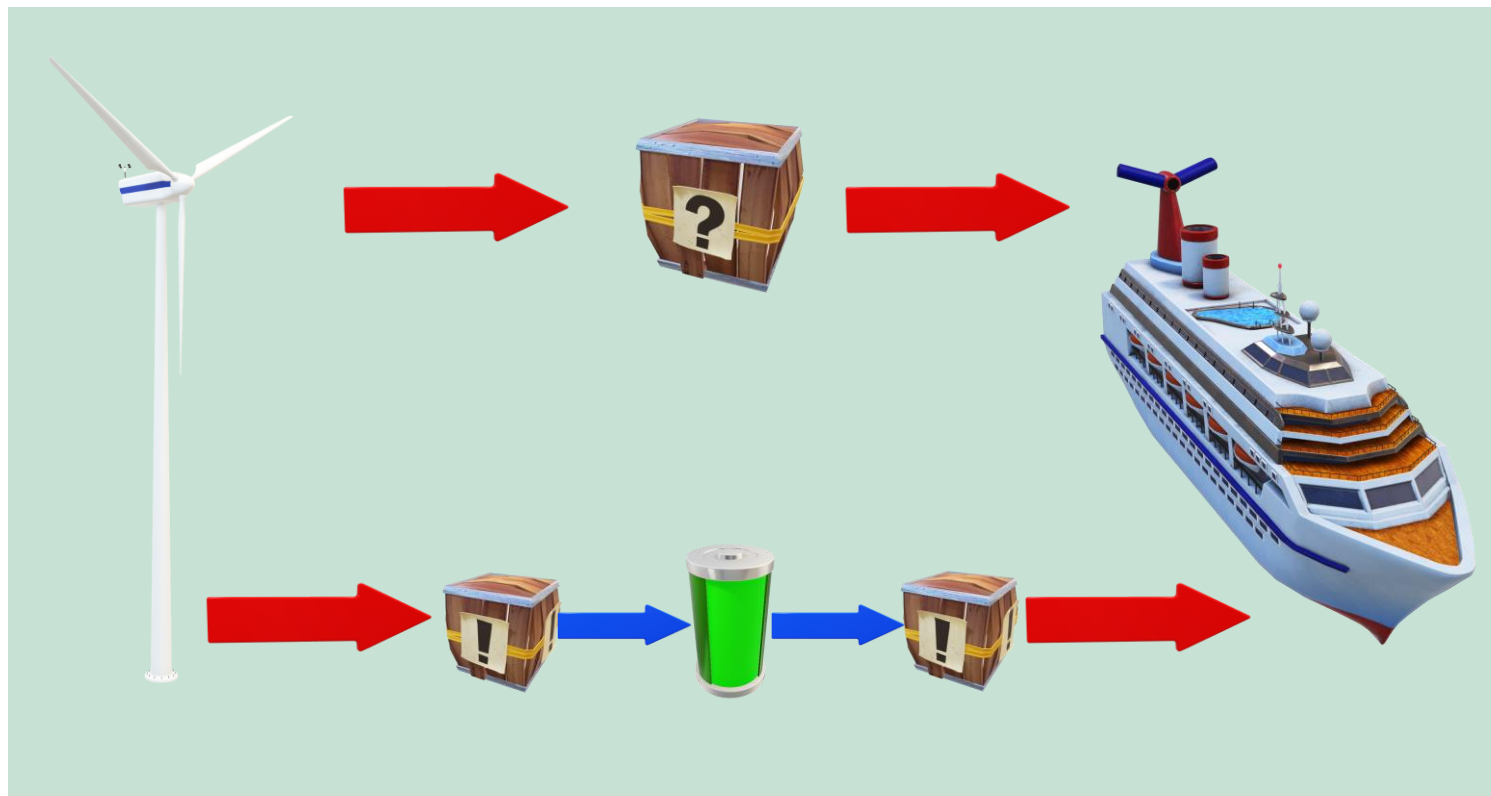


Energilager i hamnen

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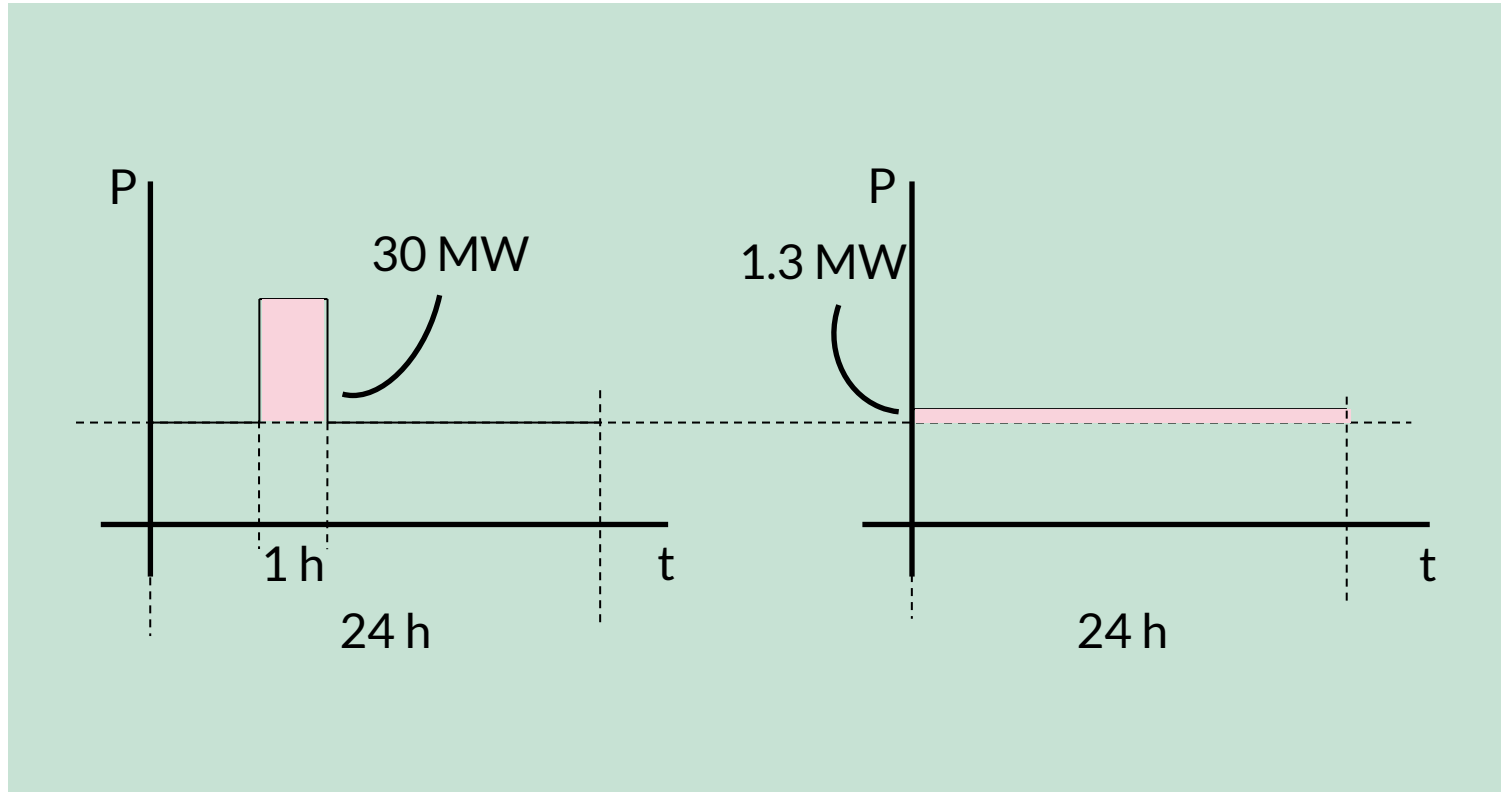
Schematic



Need for energy storage

- Peak shaving
 - High power consumption over a short period of time stresses the grid
 - Load scheduling is harder
- Lower power rating of grid side components

Peak shaving

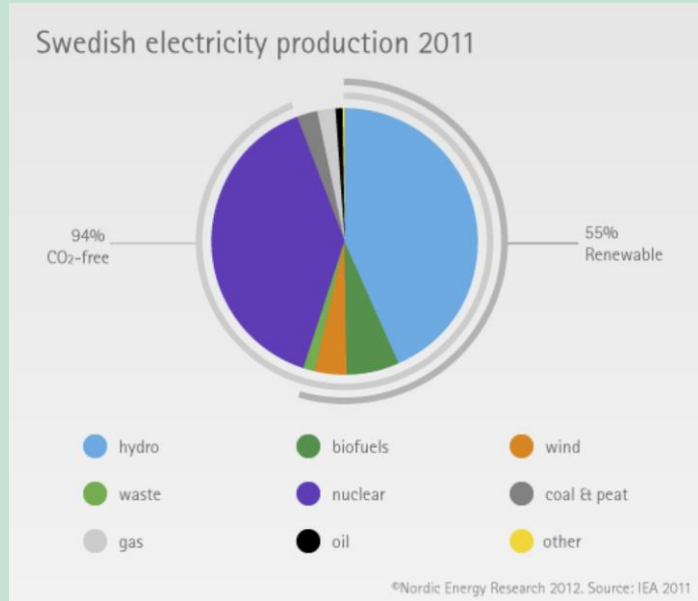


Need for energy storage

- Redundancy
 - Any energy stored more than what's needed is advantageous in terms of redundancy
- Reiability
 - Ability to keep time even in case of outages or load shedding

Alternatives

- Charging with lesser power but at both ports and twice as frequent.
- Justification - Clean energy
 - CO2 emission world average 500-1000 gCO2/kWh
 - CO2 emission Sweden 23 gCO2/kWh



Lätta elfartyg electrical specifications

- Installed capacity – 60MWh
- Charging AC voltage – 11kV
- DC link and battery voltage – 1000V
- Charging time – 1h
- Charging power 30MW

Project in **Trafikverkets Branschprogram Hållbar Sjöfart**. Branschprogrammet is coordinated by **Lighthouse**

Storage on port

- Installed capacity – 60MWh
- Similar battery design and configuration as in Lätta Elfartyg
- Charging power < 2MW

Design considerations

- Safety
 - Regulatory
Electrical installations, fire safety
 - Operational
Training, standard procedures
 - Technical
BMS, breakers, isolators, et cetera
- Life cycle

Other aspects

- Battery - second life
 - Automotive batteries
- PV generation and integration
 - Faster payback times
 - Eventually free electricity for charging the ship
 - Energy sold back to the grid

Contemporary projects

- Batteryloop
Stena Recycling Group
 - Reuse of batteries
 - 50kWh to 1MWh capacities



<https://etn.se/index.php/nyheter/67227-stena-line-vill-snabbladda-en-hel-farja.html>