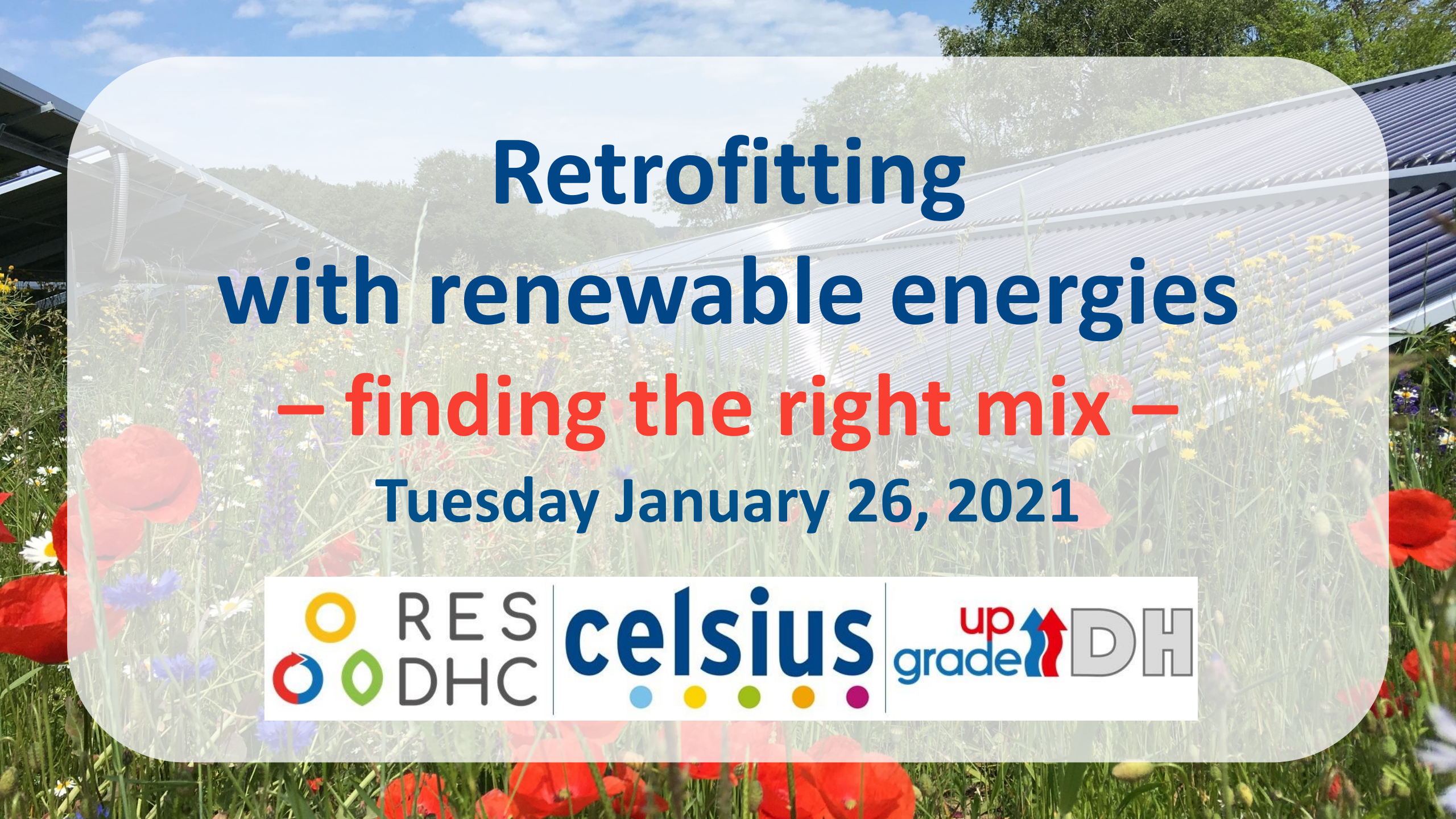

Retrofitting with renewable energies

– finding the right mix –

Tuesday January 26, 2021

RES DHC | celsius | upgrade DH

Emilia Pisani

Communications Officer

Celsius Initiative for Johanneberg Science Park

Moderator:

Retrofitting DHC with renewable energies

Johanneberg Science Park

celsius

Funded by the European Union's Horizon 2020 Programme

Swedish Energy Agency

The Celsius Initiative

- a European project that lives on -

Funded by the European Union's
Horizon 2020 Programme

Swedish Energy Agency

Our purpose

Accelerate the **energy transition** through the deployment of **smart and sustainable heating and cooling solutions** in **cities.**

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Swedish Energy Agency

Celsius: a demand-driven collaboration hub

- ✓ Continuous **knowledge sharing** through the newsletter, webinars, workshops and the Celsius Toolbox.
- ✓ Support **innovation, replication and scaling** of pilots and demonstrators.
- ✓ Influencing European **policy**.
- ✓ **Hands-on support for cities** through the forerunner groups.

Funded by the European Union's Horizon 2020 Programme

Swedish Energy Agency

Celsius forerunner groups - A sounding board for cities

- ✓ Co-creation process with and for cities based on peer to peer support
- ✓ Support cities plan and implement sustainable heating and cooling solutions
- ✓ Include systemic approach

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Swedish Energy Agency

For cities – with cities

- ✓ Supporting one spearhead city at a time
- ✓ Addressing key challenges
- ✓ Expert advice
- ✓ Exchange and inspire
- ✓ Avoid costly mistakes
- ✓ Don’t re-invent the wheel!

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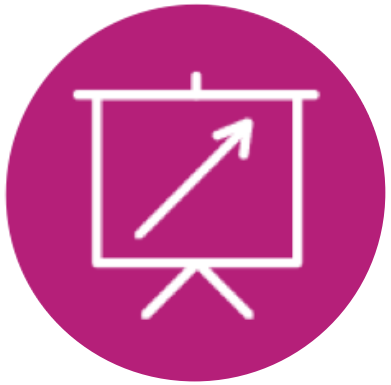
Different groups – different focus



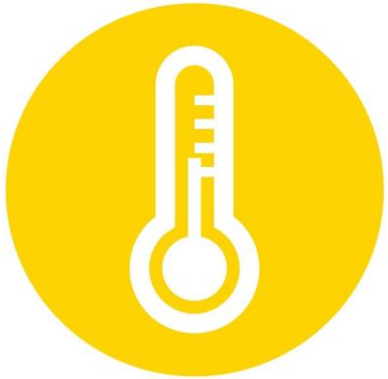
Getting Started

Residual Heat

Cooling

Fossil Free

Low Temperature



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Retrofitting with renewable energies

– finding the right mix –

Moderator:

Emilia Pisani

Johanneberg Science Park

Thomas Pauschinger

Management Member

solites

Matteo Pozzi

General Manager and Co-Owner

OPTIT optimal solutions

Wolfgang Götzhaber

Unit Leader of Energy and Climate

STADT GRAZ

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Swedish Energy Agency

Thomas Pauschinger
Management Member
Solites

Integration of solar thermal and other RES based sources

solites

RES DHC

upgrade DH

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Swedish Energy Agency

Transformation of existing urban district heating and cooling systems from fossil to renewable energy sources

Celsius-Talk: Retrofitting with renewable energies – finding the right mix

Dipl.-Ing. Thomas Pauschinger

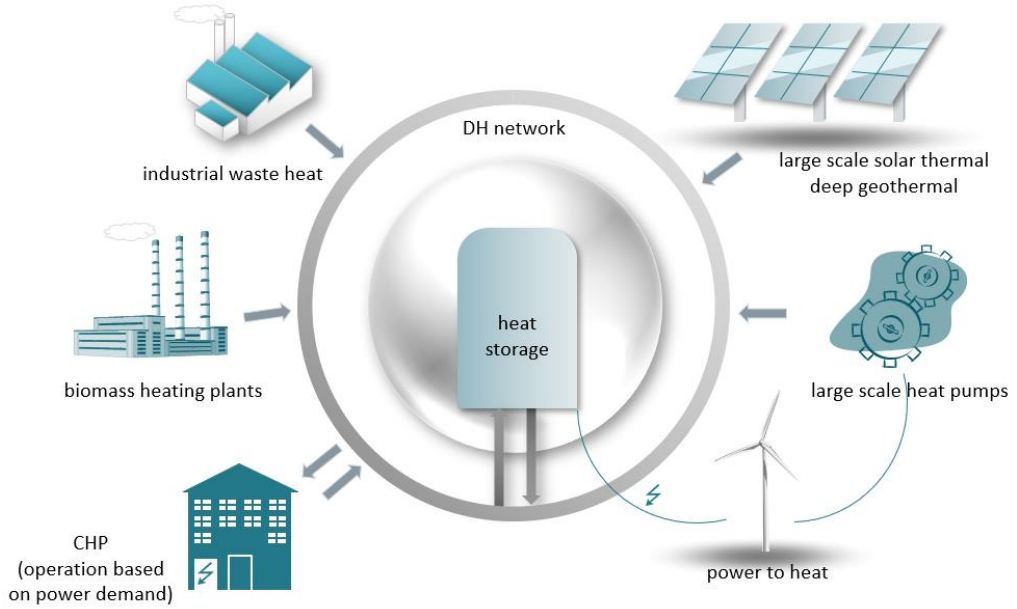
Steinbeis
Research Institute for Solar
and Sustainable Thermal
Energy Systems

Meitnerstr. 8
D-70563 Stuttgart
www.solites.de

solites

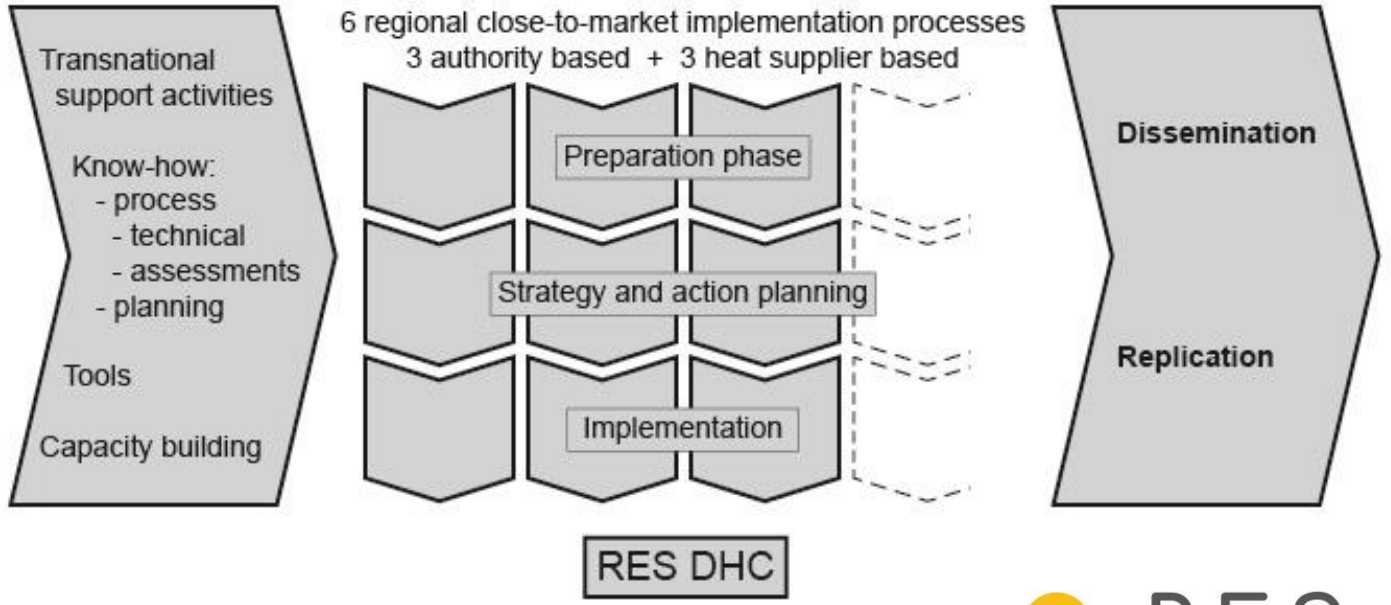
Challenges and opportunities for the transformation towards RES-DHC

- Long-term and holistic transformation process of DHC systems
- RES are often decentral, fluctuating and at lower temperatures
- Transformation along the whole DHC chain
- Local potential of RES, availability of areas
- Opportunities: fast transition, local job and value creation, new business opportunities



Graph: HIR

H2020 RES-DHC – Transformation of existing urban district heating and cooling systems from fossil to renewable energy sources



Main contact:
Steinbeis Research Institute Solites
www.solites.de, www.res-dhc.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952873. The sole responsibility for the content of this publication lies with the authors.

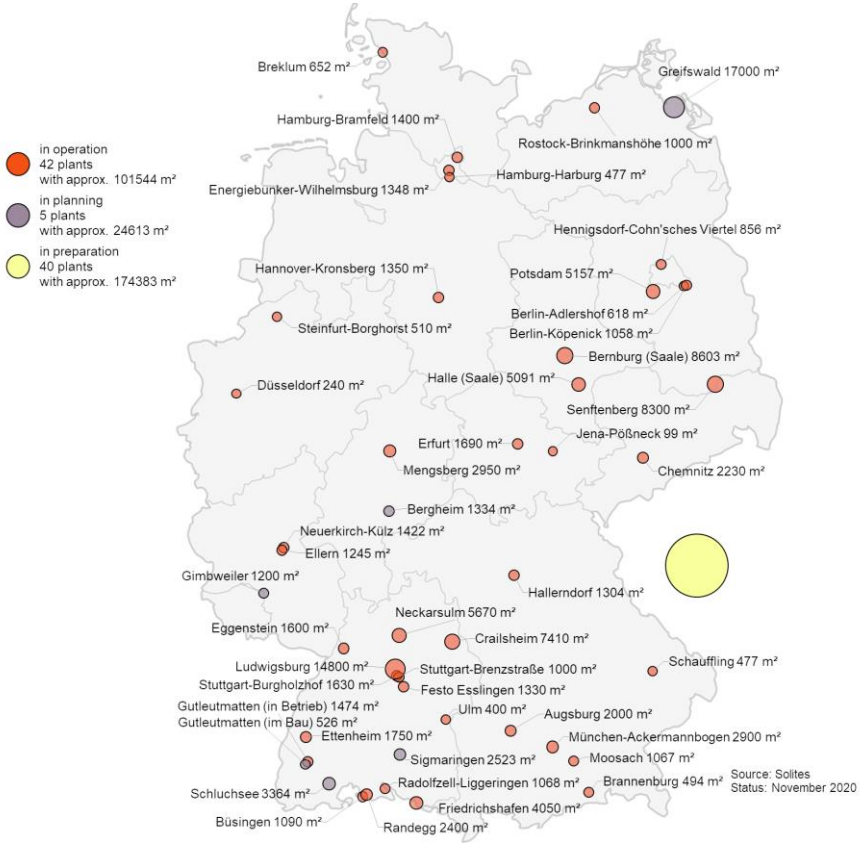
Solar thermal for district heating and cooling

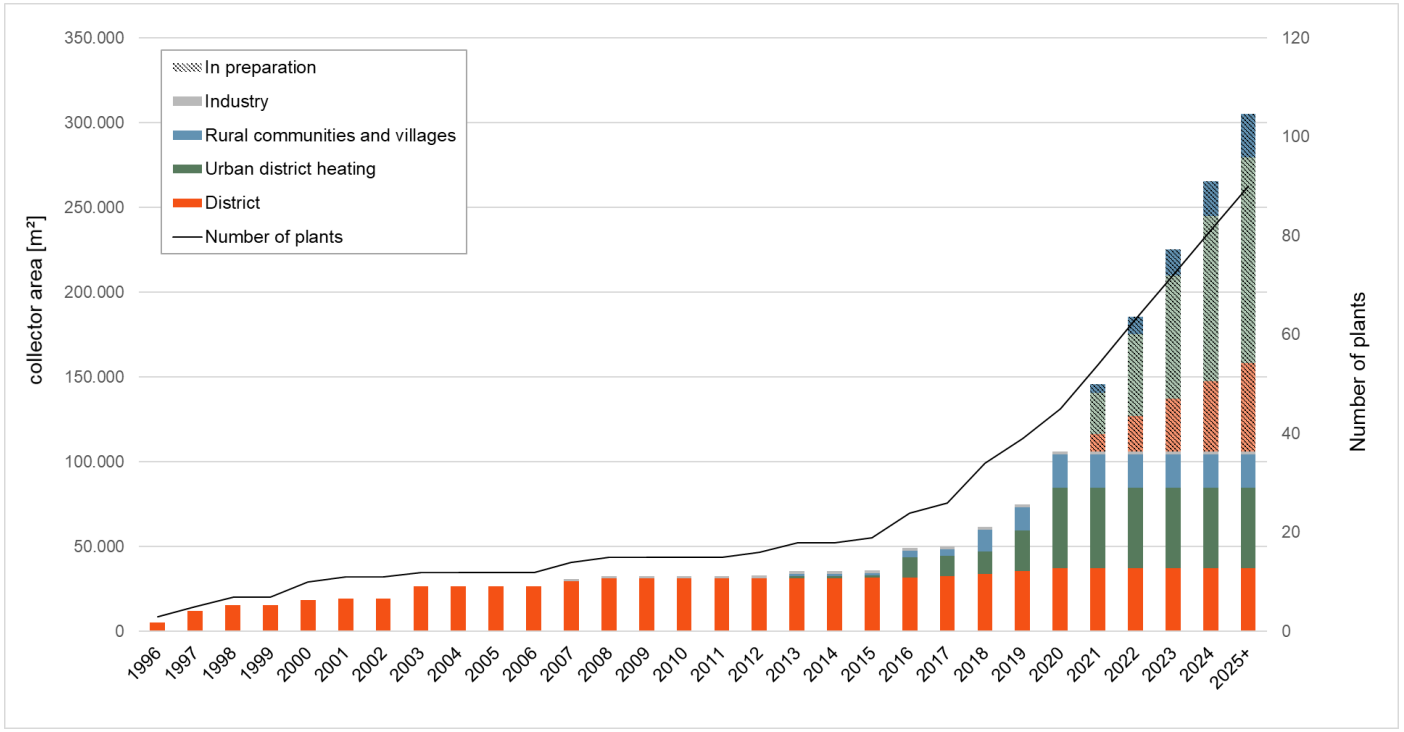
- Emission-free and 100 % RES
- Mature and market available
- Available everywhere, but need for areas
- Capacity up to 100 MW
- Solar fraction up to 50 %
- Stable heat cost of 30 - 50 €/MWh
- New opportunities in the H/C sector

Photo: Eins Energie Sachsen GmbH&Co.KG

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785014. The sole responsibility for the content of this publication lies with the authors.

Development of solar district heating in Germany





Source: Solites, November 2020

Matteo Pozzi

General Manager and Co-Owner
OPTT

Harmonizing with existing production assets

OPTIT
optimal solutions

upgradeDH

Funded by the European Union's Horizon 2020 Programme

Swedish Energy Agency

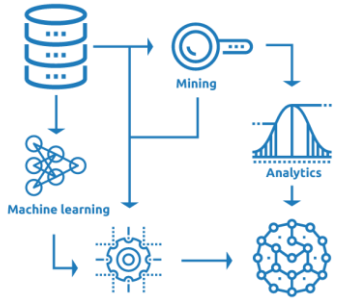
Spin-off of the Alma Mater Università di Bologna, we apply Operations Research, Data Science and Artificial Intelligence to design, develop and provide state-of-art Analytics and Optimization Solutions in Italy, EU & US

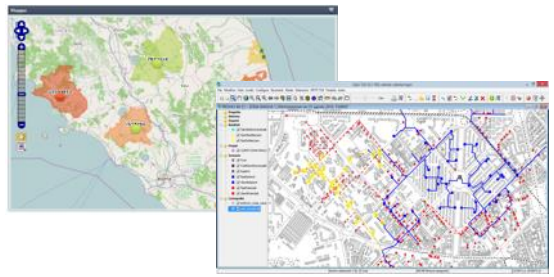
Over 40 talented professional to support Digital Innovation

Bologna: HQ & Main Office

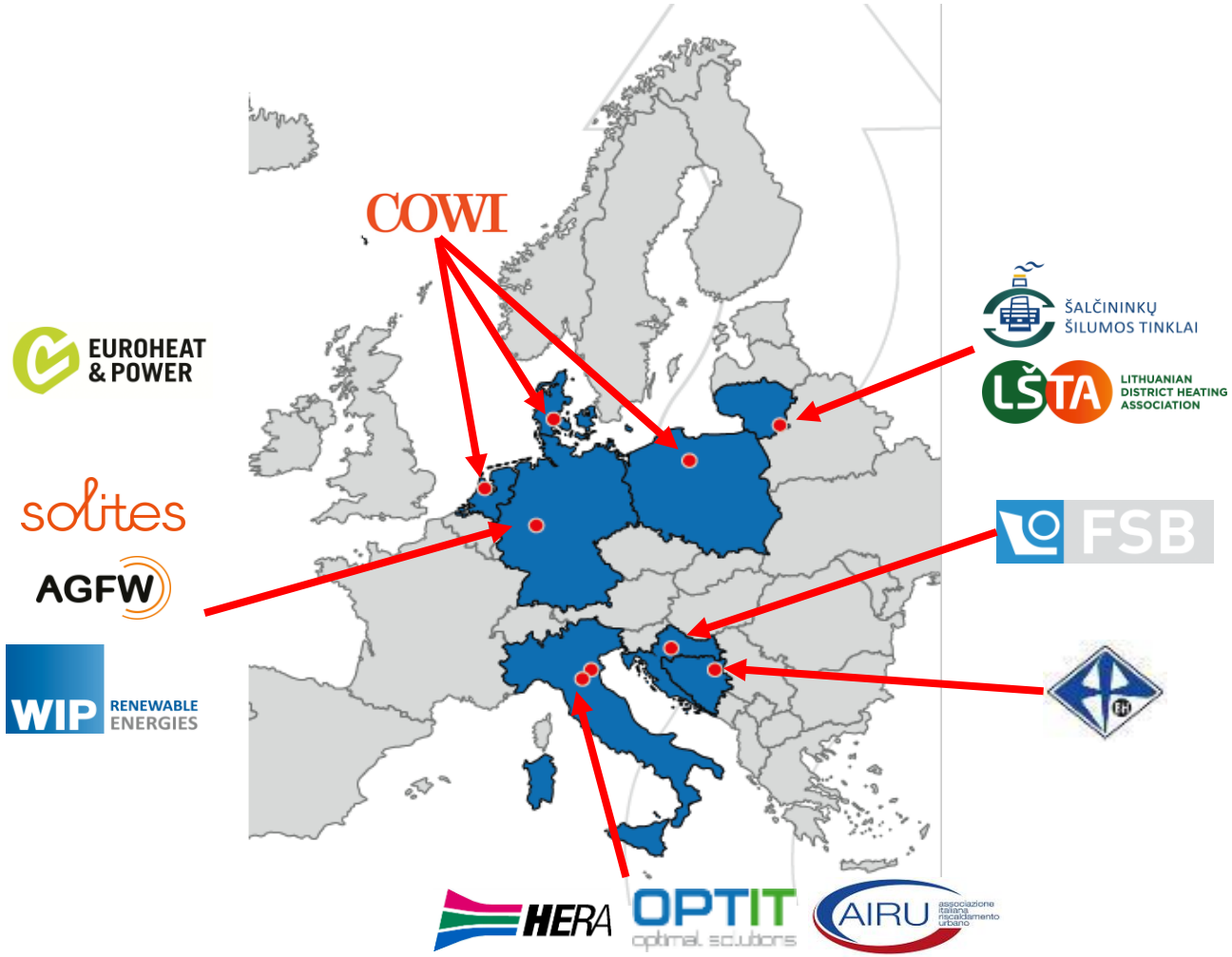
Cesena: Software Factory

BUSINESS ISSUE → **DATA MANAGEMENT** → **MODELLING, ANALYTICS & OPTIMIZATION** → **SOLUTIONS**





Upgrading the Performance of DH Networks in Europe



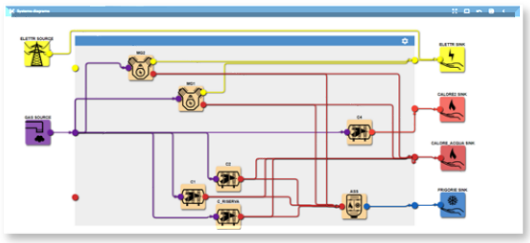
upgrade DH www.upgrade-dh.eu

- Initiate the DH upgrading process for eight district heating systems across Europe, leveraging on modern, yet mature technologies across the complete value chain
- Save more than 190 GWh/a primary energy and of 77,000 t CO_2 emissions.
- Almost double the share of waste/ residual and renewable heat
- Support replication of the upgrading solutions across Europe
- Develop regional / national action plans for the retrofitting of DH networks

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785014.

Optimizing production mix with increasing RES and sector integration

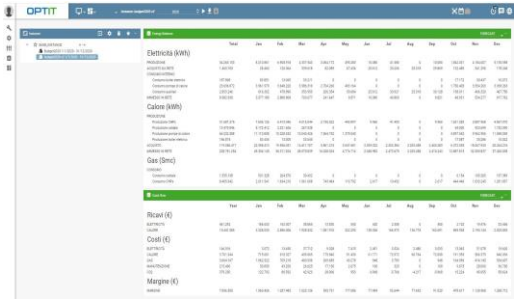
PLANT CONFIGURATION



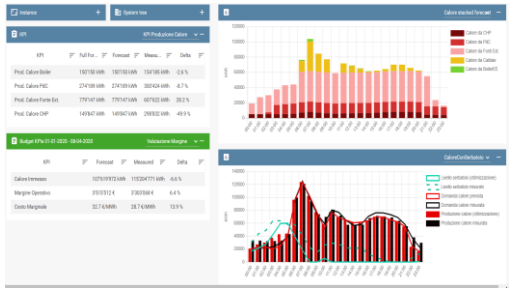
SYSTEM INTEGRATION

- Field data
- Market data
- Price estimates
- Economics
- Weather forecasts

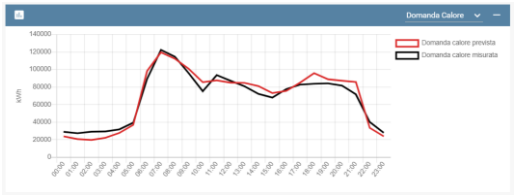
LONG TERM (YEAR)



SHORT TERM (NEXT DAYS)



FORECASTING



TRADING (SAME DAY)

STRATEGIC DECISIONS

- Investments
- Sensitivity (what-if)
- Budgeting

OPS DECISIONS

- Unit commitment
- Margin optim
- Automatisation

TRADING DECISIONS

- DA/SD adj Trading
- Flexibility markets
- XBID

Wolfgang Götzhaber

Unit Leader of Energy and Climate

City of Graz

Environmental Department

Switching to renewable

DH in the city of Graz

STADT GRAZ

RES DHC

Funded by the European Union's Horizon 2020 Programme

Swedish Energy Agency

RES DHC
Renewable Energy Sources for District Heating and Cooling

Celsius

retrofitting with renewable energies –

finding the right mix

City of Graz – District Heating

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 952873.

District Heating Graz – Heat Sources
at 530 MW, 1,200 GWh, 75 000 flats

Existing Sources (up to 2015)
New Sources (2015 till 2019)

- Solaranlage
- P2H-Anlage
- Gaskessel
- FW-Speicher mit Solar und BHKW-Nutzung
- Abwärmenutzung
- FW-Transportleitung
- FW-Netz (Stand August 2019)
- Mur
- Bezirksgrenze
- Stadtgrenze
- FW-KEK-Gebiet (Oktober 2017)
- Versorgungsgebiet Energie Steiermark Wärme

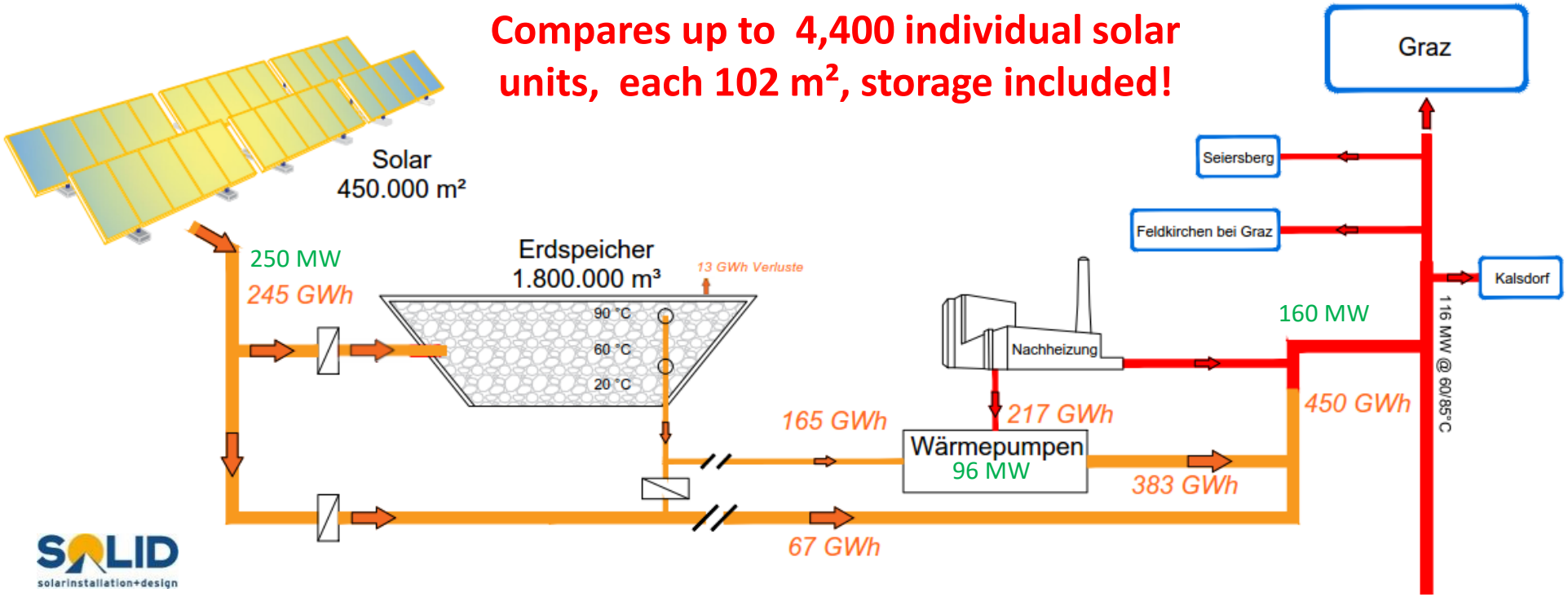
Keine Zuweisung zu Standort möglich oder mehrere Standorte:
- Fernwärmeausbau in Graz zwischen 2013 und 2019
- Energie-Effizienzmaßnahmen im FW-System
- Simulation Wärmeeinspeisung

Bildquellen: Energie Graz, Energie Steiermark, Stadt Graz Stadtvermessungsamt, Stadt Graz/Foto Fischer, Bioenergie Fernwärme BWS, Energie Graz WDS, SOLID, Stadt Graz/Umweltamt, Architekten Markus Pernthaler & Bernd Vlay

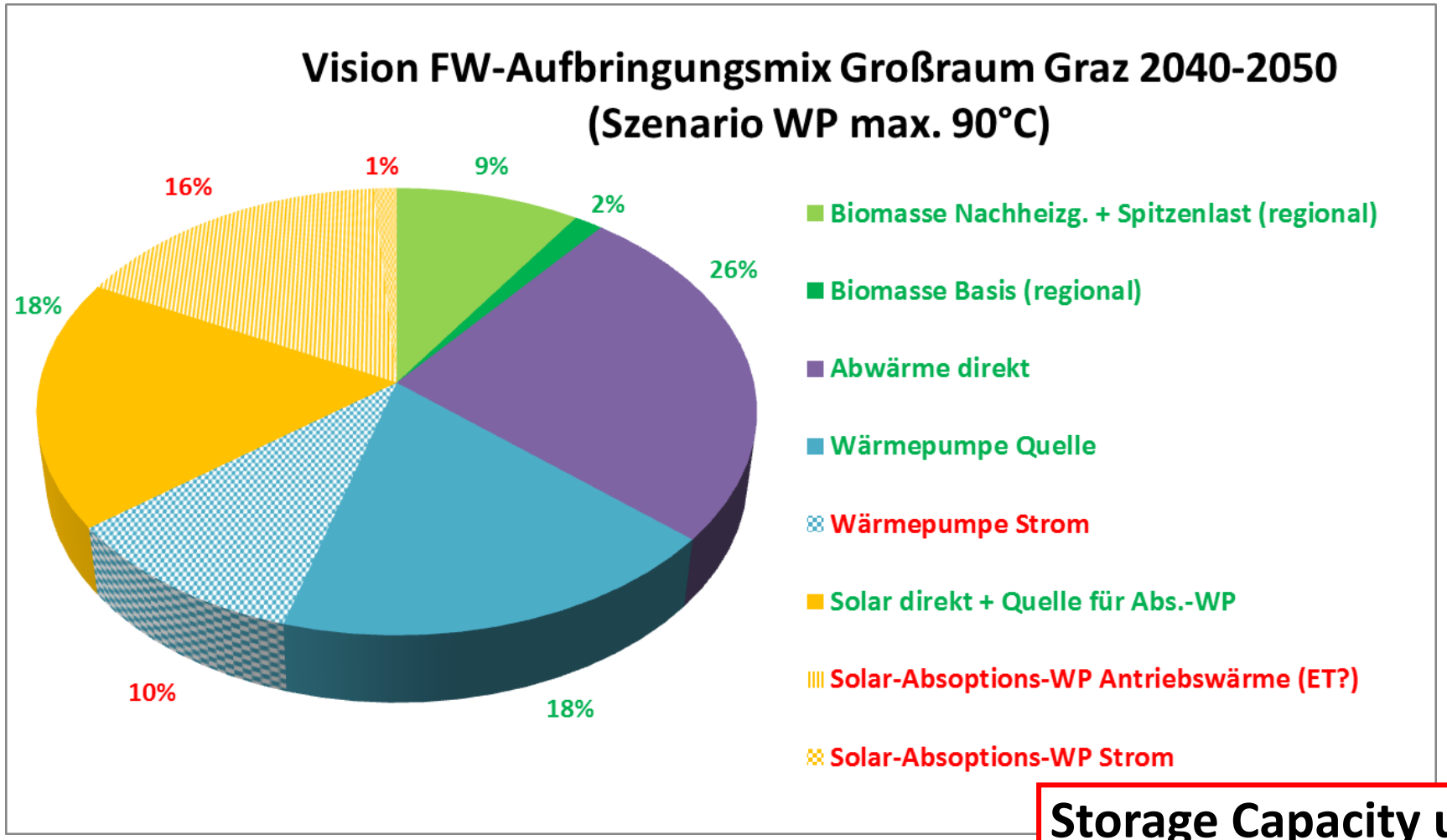
Big Solar Areas for District Heating - Example

- **Collector area:** up to 450.000 m²
- **Seasonal Storage:** up to 1,800.000 m³
- **Absorptions Heat Pump:** up to 96 MW
- **Solar Heat:** up to 232 GWh/Jahr
- **Solar Ratio:** up to 20 % = 10 % Heating of Graz
- **Investments:** up to 200 Mio. Euro

Compares up to 4,400 individual solar units, each 102 m², storage included!



District Heating Graz – Vision 2050
at 530 MW, 1 200 GWh



Biomass

Waste heat

Heat pumps

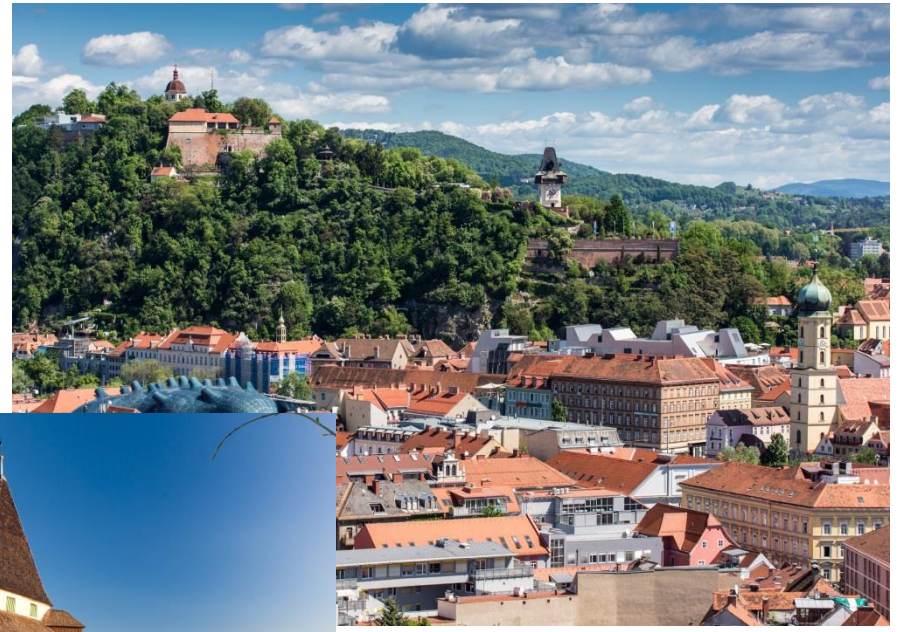
Solar heat

ET = Energy Source

73 % Renewable Energy

Storage Capacity up to approx. 5 Mio. m³ !

Quelle: Grazer Energieagentur / Grazer Umweltamt


Fotos: Graz Tourismus, Harry Schiffer

see you at: ***www.umwelt.graz.at***

Discussion

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Thank you!

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