

ENGINEERING
TOMORROW

Danfoss

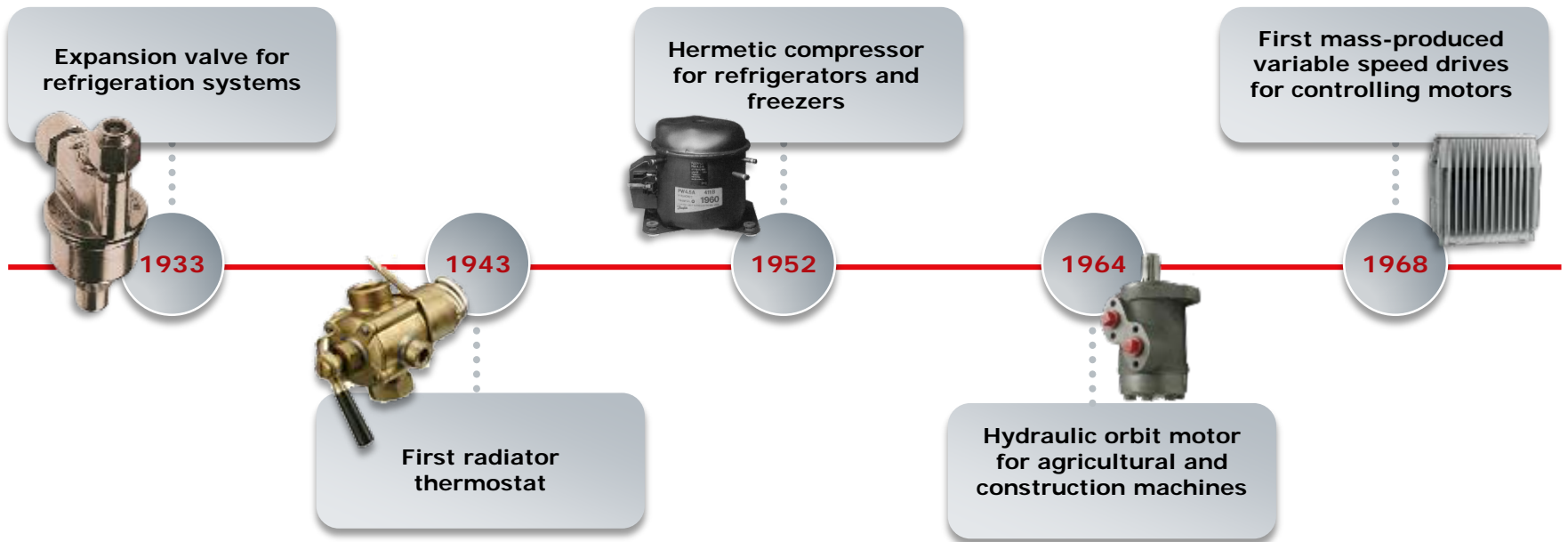
Danfoss – urban solutions for tomorrow

Kemal Lojo,
Business Development Manager
Adriatic and Black Sea region

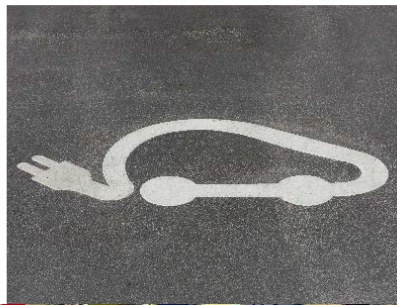


Our history

- Founded in 1933 by Mads Clausen in Nordborg, Denmark
- Grown from a solo enterprise into a world-leader
- Made possible by clear focus on innovative engineering and early entry on emerging markets



GLOBAL TRENDS DRIVING OUR BUSINESS FORWARD







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

Addressing trends and challenges of our world

Exploiting global opportunities by Engineering Tomorrow



Infrastructure



Food



Climate



Energy



Infrastructure



Trend

World population is moving into cities, creating a huge demand for infrastructure

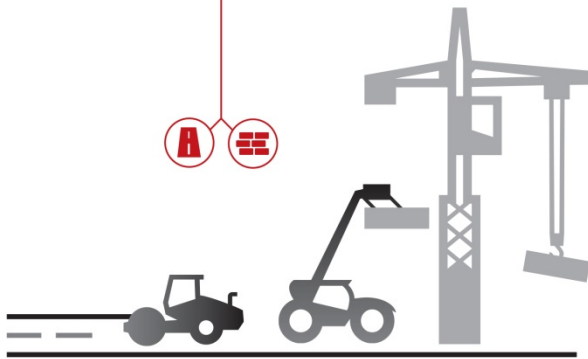
Danfoss

We help build the infrastructure in a sustainable and efficient way

Infrastructure

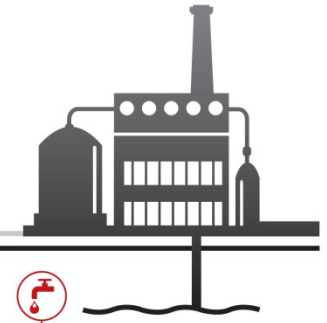
10-25%

fuel savings
with new power
control software
for construction
and road building
machines



35-50%

energy savings
with oil-free variable
speed compressors for
heating, ventilation
and air conditioning
systems



**Combining heat
and power** to use
surplus heat from
power plants

**90%
efficiency**

20-50%

energy savings
with aqua variable
speed drives in
water applications

Reduce leakage
Improve water quality
Cut investment needs

Food



Trend

World population is growing and there is a constant need for more and better food

Danfoss

We help meet this need by improving farming productivity and keeping food cold and fresh

Food

6%

more efficient
farm machines
with hydraulic
motors

Increase output
Reduce diesel
consumption

10-25%

energy savings
with variable speed
drives in refrigeration
systems

**Largest installed
base** in the dairy,
meat and poultry
industry

30%

fuel savings
with electronic
throttling valves
for refrigeration
systems in trucks

**Control the
temperature**

20%

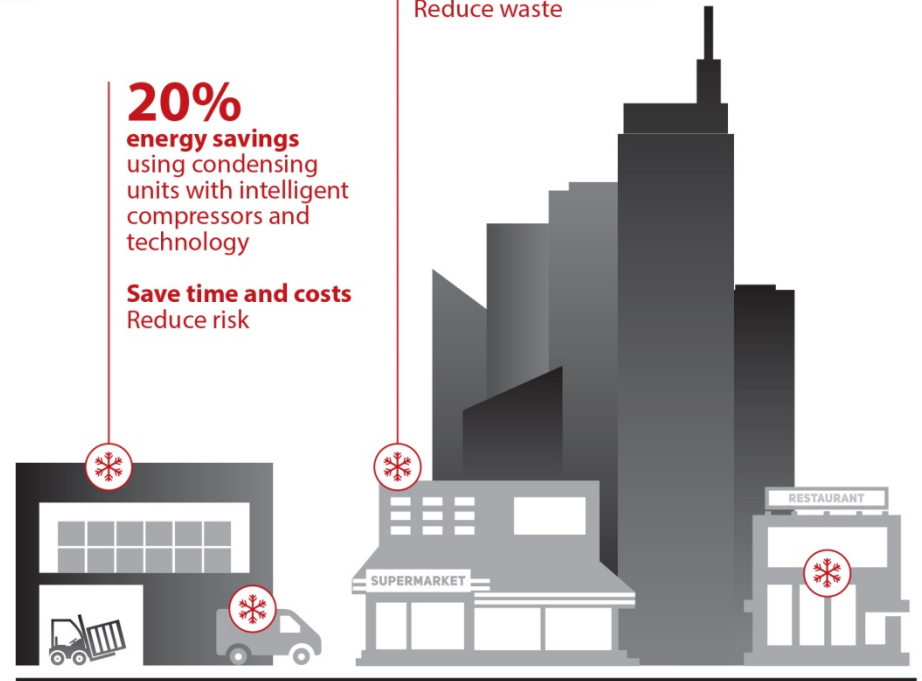
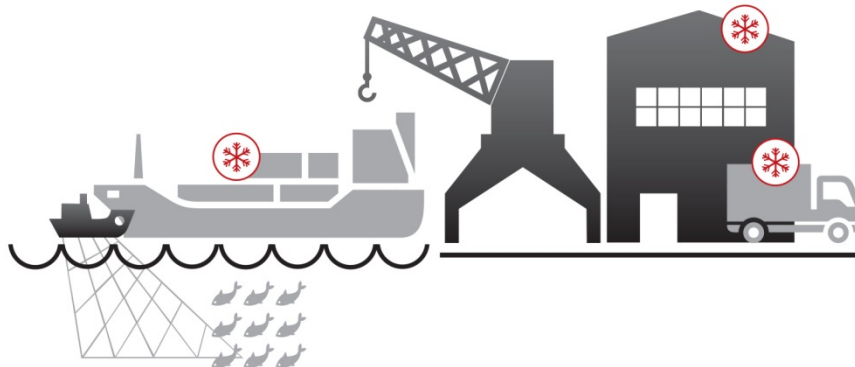
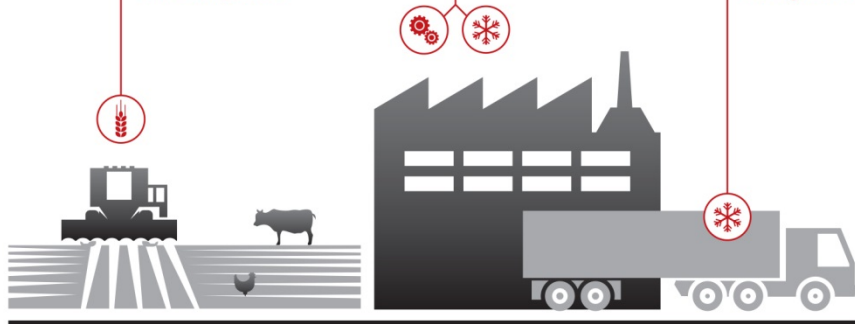
energy savings with
refrigeration control
system

Improve food quality
Reduce waste

20%

energy savings
using condensing
units with intelligent
compressors and
technology

Save time and costs
Reduce risk



Energy



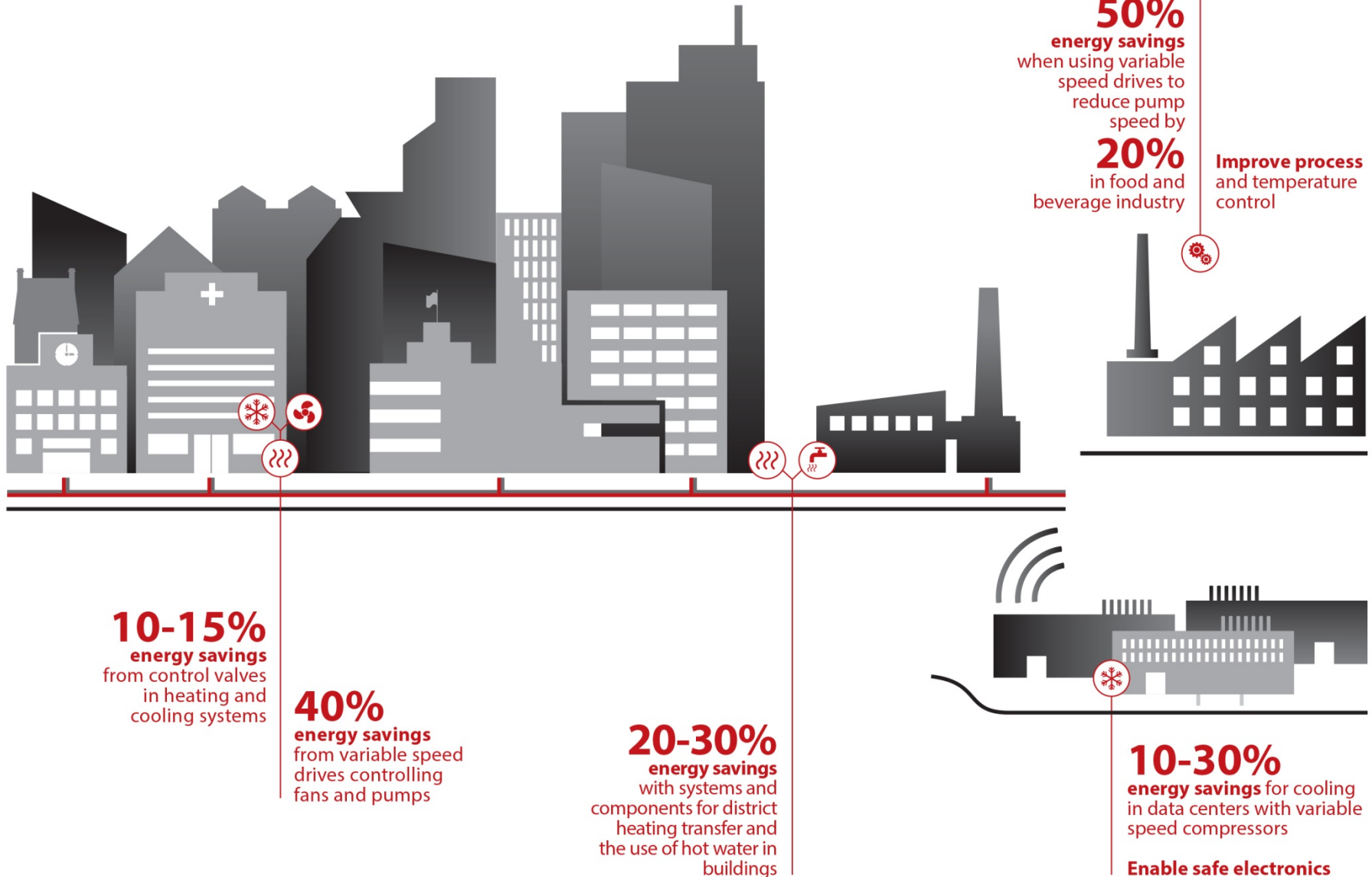
Trend

Global energy demand is rising as population grows and standards of living increase

Danfoss

We help get more out of less with our energy-efficient technologies

Energy



Climate



Trend

Global emissions are rising, however, development can be turned around and air pollution limited

Danfoss

We help lower emissions and increase human well being through our innovative technologies

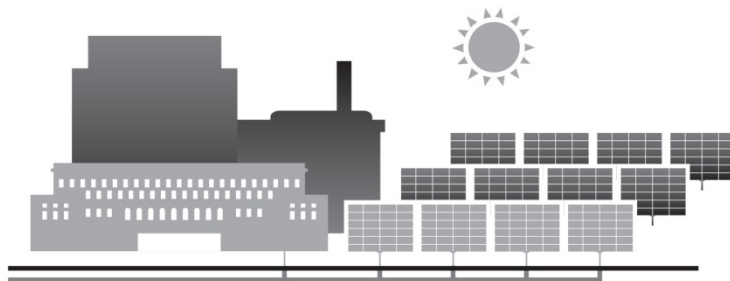
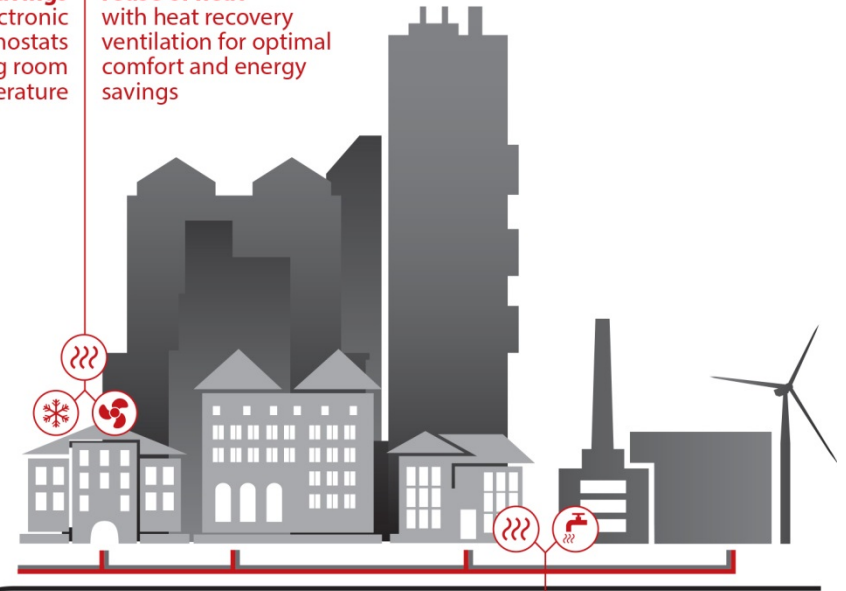
Climate

50-75%
energy savings with
air and ground source
heat pumps

60%
reduction in CO₂
equivalent emissions
in refrigeration
systems by replacing
synthetic refrigerants
with natural CO₂

23%
energy savings
with electronic
radiator thermostats
controlling room
temperature

90-95%
reuse of heat
with heat recovery
ventilation for optimal
comfort and energy
savings



98%
of the energy
available goes to
the grid with solar
inverters

517 million
tons of CO₂ could
be saved per year if
Europe doubled its
use of district heating
to 18-20% combined
with increased reliance
on renewable energy
sources

Addressing trends and challenges of our world

Exploiting global opportunities by Engineering Tomorrow



Infrastructure

- City cooling and heating
- Commercial and residential buildings
- Construction
- Water and Wastewater



Food

- Agriculture
- Production
- Storage
- Transport
- Point of Sale



Climate

- Renewable technologies
- Indoor climate
- e Mobility

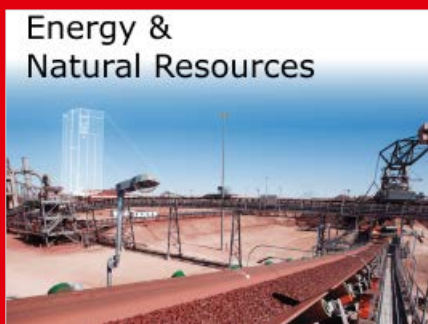
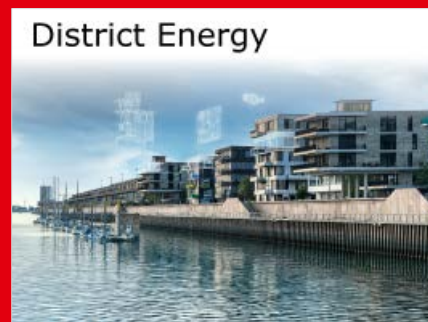


Energy

- Off-road machinery
- Buildings
- Manufacturing
- Energy generation
- Cities

Danfoss

Markets we serve



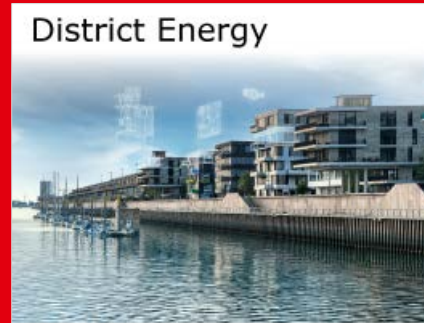


Selected Markets

Commercial Buildings



District Energy



Food and Beverage



Industry



Marine and Offshore



Residential Buildings



Water and Wastewater



Residential Buildings



Increasing comfort and reducing costs

Residential Buildings Applications



Danfoss offers energy-efficient solutions for all common systems, including radiator-based and floor heating systems for all new-build and renovation projects

Application areas include:

- Room temperature control and smart heating
- Hydronic balancing of heating systems
- Decentralized heat distribution and easy energy billing
- Systems for safe and hygienic DHW heating
- Central heat supply with one or more energy sources
- Electrical and hydronic floor heating systems

Significant reduction of energy demand

Residential Buildings Case Study

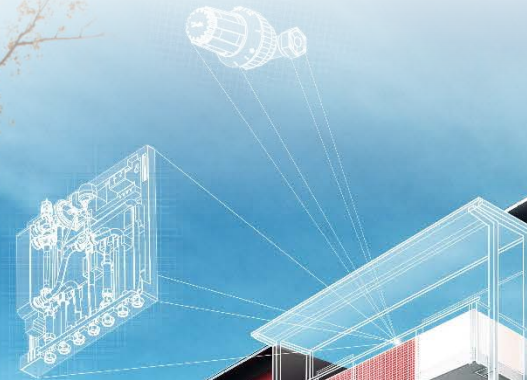
Old residential complex renovation

Germany, Cologne

Project: Renovation and modernization of residential complex

Solution: Danfoss flat stations and radiators thermostats were installed

Result: Demand for heating has declined from 290 to 47 kWh/m² per year



Effective energy solution for new building

Residential Buildings Case Study



Commercial Buildings



The future of building technology

Commercial Buildings Overview

- Danfoss is a provider of solutions for the commercial buildings of tomorrow
- Danfoss applications make energy flows more efficient – whether it's energetic redevelopment, green buildings or smart store solutions
- Danfoss recognizes and addresses the typical challenges of investors, developers consulting engineers, planners and architects as well as end-users
- Danfoss offers bespoke energetic solutions for all major buildings like hotels, airports, datacenters or supermarkets



Improving efficiency and occupant comfort

Commercial Buildings Applications



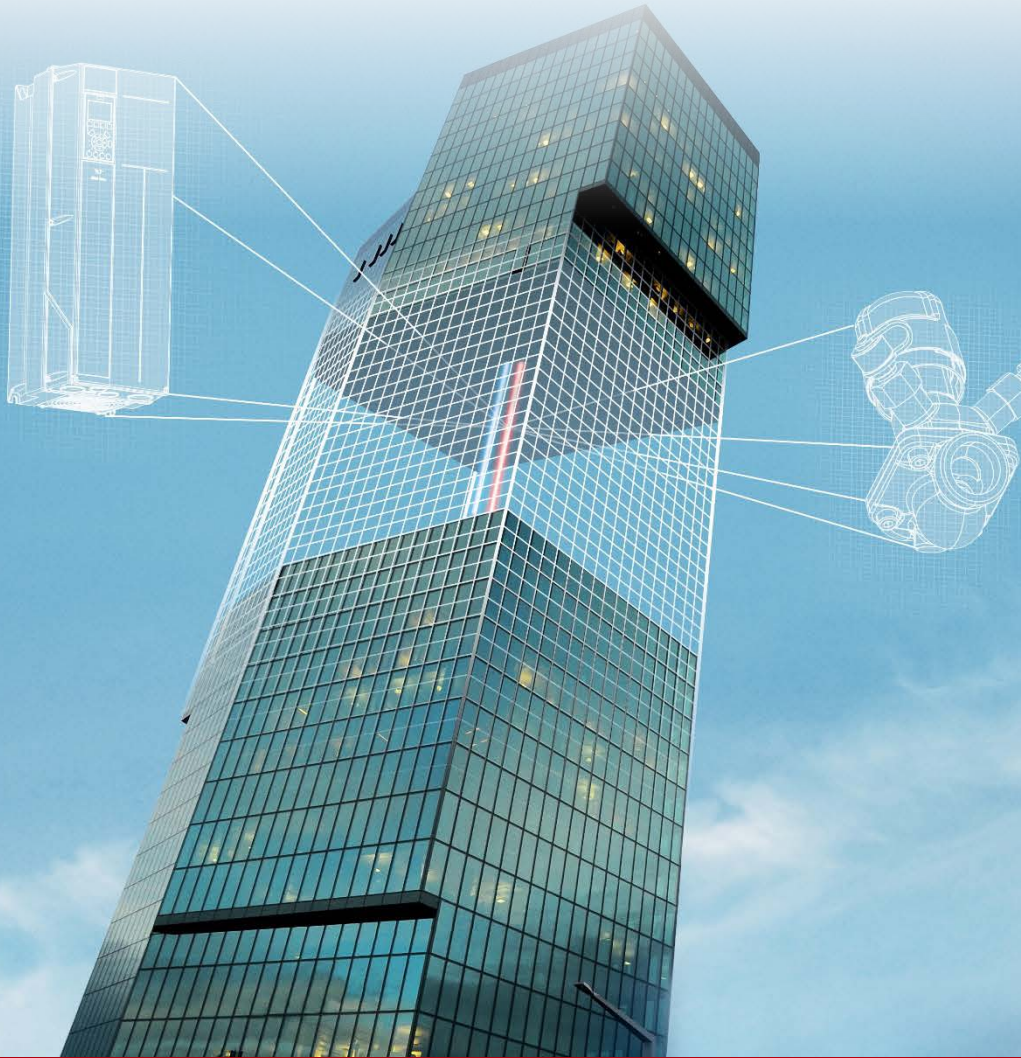
Danfoss offers applications for better indoor experience in commercial buildings

Application areas include:

- Heating: Optimized hydronic balancing delivers cost and energy savings
- Ventilation: Better fan control means energy and environmental efficiency
- Air conditioning: Cool comfort and cost reductions with better chiller performance
- Water treatment: Hygienically safe treatment of water at lower costs

Energy comfort at record high levels

Commercial Buildings Case Study



Swiss Prime Tower Switzerland, Zurich

Project: Hydronic balancing solutions to achieve the optimum balance in the heating and cooling of the tower

Solution: More than 6,000 AB-QM valves and 80 Drives installed

Results: Simple design, high balancing efficiency with low operating costs due to hydraulic efficiency, safe operation and low maintenance costs, high energy efficiency, certified according to the international LEED Gold standard

Best in class working conditions

Commercial Buildings Case Study

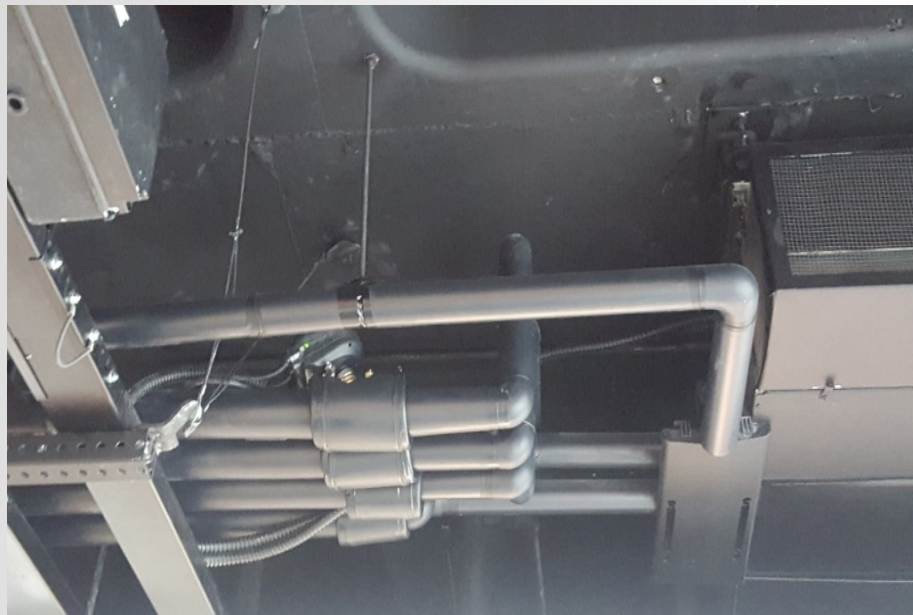


Danfoss office,
Istambul, Turkey

Project: Smart NovoCon
Hydronic balancing solutions
with connected ventilation ,
lighting and room temperature
control devices to one Danfoss
network

Solution: Smart control of air
quality,moistre level, light
intesivity, room temperature,
over Danfoss NovoCon BMS

Results: Smart solution, best
working conditions for tenats
and highest energy efficiency,
certified according to the
highest international LEED
Platinum standard



District Energy



Future-proof system enabling urban efficiency

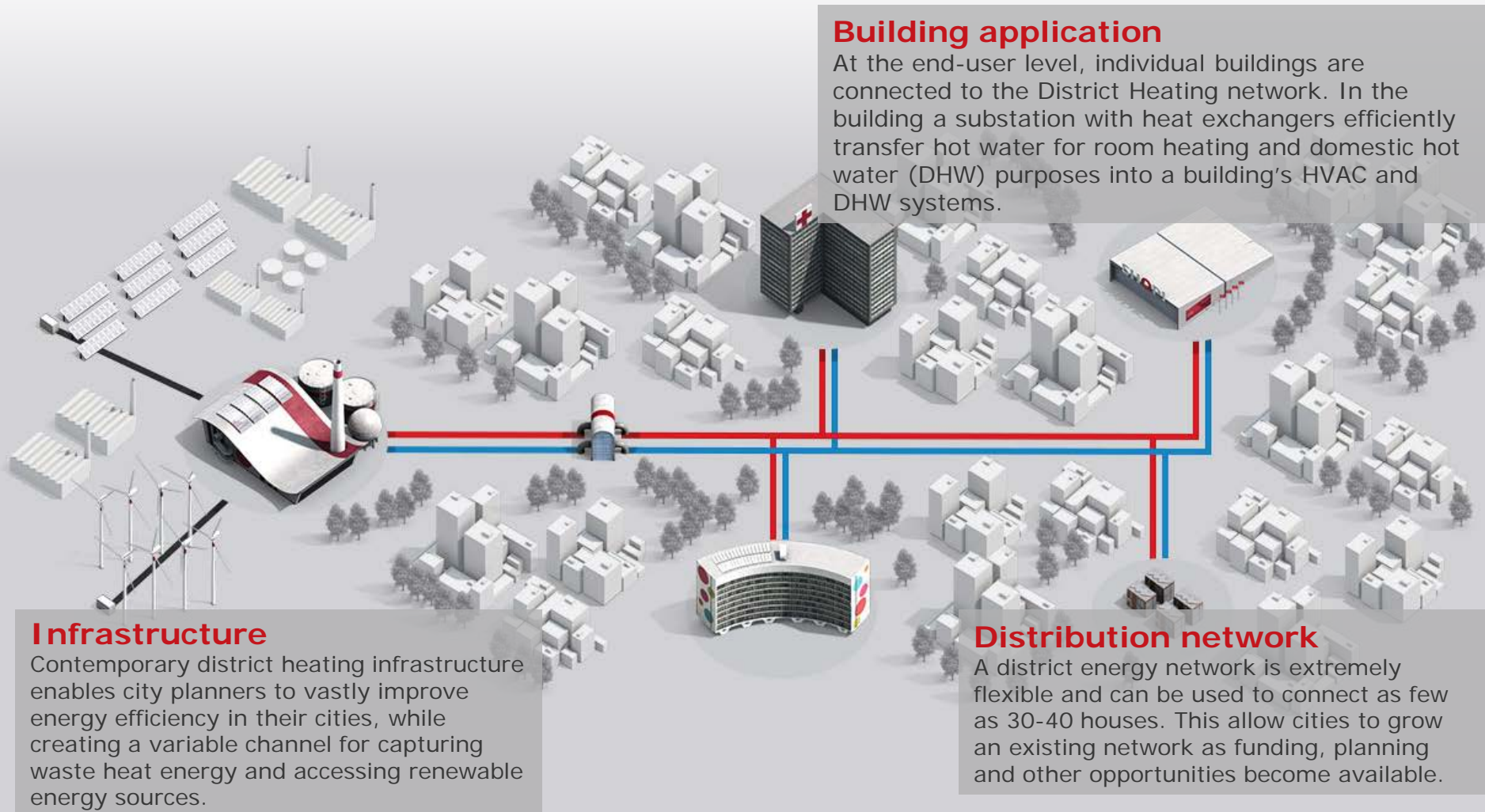
District Energy Overview

- Danfoss offers solutions within the control and transfer of heat in district heating and cooling applications
- Danfoss provides solutions that typically save 20-30% energy in district energy networks and end-consumption and thereby supports national and local governments to reach their energy saving goals
- Danfoss is a total supplier of substations, automatic controls and other key components like heat exchangers for the district heating and cooling market



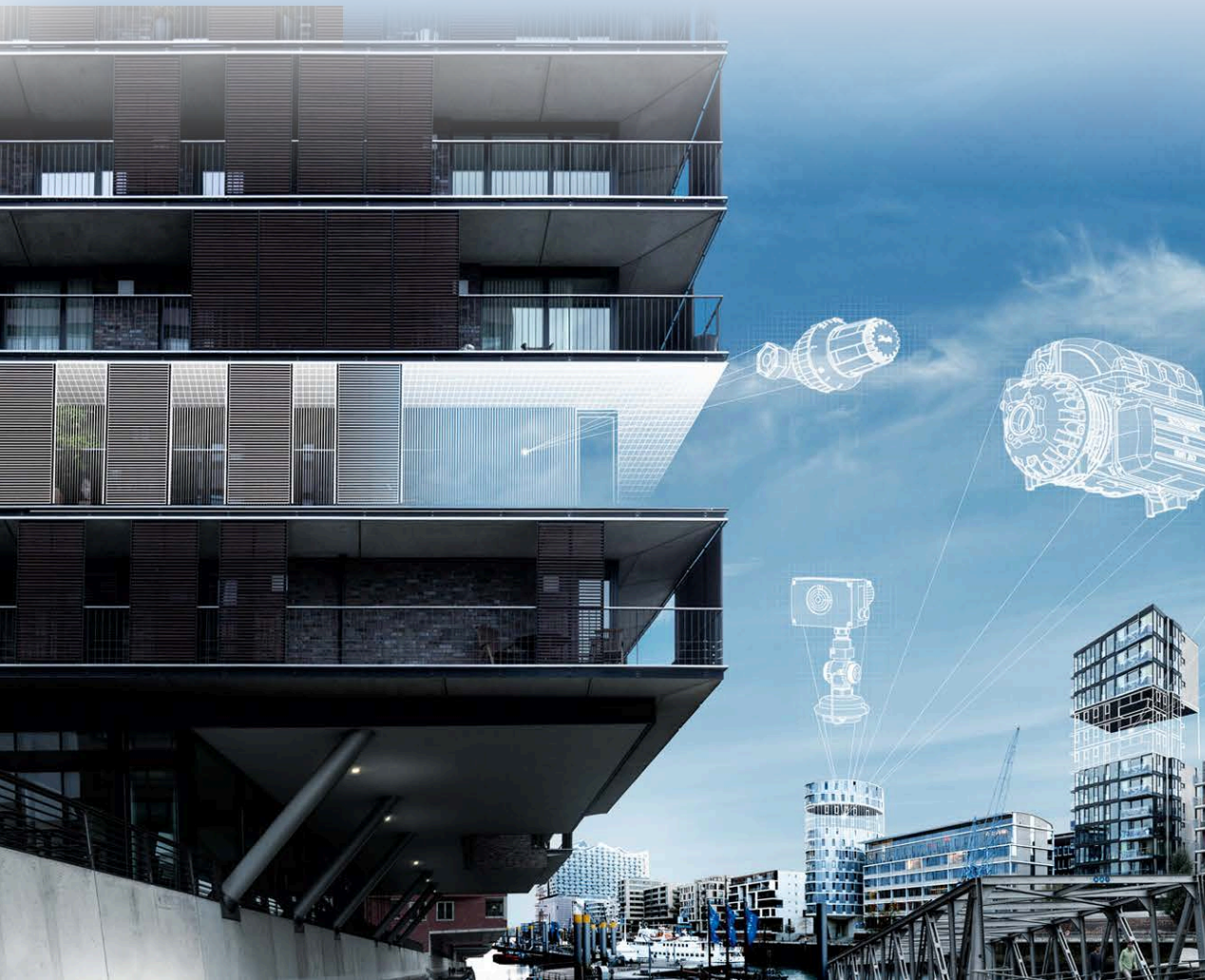
Pioneering infrastructure for energy efficiency

District Energy Applications



HafenCity is a energy flagship

District Energy Case Study



Hamburg Hafen City Germany

Project: Sustainable and economically advantageous solutions for the new city quarter

Solution: Danfoss sub-stations and domestic hot water systems as well as other Danfoss technologies, which control the energy consumption of heating and cooling systems

Results: Approximately 3.7 million euros in fuel costs and 14,000 tons of CO₂ are saved every year (compared to a conventional fossil heat supply)

Tuzla Follows the Green Track

District Energy Case Study

Tuzla distric heating

Tuzla, Bosnia and
Hercegovina

Project: Modernization of 30 years old 98 substations, largest CHP network in BiH

Solution: Reengineering old substation with new Danfoss components which control the energy consumption of heating systems and reducing network energy loses

Results: Total savings 449.000 MWh and space heating capacity increased 36% (for a new 322.000 m²) with the existing flow 2300 m³/h

Pokupsko – Mini DH smart solution

District Energy Case Study



Pokupsko – EU Sustainable Energy Award

District Energy Case Study



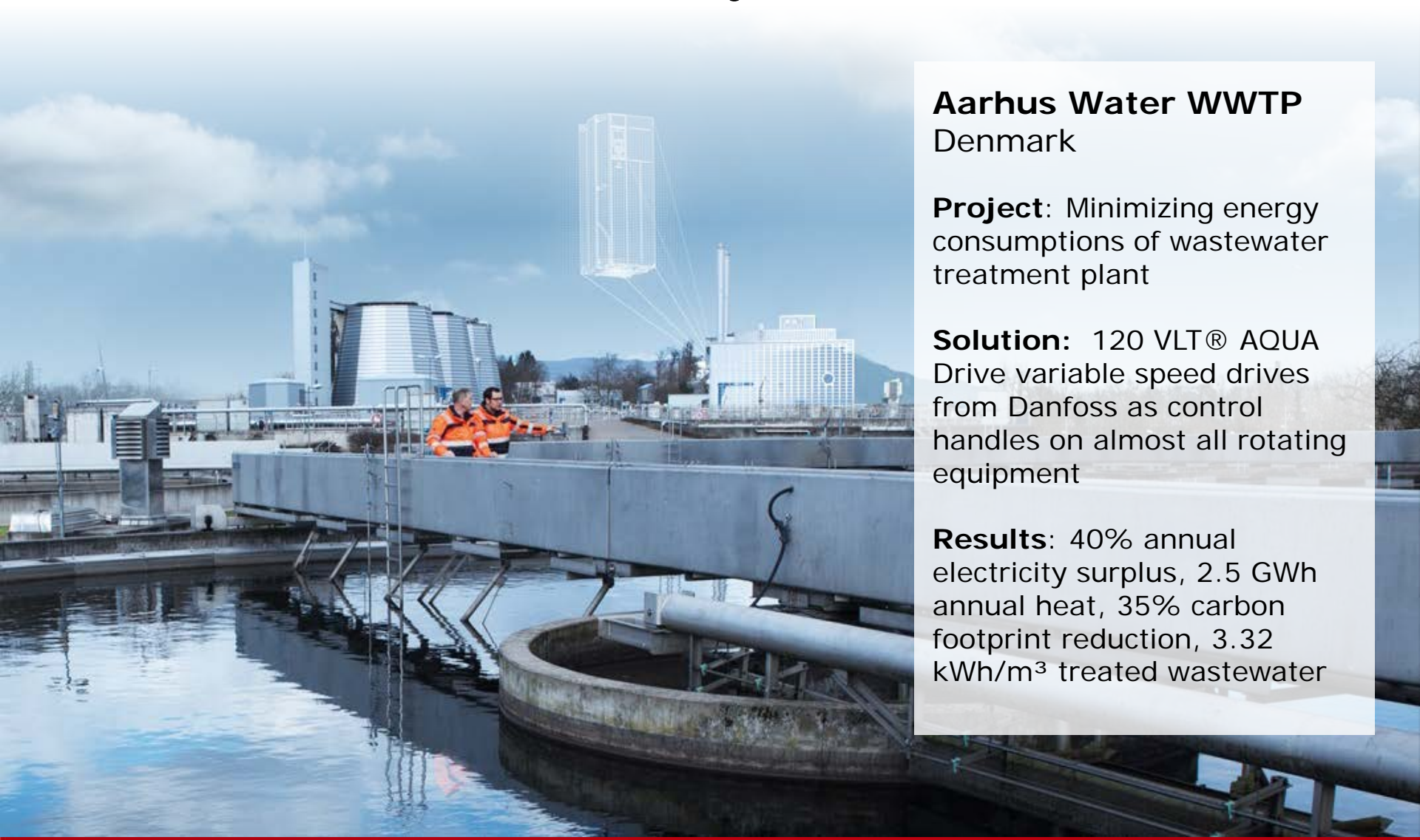
Distric heating network 2 km

Water and Wastewater



Example of energy-neutral water management

Water and Wastewater Case Study



Aarhus Water WWTP Denmark

Project: Minimizing energy consumptions of wastewater treatment plant

Solution: 120 VLT® AQUA Drive variable speed drives from Danfoss as control handles on almost all rotating equipment

Results: 40% annual electricity surplus, 2.5 GWh annual heat, 35% carbon footprint reduction, 3.32 kWh/m³ treated wastewater

Food and Beverage



Abundant and high quality food supply

Food and Beverage Overview

- Danfoss plays a vital role throughout the entire food journey from field to fork
- Danfoss optimizes the harvest on farms, increases the efficiency in food production lines and enables refrigerated transportation and storage of food
- Danfoss is increasing productivity, eliminating waste and helping societies to move towards food security for everyone

Food Processing



Food Retail



Ensuring freshness and energy savings

Food Retail Applications



Complete electronic systems developed for monitoring and optimizing commercial and industrial refrigeration and AC systems of all sizes

S-MART concept to optimize supermarkets through full Danfoss solutions and cloud connectivity

Integrates refrigeration, HVAC, lighting, and other applications

Prevent food loss situation and guarantee food safety

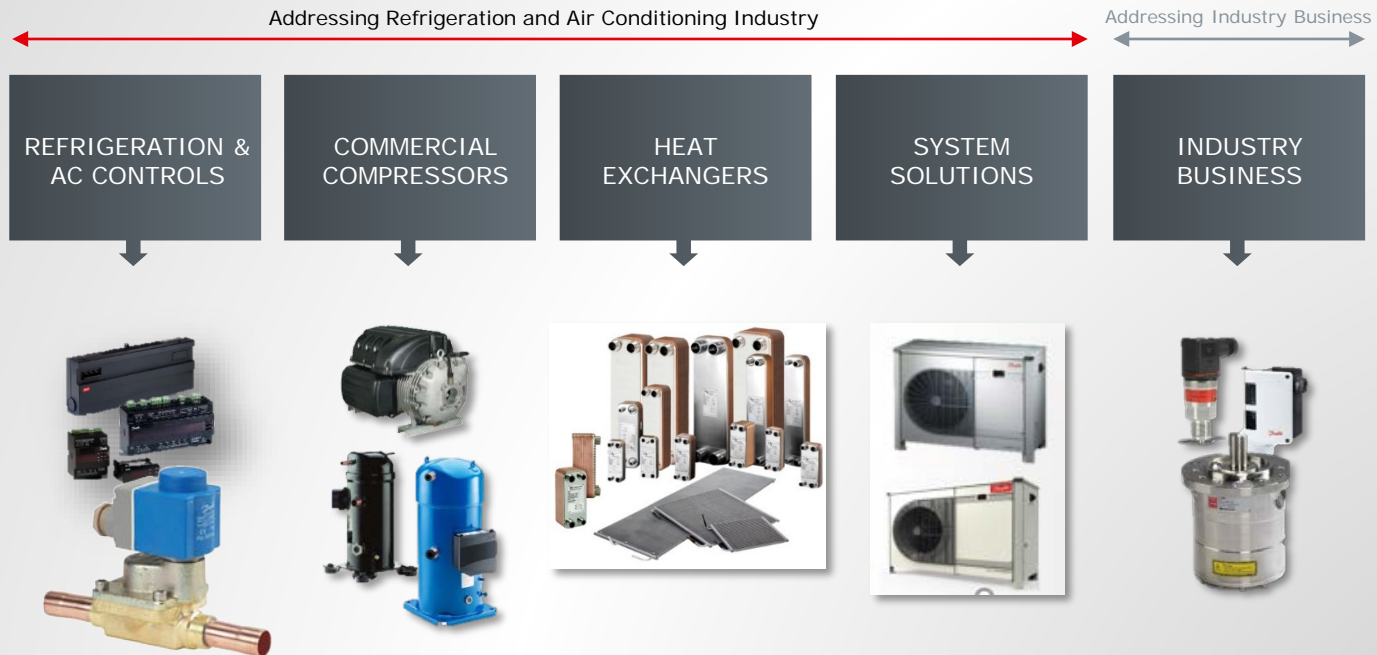
Bring down the energy and heating bills

Smart Store - Integrated retail solution

Food Retail Products and Solutions



Our broad product range makes Cooling Segment offering unique in the industry



Energy-efficient supermarkets

Food Retail Case Story

**aktiv & irma
supermarket**
Germany, Oldenburg

Project: Energy-efficient and environmentally friendly cooling system

Challenge: Use of natural CO₂ as a refrigerant

Solution: Danfoss offered a one-stop-shop solution with the smart store concept

Result: 20 % reduction in energy costs compared to a standard refrigeration system



The energy-efficient choice

Food Processing Case Study

Cantine Riunite wine bottling line Italy

Project: Fine-tuning and variant reduction to improve bottling line productivity

Solution: Decentralized high-performance Danfoss VLT Decentral Drive FCD 302 was integrated with the hygienic, energy-efficient Danfoss VLT OneGearDrive gearmotor.

Results: 30% energy savings, 40% less cleaning time, payback time ~ 1 year, EHEDG certified hygienic design for food safety

90%

overall system
efficiency

Marine and Offshore



Application-optimized products all over the ship

Marine and Offshore Products and Solutions

Cargo deck

- Firefighting systems
- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Hydraulic valves and motors

Accommodation

- Control valves for air-conditioning
- Firefighting systems
- VLT® and VACON® drives
- Floor-heating systems

Winches

- VLT® and VACON® drives
- Hydraulic valves, motors and control systems



Engine room

- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- IXA emission sensors
- Fluid controls
- Firefighting systems
- Hydraulic pumps, valves and motors

Utilities

- High pressure pumps
- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Fluid controls
- Refrigeration controls
- Firefighting systems

Thrusters

- VLT® and VACON® drives
- Pressure and temperature sensors and controls
- Firefighting systems
- Hydraulic valves and motors

Full flexibility to create clean power systems

Marine and Offshore Case Study

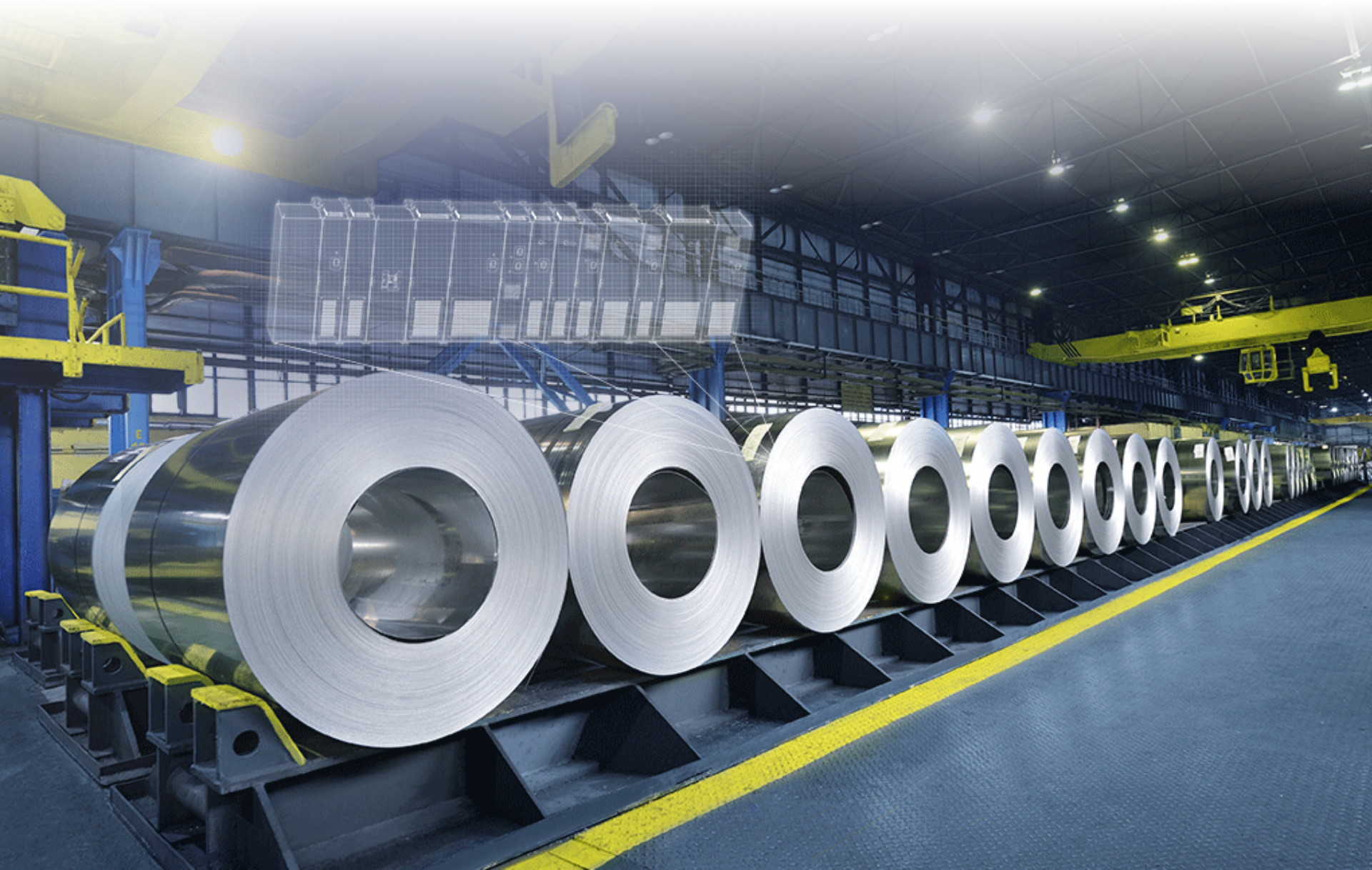
DS Norden, sea water cooling pumps
Denmark

Project: Retrofit of 17 tank- and bulk vessels

Solution: Danfoss VLT® frequency converters on seawater cooling pumps to adapt the pump's flow rate to the actual demand needed

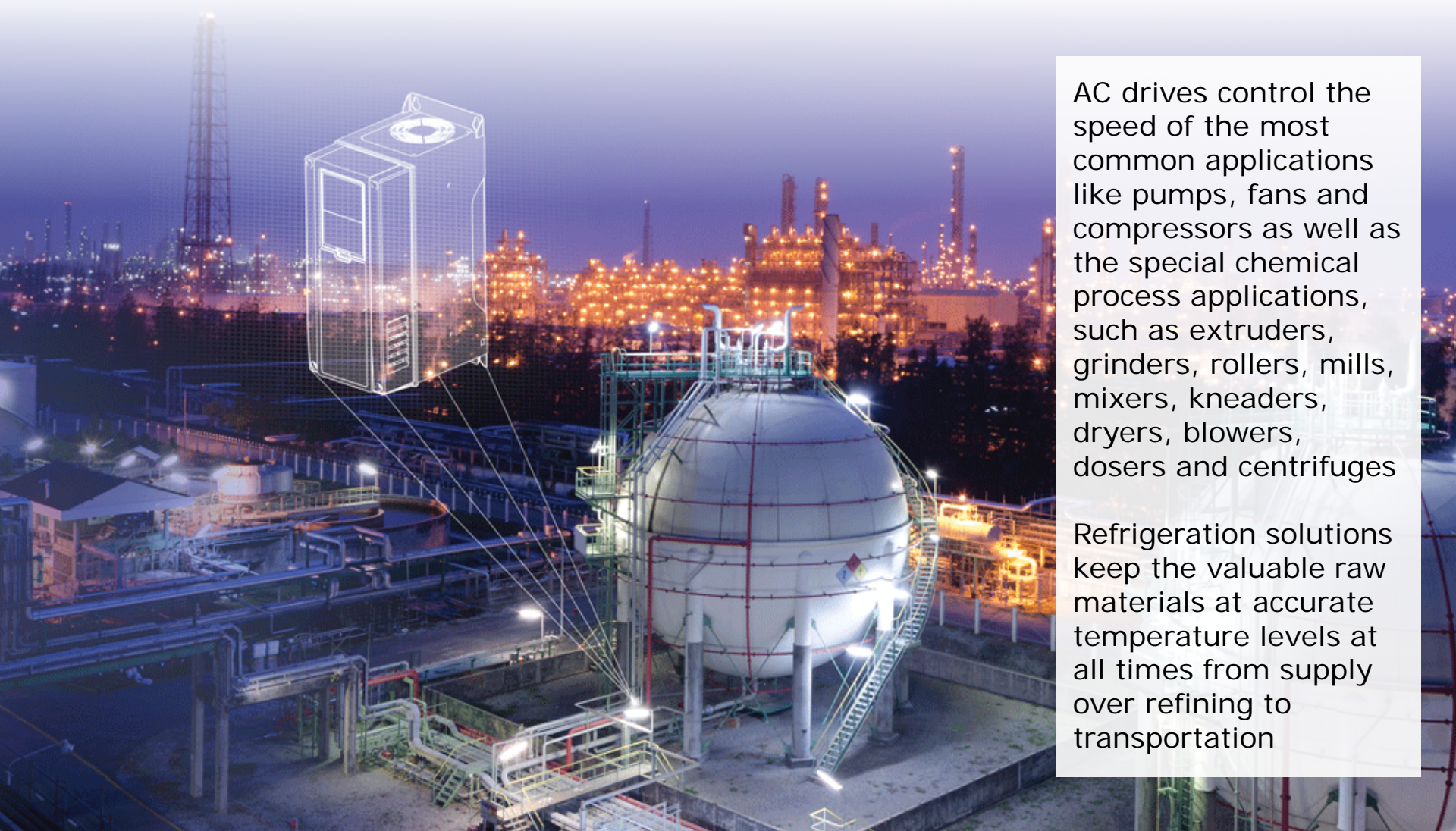
Results: 80% energy savings, 30,000 USD p.a. savings per vessel, payback time < 14 months, nine marine type approvals, safety requirements met via engineering support

Industry



Enhanced reliability in a harsh environment

Industry Applications



AC drives control the speed of the most common applications like pumps, fans and compressors as well as the special chemical process applications, such as extruders, grinders, rollers, mills, mixers, kneaders, dryers, blowers, dosers and centrifuges

Refrigeration solutions keep the valuable raw materials at accurate temperature levels at all times from supply over refining to transportation

Highest performance in all conditions

Industry Case Study

Roussas quarry

France

Project: Ensure efficient production of 800,000 tons of hard limestone

Solution: 31 VLT® Automation Drives control the speed of industrial applications such as conveyors belts, water pumps, agitators and crushers

Results: Reduction of energy consumption, optimization of productivity, reduction of malfunction risk by removing the need for long cables

Danfoss at a glance 2017

Key facts

Sales DKKbn

43.3

Sales EURbn

5.8

Local currency growth

12%

EBIT margin

11.1%

Employees worldwide

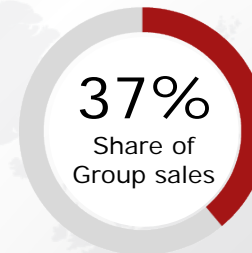
26,645

Regions

North America



Western Europe



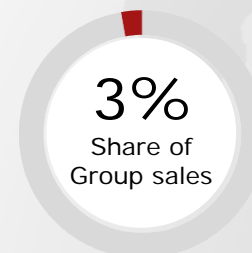
Eastern Europe



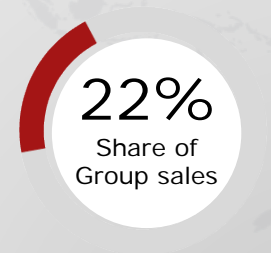
Latin America



Africa-Middle East



Asia-Pacific



Understanding customer application is key



Innovation is our approach



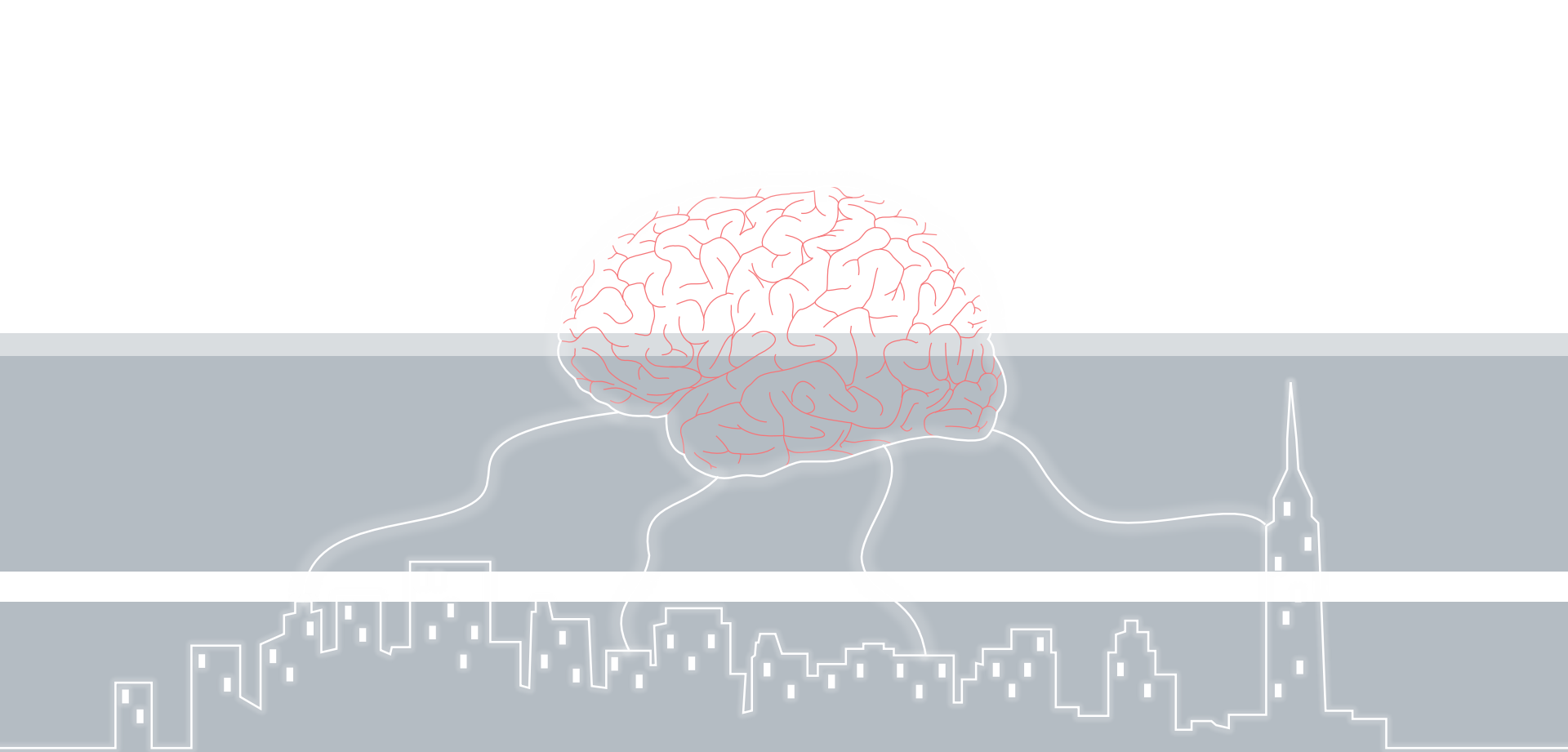


Connected buildings

- Buildings account for 40 % of global emissions
- **Smart and connected buildings** are the future

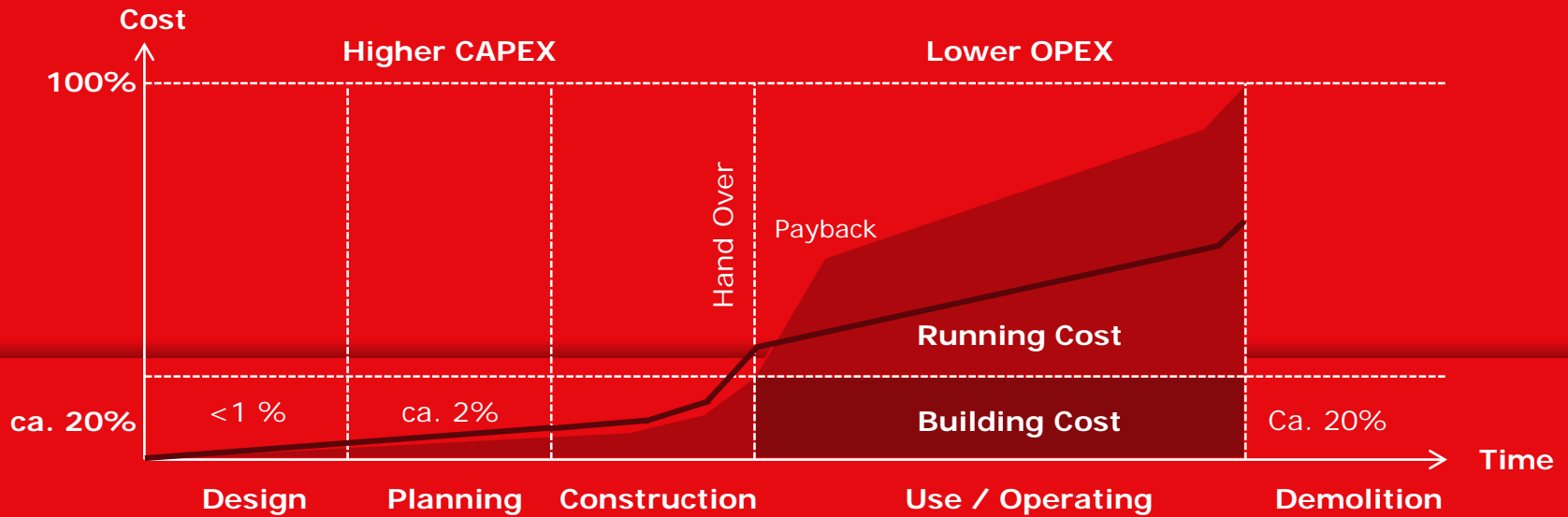
We need:

- Integrate water, wastewater, heating, cooling and electricity in one system
- Flexibility through intelligent pricing signals and demand response
- to connect people across sectors



Rethinking efficiency in buildings

With Danfoss, your building performs better over its whole lifecycle while create significant savings



Energy
consumption



Lifetime
value



Reputation



Rethink

ENGINEERING TOMORROW





**ENGINEERING
TOMORROW**