Heat Recovery in Practice - The Journey to a Carbon Neutral Future

Sustainable Places Conference 2020
SDIA Heat Recovery Thematic Session

Dr.-Ing. Birger Ober
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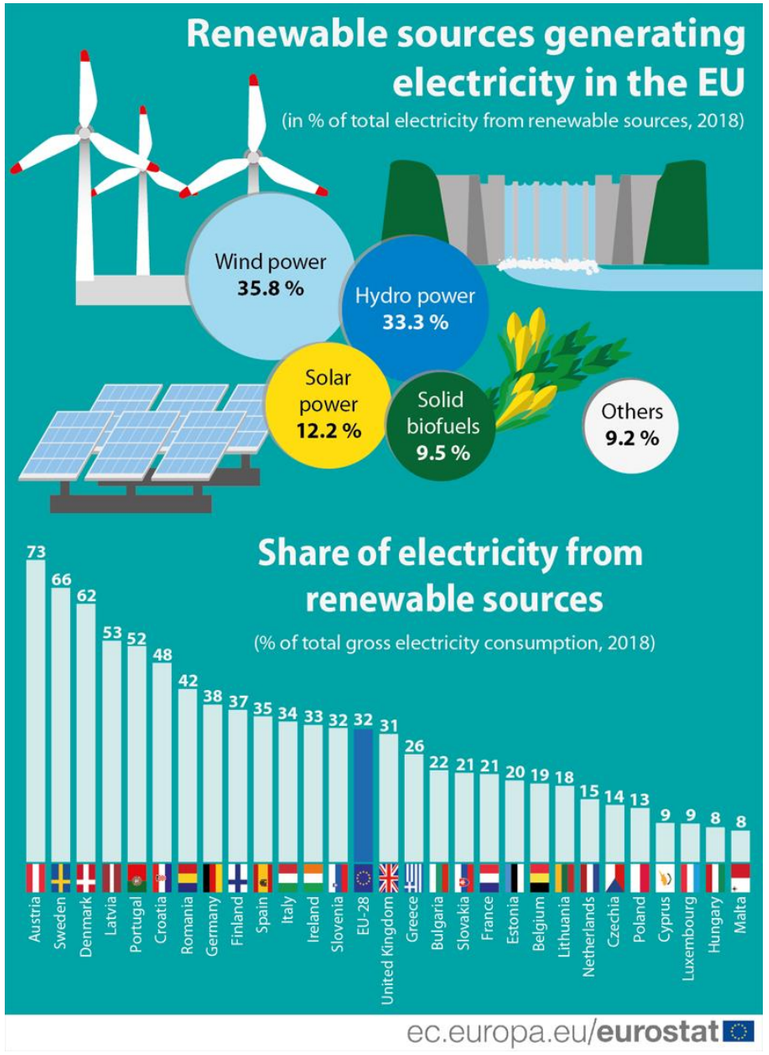
The Energy sector needs and wants to decarbonize



We have taken big steps in the Electricity sector

- Two-Digit percentages in the majority of the EU member states
- Maturity of technology to a point where multi-100MW sources are reality
- Continued growth in Wind and Solar
- **But:** Electricity is easy to transport and it is universal!

However, the Heat sector is struggling to decarbonize:

- 40% CO2 stems from the heat sector
- Heat is needed in cities
- Cities don't have space for heat from RES
- Heat is difficult to transport
- **But:** Cities have existing DH grids and houses are connected

Ultimate need for Decarbonization

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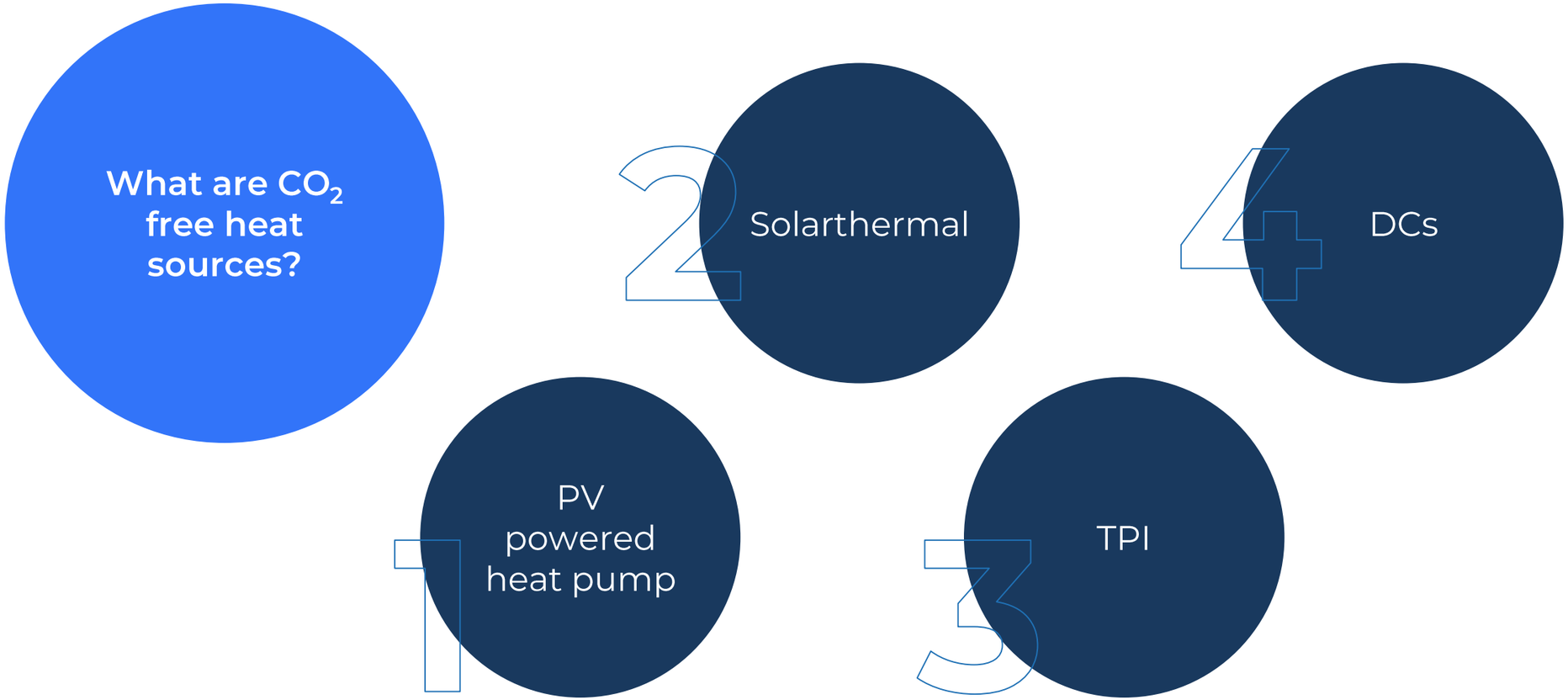
CO_2 free sources of Heat need to be made available locally or via the Heat network



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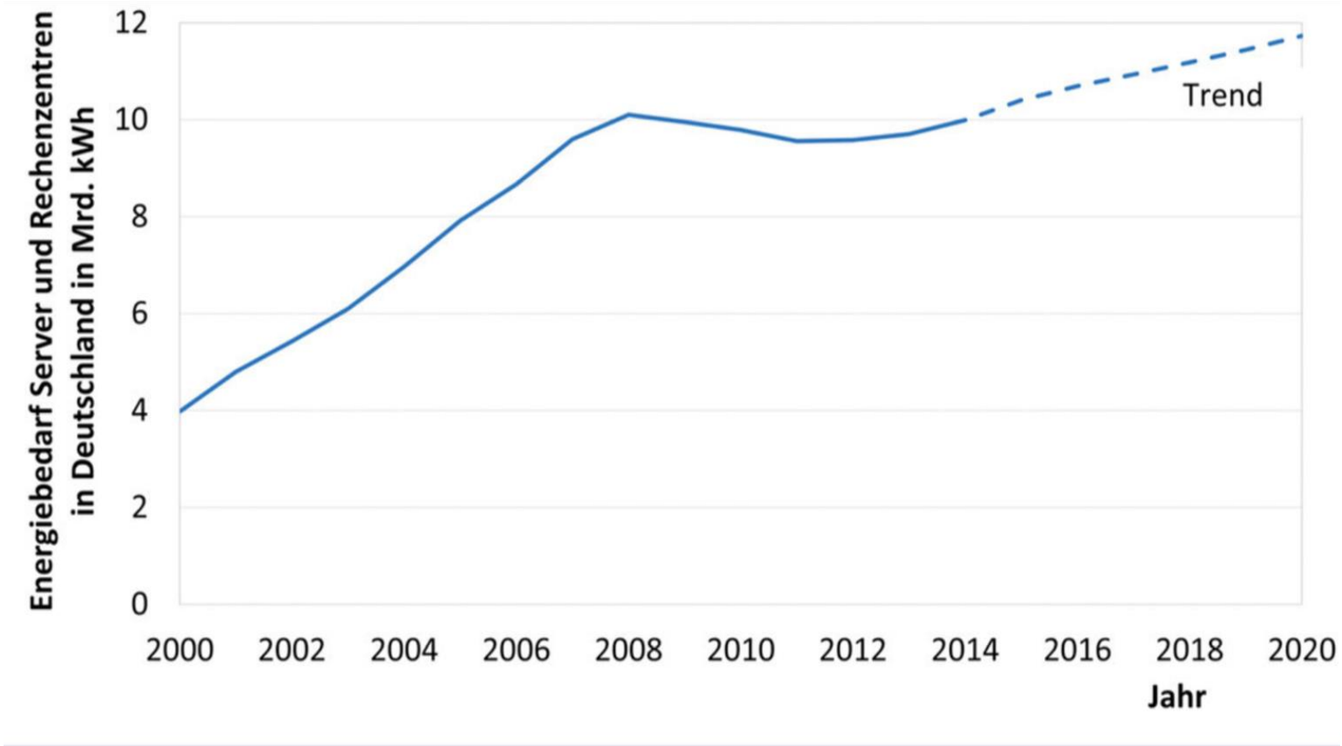
Data Centers will consume larger amounts of energy as the Digital Economy grows



Increase in the energy requirements of servers and data centers in Germany in the years 2000 to 2020. (Image: Borderstep Institute)

10 years of efficiency through Virtualization and Hyperscale adoption has come to an end.

Existing infrastructure was well optimised, but we now need to build more as 5G unleashes a new wave of applications, and as IoT connects billions more devices.

As we increase the amount of data produced, we increase the amount of computation, increasing energy consumption.

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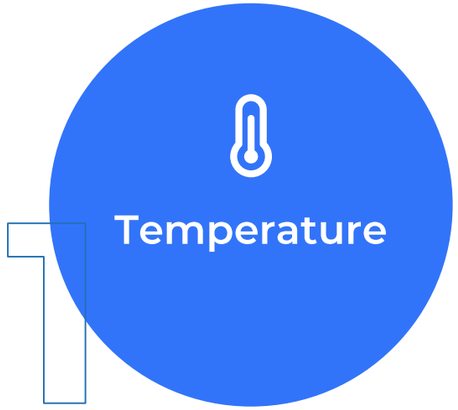
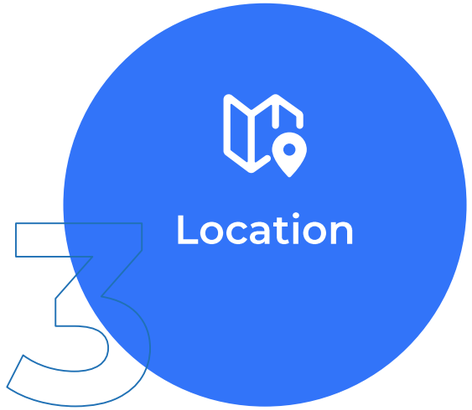
What is important to a heat network operator





Barriers for Data Centers:

- high investment costs
- low quality of the heat
- location of the waste heat and heat demand

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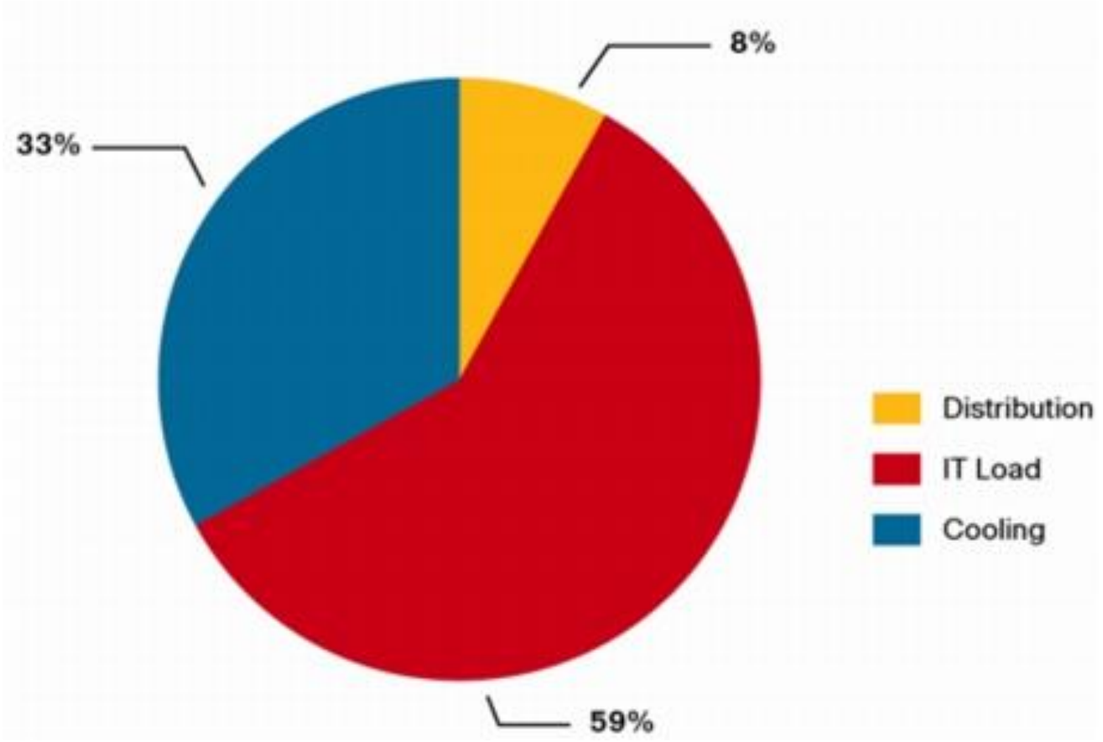
Data Centers produce heat. Heat network operators need heat.

Server blade, with direct-on-chip cooling capable of generating water of up to 60°C – sufficient for heating applications directly or boosted with a heat pump.

Direct hot water cooling allows higher power densities, saving space in the data center.



Breakdown of typical energy consumption in data centers
Source: (Cisco, 2013)

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Data Center locations differ by application, latency being a key differentiator

Close to your customer = fast

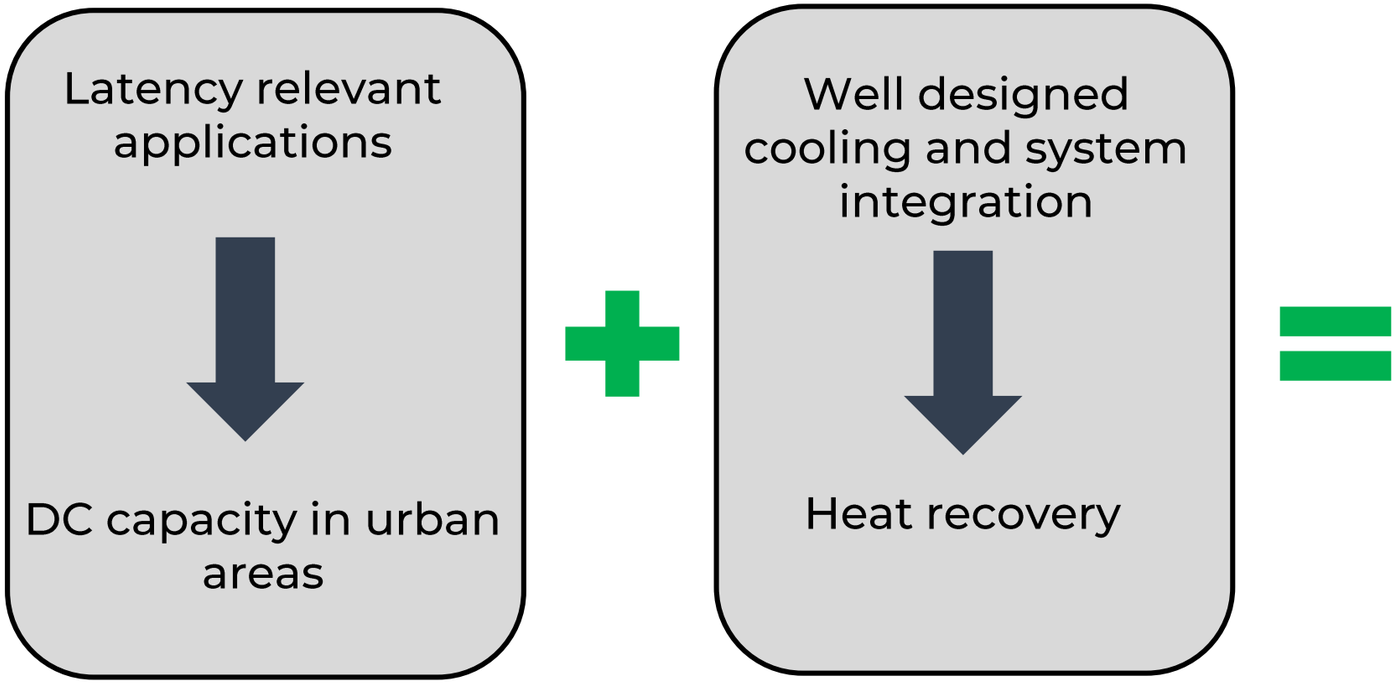
- Short distance means low latency
- Close to the customer means close to the city
- Close to the city means higher costs
- Higher costs are only acceptable if speed is of essence
  - 5G
  - Autonomous driving
  - IoT
  - Streaming
  - Gaming
- → close to the city, but more expensive

Far away from your customer = cheap

- Many applications are not latency-critical
  - Social media
  - Web
  - E-commerce
- So if possible, these capacities are built under tight cost control
- → far away

Latency sensitive applications need to run in the cities and that is where the heat is needed!

Boundary conditions are key! More heat needs to be put to good use!



- Replacement of fossil fuels in heat sector
- Taking the “Waste” out of “Waste Heat”
- Lower over all electricity need
- Low latency, high performance
- …and it is even competitive on price…

Data Centers will be used to Decarbonize our Heating Systems and we are showcasing it.

"In Addition to renewables they also want to incorporate waste heat into the heat supply. Do you see further potential for this in Berlin?"

“Where we definitely see potential is with data Centers. There (meaning in DCs) large amounts of waste heat is generated which today remains energetically unused We want to change that."

***Tuomo Hatakka**, Senior Vice President, Business Area Heat Vattenfall*


Thank you!
Questions?
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