ENERGIE FÜR UNSERE STADT

The Heating Strategy of the City of Graz

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ISEC 2022, Graz

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„All our energy for a sustainable and livable city of Graz“

Business Areas:

- Heat
- Electricity and gas network
- Energy sales
- Light
- Energy services

Key Data:

- Turnover: 220 Mio. €
- Total assets: 360 Mio. €
- Investments: 29 Mio. €
- Employees: 400
- Energy delivery: 3.170 GWh

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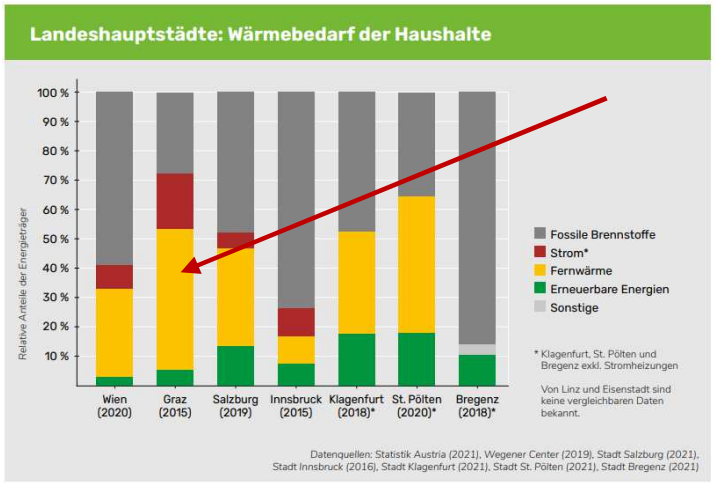
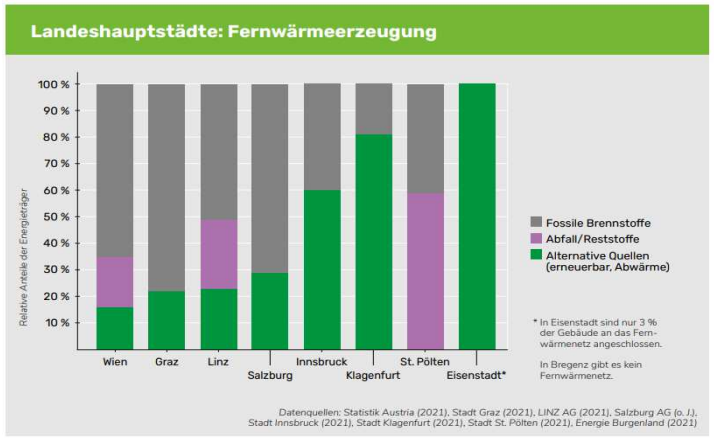
Study by Global 2000: Heating in Austrian Cities





Strategies:

1. **Expansion of District Heating**
2. **Decarbonisation of District Heating**
3. **Smart local energy concepts in new districts**
4. **Switch to heat pumps (& pellets), where DH is not available**

Source: Global 2000 Klimareport „So heizen die Landeshauptstädte", 02/2022

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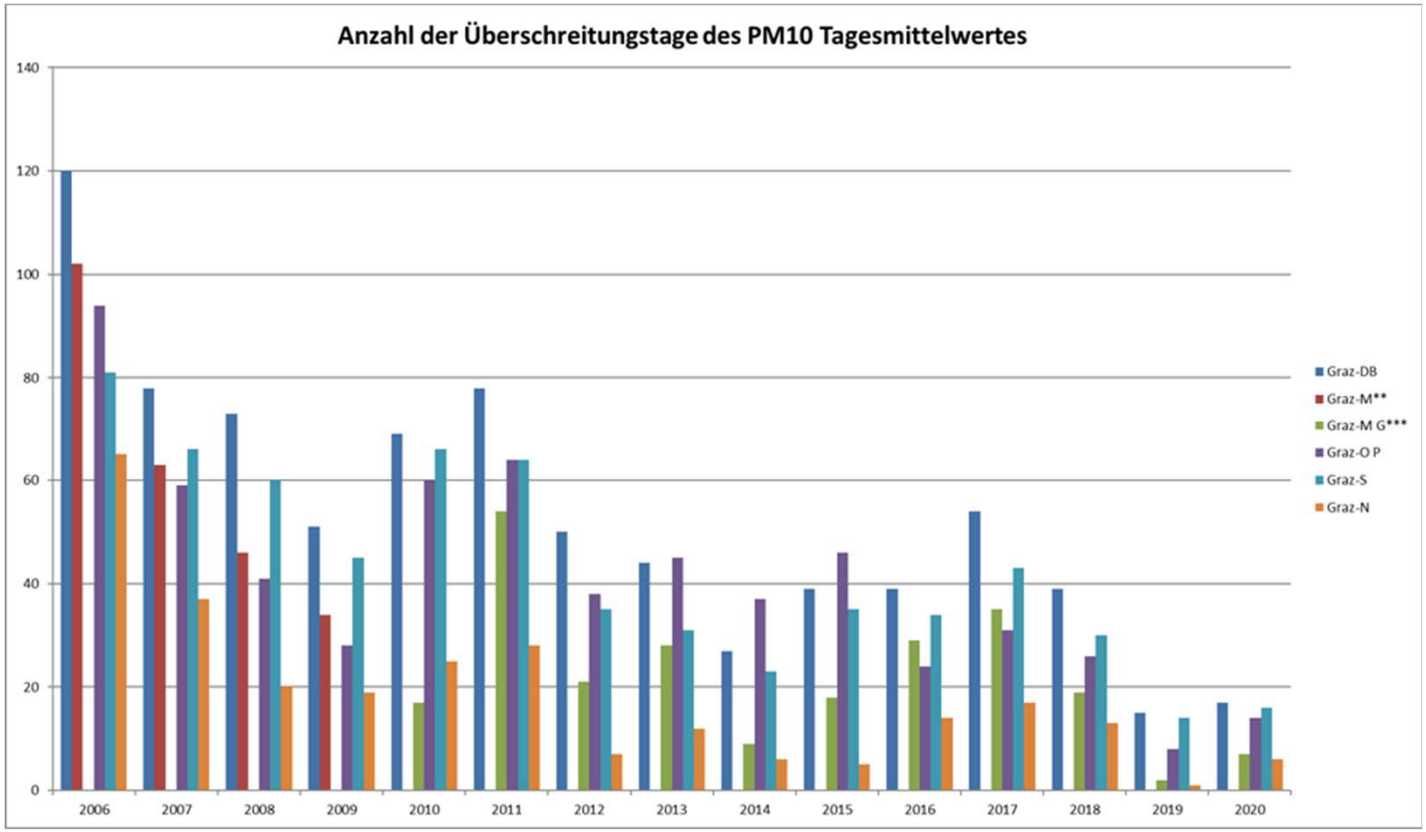
Air quality: Reduction of dust particles by district heating is a success story



Source: Stadt Graz Umweltamt, Daten Land Stmk. A15

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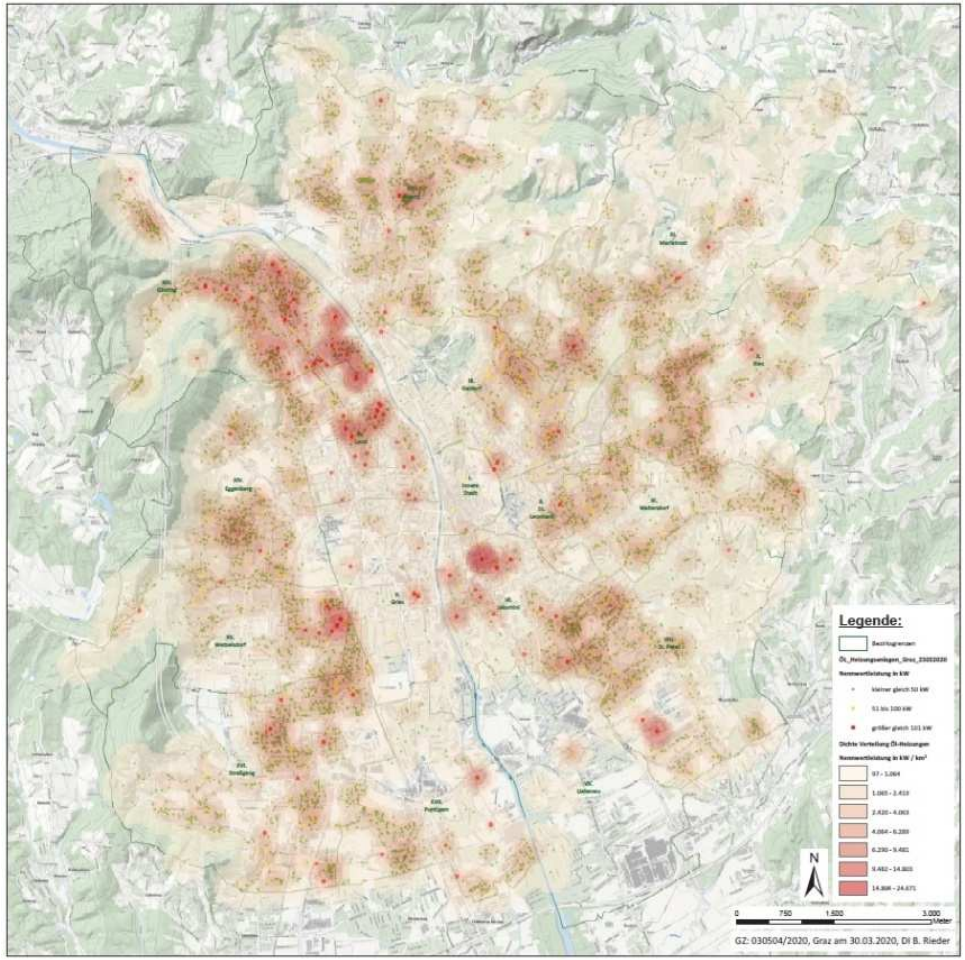
Density of oil heating in Graz



Styria heating systems database

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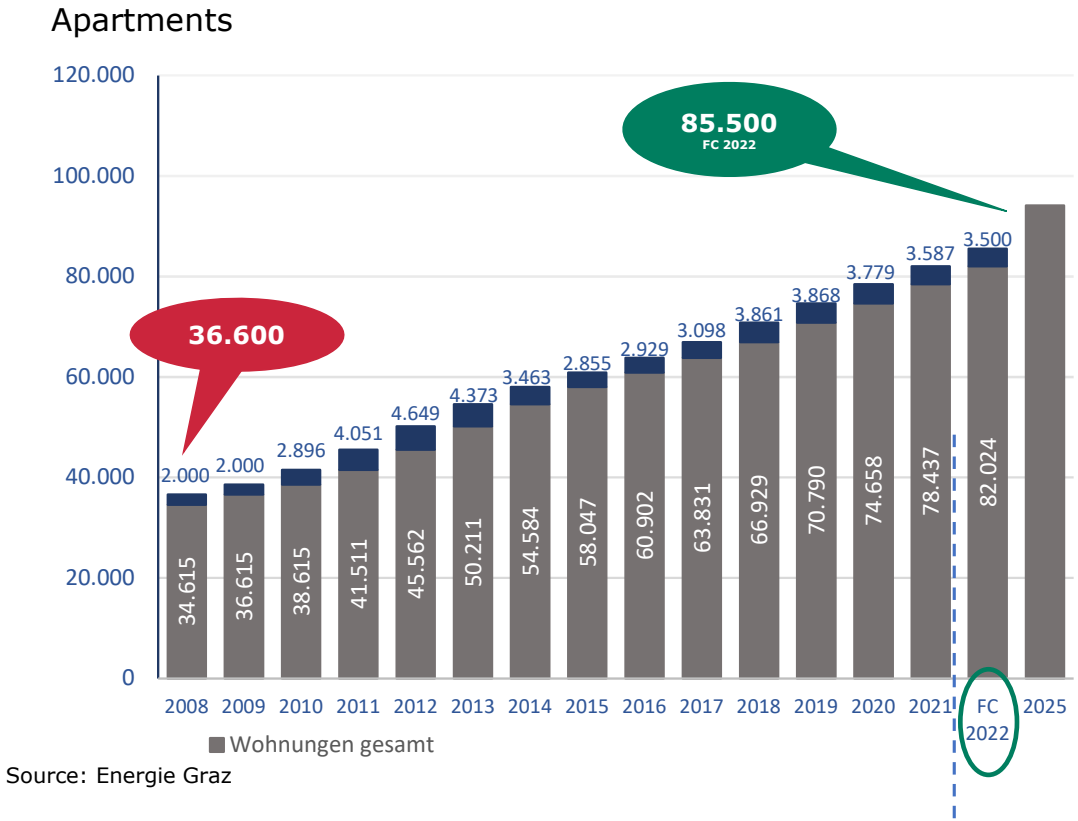
Development of district heating in Graz 2007-2021



Source: Energie Graz

- Number of apartments **more than doubled**
- **82.000 households** supplied with district heating (approx. **50%**)
- Goal for Greater Graz Area until 2030: **> 110.000 app.**
- Investments Energie Graz 2007-21: ca. **150 Mio. Euro**

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Development of district heating in Graz 2007-2021

District heating system		2007	2021	Increase
Power demand	MW	521	757	+ 45%
Length of network	km	278	440	+ 58%
Energy input	GWh	807	1.256	+ 56%
Serviced apartments	WE	35.000	82.000	+ 134%

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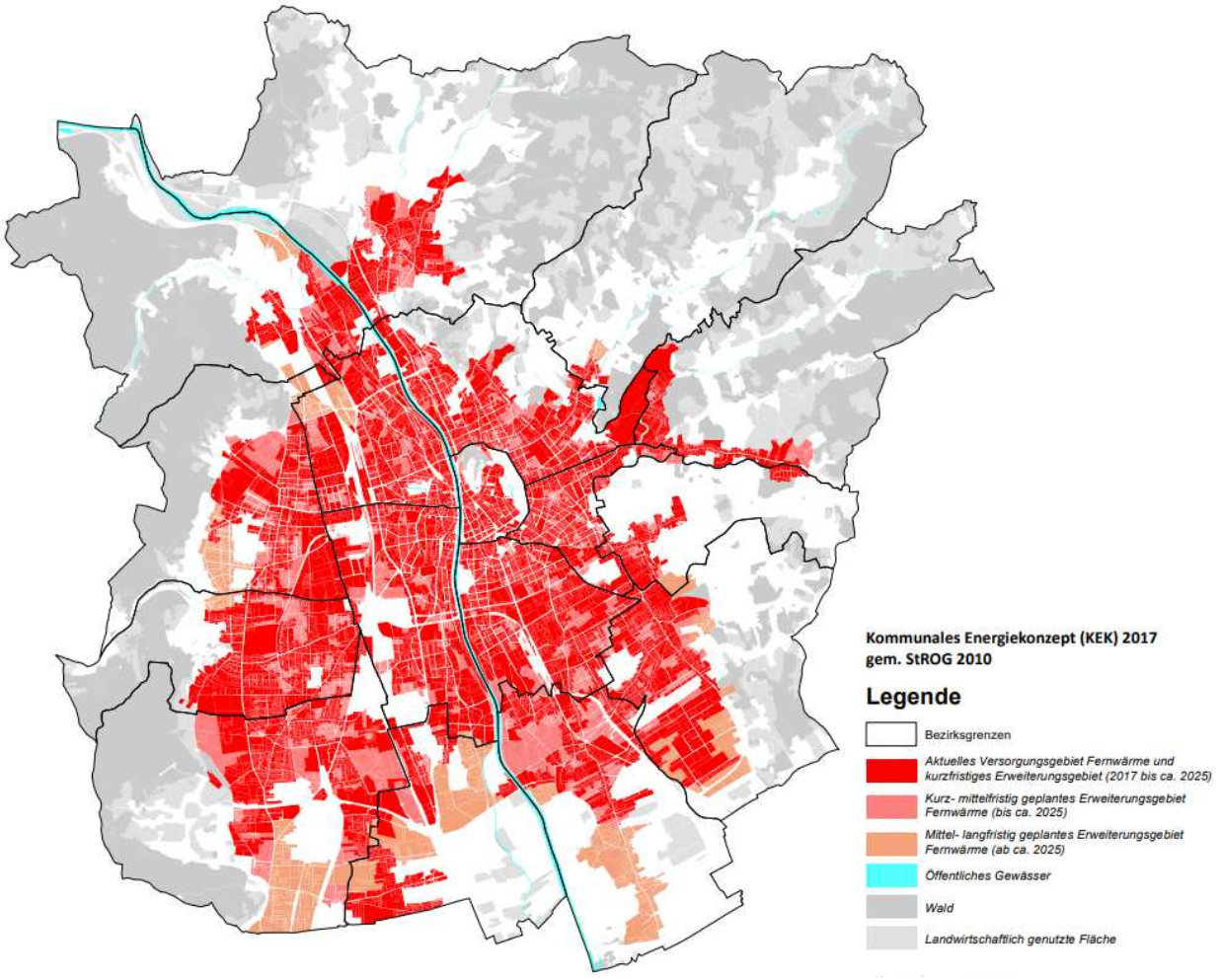
Instruments for district heating expansion



- Graz district heating expansion plan according to the **municipal energy concept** (KEK)
- Defining **territories for mandatory district heating** connection (based on Styrian governement law)
- **Support and subsidies** by City of Graz, Province of Styria, Federal Governement

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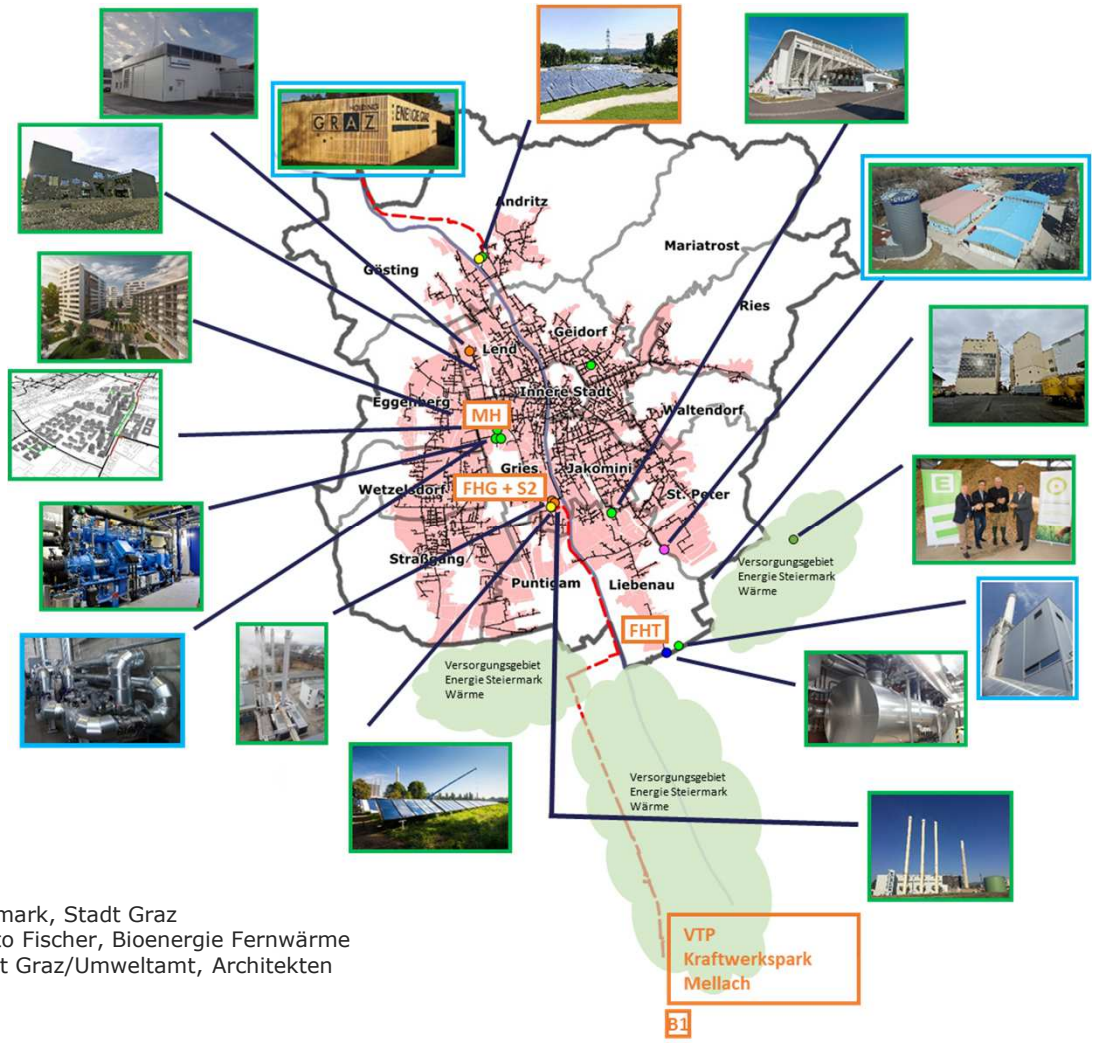
Energy production mix for DH in the Greater Graz Area



- Solaranlage
- P2H-Anlage
- Gaskessel
- FW-Speicher mit Solar und BHKW-Nutzung
- Abwärmenutzung
- Biomassekessel
- FW-Transportleitung
- FW-Netz (Stand 31.12.2020)
- Mur
- Bezirksgrenze
- Stadtgrenze
- FW-KEK-Gebiet (Oktober 2017)
- Versorgungsgebiet Energie Steiermark Wärme

Sources: 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

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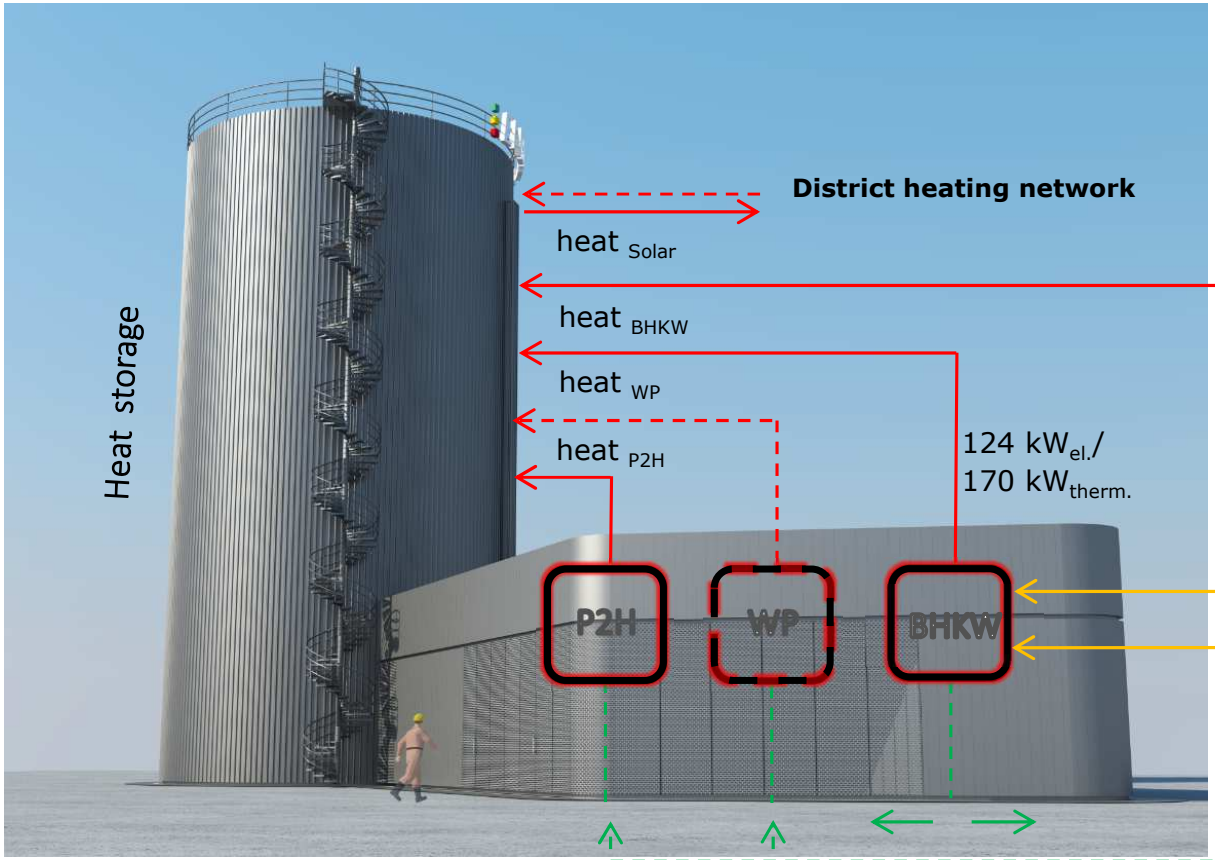
Solar storage project HELIOS



Thermal solar system
6.000 m²

Disposal site

Landfill gas

Natural Gas

Green electricity

- Integrating various sources
- Water storage for heat: 2.500 m³
- discharge capacity up to max. 10 MW

Solar storage project HELIOS - extension

Stage of extension 3:
Extension to **6.000 m²** collector area in
Q2 2022

Waste heat recovery from the paper factory Sappi

- **12 km** length of the pipeline (north of Graz)
- Heat capacity up to **35 MW**
- Heat quantity approx. **150 GWh/a** (approx. **15 %**)
  First stage, commissioned 2018
- Installation of a **heat pump** to additionally use low-temperature waste heat sources. Operation in 2022.
- In 2022, the large boiler at Sappi will be converted to **biomass**.
- Planned expansion stages:
  - **190 GWh/a** (additionally 40 GWh/a) from 2022
  - **240 GWh/a** (additionally 50 GWh/a) from 2026
- CO_2-Savings: 24.400 t/a

sappi bioenergie
Ihr Plus in Wärme.

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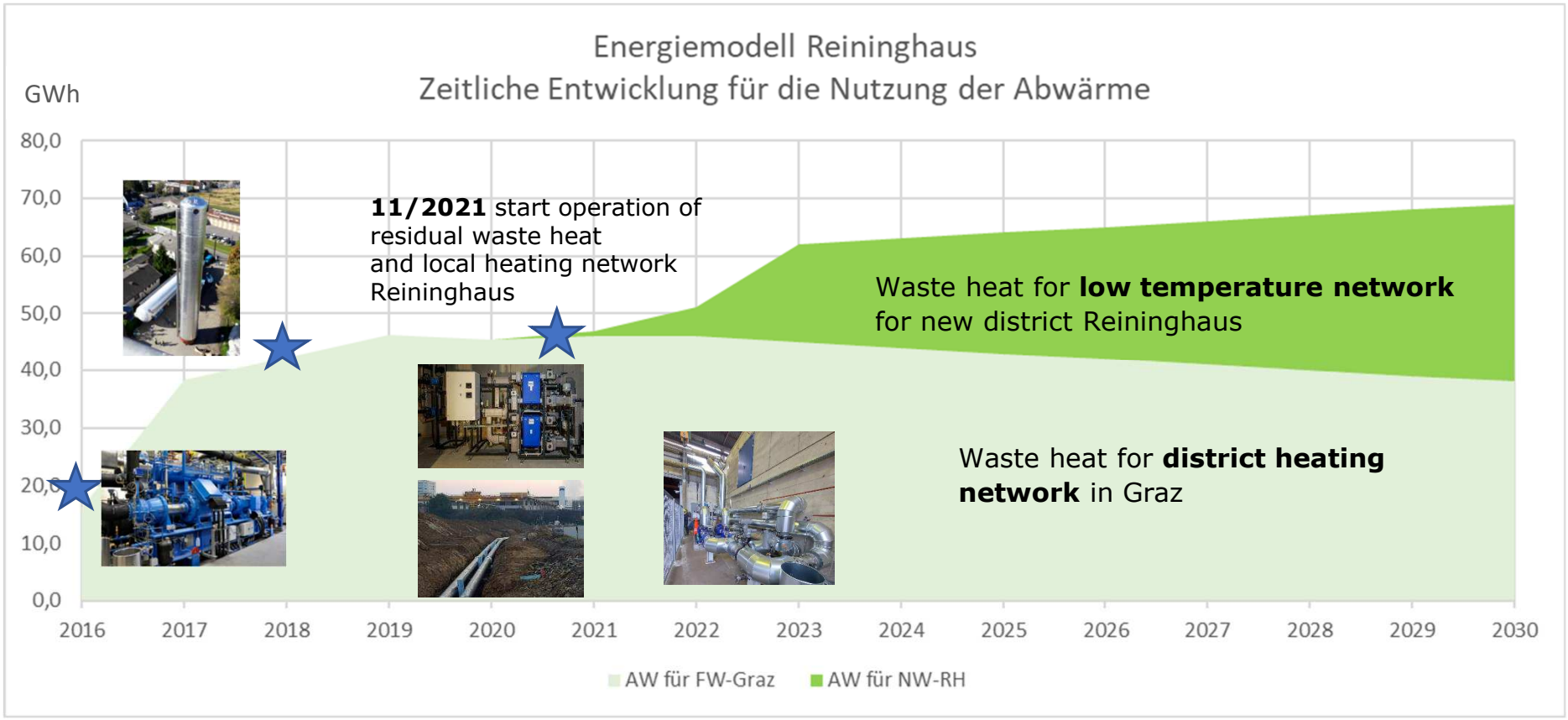
„Graz Reininghaus“ – the energy modell



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The energy modell Reininghaus – Power Tower

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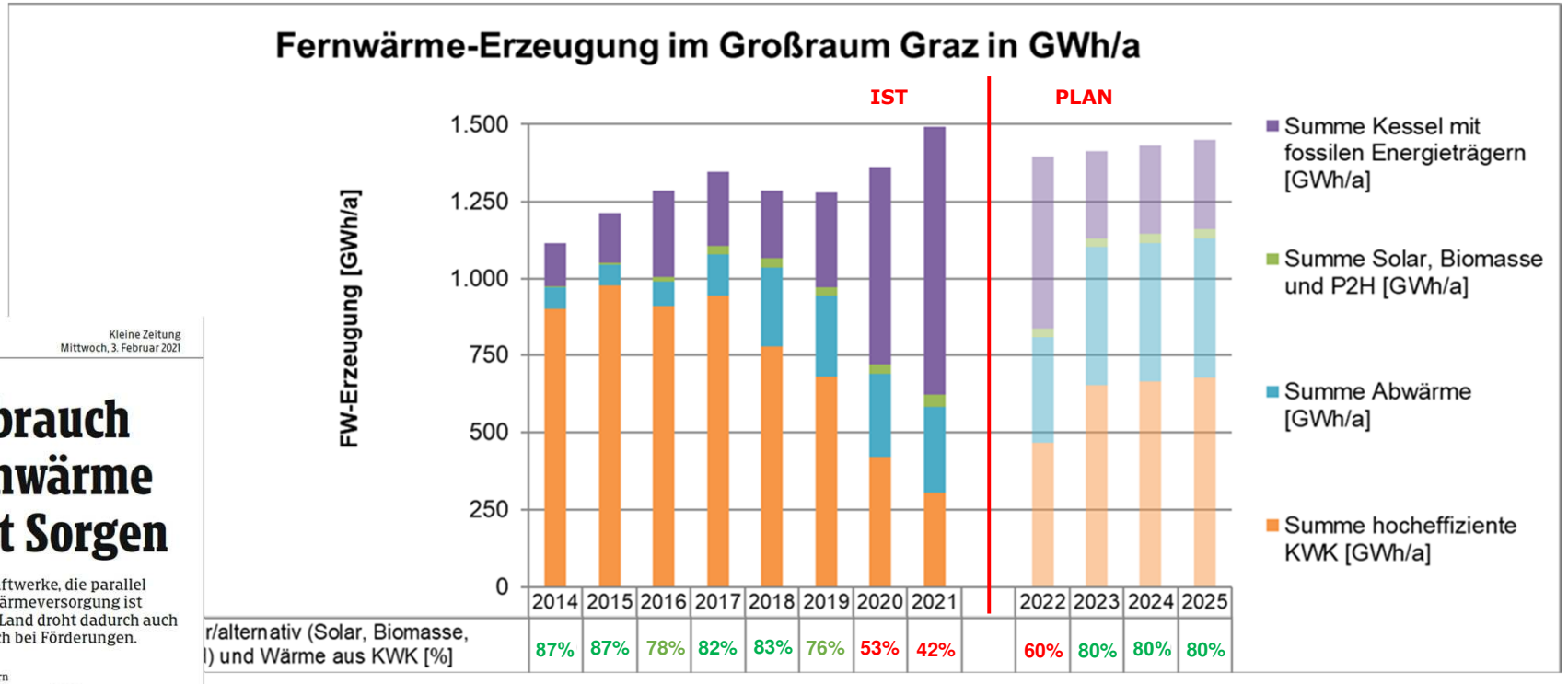
Highly efficient DH-System: 80% from alternative sources - renewables, waste heat, combined heat&power



ergieagentur, Data from Energie Graz and Energie Steiermark

Kleine Zeitung
Mittwoch, 3. Februar 2021

Gasverbrauch für Fernwärme bereitet Sorgen

Heizanlagen und Kraftwerke, die parallel laufen: Grazer Fernwärmeversorgung ist kaum effizient, dem Land droht dadurch auch rechtliches Ungemach bei Förderungen.

Ökologisch

Günter Pilch

Aufmerksamen Grazern dürfte es nicht entgangen sein: An den meisten Wintertagen dampft es gewaltig aus den insgesamt vier Schloten, die in der Puchstraße in die Höhe ragen. Dort steht das Fernheizwerk der Energie Steiermark, das seit 2016 über sechs

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Highly efficient DH-System: 80% from alternative sources - renewables, waste heat, combined heat&power

- Heat production from renewables and waste heat increased by factor 4 in the last 6 years.
- Use of coal stopped in power plant Mellach in 2020.
- Heat from power plant Mellach dropped to one third (from gas fired turbines).
- Achievement of the 80% criterion (highly efficient DH-System) for being eligible for subsidies.
- Investment programme for decarbonisation and reduction of dependency on gas needed!

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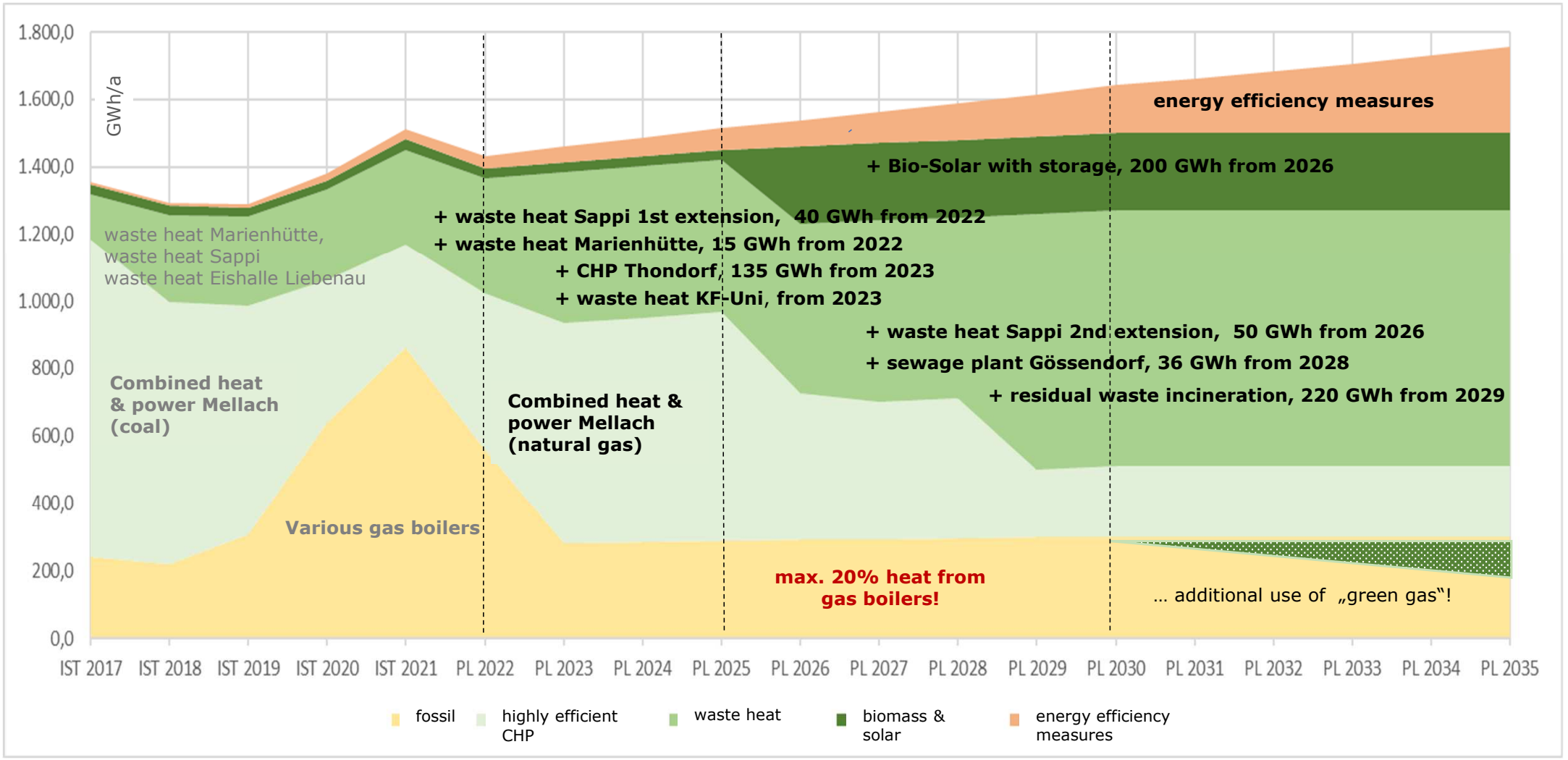
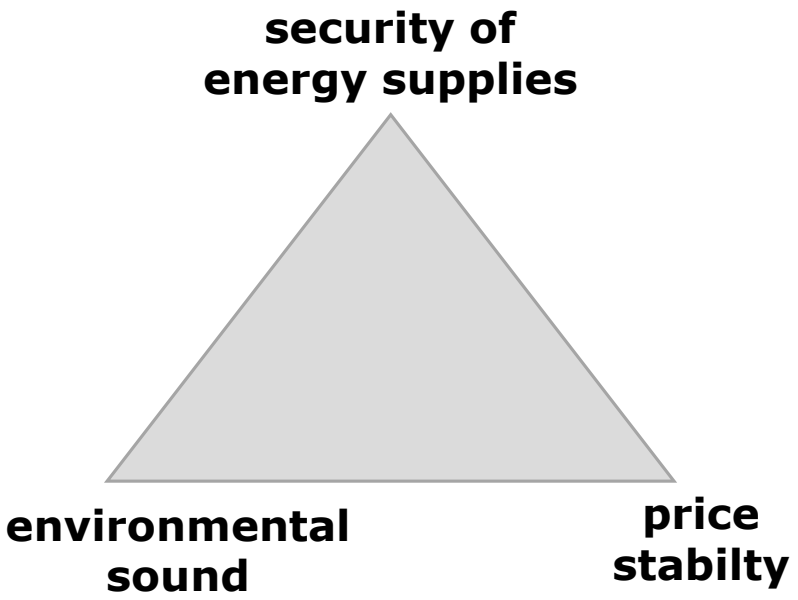
Decarbonization strategy for district heating



Ambitious plan for district heating supply mix in the greater area Graz

- **Additional** generation of **700 GWh/a (+50%)** from alternative energy.
- **Investments** of more than **EUR 300 million** with high regional added value.
- Reduction of **CO_2 emissions** by **140.000 t/a.**
- For **climate neutrality by 2040**: **More measures are required** to also substitute natural gas CHP and natural gas peak load boilers/backup reserves.
- Conversion to a **smart, efficient district heating system** with connected technologies and partnerships with our customers.

Balance as a challenge:



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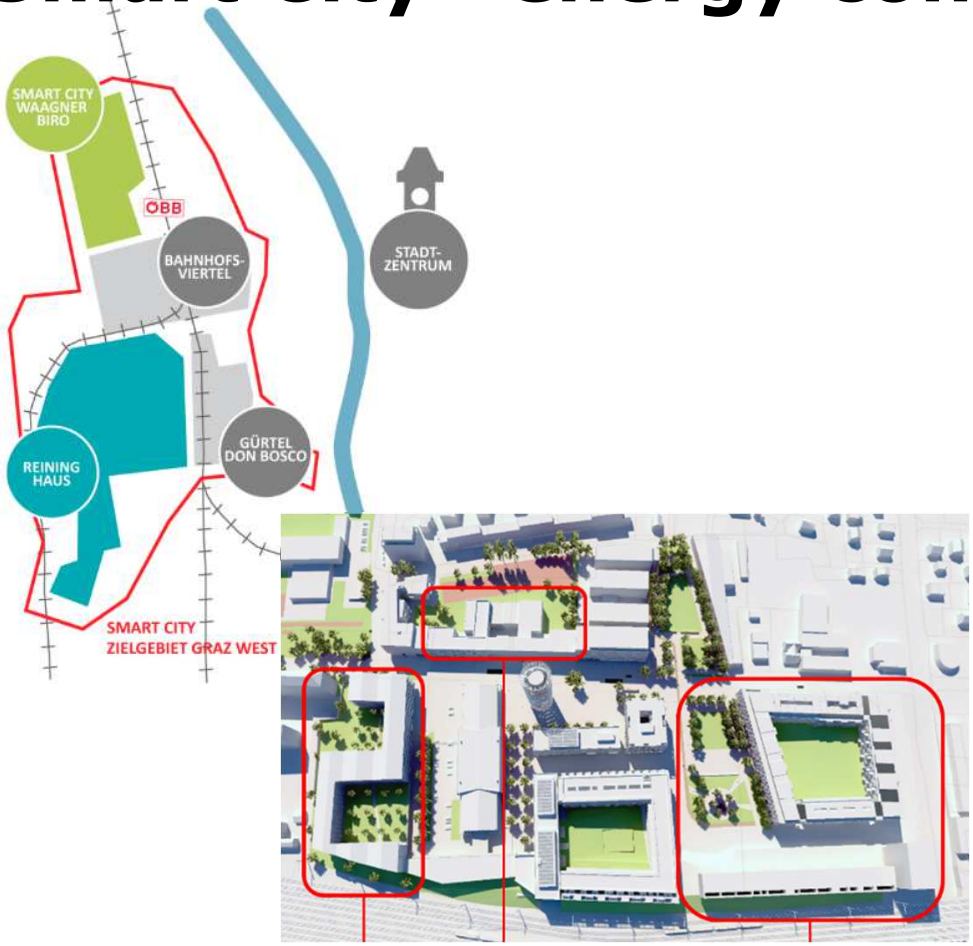
Smart City –energy concept



© Stadt Graz

- **Local geothermal energy**
  - Heat pump & Ground level probes
- **Industrial waste heat**
  - Connection to Marienhütte via DH network
- **Local and green electricity**
  - Decentralized PV systems on buildings
  - Green electricity from Solar Graz
- **Smart energy services**
  - Charging infrastructure for electromobilty
  - Community PV installations „Unser Eigenstrom“ (citizen participation)

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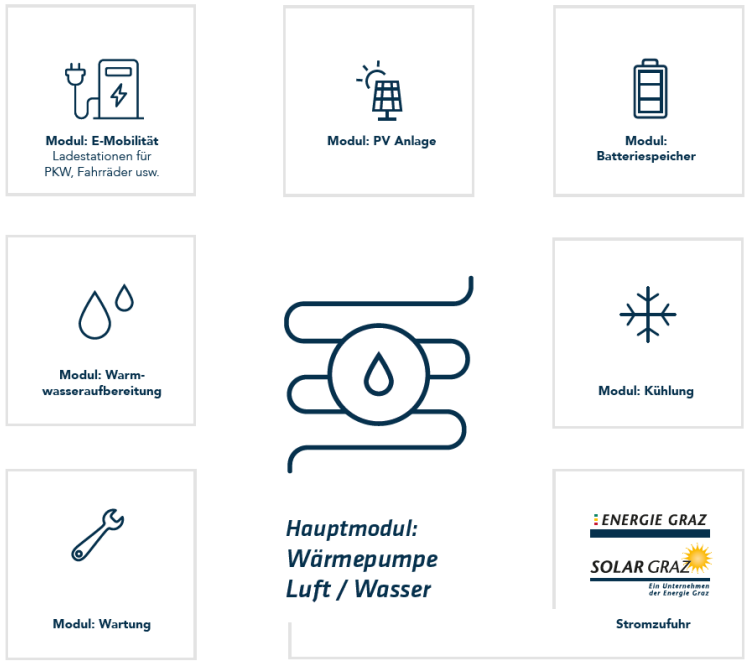
Heat Pumps (Wärmepumpe^{PLUS}): The alternative wherever district heating is not possible

© Viessmann Climate Solutions SE

- Ecologically and economically **attractive alternative** in sparsely populated areas
- Pellets as option where heat pump is not possible

The modular design:



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Conclusions

- **Simple recipes don't work!**

  It is only possible with bundles of measures (no "cherry picking")

- **Time is short!**

  We need more installation than innovation

- **It will require setting priorities!**

  To get everything is not possible

- **Energy efficiency** is very important in the long term!

  Renewable energies are limited, as well

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