Hydrogen and batteries for small fishing vessels and fast ferries

Erik Ianssen, Selfa Arctic AS
10/10-2018
<table>
<thead>
<tr>
<th>Category</th>
<th>Consumption (liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 2017</td>
<td>8,5 billion</td>
</tr>
<tr>
<td>Maritim sector</td>
<td>2 billion</td>
</tr>
<tr>
<td>Fishing vessels</td>
<td>3-400 million</td>
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<tr>
<td>Fish farming</td>
<td>2-400 million</td>
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<tr>
<td>Ferrries</td>
<td>170 million</td>
</tr>
<tr>
<td>Fast ferries</td>
<td>86 million</td>
</tr>
<tr>
<td>Coastal route</td>
<td>78 million</td>
</tr>
<tr>
<td>Cruise vessels</td>
<td>170 million</td>
</tr>
</tbody>
</table>
Sectors with revolution – private cars

- 52% of all cars sold in September were electric.
Sectors with revolution - ferries
80 batteryferries to be built before 2022
Ferry sector - 10 hybrid fuelcell/battery ferries to be built
Elektrisk Kystrute Bergen - Kirkenes

Totalt forbruk : 366 Mwh
Lading per ladestasjon : 10 Mw
Ladestasjoner : 36
**Landstrøm**
36 ladestasjoner

**Hydrogenfylling**
8 ladestasjoner
Bergen

Landligge timer: 5.30
Ladning landstrøm Mwh: 7.15
Ladning Hydrogen Kg: 1418
Bergen - Florø

Fartstid timer: 5.50
Forbruk Mwh : 20.42
Florø

Landliggende timer: 0.25
Ladning landstrøm Mwh: 3.63
The alternatives:

2018 - Fossil
- 71 millioner liter diesel

2022 - Fossil
- 56 millioner liter diesel

2022 - Ny
- 54% Hydrogen
- 12% Til kai
- 34% Batteri
- 0% Diesel
Kystruten—new coastal ferries from 2021—with battery and hydrogen?
Energy density, KWh per ton

- Batteri: 100
- Diesel: 4000
- Hydrogen: 16500
Energy efficiency – battery vs hydrogen

**Hydrogen**

- 100 kWh from the grid
- Electrolyzer
- Fuel cell: 60 kWh
- Self-use: 30 kWh

**Batteri**

- 95 kWh charged
- Energy distribution
- Self-use: 90 kWh

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Fra strømnettet
Elektrolysør
60 kWh
Fremdrift

100 kWh
Ladning

95 kWh
Energi-distribusjon
Fremdrift

90 kWh
Fast ferries – 1 % of total consumption
Fishing vessels – 4 % of total consumption
«Tonstads formula»

- Forwardleaned suppliers
- +
- Government regulations and purchase
- =
- Technology change of sectors
- The future is renewable
- The future is now

Thanks for your attention!