What has BATNET resulted in for the lead partners ?

A view from NORDIC BATTERIES and ZEM

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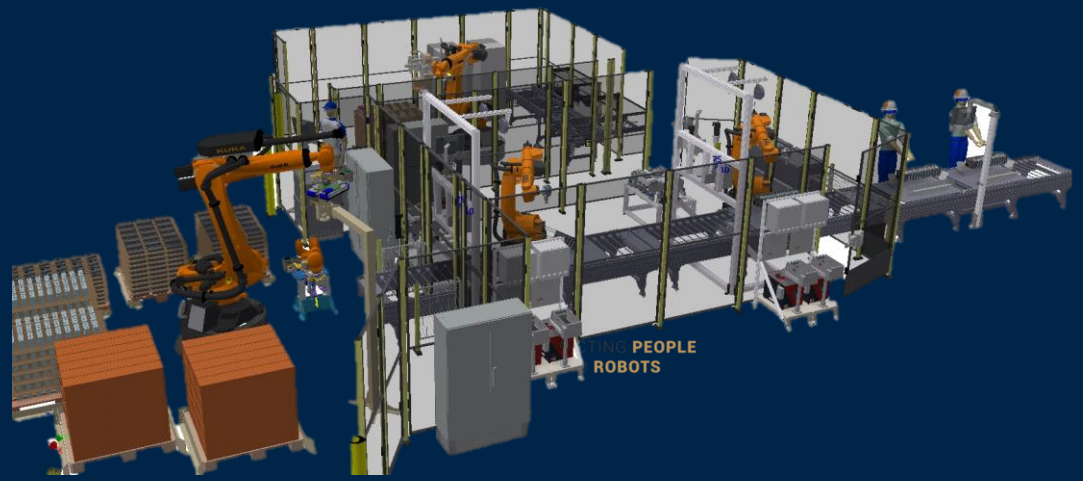
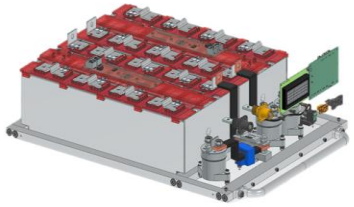
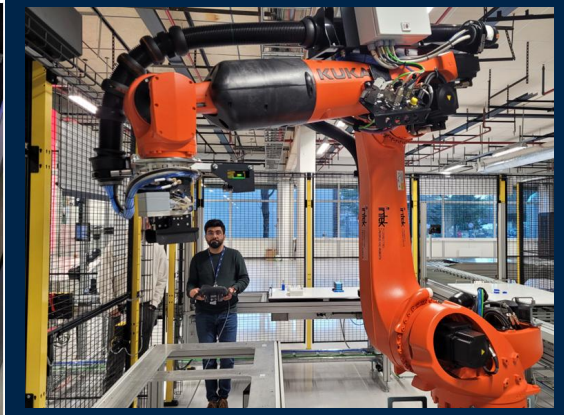
Founder and board member
Nordic Batteries and ZEM

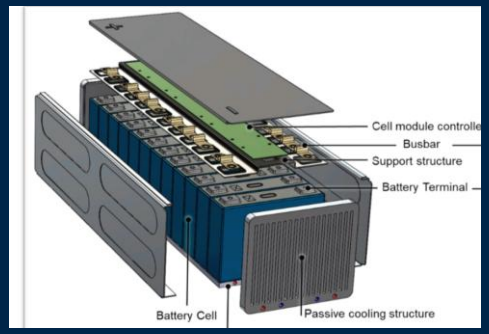


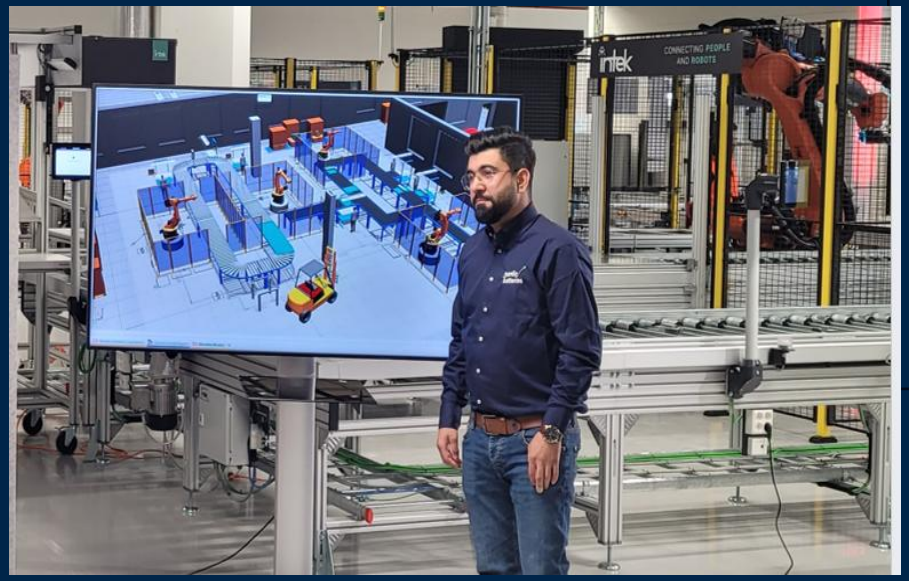
NORDIC BATTERIES gained key competences in *Design for Manufacturing and operating a (pilot) plant*

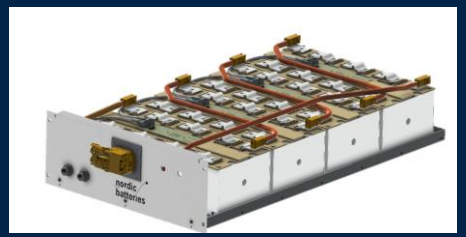




Pilotplant Kongsberg



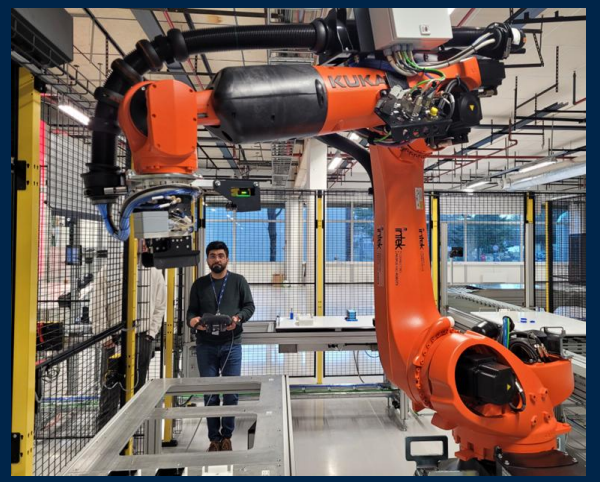




- Nordic Batteries has now experience in designing and building modules and packs, and developing a BMS
- BATNET allowed to increase battery assembly knowledge using both Norwegian, European and Asian cells
- Today, we can build customized products with up to 50 MWh/ycapacity
- We offer also contract manufacturing for European customers

BATNET helped NORDIC BATTERIES to expand

- Nordic Batteries develops now customized battery modules, pack and solutions with our own BMS.
- It builds today large charging containers for Volvo and Moen Marin and explores new charging ideas
- NB grew from 4 to 15 people during BATNET and can expand now into new nice areas.



GESI

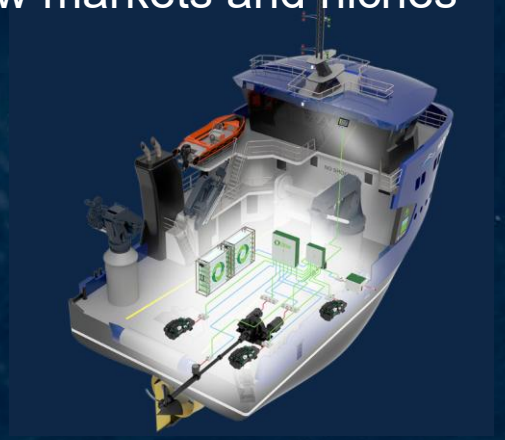
• ZEM gained new markeds through BATNET

POWERING THE GREEN MARITIME FUTURE

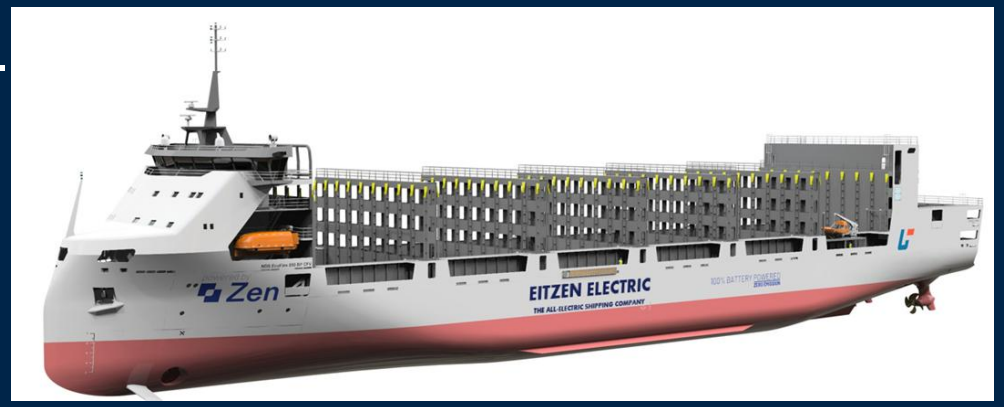
ZEM is a profitable systems integrator with more than 120 projects delivered

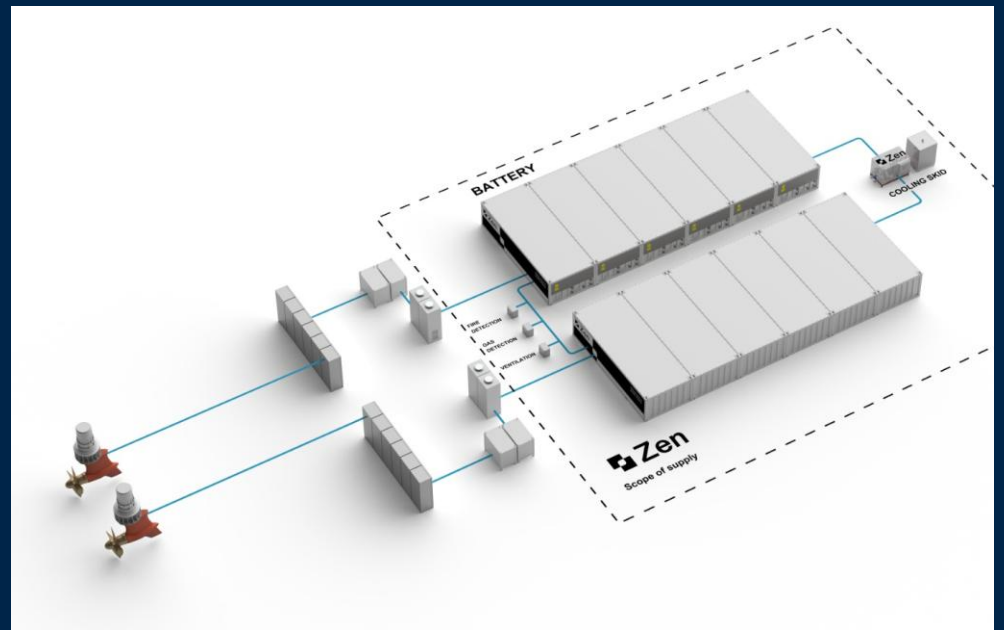
A »Gazelle Enterprise» for 3 years in a row, it is now part of the Volvo Penta Group

BATNET allowed to explore new markets and niches

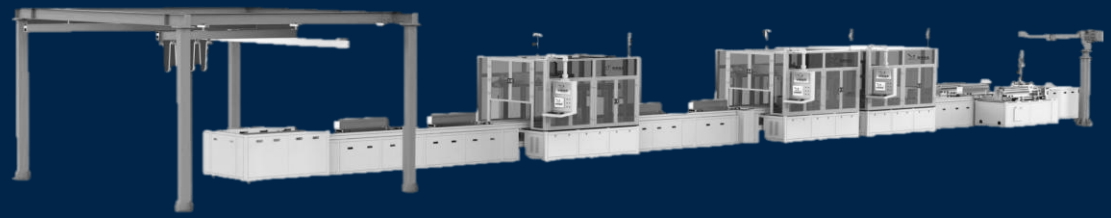


The BATNET project led to a partnership in Zen

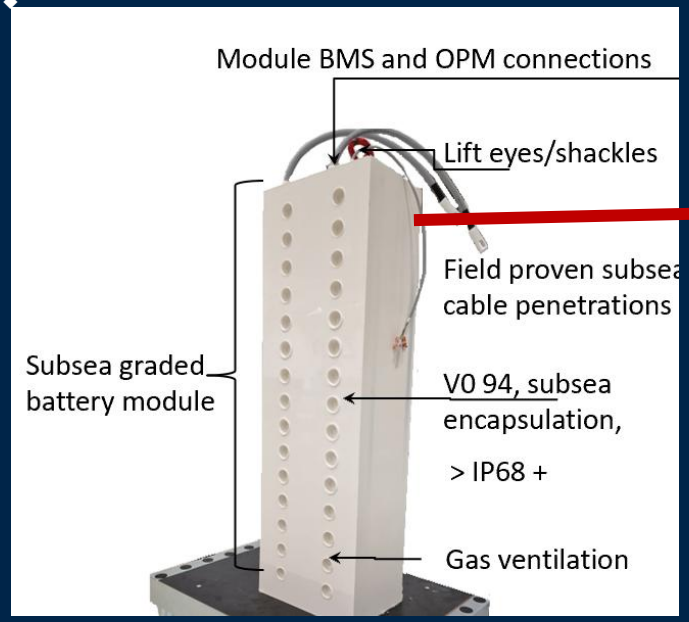




- Founded by the shipping group Eitzen, Zen developed a moulded battery solution pack for large vessels.
- A very safe, low cost and modular system, already approved by DNV
- With growing demand ZEN builds a 1,5 GWh/y assembly plant in Norway

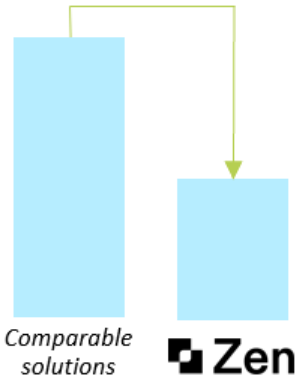


ZENs solution is innovative and price competitive



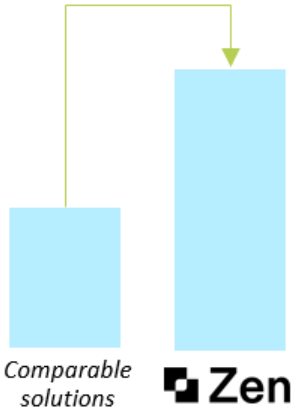
Low cost

- 50%



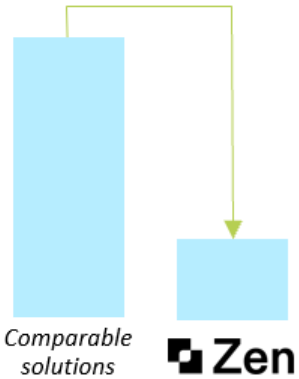
Energy dense

2-3x



Efficient

- 90%



The modular solution is designed for ultimate safety

➢**ZEN uses the safest cell types available :**

- LFP battery cells by world class cell producers with European advanced management systems (BMS/EMS)

➢**Propagation/ Thermal Runaway prevented by design**

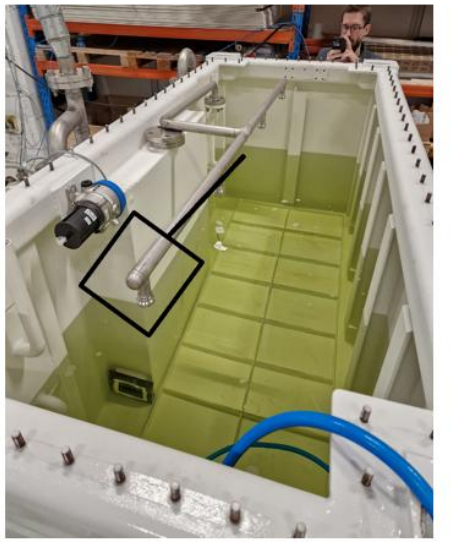
- Each Battery module is cast in a polyurethan to prevent cell-to-cell propagation and contacts with ignition sources

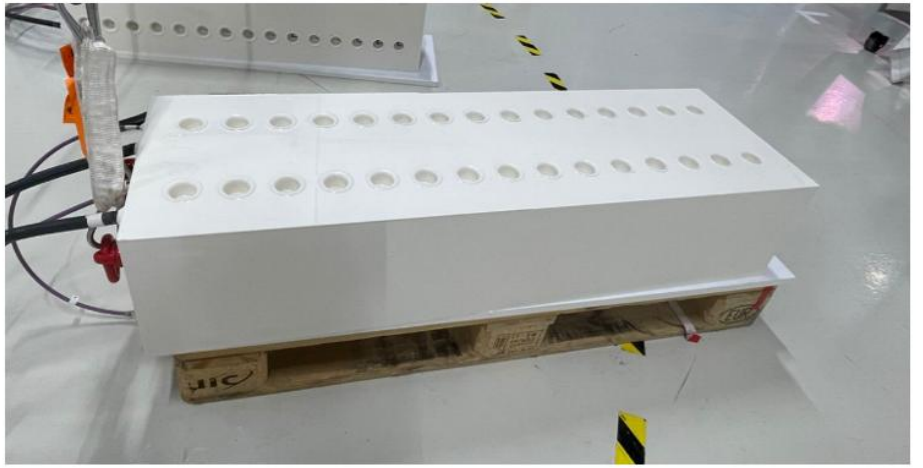
➢**Full fire and explosion protection:**

- Water mist sprinklers suppress any fire. High-cap ventilation and absence of ignition sources prevent any gas explosion

➢ **Well suited also for land-based applications**

- The Zen battery containers can be the BESS core where high safety is required, or for new port charging systems





Together we organized the

Global Electric Shipping Initiative (GESI)

to accelerate fully electric long-range shipping

the Vision To make electric shipping operations the commercially preferred option

We need to work closely together to reach IMOs new goals and EU's Zero Emission Waterborne Transport plans.

ZEM

Zen

nordic batteries

inSpire invest

The CHALLENGE

While other industries actively pursue direct electrification, the global shipping sector has lagged behind: Battery solutions provide too limited range, are not reliable or safe enough, and are too costly

GESI wants to radically change this

by combing proven battery cells with innovative battery pack concepts and new technologies: Our goal is to

- **extend battery performance for large-scale batteries**
- **raise reliability and safety for maritime applications**
- **use intelligent software to optimize total operations**
- **Accelerate access to global charging infrastructures**

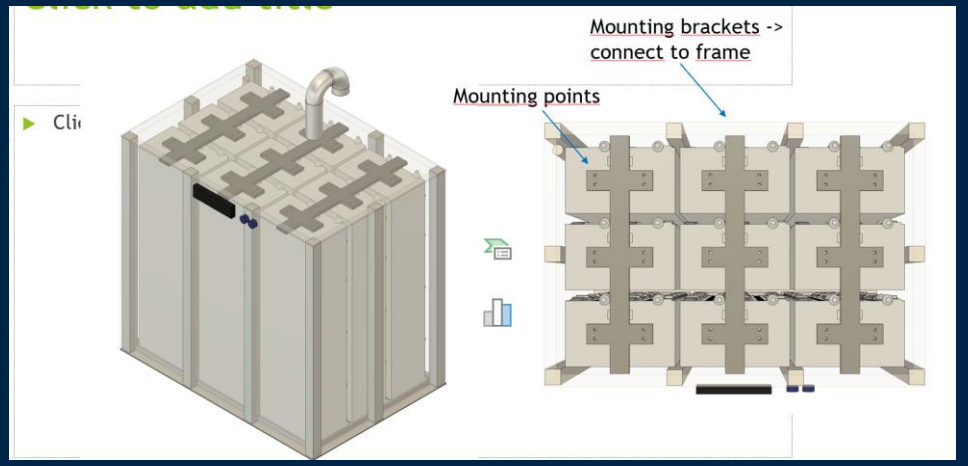
GESI

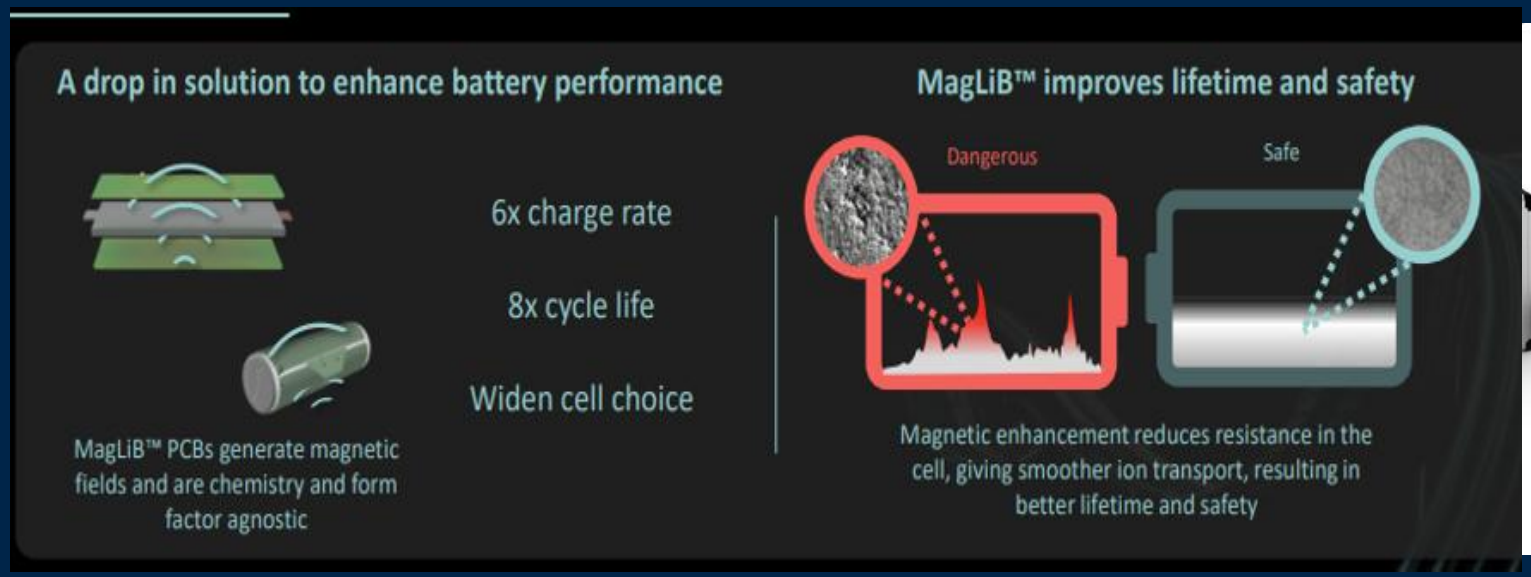
GESI manages join R&D projects for the partners to adapt the concept to other applications and vessel types

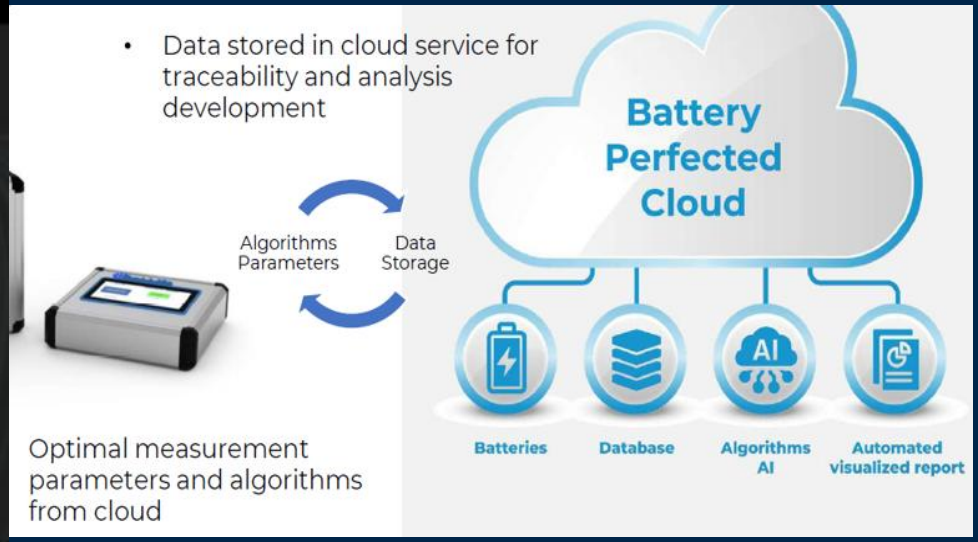
GESI has applied for development funding for new pack solutions and software for cybersecurity and optimized charging, and testing new charging techniques and building networks of charging points:

We see the potential to integrate Magnetic Enhancement technology with a very fast measurement technique to determine and control the State of Charge (SoH) and State of Health (SoH)

GESI therefore submitted a EUREKA R&D application to raise the C-rate of these LFP modules from 0,5 to I,5 / 2.5 when charging

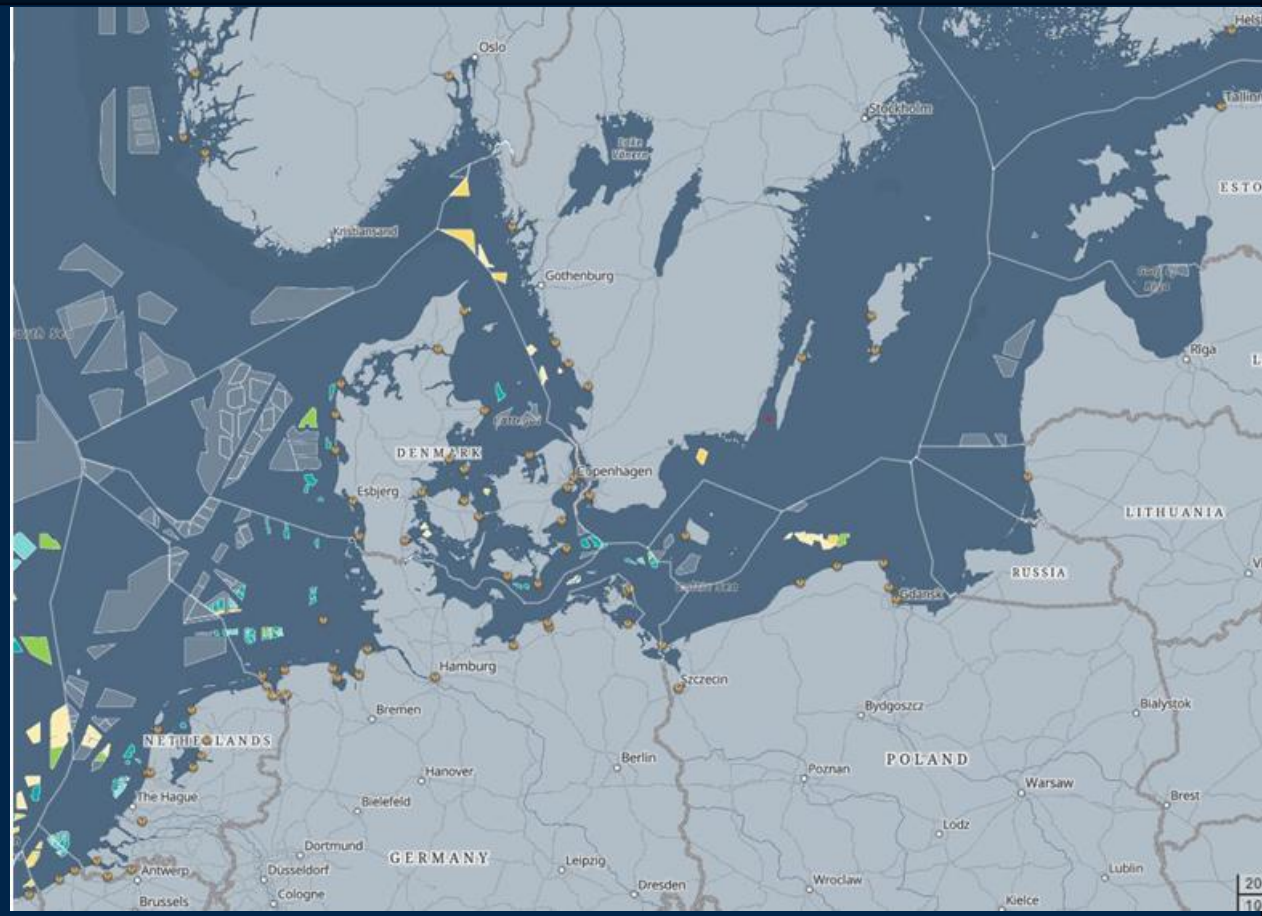






GESI explores also new concepts for charging large vessels

- The Zen BESS solutions also allow new large vessel charging concepts-
- Offshore wind farms provide a strong grid connection options for vessel charging.
- Power plants onshore close to the sea, have the grid infrastructure available.
- The North and Baltic Sea will likely provide strategically locate strong charging points cloe to offshore wind farms
- We can see in the coming decade green electrified shipping corridors through the North and Baltic Sea



Charging at TEN-T Ports

A GESI opportunity for Nordic Batteries

The Trans-European Transport Network is an EU initiative to develop an efficient, interconnected and sustainable transport network

- The EU requires TEN-T ports to offer shore power to ships in order to reduce emissions when ships are docked.
- The ports receive support for environmental measures, including the construction of shore power facilities.
- Up to 500 TEN-T port battery projects are forecast by 2030
- The total potential is up to **10 GWh** of battery capacity needed in EU-ports

nordic batteries

Join GESI and our Zero Emission Shipping vision

Together we can realize it now::
A 6600 dwt chemical carriers with Zen technology allows emission free medium distance and port operations

For further information contact

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