Conference: The green future of maritime operations

Emission-free aquaculture vessels – case from the Faroe Islands

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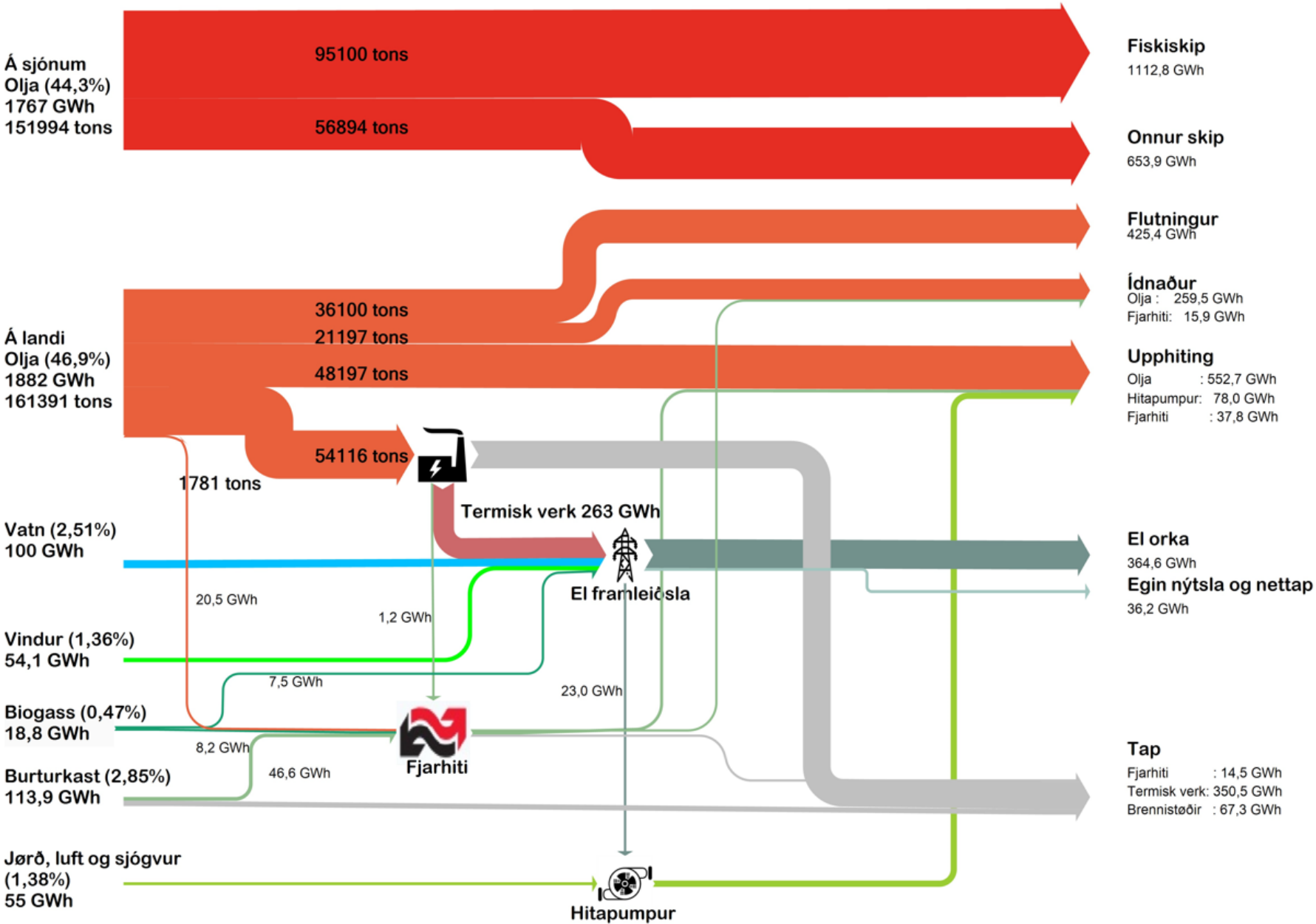
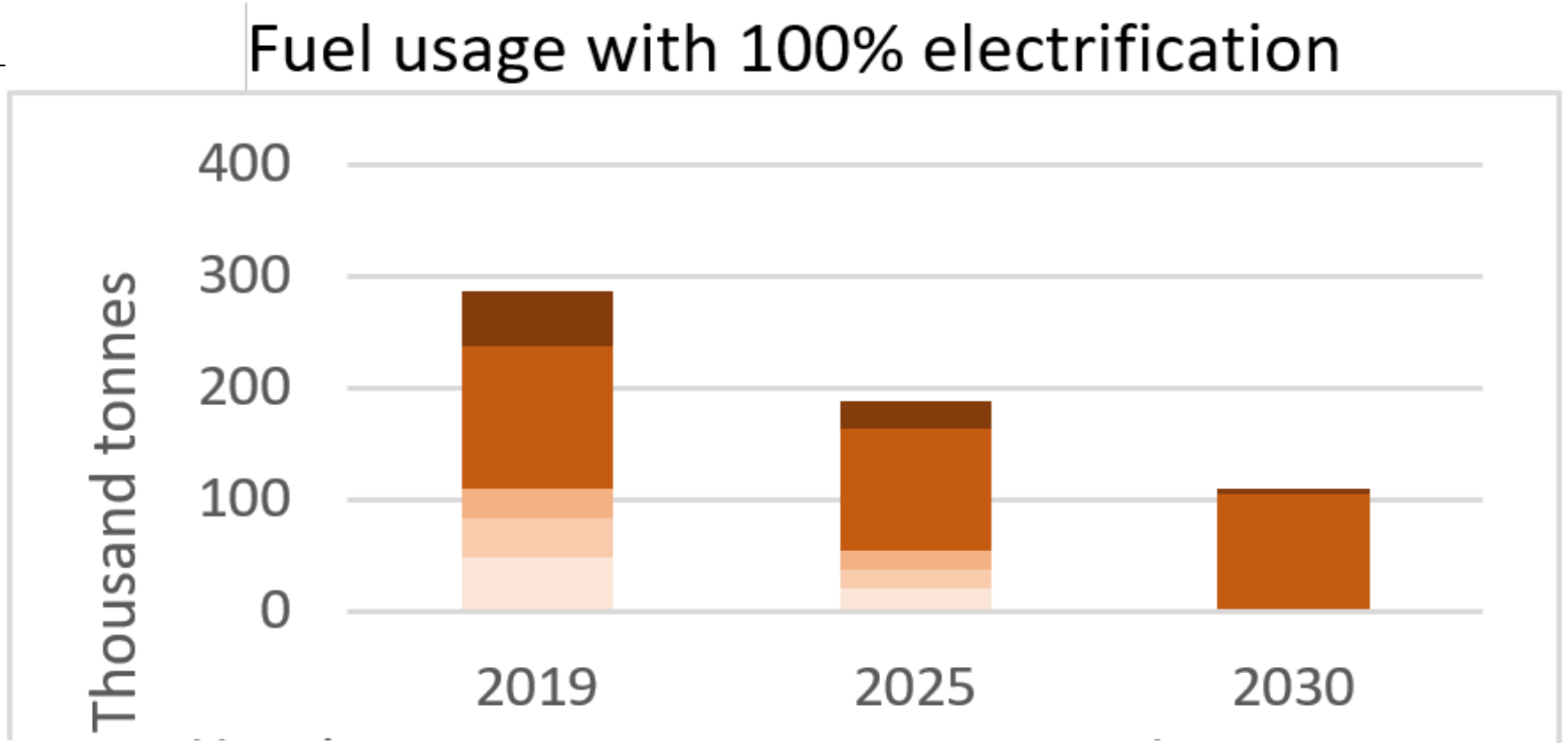
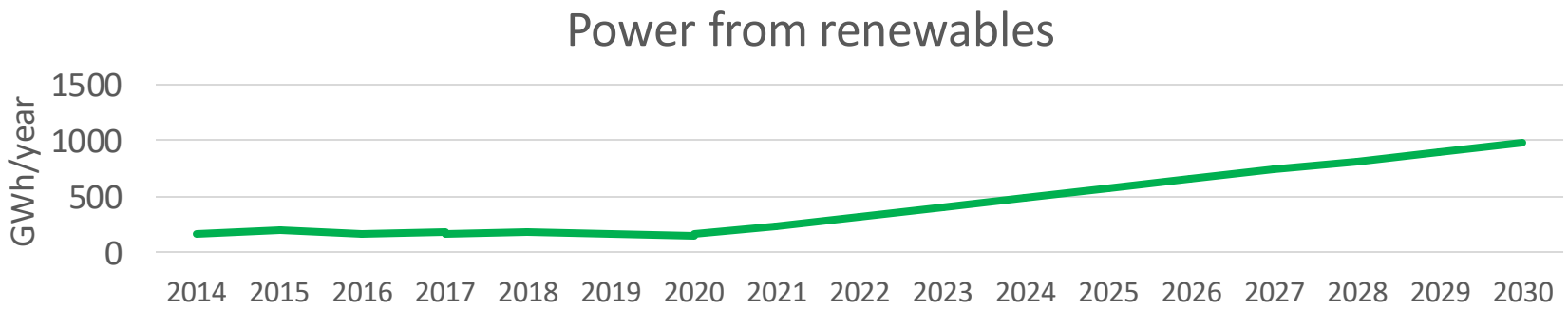
Energiflow in in the Faroes in 2021
3993 GWh

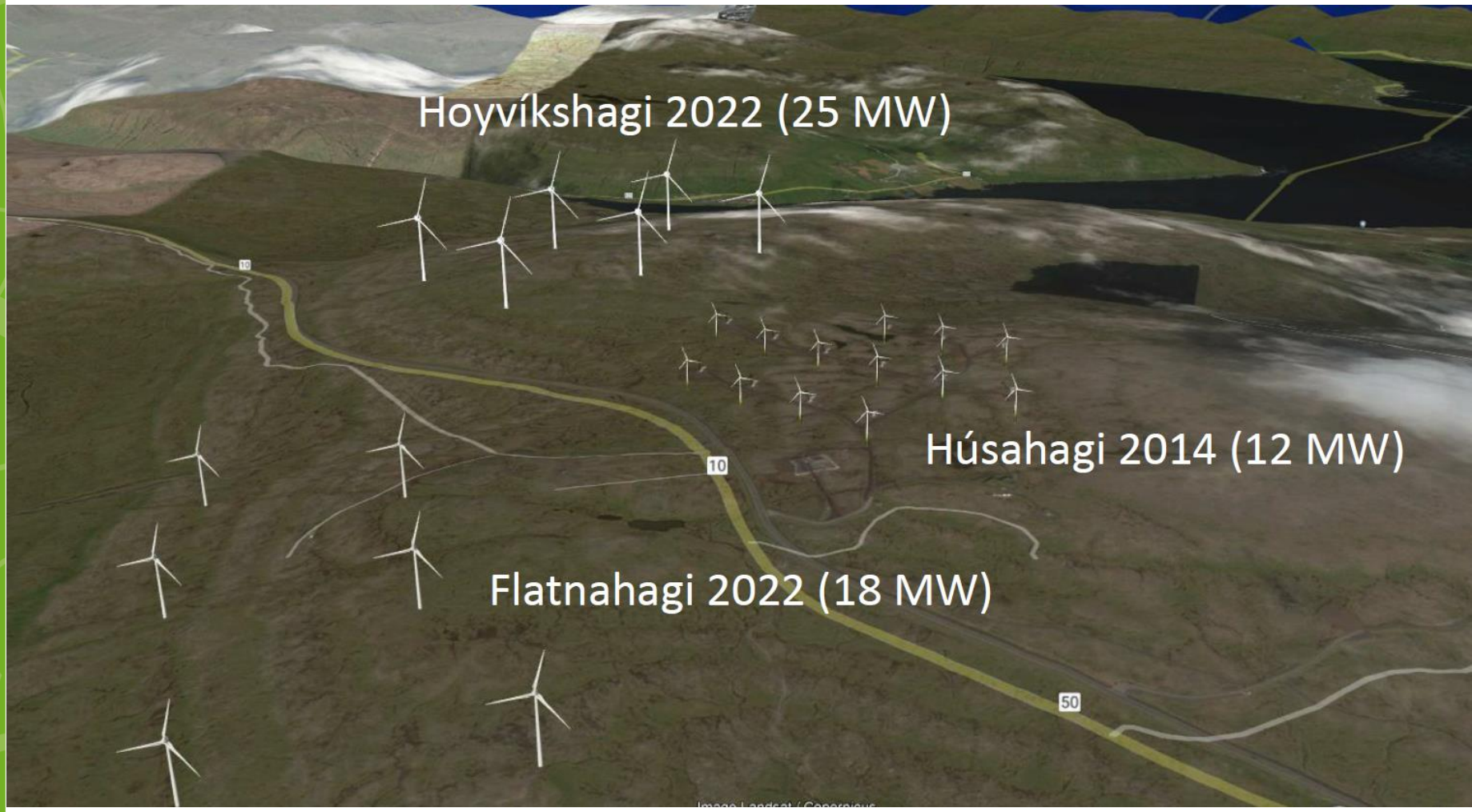


Energy policy – optimistic 2030 scenario





Wind on land in 2022



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Wind on land from 2022 to 2030

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Tidal energy on experimental basis

17 PARTNERSHIPS FOR THE GOALS

"Strengthen the means of implementation and revitalize the global partnership for sustainable development."

Tidal energy

Potential base load generation

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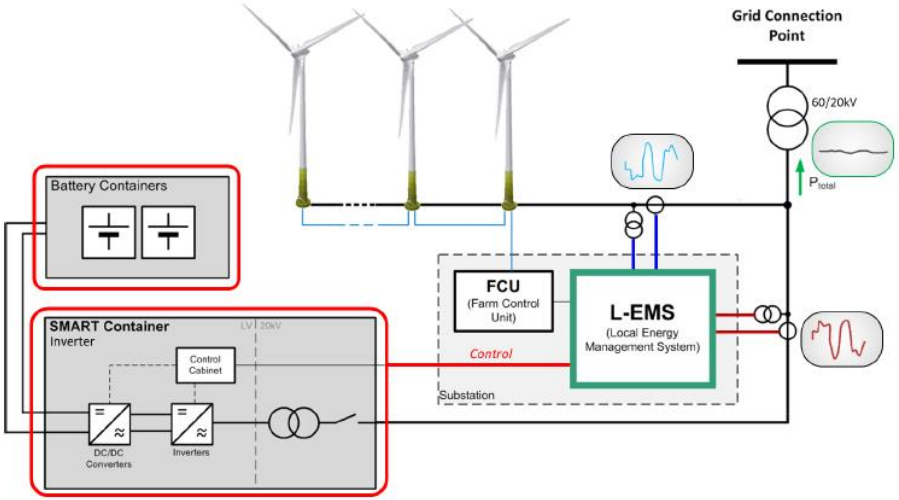
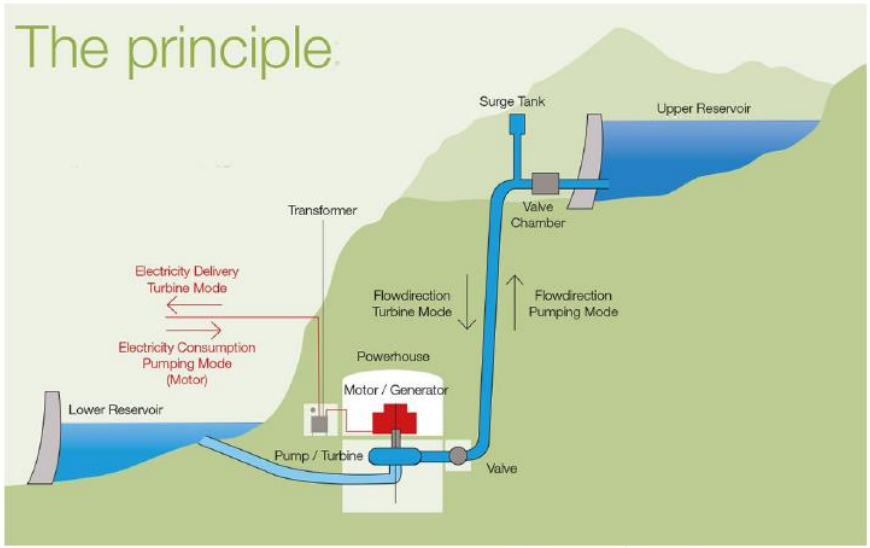
Challenges and solutions in a powersystem with very much of intermittent energy

- **Batteries** for short-term storage
  - *Seconds, minutes, hours*



- **Pumped hydro** for long-term storage
  - *Hours, days, weeks*



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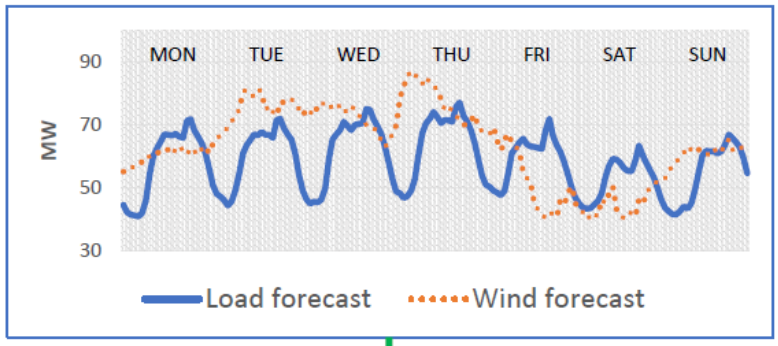
Even with batteries and pumped hydro there will still be a lot of surplus windenergy



System Operator (SEV)

internet

Demo 1
Hot water Storage
(District heating)
Remote Control Unit
Local control

Demo 2
Battery Storage
(Salmon farming Workboat)
Remote Control Unit
DC charger - Local control

Demo 3
HV electric boiler
(Heavy fuel oil heating)
Remote Control Unit
Local control

VPP Platform (as a service)

Aggregation
Monitoring
Data visualization
Active dispatch of consumers
Optimizing Energy costs
Ancillary Services
- ✓ Sheddable loads (df/dt)
- ✓ Frequency control / balancing energy

Virtual Power Plant, utilizing surplus wind

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Demand site flexibility demonstration project
Cooperation with Nordic Council of Ministers

District heating system in Leirvík

All-electric salmon farming boat

Electric boiler (steam)

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Constructing the first Faroese zero-emission aqua-culture workboat

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Mest shipyard in Tóshavn

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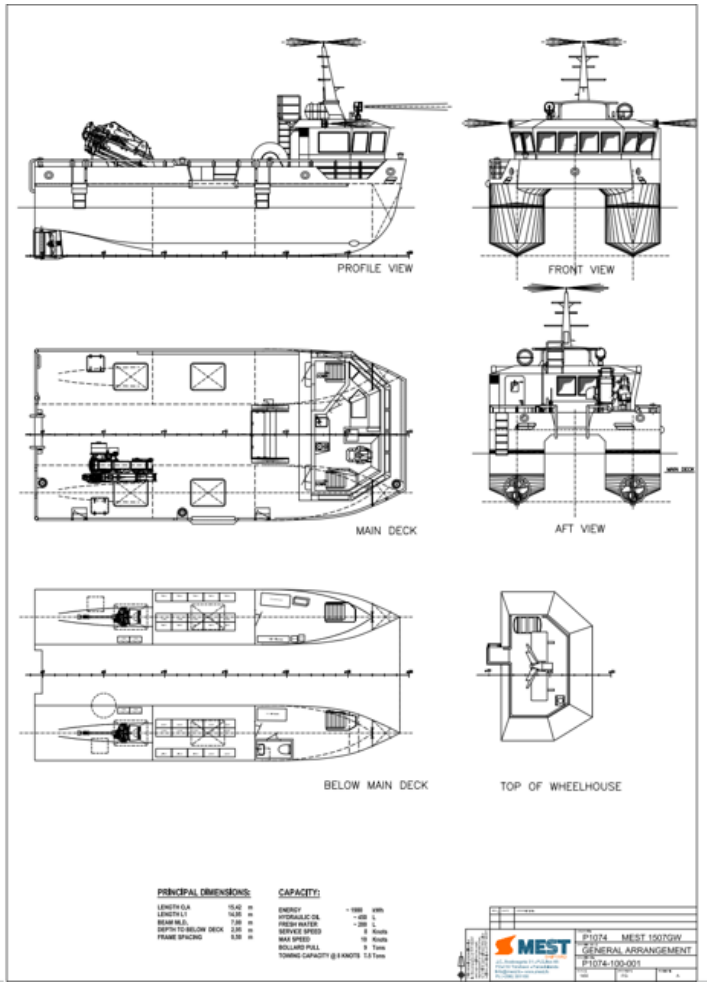
A catamaran workboat

Specifications

- Length 15,42m
- L1 14,95m
- Width 7,00m
- Depth 2,95m

- Energy onboard ~1980kWt
- Hydraulics oil ~450L
- Water tank ~200L
- Recommended speed 8 knots
- Est max speed ~10 knots
- Bollard pull ~9 tonnes
- Bollard pull at 8 knots ~7,5tonnes



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All work undertaken in the Faroe Islands

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MEST SHIPYARD

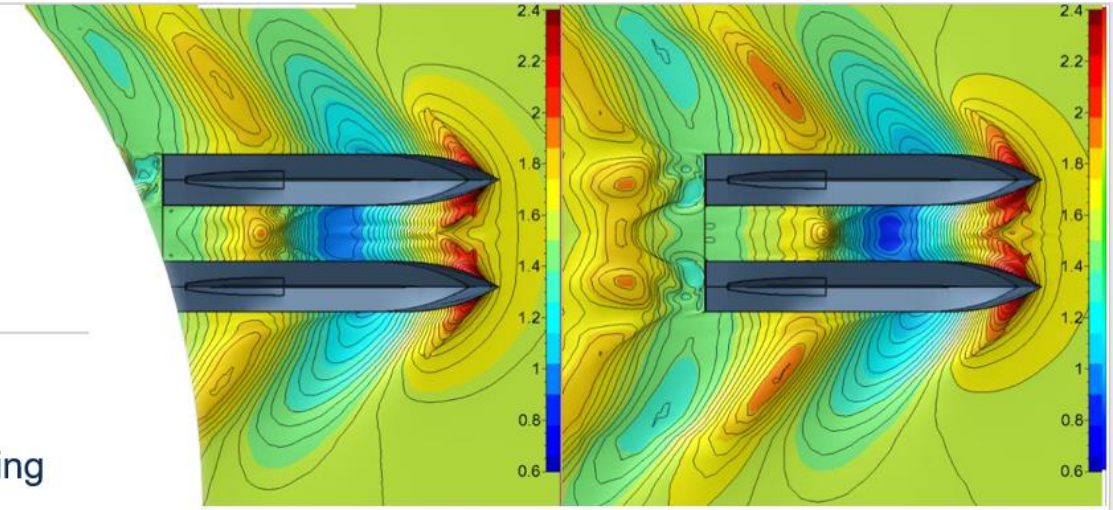
Energy-saving design of the hull

Hull design/CFD

- Less resistance and 9% energy saving

Propulsion engine

- PM motor – high power and less energy waste
- Propeller – revearse gear/energy optimization
- Revearse gear PM motor gives a high effect
- ~130kW to 8 nautical miles per hour



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Construction costs

- Built in the Faroe Islands
- The price is the same for hull, equipment, etc. as on other catamans
- The costly factor is the battery solution
- Battery prices are expected to be reduced to a third over the next 5 years

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Inside the finished workboat

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Test/commissioning in a months time

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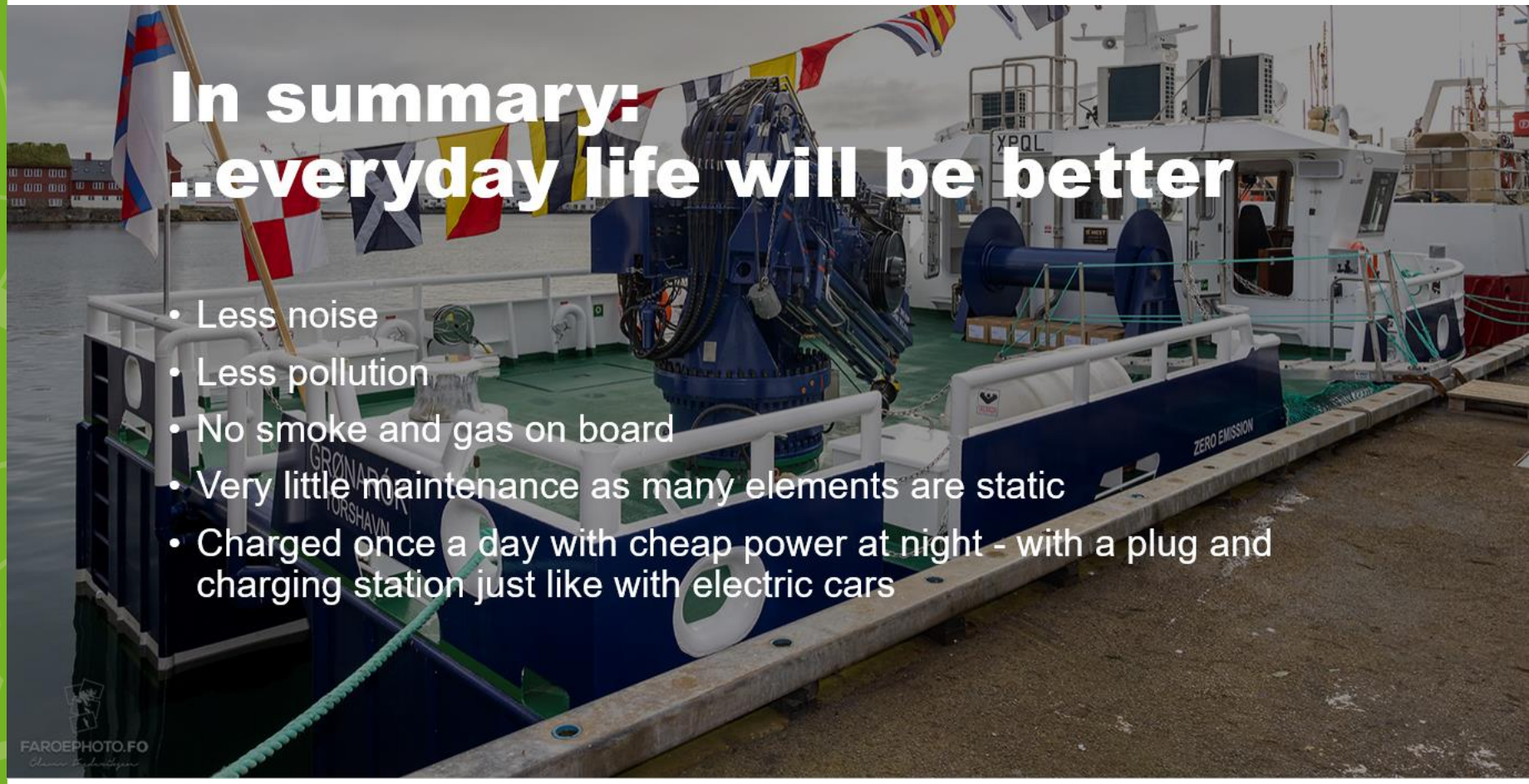

In summary:
..everyday life will be better

- Less noise
- Less pollution
- No smoke and gas on board
- Very little maintenance as many elements are static
- Charged once a day with cheap power at night - with a plug and charging station just like with electric cars

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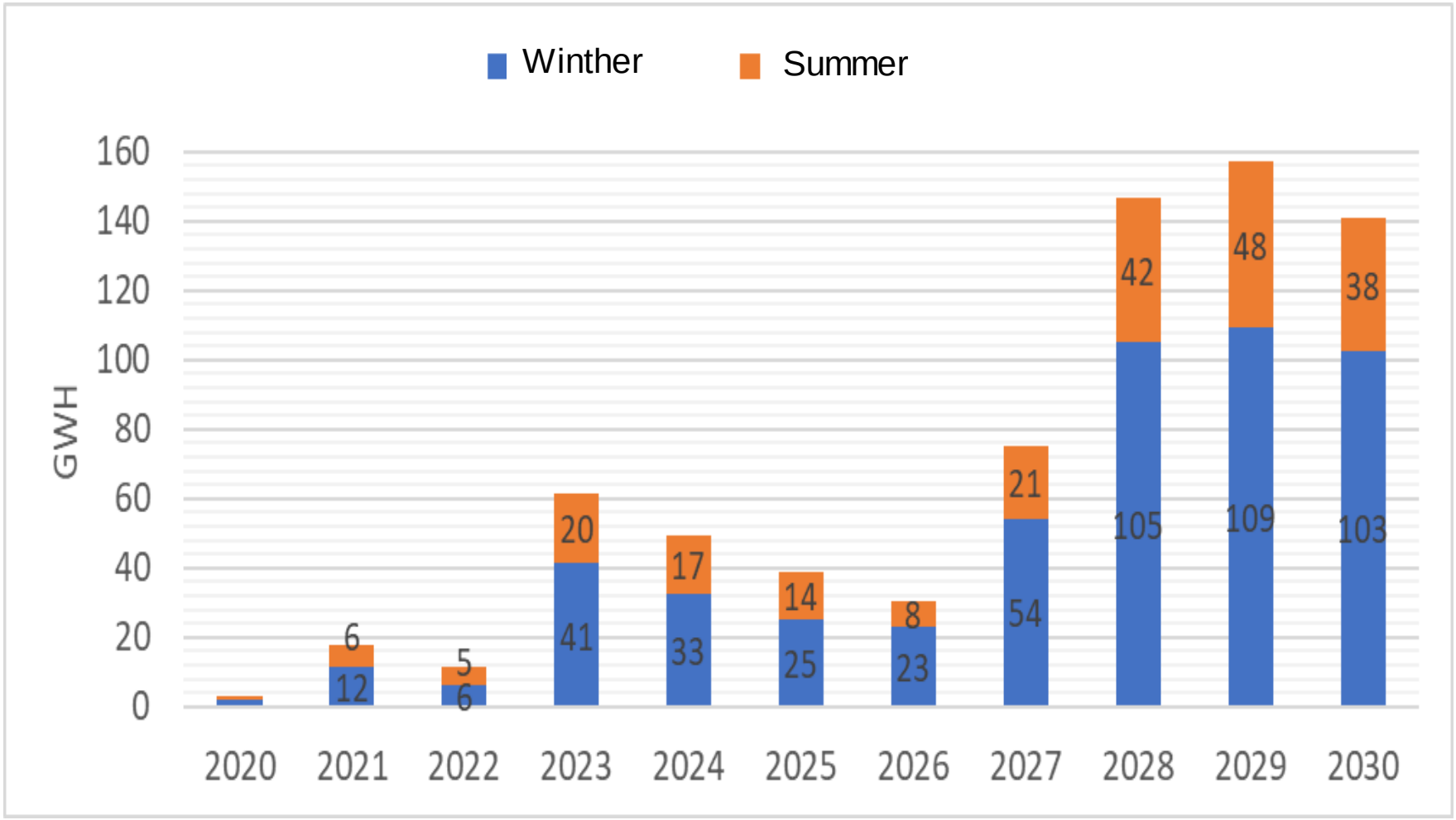
Surplus renewable energy even with pumped hydro and flexible electricity users such as the 100% electric katamaran



Study SEV US-Orka summer 2020

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Hydrogen from green surplusenergy in isolated areas to local maritime and landbased transport

- A feasibility study shall describe in detail an electrolyzer making hydrogen from green surplus electric energy in an isolated electricity grid.
- A thorough description shall be done on utilization of the products from the electrolyzer in the transport sector an other relevant sectors in the local area.
- The description will be a basis for immediate startup of one or several concrete projects in suited nordic areas with participation of relevant stakeholders in the nordic research and business sectors.

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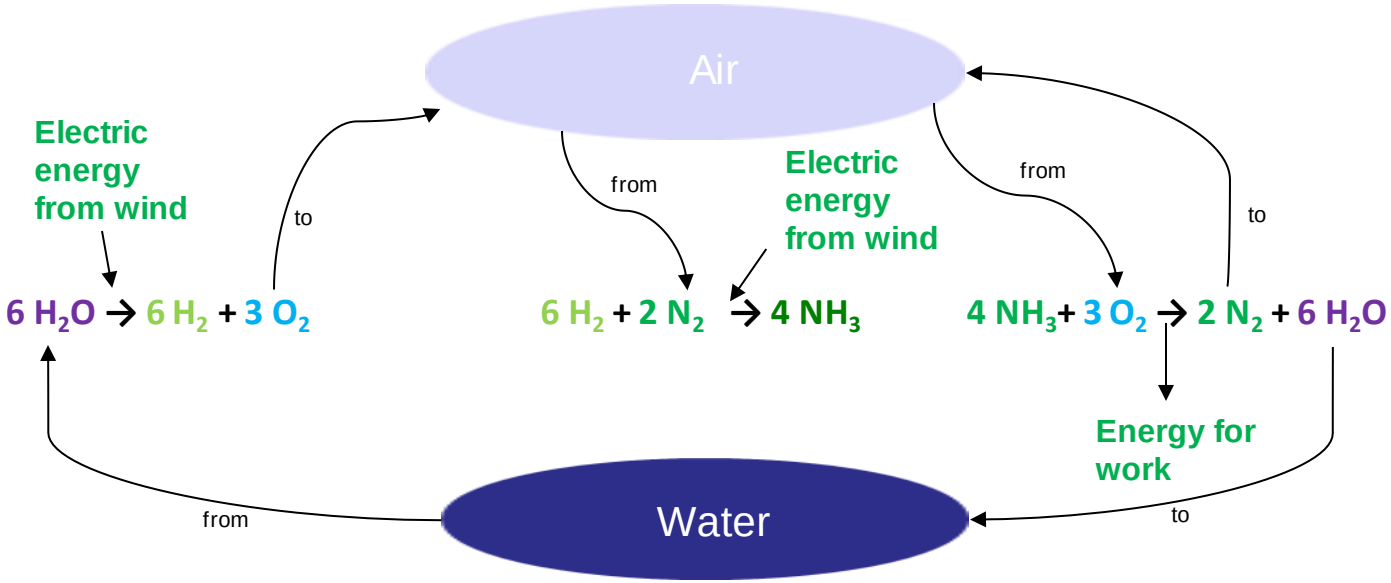
Amazing cycle of elements and process of energy

Hydrogen and ammonia as carriers of renewable energy



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Floating windturbines in faroese waters?

A windpark of up to 1 GW could produce ammonia for the faroese need of energy in the maritime sector

The total area of the Faroese Continental Shelf is 275.00 km2. 38.000 km2 of these have a water depth between 100 and 200 m.

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These are not in Faroese waters – yet☺

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