

ENGINEERING
TOMORROW

Danfoss

Sustainability for people, planet and performance

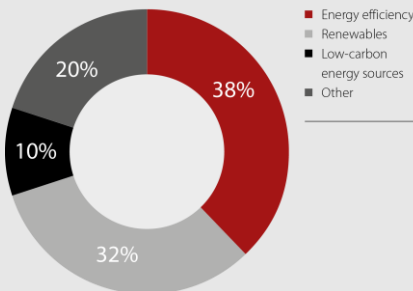
Country General Manager
김성엽, Steve Songyop KIM

We have a **passion for energy efficiency**

- The Paris Agreement has set out a global action plan to keep global warming below 2°C by 2050
- If we are to achieve this low-carbon future, we must leverage **energy efficiency** being a relevant contributor to a sustainable climate



Main contributors to achieve the 2050 target of the Paris Agreement



Source: International Energy Agency: Energy Technology Perspective 2016

Danfoss in brief

We engineer tomorrow
and build a better future

27,795
employees dedicated to engineering
smart energy technology making a
difference to people and businesses
worldwide

72
factories in 20 countries and
products sold in more than 100
countries



Group highlights 2018

Net sales,
EURbn

6.1



Growth in
local currency

7%



EBIT margin

10.6%



Energy reduction
since 2007

43%



CO₂ reduction
since 2007

25%



Four business segments geared for growth



Danfoss Power Solutions

#2 Market position

- 7,625 employees
- 25 factories in 12 countries
- 2.1bn EUR annual sales



Danfoss Cooling

#1 Market position

- 6,179 employees
- 15 factories in 10 countries
- 1.6bn EUR annual sales



Danfoss Drives

#2 Market position

- 4,645 employees
- 11 factories in 7 countries
- 1.4bn EUR annual sales



Danfoss Heating

#1 Market position

- 4,898 employees
- 24 factories in 11 countries
- 0.9bn EUR annual sales



SUSTAINABILITY PROGRAM

Strategic focus areas

Business and products

Energy & CO₂ emissions
UN Global Goals
Products & materials
Supply chain

People and communities

Health & Safety
Environment
Ethics & human rights
Compliance programs

Desired outcome

Cost and resource optimization

Risk assessment & mitigation

Business opportunities & reputation

Employee engagement & commitment

AMBITIOUS CLIMATE STRATEGY

2030 targets

- Reduce energy intensity by 50%
- Double the energy productivity
- Reduce the CO₂ intensity by 50%
- All compared to 2007 as baseline

Since 2007, we have achieved:

43%

Energy reduction



25%

CO₂ reduction



THE SUSTAINABLE DEVELOPMENT GOALS

Four prioritized goals

6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



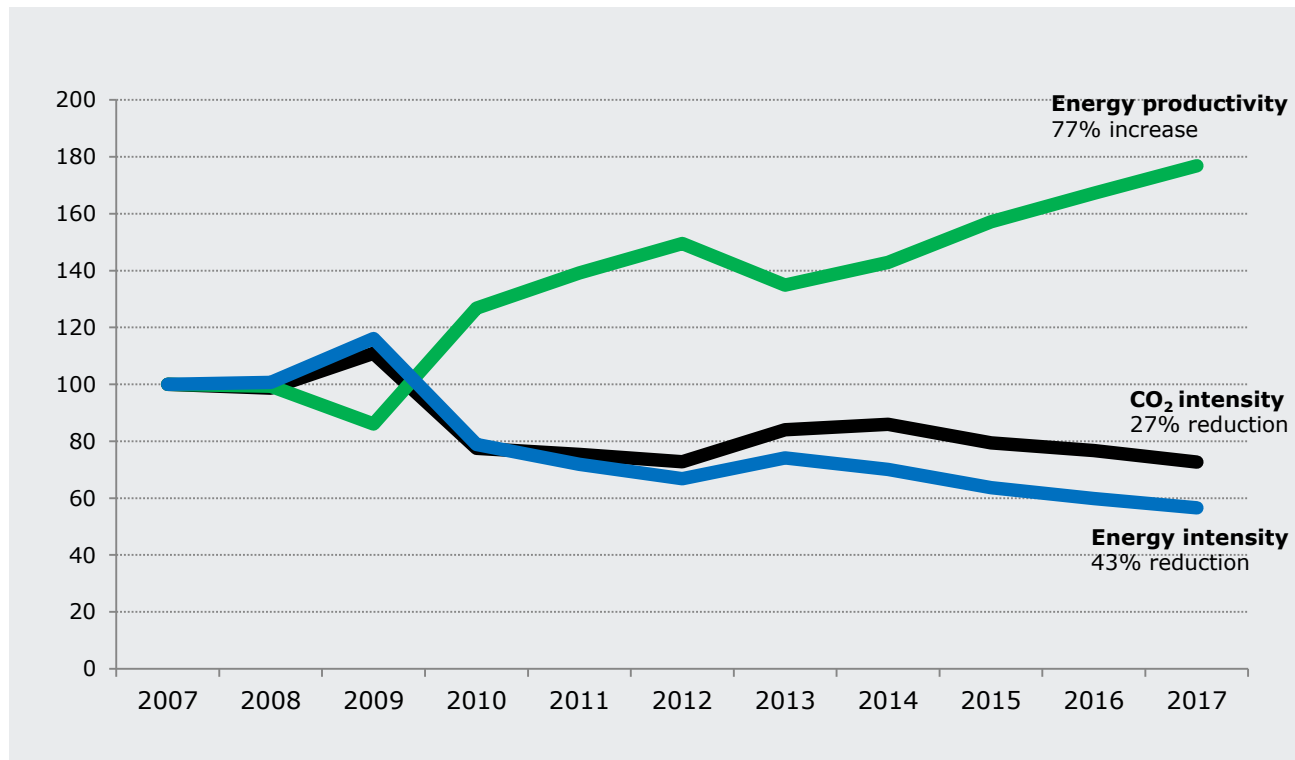
11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Our ambitious **climate strategy**



2030 targets

- Halve the energy intensity
- Double the energy productivity
- Halve the CO₂ intensity

All compared to 2007

... and we are well on track!



DIGITALIZATION



ELECTRIFICATION



URBANIZATION



CLIMATE CHANGE

GLOBAL MEGA-TRENDS

transforming our world




FOOD SUPPLY

DIGITALIZATION

- 90% of all data created in the past two years
- 1 million new devices coming online every hour
- Digitalization will drive customer value
 - eg. IoT will save USD 1 trillion a year in maintenance





URBANIZATION

- Cities account for up to 70% of energy consumption and CO₂ emissions
- World population to reach 8.6 billion people in 2030
- By 2050, 70% will be living in cities



FOOD SUPPLY

- One third of all food is lost
- Food wastage is responsible for one third of all greenhouse gas
- Food production will increase 60% to feed the population

CLIMATE CHANGE

- Greenhouse gases increased by 50% since 1990
- Energy efficiency and renewable energy only ways to a low-carbon world
- Energy efficiency deliver largest reductions in greenhouse gas



ELECTRIFICATION

A red electric car is parked in a parking space, with its rear end visible. To the right of the car, a modern, black and white wall-mounted charging station is attached to a grey concrete wall. A bright yellow charging cable is plugged into the station and extends towards the car. The scene is dimly lit, suggesting an indoor or nighttime setting.

- Green energy will make electricity the largest energy carrier
- Increased need for storage capacity to deal with peak loads
- By 2040, 50% of all cars will be electric – ferries, trucks and other vehicles also going electric

Examples of what we do



Electric and hydraulic solutions



Electric vehicles and charging



Examples of what we do

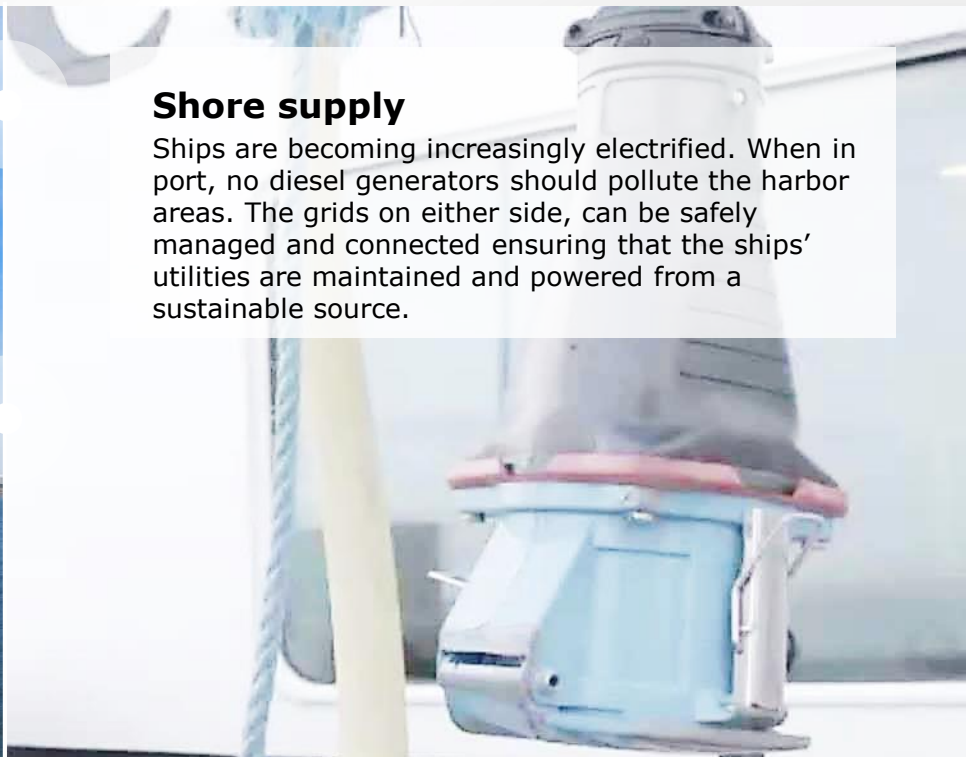


Hybridization in the marine industry

Significantly reducing the environmental footprint of the industry by equipping vessels with DC grids and storage systems as well as ensuring that all rotating equipment is frequency controlled

Shore supply

Ships are becoming increasingly electrified. When in port, no diesel generators should pollute the harbor areas. The grids on either side, can be safely managed and connected ensuring that the ships' utilities are maintained and powered from a sustainable source.



Taiwan's first all-electric bus route

100%

Reduction in
carbon
pollution

Asia's first electric ferry



**25000
litres**

of fuel saved by
Asia's first electric
ferry in Taiwan

Astrid Helene

One of the world's first fully electrified workboats

90 tons

Of CO₂
reduction
annually

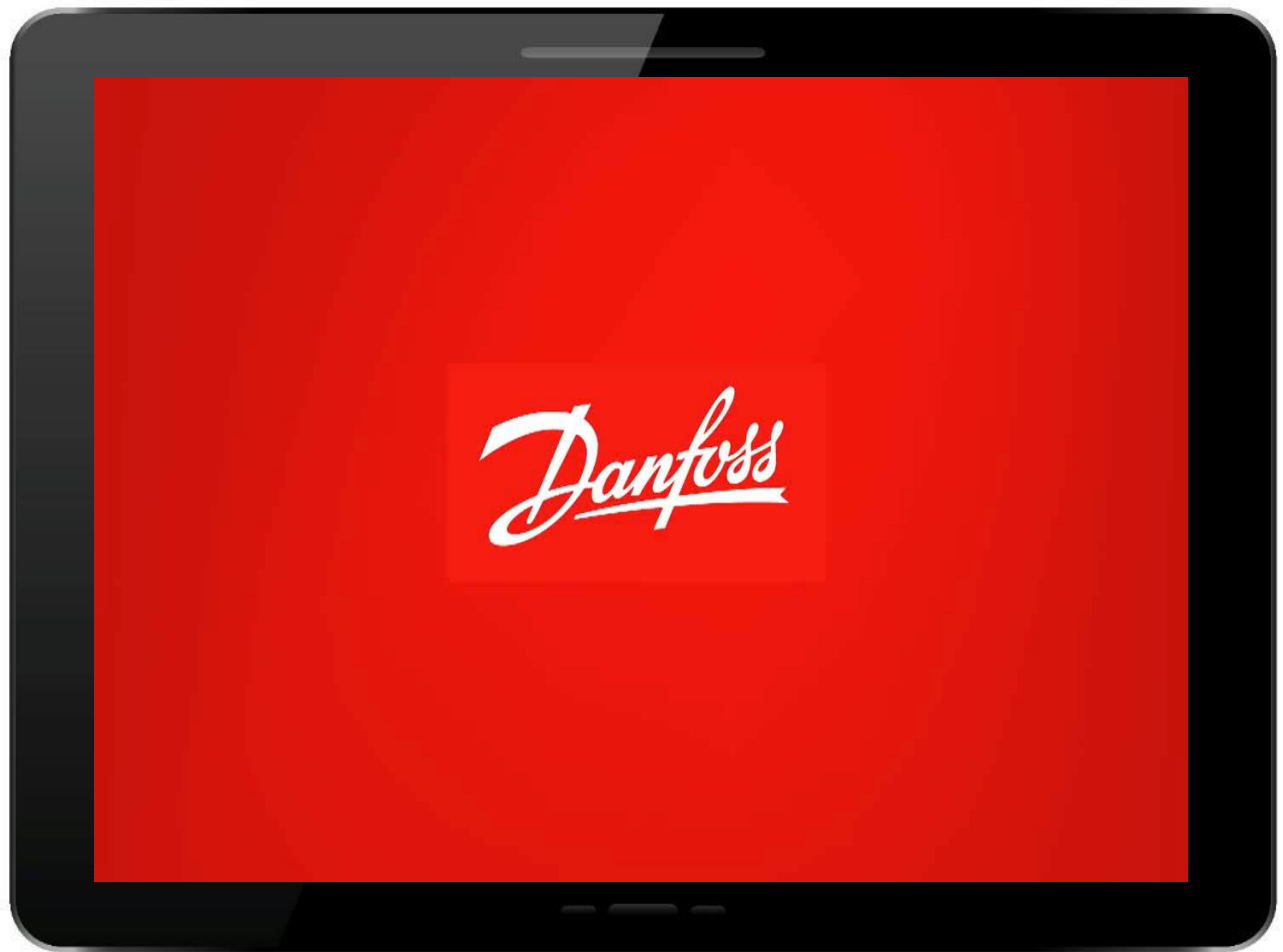


Electric Hybrid Technology

Minimizes Fuel Consumption and Emissions



Equipped with Danfoss Solution, this system is achieving **fuel savings of up to 38%** with a commensurate reduction in emissions.



Energy Efficiency First

The foundation of Danfoss' advocacy globally



Key Messages

Energy efficiency targets and regulation to increase the demand for energy efficiency.

Hybridization and **electrification** of the transport sector plays a major part towards a low-carbon world and bring many other benefits – improved performance, reduced weight, noise, savings from fuel consumption

Renewable energy and **energy efficiency** can bring more than 90% of the energy-related CO2 emissions reductions

Public Private Partnerships are an effective measure to deliver on our business priorities.

Reflections and Q&A





ENGINEERING
TOMORROW

CASE STUDY

Full-ELECTRIC CITY BUSES IN COPENHAGEN

Manufacturer: Linker Oy
Type: Battery electric
Delivery: 2016

SCOPE OF DELIVERY

- EM-PMI motor
- EC-C Inverters

MAIN BENEFITS

- High efficiency power train guarantees longer range
- Energy consumption less than 0.7 kWh of energy per km
- Over 40% better energy efficiency in Helsinki city EV-Bus test
- Six different electric buses from Europe and China tested



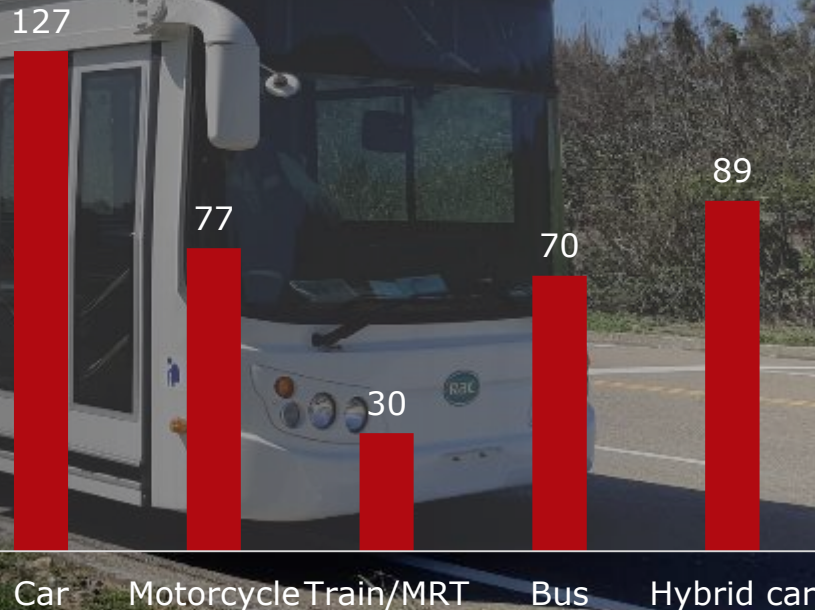
Singapore Electric Busses

**6000 busses on
the streets**

**60 electric
busses from
2019**

**Zero
tailpipe
emission**

CO2 emission per passenger/gm



CASE STUDY

THYBORØN-AGGER

Builder: Søby Shipyards Ltd.
Type: Diesel-electric with batteries
Delivery: 2018

SCOPE OF DELIVERY

- Design of the drive system
- PowerDRUM™ motors and generators
- PowerMASTER™ inverters:
- DC Power Distribution
- Batteries
- Gensets
- Smooth THRUST control algorithm

MAIN BENEFITS

- Reduction of fuel consumption and emissions
- Less noise
- Less maintenance costs
- Increased system redundancy



CASE STUDY - ELLEN E-FERRY ELECTRIC FERRYBOAT

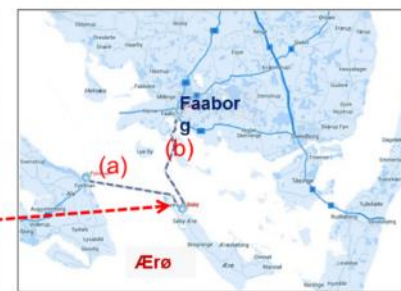
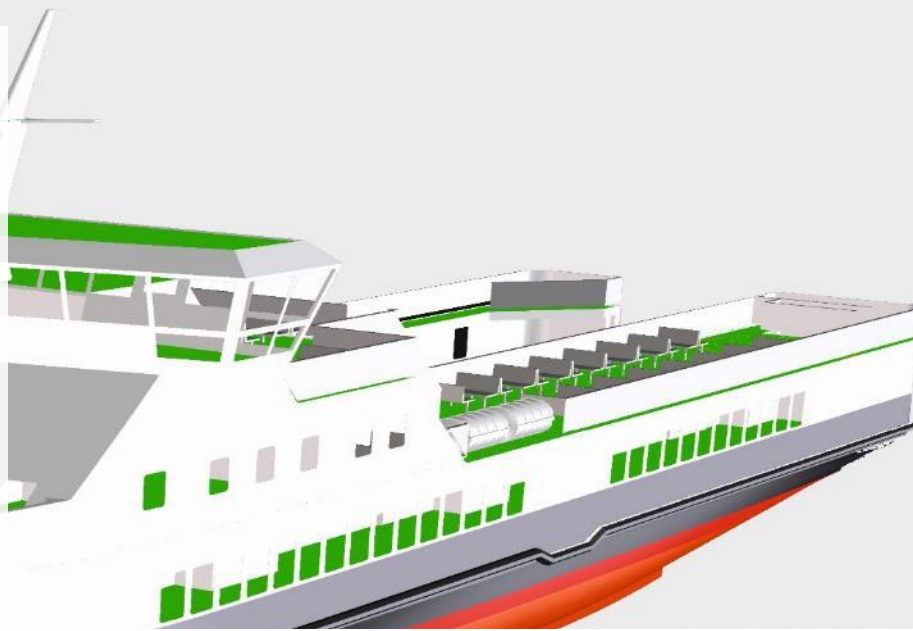
Builder: Søby Shipyards Ltd.
Type: Battery electric
Delivery: 2018


SCOPE OF DELIVERY

- EM-PMI electric machines
- EC-C inverters
- EC-C DC/DC converters for batteries
- Propulsion and power management controls
- Battery charger for shore

MAIN BENEFITS

- Reduction of CO2 emissions by 2000 tons and NOx emissions by 41,500 kg/year
- Safe and silent operation





Eliminate pollution and noise through **shore supply**:
maintained and powered from a sustainable source

**1000
litres**

marine oil saved
each day by the
first Dutch harbor
with shore supply