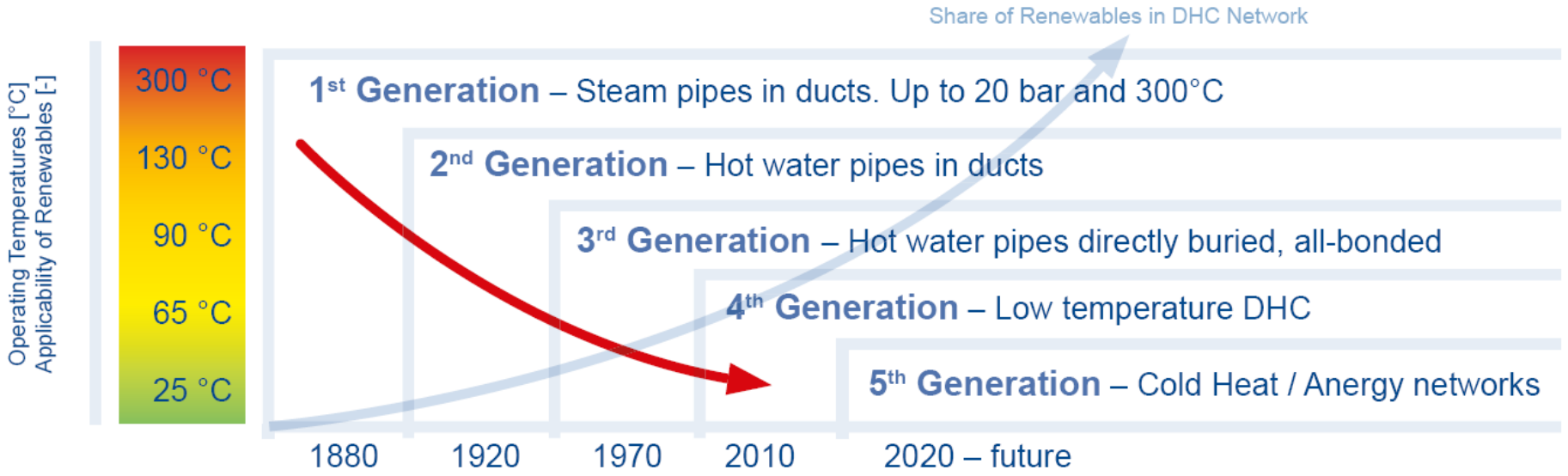
TT2: Special add-on to 2nd training session
Webinar, 16.06.2020

What is cold district heating?

ENTRAIN |AEE INTEC| Harald Schrammel

CONTENT

DEVELOPMENT OF DISTRICT HEATING TEMPERATURES



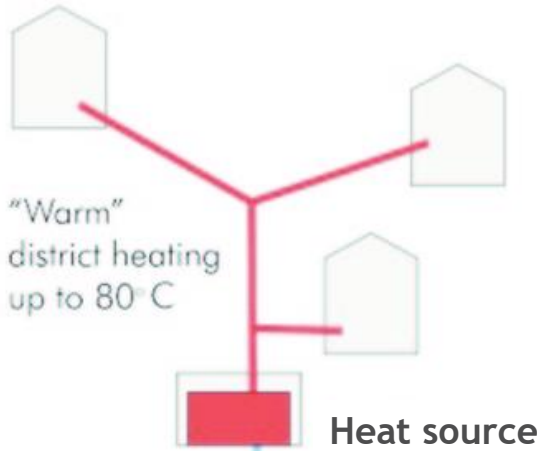
Development of district heating systems. (in accordance with: Lund, H. et.al.: "The status of 4th generation district heating: Research and results", 2018)

WHAT IS COLD DISTRICT HEATING?

A cold district heating system is a district heating system operated at a temperature level <30°C.

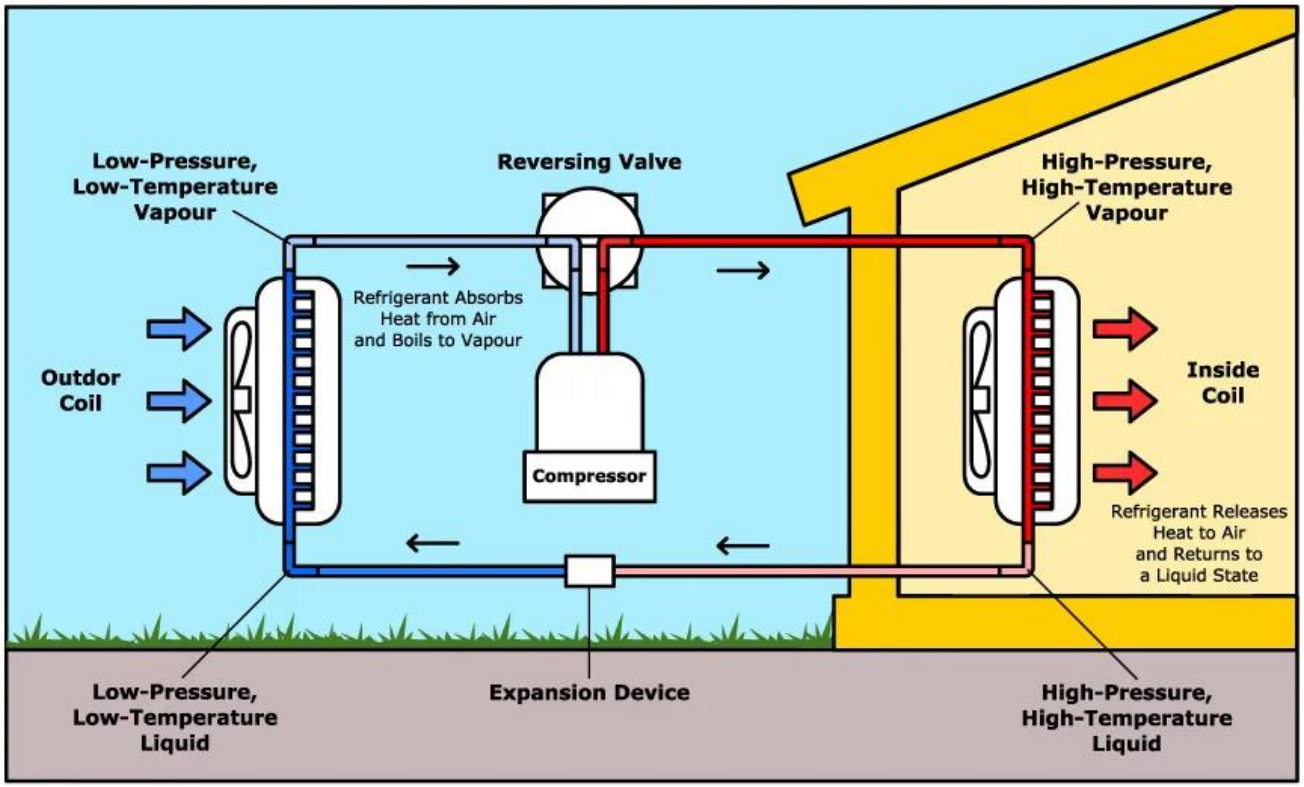
The district heating system is used as a (distributed) source for heat pumps.

The same system can be used for district cooling.



Source: Stöglehner G., Neugebauer G.: Realising energy potentials from wastewater by integrating spatial and energy planning; Sustainable Sanitation Practice Issue 22 1/2015

HEAT PUMP



Source: https://www.carrier.com

WHY COLD DISTRICT HEATING?

- Heating and cooling is responsible for approx. 50% of EUs energy demand

- Renewable heating and cooling required to meet climate targets!
  - District heating (and cooling) is one of the key technologies

➡ We need more efficient systems and new heat sources!

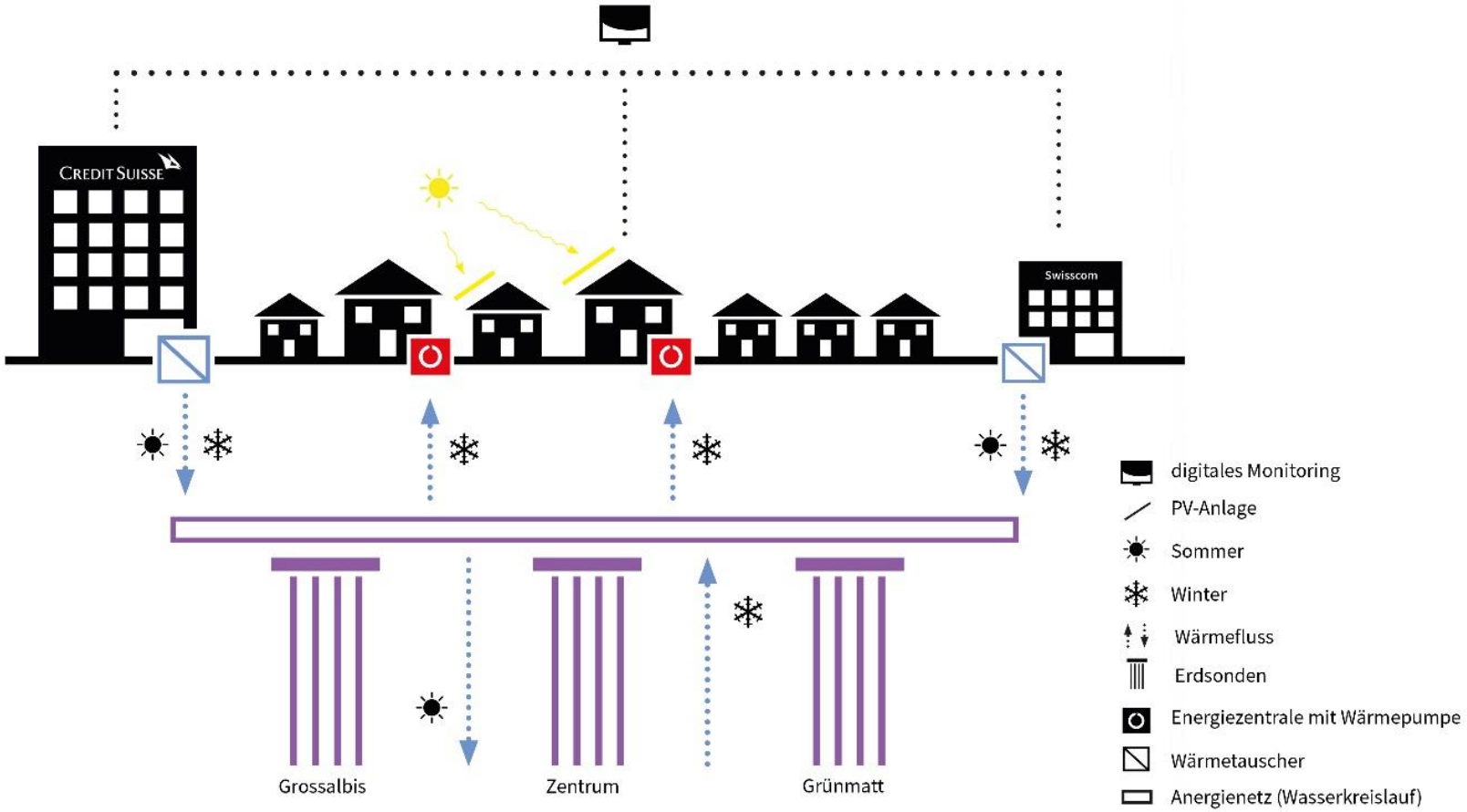
➡ Cold District Heating & Cooling: A new option with high potential!

ADVANTAGES OF COLD DISTRICT HEATING

- Makes low temperature heat sources useable
  - Avoids individual boreholes/air heat exchangers in every garden
- Almost no heat losses
  - Non - insulated plastic pipes
- Significant reduction of primary energy demand
  - High heat pump efficiency
- Heat and cold supply with the same infrastructure
- High system flexibility
  - Integration of various producers and consumer
  - network enlargement and network structure
  - Prosumer and sector coupling (power gird)
  - (Seasonal) Storage

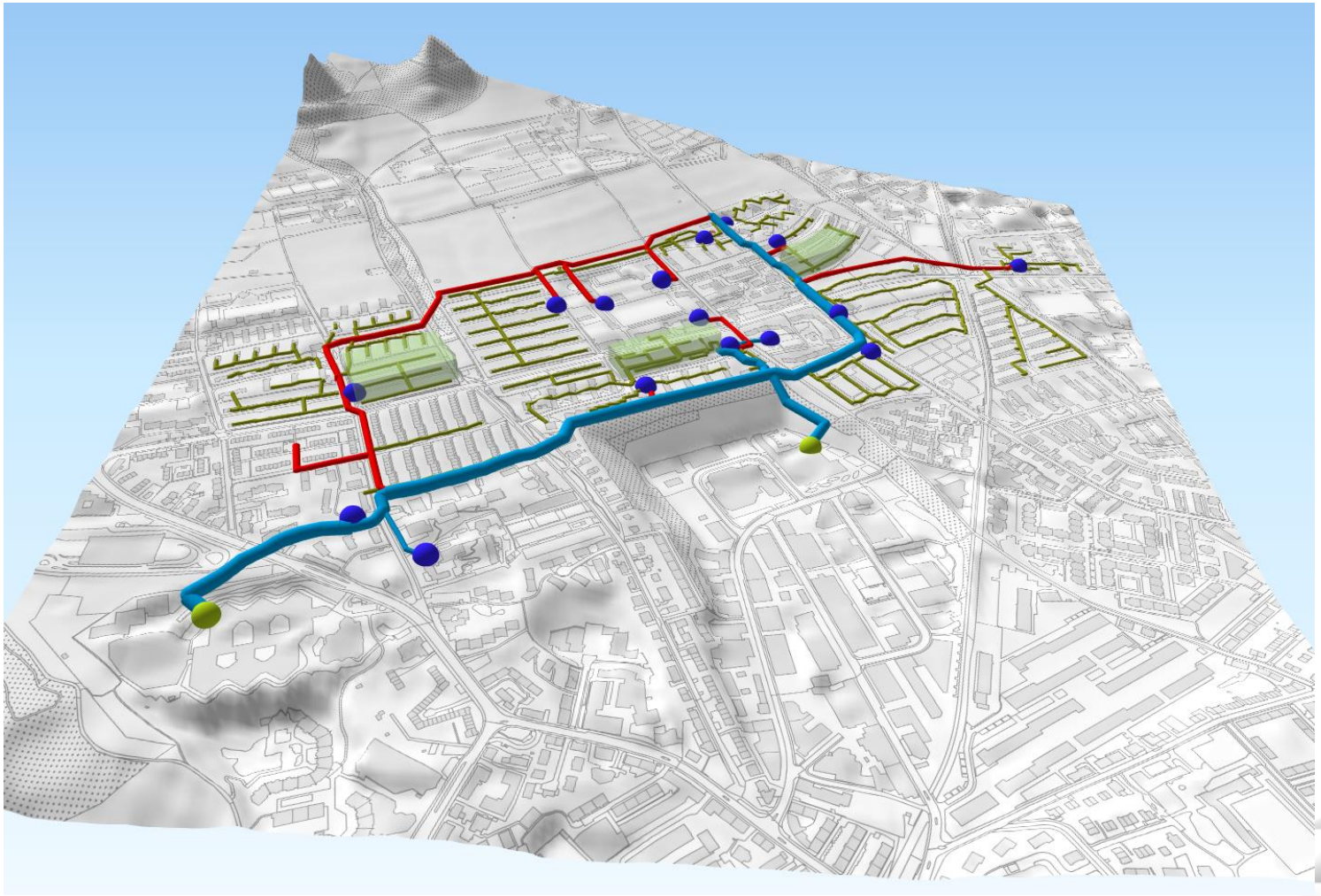
Source: anex Ingenieure AG

CONCEPT OF COLD DISTRICT HEATING FGZ ZURICH

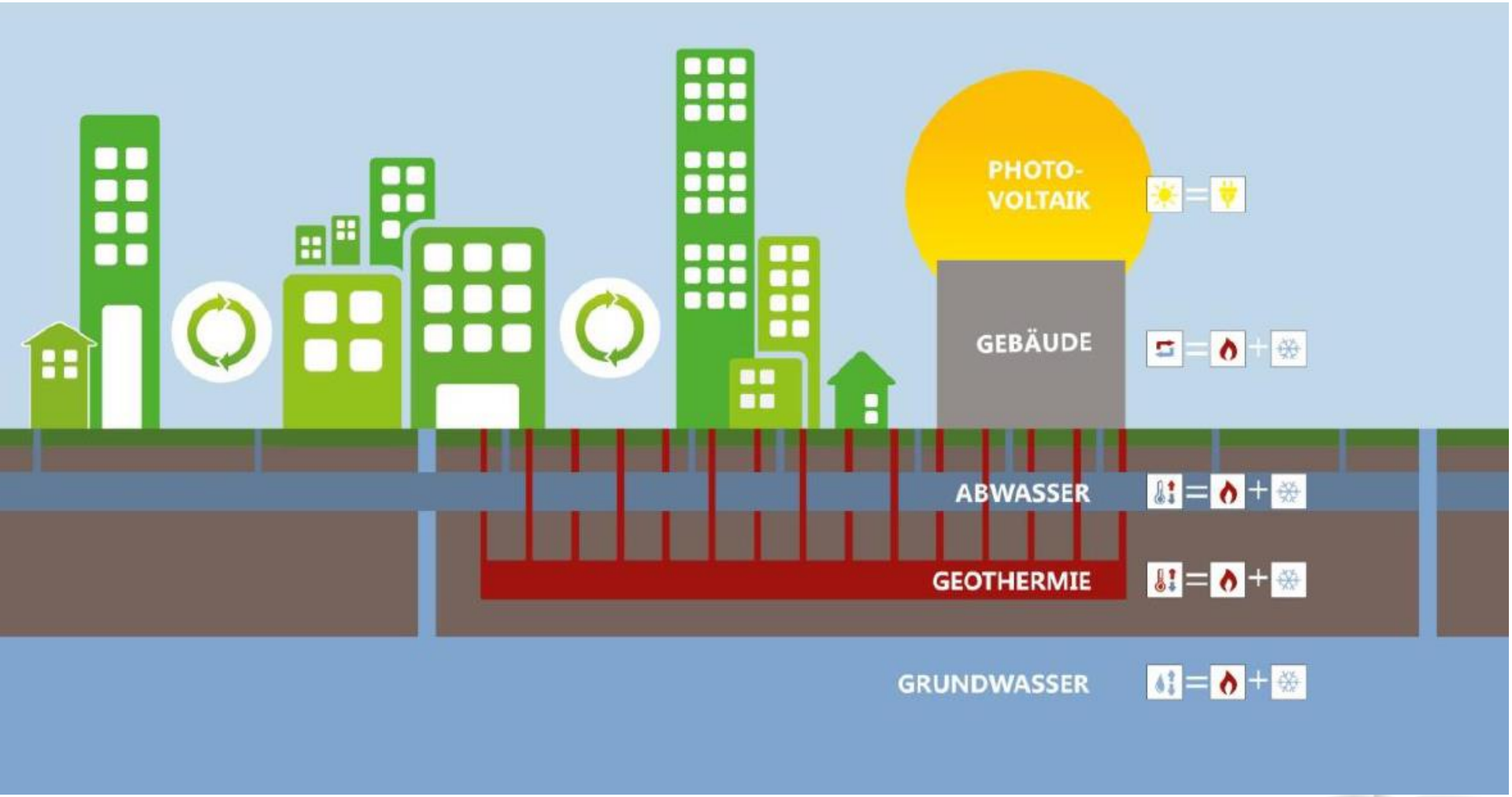


Source: anex ingenieure GmbH

COLD DISTRICT HEATING FGZ ZURICH (SINCE 2014!)

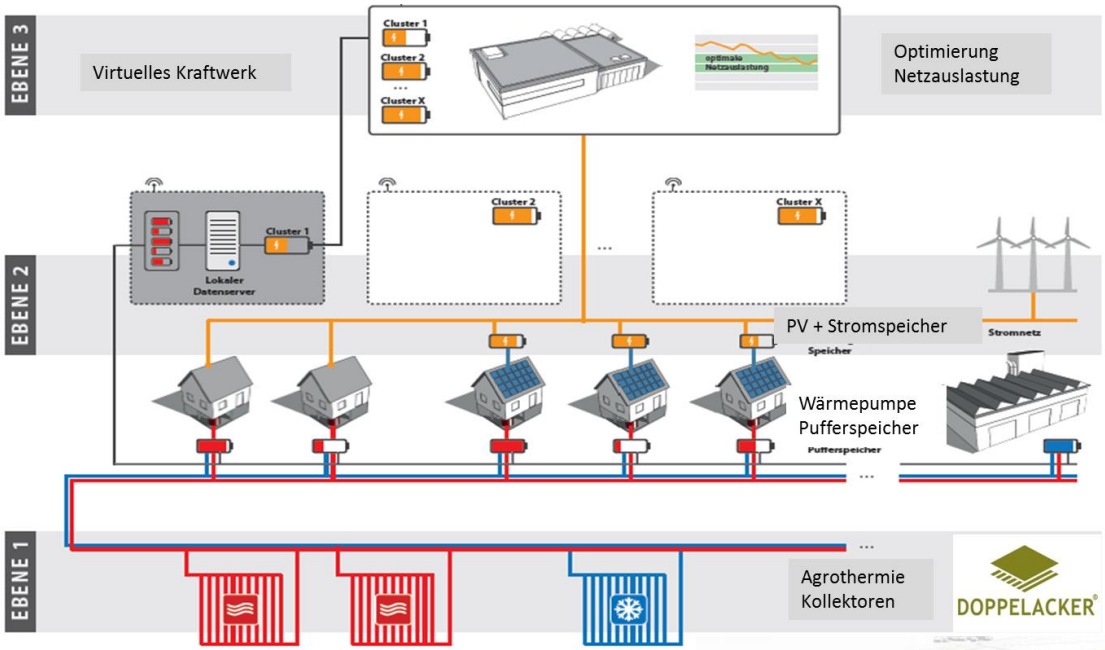


Source: AEE INTEC, anex Ingenieure AG

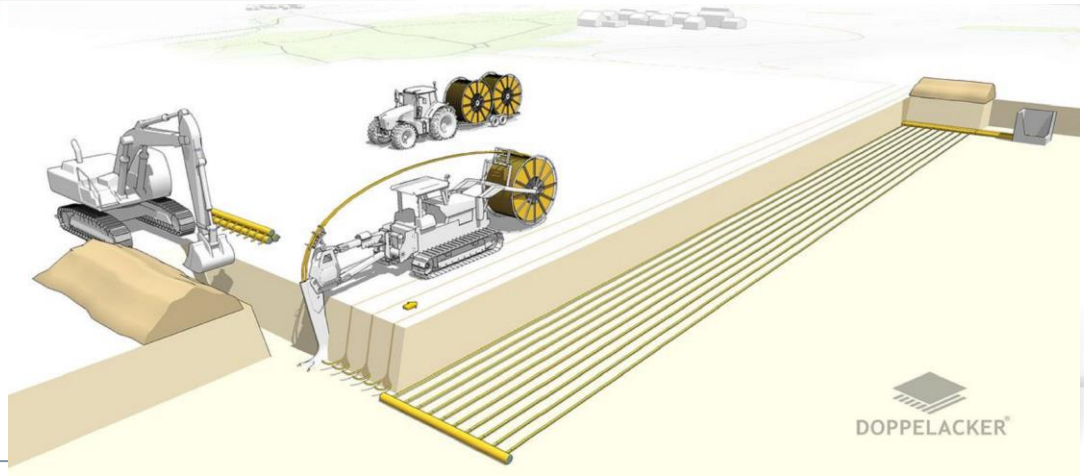


Source: IP Jung GmbH, bauConsult GmbH

COLD DISTRICT HEATING IN WUESTENROT, GERMANY



Source: Dirk Pietruschka, Hochschule für Technik Stuttgart ; Doppelacker GmbH



CONCEPTS AND PLANTS FROM RATIOPLAN GMBH, GERMANY

Interreg CENTRAL EUROPE European Union European Regional Development Fund

ENTRAIN

Flexible system temperatures (20 - 50°C)
Multiple heat sources (high/low temperature)
Central power supply included

Versorgungskonzept Nahwärme Vinger Weg (Kerpen) - Neubauquartier

Projektbeschreibung

Das ausgearbeitete Konzept beinhaltet die zentrale Bereitstellung von Strom zum häuslichen Gebrauch, Wärme für Heizung und Warmwasser, Kälte zur Kühlung im Sommer und Strom für öffentlich zugängliche Ladesäulen für E-Mobilität.

Installierte Leistung	ca. 400 – 500 kW
Wärmeerzeugung	BHKW, zentrale Wärmepumpe, dezentrale Wärmepumpe, Spitzenlastkessel, PV-Anlage, Stromspeicher
Trassenlänge	ca. 2.000 m
Anzahl Wohneinheiten	ca. 130
Betriebsweise Netz	Ganzjährige von 20 bis 50°C, bei Kühlung ca. 15°C
Projektstatus	In Umsetzung - Erschließung

Source: ratioplan GmbH

SUMMARY

- „Everything“ is a heat source
  - Geothermal, thermal solar, PVT, ambient heat, lakes/rivers, low-temp. waste heat (industry, data centers), waste water, power plants, tunnels,…
- Many options - no standardized concepts
  - Small „village“ to large city quarters
  - Various sources and system configurations
- High efficiency, low primary energy demand
  - But heat pumps and electric power demand!
- Cooling is a heat source!
  - e.g. data center, super markets, industry, buildings, …
  - Cooling options depend on system temperatures (limitations possible) !

THANK YOU!

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