UiT The Arctic University of Norway

Electric ships in Norway

Experiences and Future Trends

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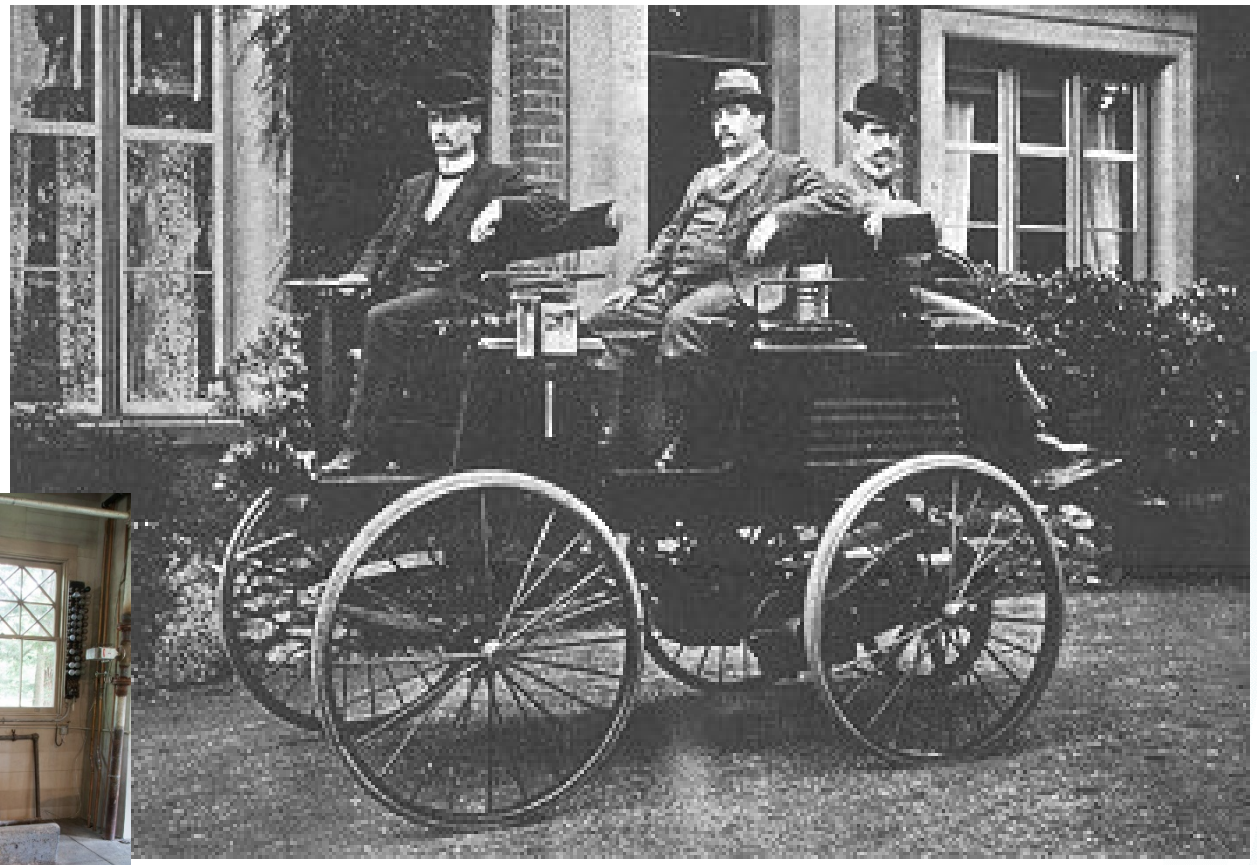
Electric transport is not new

- The inventor Thomas Parker – First electric vehicle in production in 1884 by Elwell-Parker Company
- First German made EV in 1888 by Andreas Flocken
- First American EV in 1891 by William Morrison

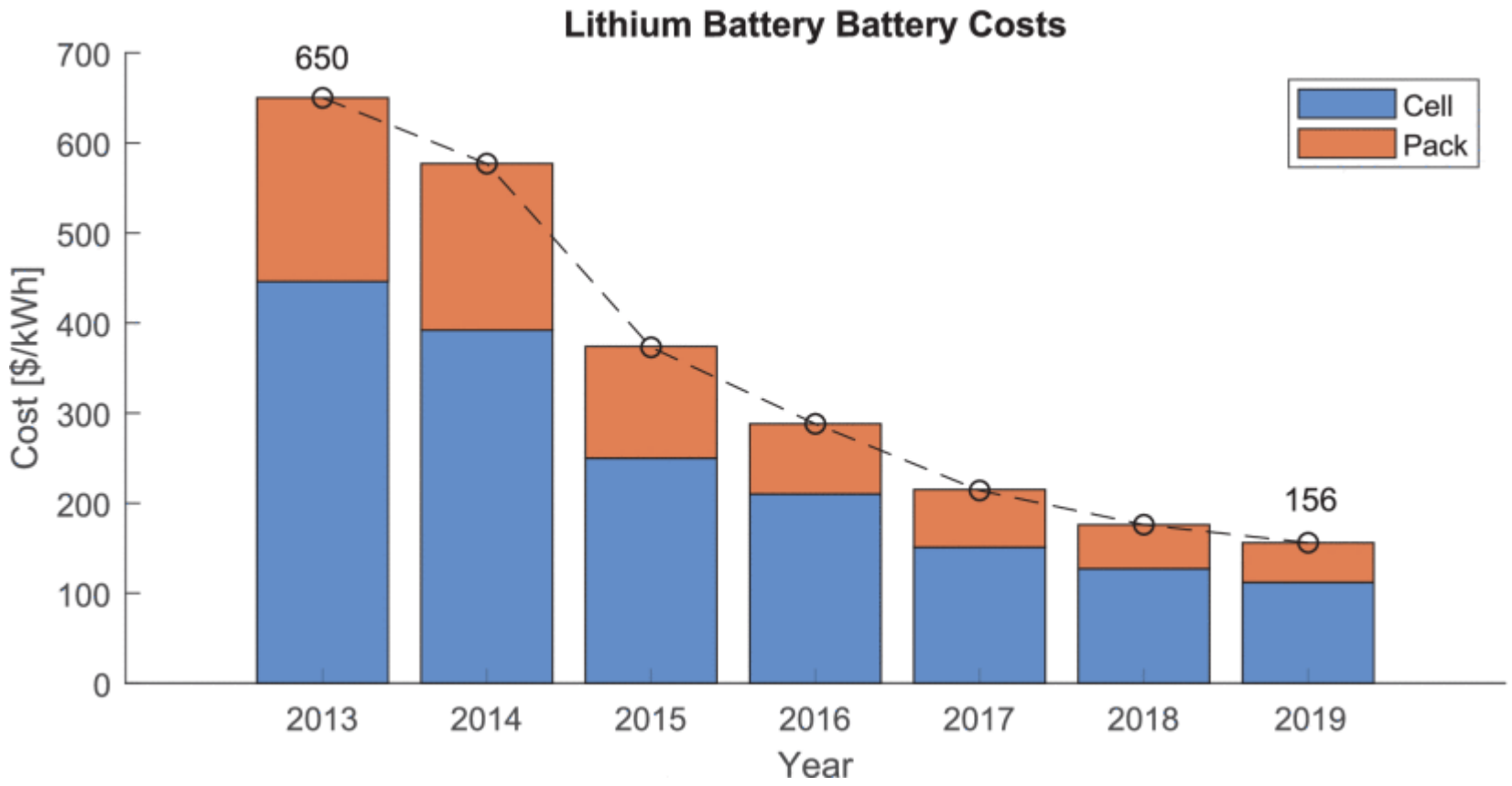


- Thomas Edison charging station for EVs (1897?)

Maritime electric propulsion

- Known technology from diesel-electric vessels
- Diesel generators can be replaced by batteries

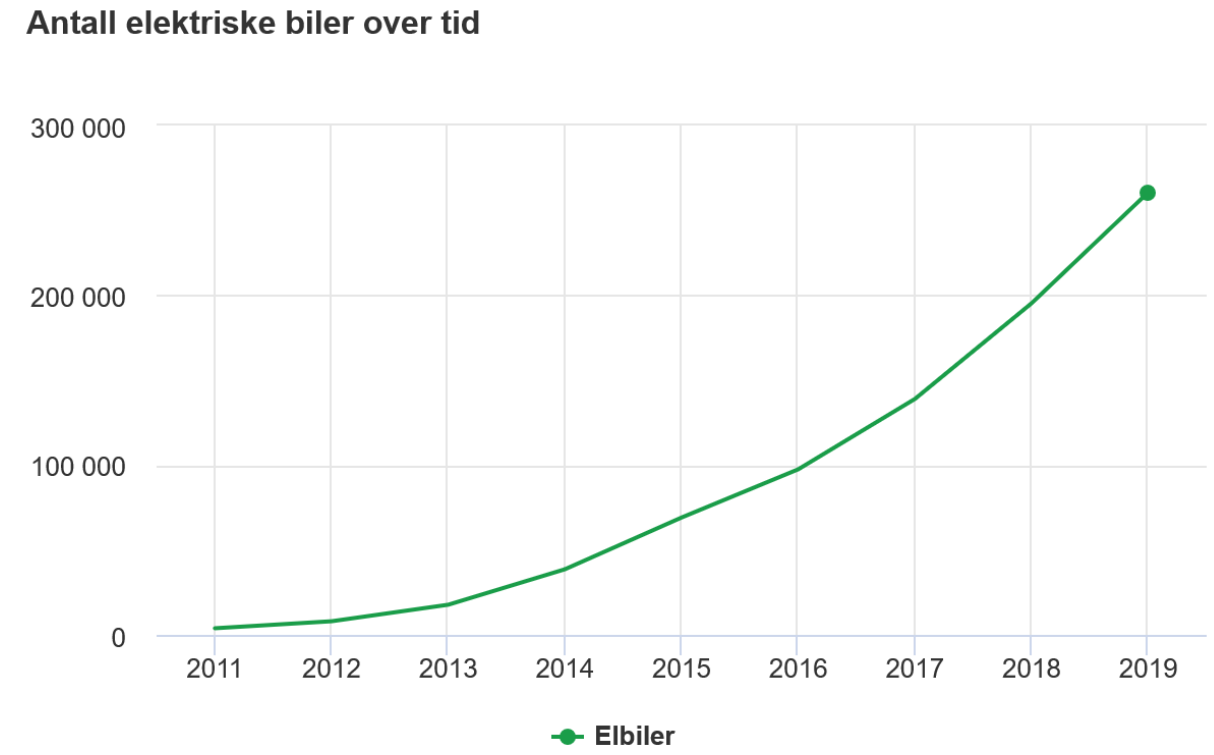
Battery prices are being reduced



M. Stecca, L. R. Elizondo, T. B. Soeiro, P. Bauer and P. Palensky, "A Comprehensive Review of the Integration of Battery Energy Storage Systems Into Distribution Networks," in *IEEE Open Journal of the Industrial Electronics Society*, vol. 1, pp. 46-65, 2020, doi: 10.1109/OJIES.2020.2981832.

Electric transport in Norway

- All car ferries should be fossil free by 2030



Kilde: Bilparken, Statistisk sentralbyrå

- Electric vehicles in Norway

Worlds first electric car ferry

- Produced by Fjellstrand AS for Norled
- Electric propulsion system by Siemens
- Battery capacity 1040 kWh
- Transit duration 20 minutes, uses 130 – 200 kWh

Development of electric ferries

- Worlds first electric ferry in 2015: Ampere
- Norwegian government: All (200) on electricity within 2025 (more realistic with 2030)
- In addition comes biofuel and hydrogen

Fish farming goes electric

Illustrasjon: ABB

Sea trial movie

Health and safety:

- No exhaust fumes
- Reduced noice
- Less vibration

Environment:

- No local CO_2 emissions
- No NOX emissions

Electric fishing boats

Image: Selfa

Image: VM boats

Selfa Arctic El-Max 1099

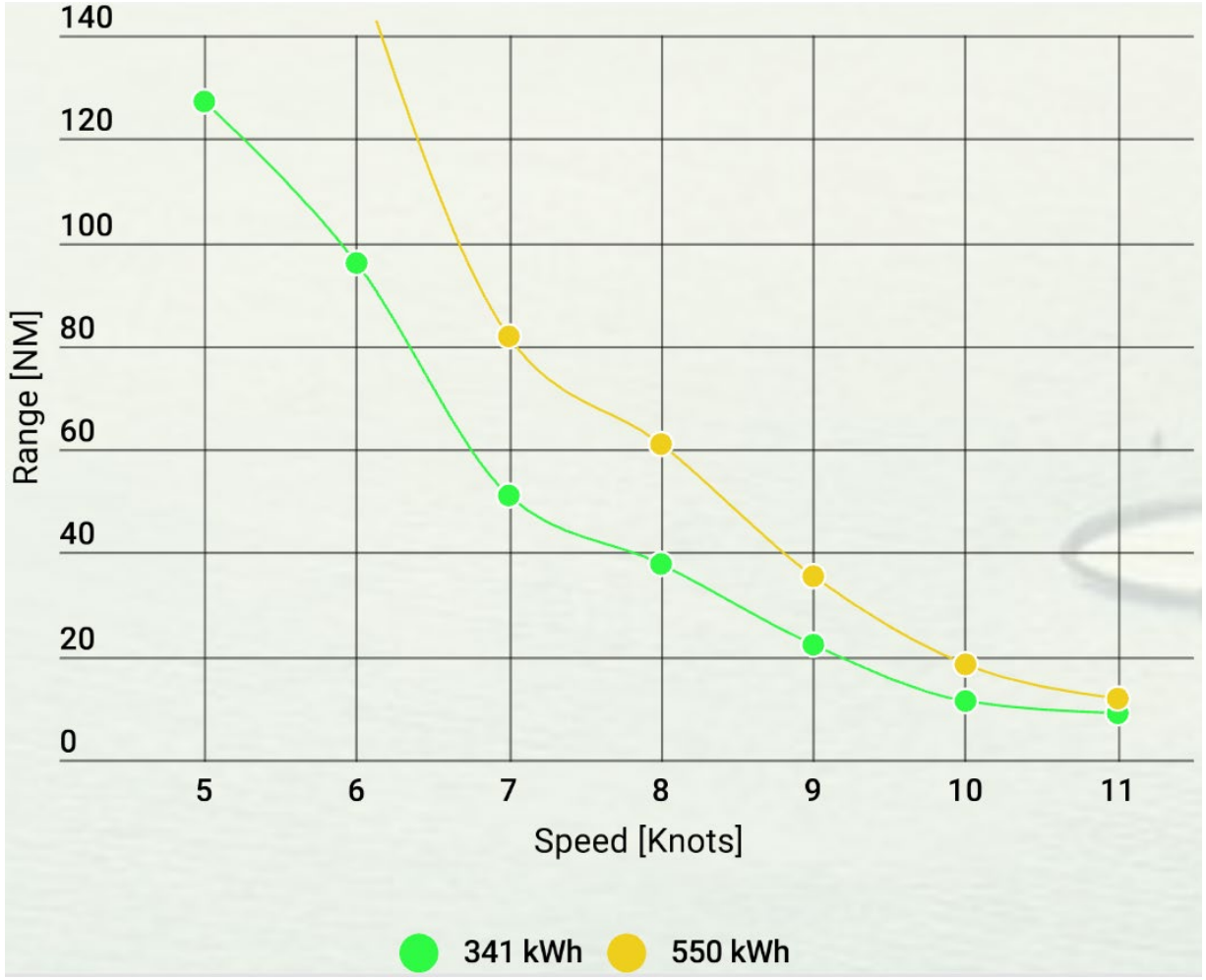
- Electric hybrid
- 195 kWh battery + diesel generator

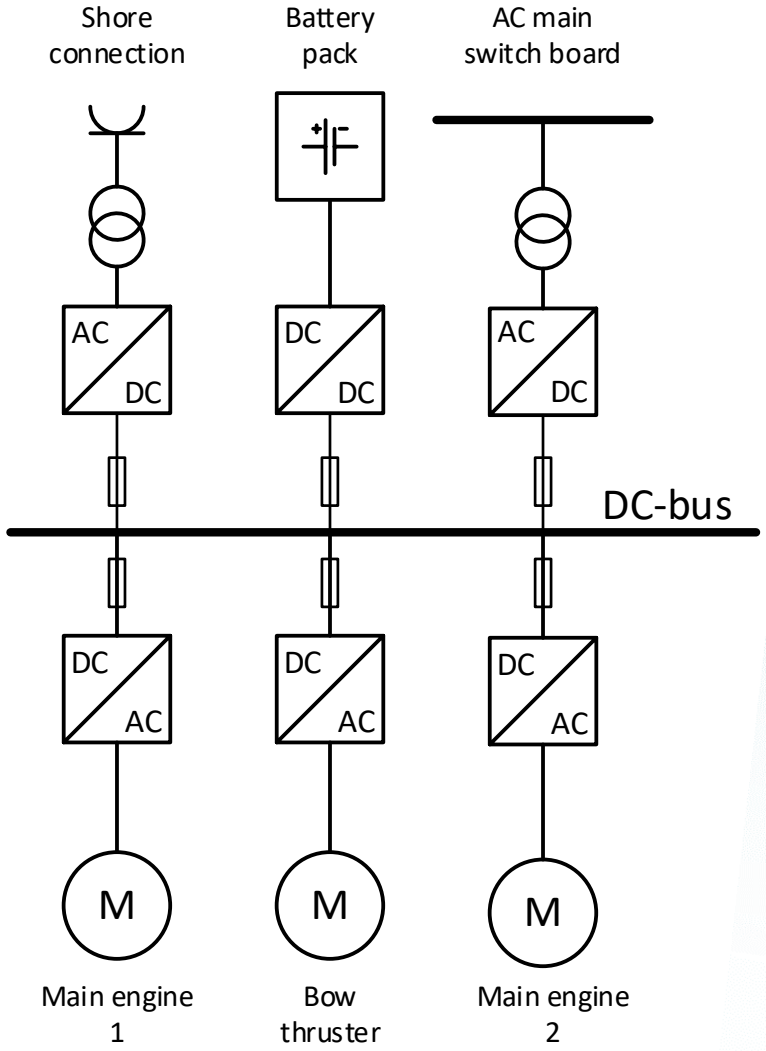
VM 900 Fischer

- Electric fishing boat
- 120 kWh battery
- Range of 25 nmi at 6 knop

Hybrid fishing boat – “Angelsen Senior”

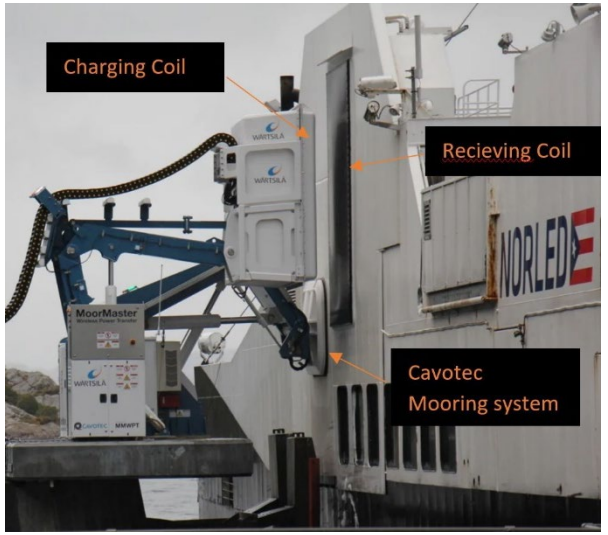
Typical electric propulsion system

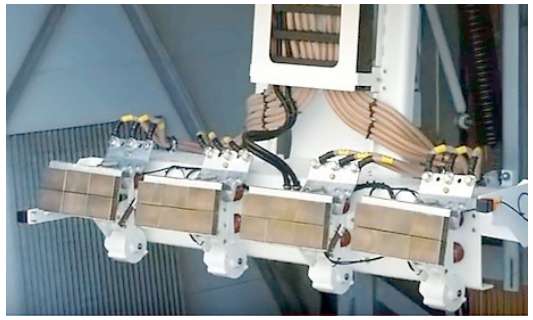




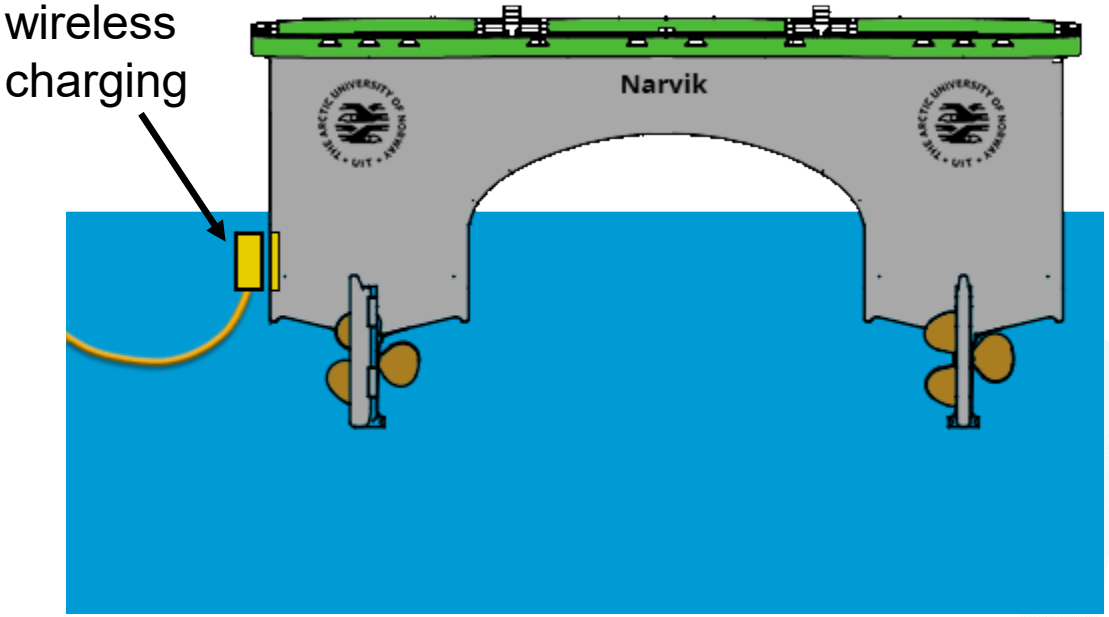
Charging requirement and technology

Vessel	Battery capacity	Charging power	Charging solution
Karoline (Hybrid)	195 kWh	44 kW	63 A plug 400 V
Angelsen Senior (Hybrid)	270 kWh	50 kW 850 kW gen.	125 A 3~ 230 V
GMV Zero	350 kWh	2 x 87 kW	2 x 125 A plug 400 V
MF Folgefonn (Hybrid)	1000 kWh	1 MW	Inductive + NG3 plug
MF Ampere	1040 kWh	1.2 MW	ST.Pantograf Cavotec plug
MF Future of the Fjords	1800 kWh	2.1 MW	Cavotec plug
Color Hybrid	5000 kWh	7 MW	NG3 plug





Floating charging points



- Power dock with integrated battery pack
- UiT research – Underwater wireless charging

Students interested in electric vessels

Søkte én til to – ansatte ni personer

LADING PÅ HJERNEN: BAK FRA VENSTRE: SURAJ TIMILSINA, JONAS NYSTAD, SIMON FJELLSTRÖM JENSEN, SHAMRAIZ KHAN, ABDALLA ALAAELDIN MAHMOUD ABDELLATIF. FORAN FRA VENSTRE: JEEWAN YOUSUF ADEEL. IKKE TIL STEDE: HAFEEZ ABOLADE OMOSANYA OG HENRIK FJELD NILSEN. FOTO: PRIVAT

UiT i Narvik søkte i utgangspunktet én til to forskningsassistenter til prosjekt. Etter stor interesse endte de opp med å tilsette hele ni.

Ladeteknologi

for elektrifisert framdrift av

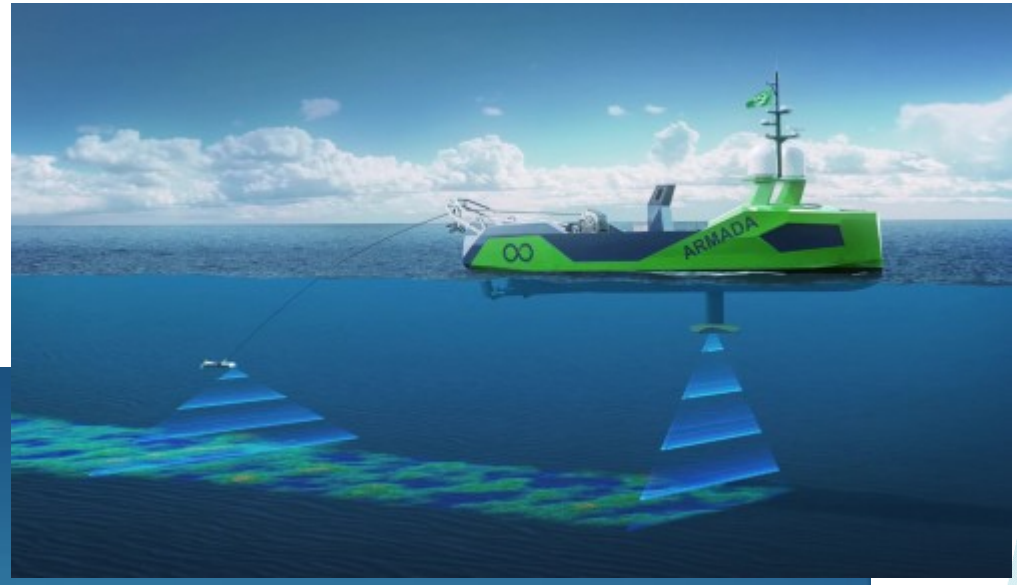
maritime fartøy og luftfart

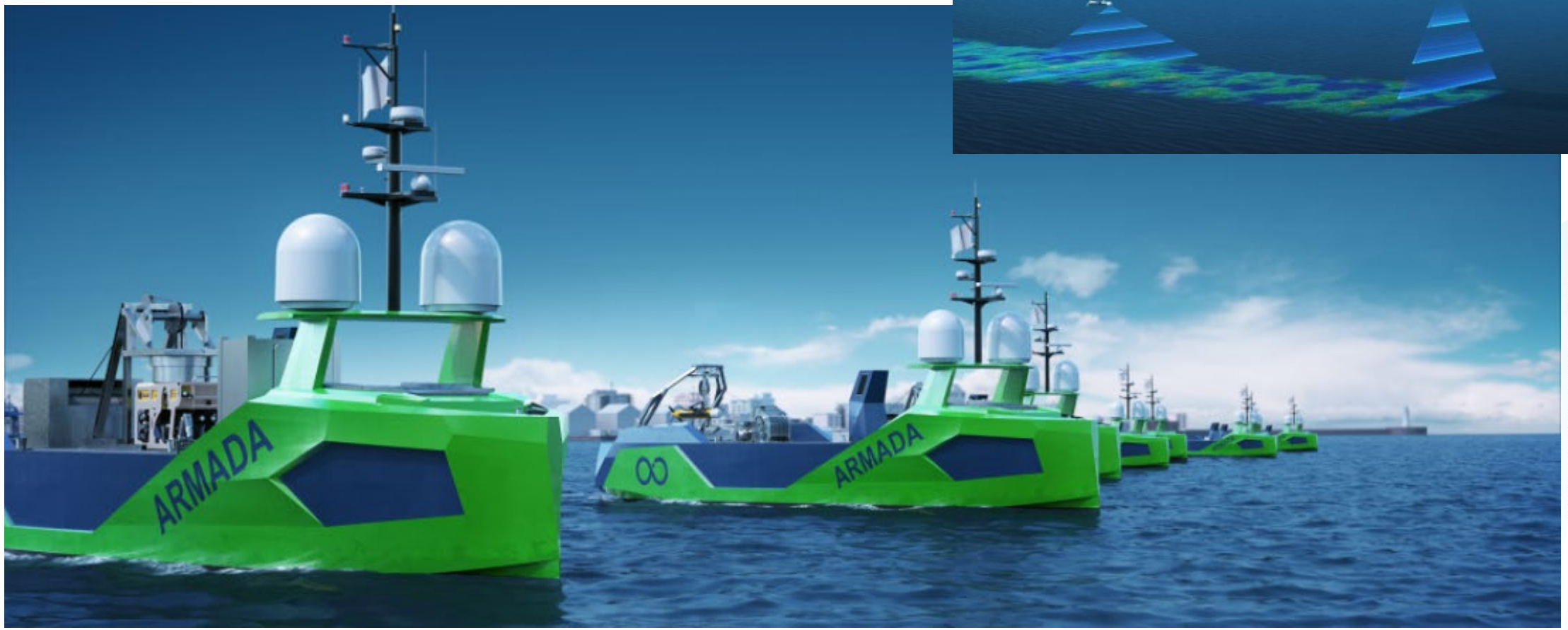
http://www.ladeteknologi.no

ARCTIC CENTRE FOR SUSTAINABLE ENERGY

Electric boat collecting plastic waste

Armada





Grovfjord Mek. Verksted is building nine autonomous hybrid vessels for Ocean Infinity