

ENGINEERING
TOMORROW

Danfoss

Energy savings in Danfoss - focus on **Nordborg campus**

October 2017



About Danfoss

Danfoss engineers technologies that enable the world of tomorrow to **do more with less**. We meet the growing need for **infrastructure**, **food** supply, **energy** efficiency and **climate**-friendly solutions

Cooling

First product was an expansion valve for refrigeration systems (1933)



Later the hermetic compressor for refrigerators and freezers followed (1952)

Heating

Danfoss invented one of the first radiator thermostats in the world (1943)



Power Solutions

Entered hydraulics business with orbit motor for agricultural and construction machines (1964)



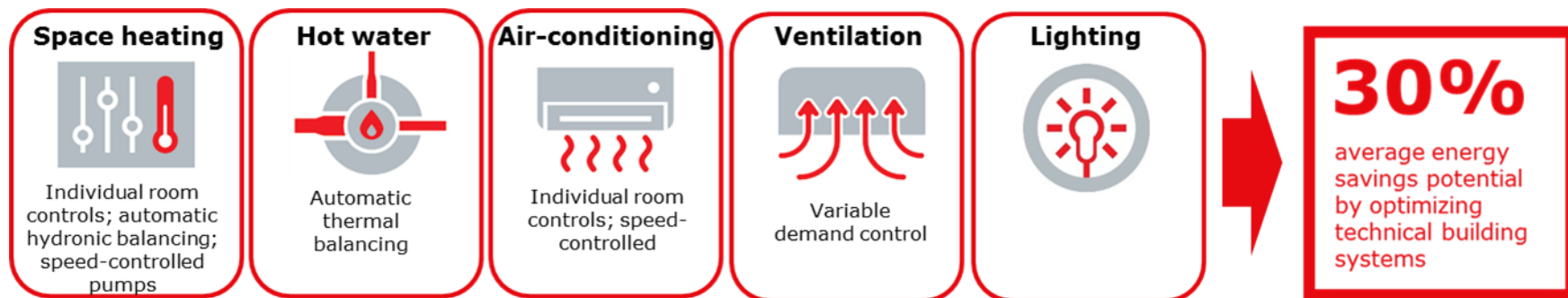
Drives

First company to mass-produce variable speed drives for controlling motors (1968)



Energy efficiency in our buildings

Technical building systems – our solutions for improvements



- Global energy saving project in the 27 largest factories worldwide
- Target is to cut energy consumption >30% with payback <3 years
- Purpose is to increase resilience and competitiveness and to free resources that can be invested elsewhere
- Special focus on Nordborg campus – CO₂ neutral before 2029

Global program for energy savings



27



FACTORIES IN 11 COUNTRIES



- Consume **84%** of the total energy consumption in Danfoss
- Total yearly spent on energy in Danfoss > EUR **40m**
- **50%** is used in buildings and utilities
- **50%** in production and processes
- **68%** of consumption is electricity, **32%** is heating

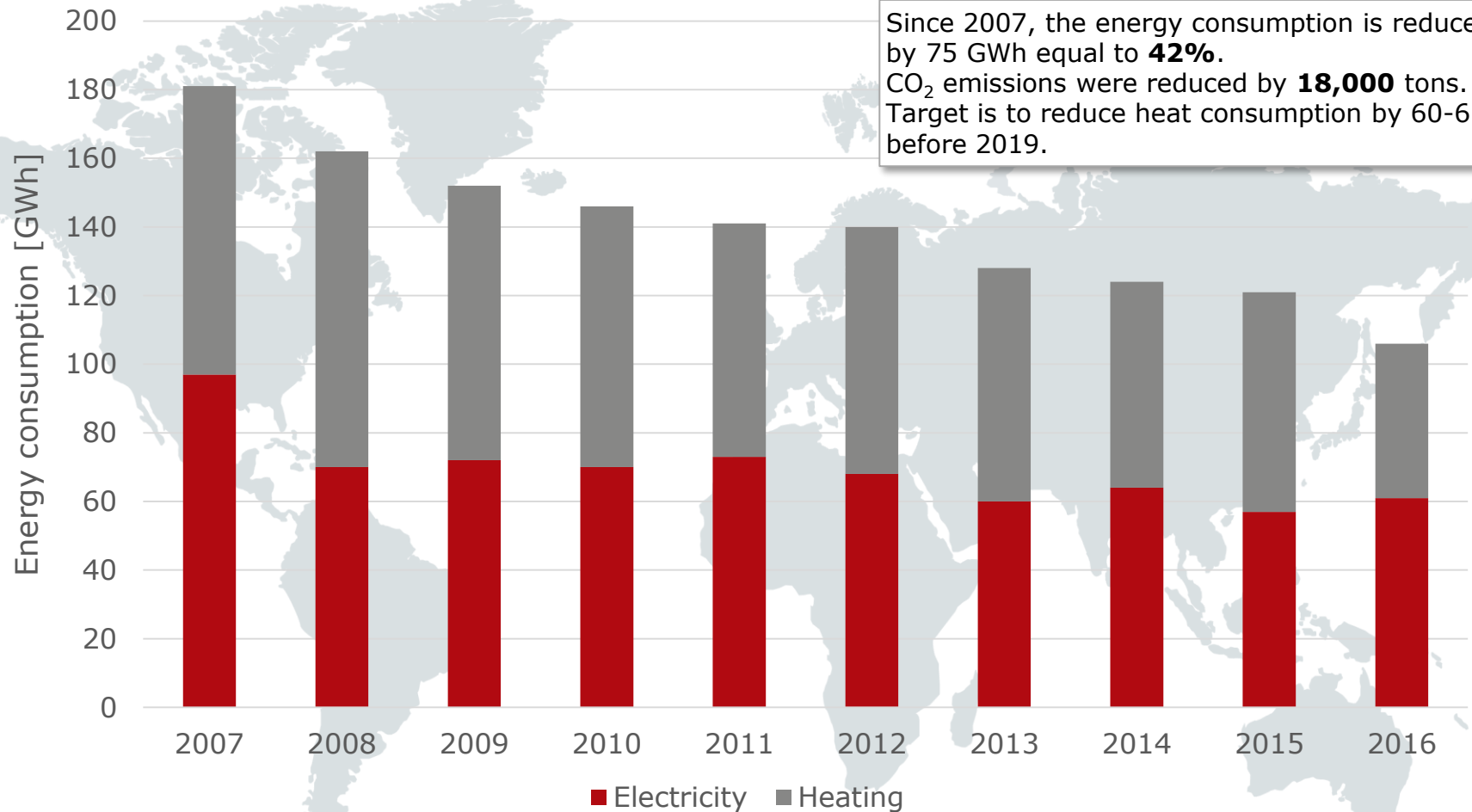
- **>170** energy saving projects identified in buildings and supply installations
- Buildings: **30%** savings in terms of consumption. **44%** savings in terms of money
- Estimated annual savings in energy costs EUR **9m**
- Overall net investment EUR **24m** after receiving energy subsidies of EUR **4m**
- Overall payback time of **2.75** years

Where is the saving potentials?

Ventilation	-39%
Process cooling	-35%
Air-conditioning	-30%
Heating	-22%
Lighting	-20%
Compressed air	-10%

The project is **56%** implemented in terms of investment and **49%** of the savings are realized.

Energy consumption at Nordborg campus



Examples of technical solutions



The energy savings varies from area to area – but range between -30% to -75%.

This application uses variable speed drives, motorized valves, actuators and pressure transmitter

Large industrial ventilation systems with heat-recovery by connecting exhaust from production processes into the main ventilation system.



Examples of technical solutions

Four 500 kW **industrial heat pumps** recovering excess heat from process cooling water (previously removed in cooling towers).

Capacity of 15.000 MWh / year

This application uses variable speed drives, motorized valves, actuators, pressure transmitters and level sensors.

The business case

Investment	€ 1,250,000
Energy recovery	9,900 MWh / € 775,000
Electricity for HP	2,475 MWh / € 185,000
Heat recovery tax	€ 120,000
Annual savings	€ 470,000
Simple payback	2.6 years



Examples of technical solutions



- We have optimized TBS continuously
- Most recent renovations include:
 - New central control of radiators
 - Efficient lighting systems (LED)
 - Optimized heat recovery units
 - Optimizing chiller using Turbocor cooling compressor
- Optimizing TBS is a low investment with short payback and high energy savings
- It makes sense to optimize TBS as a first step of a renovation, then use the saved resources for further improvements

Conclusions on the Nordborg campus

- **We have in just four years reduced the energy consumption for heating by >30% and the cost by >50%**
- 18% of the heat demand in Nordborg is now covered by surplus heat
- Step-by-step renovation, starting with technical buildings systems

Why have we done this?

- Economic rationale: energy savings, freed resources, increased resilience and competitiveness
 - Political context and regulatory framework: COP 21, EU targets
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- ➔ Energy efficiency makes a great business case for industry and business, **but regulatory push is needed**
 - ➔ The solutions are easily transferable to other countries or industries, e.g. using the ESCO model



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