



## One Ocean Conference

### Decarbonization Dilemma for deep-sea shipping

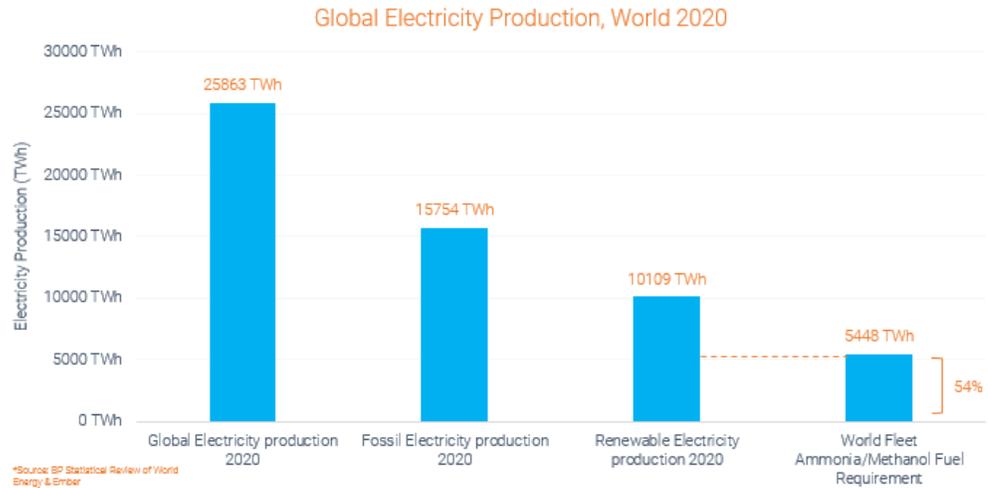
Harald Fotland, CEO – Odfjell SE

| One Ocean Week, Grieghallen – 18.04.2023 |

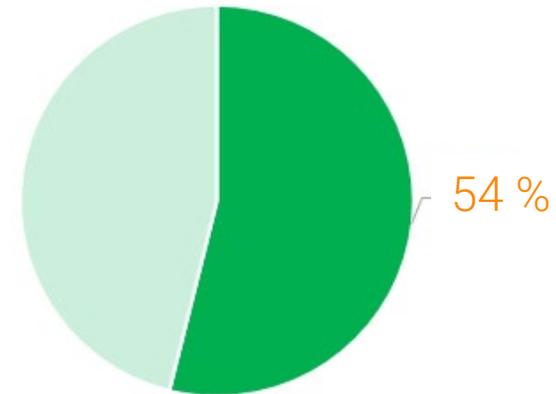


**ODFJELL**

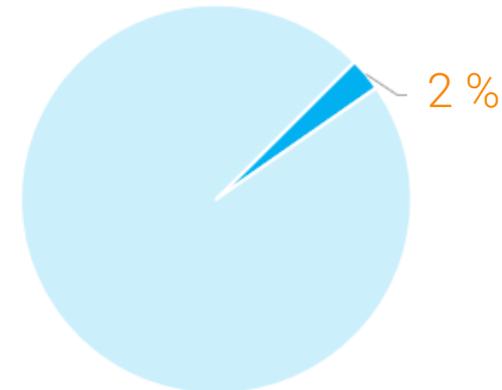
# Renewable Electricity demand from the deep sea fleet



- The World's Deep Sea fleet requires 454 million tonnes of green fuels per year
- The production of 1 tonne green ammonia/methanol requires 12 MWh renewable electricity
- Deep Sea total demand for renewable energy is therefore 5.500 TWh per year
- This equals 54% of the World's present production of renewable electricity



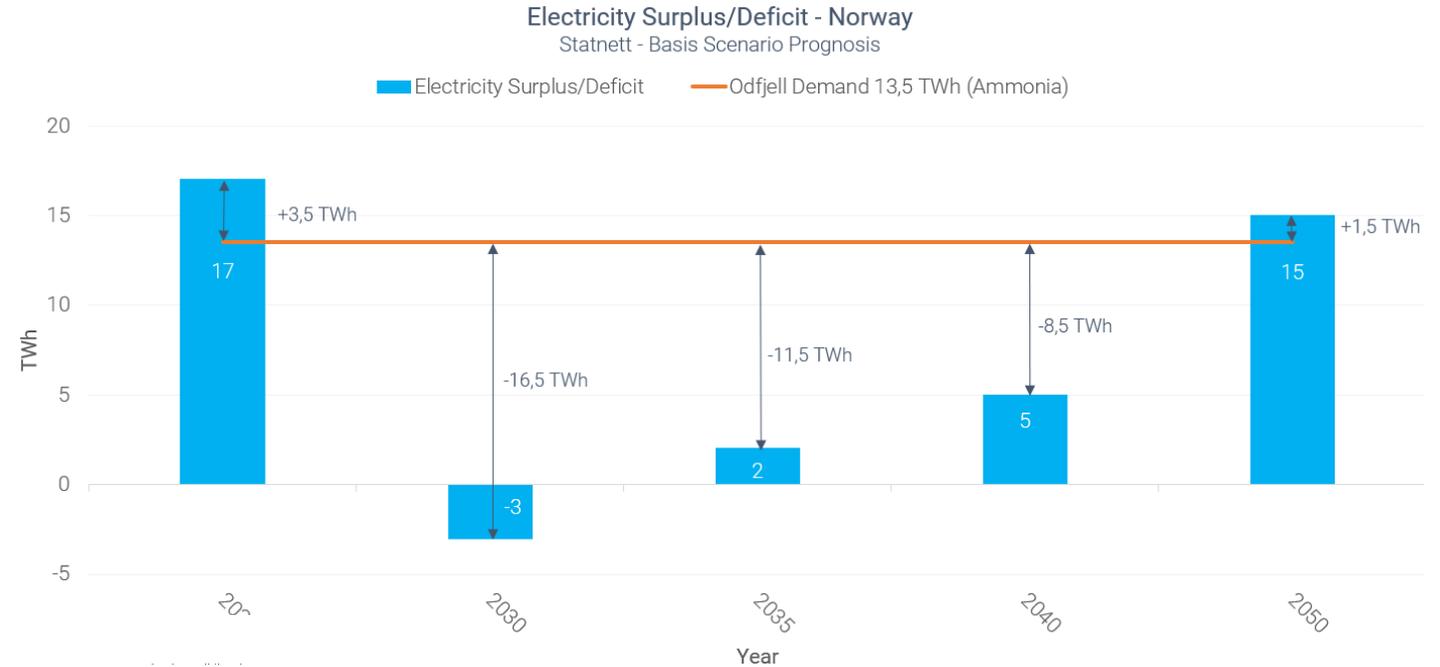
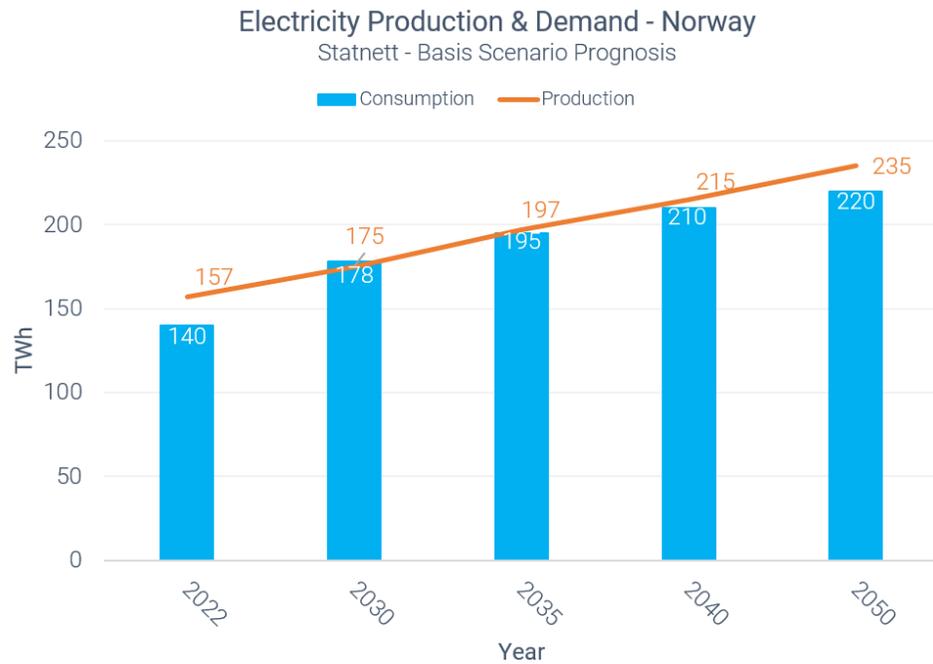
WORLD  
RENEWABLE  
ELECTRICITY  
SHARE



DEEP SEA FLEET  
SHARE OF  
GLOBAL  
EMISSIONS

# For comparison: Odfjell's electricity demand versus electricity surplus in Norway

Our requirement equals 79% of Norway's electricity surplus in 2022 and 90% of the estimated 2050 surplus

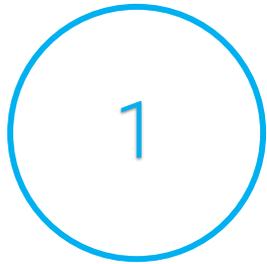


These facts and assessments point in the following direction:

- There is a massive need for renewable electricity
- Our politicians need to clearly prioritize the utilization of this energy
- Shipping does not have its own atmosphere. We need a holistic approach to the utilization
- Energy Efficiency will be a critical success factor in any future scenario



# The decarbonization **dilemmas** for deep sea shipping



Renewable energy

Spend half of the resources to solve 2 % of the problem?



Tank-to-Wake vs Well-to-Wake

Shall we solve shipping`s problem or the global problem?



Lifetime extension or build new?

Replace energy efficient older vessels with green(er) newbuildings?



Fuel-type

Methanol / Ammonia / Biofuel / Bio LNG / Hydrogen / Nuclear



Energy efficiency or zero emission?

Reduce emissions or go to zero? When is the right timing?

# Energy efficiency: Numerous existing off-the-shelf solutions

Mewis Ducts



Propeller Boss Cap Fins



Propulsion upgrade



Reversed osmosis



Ultrasound

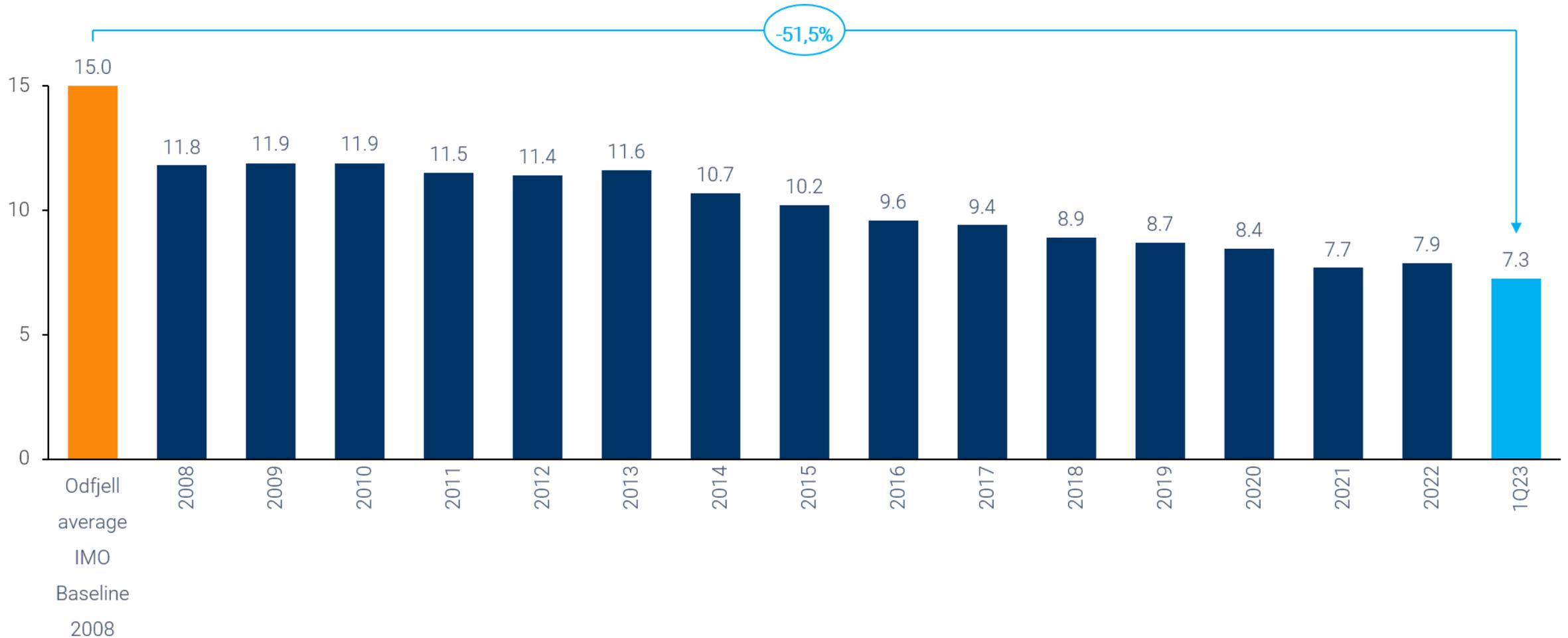


In-transit hull-cleaning



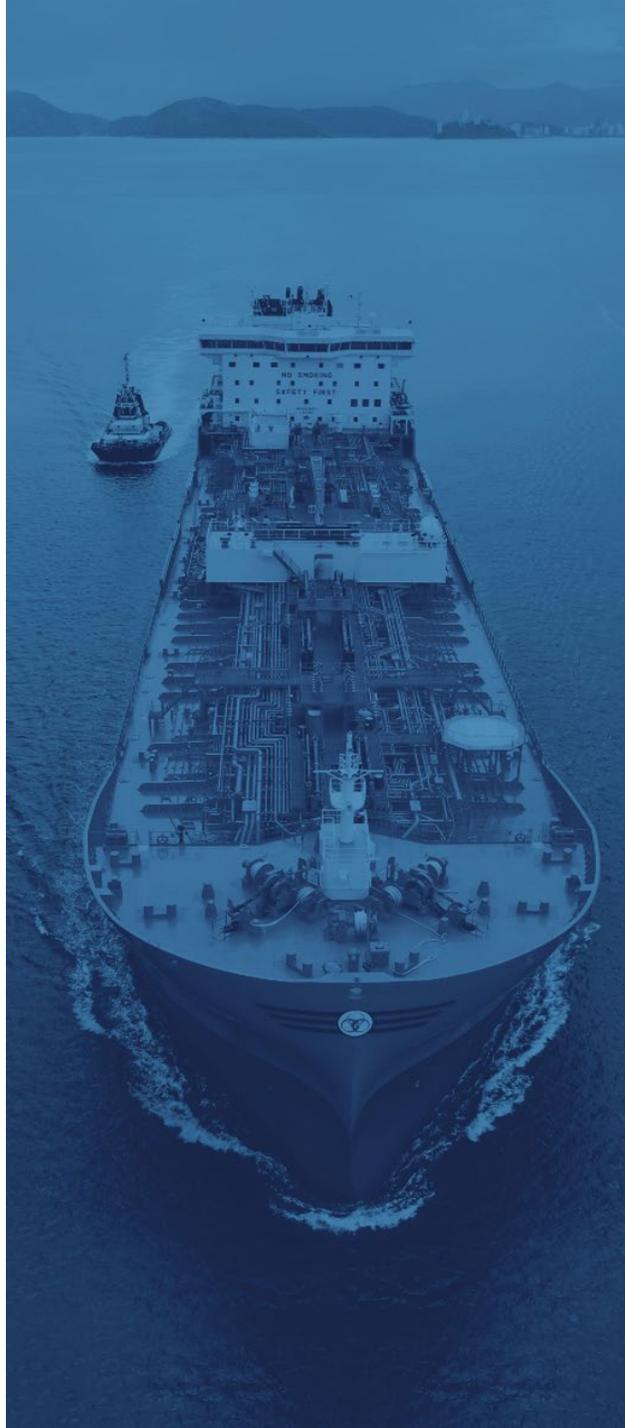
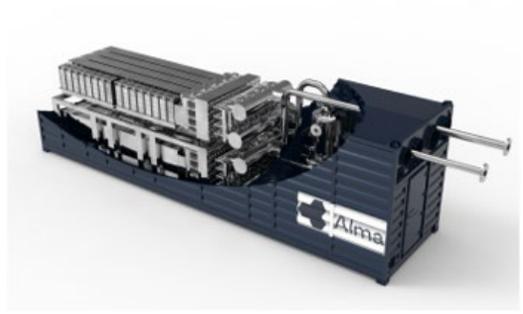
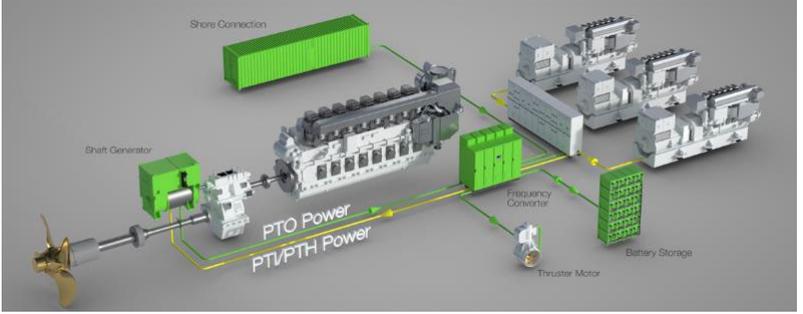
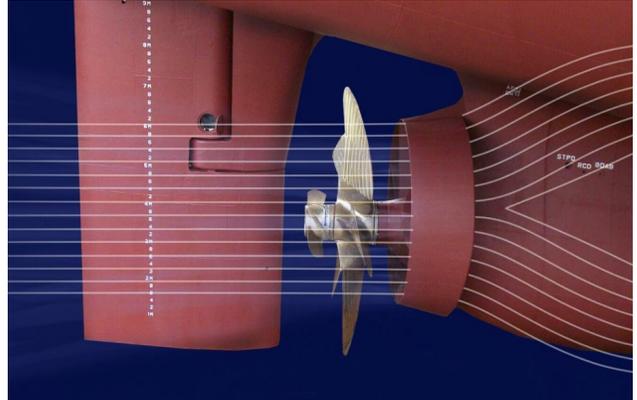
# In Odfjell we have focused on energy efficiency for almost 15 years

Annual Efficiency Ratio (AER: gram CO<sup>2</sup> emitted per dwt-mile) for the Odfjell managed fleet compared to average IMO baseline for our 2008 fleet



# Energy efficiency: Novel available Technology

Energy efficiency technologies will continue to be very important on the road to zero emissions



# The Green Transition: Possible trends

- Domestic shipping will lead the way
  - Electrical propulsion
  - Hydrogen and Ammonia
- Regional shipping will be right behind
  - The shortest distances will be the first movers
  - Fixed trading pattern – predictability
  - Bilateral agreements will likely be necessary
- Deep Sea shipping will eventually follow suit, where the front runners will be those who:
  - Have customers willing to pay
  - Permanent trade within green corridors
  - Have access to green(er) fuels within their trade pattern
  - Vessels' fuel flexibility will be a success factor





Thank you  
for your attention

