



DeCarbCH Newsletter

December 2023

Dear DeCarbCH Partners,

Before the end of the year, we would like to inform you about the latest news from the SWEET DeCarbCH project.

This Newsletter covers various key topics such as [Past Events](#), [Lunch Talks](#) and specific news on [Heat Pumps](#), [Process Integration](#), [Thermal Networks](#), and [Socio-Economic](#) studies.

Recently, two Lunch Talks were held on the following topics:

- [5 Dec 2023, Revolutionary energy storage cycle with carbon free aluminium, presented by Yvonne Bäuerle \(OST\)](#)
- [7 Nov 2023, Current legal issues relating to district heating, presented by Prof. Andreas Abegg \(ZHAW\)](#)

If you have missed a Lunch Talk, you can still watch it on our [YouTube Video Channel](#).

We have also compiled a list of [Publications](#) with results from DeCarbCH. In addition, all deliverables and highlight reports are now listed on the [ARAMIS](#) platform.

Also, we would like to draw your attention to the [Advanced Training Courses](#) for which registration is still possible until the end of 2024.

- [CAS Heat Pumps/Refrigeration at OST](#)
- [CAS Energy Digital at OST](#)
- [Module Energy Storage - Theory and Applications at OST](#)
- [CAS Thermal Networks at HSLU](#)

Finally, save the dates of the [Upcoming Events](#) for 2024:

- [25 Jan 2024, Fernwärme-Forum, Bern](#)
- [26 Jan 2024, 11th Swiss Symposium Thermal Energy Storage, Lucerne](#)
- [4-5 March 2024, SWEET DeCarbCH Annual Networking Conference, Olten](#)
- 26 June 2024, Wärmepumpen-Tagung, Burgdorf
- [4 Sept 2024, 3rd SWEET Conference 2024, Bern](#)
- 7 Nov 2024, 10th Symposium Solar Energy and Heat Pumps, Rapperswil

We hope you will join us at these events, which will bring participants together for knowledge exchange and networking.

Contact the DeCarbCH management team with questions.

Don't forget to follow us on [LinkedIn](#) and [Twitter](#).

Last but not least, we wish you a Merry Christmas and a Happy New Year. We look forward to seeing you again in 2024.

[The DeCarbCH management team](#)

Upcoming Events

BRIDGING THE GAPS

HOW CAN WE SUPPORT
THE ENERGY TRANSITION
TODAY AND IN THE FUTURE?



11th Swiss Symposium Thermal Energy Storage
Friday, 26 January 2024, 9:00 - 18:30

26 January 2024, HSLU

11th Swiss Symposium Thermal Energy Storage

The symposium will focus on gaining insights into the pivotal role of thermal energy storage in the decarbonisation efforts of Switzerland and Europe.

The event will feature

- *a combination of long and short presentations,*
- *engaging panel discussions,*
- *workshops, and*
- *an exhibition, all centered around the theme:*

Bridging the gaps: How can thermal energy storage support the energy transition today and in the future?

[read more](#)



4-5 March 2024, Olten

3rd SWEET DeCarbCH Annual Networking Conference

The 3rd DeCarbCH Annual Networking Conference enables exchange within the DeCarbCH community, with academic research partners as well as with partners from industry and the public. Looking forward to a fruitful collaboration!

[read more](#)

Past Events



6 September 2023, Bern
2nd SWEET Conference

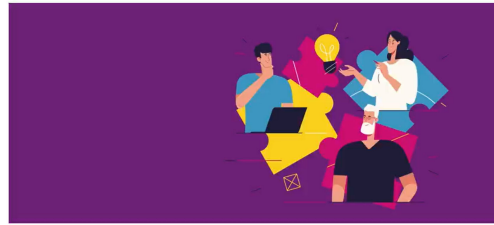
The 2nd SWEET Conference took place on 6 September 2023 at the Eventforum in Bern.

The conference offered a platform for exchange between experts from energy research and representatives from the private sector, associations, cantons, cities, municipalities and the federal government. The presentations and posters are available for download.

The 3rd SWEET Conference 2024 will take place on 4 September 2024.

Save the date!

[read more](#)



KTT FOR SWEET – MEETING II 2023

12 December 2023
2nd KTT Meeting 2023

Daniel Saraga from [Sagada Communication](#) explained to the social media managers of the SWEET consortia in a [workshop](#) how research initiatives can maximize the impact of using LinkedIn with limited resources! A few key messages:

- *Write to be read with a clear message and short sentences*
- *Regularly maintain and expand your network*
- *Leverage members communicating in different languages to reach specific communities*
- *YouTube videos of seminars are a low-hanging fruit for limited investment*

[read more](#)

Tagung zum Energie- und Nachhaltigkeitsrecht

Wärmeversorgung und Strom

Dienstag, 5. September 2023, 13.00 Uhr
PH Zürich, Lagerstrasse 2, Zürich



Building Competence. Crossing Borders.

In Kooperation mit



5 September 2023, Zurich Conference on Energy and Sustainability Law - Heat Supply and Electricity

The conference organized by ZHAW examined the interdependence of thermal energy and electricity from a technical, planning, political and legal perspective.

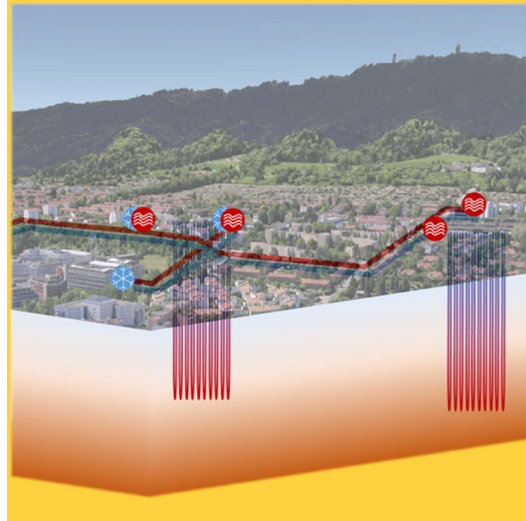
[read more](#)

Symposium

Solarenergie und Wärmepumpen

Fokus: Thermische Netze

2. November 2023



2 November 2023 9th Symposium Solar Energy and Heat Pumps: Focus Thermal networks

The symposium, with a focus on thermal networks organized by the SPF at OST, attracted around 100 participants. Next year's symposium will take place on 7 November 2024. Save the date!

[read more](#)

Focus Heat Pumps



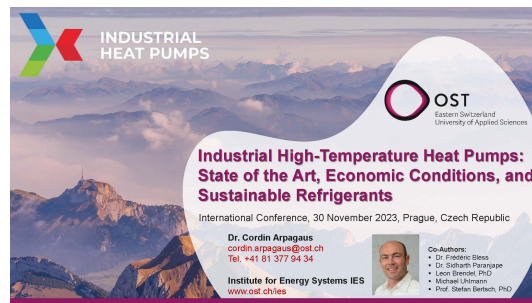
27 October 2023

Field experience with heat pumps: Improvement potential and developments

This article presents a summary of key findings from field experience with heat pumps from 2015 to 2021 and outlines potential improvements.

The article also provides an outlook on possible future developments of heat pumps up to 2050.

[read more](#)



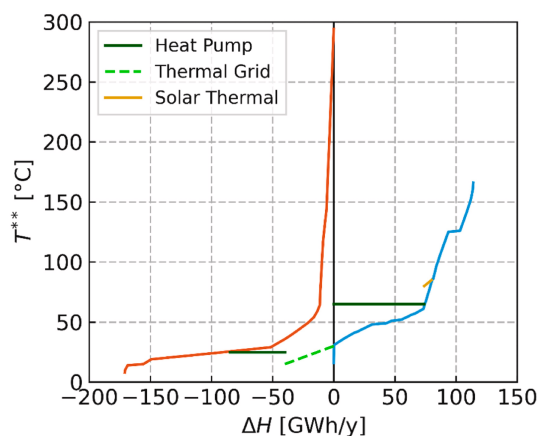
29-30 November 2023

Industrial High-Temperature Heat Pumps: State of the Art, Economic Conditions, and Sustainable Refrigerants

Dr. Cordin Arpagaus from IES at OST presented an overview at the International Conference on Industrial Heat Pumps in Prague.

[read more](#)

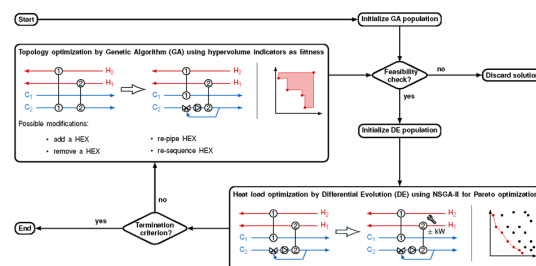
Focus Process Integration



1 November 2023

Characterizing sector-wide thermal energy profiles for industrial sectors

This study presents a novel methodology for constructing



31 August 2023

Retrofit for multi-period processes for practical heat exchanger network design

HSLU-TEVT developed in collaboration with TU-Wien an evolutionary two-level algorithm for multi-period heat exchanger network retrofit that considers

sector-wide composite curves to accurately characterize the thermal energy demands and the available excess heat sources for the Swiss industry subsectors.

[read more](#)

practical constraints. The algorithm includes a Pareto optimization to consider greenhouse gas emissions in addition to the total annual cost.

[read more](#)

Focus Thermal Networks

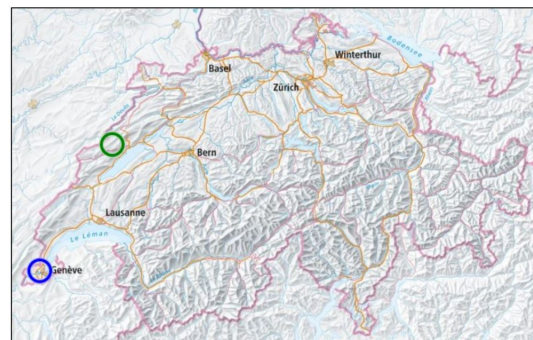


30 September 2023

Themenheft 60: Thermische Netze im Faktor Verlag

The booklet shows how thermal networks work, what types there are and what to consider when planning.

Practical examples serve as inspiration for municipalities, building owners and investors who want to implement a district heating or cooling project.



31 October 2023

Strategies and potentials of temperature reduction on existing district heating substations (DH SST)

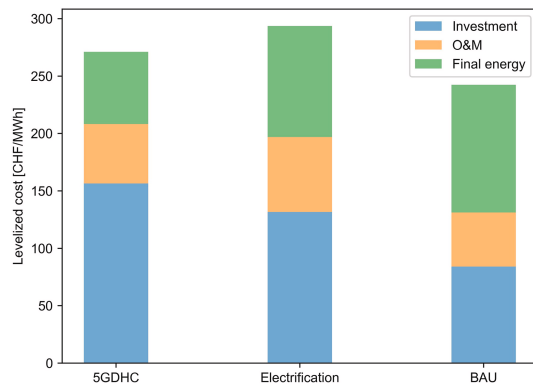
This study tackles the issue of temperature reduction in existing DH SSTs with a focus on two case studies:

- CAD-SIG located in Geneva: 2nd generation (2G), and
- CAD Le Marais-Rouge located in Les Ponts-de-Martel.

[read more](#)

HSLU actively contributed to the new booklet.

[read more](#)



15 December 2023
Techno-Economic and Sensitivity Analysis on 5th Generation District Heating and Cooling combined with Seasonal Borehole Thermal Energy Storage

5th Generation District Heating and Cooling (5GDHC) is the perfect partner for seasonal thermal storage with shallow borehole technology.

When the cooling-to-heating ratio is within the optimal range of 0.4 to 1.0, 5GDHC reaches a lower levelized cost compared with modern heat pump-driven systems and present-day gas-fired heating systems.

[read more](#)



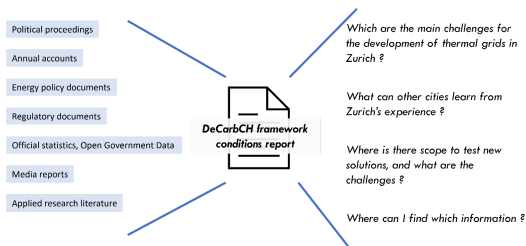
31 October 2023
Planeto SA - Spin-off

The company [Planeto SA](#) is a spin-off from the University of Geneva to commercialize the [TESSA \(Thermal Energy System Simulation Assistant\)](#) software.

TESSA is the digital toolbox that optimizes time and costs in district energy planning.

[read more](#)

Focus Socio-Economics

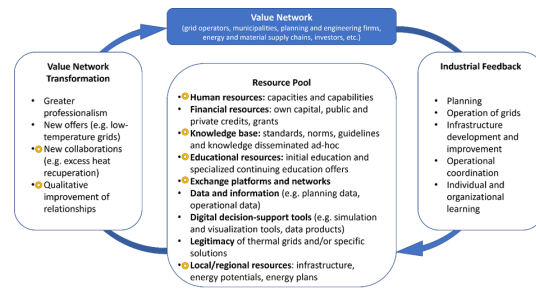


13 December 2023

A rich data pool makes the city of Zurich an ideal laboratory for accelerating the heating and cooling transition

DeCarbCH compiles and synthesizes diverse datasets to understand the challenges and success factors of accelerating decarbonization and thermal grid development. A forthcoming report will provide an overall view of thermal grids in Zurich

[read more](#)



5 December 2023

Study on how to support the further development of the thermal grids ecosystem

The WP2 team conducted 17 semi-structured interviews with actors involved in the development of thermal grids: utilities, municipal administrations, engineering firms, and intermediary organizations. The study provides a comprehensive picture of current dynamics.

[read more](#)

Advanced Training Courses

CAS Wärmepumpen/
Kältetechnik



23 February 2024

CAS Heat Pumps/Refrigeration

CAS Energie digital



19 February 2024

CAS Energy Digital

This CAS explores IoT, data science,

This CAS provides a basic understanding of a heat pump and what influences the efficiency of the application.

The CAS can be attended as an independent course or as part of the MAS in Energy Systems or the M.Eng. Energy Systems and Energy Economics

Start: 23 February 2024

End: 7 June 2024

Registration until the end of 2023

[Details and Registration](#)

and smart grids in-depth and provides the skills to work independently with specific applications.

The CAS can be attended as a self-contained course or as part of the MAS in Energy Systems or the M.Eng. Energy Systems and Energy Economics.

Start: 19 February 2024

End: 3 June 2024

Registration until the end of 2023

[Details and Registration](#)

Modul «Energiespeicher – Theorie und Anwendungen»



16 May 2024

Module "Energy storage - theory and applications"

This module highlights various aspects of energy storage, including current and future demand as well as current areas of application.

The module provides an overview of different technologies and familiarizes with technical and economic key figures.

Dates: 16, 17, 23 and 24 May 2024

[Details and Registration](#)

CAS Thermische Netze

HSLU Hochschule
Luzern

27 October 2023

CAS Thermal networks

This CAS provides the knowledge required to create and operate sustainable industrial and district networks.

It enables the successful implementation of projects in district heating and is oriented towards the expected future structure for grid-bound thermal energy supply.

This CAS can also be attended as part of the MAS program EN Bau

Start: 27 October 2023

End: 6 February 2024

Lunch Talks

LEGAL ISSUES
RELATING TO
DISTRICT HEATING
by Andreas Abegg (ZHAW)

sweet swiss energy research
for the energy transition
DeCarbCH
LUNCH TALKS SERIES

7 November 2023

Current legal issues relating to district heating

[Presentation given by Andreas Abegg \(ZHAW\)](#)

This talk addresses the current legal issues regarding responsibility and planning requirements for district heating networks, such as permits and concessions, requirements for delegation to third parties, connection obligations and rights, and finally rules for public tendering.

[read more](#)

REVOLUTIONARY ENERGY STORAGE
by Yvonne Bäuerle (OST)

sweet swiss energy research
for the energy transition
DeCarbCH
LUNCH TALKS SERIES

5 December 2023

Revolutionary energy storage cycle with carbon-free aluminum

[Presentation given by Yvonne Bäuerle \(OST\)](#)

This talk presents a new technical solution that converts aluminum oxide into elementary aluminum (Power-to-Al) for long-term storage of renewable energy with an unmatched energy storage density of >15 MWh/m³.

[read more](#)

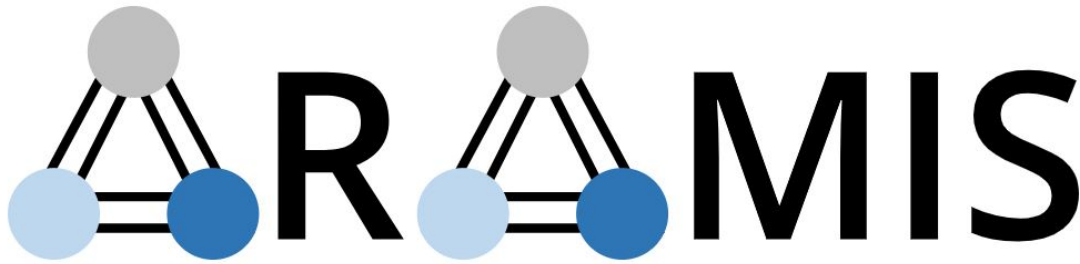


Watch our previous Lunch Talks on our YouTube Channel

1. [Pinch Analysis](#)
2. [Socio-Economic Challenges](#)
3. [Industrial Heat Pumps](#)
4. [Thermal Networks](#)
5. [Long-term Thermal Energy Storages](#)
6. [Temperature Reduction in District Heating](#)
7. [Solar Energy for Networks / Industry](#)
8. [Perspectives on Thermal Grid Modelling under Uncertainty](#)
9. [Negative Emission Technologies](#)
10. [Case Study – Decarb City of Zurich](#)
11. [Renewable Heat: Is it rocket science?](#)
12. [Deep geothermal energy to decarbonize the Swiss energy system](#)
13. [Bubble in the lake, big thermal storage underwater?](#)
14. [Decarbonisation of heat supply of Vienna's district heating system](#)
15. [Beyond the Numbers: Why Energy Scenarios Often Fail to Connect with Decision-Makers](#)
16. [RESHeat - system for heating, cooling and domestic hot water production for residential buildings](#)
17. [Decarbonising New Zealand Industry through Process Integration and Renewable Energy Integration](#)
18. [Current legal issues relating to district heating](#)
19. [Revolutionary energy storage cycle with carbon-free aluminium](#)

are available on [YouTube](#) and the presentation slides on our [DeCarbCH Website](#).

Deliverables and Highlights



DeCarbCH Deliverables and Highlight Reports are now available on the [ARAMIS](#) data platform

Recent Publications



See our list of publications

Work Package W01

1. Altieri, D., Patel, M.P., Lazarus, J., Branca, G. (2023): Numerical analysis of low-cost optimization measures for improving energy efficiency in residential buildings, *Energy*, 273, 127257, <https://doi.org/10.1016/j.energy.2023.127257>
2. Li, X., Yilmaz, S., Patel, M.K., Chambers, J. (2023): Techno-economic analysis of fifth-generation district heating and cooling combined with

- seasonal borehole thermal energy storage, *Energy*, 285, 129382, <https://doi.org/10.1016/j.energy.2023.129382>
- Li, X., Chambers, J., Yilmaz, S., Patel, M.K.: Sensitivity Analysis of Fifth Generation District Heating and Cooling Coupled with Borehole Thermal Energy Storage with Respect to Cooling Adoption. *Accepted by Journal of Physics: Conference Series*
 - Sasso, F., Chambers, J., Patel, M.K. (2023): Space heating demand in the office building stock: Element-based bottom-up archetype model, *Energy & Buildings*, 295, 113264, <https://doi.org/10.1016/j.enbuild.2023.113264>
 - Wilczynski, E., Chambers, J., Patel, M., Worrell, E., Pezzutto, S. (2023): Assessment of the thermal energy flexibility of residential buildings with heat pumps under various electric tariff designs, *Energy and Buildings*, 294, 113257, <https://doi.org/10.1016/j.enbuild.2023.113257>

Work Package W02

- Speich, M., Ulli-Ber, S.: Applying an ecosystem lens to low-carbon energy transitions: A conceptual framework, *Journal of Cleaner Production*, Volume 398, 20 April 2023, 136429, <https://doi.org/10.1016/j.jclepro.2023.136429>

Work Package WP03

- Baldini, Luca and Mahecha Zambrano, Juan (September 2023): Thermochemical storage networks for integration of renewable energy sources through seasonal load shifting, CISBAT 2023 International Hybrid Conference The Built Environment in Transition. In *Journal of Physics: Conference Series*, Volume 2600, IOP Publishing Ltd, <https://doi.org/10.1088/1742-6596/2600/4/042001>
- Fumey, B., Weber, R., Baldini, L. (2023): Heat transfer constraints and performance mapping of a closed liquid sorption heat storage process, *Applied Energy*, 335, 120755, <https://doi.org/10.1016/j.apenergy.2023.120755>
- Fiorentini, M., Heer, Ph., Baldini, L. (2023): Design optimization of a district heating and cooling system with a borehole seasonal thermal energy storage, *Energy*, Volume 262, Part B, 125464, <https://doi.org/10.1016/j.energy.2022.125464>
- Mennel, S., Villasmil, W., Fischer, L., Tuohy, P. (2023): Decarbonising energy supply: the potential impact on district heating networks of the integration of thermal energy storage and substitution of peak load with base load, CISBAT 2023, Lausanne, Switzerland, 13-15 September 2023, <https://cisbat.epfl.ch>, *Journal of Physics: Conference Series*, Volume 2600, <https://doi.org/10.1088/1742-6596/2600/5/05200>

Work Package WP04

1. Ong, B. H. Y., Bhadbhade, N., Olsen, D. G., Wellig, B. (2023): Characterizing sector-wide thermal energy profiles for industrial sectors, Energy, 282, 129028, <https://doi.org/10.1016/j.energy.2023.129028>
2. Stampfli, J.A., Ong, B. H.Y., Olsen, D. G., Wellig, B., Hofmann, R. (2023): Multi-objective evolutionary optimization for multi-period heat exchanger network retrofit, Energy, 281, 128175, <https://doi.org/10.1016/j.energy.2023.128175>
3. Stampfli, J. (2023). Retrofit for multi-period processes for practical heat exchanger network design [Dissertation, Technische Universität Wien]. reposiTUm. <https://doi.org/10.34726/hss.2023.116946>

Work Package WP05

1. Arpagaus, C., Paranjape, S., Nertinger, S., Tietz, R., Bertsch, S.: [Review of Business Models for Industrial Heat Pumps](#), 36th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2023), 25-30 June 2023, Las Palmas de Gran Canaria, Spain, <https://doi.org/10.52202/069564-0068>
2. Arpagaus, C., Bless, F., Bertsch, S., Krummenacher, P., Flórez-Orrego, D.A., Pina, E.A., Maréchal, F., Calame Darbellay, N., Rognon, F., Vesin, S., Achermann, P., Jansen, C.: [Session Keynote: Integration of High-Temperature Heat Pumps in Swiss Industrial Processes \(HTHP-CH\) \(494\)](#), 14th IEA Heat Pump Conference, 15-18 May 2023, Chicago, Illinois, USA
3. Arpagaus, C., Bever, P.-M., Brendel, L., Bertsch, S.: [Kältemittel heute und in der Zukunft: Neue Vorgaben, neue Kältemittel](#), 7. Internationaler Grosswärmepumpen Kongress, 24./25. Mai 2023, Zürich
4. Arpagaus, C., Kuster, R., Uhlmann, M., Berthold, M., Eschmann, M., Bertsch, S.: [Felderfahrten mit Wärmepumpen in der Schweiz: Verbesserungspotentiale und zukünftige Entwicklungen](#), Energieforschungsgespräche Disentis 2023, 25. bis 27. Januar 2023, Disentis/Mustér, [Kurzfassung](#), [Artikel auf bulletin.ch](#), [Video Link zum Vortrag auf YouTube](#)
5. Arpagaus, C.: [Felderfahrten mit Wärmepumpen: Verbesserungspotentiale und Entwicklungen](#), Bulletin Electrosuisse 7/2023, 27.10.2023
6. Arpagaus, C., Bless, F., Paranjape, S., Bertsch, S.: Integration of High-Temperature Heat Pumps in Swiss Food Processes, ICR2023, 26th International Congress of Refrigeration, 21-25 August 2023, Paris, France, <https://doi.org/10.18462/iir.icr.2023.0367>

7. Ayou, D.S., Arpagaus, C., Bertsch, S.S., Coronas, A.: Performance analysis of add-on large-temperature-lift heat pumps for pasteurization in the juice and dairy processing industries, ICR2023, 26th International Congress of Refrigeration, 21-25 August 2023, Paris, France, <https://doi.org/10.18462/iir.icr.2023.0505>
8. Bertsch, S. and Arpagaus, C.: [High-temperature heat pumps are on the rise - Why is their market uptake slow?](#) Heat Pumping Technologies HPT MAGAZINE, Vol. 41 No 1/2023
9. Ghasemi, M., Saini, P., Arpagaus, C., Bless, F., Bertsch, S., Zhang, X.: [Techno-economic comparative analysis of solar thermal collectors and high-temperature heat pumps with PV for industrial steam generation \(1166\)](#), 14th IEA Heat Pump Conference, 15-18 May 2023, Chicago, Illinois, USA
10. Henninger, S., Arpagaus, C., Benkert, S., Teles de Oliveira, H., Schöttl, P., Kramer, W., Cherri, F., Bertsch, S.: Integration of high-temperature heat pumps in Germany, 14th IEA Heat Pump Conference, 15-18 May 2023, Chicago, Illinois, USA
11. Pachai, A., Hafner, A., Arpagaus, C.: High-temperature working fluids for heat pumps – A way to select the optimal fluid for a given application, [10th IIR Conference: Ammonia and CO2 Refrigeration Technologies, 27-29 April 2023, Ohrid, North Macedonia](#)
12. Saini, P., Ghasemi, M., Arpagaus, C., Bless, F., Bertsch, S., Zhang, X.: Techno-economic comparative analysis of solar thermal collectors and high-temperature heat pumps for industrial steam generation, Energy Conversion and Management, Volume 277, 1 February 2023, 116623, <https://doi.org/10.1016/j.enconman.2022.116623>
13. Sulaiman, A.Y., Cotter, D., Arpagaus, C., Hewitt, N.: Theoretical Evaluation of Energy, Exergy, and Minimum Superheat in a High-Temperature Heat Pump with Low GWP Refrigerants, International Journal of Refrigeration, available online 2 June 2023, <https://doi.org/10.1016/j.ijrefrig.2023.06.001>
14. Vieren, E., Demeester, T., Beyne, W., Magni, C., Abedini, H., Arpagaus, C., Bertsch, S., Arteconi, A., De Paepe, M., Lecompte, S. (2023): The Potential of Vapor Compression Heat Pumps Supplying Process Heat between 100 and 200 °C in the Chemical Industry, Energies, 16(18), 6473, <https://doi.org/10.3390/en16186473>

Work Package WP07

1. Callegari, Simon Augustin, Novoa-Herzog, Ruben, Schneider, Stefan, Brischoux, Pauline, Duret, Alexis, Jobard, Xavier, Hollmuller, Pierre: Strategies and potentials of temperature reduction on existing district heating substations: Two case studies. 2023

All the News on the Website

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



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

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