Case Studies

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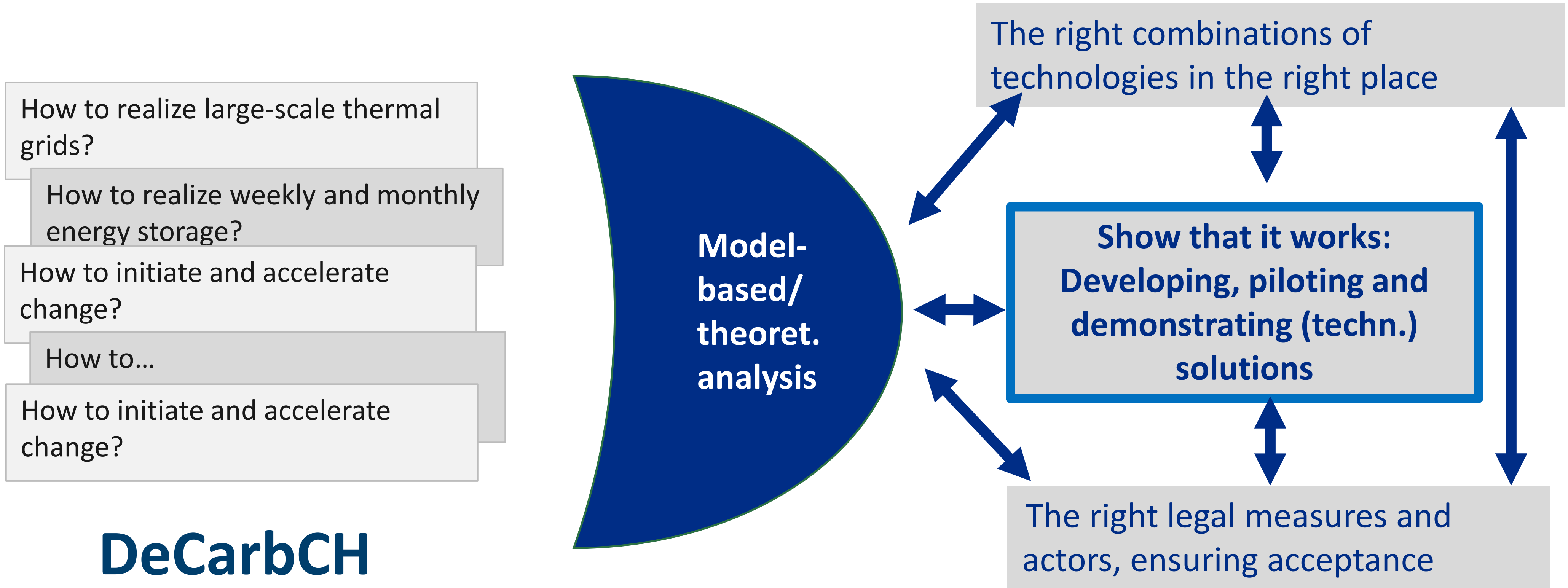
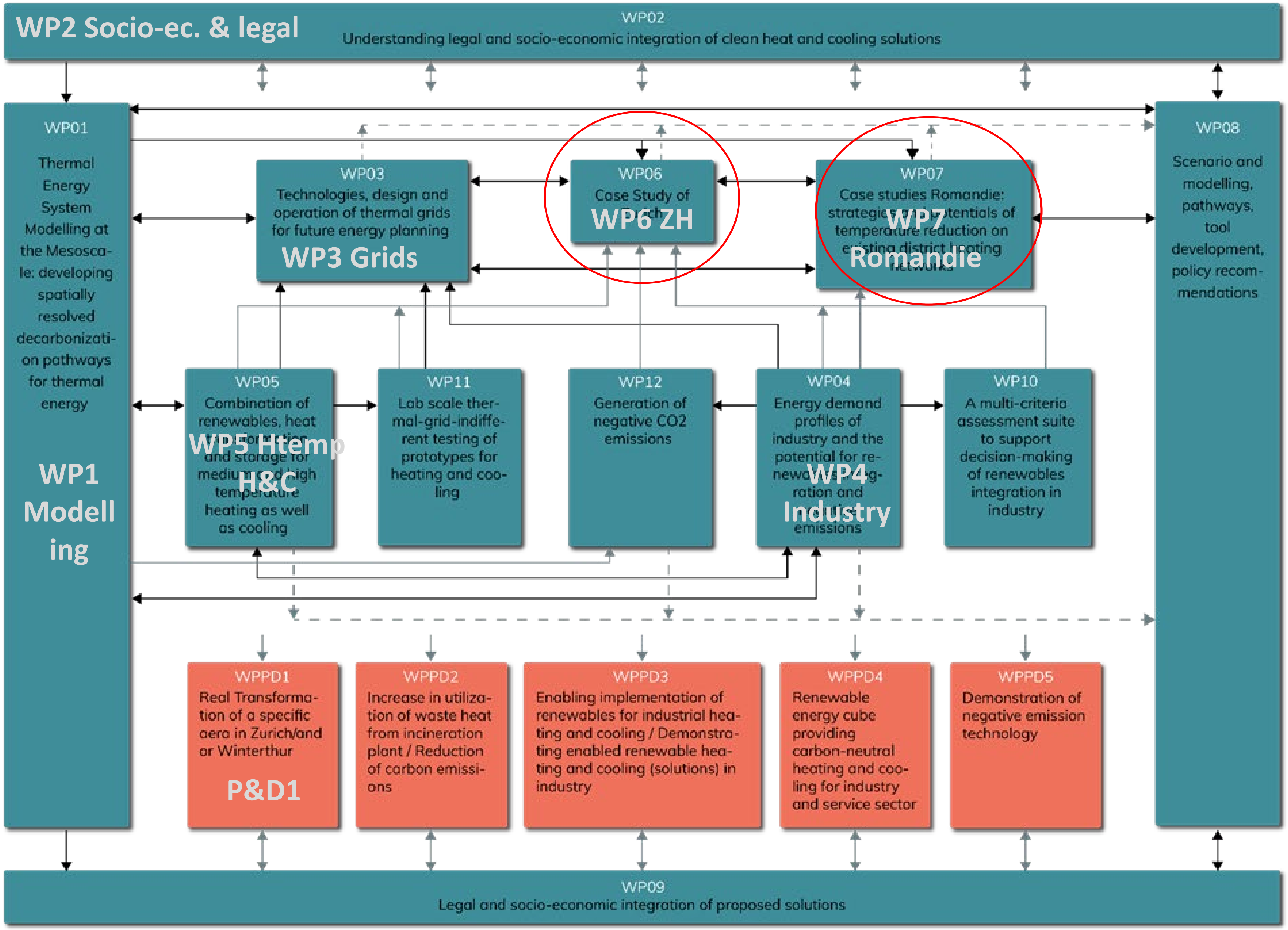
About the Case Studies

Aim: Bringing Science and Application together



DeCarbCH by WPs



Case Study Zurich

- Zurich on its way to «Net Zero» until 2040,

→ let's accompany them

Referendum May 15th

430 Mio. Francs/year

Goals/Achievements

Until 2022

Task 1: Identification of fitting challenges and research contributions

- Matching WP 01 –07, specifically 02 (socio-economic/legal) and 03 (grids)

Definition of concrete implementation situations as experimental areas

- At least three implementation sites
- With/without distance heating, with/without gas infrastructure

sweet swiss energy research for the energy transition
DeCarbCH

Common fields identified

Zurich

SWEET

- Modelling demand (by actors, role of industry)
- Diverse energy supply (heating and cooling)
  - how, where, when (speed)
  - centralised/decentralised
  - Storage, peak load
- Development of district heating networks, dismantling of gas grids
- Transition (how to get there, legal, social, economic frameworks)

Goals/Achievements

Until 2024

Task 2: Results, learnings for scaling

- Compare and validate feasibility of technical solutions
- Relate to socio-economic and legal conditions
- How to standardize, adapt to other frameworks, scale up results,

Task 3: Thermal grid technologies for the City of Zurich

- Knowing chances and obstacles (technical, economical)
- Implement different technologies in different settings
- Heating and cooling needs, application of a developed planning tool (WP3)

Yet to come (WP PD1)

- Research
- Case Studies

--> Scaling up, building references

Pilot and Demonstration projects

- Finding opportunities and innovative investment partners
- Implementation from 2025

Constructive Collaboration

Scientific Partners

Identification of fitting challenges and research contributions

- Matching WP 01 –07, specifically 02 (socio-economic/legal) and 03 (grids)

City of Zurich

Identification of fitting challenges and research contributions

- EWZ, Ausbau Energieverbunde
- ERZ, Fernwärme, incineration plant, wastewater treatment plant, (biogas)
- UGZ, Energieverbunde, Förderprogramme
- EB, Energiebeauftragte, Energieplanung

So far

Very constructive collaboration, common goals

Great potential of resources

Many different actors, complexity

Finding balance between centralized, dezentralized collaboration, establishing teams, getting to know what’s going on

Timing is important

Matching political, scientific and (real)city roadmap

Case Studies

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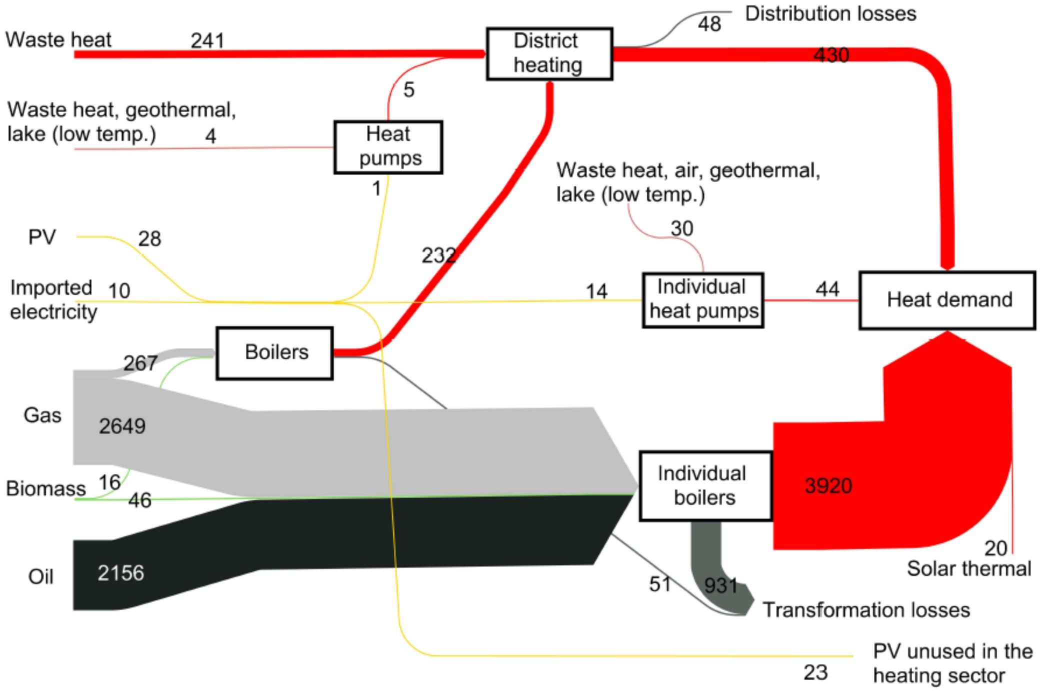
Case Study Romandie

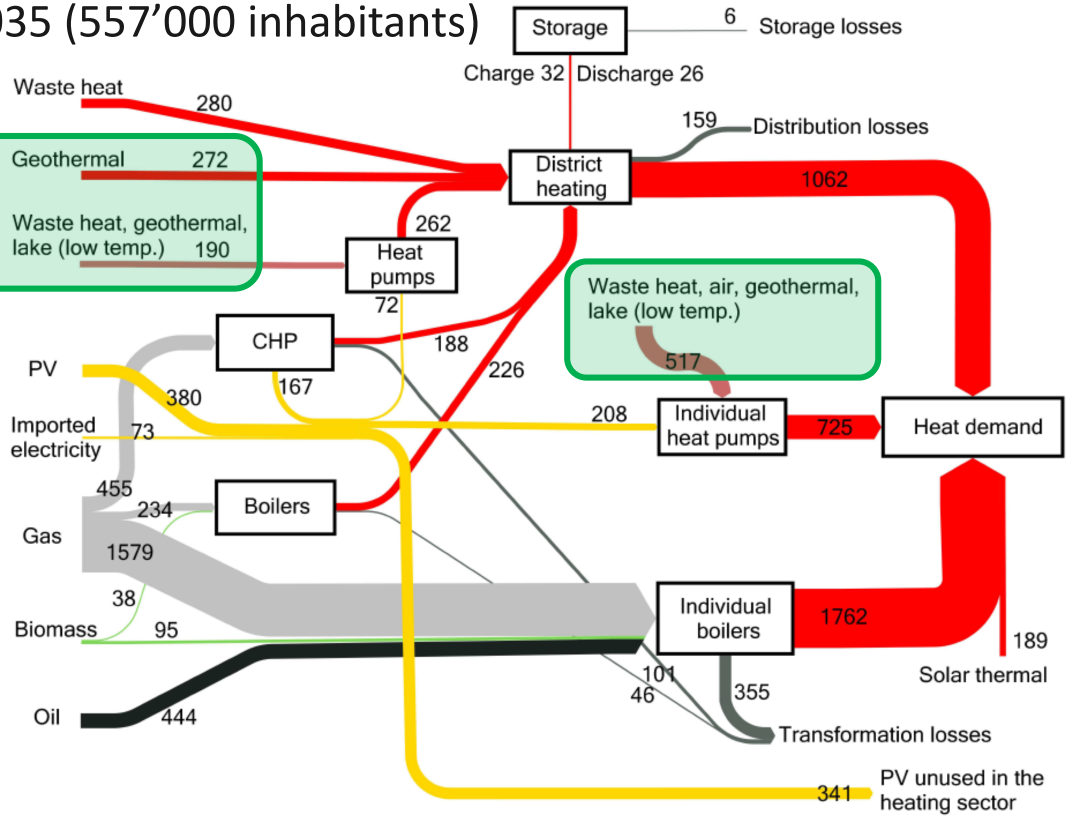
Starting point: Prospective scenarios for the heat supply of Canton Geneva

Values in GWh/year (calibrated simulation, in hourly values)

2014 (482’500 inhabitants)

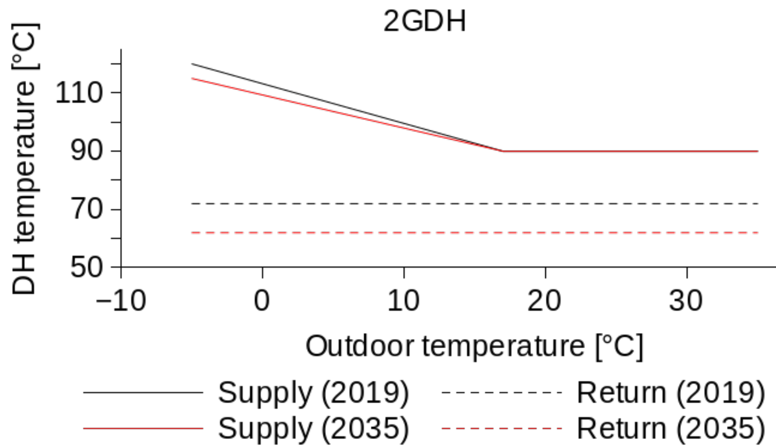


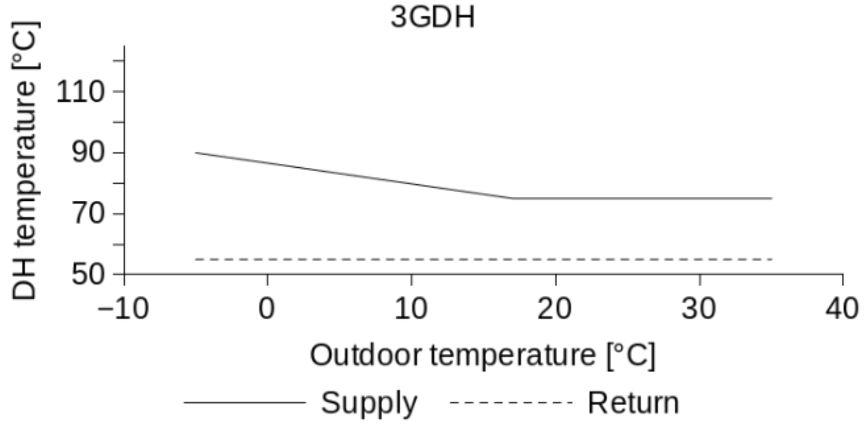
2035 (557’000 inhabitants)

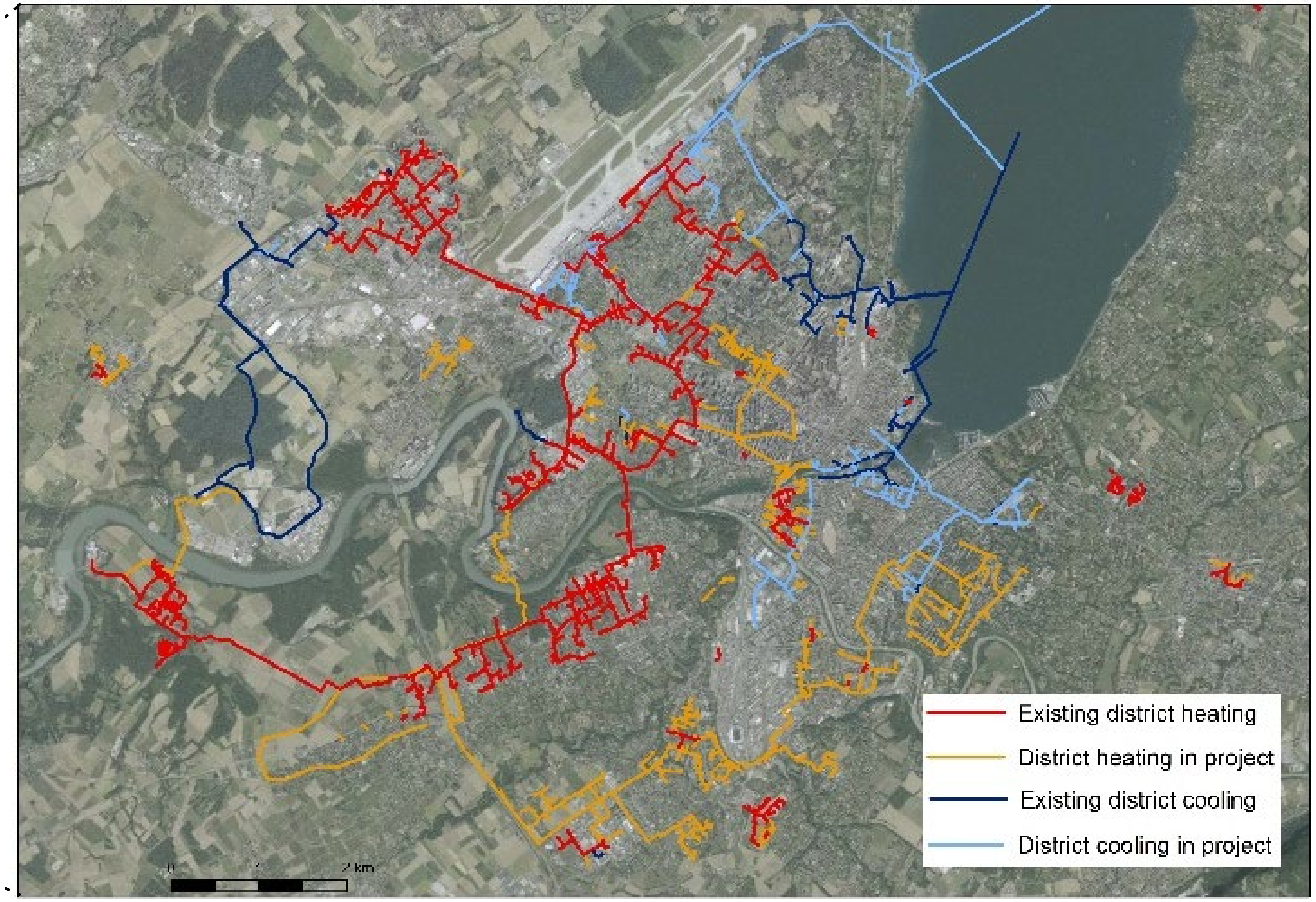


Source: QUIQUEREZ et al. (2016). The role of district heating in achieving sustainable cities: comparative analysis of different heat scenarios for Geneva. http://archive-ouverte.unige.ch/unige:86876

Specific issue: lowering of DH temperatures

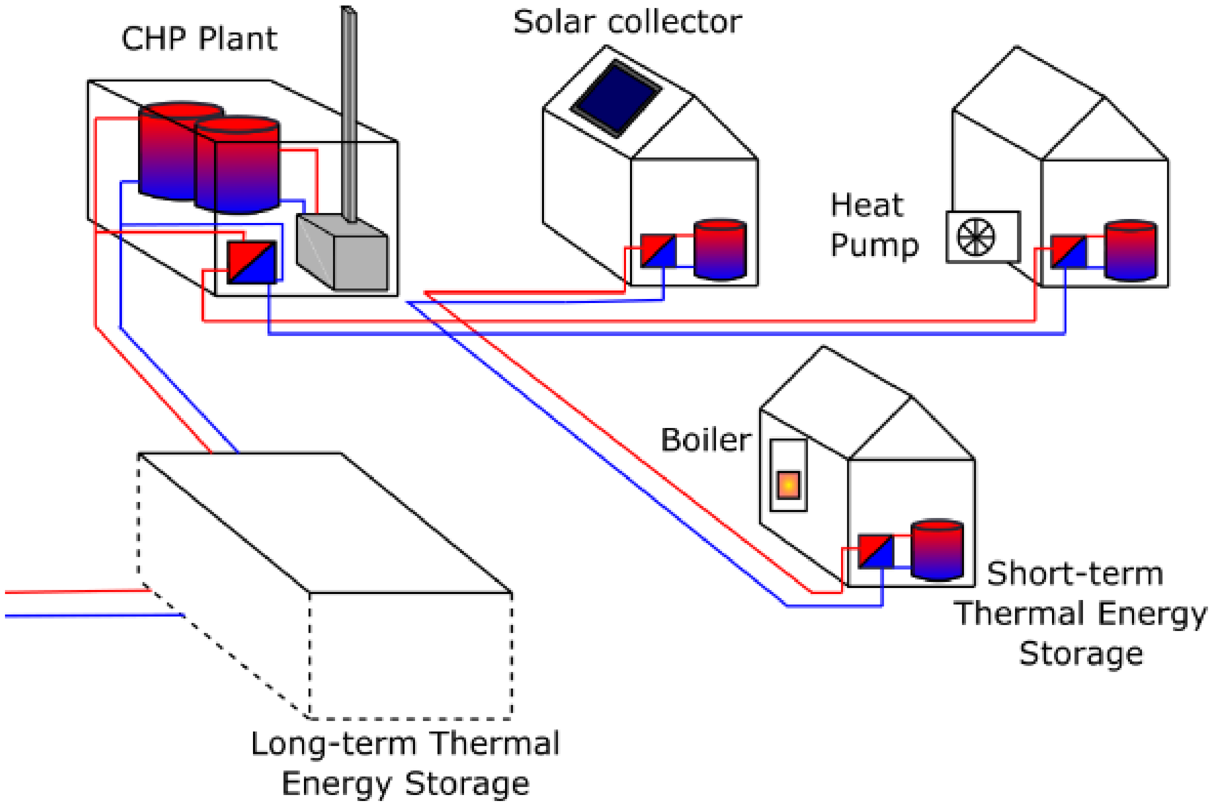






Source: QUIQUEREZ et al. (2020). Scenarios for integration of medium-depth geothermal energy in an evolving district heating system: case study in Geneva (Switzerland). http://archive-ouverte.unige.ch/unige:136510

Lowering of DH return temperatures



Supply temperature

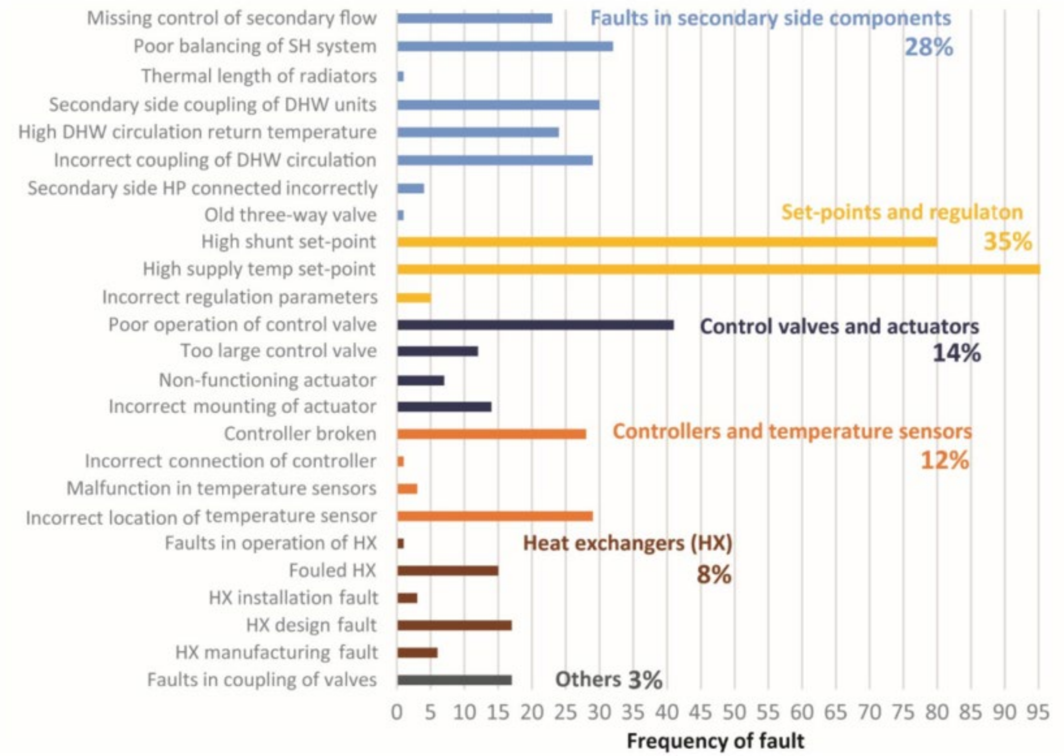
- Space heating: 40 to 80 °C (depending on building type)
- Domestic hot water, 65 to 70 °C (if DHW storage)

Return temperature

- Heat exchanger efficiency
- Hydraulic regulation of heat distribution system of the building
- Substation architecture

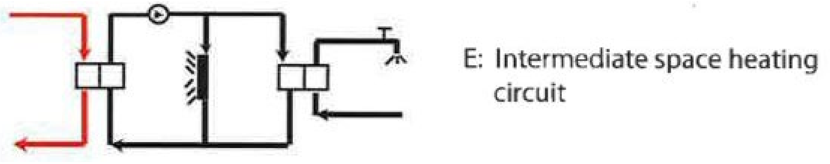
Lowering of DH return temperatures

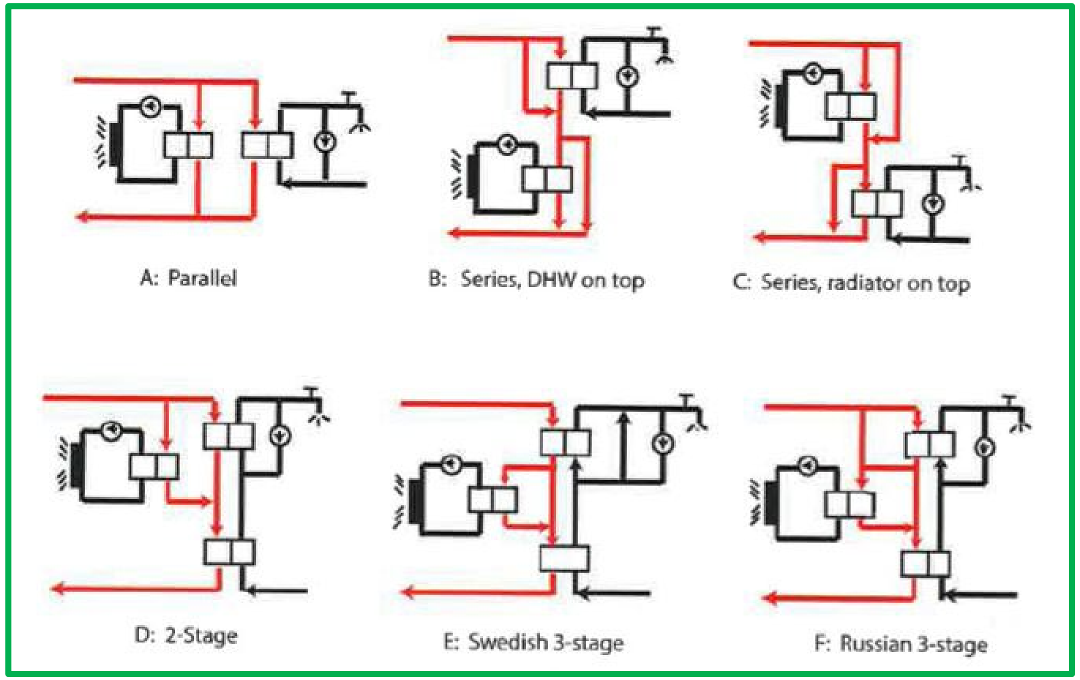
Control & Implementaion



Source: IEA DHC Annex TS2 Implementation of Low-Temperature District Heating Systems. Final report

Substation architectures



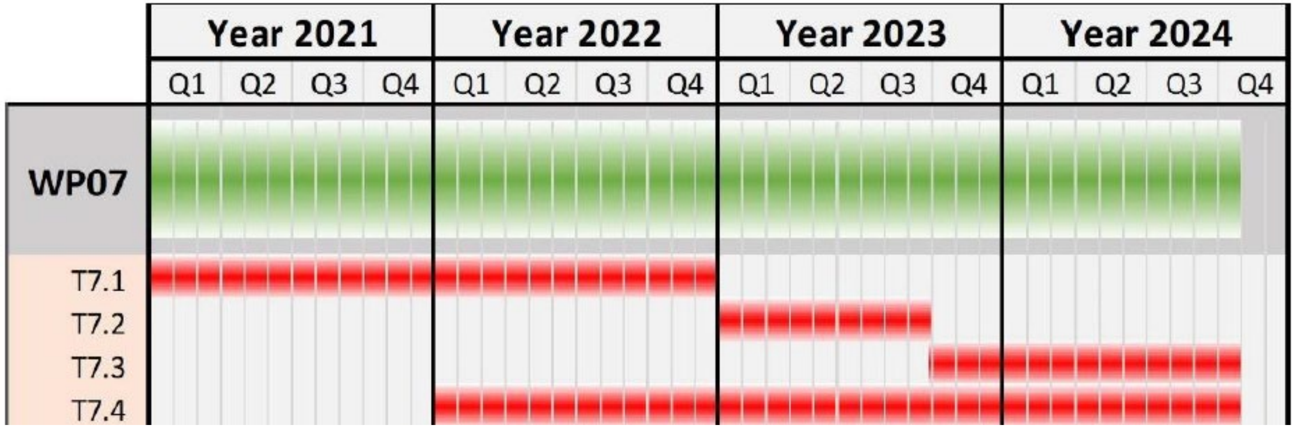


Source: Frederiksen & Werner (2013). District Heating and Cooling

WP 7: Focus and Structure

Focus: Strategies and potentials of temperature reduction on existing district heating networks

- Task 7.1: Temperature reduction in existing DH substations ➔ UNIGE, HEIGVD
- Task 7.2: Impact of different temperature lowering strategies at the level of DH networks ➔ CREM + HEIGVD
- Task 7.3: Interaction between temperature reduction strategies and other energy policy measures ➔ CREM + HEIGVD
- Task 7.4: Comparison of different measures and governance arrangements for the implementation of temperature reduction strategies ➔ ZHAW



Task 1: Temperature reduction in existing DH substations

Objectives:

- Development and testing of an auditing method for existing SST (SH and DHW loads and temperature levels, SST architecture / components).
- Comparative analysis of alternative techniques for substation temperature reduction (literature review, numerical simulation, test bench).
- Proposal and definition of P&D projects, for implementation by cooperation partners.

Cooperation partners:

- SIG (Geneva)
- Coopérative CAD « Le Marais-Rouge » (Les Ponts-de-Martel)

Task 1: Temperature reduction in existing DH substations

Case studies

Geneva: CADSIG (1964) & CADIOM (2001)

- 220 MW (gas boiler + waste incineration)
- Cantonal utility (SIG)
- Urban area, post-war MFB building stoc
- Mostly standard / pre-existing SST architecture
- Forward: 90-110°C / Return: 70-90°C

➔ Standard / complex case

Les Ponts-de-Martel: CAD Marais-Rouges (2007)

- 2.25 MW (biomass boiler with condensation)
- User cooperative
- Rural area, 79 old buildings (mainly < 1920)
- Optimization of secondary side of heat distribution (SST architecture, hydraulic balancing & flowrate regulation)
- Forward: 70-83°C / Return: 40°C

➔ Exemplary case

Work done so far

General:

- Literature review (issues, error detection + optimization methods, …)

Case studies:

- System description
- Review of previous optimisations / audits
- Collection and pre-analysis of existing monitoring data (2 – 10 years, hourly / monthly)
- Identification / visit of SST to be analyzed in priority