



Agenda

1. Grundfos general



Moving water, energy efficiency — Global electricity consumption — Organisation: Buildings Water Industry Service

2. District Heating



4th generation: The future of District Heating

The advantages of low temperature district heating

Zone-divided solutions for intelligent pumping

3. Partner with Grundfos



Rely on 50 years of experience and innovation

—

Get all the tools and support you need

Support on network design and intelligent pumping control





OVING W

THO OTHER LIQUIDS



GRUNDFOS



Pumps provide and remove water. This is essential to life on earth







GRUNDFOS X









- YET MOST PUMPS RUN FULL SPEED 24/7

- Even when there is no need







We invented auto adaptable pumps and motors - that can potentially save 5% of global electricity



Our pumps are packed with intelligence - the present wave 4 is a giant leap forward



GRUNDFOS

Group Management





Mads Nipper CEO & Group President





Ernst Lutz Business Development



Stéphane Simonetta Operations



Henrik Christiansen Human Resources Mikael Geday Finance, IT & Legal Affairs

18,000 employees work each day16 milion produced pumps each year

NET TURNOVER



PROFIT BEFORE TAX





WATEF

INDUS"







Family homes





Commercial Buildings









Water Treatment Solutions



Developing World Solutions





BUILDING

WATER

INDUST











Service Offerings



Circle of Trust

Our Purpose Grundfos is a global leader in advanced pump solutions and a trendsetter in water technology. We contribute to global sustainability by pioneering technologies that improve quality of life for people and care for the planet.



GRUNDFO



Meste

TARRES COLLECTED

STATES



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Would you like to...



... Move towards a fossil-free future?



... Reduce heat losses and increase system efficiency



... Reduce your energy bill and initial installation costs



... Improve peace-of-mind for end users?



Paving the way to a fossil free future

Utilizing renewable energy sources and increasing energy efficiency

THE SOLUTION



Lower supply temperature in district heating

Clean energy calls for intelligent District Heating



GRUNDFOS

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GRUNDFOS DISTRICT HEATING

The potential of district heating for meeting tomorrow's energy demands

District Heating evolution

- Increasing system efficiency
- Increasing comfort and reliability
- Increasing need for sustainable solutions



Source: Danfoss/4DH



4th Generation District Heating

4th generation benefits:

- Reduced energy demands
- Flexibility to handle several energy sources
- Smarter energy distribution and consumption
- The potential for 2-way district heating





Example: The Danish district heating effect

Danish district heating from the 90's until today:

- Today 68% of all households are covered by district heating and approx. 99% in large cities
- District heating based on coal has decreased from 50% to almost 25%
- Renewable energy and waste inceneration has increased from 30% to 58% today
- Buildings have been energy renovated over many years



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The challenge of low temperature heating

PRESSURE LOSS

The traditional district heating system



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The challenge of low temperature heating

PRESSURE LOSS

Solve the challenge of high pressure and loss by distributing pumps and adding the pressure when needed: $\Phi = Q * \Delta t$



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be think innovate

Take-aways: District Heating



Low temperature district heating for reduced heat loss and implementation of renewable energy sources.



District heating enables better utilization of various energy sources and end-user peace-of-mind.



Add more pumps to the system and gain the advantages of low temperature district heating.



Zone-divided district heating for a more cost-effective solution.



Central control of pumps in buildings to ensure demandresponse and optimize peak shaving.



GRUNDFOS

Your partner in District Energy



GRUNDFO

Rely on 50 years' experience and cutting-edge technology

CONTACT US

Support on network design and intelligent pumping control



All the tools and support you need



Free Grundfos tools

Grundfos Product Center

Grundfos for Engineers Knowledge Hub

Grundfos Engineering Manuals

Grundfos Ecademy

District Energy application overview

THE

CHP POWER PLANT

MAIN PUMPS

FLOW FILTER PUMPS

WATER TREATMENT PUMPS

BOILER HOUSE

BOILER SHUNT PUMPS

LULL HEAT PUMPS

FLUE GAS ECONOMISER

DISTRIBUTION LINE

BOOSTER PUMPS

TEMPERATURE ZONING

CONSUMER CONNECTIONS

DIRECT CONNECTION

PLATE HEAT EXCHANGE

MIXING LOOPS

SUB STATION

PRESSURE HOLDING SYSTEMS

DISTRIBUTION PUMPS

GRUNDFOS

Grundfos provides pumps for every application



1. Main circulator pump	3. Boiler shunt pump	5. Exhaust gas exch. pump	7. Flow filter pumps	9. Pressure holding pump	11. DWH recirculation pump
2. Booster pump	4. Lull heating pump	6. Air separation pump	8. Replenishment pump	10. Temperature shunt pump	



Control modes for every application

Control mode								
System	Constant curve	Constant pressure	Constant differential pressure	Auto Proportional differential pressure (calculated)	Proportional differential pressure (calculated)	Proportional differential pressure (measured)	Temperature control	Constant flow
Main pumps								
Boiler shunt								
Temperature shunt								
Flow filter								
Lull heating								
Exhaust gas exchanger								
Mixing loops								
DHW recirculation								
Pressure holding								



Choosing the right control mode matters

GET MASSIVE SAVINGS

- Same "E"-pump, but different control modes
- Knowing the minimum needed differential pressure leads to massive savings



14.510 kWh/year



11.064 kWh/year





9.269 kWh/year



7.393 kWh/year



THANK YOU!

