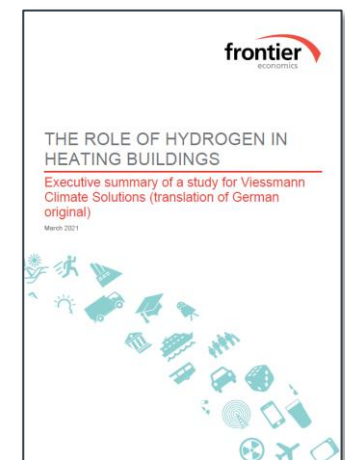


<https://www.frontier-economics.com/media/4835/the-value-of-hydrogen-in-the-heating-market.pdf>



<https://www.frontier-economics.com/uk/en/news-and-articles/news/news-article-i8293-hydrogen-in-the-heat-market/>

# The role of hydrogen in heating buildings

Presentation to the European Parliament Intergroup on  
'Climate Change, Biodiversity and Sustainable Development'

12 October 2021

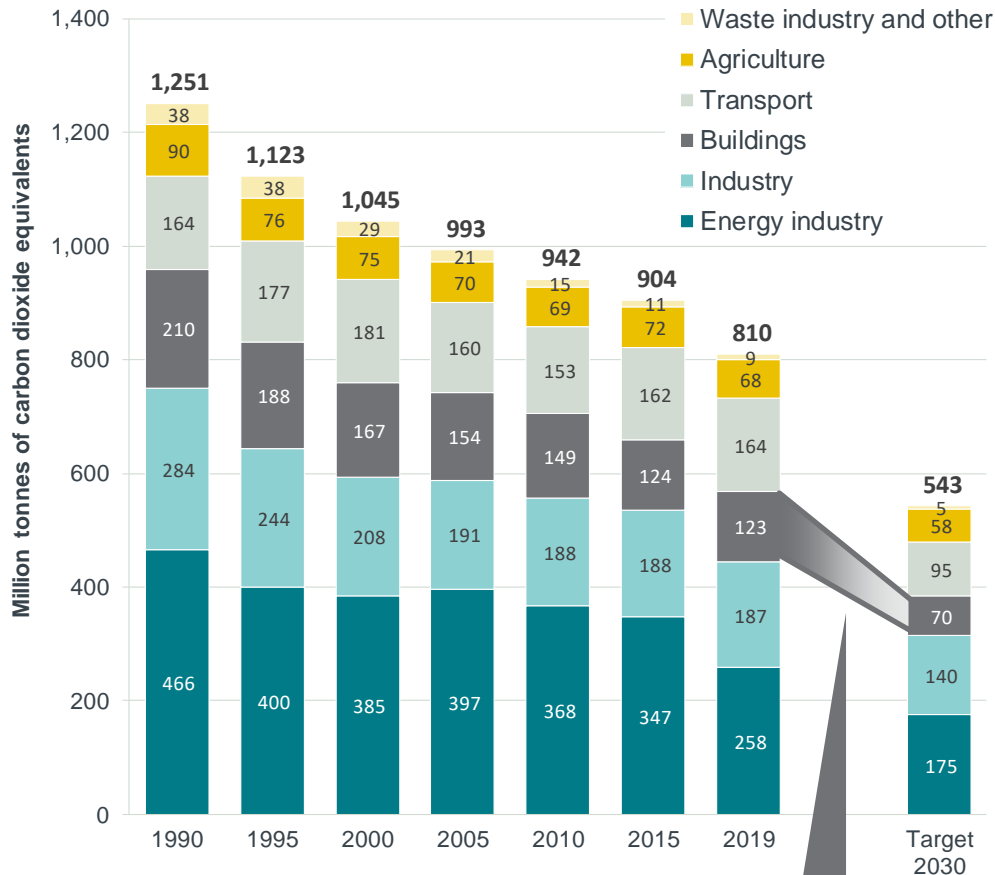




The heating sector is one of the **major fields of action** on the journey to a defossilized society.

# Carbon emissions in the heating sector are to be reduced by at least 40% in 10 years by 2030, roughly as much as in last 30 years

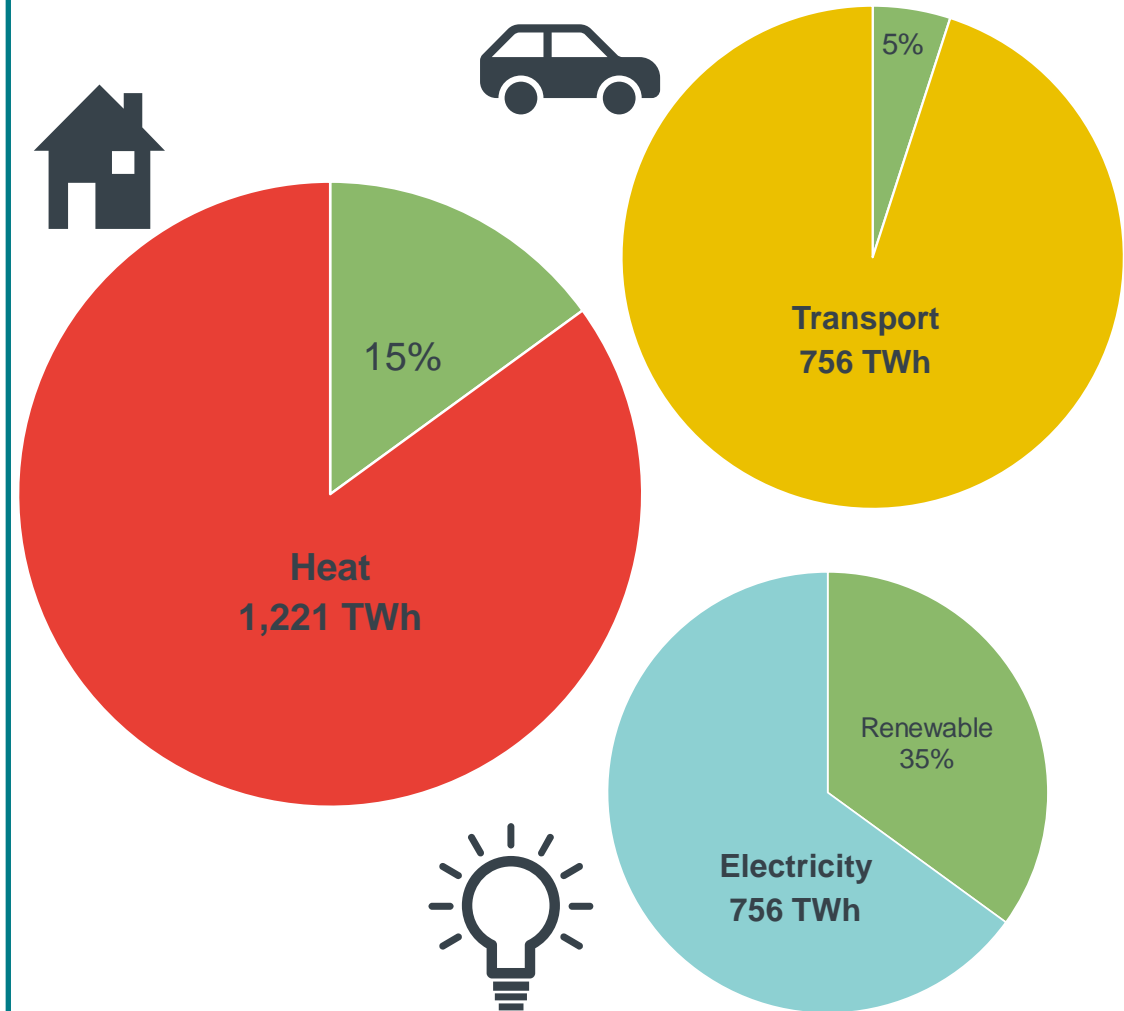
## Space heating is fourth largest source of emissions...



Current sector target 'buildings': -40% by 2030

Expected tightening in the course of the EU Green Deal:  
At least -50% by 2030

## ...with heating applications accounting for half of final energy demand (in Germany)





The housing stock is heterogeneous and there is **no one size fits all** technical solution to achieve climate targets

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# Heterogenous building stock requires a broad mix of technologies; there is no one-size-fits-all heating system



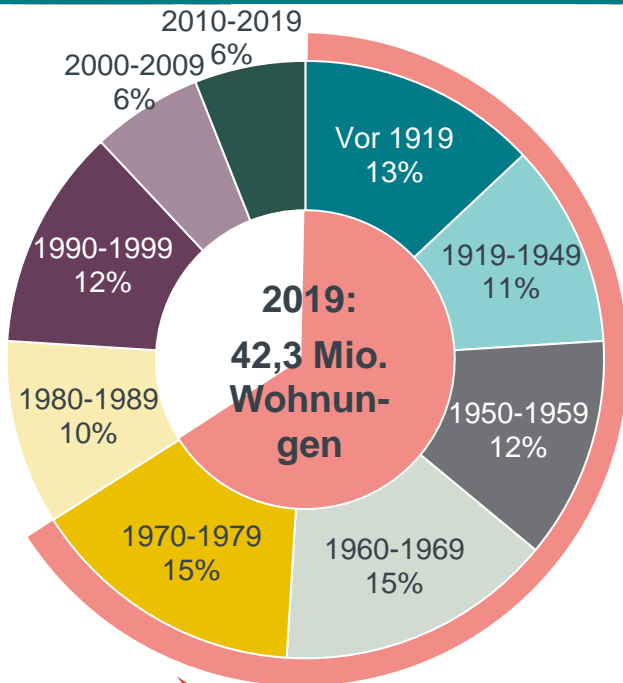
Age



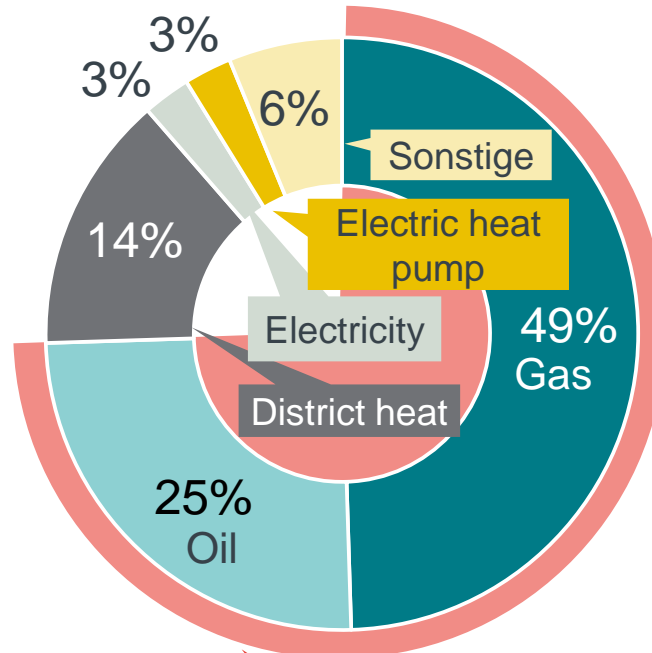
Technology



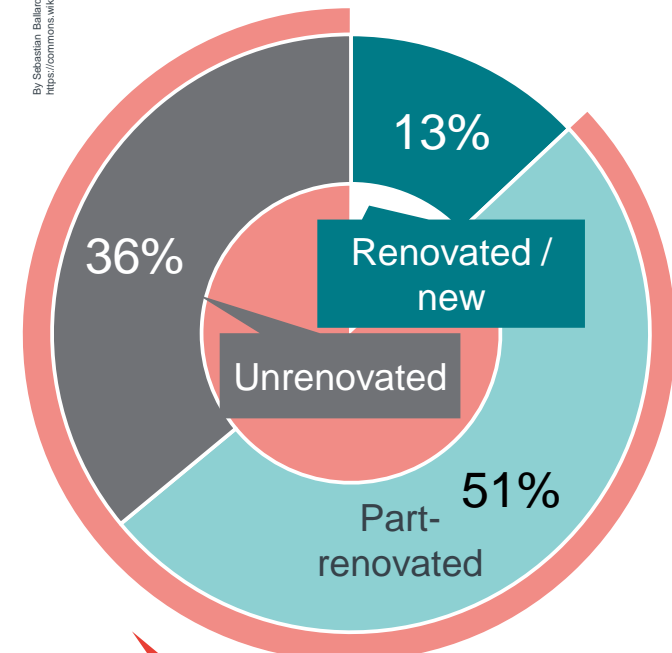
Renovation status



2/3 of homes built before (1st heating efficiency regulation of 1977)



3/4 of homes heated with oil/gas



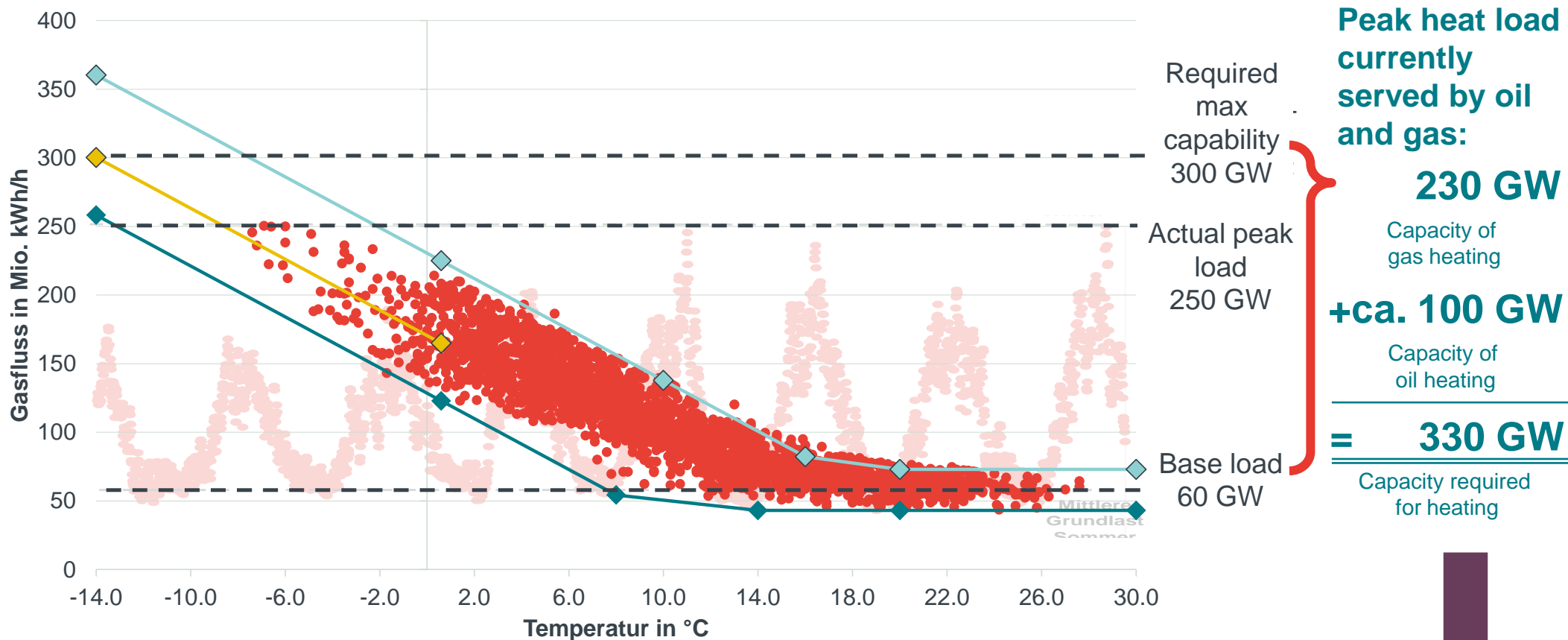
Only 1 in 8 buildings new or fully renovated



Managing **peak winter demand** is the key challenge in the heating sector.

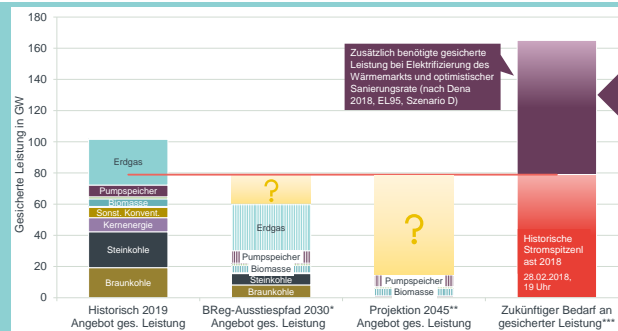
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# Peak heat load on cold winter days is a key challenge



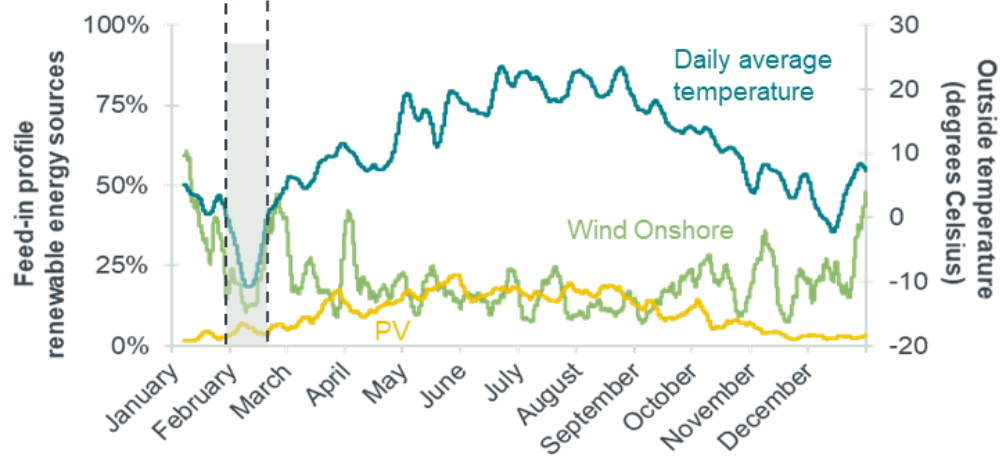
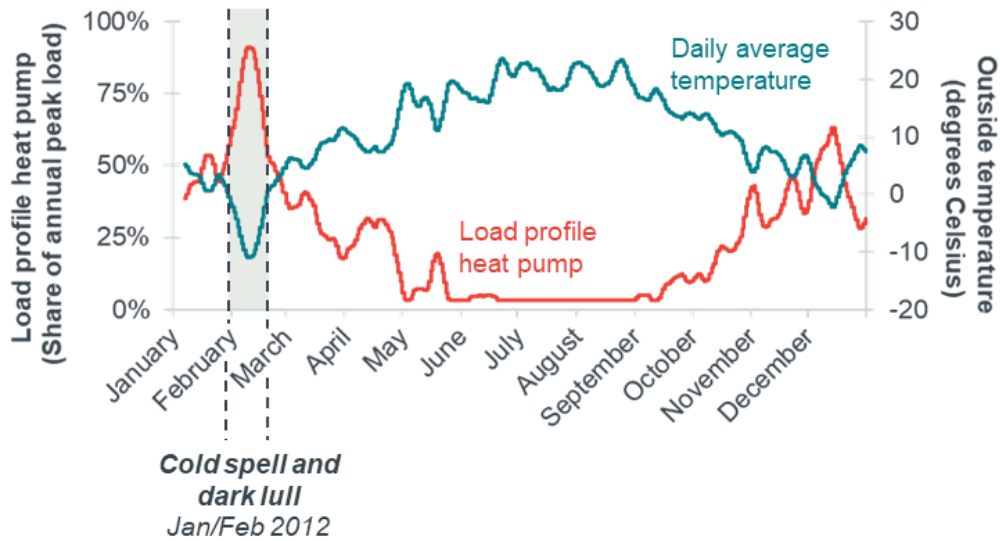
Would full electrification with heat pumps be feasible?

Current peak load power: **80GW**  
What about secured capacity?

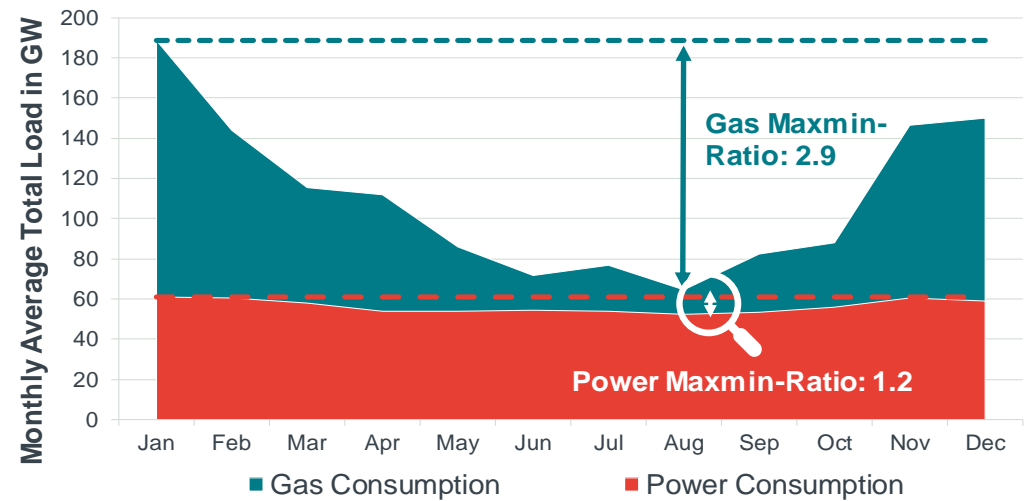


**86-124 GW**  
additional power capacity requirement

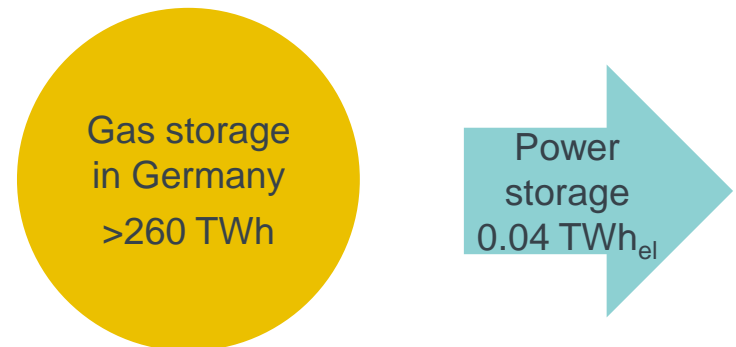
# Electrification of heating requires provisions for seasonal demand and multi-day weather phenomena such as dark and windless periods



In contrast to the gas grid, the power grid has not yet been confronted with strongly seasonally fluctuating demand from heating...



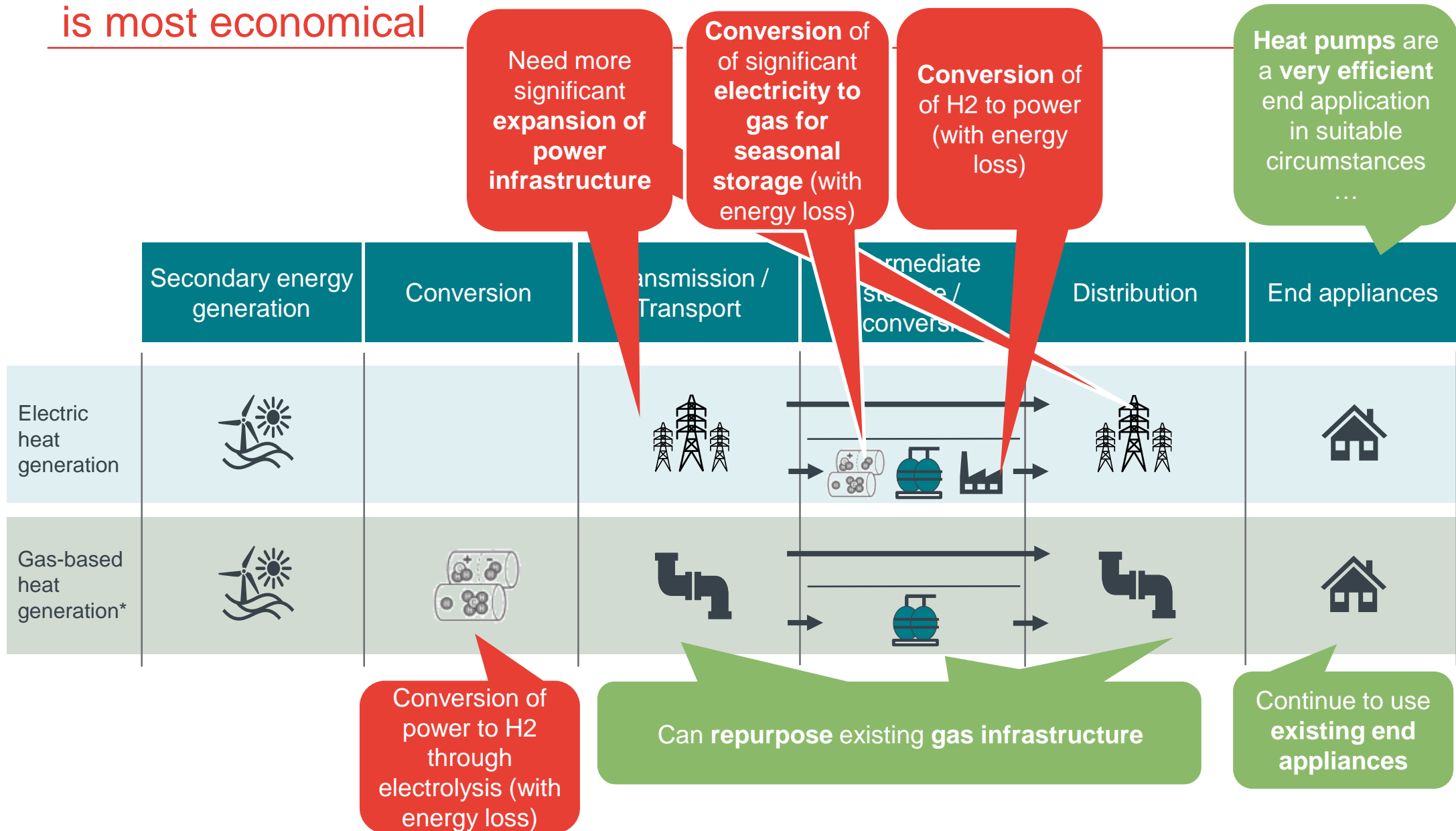
... whereby there is no way around gas as an (intermediate) energy carrier due to the availability of storage!



Source: Frontier Economics (2021) based on various sources (KommEnergie, SWM Infrastruktur, netztransparenz.de and Bundesnetzagentur).  
Note: Dark lulls refer to dark and windless periods (low generation from wind and PV).



# A combination of electricity and gas (or liquid) based heat supply is most economical



\*Other potential routes of low carbon gas based heat supply include H<sub>2</sub> from natural gas („blue hydrogen) and use of green H<sub>2</sub> in district heating



We need a **mix of technologies** for the transition of the heating sector and hydrogen can make a potentially important contribution.

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# Hydrogen can contribute to the defossilization of the heating market and should be part of the technology mix!

As part of a technology mix, hydrogen can make a significant contribution to the defossilization of the heating market

## Heterogeneity in the heating market

Energy efficiency measures and the direct use of renewable energy sources (RES) can be usefully supplemented by hydrogen.



## Seasonality in the heating market

Hydrogen offers the possibility to serve the considerable seasonality of heat demand.



## H2 transport infrastructure

The existing gas infrastructure can support the transport of renewable energy to the heat via hydrogen.



## H2 production quantities

Hydrogen in the heating market can help to meet the challenge of limited RES potential in EU and potentially supports the market ramp-up of hydrogen in other sectors.



## Lower system costs with H2

The use of hydrogen can reduce the overall system costs of defossilization and relieve the burden on households, for example.



**Climate target:** CO<sub>2</sub> emissions in the heating market are to be reduced by around 40% by 2030 compared to today. Currently, the heating market accounts for about a quarter of all direct and indirect CO<sub>2</sub> emissions (in Germany).



## Dr. Christoph Riechmann



+49 221 337 13 104



[Christoph.riechmann@frontier-economics.com](mailto:Christoph.riechmann@frontier-economics.com)