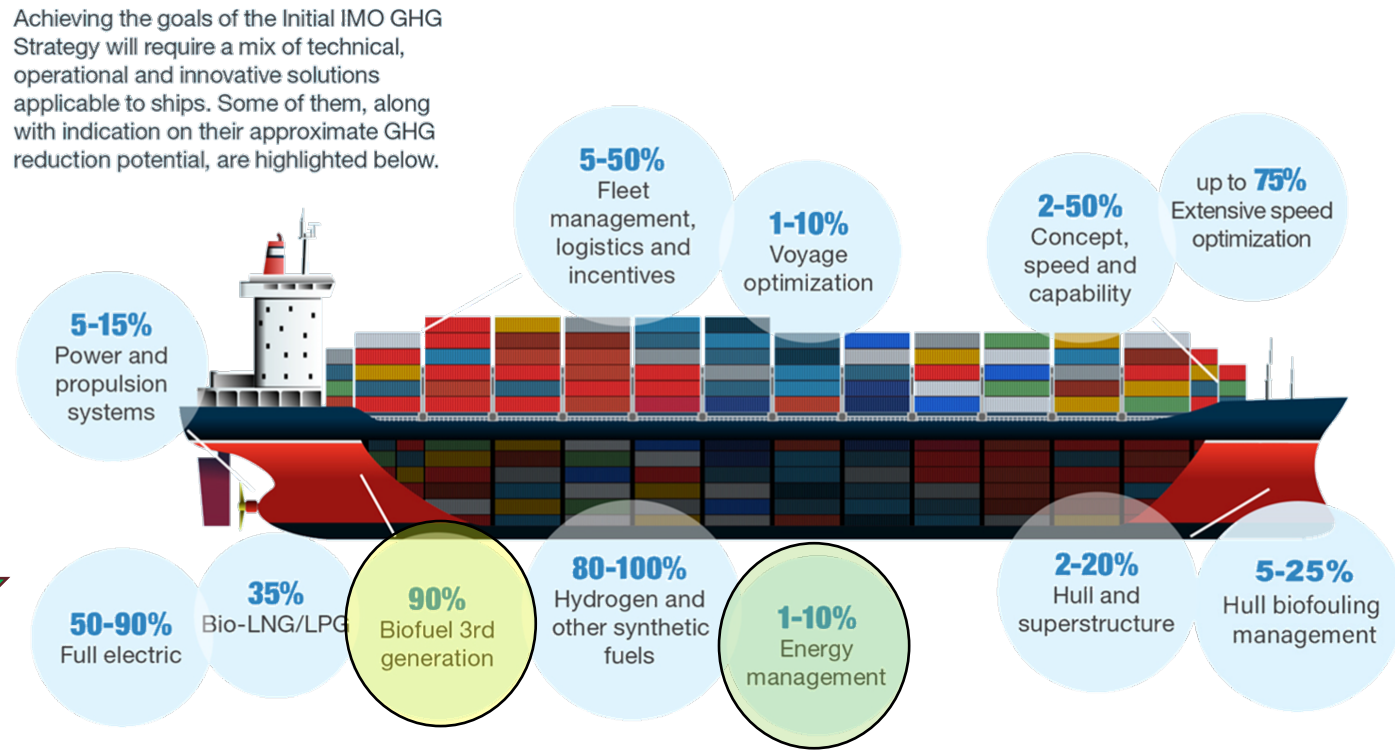
Ref: theicct.org (Jan 2024)

Maritime sector NetZero Solutions

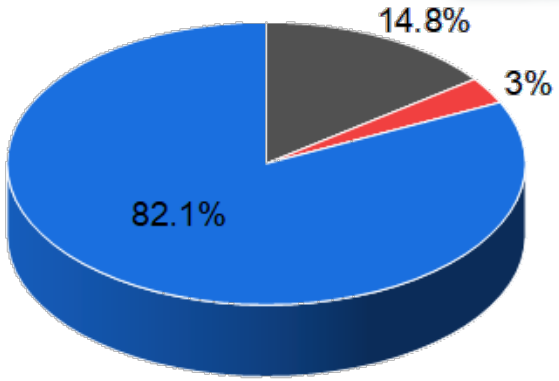
Opportunities for decarbonisation are identified in areas of **design**, **operations**, **fuels**, and **onboard technologies**.



Ref: theicct.org (Jan 2024)

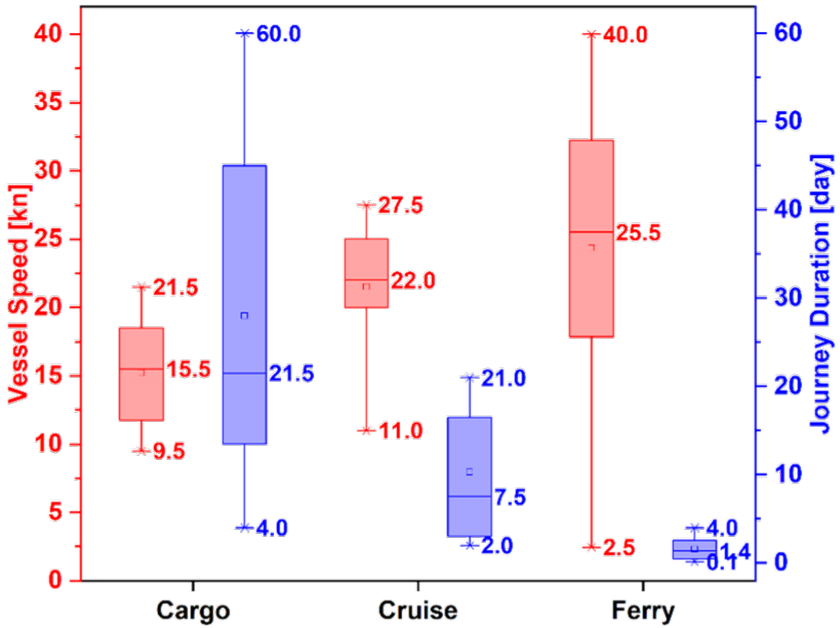


World Fleet



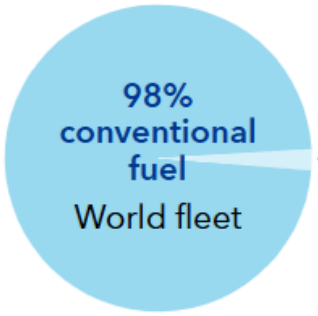
Number of ships in global fleet: 9000

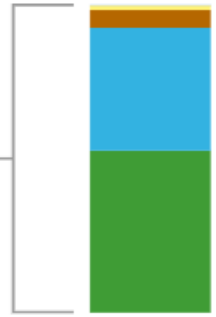
Journey specifics



NUMBER OF SHIPS (as of June 2024)

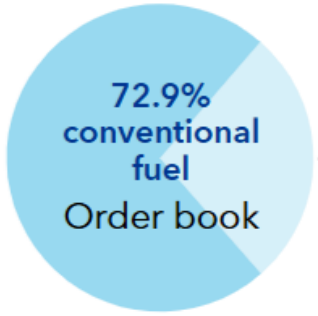
Ships in operation

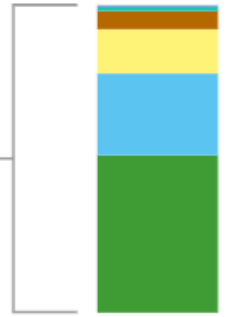




1	Ammonia
3	Hydrogen
35	Methanol
139	LPG
940	Battery/Hybrid
1 239	LNG
2 357	Total

Ships on order

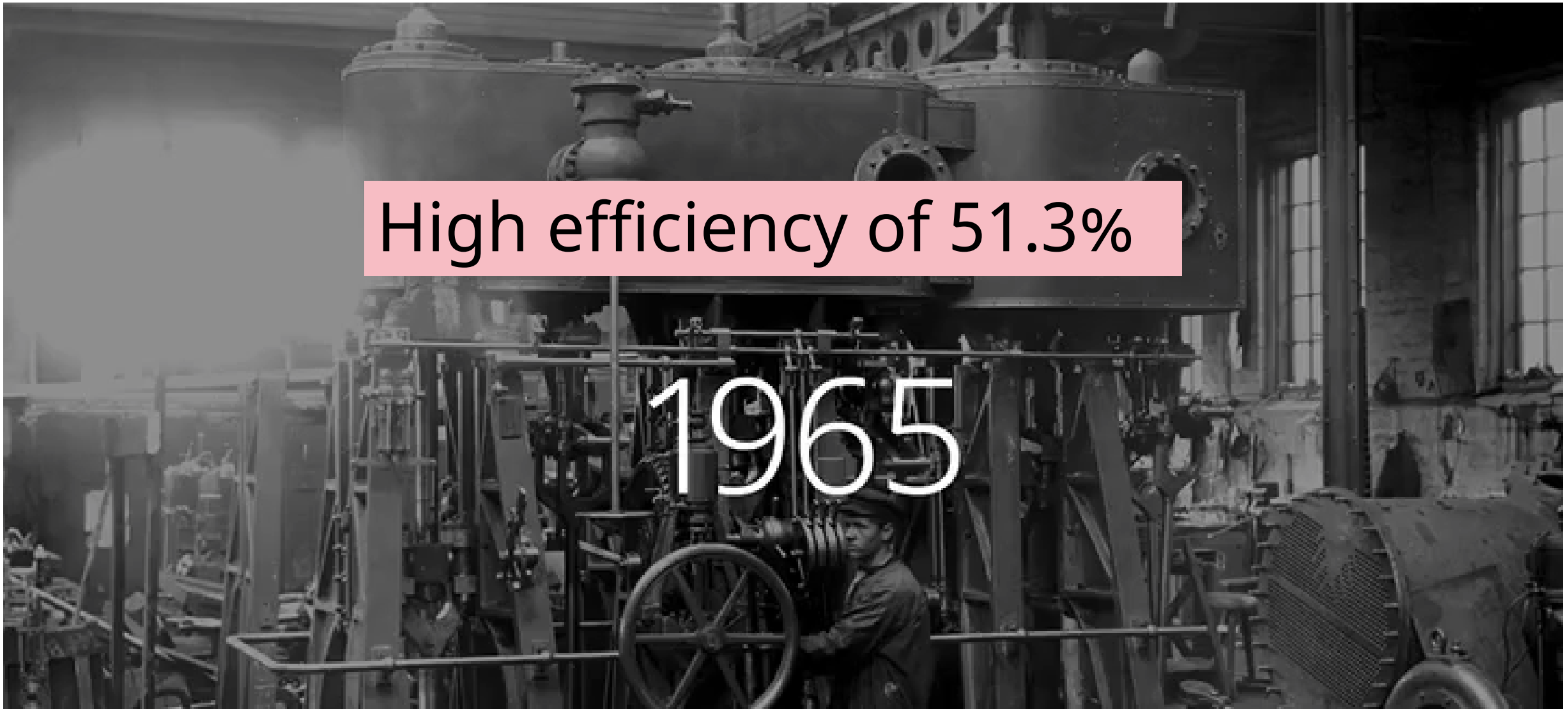




10	Hydrogen
25	Ammonia
96	LPG
234	Methanol
433	Battery/Hybrid
832	LNG
1 630	Total

MARITIME FORECAST TO 2050, DNV 2024

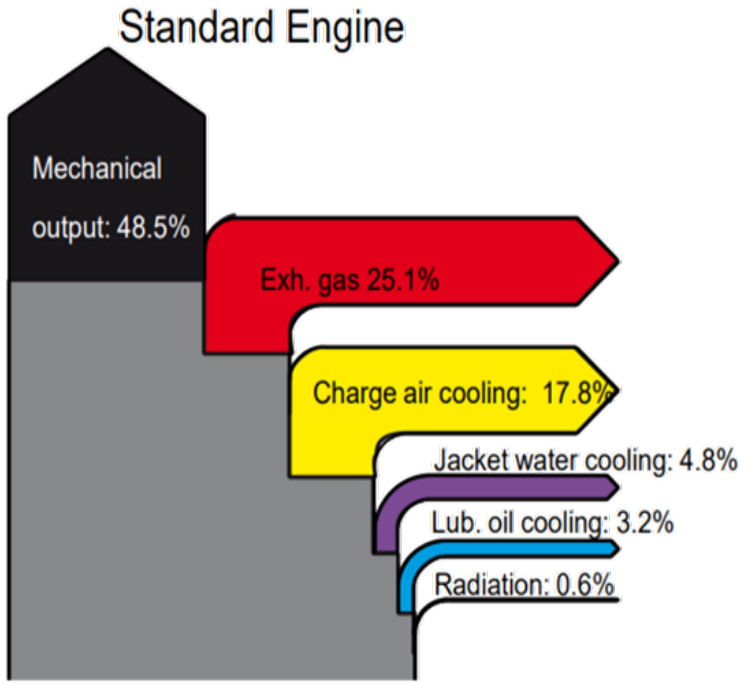
Energy efficiency



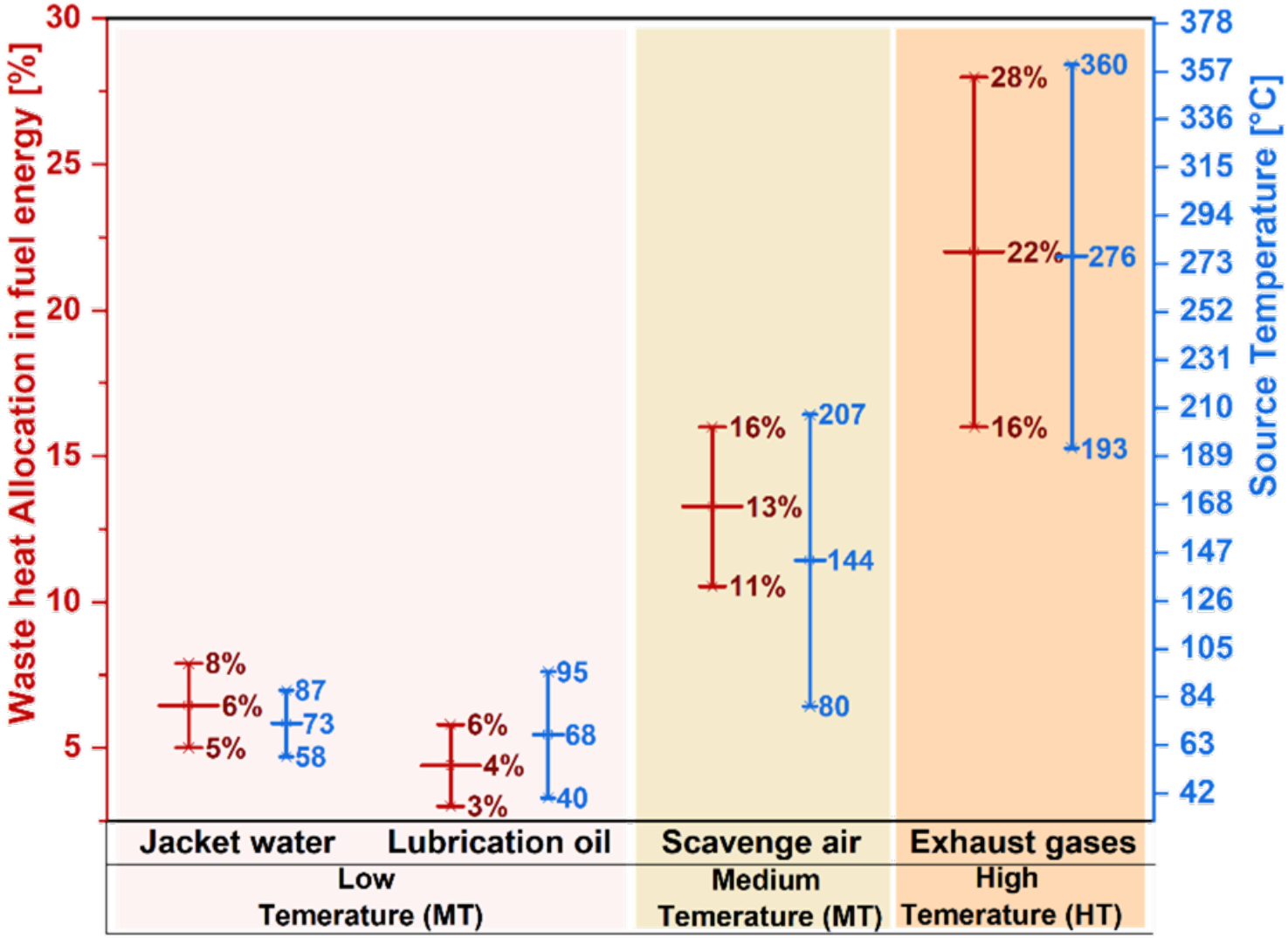
https://www.wartsila.com/energy/solutions/engine-power-plants/46TS?utm_source=linkedin&utm_medium=social-org&utm_term=energy&utm_campaign=46TS

WH Classification

1. Identifying the source of WH
2. Determining the amount of WH
3. Estimating the temperature of WH
4. Exploring their dynamics

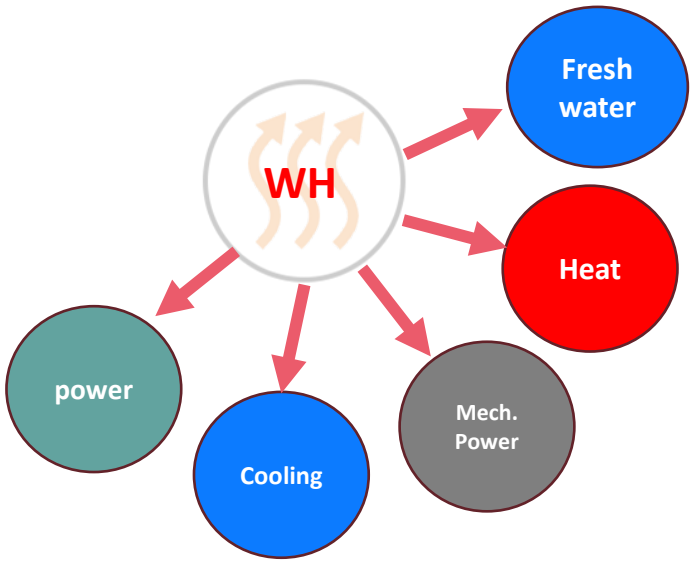


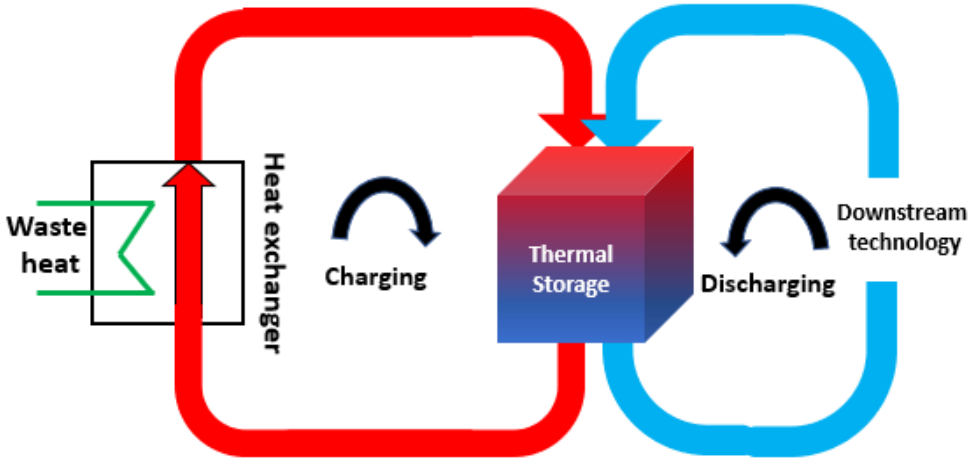
Ref: MAN B&W, Waste Heat Recovery System (WHRS)



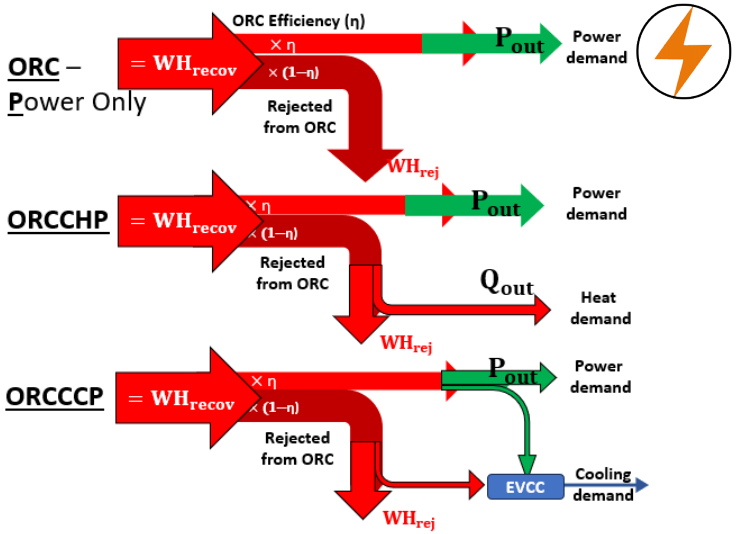
Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

Waste heat recovery (WHR) : Concept and technologies

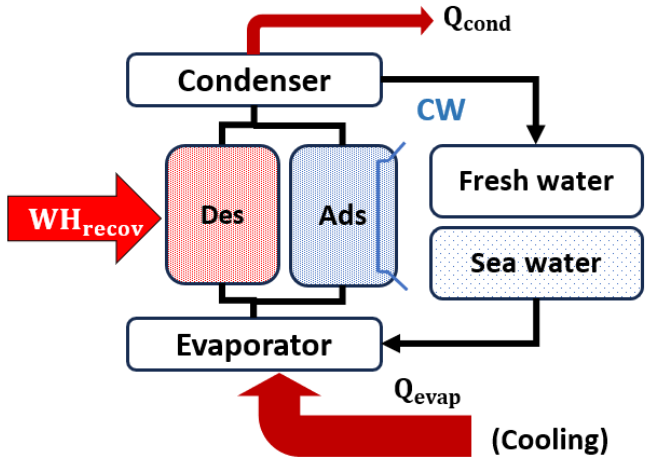




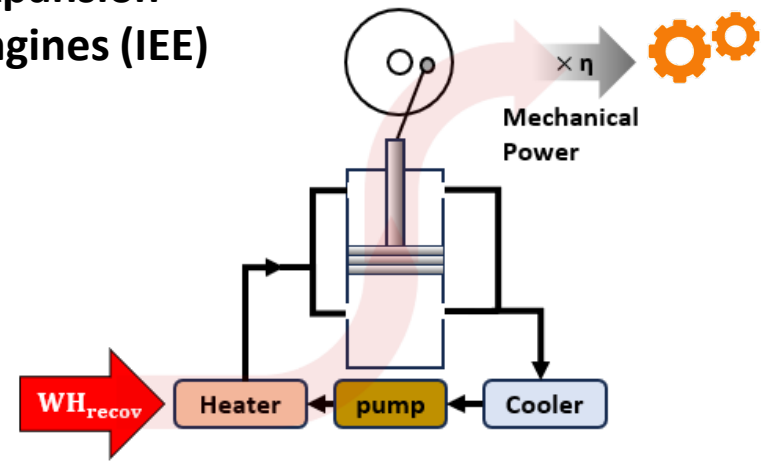
ORC*



Sorption



Isobaric Expansion Engines (IEE)

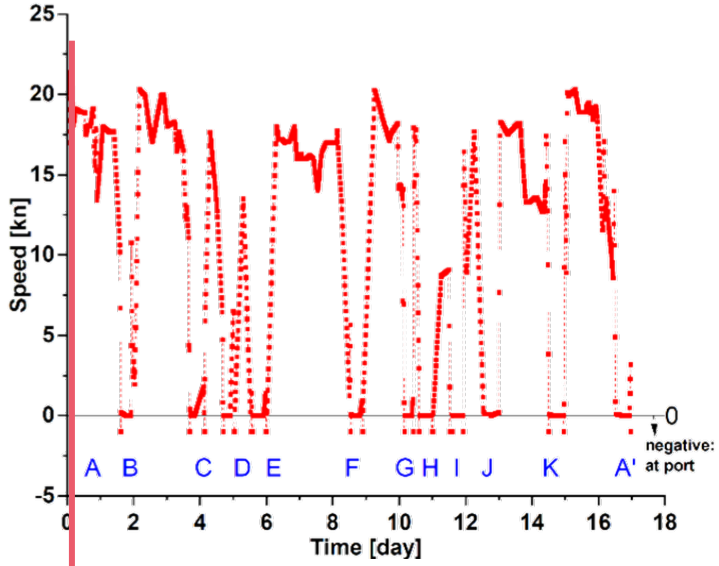


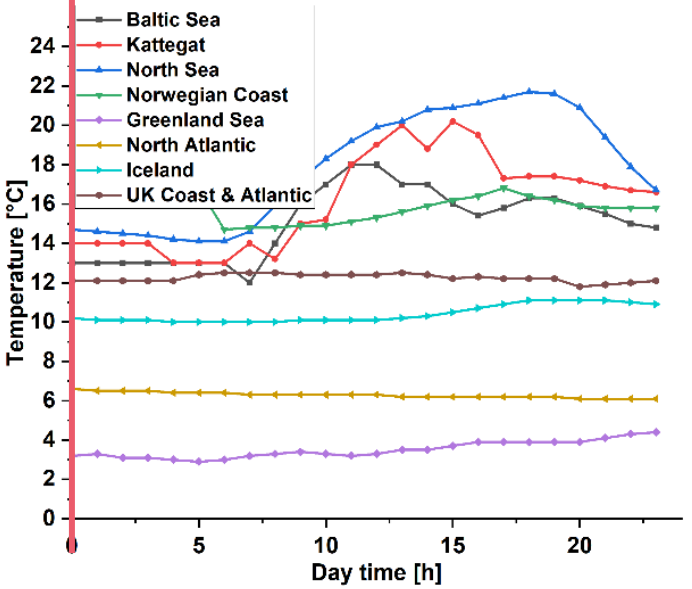
Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

Representative vessel: AIDALuna Cruise ship

- **Multiple stops**, highlighting tourist destinations and leisure activities
- **Variable speeds**, may increase to meet tight schedules for tourists' comfort

Journey duration:	**17**	**days**
N of stops	**11**	**-**
ME capacity:	**36000**	**kW**
max Speed:	**19**	**knot**
Length:	**259**	**m**
Gross Tonnage:	**69**	**kt**
ME Efficiency (design)	**47.9**	**%**
Vessel Value:	**315**	**M €**

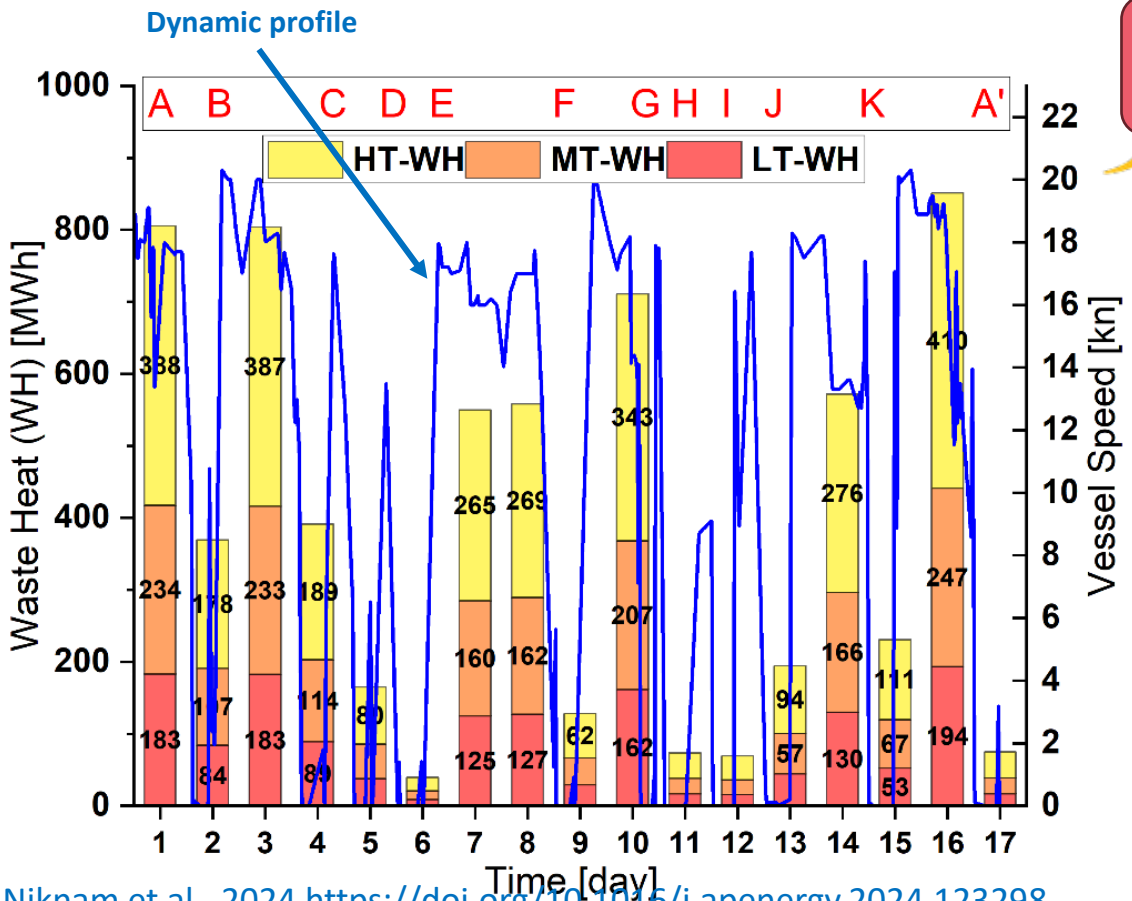




Modelling Framework- WH & Demand

WH profiles

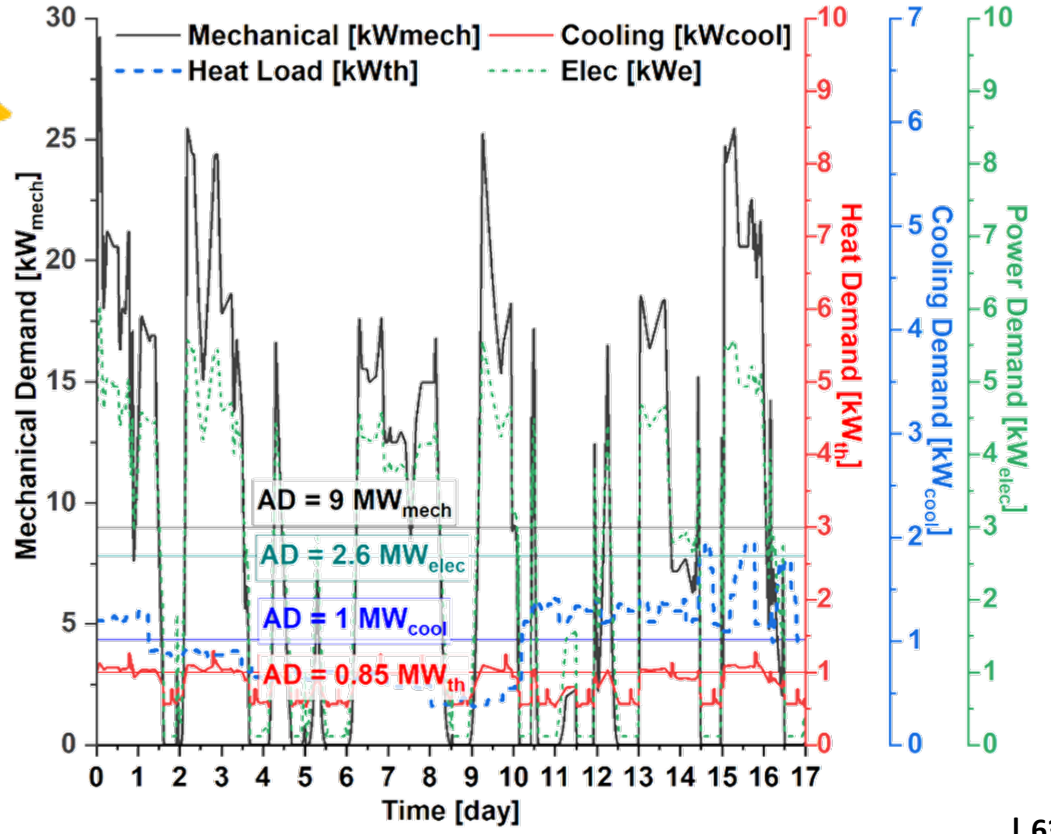
- ❑ WH is estimated using engine datasheet and Speed-engine load correlation
- ❑ Breakdown of WH is determined on each time interval (accuracy of 15 min)



WHR

Demand profiles

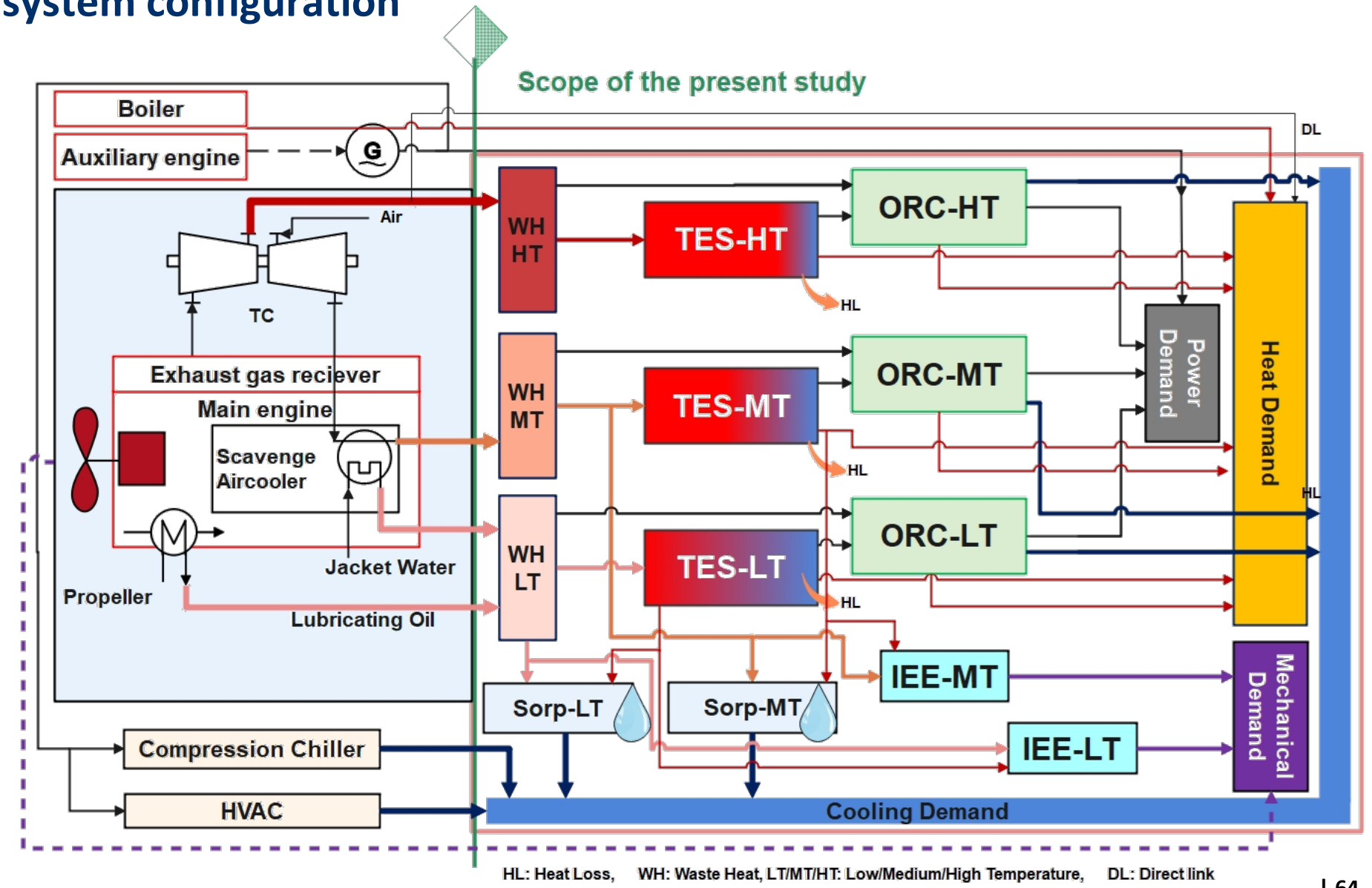
- ❑ Distinct semi-synthetic profiles have been developed for each demand in the form of daily correlations fitted to literature data, scaled to the representative vessel



Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

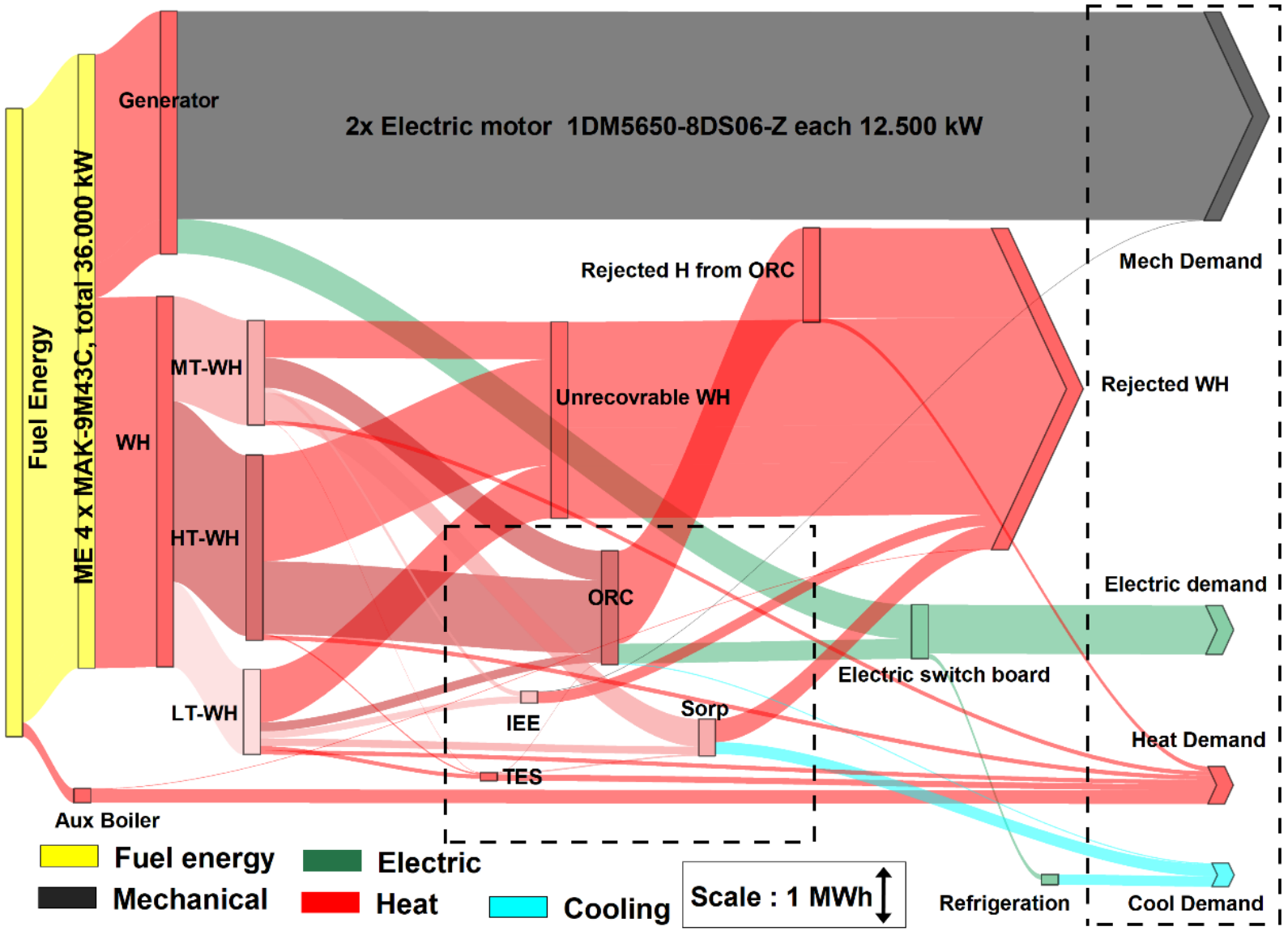
Integrated-WHR system configuration

- All the configuration is evaluated by the optimisation
- TES involvement is optionally evaluated to one of the three active technology
- All technologies are defined in three temperature class (excluding HT-IEE and HT-Sorption)



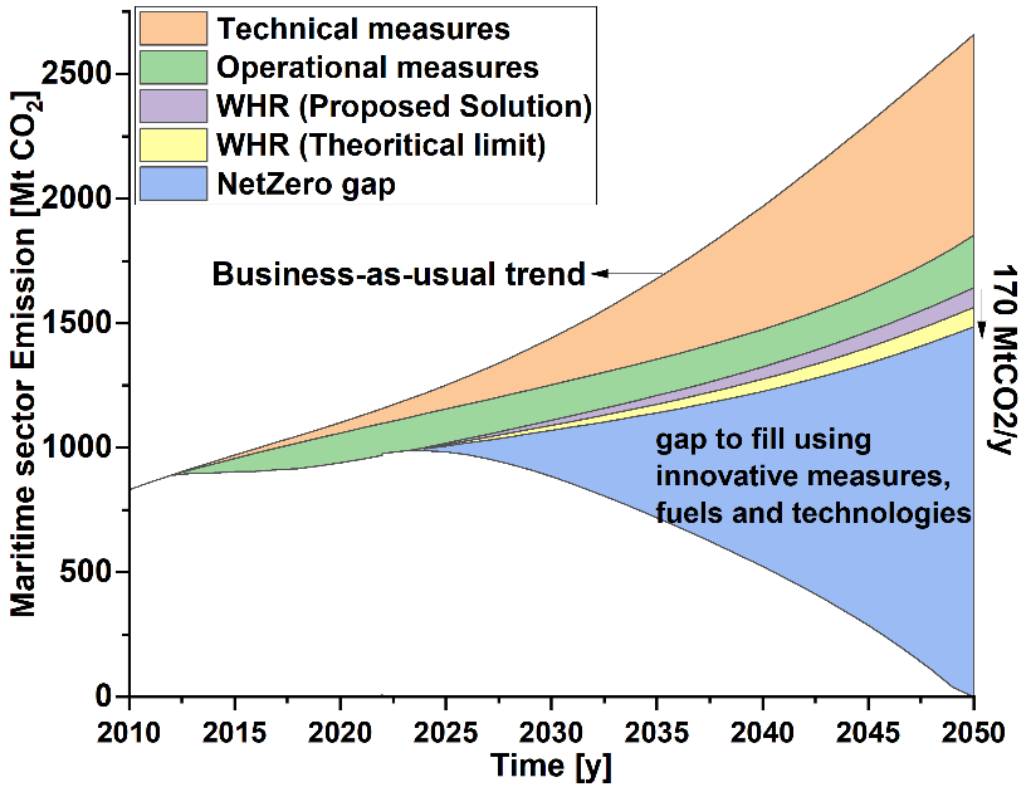
Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

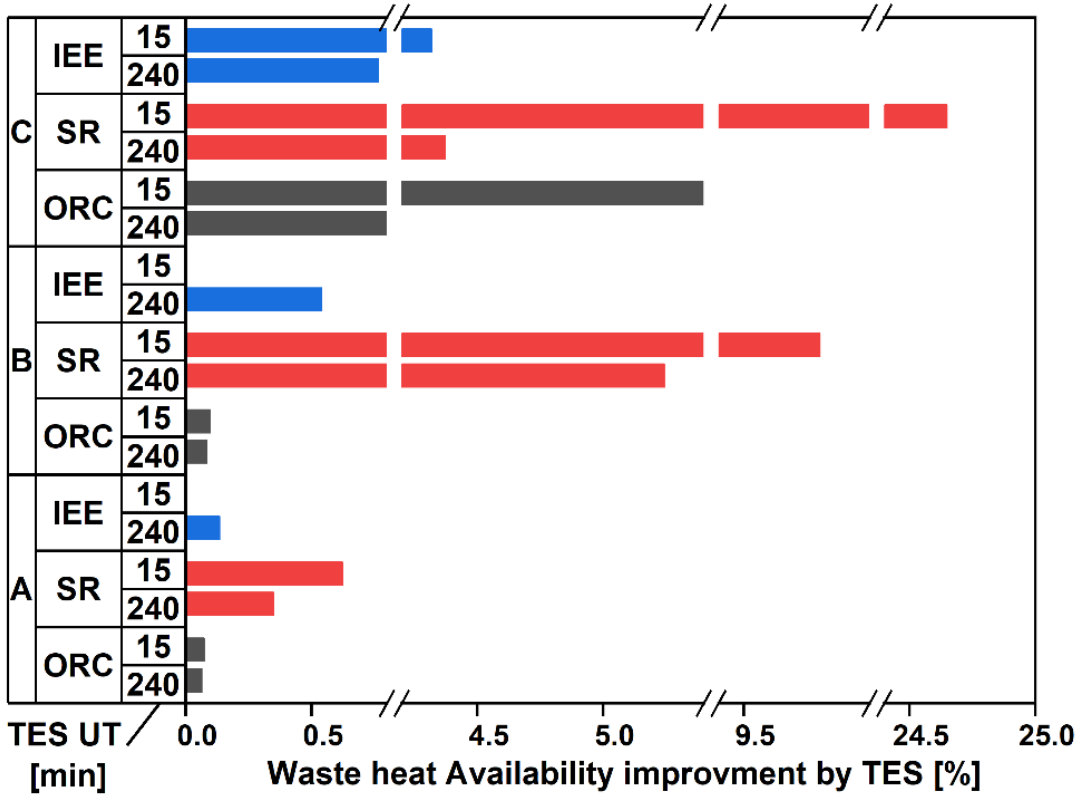
Annual Energy distribution for optimised WHR system



Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

Thermal energy storage critical for Waste heat recovery

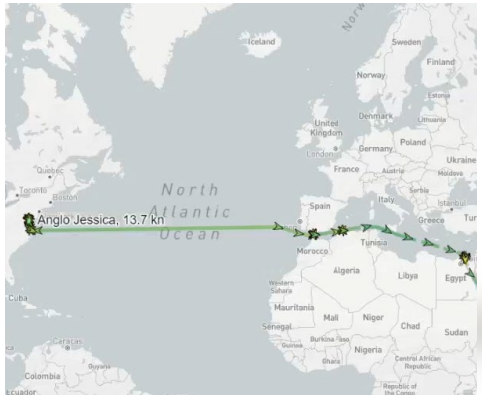


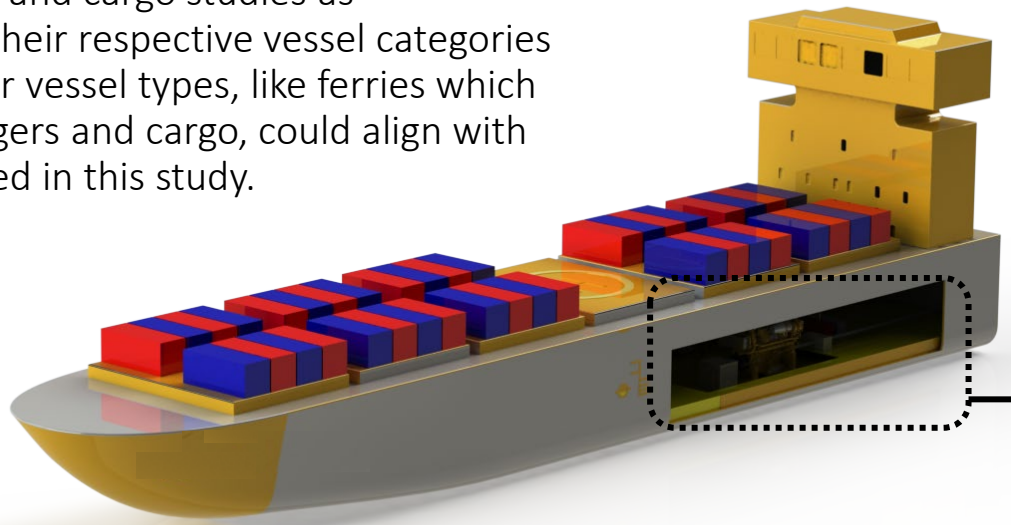


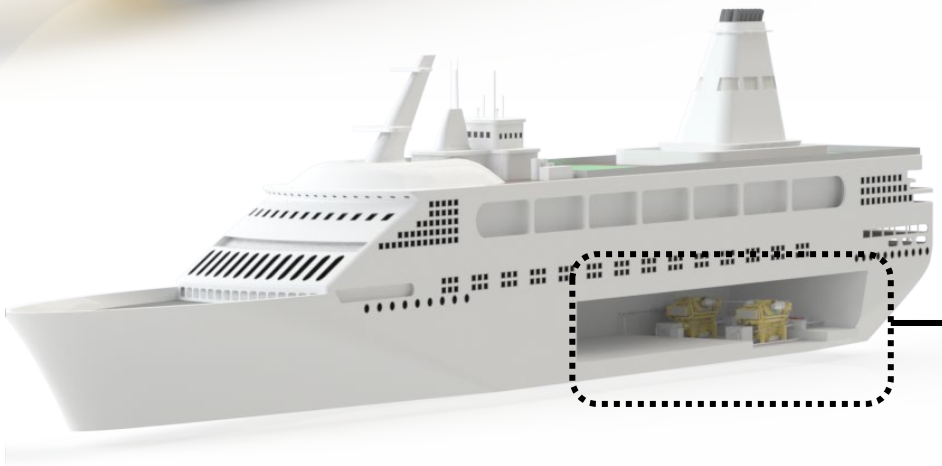
Niknam et al., 2024 https://doi.org/10.1016/j.apenergy.2024.123298

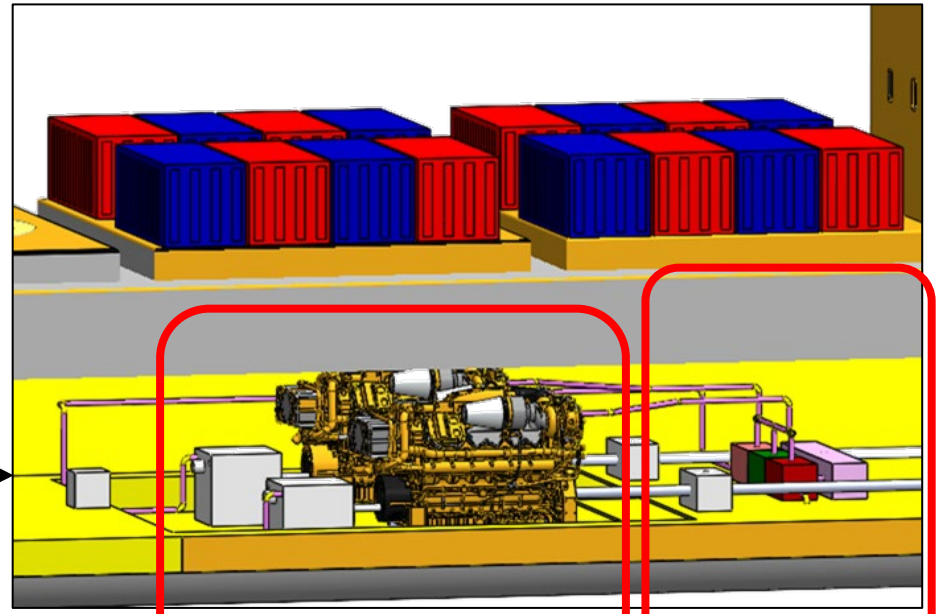
Adaptability of the model

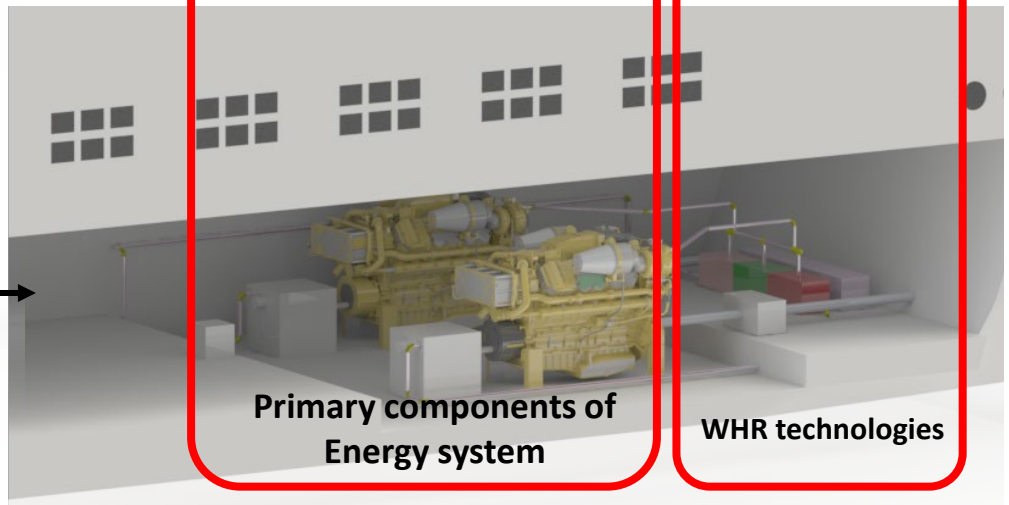
- Viewing the cruise and cargo studies as representative of their respective vessel categories suggests that other vessel types, like ferries which carry both passengers and cargo, could align with the range presented in this study.

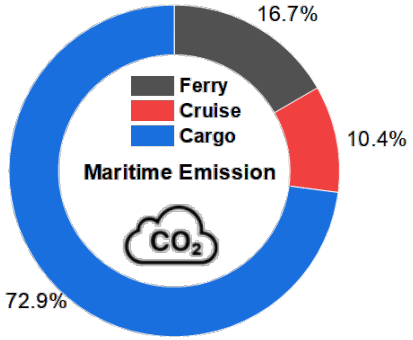








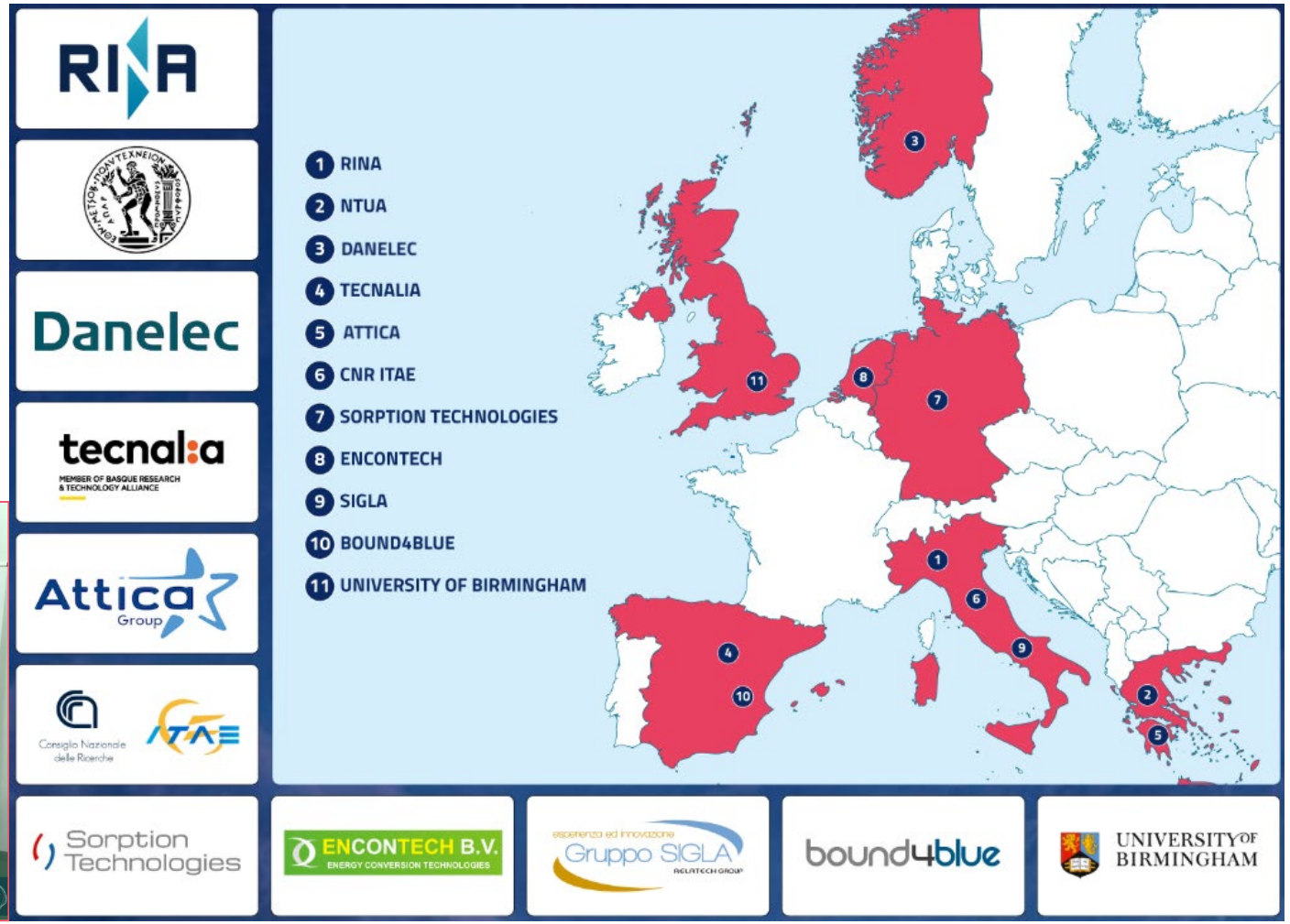




What we discussed so far was a part of

https://www.zhenit.eu

Funded by the European Union



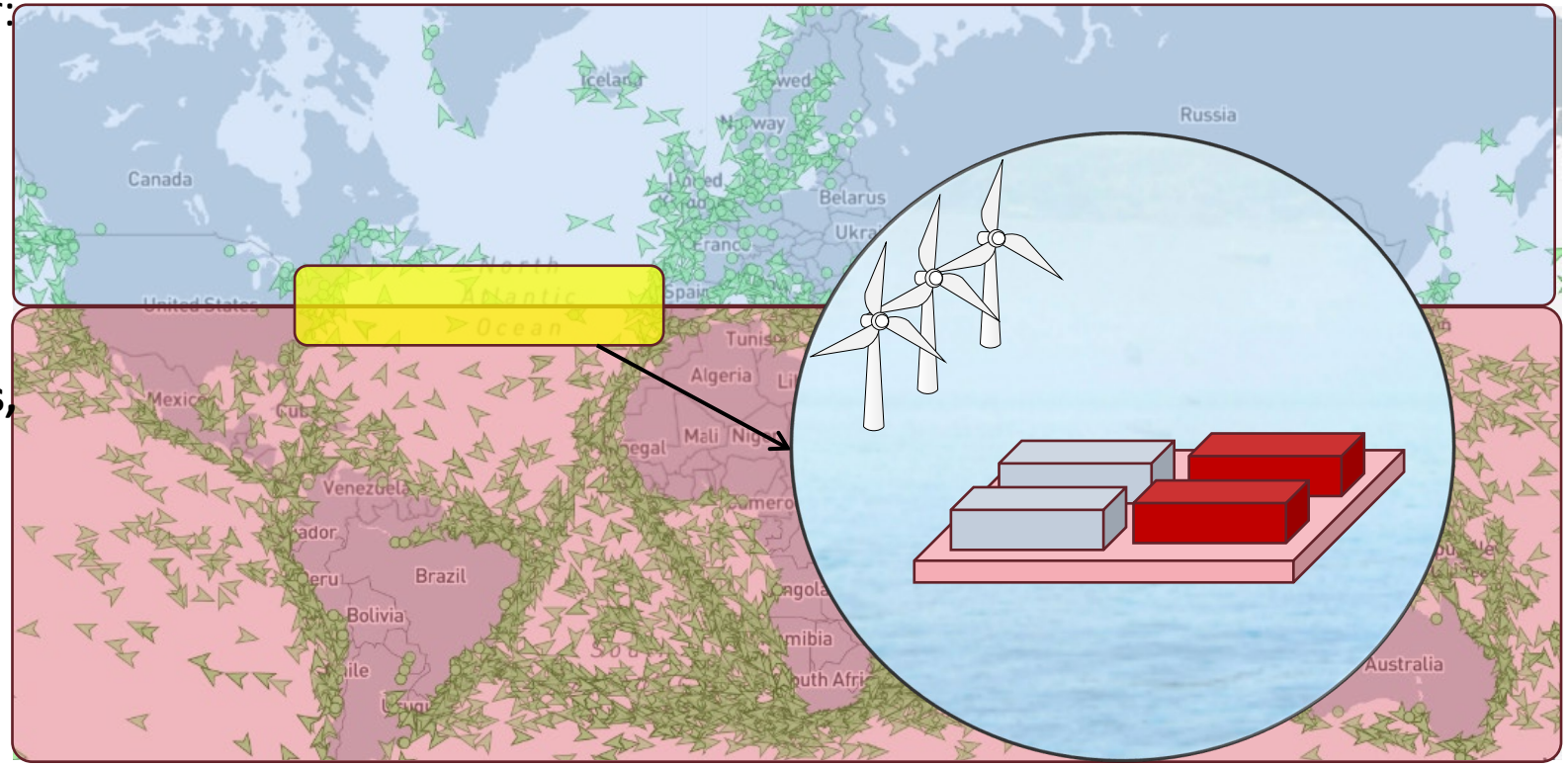
Pitching a Breakthrough Concept

Floating Energy Barges

The thermal energy demand across maritime sectors varies significantly, from extreme cooling at -260°C for LNG carriers to heating needs of up to 70°C.

Floating energy storage station serving as a mid-route exchange point or charging station for:

✅ **LNG and future H_2 carriers** – Facilitating the exchange of **portable thermal storage units**, reducing reliance on onboard reliquefaction, minimising **boil-off gas losses**, decreasing vessel weight, and improving overall energy efficiency.
✅ **Other vessel types** – Supporting **reefer ships, cruise ships, and cargo vessels**.



Potential Shipping Routes

- **Norway → Mediterranean Ports**
- **Qatar → Northern Europe**
- **Alaska (USA) → Pacific Rim**
- **Canada's East Coast → Europe**

The First Inshore LNG Barge 1959

https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/11/Floating-Liquefaction-FLNG-NG-107.pdf

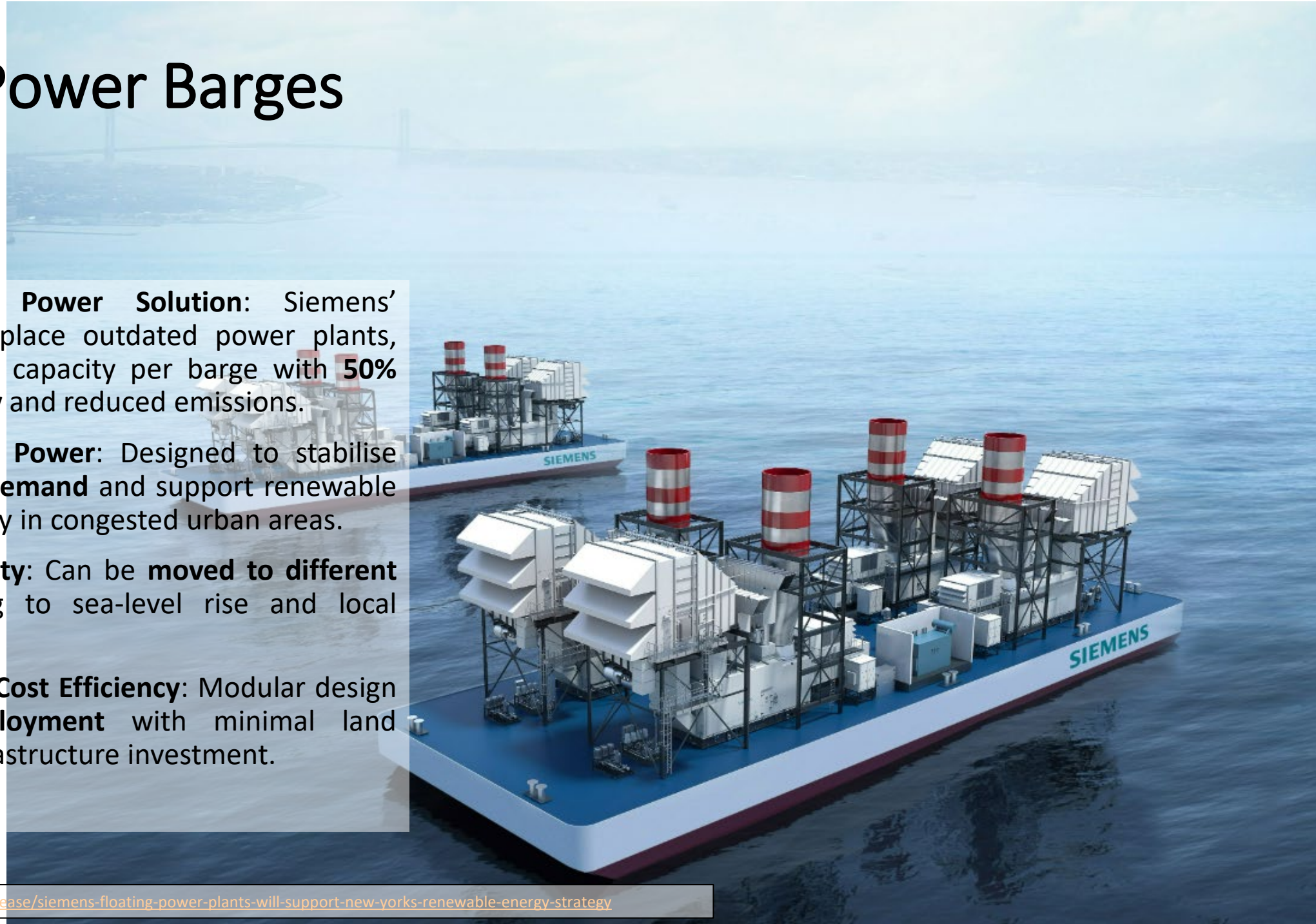
Floating Energy Storage Systems (FESS)

- **Offshore Energy Storage for Land-Constrained Areas**: Floating **battery energy storage systems (ESS)** enable **grid stability and renewable energy integration** where land-based solutions are impractical.
- **Key Projects in Southeast Asia**: Wärtsilä's **54-MW/32-MWh** barge-mounted ESS in the **Philippines** and Keppel's **7.5-MW** system in **Singapore** support **grid balancing and hybrid energy solutions**.
- **Modular & Scalable Design**: Deployable in urban harbours, industrial zones, and marine applications, providing flexibility for renewable and hybrid grids.
- **Advanced Cooling & Efficiency Features**: Uses seawater cooling, battery stacking, and energy management software to optimise performance and reduce footprint.

https://www.powermag.com/floating-energy-storage-systems-take-shape/

Floating Power Barges

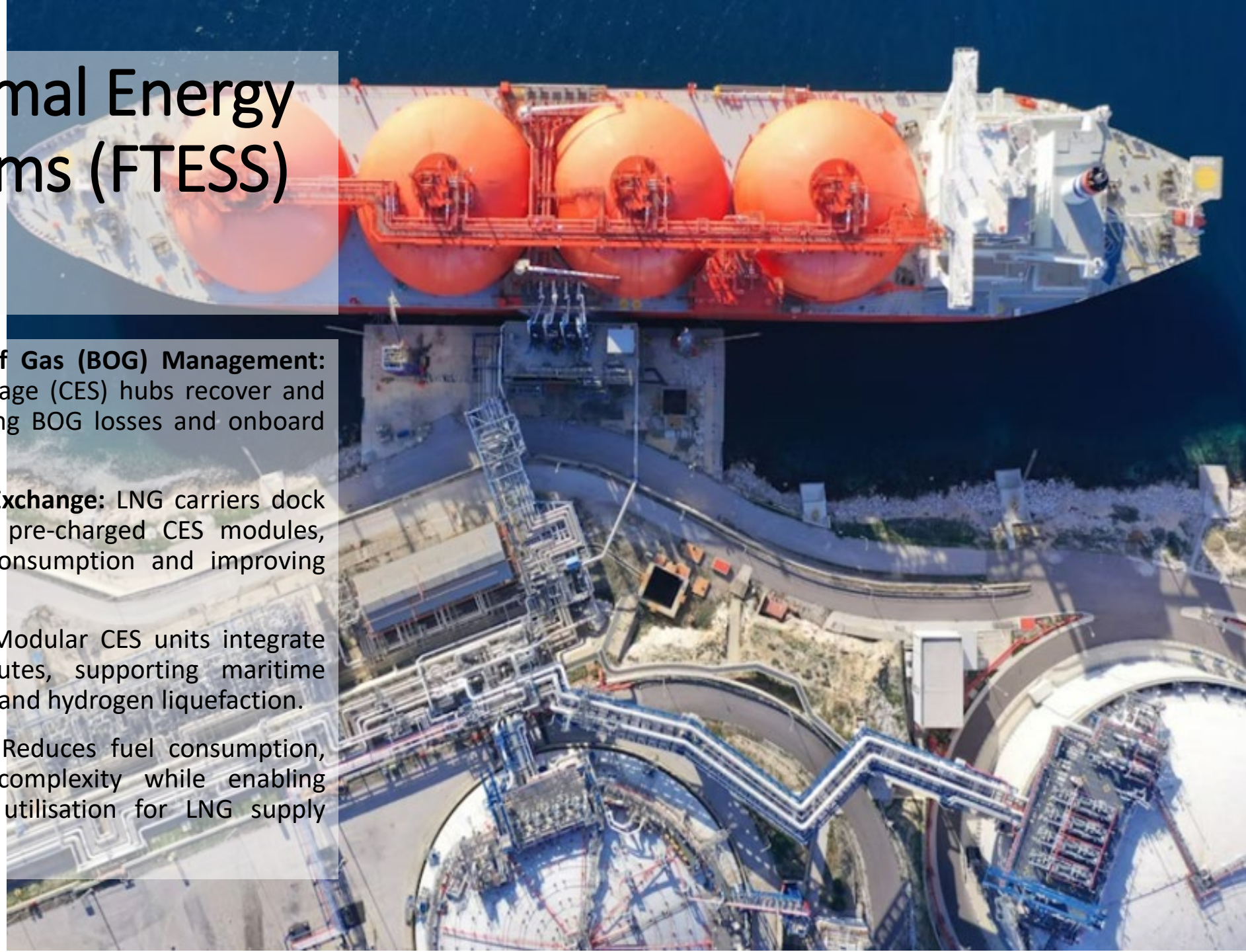
- **Modern Floating Power Solution**: Siemens' SeaFloat barges replace outdated power plants, providing **300 MW** capacity per barge with **50% improved efficiency** and reduced emissions.
- **Peaking & Backup Power**: Designed to stabilise grids during **peak demand** and support renewable energy intermittency in congested urban areas.
- **Mobility & Flexibility**: Can be **moved to different locations**, adapting to sea-level rise and local energy needs.
- **Fast Installation & Cost Efficiency**: Modular design allows **quick deployment** with minimal land acquisition and infrastructure investment.



https://press.siemens.com/global/en/pressrelease/siemens-floating-power-plants-will-support-new-yorks-renewable-energy-strategy

InfraStrat to acquire UK's first Floating Storage Regasification Units (FSRU)

Floating Thermal Energy Storage Systems (FTESS)



- **Offshore CES for LNG Boil-Off Gas (BOG) Management:** Floating Cryogenic Energy Storage (CES) hubs recover and store LNG cold energy, reducing BOG losses and onboard reliquefaction needs.
- **Mid-Route Cryogenic Energy Exchange:** LNG carriers dock at offshore stations to swap pre-charged CES modules, minimising onboard energy consumption and improving efficiency.
- **Scalable & Mobile Solution:** Modular CES units integrate with existing LNG trade routes, supporting maritime cooling, industrial applications, and hydrogen liquefaction.
- **Sustainable & Cost-Effective:** Reduces fuel consumption, emissions, and operational complexity while enabling energy-efficient cold storage utilisation for LNG supply chains.

Funding competition
Clean Maritime Demonstration Competition 6: Feasibility Studies (CMDC6)

- The Department for Transport (DfT), has launched new funding to help decarbonise sea travel as part of the latest round of the Clean Maritime Demonstration Competition (CMDC6).
- The competition is split into 3 strands:
  Strand 1: Clean Maritime Demonstration Competition Round 6 – **Pre-deployment trials**
- Strand 2: Clean Maritime Demonstration Competition Round 6 – **Feasibility studies**
- Strand 3: Clean Maritime Demonstration Competition Round 6 – **Smart Shipping**

Category 1 Feasibility studies
Funding available for your eligible project costs of:
up to 70% if you are a micro or small organisation

Competition closes: Wednesday 16 April 2025 11:00am

phniknam@lincoln.ac.uk

https://apply-for-innovation-funding.service.gov.uk/competition/2119/overview/2ae57565-76cf-4e1c-8ee3-fdbb7766b5d5

Green Kid: Championing Sustainability and Inspiring the Next Generation

by Dr Robert McElroy, Senior Lecturer, Lincoln University

UNIVERSITY OF LINCOLN

Teesside University

GREEN KID COMICS TO PROMOTE STEM TO KS2 CHILDREN (8-11)

Dr Rob McElroy, Dr Julian Lawrence

Past issues

Solvents

Phytoremediation

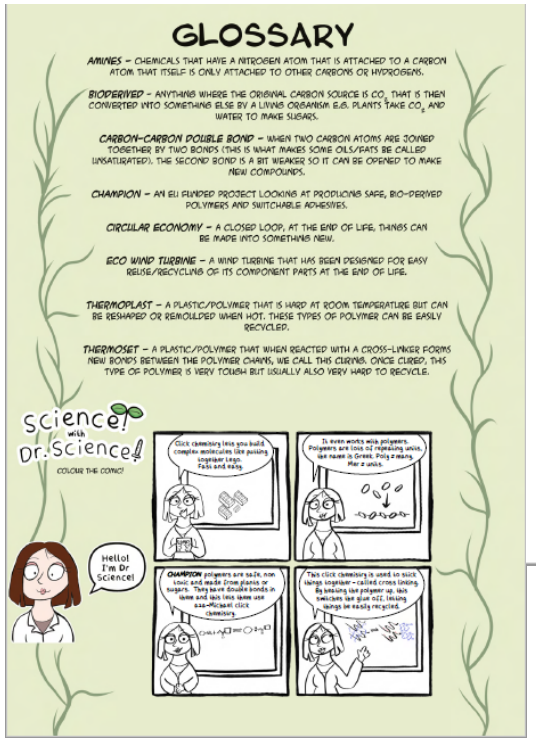
Batteries

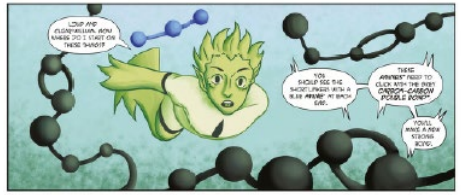
Biorefineries

Switchable adhesives

Low carbon cement

What is in the comic?





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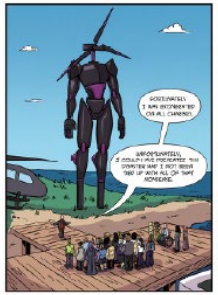
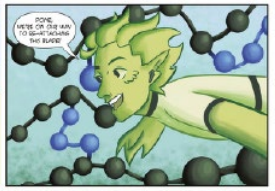
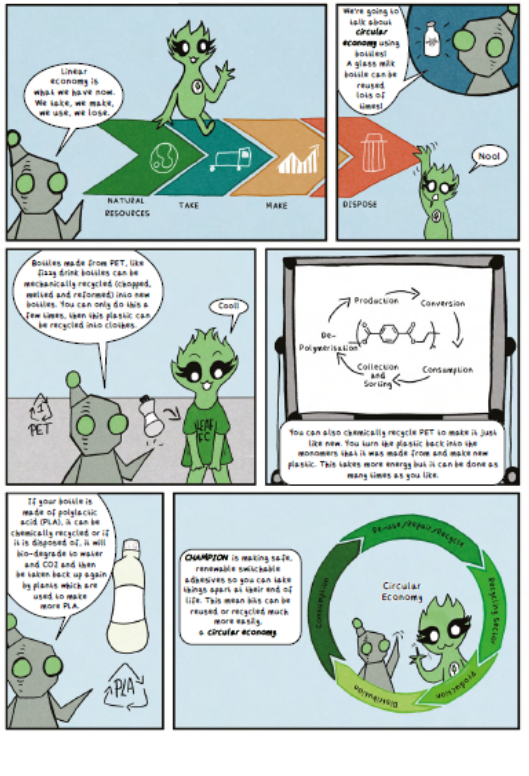




5

sprout and Cyrus



18

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Current issue

Pages 1 and 2

- 2 Page Spread.

Panels 1 - 5 go across the top of the page:

Panel 1:

A badger scurrying through the brush.

Caption:
Another badger.

Panel 2:

An owl with her nest in a tree.

Caption:
Mother barn owl, I count 3 chicks.

Panel 3:

Two rabbits nuzzling each other in some long grass.

Caption:
Two bunnies.

Panel 4:

Bats, sleeping upside down on a tree branch.

Caption:
At least 3 sleepy bats.

Panel 5:

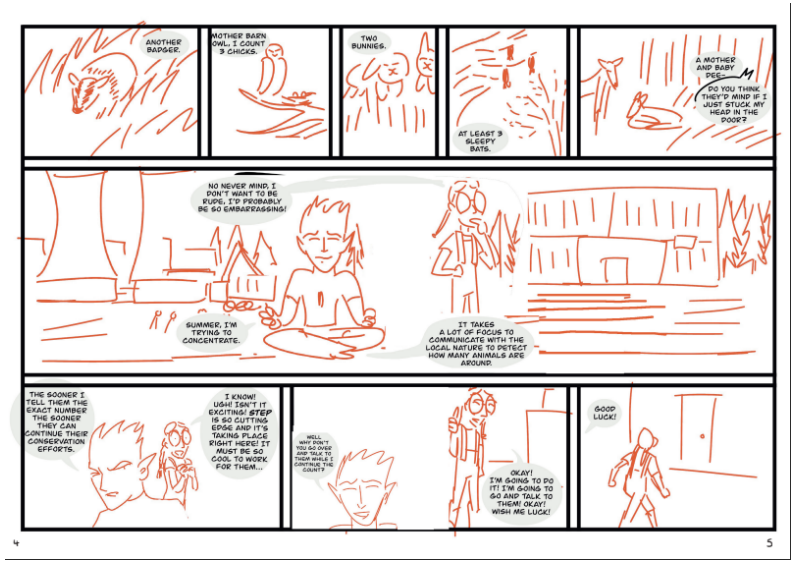
A deer with her fawn in a clearing in the forest.

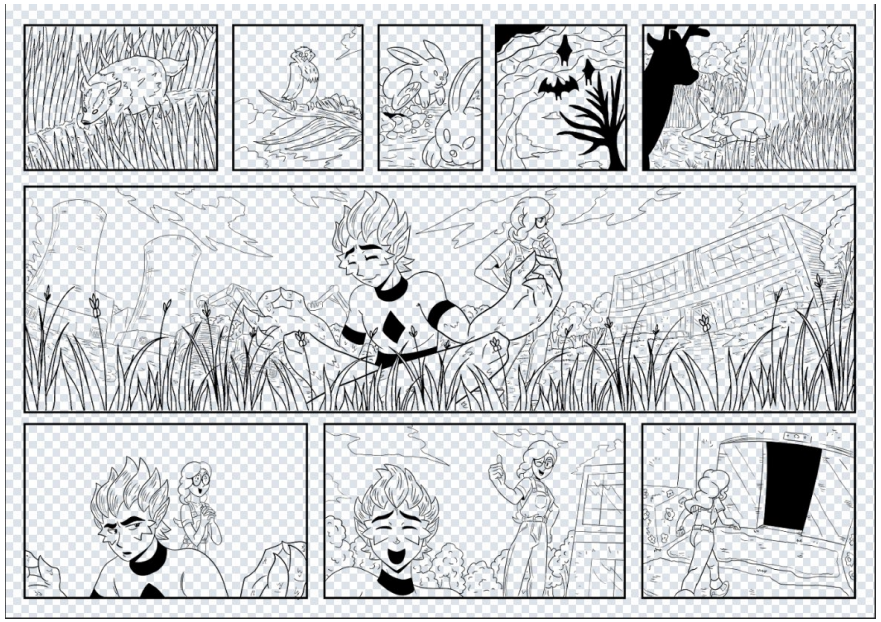
Caption:
A mother and baby dee-

Summer (Out Of Shot):
Do you think they'd mind if I just stuck my head in the door?

Panel 6:

Large wide panel shot. In the centre of the panel is Green Kid sat cross legged in a meditating pose. They've got their eyes closed as they concentrate. Next to them is Summer who's looking pensively towards the crate offices to the left of the page. The whole scene





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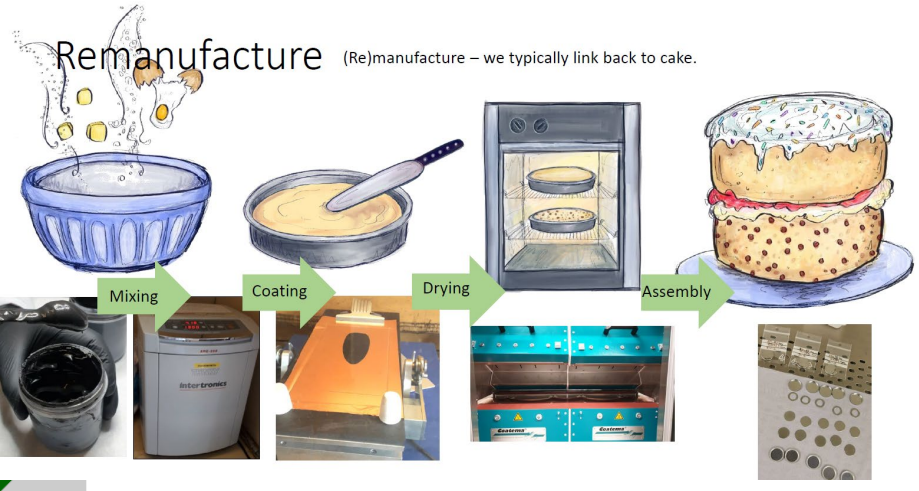
Aiding in learning #1

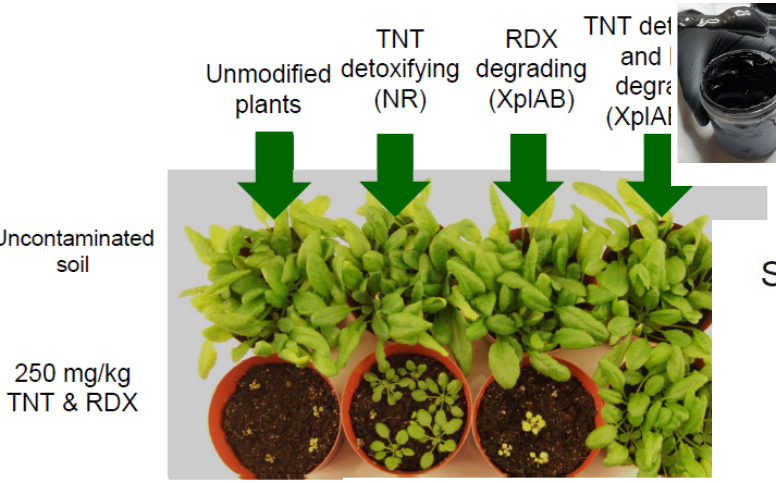
Teacher packs to give extra info for delivery

Remanufacture

(Re)manufacture – we typically link back to cake.



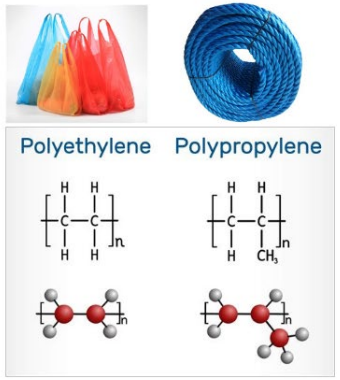
Combining NR and XplAB in Arabid



Combining both enzymes in one plant means it can de with both TNT and RDX and grow vigorously even on contaminated soil.

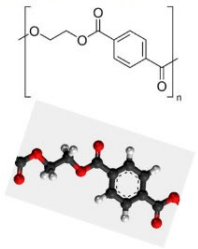
New Phytologist

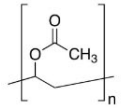
Synthetic polymers

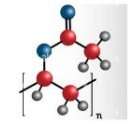


Polyethylene Terephthalate

Poly vinyl acetate







SMASH

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University of Sheffield

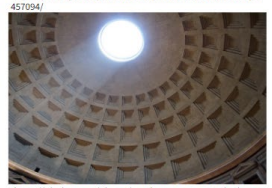
The Wonder of Roman Concrete! - Pozzo

The Romans would often use volcanic ash to create pozzolan-lime cement. Structures built with this cement are still standing today! (Kosmatka et al., 2002)

KOSMATKA, S. H., KERKHOOF, B. & PANARESE, W. C. 2002. *Design and Control of Concrete Mixtures*, Portland Cement Association.

https://pixabay.com/photos/rome-pantheon-historical-italy-5457094/

https://pixabay.com/photos/bridge-architecture-travel-river-3373744/



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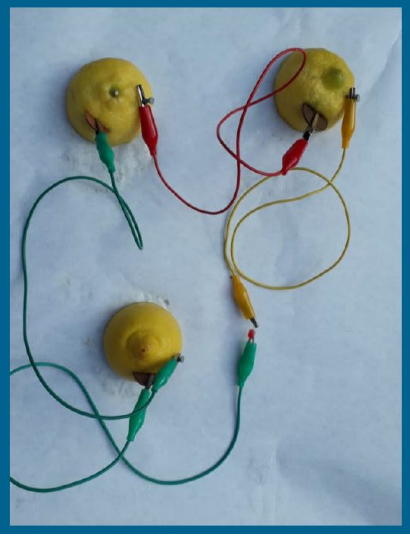
Aiding in learning #2

Lesson ideas

Experimental: Photos of Set-Up



- For every lemon cell, you'll need one extra crocodile clip wire.
- Connect the copper coin in one lemon, to the nail on the second lemon. It should always alternate
- You'll need maybe 2-3 lemon cells to power an LED. You can get the class to make one lemon cell and connect in series.
- Turn off the lights and see if it lights!

Why?

Case 1: Concrete Cupcakes (concrete with cement)

Case 2: Control Cupcakes (no cement)

Case 3: Replacement Egg Cupcakes (supplementary cementitious material)

- Protein in the egg binds the ingredients together
- No protein and the cake falls apart as nothing is holding the ingredients together (also why it doesn't rise as much)
- Protein in the high protein yogurt acts like the egg protein sticking the ingredients together

SMASH SUSTAINABLE MATERIALS AT SHEFFIELD

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Alignment to learning goals

KS2 curriculum where we overlap (so far)

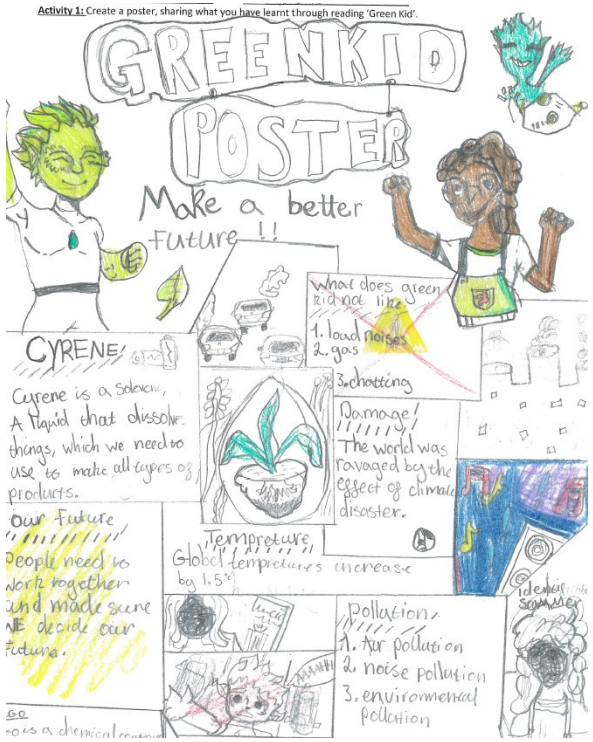
- Plants
- Properties of materials
- Electricity
- Scientific method

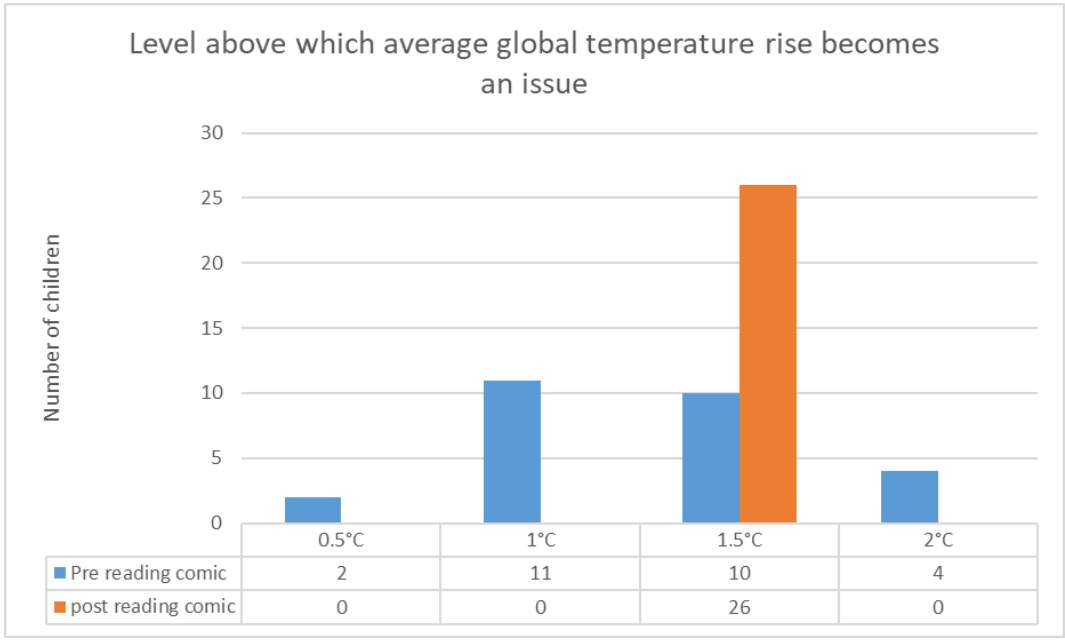
Additional impact

- All comics promote net zero and circular economy
- Useful resource for e.g. Earth day/Earth week

Feedback

Some examples





- Great font
- Colours
- Great range of characters
- Overall look
- The illustrations are really good
- We like that it is printed on recycled paper- the weight and feel of the book is really good quality
- Greenkid could be a boy or a girl
- Really handy glossary

Requirements from company

Funding

- Production of comic
  - Free to share pdf anywhere/everywhere once complete
  - Printing of comic
    - Usually print 2000 but can be more or less as required
    - 950 for Lincoln to go to schools here (30 schools, 30 comics each)

Involvement

- One company employee to help in production of image pack for artists to explain the science and innovation and then delivery
  - This becomes the teacher pack
  - 3-5 hours
- Employee and any other team members to sign off stage gates with whole team
  - 4 x 1 to 2 hours
    - Outline
    - Script
    - Pencilled story board
    - Final comic

Support for Innovation in the Sector

by Trevor Durant,
Manufacturing Advisor,
Business Lincolnshire

GLEAM NETWORK

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Manufacturing Support Programme

Trevor Durant
Manufacturing Advisor

Contents

- Biz Lincs – what do we do?
- Overview of support on offer
- Manufacturing Workshops
- Case Studies
- Marine Renewables – what might this mean?

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What do we do?

Business Lincolnshire is set up to help support Greater Lincolnshire based businesses to start and grow

The aim is to increase economic output by almost a third by 2030, through our amazing local manufacturing businesses

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Fully Funded Specialist Adviser Support – accessible via your local Growth Hub Adviser

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Overview of support

Diagnostics & Action Plans

- Manufacturing-specific diagnostics
- Creation of shared action plans
- Sign-post to further support: Made Smarter, Scale Up, GLEAM etc.

Manufacturing Support Programme

- Access to a business consultant to identify opportunities
- Support in training, 1-2-1 coaching, implementation guidance and support

Provide & Build Manufacturing Skills

- Specific in-business support
- Working in the business to create change
  - Quality
  - Productivity
  - Cost

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What might that support look like?

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Manufacturing Excellence Sprints

Manufacturing Excellence Workshops

- **One-day** intensive training on key aspects of manufacturing:
  - Workplace Organisation (5S)
  - Problem Solving
  - Lean Principles
  - Tour of another manufacturing business

- **Dates for 2025:**
  - ~~**25 March**~~, **13 May, 01 July**

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Case Study 1

- Context:
  - Growing manufacturer of foam components
  - Fully manual process from order collection through to invoice and ship
  - Production orders took any form…

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Case Study 1

- Support:
  - **Helped develop a rudimentary system for collecting orders, tracking progress and including accountability gates throughout the process**
  - Enabled access to grant funding and a business loan for new CNC machine

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Case Study 1

Company XX Foam Order Tracking								
Order date	W/O #	Customer	Site Name	Production Dat	Due Date	Quantity	Planned	Dispa
08/04/2024	MB24001	Bob Smith	Rose Cottages	07/04/2024	10/04/2024	1	x	
16/04/2024	MB24002	John Terry	Unit 6 Bay Hill	15/04/2024	18/04/2024	4	x	
21/04/2024	MB24003	Clive Woodward	Castle Howard	20/04/2024	23/04/2024	3	x	
16/04/2024	MB24004	John Smith	Unit 12, The stables	15/04/2024	18/04/2024	7		
21/04/2024	MB24005	Lucy Brahshaw	64 Acacia Road	18/04/2024	23/04/2024	2		
16/04/2024	MB24006	Steve Waite	The Forge, Huddersfield	14/04/2024	18/04/2024	8		
21/04/2024	MB24007	Alan Williams	19, Back End Road	15/04/2024	23/04/2024	6		
	MB24008							
	MB24009							
	MB24010							
	MB24011							
	MB24012							
	MB24013							
	MB24014							
	MB24015							
	MB24016							
	MB24017							
	MB24018							
	MB24019							

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Company XX Foam Order Tracking

Order date	W/O #	Customer	Site Name	Production Dat	Due Date
08/04/2024	MB24001	Bob Smith	Rose Cottages	07/04/2024	10/04/2024
16/04/2024	MB24002	John Terry	Unit 6 Bay Hill	15/04/2024	18/04/2024
21/04/2024	MB24003	Clive Woodward	Castle Howard	20/04/2024	23/04/2024
16/04/2024	MB24004	John Smith	Unit 12, The stables	15/04/2024	18/04/2024
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21/04/2024	MB24007	Alan Williams	19, Back End Road	15/04/2024	23/04/2024
	MB24008				
	MB24009				
	MB24010				
	MB24011				
	MB24012				
	MB24013				
	MB24014				
	MB24015				
	MB24016				
	MB24017				
	MB24018				
	MB24019				

Company XX Production Works Order

Works Order #	MB24004
Production Date	15/04/2024
Customer	John Smith
Customer Ref	12349b
Site Address	Unit 12, The stables
Due Date	18/04/2024
Quantity	7

Process	Date	Initials
Process W/O		
Feather / Fibre Ordered		
Pick / Cut Foam		
Fabrication		
Quality Check		
Costed		
Invoiced		
Dispatched		

Production Notes

FOAM type xxx to be used due to customer requirements

Notes to Office

If any materials are not of the required quality, please raise the issue with your supervisor

Please do not work on any order which do not have clear instructions

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Case Study

Production Date	15/04/2024
Customer	John Smith
Customer Ref	12349b
Site Address	Unit 12, The stables
Due Date	18/04/2024
Quantity	7

Process	**Date**	**Initials**
Process W/O		
Feather / Fibre Ordered		
Pick / Cut Foam		
Fabrication		
Quality Check		
Costed		
Invoiced		
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Production Notes

FOAM type xxx to be used due to customer requirements

Notes to Office

If any materials are not of the required quality, please raise the issue with your supervisor

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Case Study 1 - feedback

“We have been running the production order system for a month now and it has been quite smooth, and even saved us from a couple of missed orders”

“We don’t miss orders”

“It’s been revolutionary”

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Case Study 2

- Business producing seasonal decorations wanted support to understanding their processes better
- Completed 2 x 3 hrs support sessions to fully map out the process, identifying areas of inefficiency, and potential improvements

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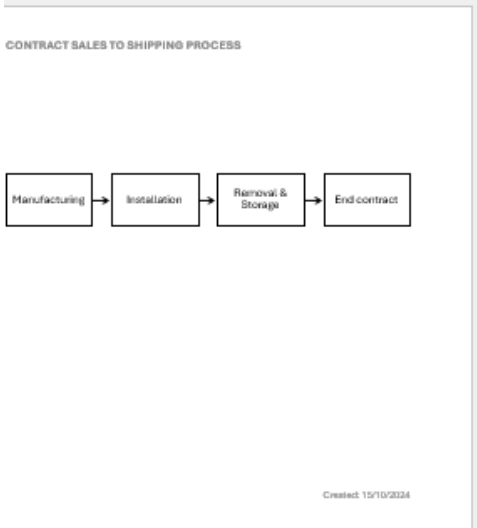

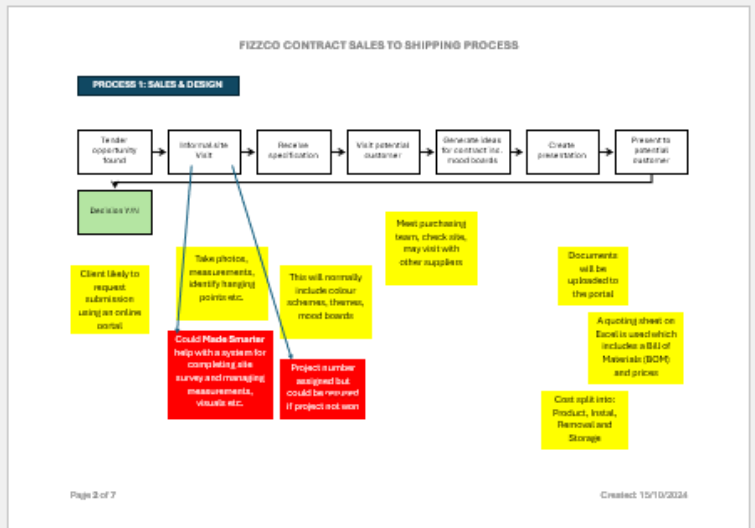

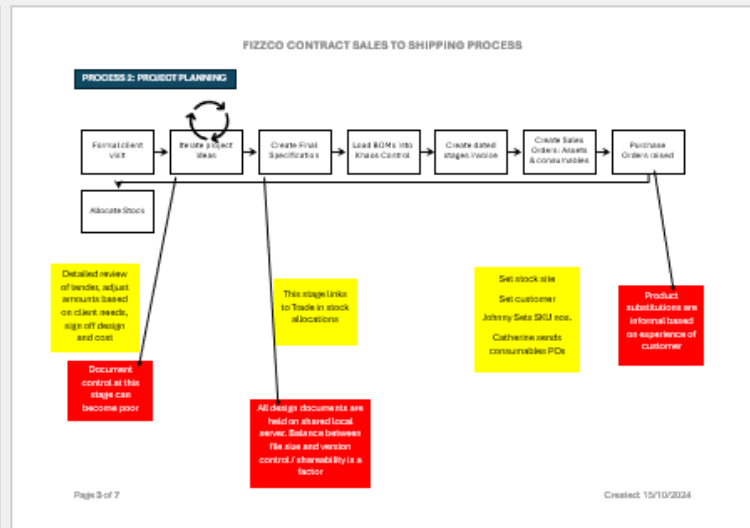

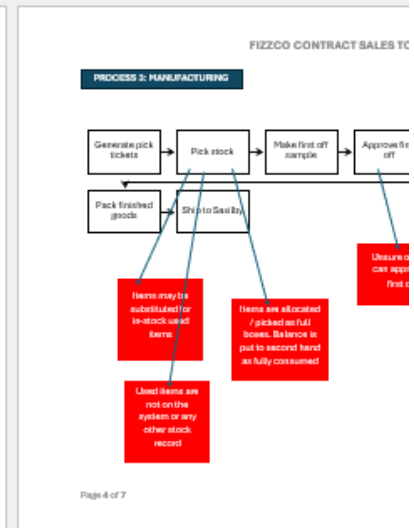

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Case Study 2

- **Findings**:
  - Several areas where Made Smarter could help with automation of a system
  - Identified areas where stock discrepancies could lead to QA issues
  - Issues with version control on critical documents / specifications
  - Identified potential for software to help with creating audits and checklists to reduce risk of claims during installation and use of third-party equipment
  - Identified a significant project around removal and storage of items and how savings / reduction in workload could bring ££ benefits

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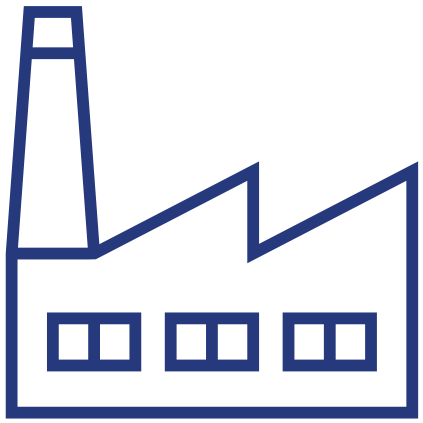
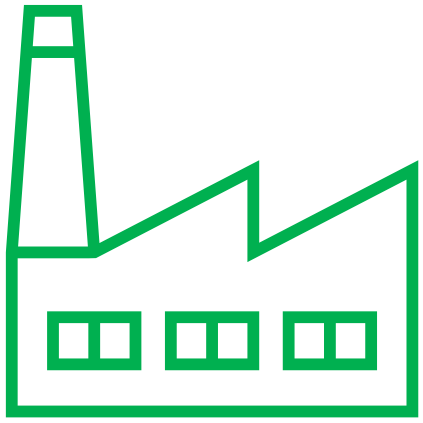
Case Study 3





- New Product
- Control system knowledge gap

- Seasonal lull in Q4
- Expertise in control systems

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Case Study 3 - feedback

- “We’ve got an agreement set up and should be producing for them in the next few months”

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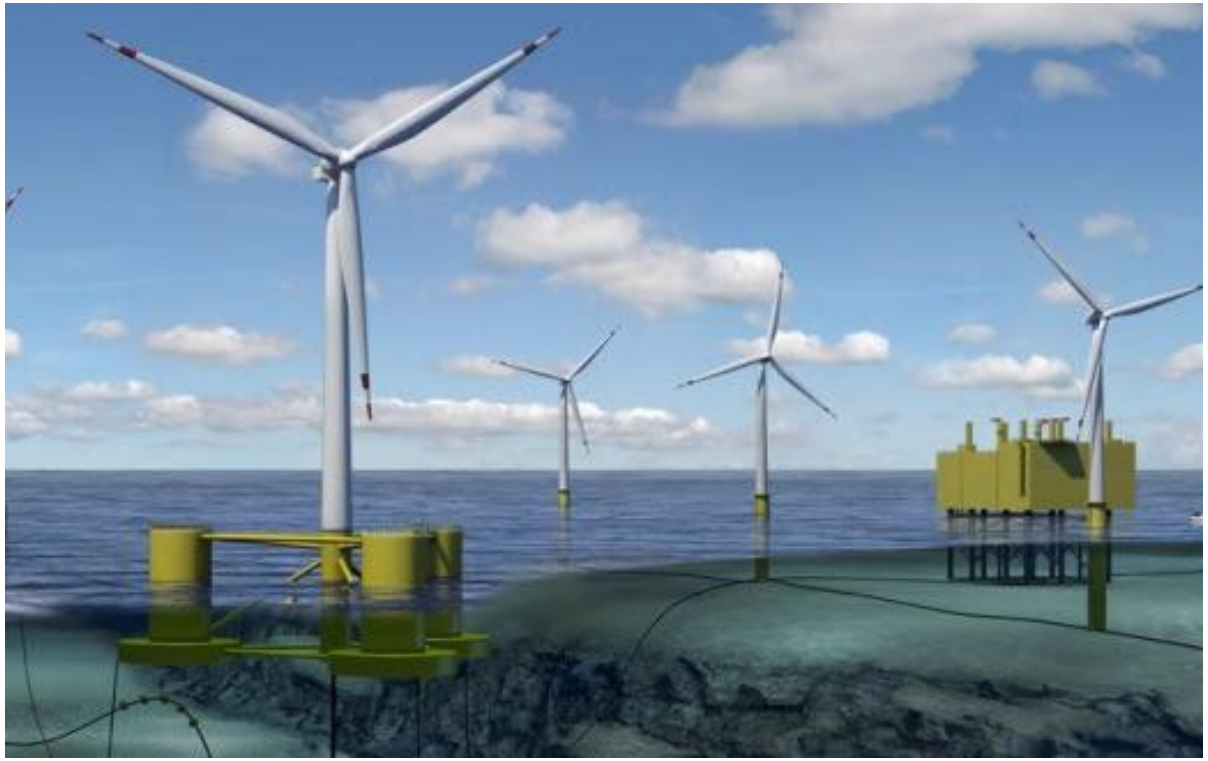
Marine Renewables

What might this mean?

A Growing Global Market

- The marine renewables sector (tidal, wave, and floating offshore wind) is projected to reach **£76 billion** by 2050.
- The UK could be a world leader in marine renewables, with abundant tidal and wave resources and major government support.
- The push for Net Zero by 2050 is driving massive investment and creating long-term opportunities.
- **Key Takeaway:** Businesses that adapt now can secure early-mover advantage in a sector set for rapid growth.



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What if you don't currently work in Marine Renewables?

SO WHAT…!

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Food for thought…

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Food for thought…

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Food for thought…

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Food for thought…

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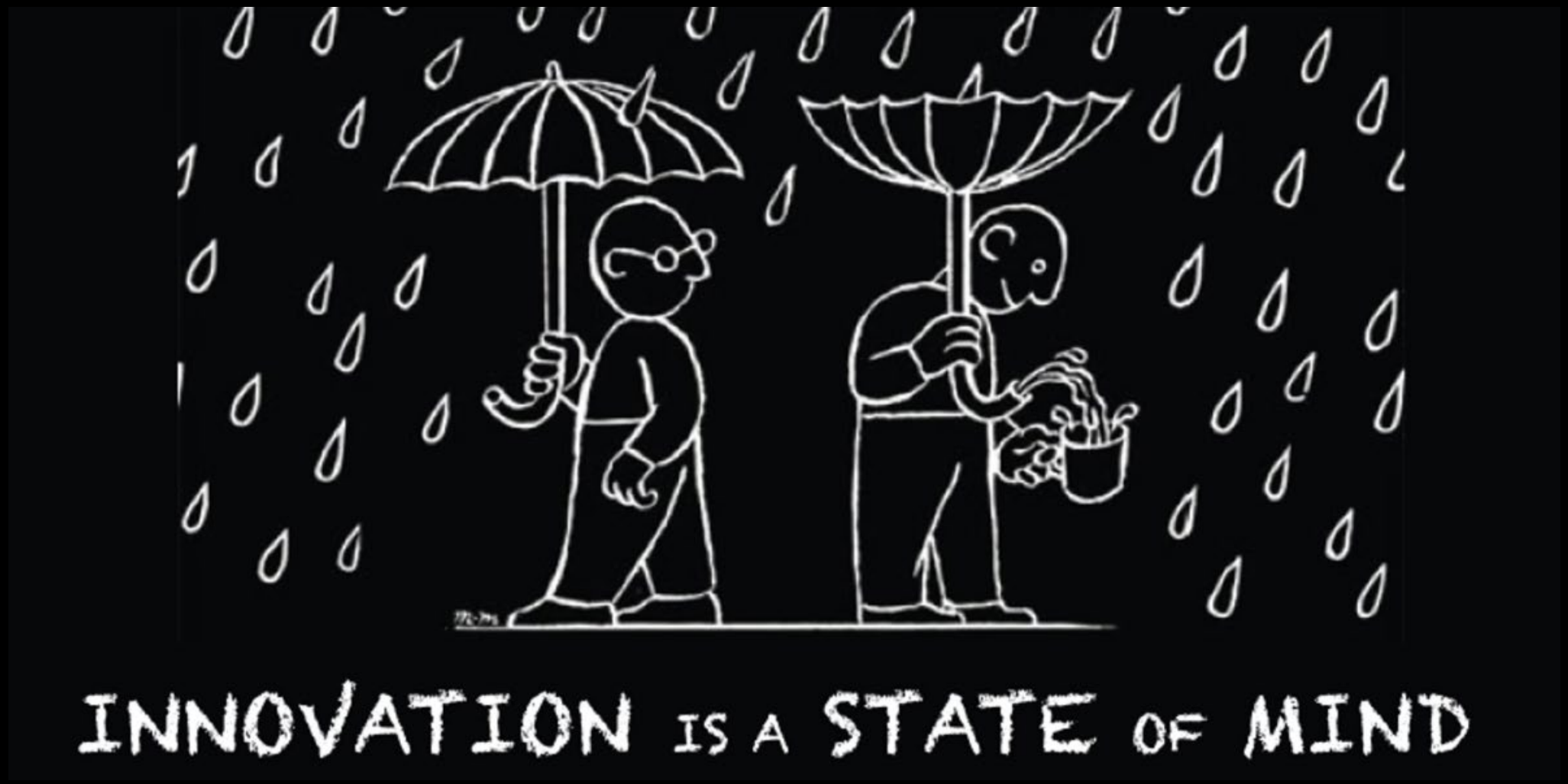
What triggered the change?



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Marine Renewables

🛠️ Structural & Mechanical Components

- Tidal and wave turbines (precision parts, blades, housings)
- Subsea foundations and mooring systems
- Corrosion-resistant materials and coatings

Who Can Pivot:

- Engineering & Fabrication (precision machining, welding, CNC)
- Automotive & Aerospace (advanced materials, aerodynamic design)
- Construction & Civil Works (concrete foundations, large-scale structures)

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Marine Renewables

💪 Power Generation & Transmission

- Tidal and wave energy converters
- Subsea power cables and offshore grid integration

Who Can Pivot:

- Electrical Engineering (generators, transformers, connectors)
- Oil & Gas (offshore power transmission, cable laying)
- Robotics & Automation (electromechanical solutions)

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Marine Renewables

🎨 Data, Monitoring & Control Systems

- IoT and real-time monitoring
- AI for predictive maintenance
- Sensor technology for marine environments

Who Can Pivot:

- IT & Data Firms (software, real-time analytics)
- Telecoms (remote monitoring systems)
- Aerospace (sensor technology and telemetry systems)

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Marine Renewables

🚗 Marine Operations & Logistics

- Specialised vessels for installation and maintenance
- Ports with heavy-lift and laydown capabilities

Who Can Pivot:

- Logistics Providers (heavy-haulage, supply chain management)
- Marine Transport (specialist shipping and offshore services)
- Construction (lifting, rigging, and offshore infrastructure)

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Marine Renewables

🌐 **Maintenance & Lifecycle Support**

- Remote inspection (ROVs, drones)
- Long-term maintenance and replacement parts

Who Can Pivot:

- Oil & Gas Services (offshore inspection, maintenance)
- Engineering Firms (repair, custom part fabrication)
- Drone & ROV Operators (remote inspection capabilities)

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A change of perspective:

- **Current thinking:**
  - **Does** our business and products fit with Marine Renewables?

- **Future thinking:**
  - **How can** our business and products be an integral part of marine renewables?

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Summary

- We can provide bespoke support in lots of different business areas
- There is so much more value to be had by improving business processes before you look at grant funding
- Being an active part of our network can bring about unexpected opportunities and benefits
- Any issues, opportunities, ideas, etc. just drop me an email / call and we can discuss best approach

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Get in touch

trevor.durant@bizlincolnshire.com

0794 002 6762

www.businesslincolnshire.com

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BRIDGE

Coffee, Networking &
Optional Tour of the Bridge
led by Dr Nick Riess & Dr Peter Eaton