How can datacenters become sustainable?

Rolf Jönsson
Mats Carselid

Alfa Laval at a glance

6,184

ORDER INTAKE

21,321

NO OF EMPLOYEES

Heat Transfer
Separation
Fluid handeling

35

MAJOR PRODUCTION UNITS

Employee
72
thousand

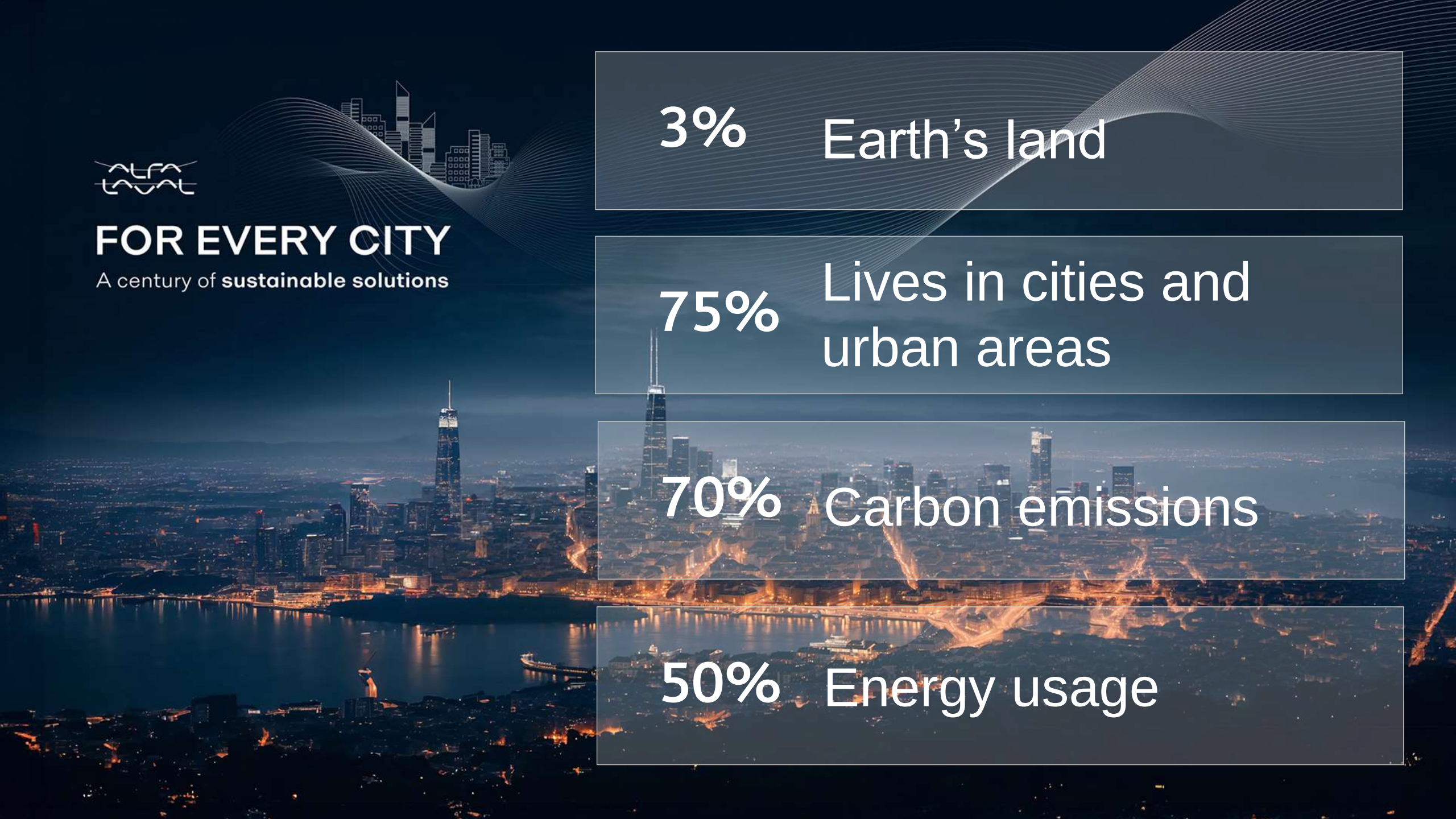
Customers
51
millions

Energy networks
1.60
Millions of kilometers

Regulated asset Base
35
billion euro

Renewable energy systems
900
thousand

Adjusted EBITDA
7.90
billion euro


FOR EVERY CITY
A century of sustainable solutions
3% Earth’s land
75% Lives in cities and urban areas
70% Carbon emissions
50% Energy usage

100 Climate-neutral Cities 2030

ALFA LAVAL

FOR EVERY CITY

A century of **sustainable solutions**

EUROPEAN UNION

EU MISSIONS

CLIMATE-NEUTRAL & SMART CITIES

Concrete solutions for our greatest challenges

#EUmissions #HorizonEU #MissionCities

CITIES FROM ASSOCIATED COUNTRIES

- **ALBANIA** Elbasan
- **BOSNIA AND HERZEGOVINA** Sarajevo
- **ICELAND** Reykjavík
- **ISRAEL** Eilat
- **MONTENEGRO** Podgorica
- **NORWAY** Oslo, Stavanger, Trondheim
- **TURKEY** Istanbul, Izmir
- **UNITED KINGDOM*** Bristol, Glasgow

EU CITIES

DENMARK
Aarhus
Copenhagen
Sønderborg

NETHERLANDS
Amsterdam
Eindhoven & Helmond
Groningen
Rotterdam

ICELAND
Reykjavik

NORWAY
Oslo
Stavanger
Trondheim

Brussels Capital Region
La Louvière
Leuven

IRELAND
Cork
Dublin

SWEDEN
Gävle
Gothenburg
Helsingborg
Lund
Malmö
Stockholm
Umeå

FINLAND
Espoo
Helsinki
Lahti
Lappeenranta
Tampere
Turku

ESTONIA
Tartu

LATVIA
Liepāja
Riga

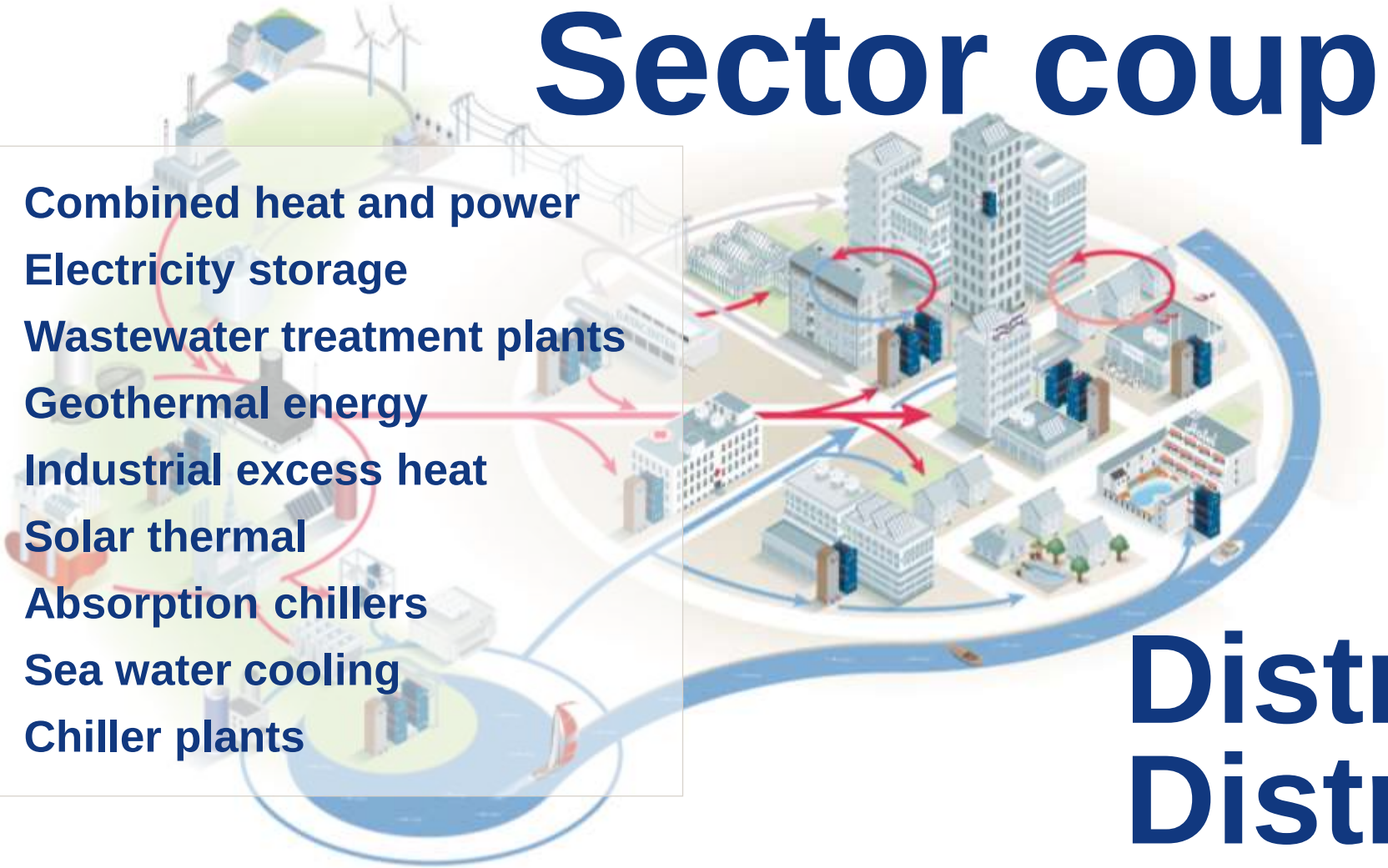
LITHUANIA
Taurage
Vilnius

POLAND
Krakow


FOR EVERY CITY
A century of sustainable solutions
Energy efficient buildings
Fossil free energy sources
Energy efficiency and Energy reuse
Sector coupling

Sector coupling

- Combined heat and power
- Electricity storage
- Wastewater treatment plants
- Geothermal energy
- Industrial excess heat
- Solar thermal
- Absorption chillers
- Sea water cooling
- Chiller plants

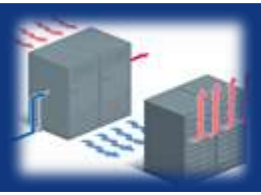


Electricity
District heating
District cooling

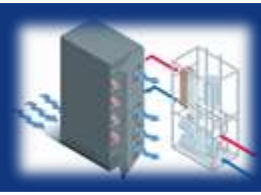
Cooling methods for IT-equipment

Direct Air-to-air

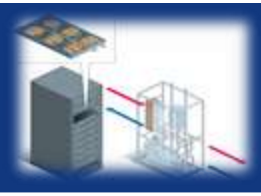
Computer room
air handling unit /
Chilled water to air



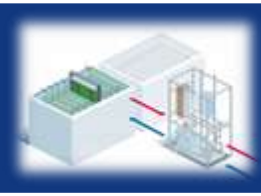
Rear door cooling



Direct to chip cooling /
Cold plate

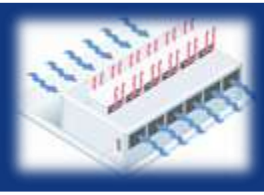


Immersion cooling



Cooling methods for IT-equipment

Direct Air-to-air

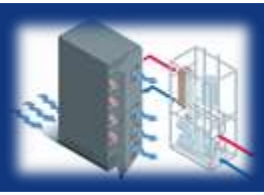


→ 30°C

Computer room
air handling unit /
Chilled water to air

→ 30°C

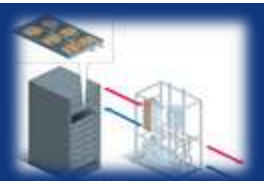
Rear door cooling



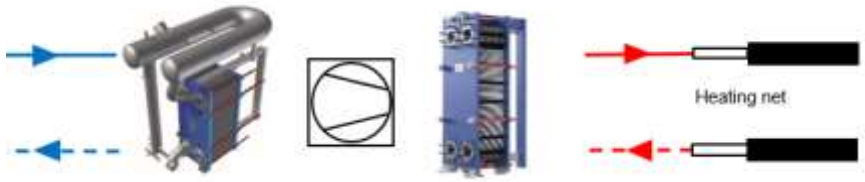
→ 40°C

?°C

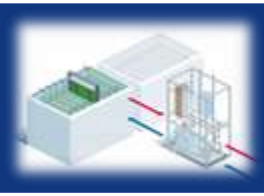
Direct to chip cooling /
Cold plate



→ 45°C

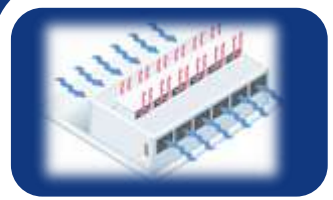


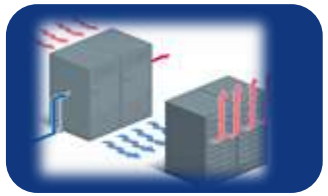
Immersion cooling

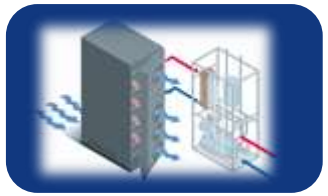


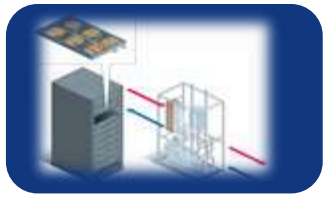
→ 55°C

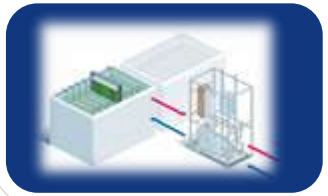
Heating net temperature


→ 30°C

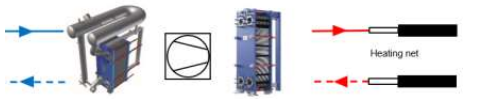

→ 30°C

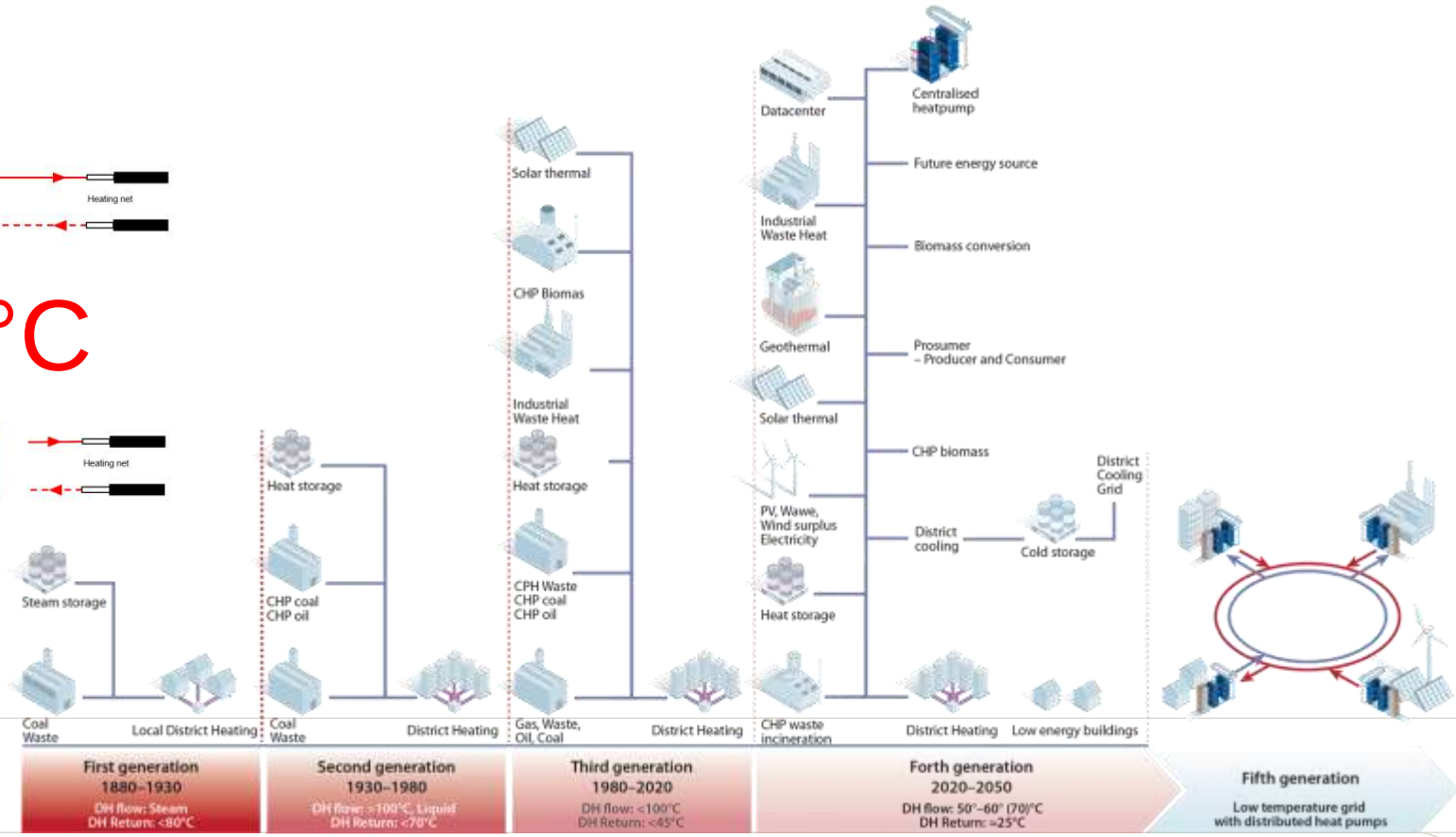

→ 40°C


→ 45°C

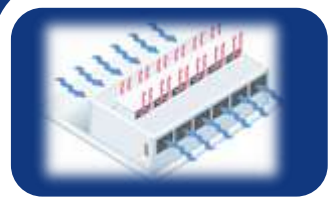

→ 55°C

?°C

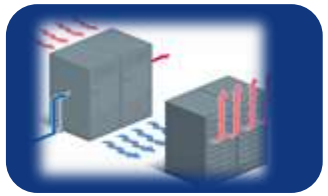




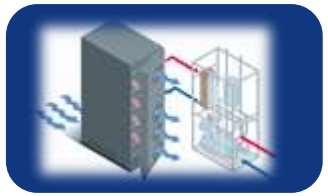
Heating net temperature

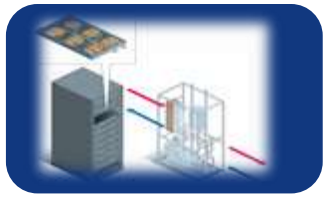


→ 30°C

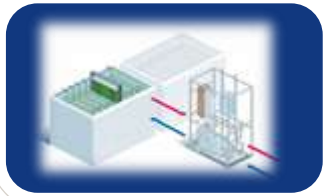


→ 30°C



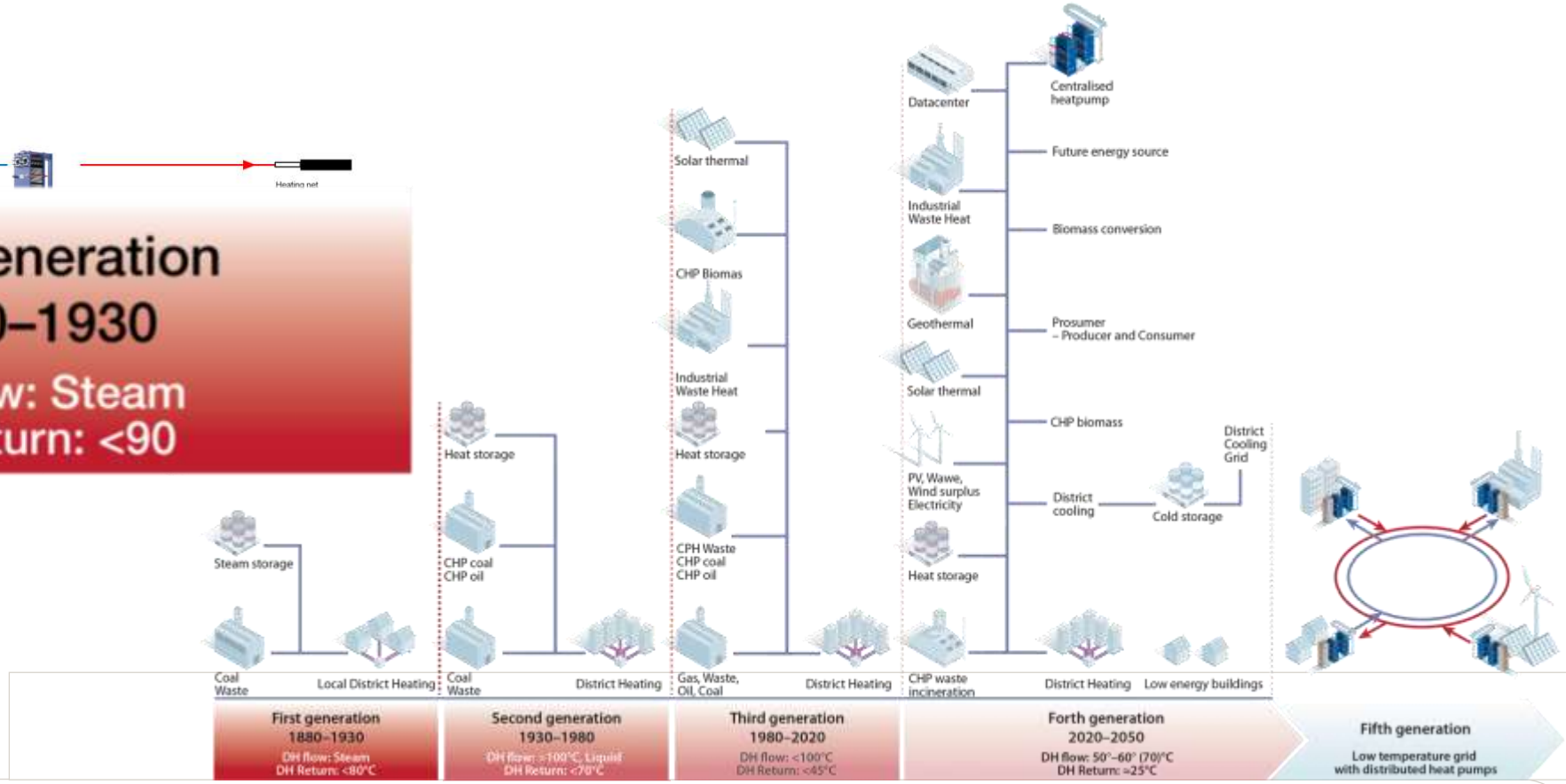


→ 45°C

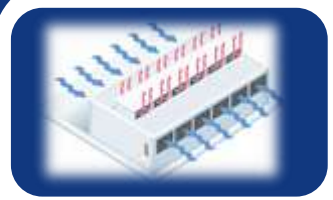


→ 55°C

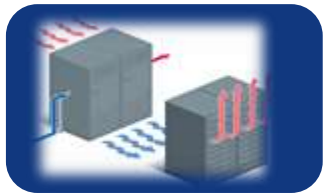
First generation
1880–1930
DH flow: Steam
DH return: <90

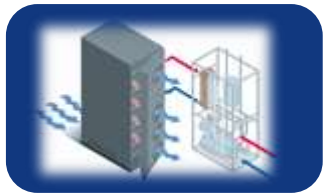


Heating net temperature

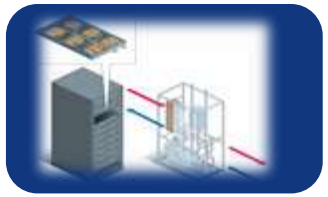


30°C

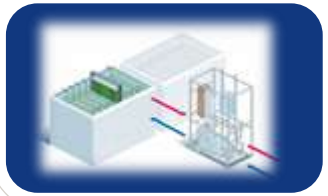




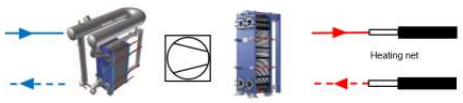
Second generation
1930–1980
DH flow: 100°C, Liquid
DH return: <70

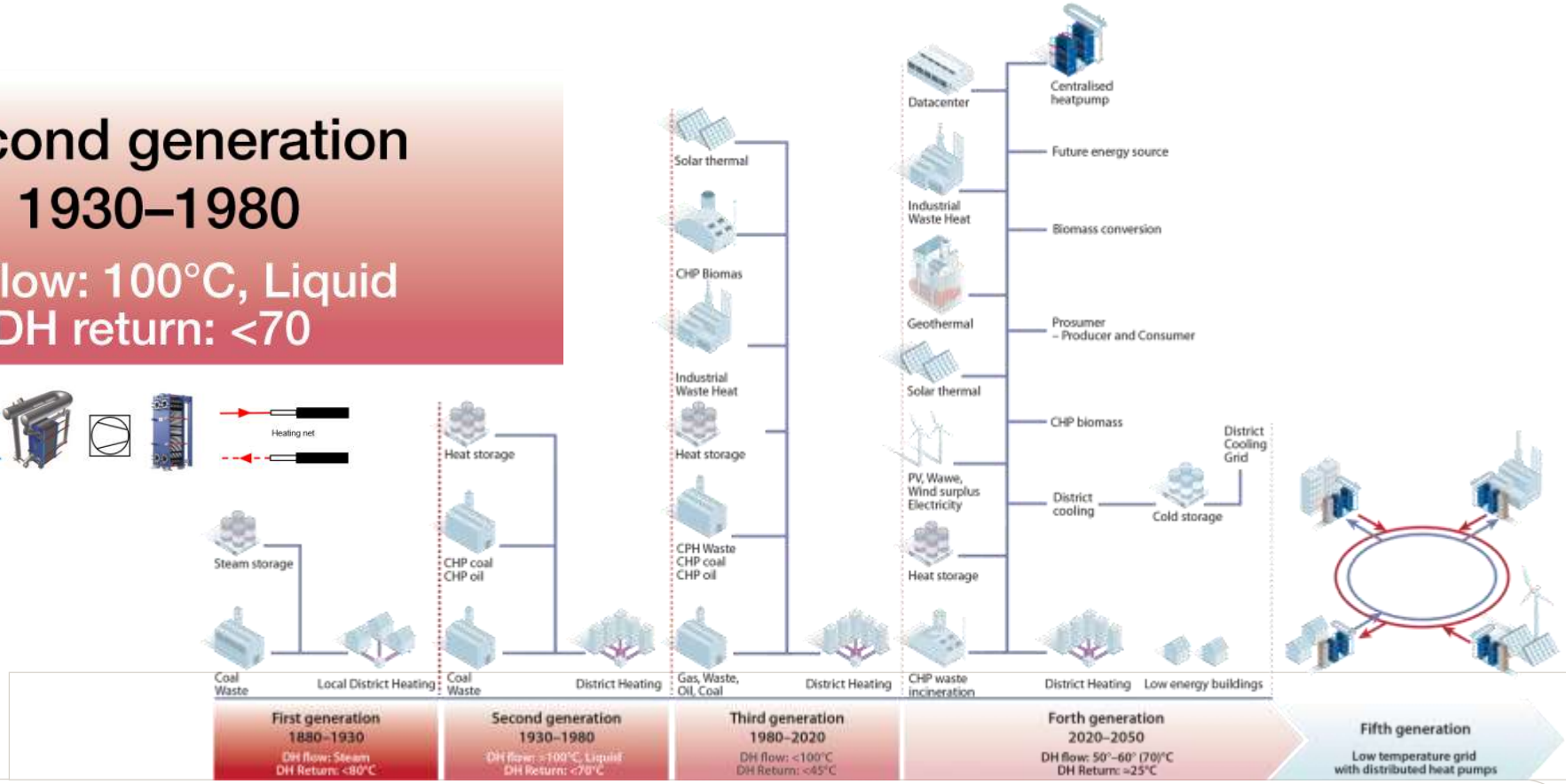


45°C

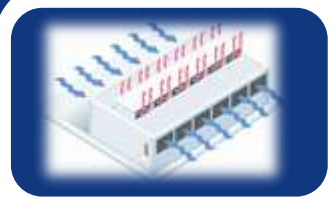
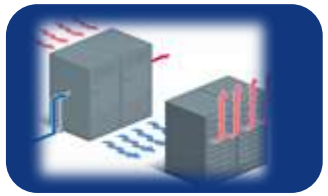
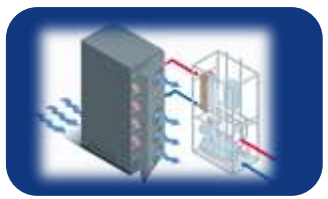
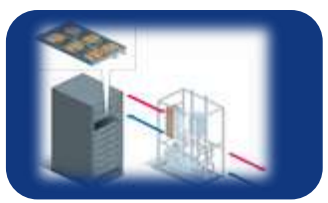
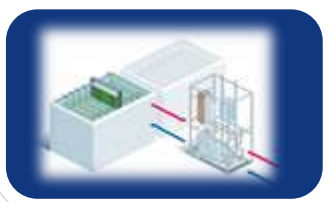


55°C





Heating net temperature

30°C

30°C

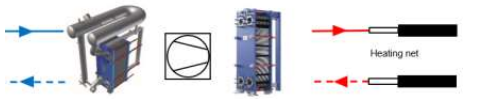
40°C

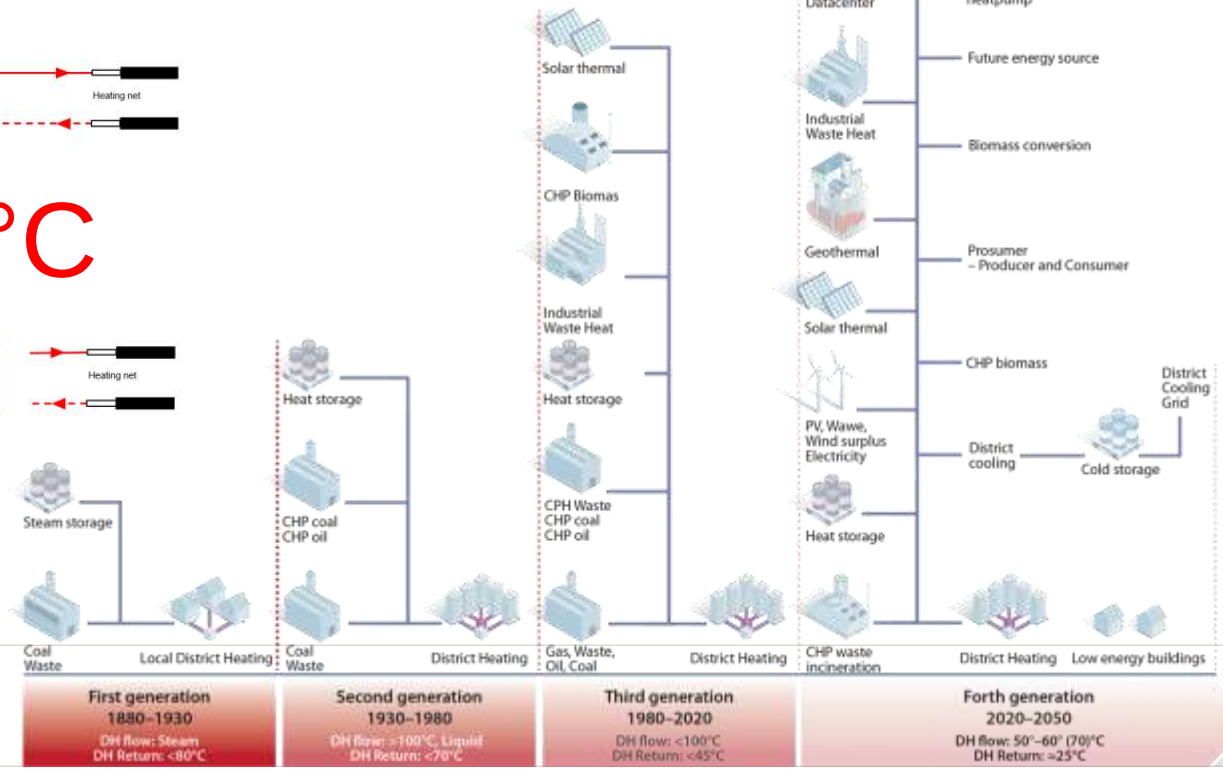
45°C

55°C

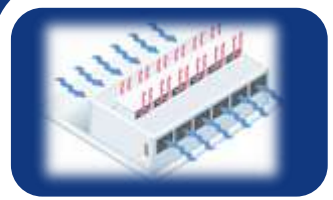
Third generation
1980–2020
DH flow: 100°C
DH return: <45

?°C

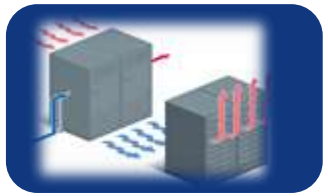




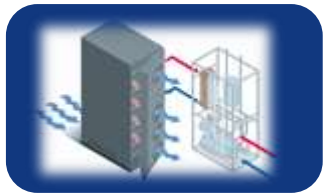
Heating n



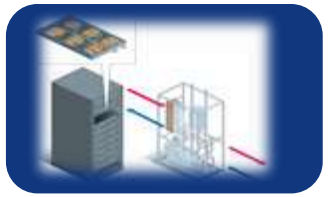
→ 3



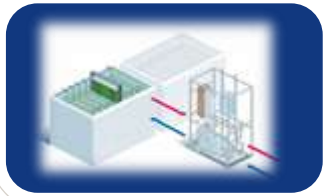
→ 30°C



→ 40°C



→ 45°C

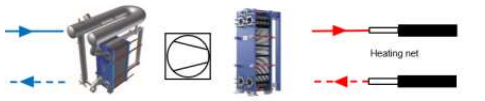


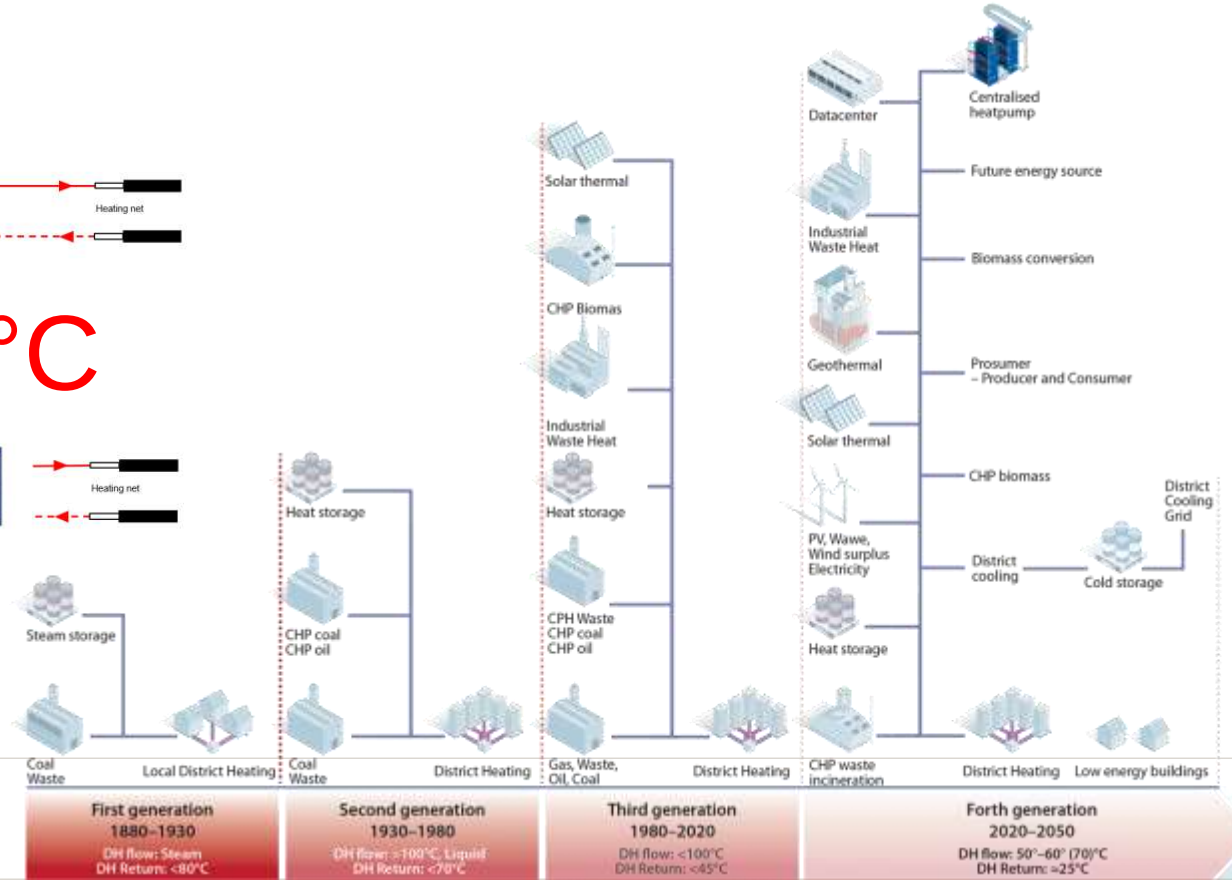
→ 55°C

Forth generation
2020–2050

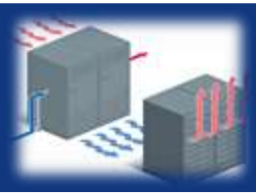
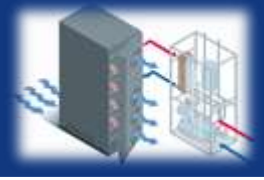
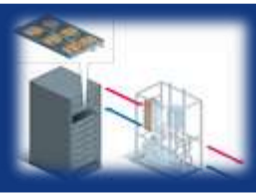
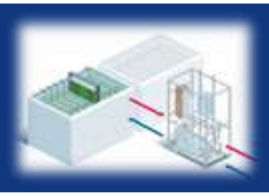
DH flow: 50–60 (70)°C
DH return: ≈25°C

?°C

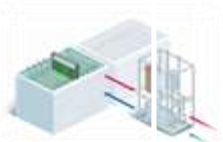




Heat reuse with heat pump

White space cooling solutions		Availaible temperature	Realistic t_{evap} (°C)	Cooling water	Primary supply heating water	Primary return water	Absorbed power	Cooling capacity	Heating capacity	COP Cooling	COP Heating	COP Total
Computer room air handling unit / Chilled water to air		30°C	15°C	17°C	65°C	35°C	110,7 kW	415,1 kW	500 kW	4,5	5,4	10,0
		30°C	15°C	17°C	80°C	40°C	143,4 kW	385,9 kW	500 kW	3,1	4,0	7,1
Rear door cooling		40°C	23°C	25°C	65°C	35°C	91,8 kW	435,4 kW	500 kW	6,3	7,3	13,6
		40°C	23°C	25°C	80°C	40°C	124,3 kW	406,5 kW	500 kW	4,0	5,0	9,0
Direct to chip cooling / Cold plate		45°C	33°C	35°C	65°C	35°C	68,9 kW	445,2 kW	500 kW	7,7	8,7	16,4
		45°C	33°C	35°C	80°C	40°C	101,0 kW	416,5 kW	500 kW	4,6	5,6	10,2
Immersion cooling		55°C	38°C	40°C	65°C	35°C	57,8 kW	464,1 kW	500 kW	12,8	13,8	26,6
		55°C	38°C	40°C	80°C	40°C	89,6 kW	436,0 kW	500 kW	6,7	7,7	14,5

Heat reuse with heat pump

Availaible temperature	Realistic t_{evap} (°C)	Cooling water	Primary supply heating water	Primary return water	Absorbed power	Cooling capacity	Heating capacity	COP Cooling	COP Heating	COP Total
°C	°C	°C	°C	°C	kW	kW	kW			
										
30	15	17	80	40	143,4	385,9	500	3,1	4,0	7,1
										
55	38	40	65	35	57,8	464,1	500	12,8	13,8	26,6

Concept Zero

The worlds’ first heat exchanger made using fossil-free steel and recycled materials


FOR EVERY CITY
A century of sustainable solutions
How to compare performance of heat exchangers?


FOR EVERY CITY
A century of sustainable solutions
3rd party performance certification guarantees your performance
Validated by continuous real product testing
3rd party organization, free of charge for the customer
AHRI CERTIFIED®
www.ahridirectory.org
Liquid to Liquid Heat Exchangers
AHRI Standard 400

ectogrid™

By E.ON

Mats Carselid - E.ON Ectogrid™

Patrick Lammers • 2:a
Chief Operating Officer - Commercial at E.ON
2 d •

+ Följ

Big news from **COP28 UAE**! I am very proud to announce that today we have won the COP28 Energy Transition Changemakers award in the energy efficiency category with **E.ON** **#ectogridTM**! ... se mer

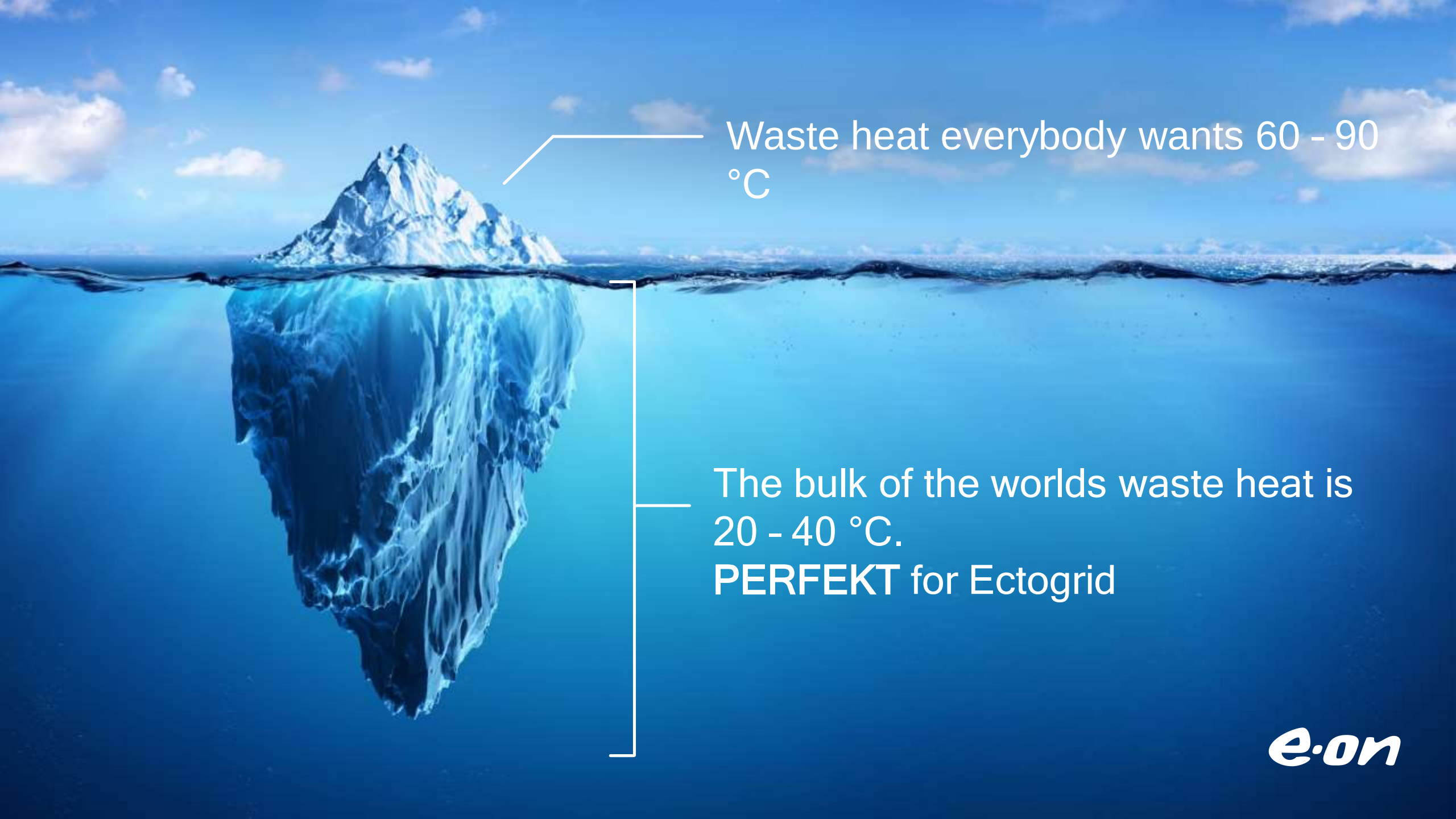
ectogrid™

Ectogrid™ is an electrified de-centralized energy system for both heating and cooling optimized by cloud based AI soft ware - Ectocloud™

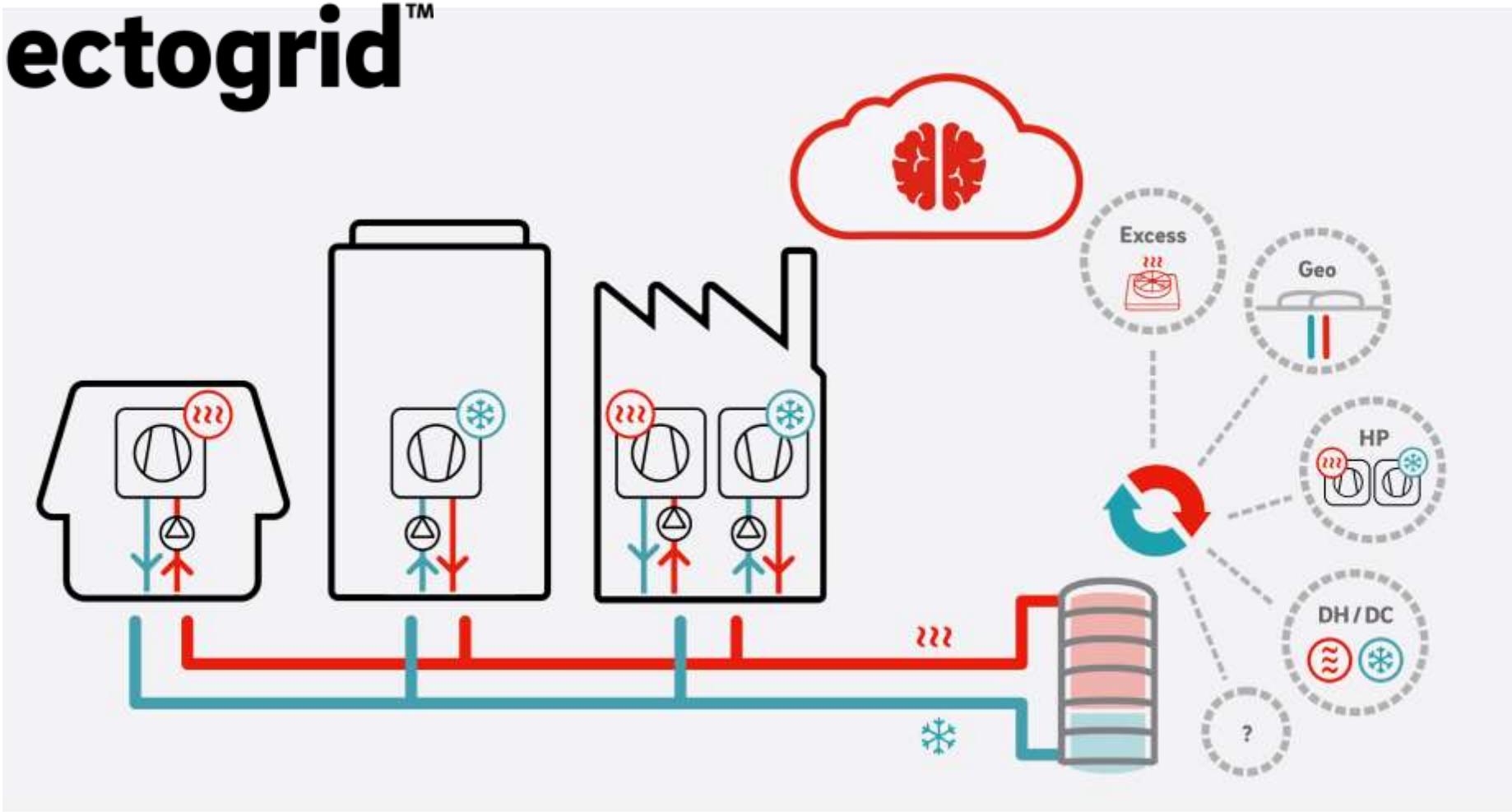
ectogrid™

E.ON ectogrid™

- One energy system for both heating and cooling
- Automated with innovative cloud technology - reduces operating costs
- Utilizes standard components - flexible and simple to scale up
- Low temperature network enable energy sharing between buildings and reuses low-level waste energy, reducing the climate footprint

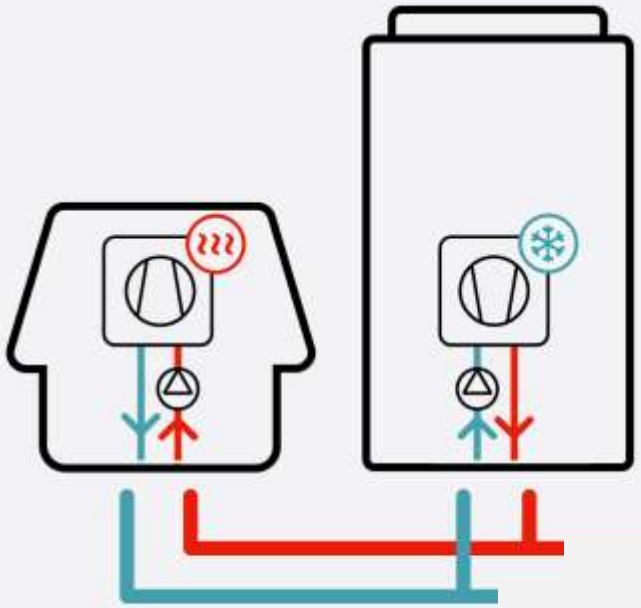

Waste heat everybody wants 60 - 90 °C
The bulk of the worlds waste heat is 20 - 40 °C.
PERFEKT for Ectogrid

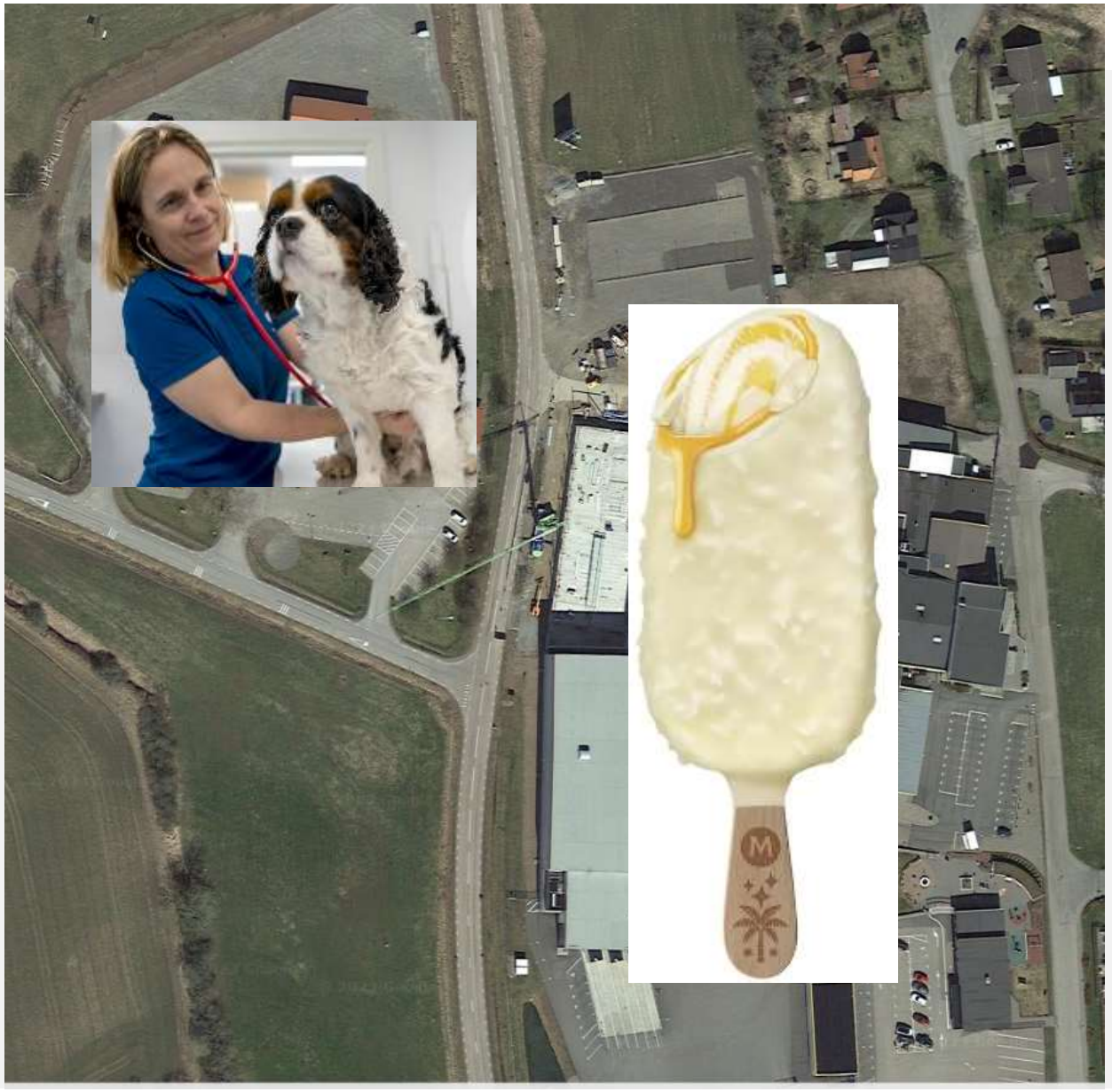
ectogrid™



Ectogrid™ is an electrified de-centralized energy system for both heating and cooling optimized by cloud based AI soft ware - Ectocloud™

ectogrid™



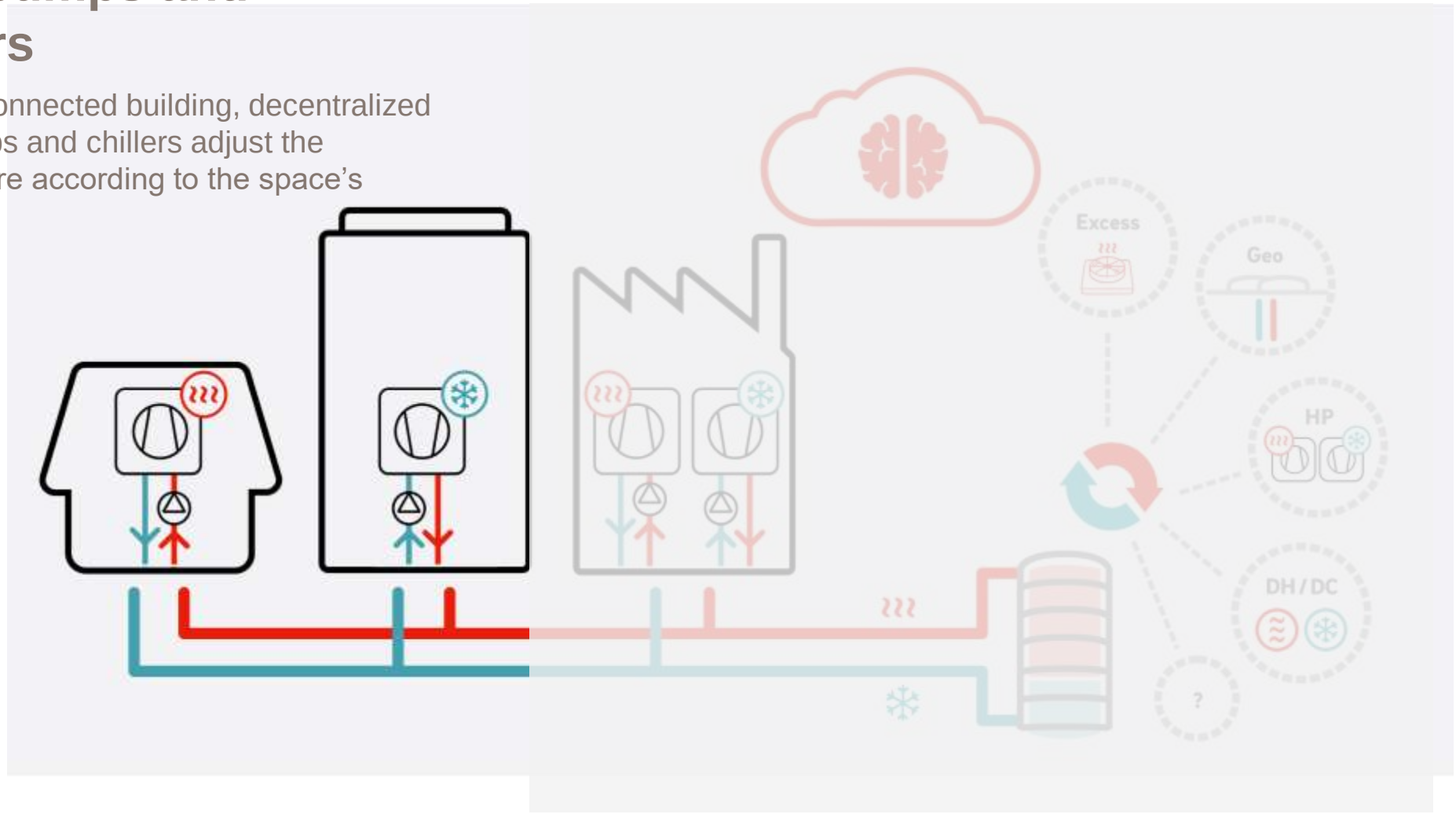


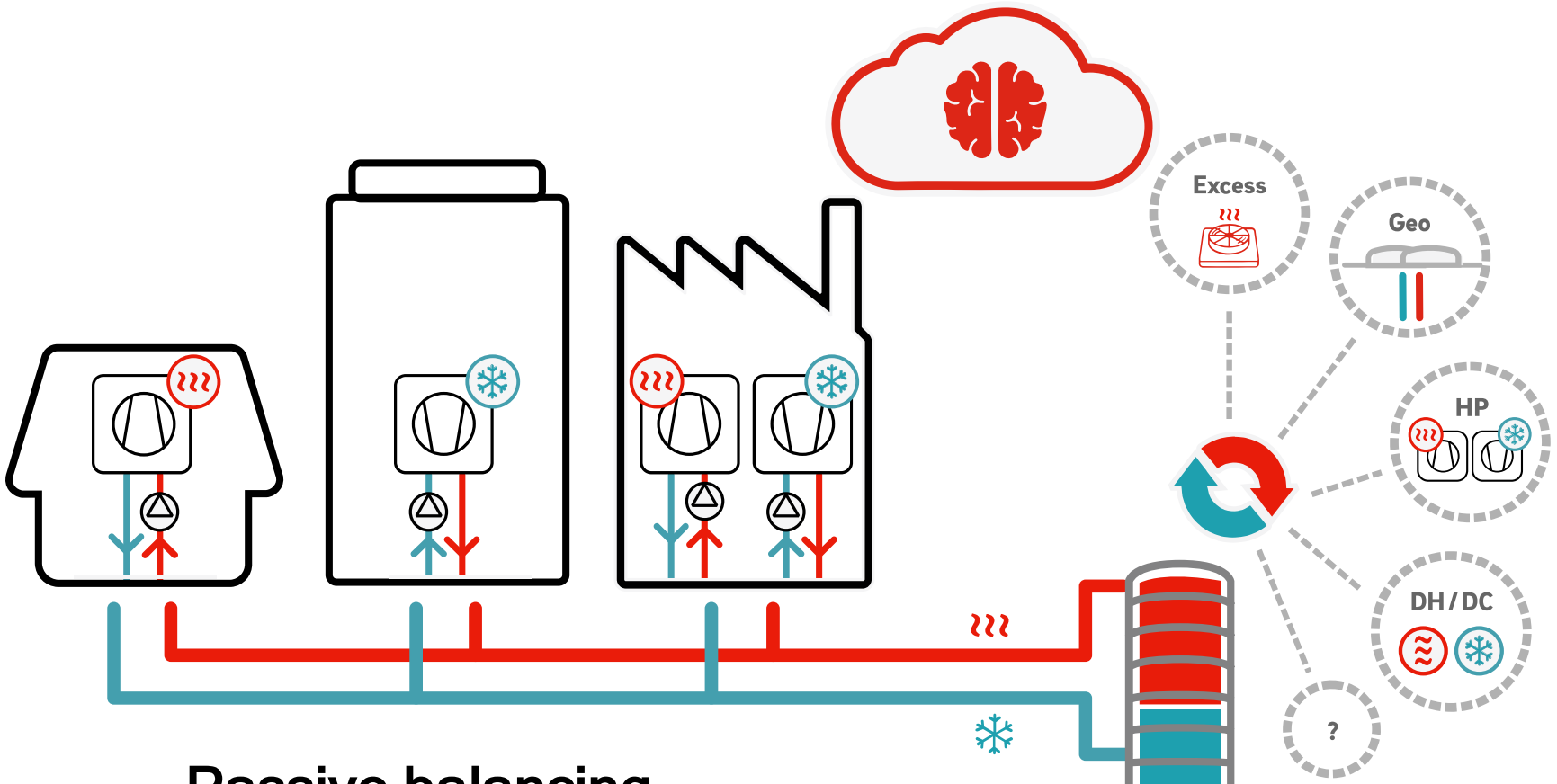
Low temperature grid

Two uninsulated plastic pipes for warm and cold water, with temperatures ranging between 0° and 40°C. Distributed pumping enables a bi-directional flow.

Heat pumps and chillers

In every connected building, decentralized heat pumps and chillers adjust the temperature according to the space’s needs.





Passive balancing

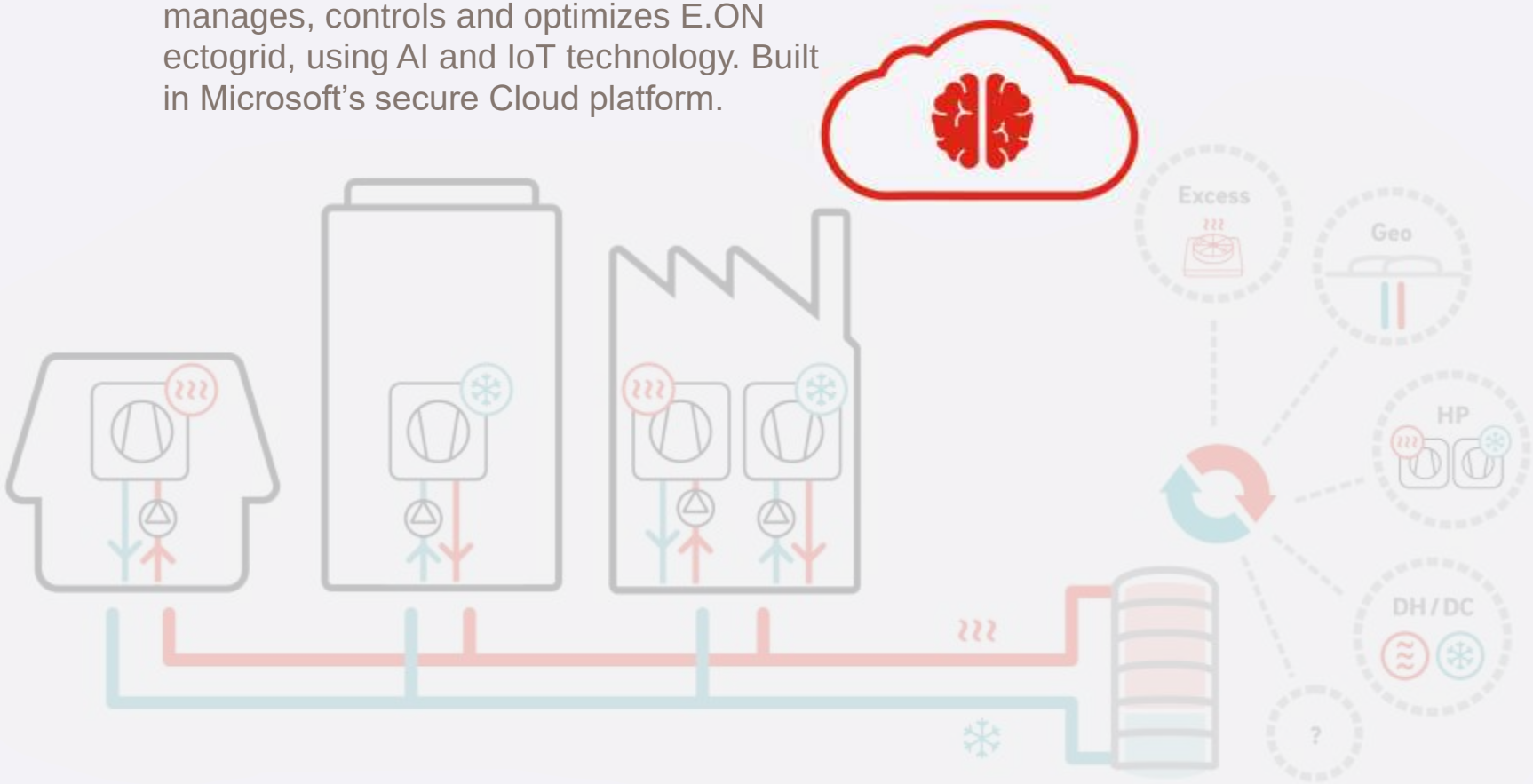
A water storage tank balances the warm and cold water levels, maximizing the re-use of energy in the grid. New energy can be supplied at the right moment from intermittent, renewable sources.

Active balancing

When all available energy is balanced, new energy can be supplied from various sources, including: waste heat from e.g., industry, data centers, hospitals or big-box stores, geo-energy, reversible air-to-water heat pumps, or district heating and cooling.

E.ON ectocloud™

A cloud-based digital platform that manages, controls and optimizes E.ON ectogrid, using AI and IoT technology. Built in Microsoft's secure Cloud platform.



www.alfalaval.com

Intelligent control

Digital platform – controls and optimizes E.ON ectogrid™:

Adjusts temperature to improve COP-value for heat pumps and chillers

Minimizes peak demand, costs and environmental impact

Maximizes the use of self-produced renewable electricity

Manages prioritizing of energy sources

Monitor the solution and send alerts when deviations from plan

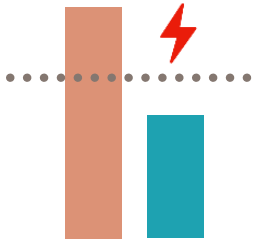
Built in Microsoft's secure Cloud platform

Why choose E.ON ectogrid?

ectogrid™

2-in-1-system

A complete energy system for heating and cooling



Minimize supplied energy

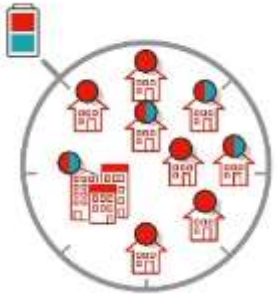
Always use all available energy in the system through balancing and sharing

Reduce energy costs

Limiting the amount of supplied energy means more competitive prices

Minimize climate impact

Enabling greater use of intermittent renewable energy can result in a zero-emission solution.



Cost effective and scalable

The lack of expensive special components means a decentralized system that you can scale up to cover more buildings or even a whole neighborhood.

e·on

www.alfalaval.com

E.ON ectogrid – a game changer for waste energy management

- A partner for re-use of waste energy from data centers
- A partner for energy infra structure
- A partner for decarbonizing cities, suburban areas, industrial zones etc.
- A partner for auxiliary products fitting ectogrid – solar panes, batteries, software etc.

MEDICON VILLAGE

CASE: Medicon Village

e·on

MEDICON VILLAGE

15
commercial and residential buildings

14 GWh
heating and cooling – before E.ON ectogrid™

170
Life Science companies, 2 600 people

65 %
expected decrease of added energy using E.ON ectogrid™

” E.ON ectogrid™ is an energy solution that goes very well with or goal and vision- a sustainable and inventive research park for science and innovation.”

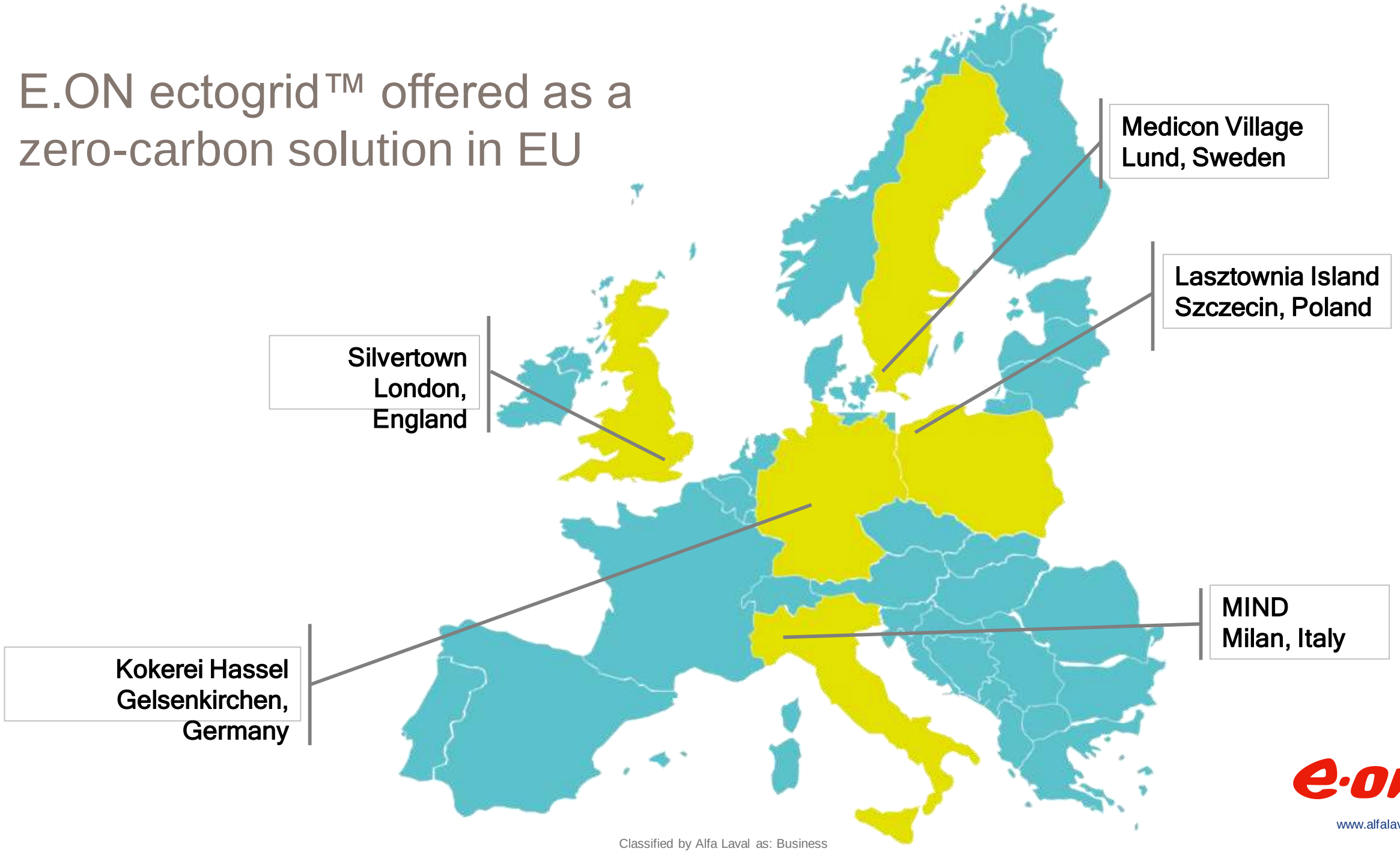
Erik Jagesten
CEO Medicon Village

e·on


CASE:
Silvertown, London

CASE:
MIND, Milano

E.ON ectogrid™ offered as a zero-carbon solution in EU



Rolf Jönsson

Business Developer Alfa Laval

mats.carselid@eon.se