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An: Cordin Arpagaus
Betreff: DeCarbCH Newsletter September 2022

sweet swiss energy research for the energy transition

DeCarbCH

DeCarbCH Newsletter September 2022

Dear DeCarbCH Partners,

This is the 7th Newsletter of SWEET DeCarbCH.

The focus is on Work Package WP07 with case studies of the Romandie: Strategies and potentials of temperature reduction on existing district heating networks.
We present an exclusive interview with the WP leader, Dr. Pierre Hollmuller from the University of Geneva.

In addition, we report on current research projects on district heating networks in Les Ponts de Martel and at CAD-SIG, substation architectures and optimizations to reduce return temperatures, and numerical dynamic models.

Our monthly Lunch Talk series continues. On September 20, we are looking forward to the presentation by Christiane Egger from the Austrian OÖ Energiesparverband. The topic will be Renewable Heat: Is it Rocket Science? If you missed the past Lunch Talks, they can still be viewed on our YouTube channel.

Finally, we want to draw your attention to our "Do not forget cooling" campaign. The goal is to rank cooling networks higher in the priority lists of Swiss cities when planning for the future.
#dontforgetcooling

Don't forget to follow us on LinkedIn and Twitter.

All the best!
The DeCarbCH management team

This Newsletter offers the following content:

1. Interview with Dr. Pierre Hollmuller from UNIGE
2. Case study 1: District heating network in Les Ponts de Martel (Neuchâtel)
3. Case study 2: District heating network CAD-SIG in Geneva
4. Substation architectures and optimizations
5. Substation ranking by influence on return temperature
6. Visits and audits of district heating substations
7. Numerical dynamic models of substation architectures

8. Lunch Talk: Renewable Heat: Is it Rocket Science?
9. Futher News: "Do not forget cooling" (SWEET DeCarbCH campaign)
10. YouTube Videos of Lunch Talks

Interview with Dr. Pierre Hollmuller from UNIGE-SE

Pierre is leading the WP07, Case studies Romandie: strategies and potentials of temperature reduction on existing district heating networks.

UNIVERSITÉ DE GENÈVE

WP 07

Question: Could you describe the topic of your WP?

Answer Dr. Pierre Hollmuller**:** While reducing temperatures in district heating networks (DHN) is a priority for integrating renewable heat, it is conditioned by the temperature level of the individual substations. This issue is of particular concern for existing buildings, where distribution temperatures are known to be high and where corrective actions within inhabited spaces are of a certain

complexity. Several techniques for temperature reductions at the substation level have been proposed or are currently under investigation, but their actual implementation on existing DH substations depends, to a large extent, on pre-existing conditions. Furthermore, specific case studies need to analyze the real benefit of temperature reduction at the DH network level and the interaction between temperature reduction strategies and other energy policy measures. Within this WP, these issues will be tackled using case studies on existing DH systems in an urban and rural context, requiring close collaboration with our cooperation partners.

Question: How does it relate to DeCarbCH?

P. Hollmuller: In the case of existing 2nd generation DH networks (with nominal 120 °C supply/70 °C return temperatures), integration of low-temperature resources by way of heat pumps (with production at 90 °C) is intrinsically limited to around 50% share of the annual delivered heat. On the contrary, temperature reduction of such DH (nominal 100 °C supply/60 °C return) could increase this share to 90%. The WP07 is in direct link with the overall DeCarbCH project, which addresses the colossal challenge of decarbonization of heating and cooling in Switzerland by facilitating, speeding up, and de-risk the implementation of renewables for heating and cooling in the residential sector.

Question: What are the main objectives?

P. Hollmuller: Based on actual case studies, in relation to cooperation partners, we strive to gain a solid understanding of i) Strategies/actions to lower temperature levels on existing substations; ii) the impact of such strategies at the level of the DHN network in terms of integration of renewable heat; iii) Interaction between temperature reduction strategies and other energy policy measures; iv) socio-technical dynamics of the implementation of temperature reduction measures; v) suitable socio-economic and policy measures to accelerate the diffusion of such solutions.

Question: What are the main research questions?

P. Hollmuller: Task 1 tackles the issue of temperature reduction techniques at the substation level: optimization/control of flowrates and heat exchanger sizes, cascade production of SH and DHW, instantaneous DHW production (without storage) for suppression of legionella issues, etc.

Task 2 focuses on the impact of the technologies mentioned above on the operating temperatures of the DHN itself. It is foreseen that two case studies will be selected, one in an urban setting and one in a rural/semi-urban setting. The selection will be based on the existence of detailed monitoring at the substation level combined with motivated utility partners.

Task 3 deals with the interaction between temperature reduction strategies and other energy policy measures, like i) the expected impact of different refurbishment policies on the possible lowering of DHN temperatures; ii) the relation between foreseeable DHN temperatures and the achievement of renewable energy policies at municipal/regional level; iii) the impact of solar energy strategies on DHN temperatures.

Task 4 analyses the relation between temperature reduction measures and governance arrangements in terms of the nature and intensity of economic relationships between the different actors (e.g., modified energy sales, delivery guarantees and contractual obligations, terms for the sale of heat from renewable energy sources).

Question: What are the main expected outcomes of your WP?

P. Hollmuller: Most of the existing DHN networks in Switzerland have not been optimized in terms of forward/return temperature. The cooperation partners of WP07 have expressed keen interest in implementing possible temperature reduction strategies on their existing DH networks. Once properly identified, implemented, and validated, such strategies should be transposable to other existing DH networks.

Preliminary calculation shows that in the case of existing 2nd generation DH networks (with nominal 120 °C supply/70 °C return), integration of low-temperature resources by way of heat pumps (with production at 90 °C) is intrinsically limited to a 50% share of the annual delivered heat. However, temperature reduction of such DH (nominal 100 °C supply/60 °C return) could increase this share to 90%.

Question: Could you provide some examples to illustrate the specialty of your WP?

P. Hollmuller: The short News contributions illustrate some ongoing tasks, covering aspects such as data collection on used case studies, audit of existing DHN and substations, and numerical simulation models.

Question: A final word for our readers?

P. Hollmuller: In the energy field, as elsewhere, efficiency is the fruit of an iterative process of innovation, observation, and training: it's not because a technology is efficient that is being used, it's because it is being used that it becomes efficient!

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NEWS from WP07: Case studies Romandie: Strategies and potentials of temperature reduction on existing district heating networks

Case study 1: District heating network in Les Ponts de Martel (Neuchâtel)

This rural district heating network feeds more than 80 substations and supplies about 6 GWh of heat annually. An optimized substation architecture is used to limit the supply and return temperatures.

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Case study 2: District heating network CAD-SIG

The CAD-SIG in the canton of Geneva has high supply/return temperatures of around 110 °C/70 °C. It supplies 214 substations, mostly multifamily buildings from the 20th century. Target is to reduce the working temperatures to 90 °C/55 °C in a few years.

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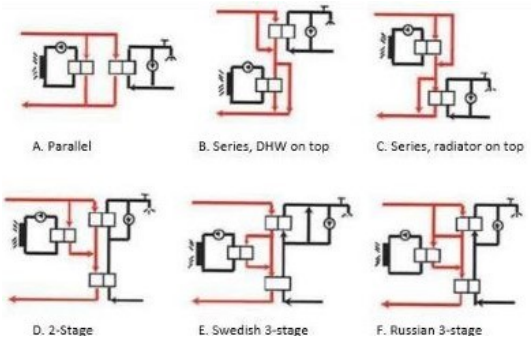

Substation architectures and optimizations to lower the return temperature on district heating networks

In view of reducing high return temperatures, the first solution is to check the proper functioning of the substations by regular monitoring and checking the frequent sources of error when their performance is not satisfactory. A next step may be a modification in the choice of the substation architecture.

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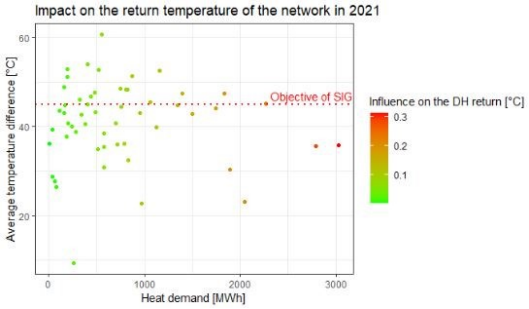

District heating substation ranking by their influence on primary return temperature

To achieve lower temperatures in existing district heating networks, all substations must first be ranked according to their influence on the primary return temperature. In a second step, useful information can be gathered by visiting problematic substations and identifying the most obvious sources of temperature errors.

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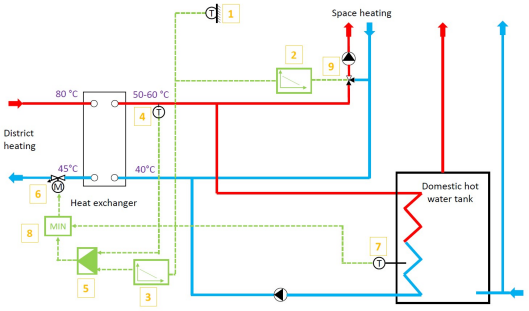
Visits and audits of district heating substations

The WP07 team developed a specific checklist and visited several substations that have a significant impact on the return temperatures



Numerical dynamic models of substation architectures using TRNSYS® software

The Laboratory of Solar Energetics and Building Physics (LESBAT) has

of the district heating network. The visit also uncovered other potential problems, such as fixed-flow pumps, partially open bypasses, and hot water storage tanks with production through internal heat exchangers with unknown characteristics.

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developed several numerical dynamic models, which will be validated using data collected from different substations. A measurement campaign will be launched before the end of the year.

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FURTHER NEWS

In Swiss cities, heating networks are being installed, but many lack plans to install cooling networks.

"Do not forget cooling" is a SWEET DeCarbCH campaign to make the Swiss people aware of the discrepancy between the rise of temperature in cities and the lack of cooling networks plans. The goal is to rank cooling networks higher in the priority lists of Swiss cities when planning for the future.

#dontforgetcooling

Watch our previous Lunch Talks on our YouTube Channel

- *Pinch Analysis*
- *Socio-Economic Challenges*
- *Industrial Heat Pumps*
- *Thermal Networks*
- *Long-term Thermal Energy Storages*
- *Temperature Reduction in District Heating*
- *Solar Energy for Networks / Industry*
- *Perspectives on Thermal Grid Modelling under Uncertainty*
- *Negative Emission Technologies*
- *Case Study – Decarb Zurich*

are available on YouTube and the presentation slides on our DeCarbCH Website.

All the News on the Website

EVENTS

- Lunch Talk -

Renewable Heat: Is it Rocket Science?

This Lunch Talk is online on September 20, 2022 at 12:00

REGISTER

Any question can be sent to info@sweet-decarb.ch

DeCarbCH has received funding from the SFOE in their SWEET programme.

Our mailing address is:
SWEET DeCarbCH
Room B 609
Boulevard Carl-Vogt 66
Genève 1205
Switzerland