LESSONS LEARNED FROM CURRENT SMART ENERGY PROJECTS

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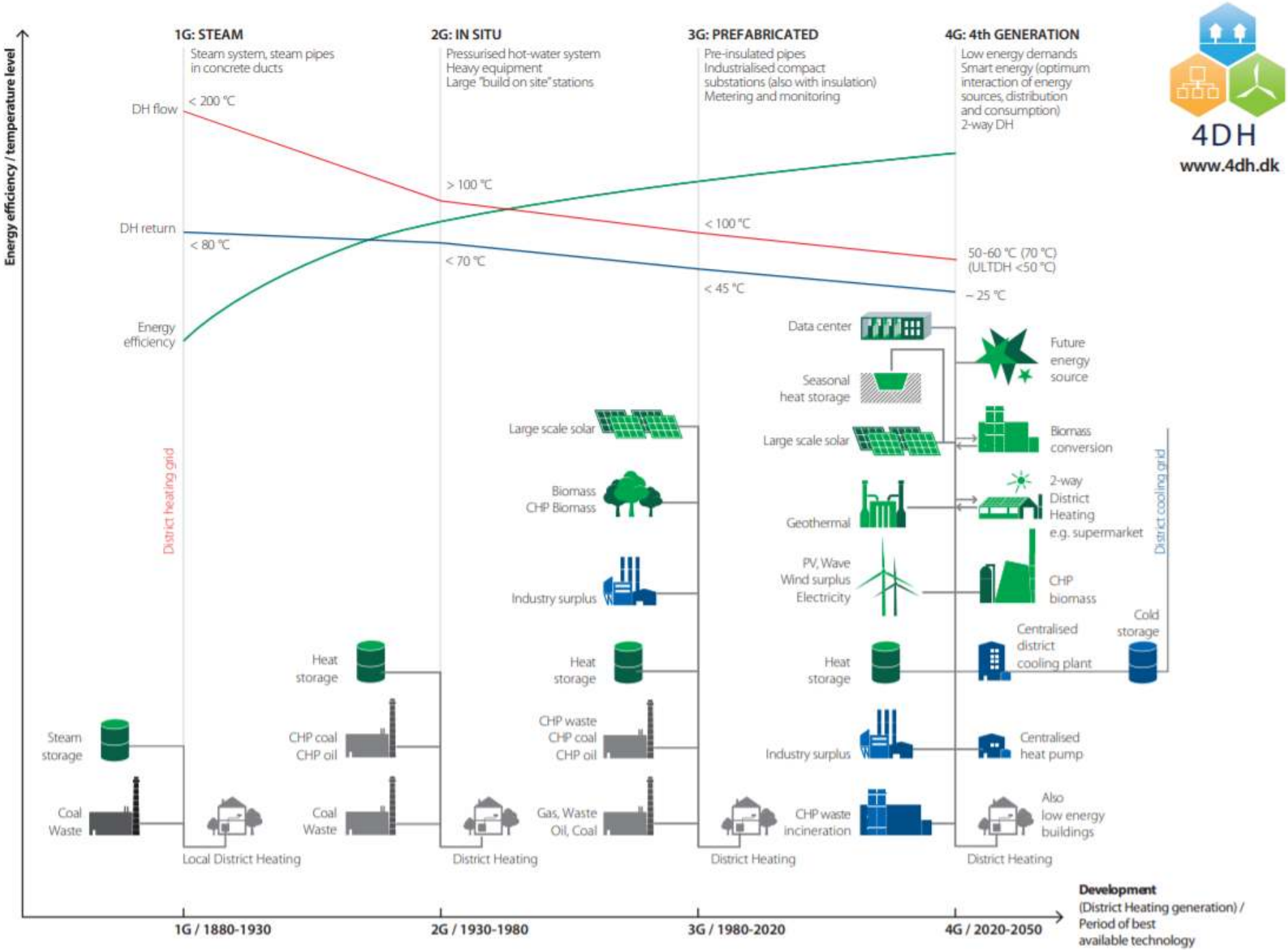
Terms and Definitions – Danish Perspective

- Traditional District Heating: 70-80 / 40 °C
- Low Temperature District Heating: 55-60 / 35 °C
- Ultra-low Temperature District Heating: 35-45 / 25 °C
  - Decoupling of production of Space Heating (SH) and Domestic Hot Water (DHW)
- Ambient Temperature Network, ex.
  - Ground source temperature at approx. 5-10 °C
  - Ambient air



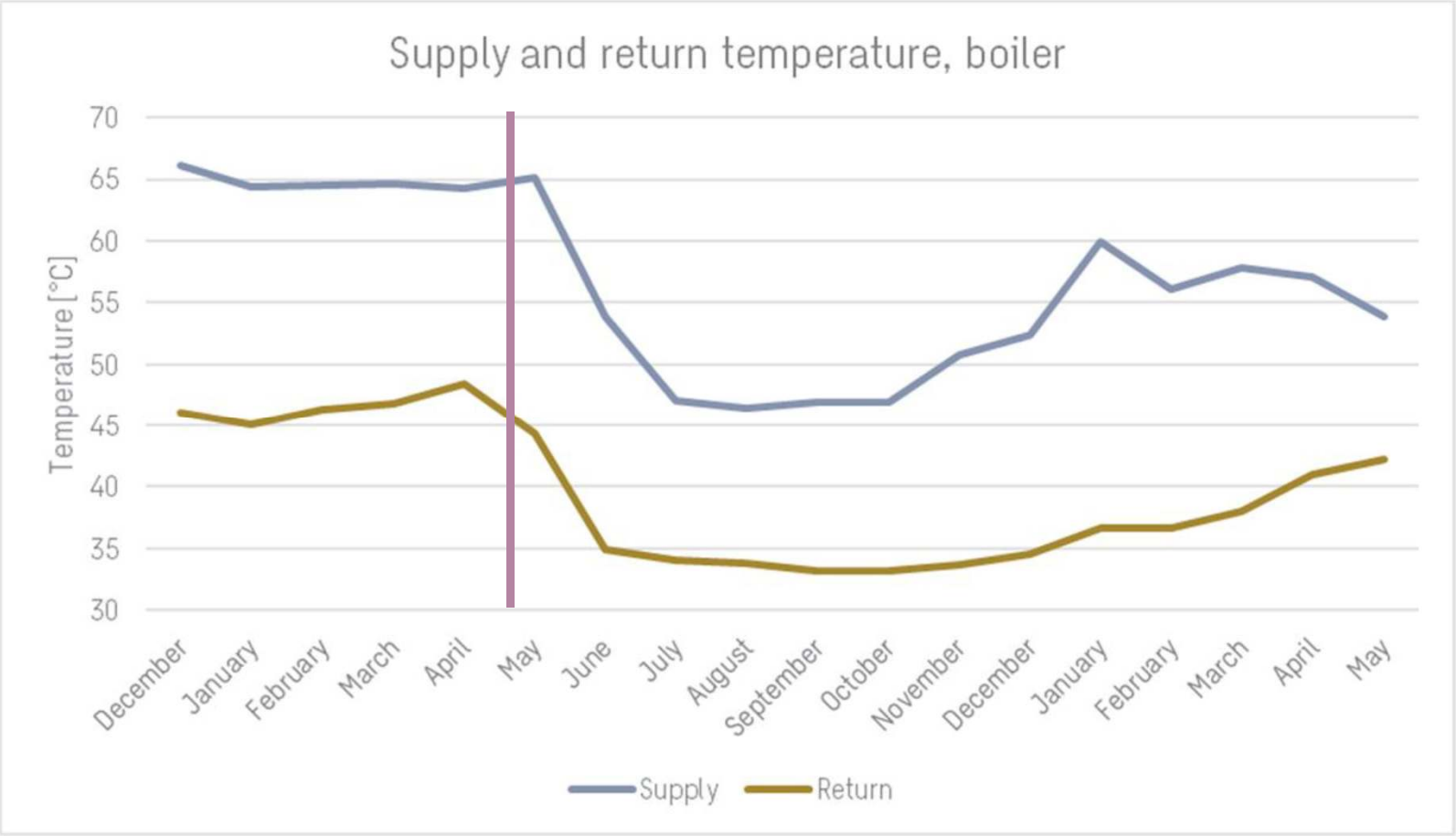
Source: Thorsen, J. E., Lund, H., & Mathiesen, B. V. (2018). "Progression of District Heating – 1st to 4th generation"

Sweco and Ultra-low Temperature District Heating

Sweco DK has worked intensively within the area since 2010

- **Birkerød – Copenhagen** (2010-2012): Development of micro booster-unit in cooperation with DTU and Danfoss.
  –Demonstration project for five houses
- **Geding – Aarhus** (2013-2016): Same micro booster-unit applied at 25 houses in the village
- **Louiselund – Hørsholm** (2015-2017): Demonstration Project for a block of flats (40 apartments)
- **Teglbakken – Nivå** (2017-2019): Demonstration Project for a new built area with 105 dwellings
- **Risø – Danish Technical University** (DTU) (2018-2021): SYSLAB Smart Energy Test Facility

Geding – Aarhus (2013-2016)



Louiselund – Hørsholm (2015-2017)

Steps for achieving lower temperature operation in existing buildings

- Optimise existing system and components
- Focus on reducing return temperature
- Reduce supply temperature by identifying the minimum supply temperature curve for weather compensation controller
- Identify and operate circulation pumps according to critical rooms/radiators
- Monitor and follow up if needed

Teglbakken – Nivå (2017-2019)

Benefits and challenges

Main Benefits

- Significantly reduced heat loss
- Better and more efficient integration of RES (solar, large heat pumps, excess heat, geothermal heat etc.)
- Heat from the existing DH return pipe can supply new areas
  – Cost-effective capacity expansion
- Unlinking temperature requirement for space heating and domestic hot water
- Legionella issue dealt with

Some Challenges

- Lower ΔT results in reduced capacity for the district heating grid
- Some unit concepts can be more expensive and complex
- Retrofit can be difficult – static and different original design
- Systems with DHW tanks require more space
- Electricity consumption for the heat pump – could also be an advantage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