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Intelligent utilization of pumps in low temperature district heating

be think innovate

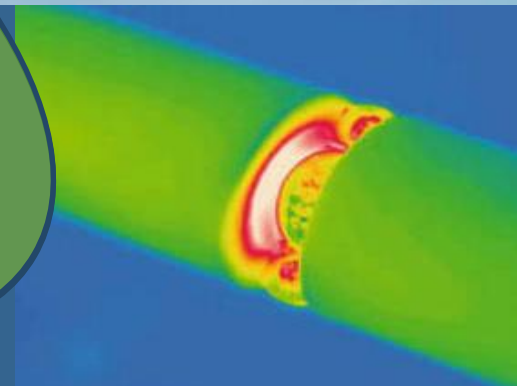
GRUNDFOS 



**Both can be
achieved**

**INTERESTED IN A
SUSTAINABLE FUTURE?**

**WANT TO INCREASE
SYSTEM EFFICIENCY?**



Political support to lower carbon emissions with district heating as a key element

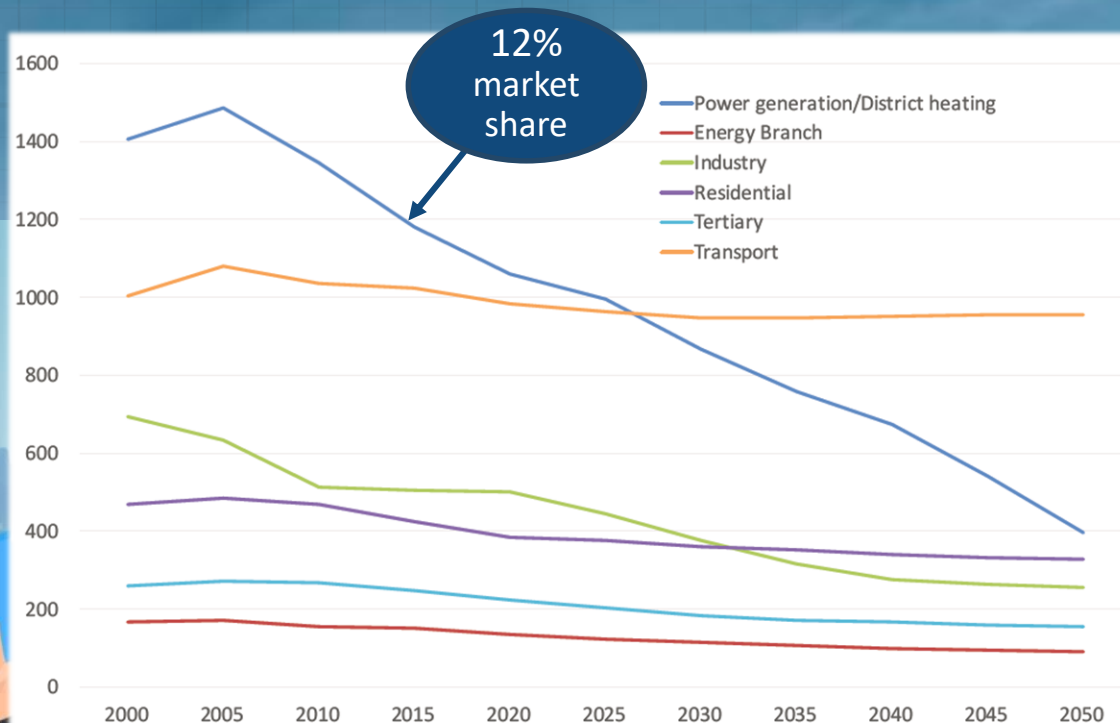


Figure 2-6: Development GHG emission per sector (in Mt) in the European Union until 2050. [6]

CLIMATE CHANGE (COP21)

KEEP GLOBAL TEMPERATURES RISE
WELL BELOW 2°C WITH ASPIRATION TO 1.5°C

ALL COUNTRIES TO REPORT REGULARLY ON THEIR EMISSIONS AND EFFORTS TO REDUCE THEM

NEW TRANSPARENCY AND ACCOUNTING SYSTEM IN PLACE

EVERY 5 YEARS

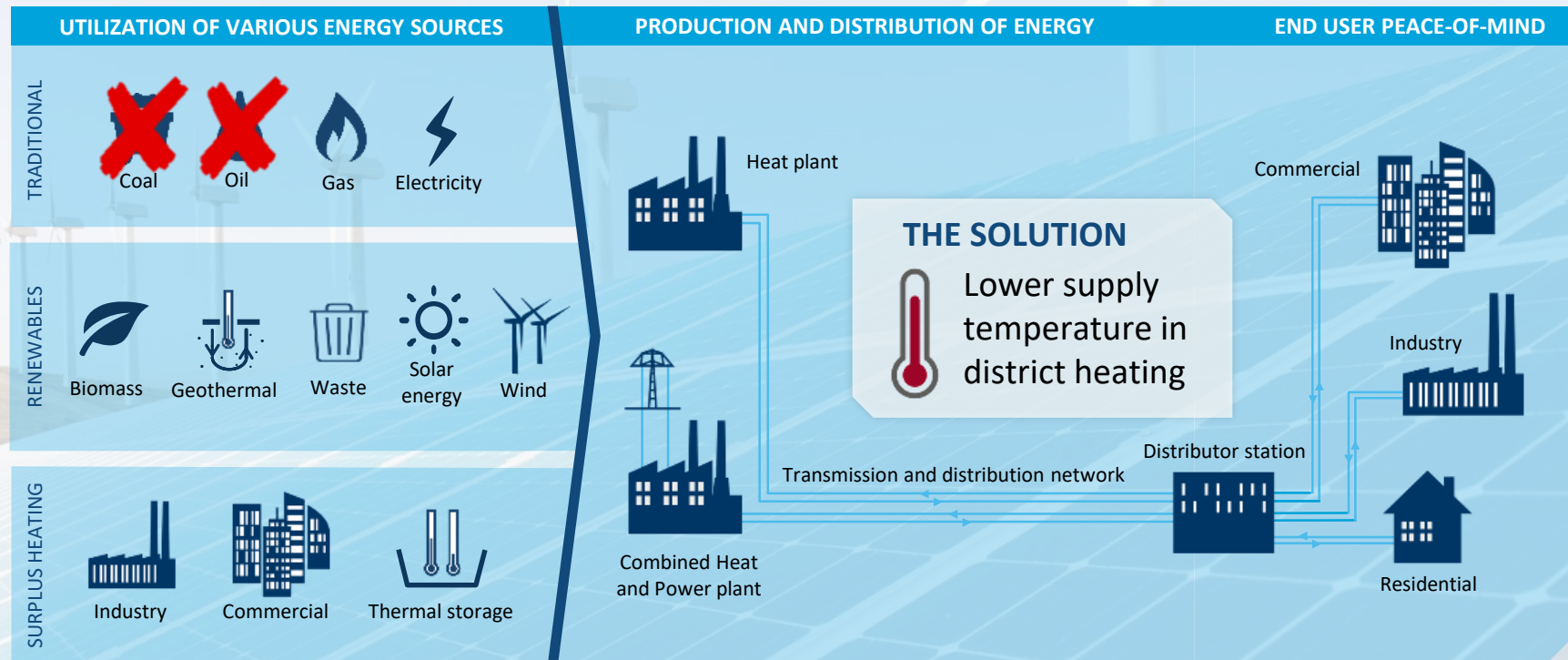
REVIEW EACH COUNTRY'S CONTRIBUTIONS TO GHG EMISSIONS CUTS SO THAT THEY CAN BE SCALED UP

DEVELOPED COUNTRIES TO PROVIDE

\$100BN

CLIMATE FINANCE PER YEAR UNTIL 2025

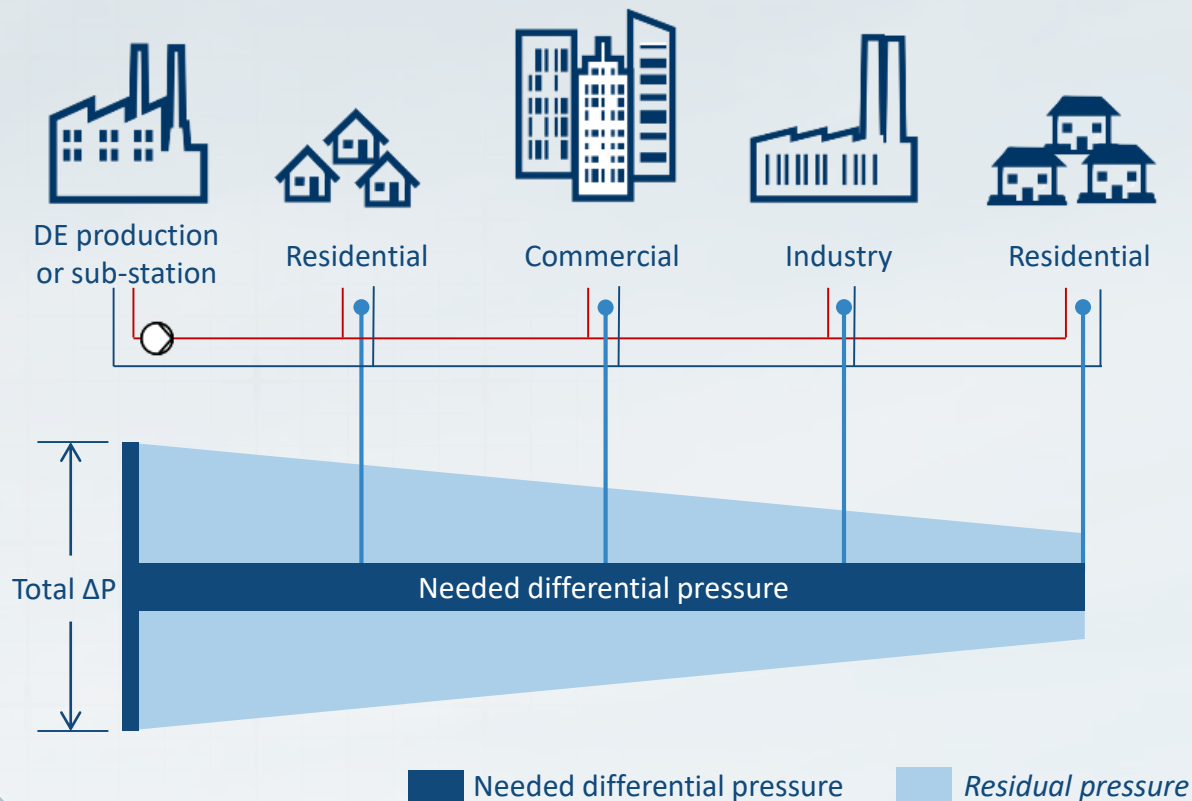
Clean energy calls for intelligent heat grids



The challenge of low temperature heating

PRESSURE LOSS

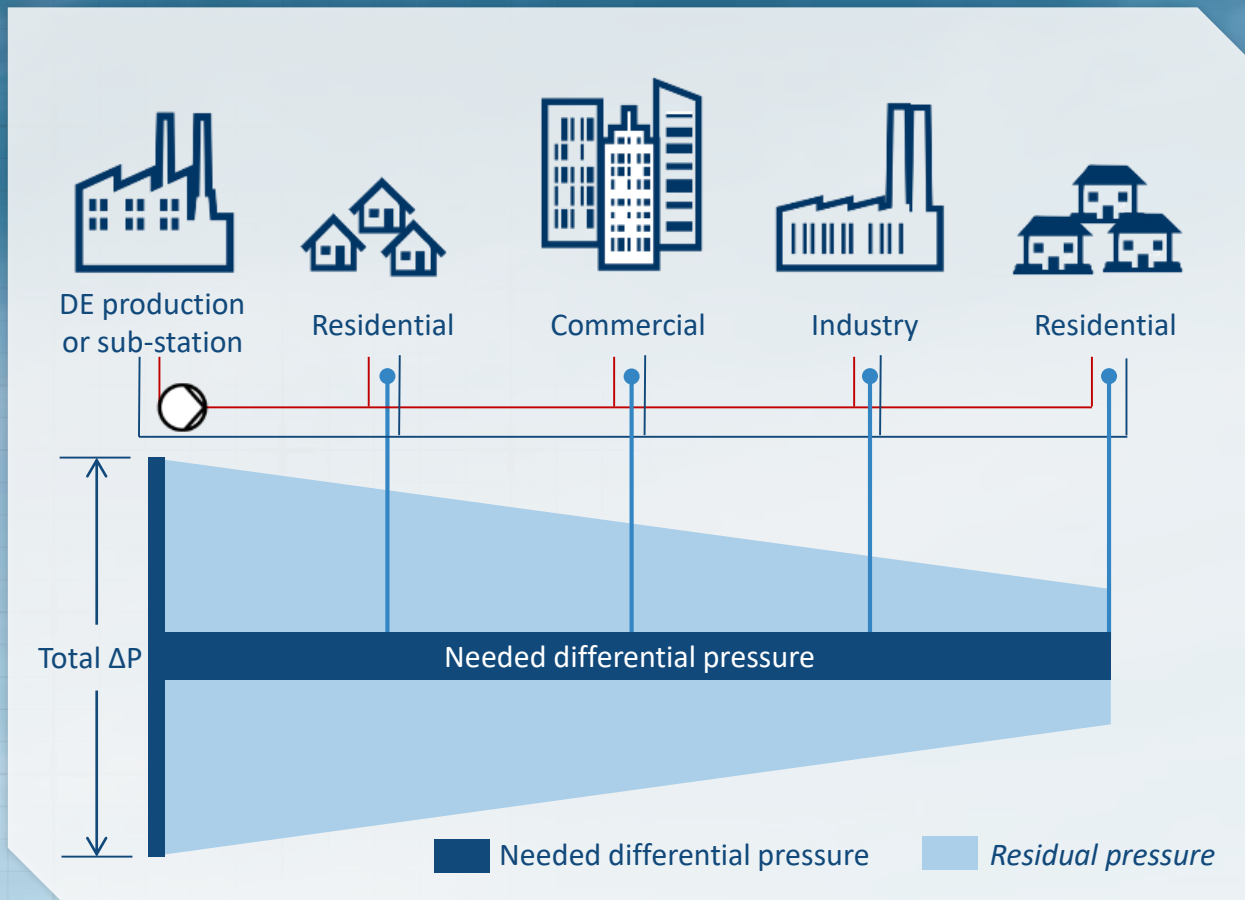
The traditional district heating system



The challenge of low temperature heating

PRESSURE LOSS

A lower forward temperature require more flow (and pressure) to deliver the same energy in the system:
 $\Phi = Q * \Delta t$

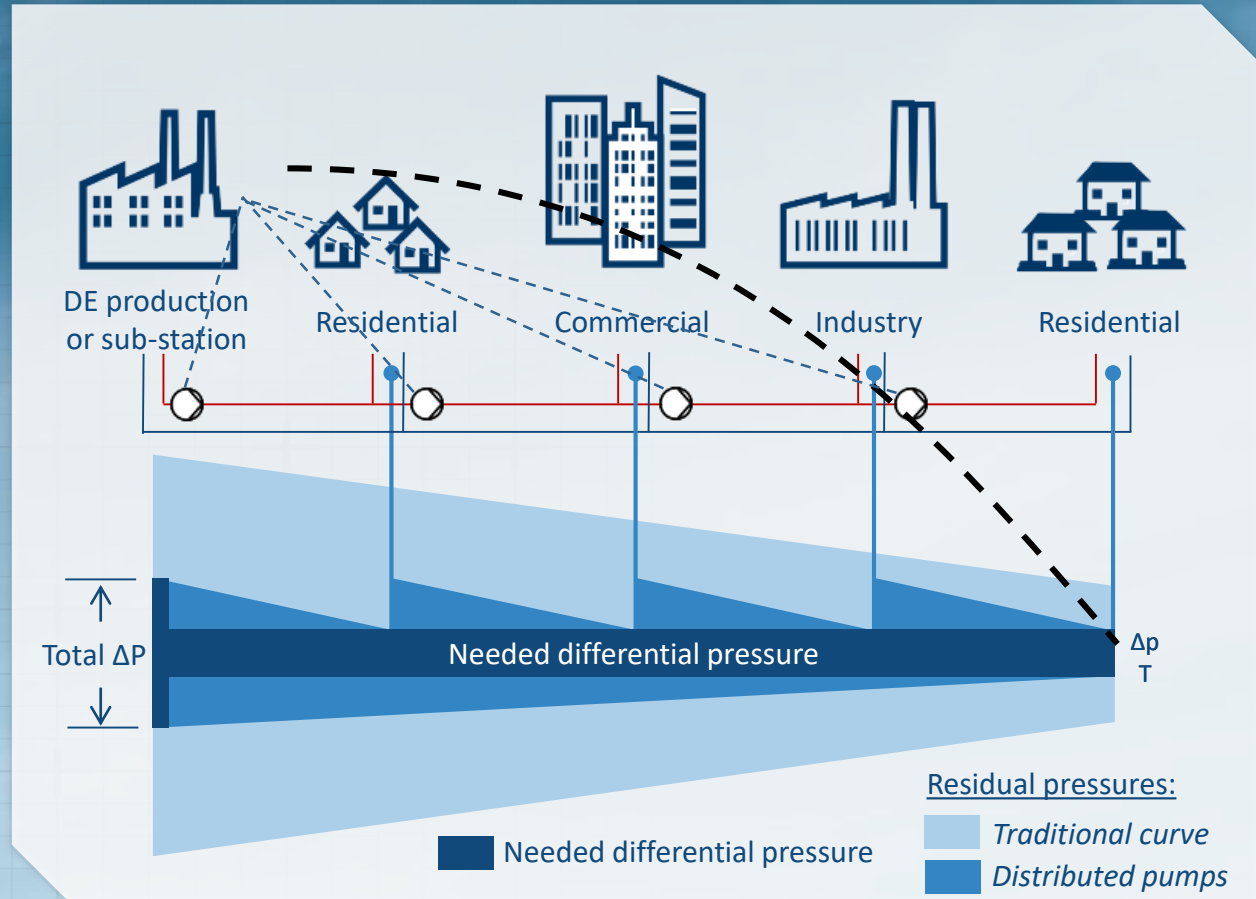


The challenge of low temperature heating

PRESSURE LOSS

Solve the challenge of high pressure and loss by distributing pumps and adding the pressure when needed:

$$\Phi = Q * \Delta t$$



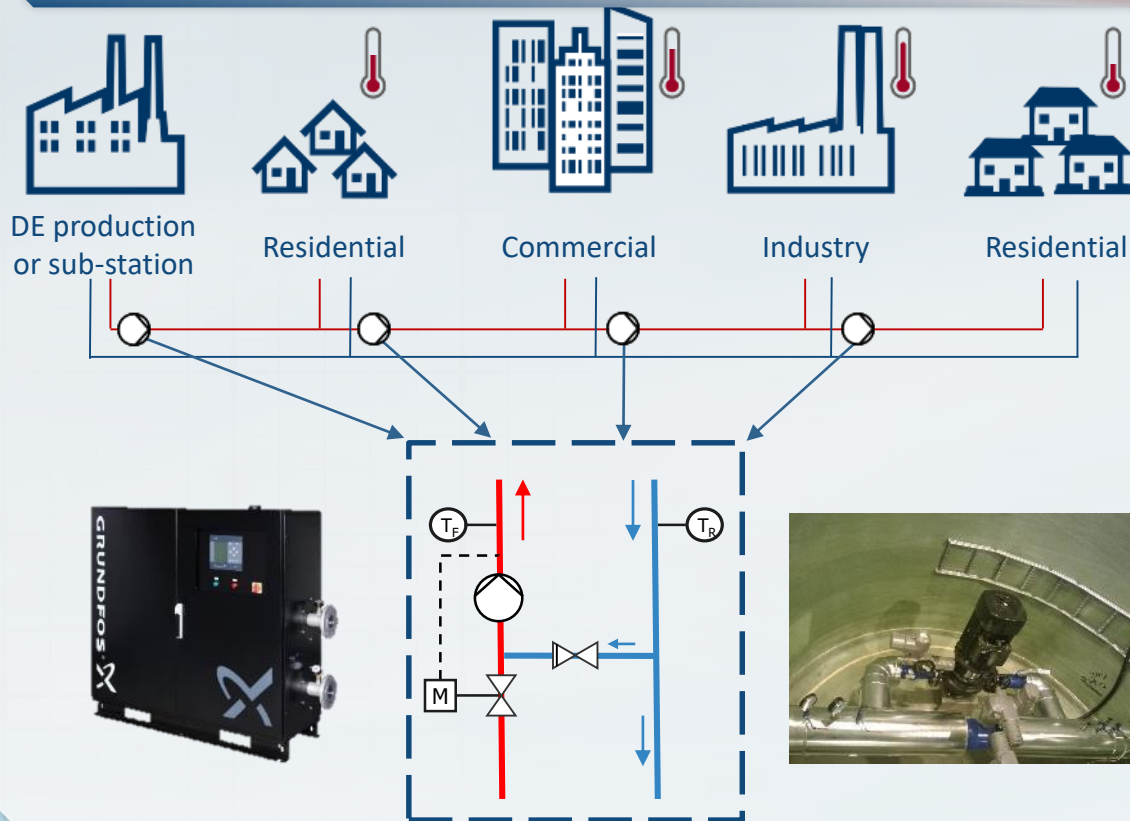
The challenge of low temperature heating

PRESSURE LOSS

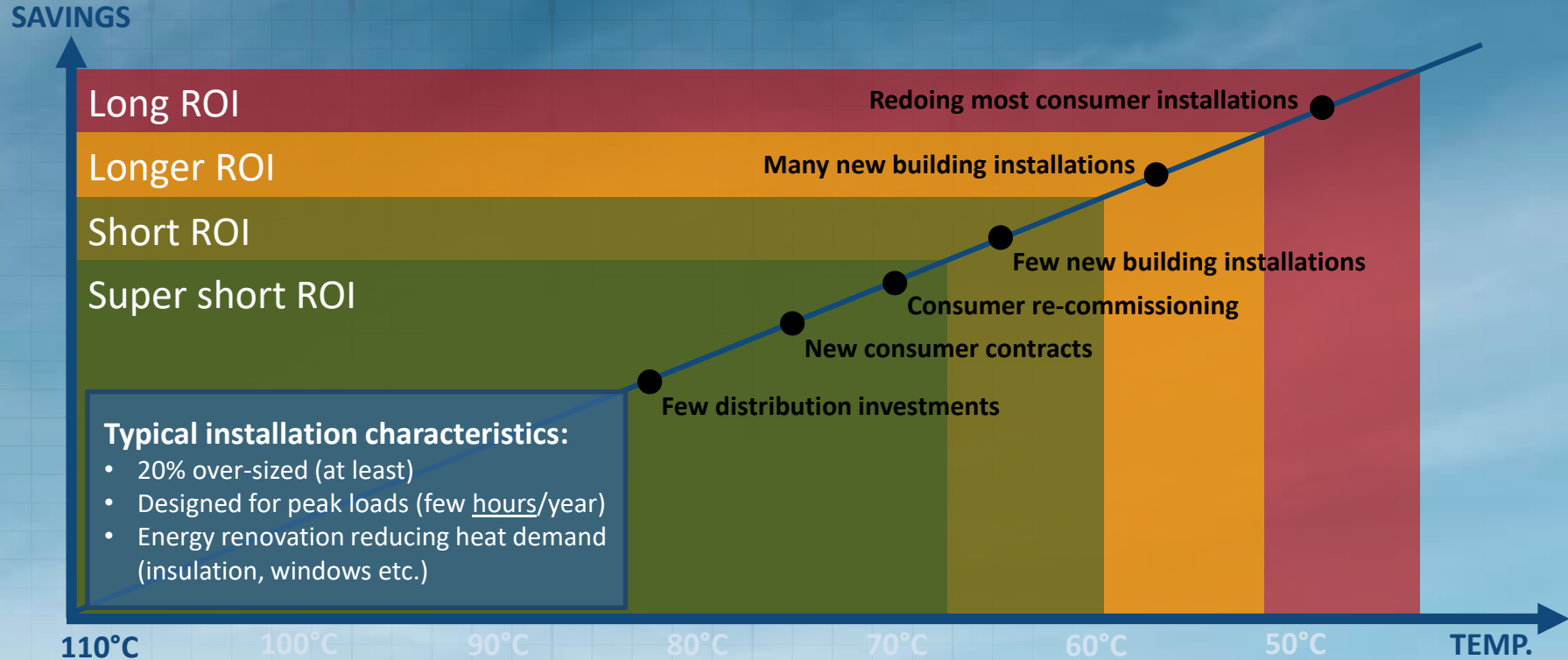
Solve the challenge of high pressure and loss by distributing pumps and adding the pressure when needed:

$$\Phi = Q * \Delta t$$

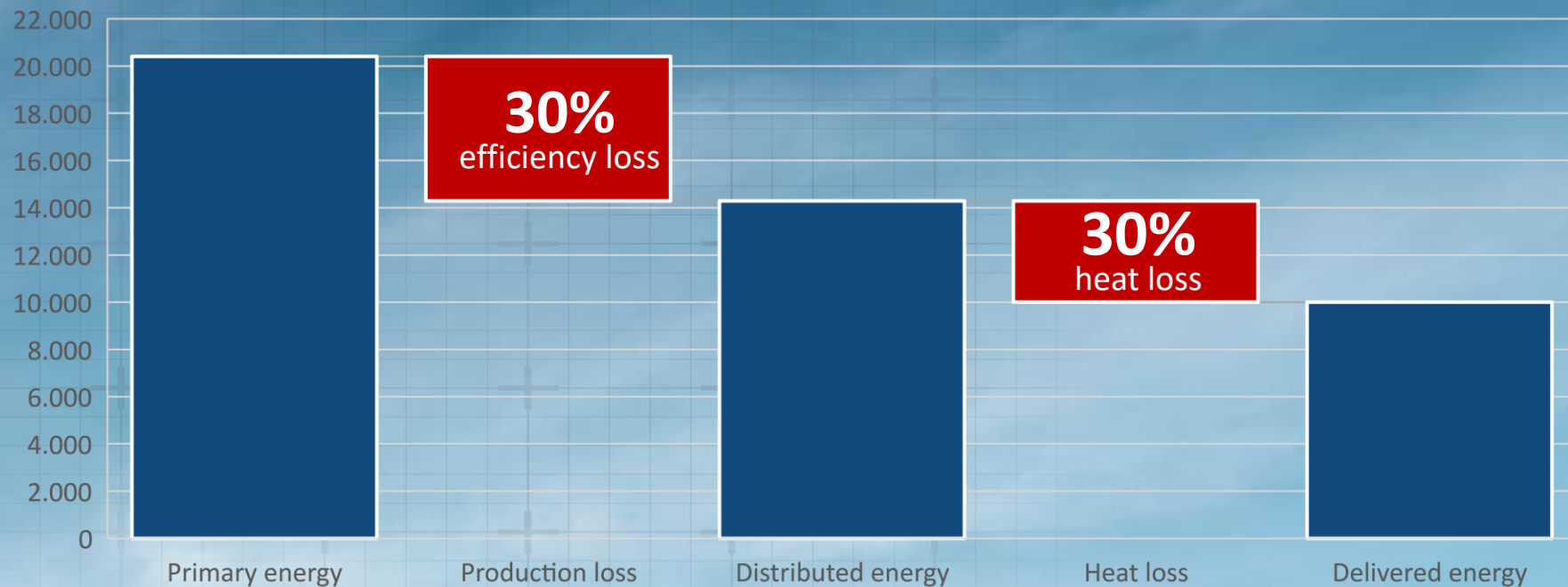
Temperature zoning to further reduce heat losses



Savings when changing to low temperature district heating

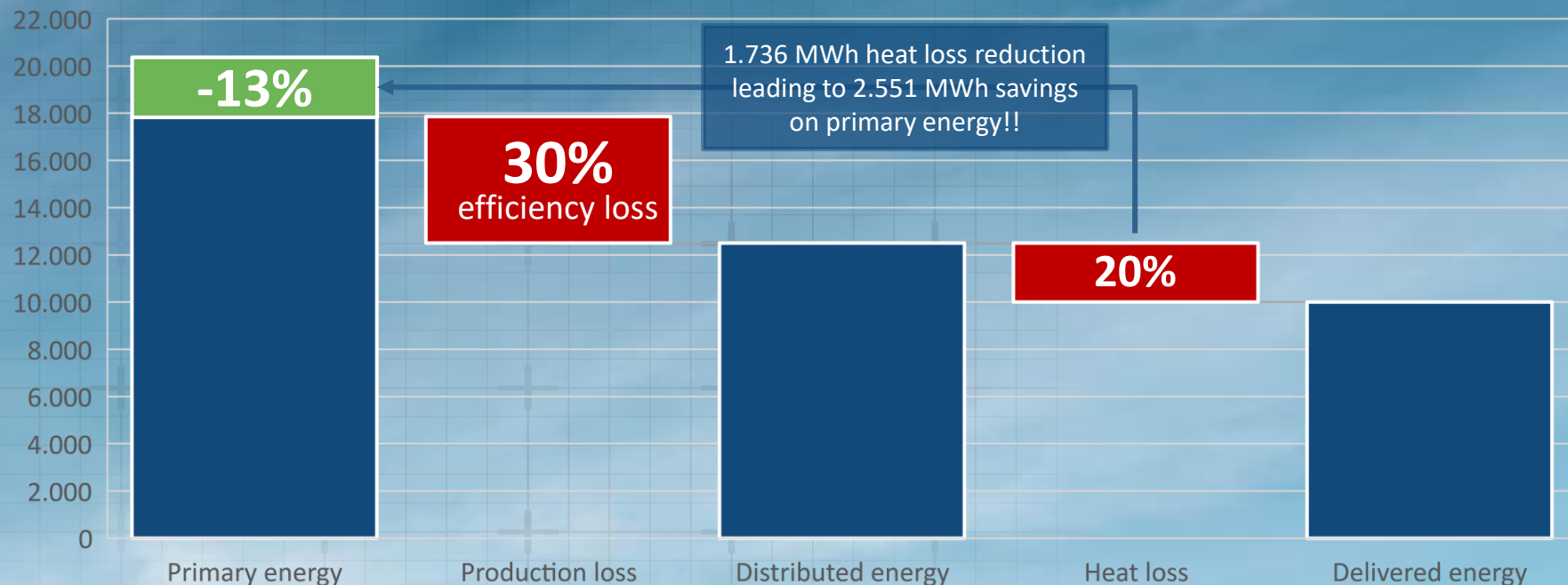


Energy losses in traditional District Heating



Source: Anders Nielsen & Carsten Pedersen, BS Segment

Energy losses in Low Temperature District Heating



Source: Anders Nielsen & Carsten Pedersen, BS Segment

CASE: Savings in an extension area with mixing loop (highly insulated piping)

Payback < 4 years

	USUAL DESIGN	NEW TEMPERATURE DESIGN	DIFFERENCE
Temperatures (flow/return)	90°C - 58°C	69°C - 37°C	
Heat loss pipes/year MWh	2.573 MWh 22%	2.021 MWh 18%	552 MWh
Primary energy MWh/year	16.533 MWh	15.744 MWh	789 MWh
Pump energy MWh/year	0 MWh	14 MWh	14 MWh

THANK YOU FOR LISTENING!



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

