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Electrifying Maritime Transport

47th Annual Interferry Conference

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06 November 2023

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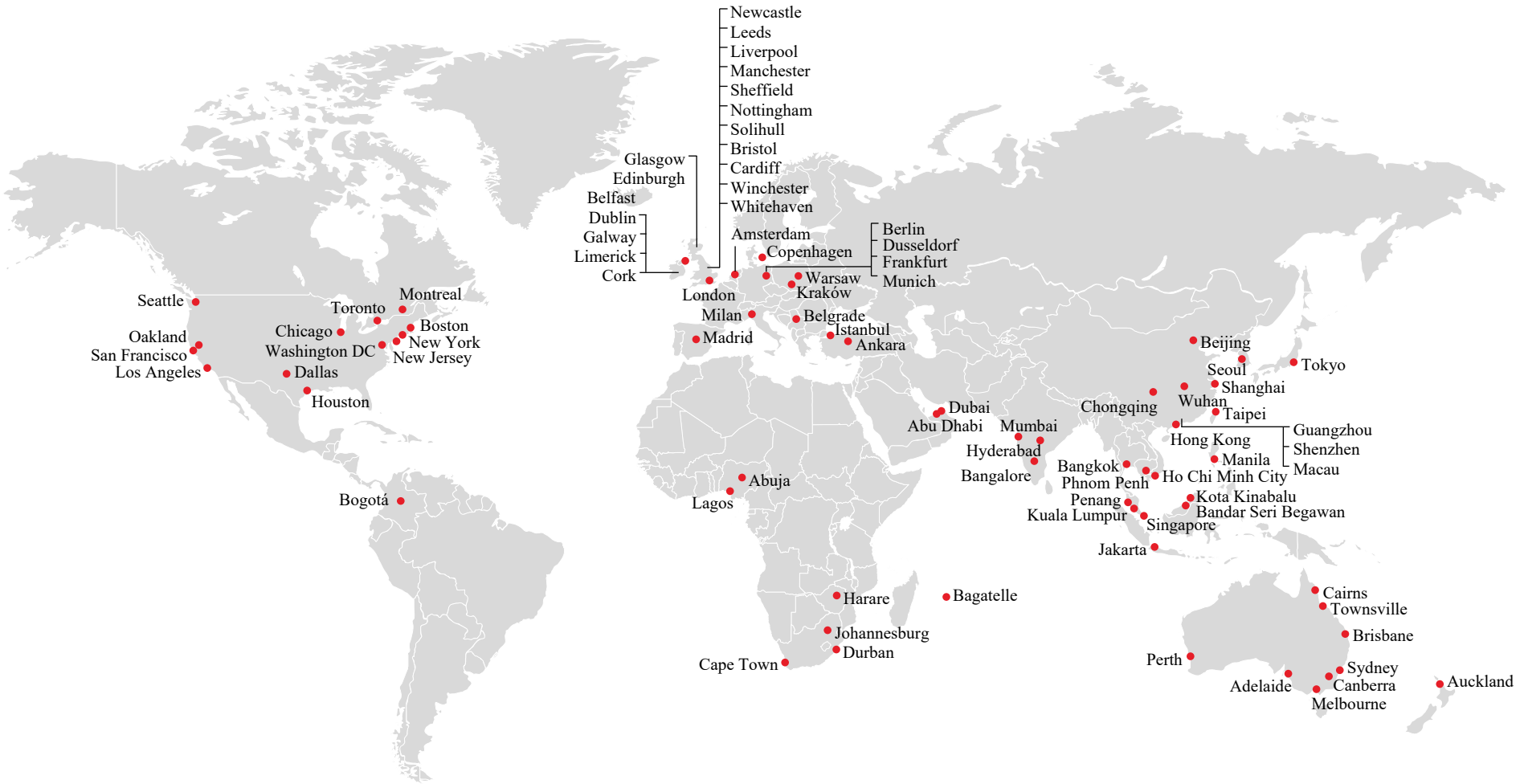

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Electrification of ferries

The Why?

One the most viable sectors for decarbonisation are passenger ferries

- Connecting people and places
- Predictable operational power demand
- Regular journey schedules
- Operates on pre-defined routes
- Evolution of battery technology and hybrid vessels
- Onshore power supply

Norway’s carbon fibre Rygerelektra

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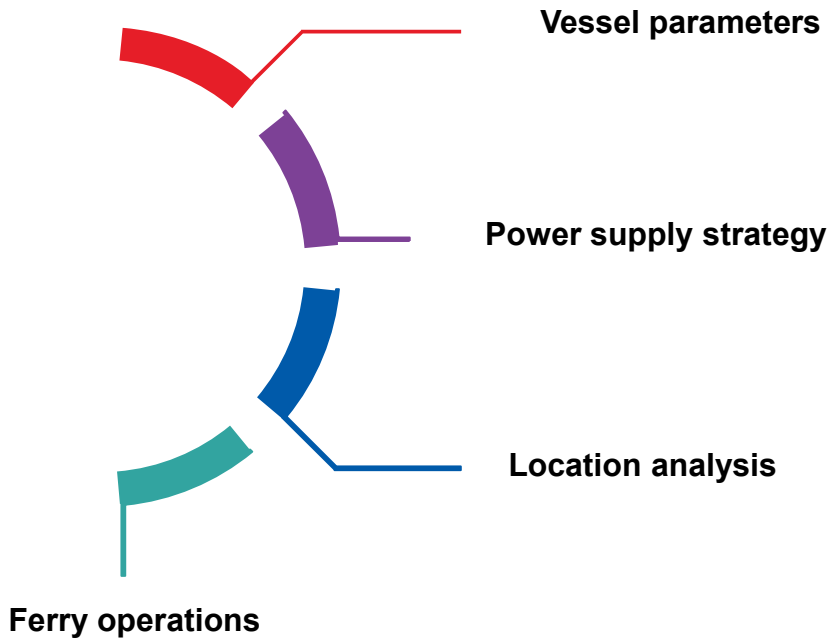
Shoreside considerations

Electrification of ferries



Power demand and dwell time determines the battery capacity of the ferry when it departs.

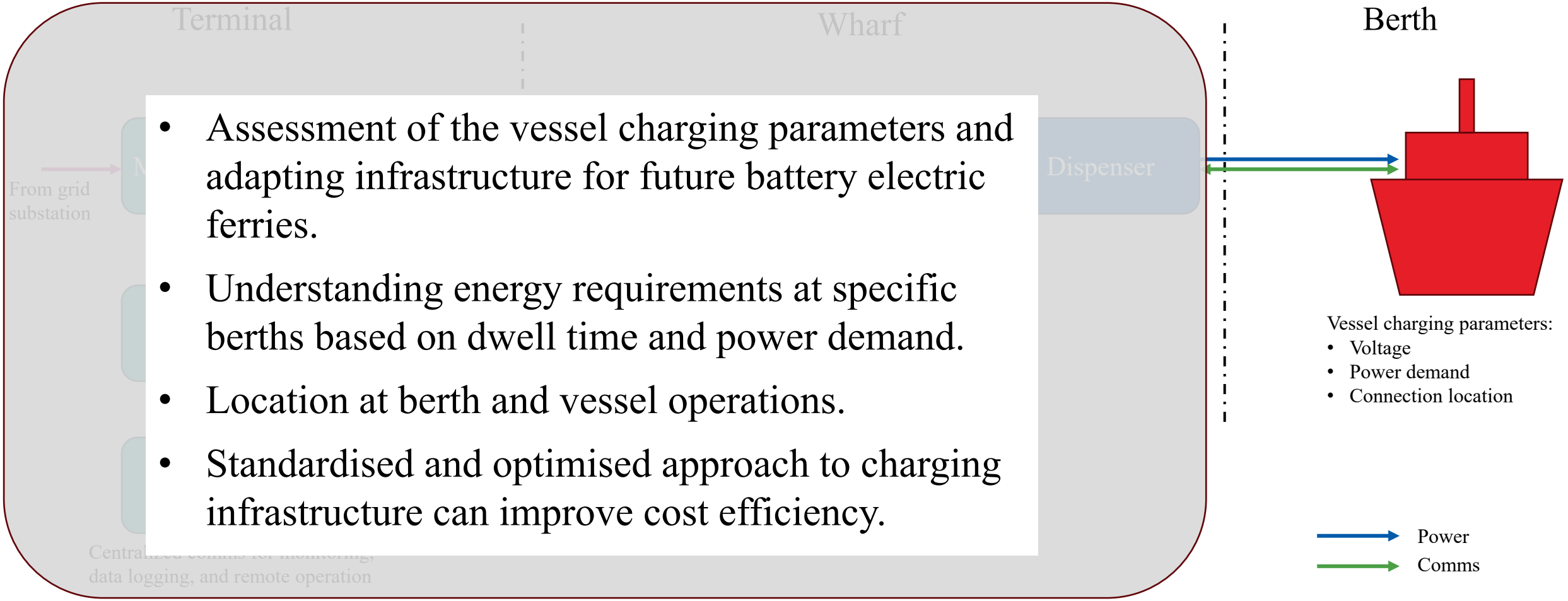
Intermittent use of energy when charging introduces peaks in energy profile.

Shoreside infrastructure constraints - public space and safety, grid capacity, spatial constraints and existing sites.

Multi-stop journeys introduces risks/opportunities for charging infrastructure.

Shoreside infrastructure

System block diagram



- Assessment of the vessel charging parameters and adapting infrastructure for future battery electric ferries.
- Understanding energy requirements at specific berths based on dwell time and power demand.
- Location at berth and vessel operations.
- Standardised and optimised approach to charging infrastructure can improve cost efficiency.

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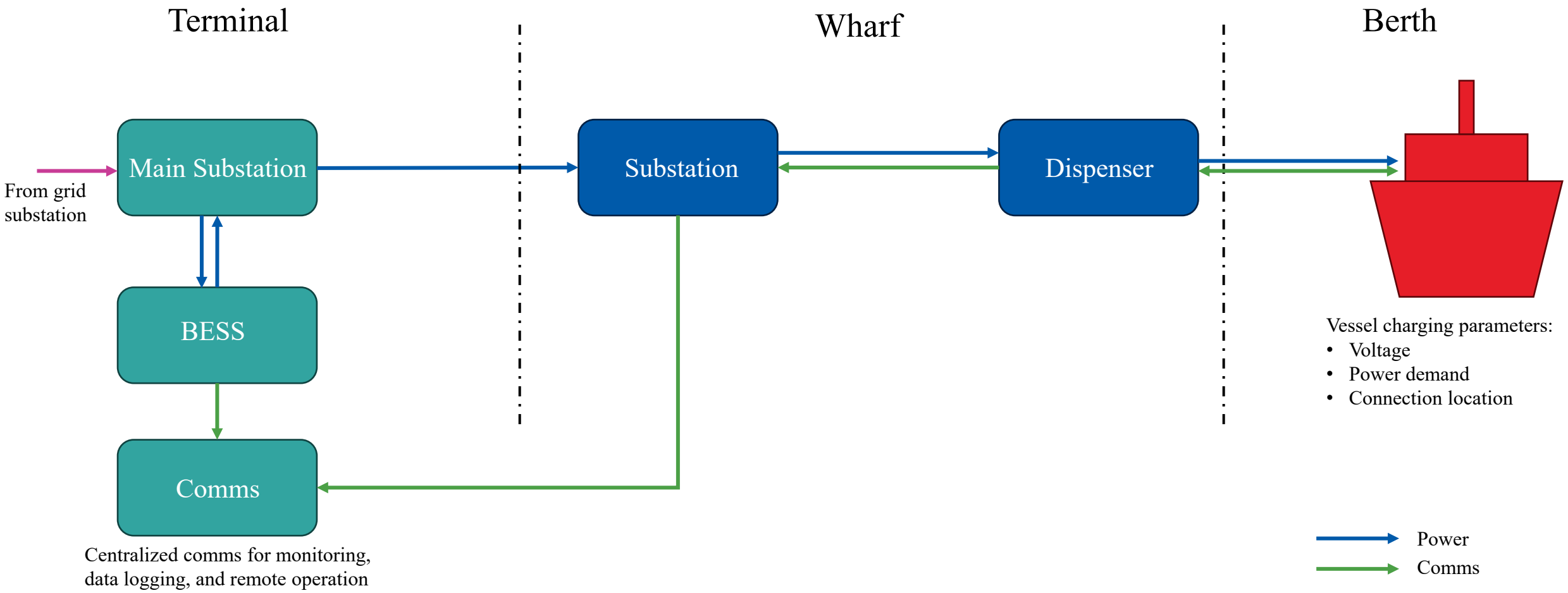
Shoreside infrastructure

System block diagram



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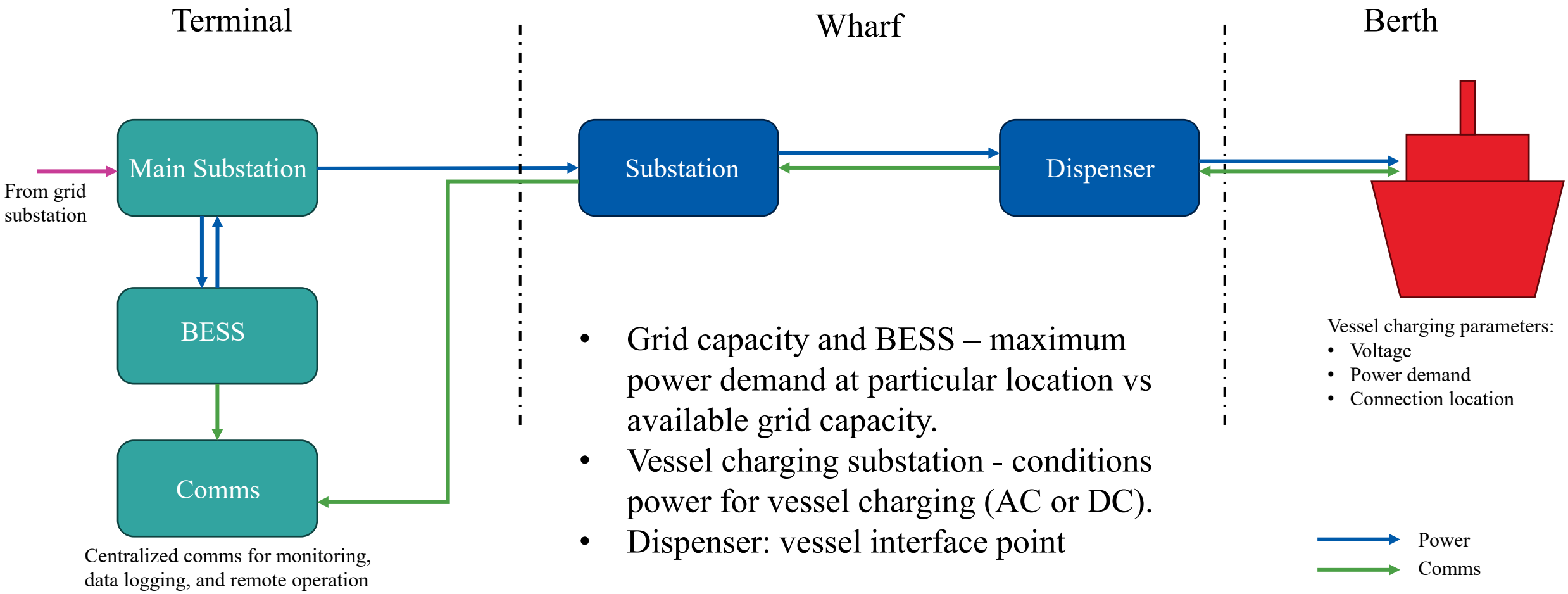
Shoreside infrastructure

System block diagram



- Grid capacity and BESS – maximum power demand at particular location vs available grid capacity.
- Vessel charging substation - conditions power for vessel charging (AC or DC).
- Dispenser: vessel interface point

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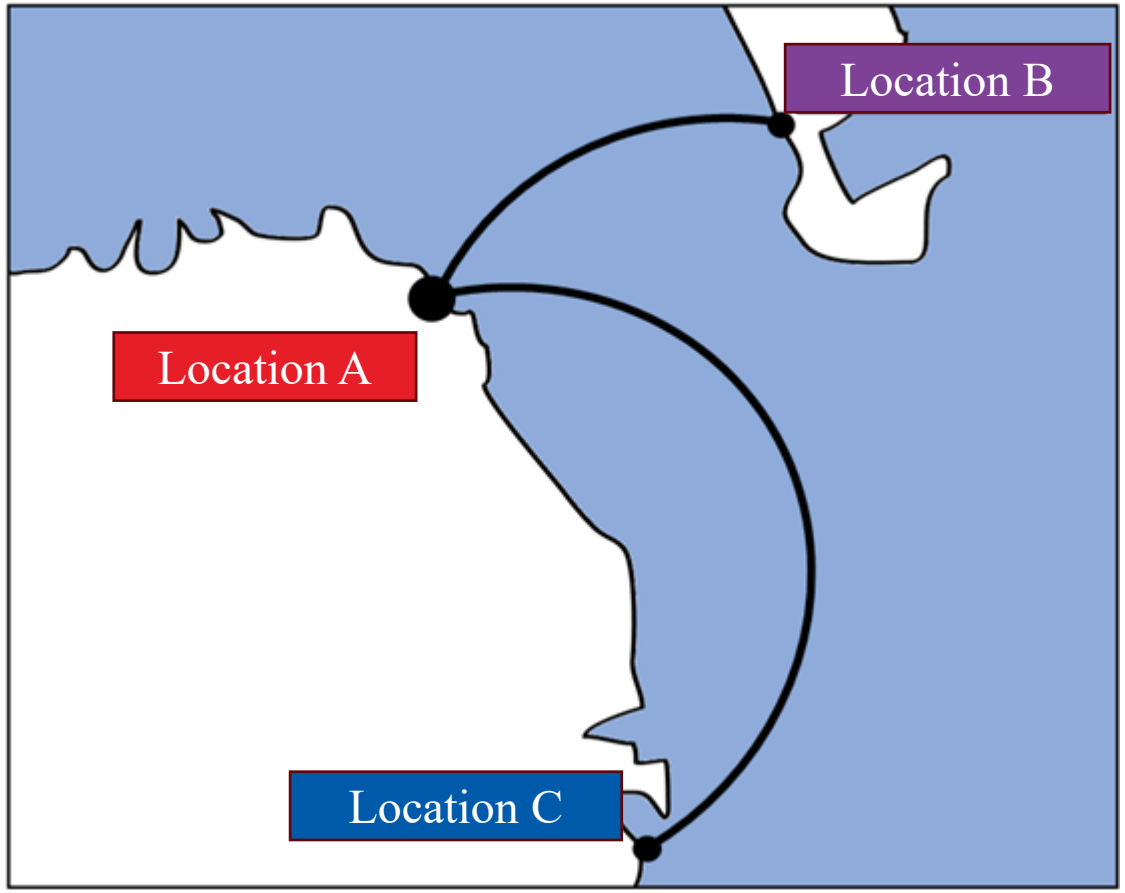
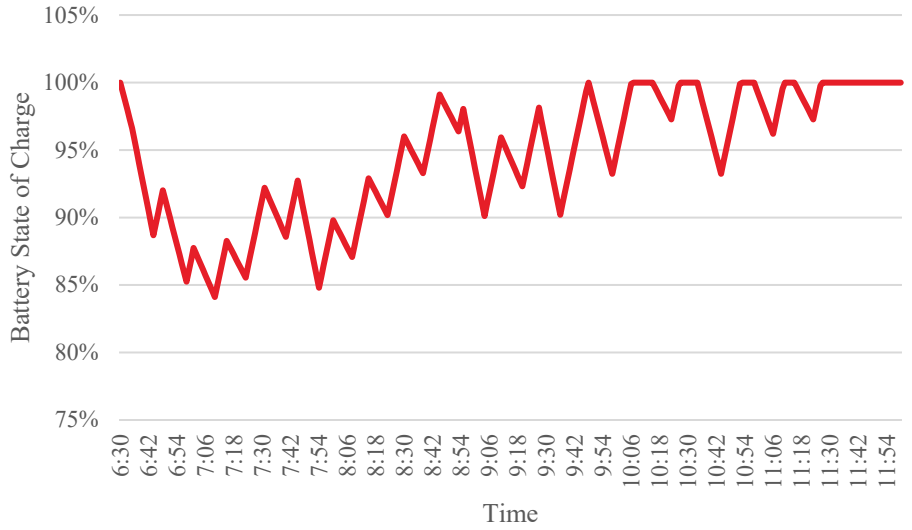
Vessel operations

Multi-stop analysis





- Predictability in energy demand modelling - ferries operate on fixed schedule and pre-defined routes.
- Suitability for ferry charging – each location has specific constraints.

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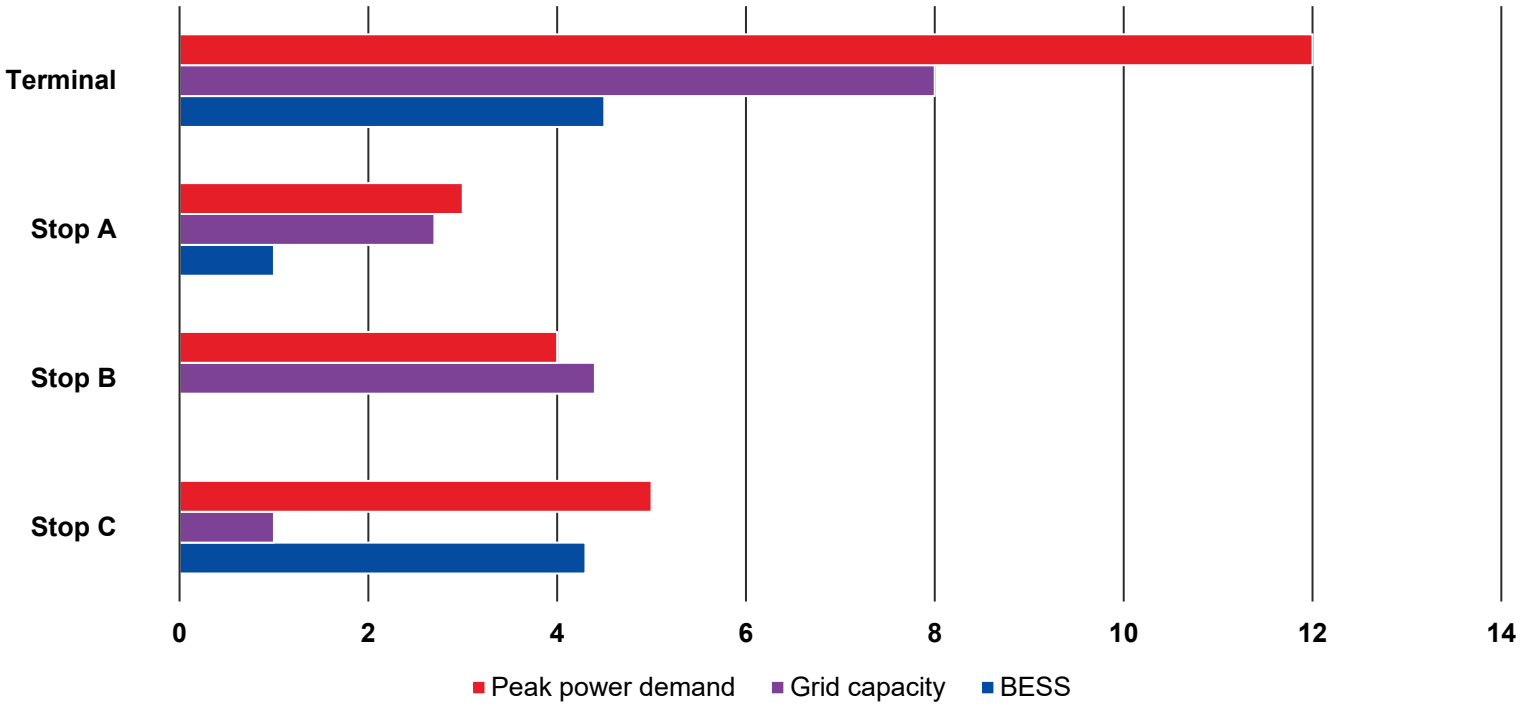
Location assessment

Peak power demand vs grid capacity vs energy storage



- Charging infrastructure designed for peak power demand
- Peak power demand examples
  - Multiple ferries using charging infrastructure at evening peaks.
  - Single ferry at a particular stop
- Grid capacity varies at different urban locations with potentially costly infrastructure upgrades.

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Flexible systems

Challenges with futureproofing infrastructure

- Majority of ports/ferry terminals are not equipped with shoreside electrical infrastructure (HV distribution and charging systems) to charge vessels at multi-MW powers.
- Overall grid capacity may be limiting in some locations, requiring planning for upgrades or utilizing energy storage to manage peaks in demand.
- Improved battery technology will increase capacity – enabling greater distances under fully electric power but also increasing net energy demand at ports.
- Alternative battery technologies (e.g. flow batteries or battery-swapping) that may be preferable in some cases.

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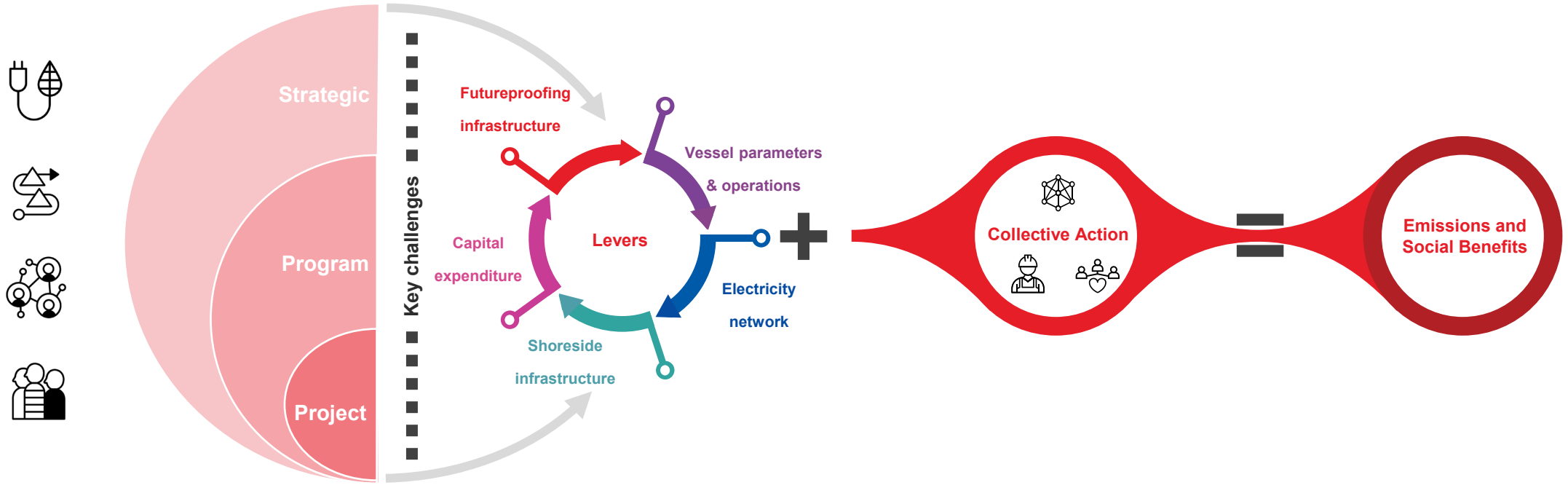
Electrification of ferries

An ecosystem approach



Contact

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