WIEN ENERGIE
WIENER STADTWERKE GRUPPE

The need for platform technologies in industrial-scale applications

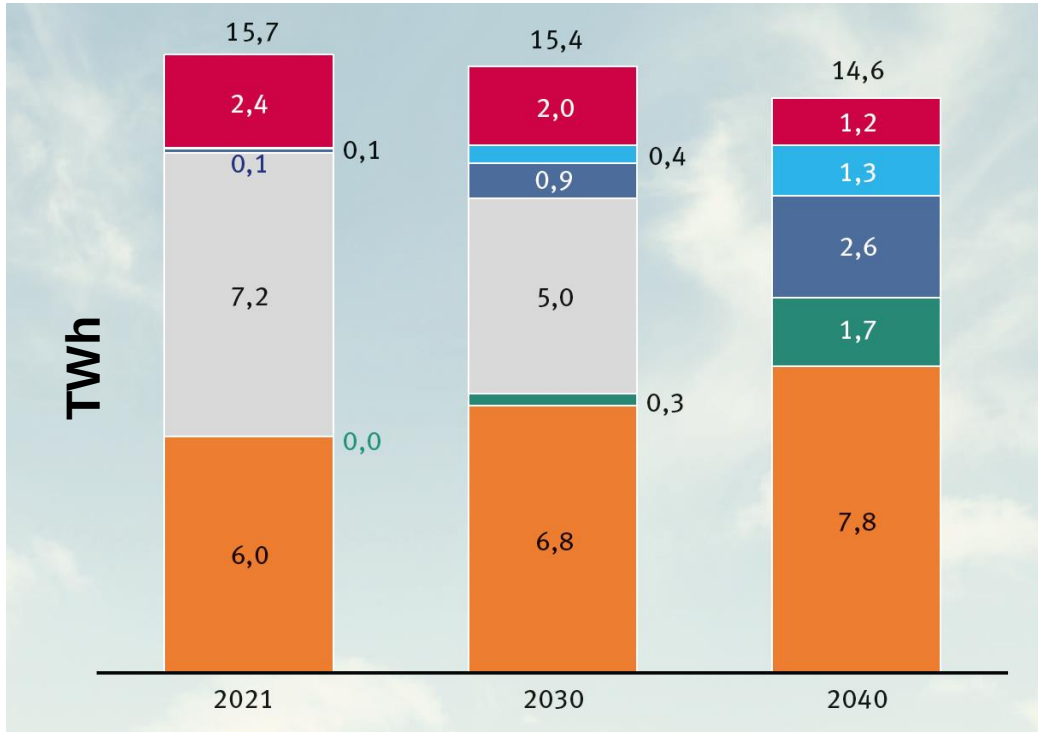
Agenda

- Decarbonisation of District Heating in Vienna
- Asset Overview – Wien Energie
- R&D @ Wien Energie
- Platform Technology vs. Silver Bullets
- Conclusion

Decarbonisation of District Heating in Vienna

Heating Energy Demand in Vienna

District heating (DH) as the backbone of Vienna‘s heat supply



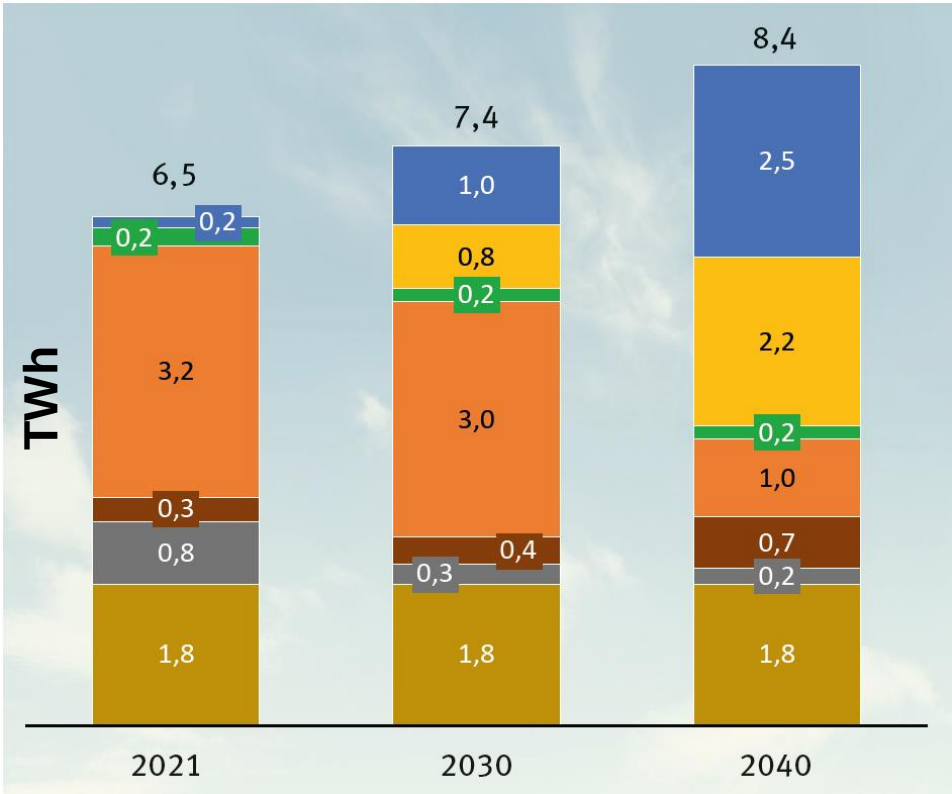
Decarbonised heating sector in 2040

- Reduction of the heat demand
- Increase of the electricity demand
- 53% of the heat demand covered by DH

others (biomass, oil, electricity)
natural gas
heat pumps (electricity)
heat islands
heat pumps (ambient heat)
district heating (DH)

Source: Wien Energie, Compass Lexecon, Dekarbonisierungsstudie 2023, Fokus auf Wärme Wien

District Heating Vienna - 2040



Six Factors for Decarbonisation

- Heat pumps
- Geothermal energy
- CCUS (waste incineration)
- Seasonal energy storage
- Green gases in power plants
- Lower temperature in DH

Source: Wien Energie, Compass Lexecon, Dekarbonisierungsstudie 2023, Fokus auf Wärme Wien

Asset overview – Wien Energie

Asset Overview Wien Energie

Asset Overview Wien Energie (Umwelterklärung 2023, Data from 2022)

- Waste Treatment (50-75 MW_{th} each)
  - Thermal Waste Treatment and thermal power station (340 MW_{th}) Spittelau (1)
  - Thermal Waste Treatment Flötzersteig (2)
  - Thermal Waste Treatment Simmeringer Haide (3)
- Electricity/District Heating
  - Thermal power station Arsenal (340 MW_{th}) (5)
  - Power plants Simmering (1,100 MW_{th}/1,300 MW_{el}) (6)
  - Thermal power station Inzersdorf (340 MW_{th}) (7)
  - CHP Donaustadt (350 MW_{th}/400 MW_{el}) (8)
  - Thermal power station Leopoldau (230 MW_{th}) (9)
  - Bioenergy (~ 40 MW_{th}), Hydro (31 MW), Wind (131 MW), Solar (114 MW)
- additional Wind, Solar and Hydro Plants in AT, D, Southern Europe

R&D @ Wien Energie

Asset Decarbonisation and New Technologies

We guarantee a climate neutral future for the citizens of Vienna through innovative solutions. Our affordable, resource efficient projects make Vienna a global role model.

Research and Energy Technology

Central research division

Renewable Hydrogen

Hydrogen strategy implementation

Decarbonised Heat Supply

Decarbonisation of DHC

Circular Economy and Sustainability Solutions

Closing of resource loops

Our Focal Points

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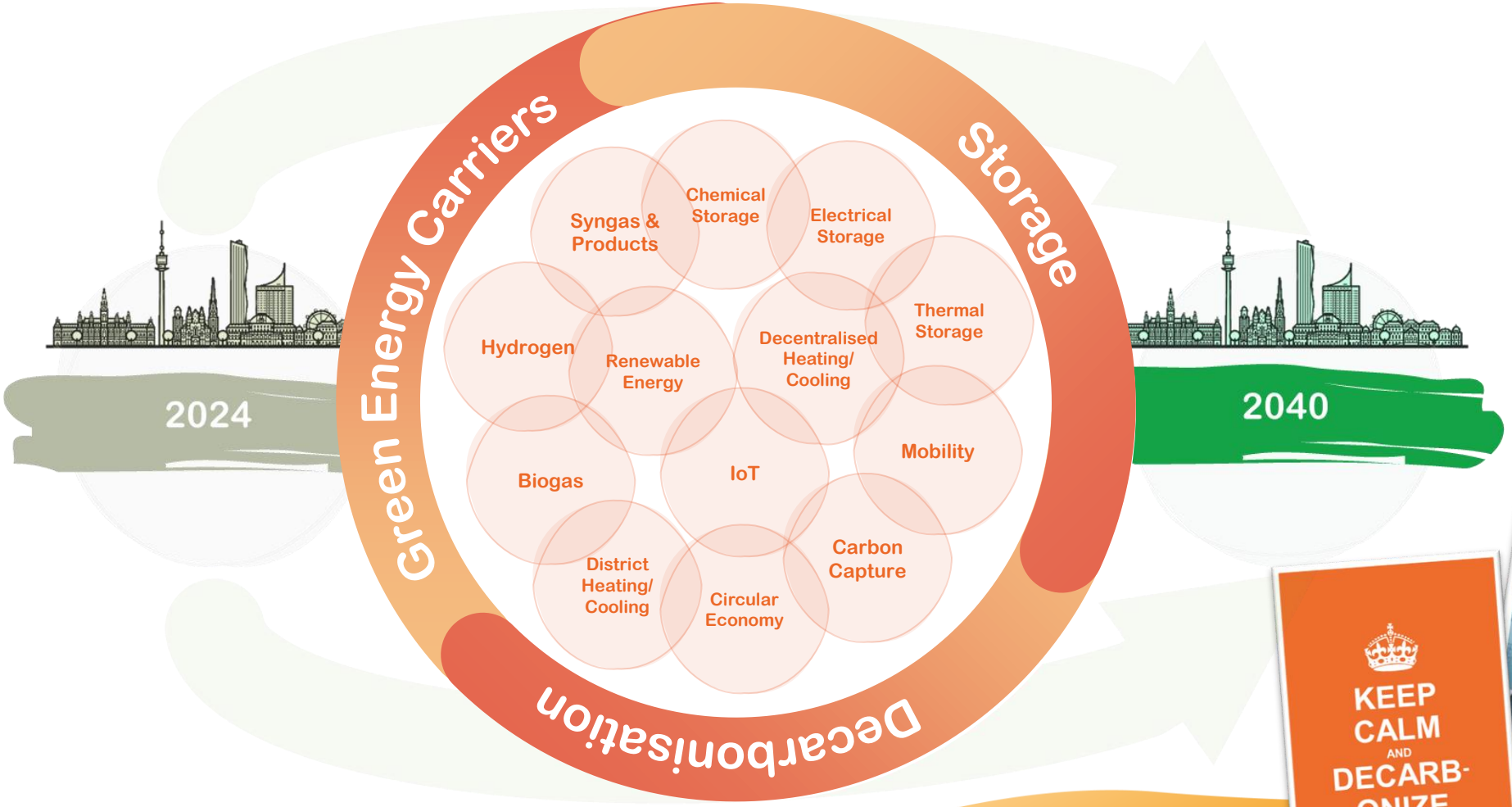
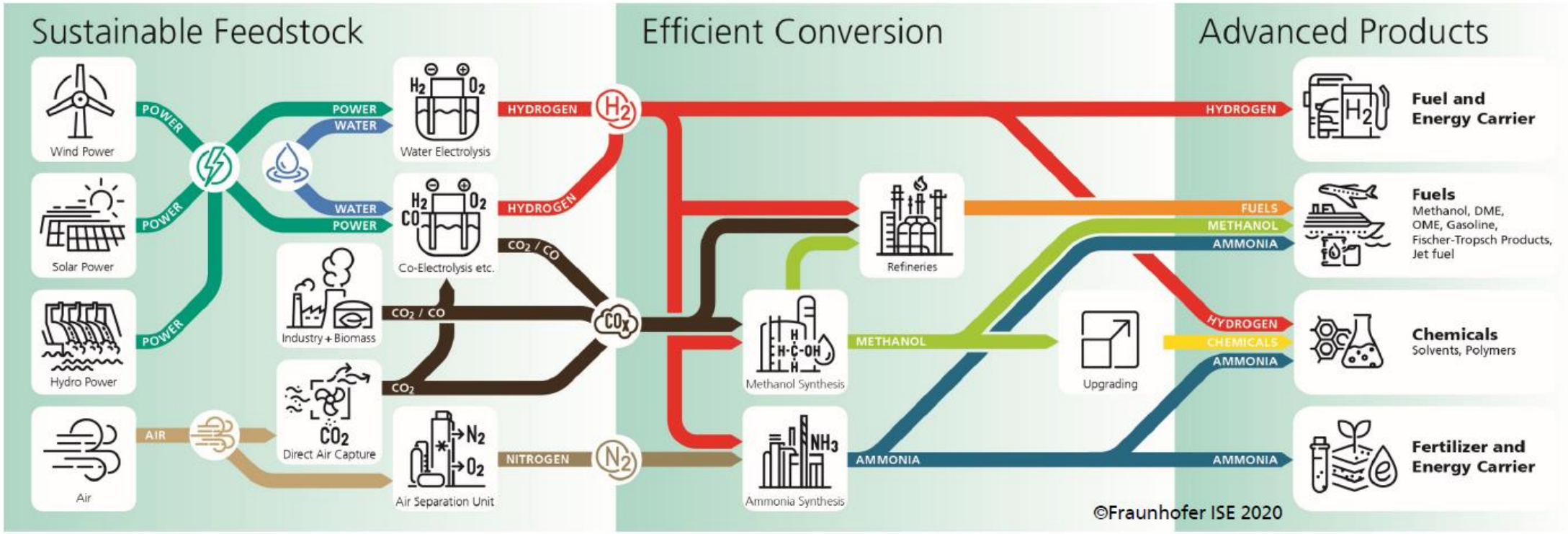
Climate neutral by 2040



Platform Technology vs. Silver Bullets

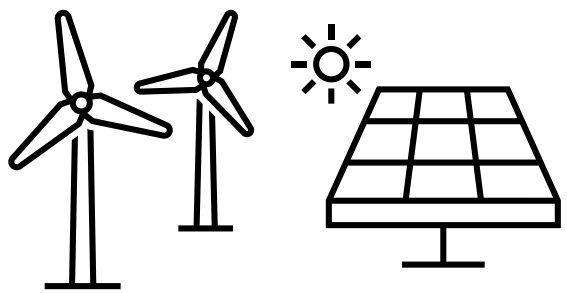
Example for Decarbonisation Efforts: Green Hydrogen

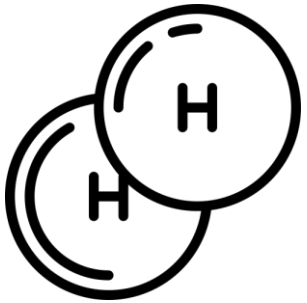
Overview of selected hydrogen derivatives



Source: Hebling, C. (Fraunhofer ISE): 80. Sitzung des Parlamentarischen Beirates für nachhaltige Entwicklung, Berlin, 19.05.2021

Hydrogen Imports in the Form of Ammonia





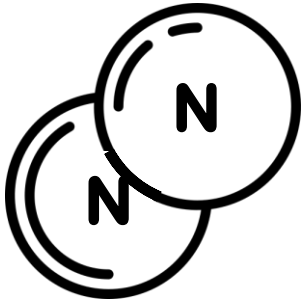
Electrolysis

lowest TRL in chain 4

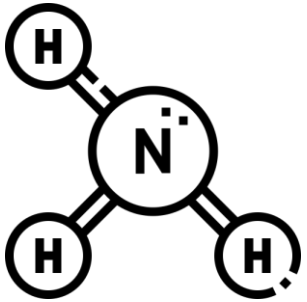
environmental hazard

existing infrastructure

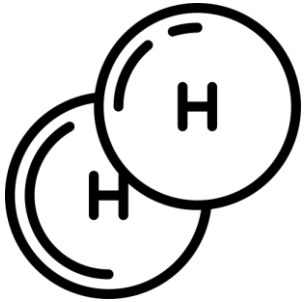
efficiency



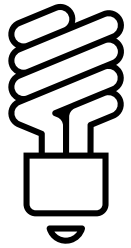
Air separation

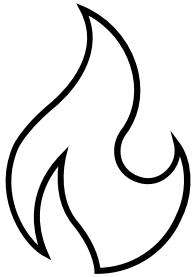


Haber-Bosch-Synthesis
Ammonia



Cracking





Smashicons via Flaticon.com

A Holisitc View: Carbon Emissions Along the Supply Chain

- Assumptions:
  - All processes along the supply chain (excl. transport) are electrified.
  - The electricity-related emissions are as low as today‘s Austrian **production-associated** emissions of < 100 g/kWh.
  - The methane combustion reference scenario includes combustion and supply chain emissions.

Derivative	H_2 content [% (m/m)]	Efficiency (excl. transport, H_2-H_2) [%]
Ammonia	17.65	46.75

Efficiency along the supply chain

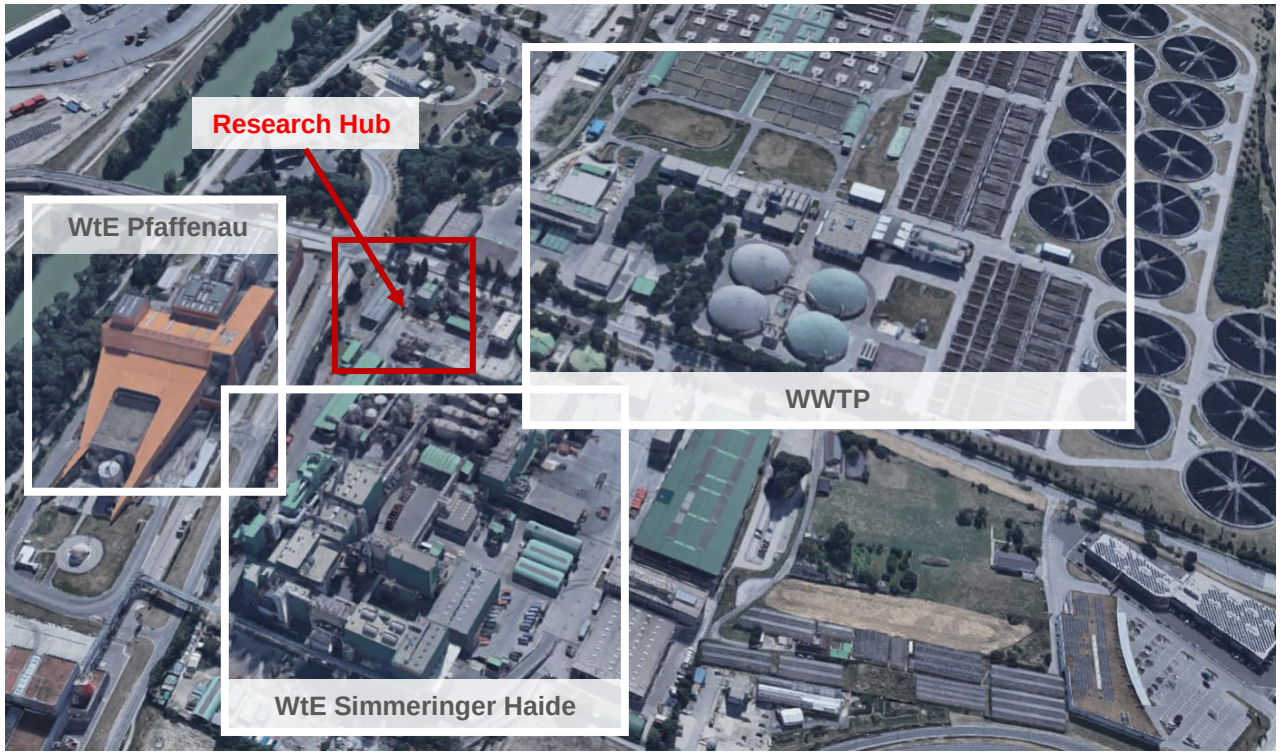
Derivative	CO_2-eq. of supply chain in comparison to CH_4-use [%]
Ammonia	91.32

Emissions along the supply chain

- Conclusions:
  - There is a huge dependency on the global renewable energy and green hydrogen economy and infrastructure.
  - Technology lock-ins bear the risk of increasing global emissions or minimise them only marginally.
  - Flexibility is required.

Potential Use Cases of W2V for WE

- Sustainable fuel for buses of Wiener Linien
  → focus shift to H_2/electrification
- Sustainable fuel for cold start capacity of power plants/peak heat demands
- Sustainable methane for power plants/ peak heat demands
- Green hydrogen carriers for power plants (e.g. MeOH)
- Sales of green chemicals/fuels (SAF, not fuel for individual transport) and certificate generation
- Off-heat use (DH system integration)



Conclusion

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Platform Technology Advantages

- Biomass gasification as a platform technology offers flexibility in a fast-evolving world and economy.
- For WE as a heat provider, the system integration of this technology is crucial and offers beneficial synergies.
- Research Hubs in close proximity to WE‘s assets enable accelerated industrialisation.

Please feel free to contact…

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