Bosch Thermotechnology

ExpertTalk

Reaching our climate goals: A multi-technology approach

Feb. 15 2022 | 10:00 AM CET

Expert Talk | Multi-Technology
Reaching our Climate Goals | A multi-technology approach

Agenda

Dr. Rainer Ortmann
Vice President Energy Policy at Bosch Thermotechnik

Dr. Philipp Perrin
Group leader Engineering Architecture and Systems at Bosch Thermotechnik

Expert Talk | A multi-technology approach

What it is about

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Reaching our Climate Goals | A multi-technology approach

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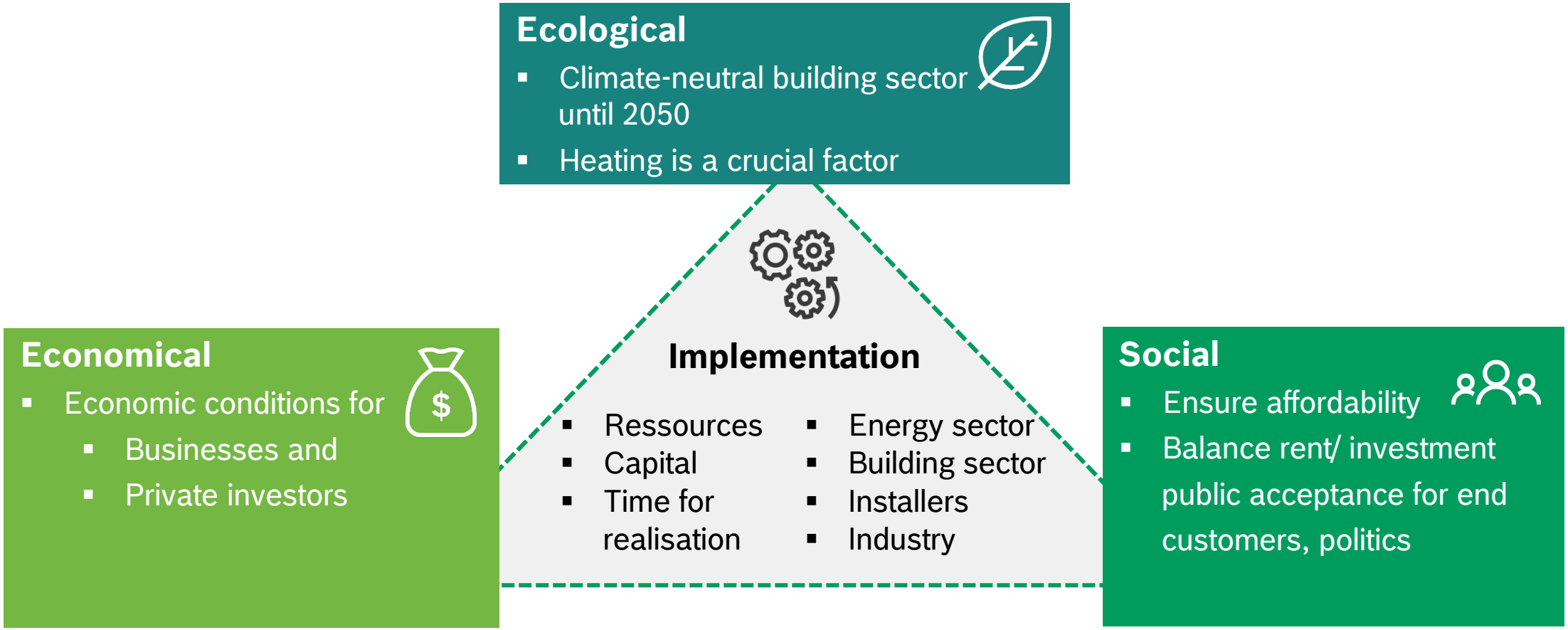
Reaching our Climate Goals | A multi-technology approach

Green multi-technology solutions for the building sector

Bosch drives solution within a comprehensive context



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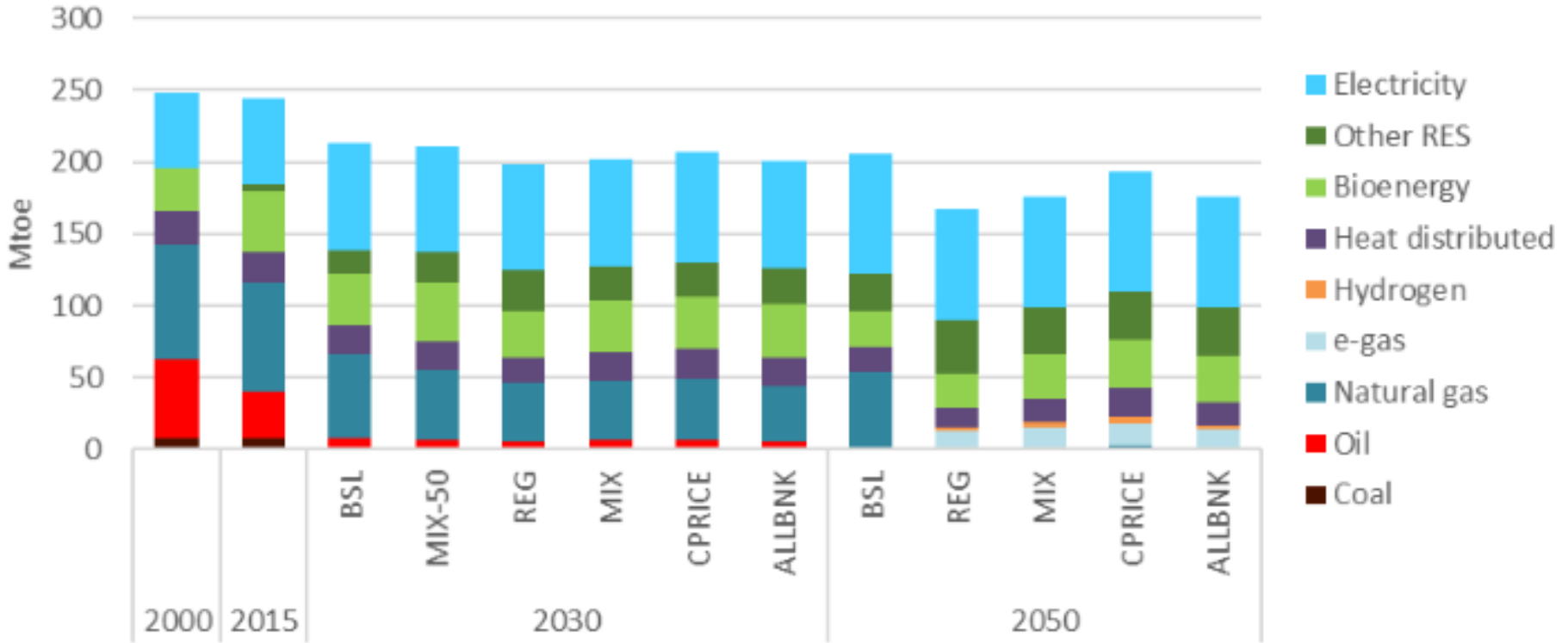
Energy demand in residential buildings



Source: 2000-2015: Eurostat, 2030-2050: PRIMES model

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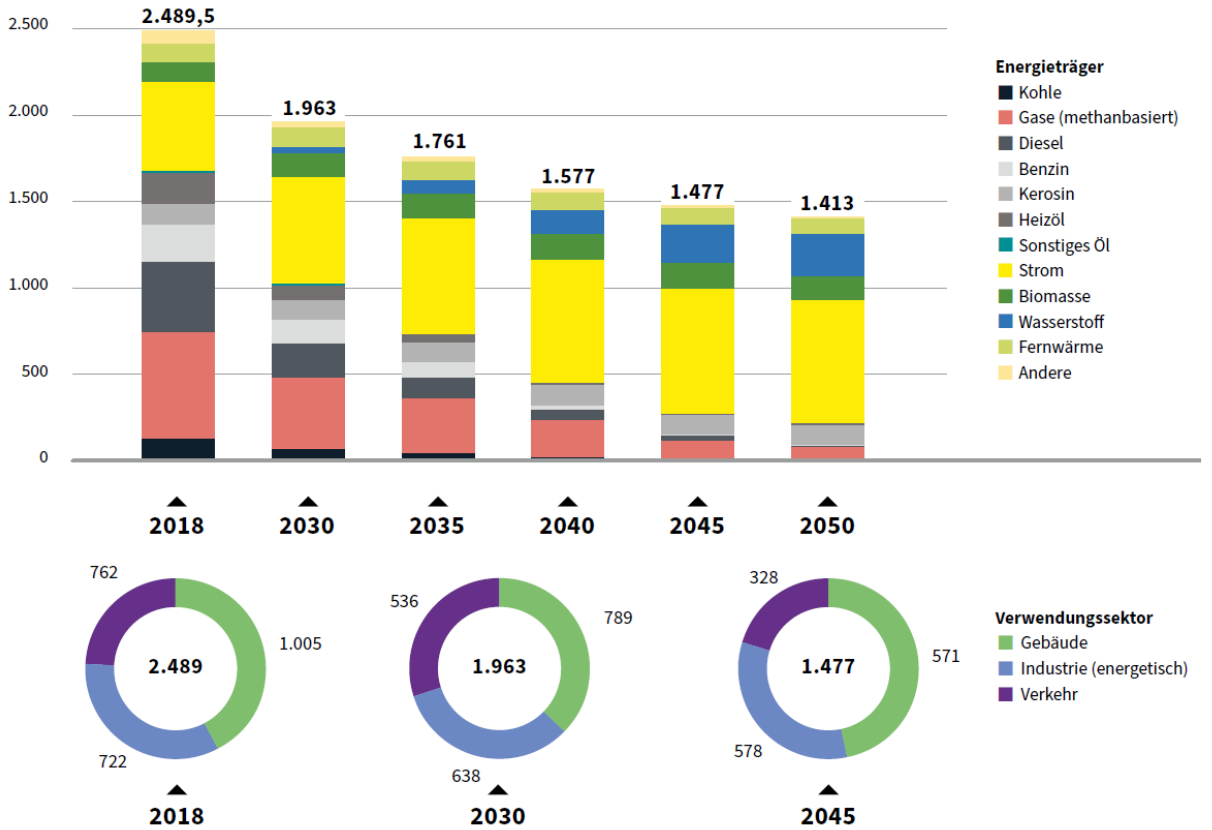
End energy sources in TWh to achieve climate goals



(Source: Deutsche Energie-Agentur GmbH (Hrsg.) „dena-Leitstudie Aufbruch Klimaneutralität) (dena, 2021)

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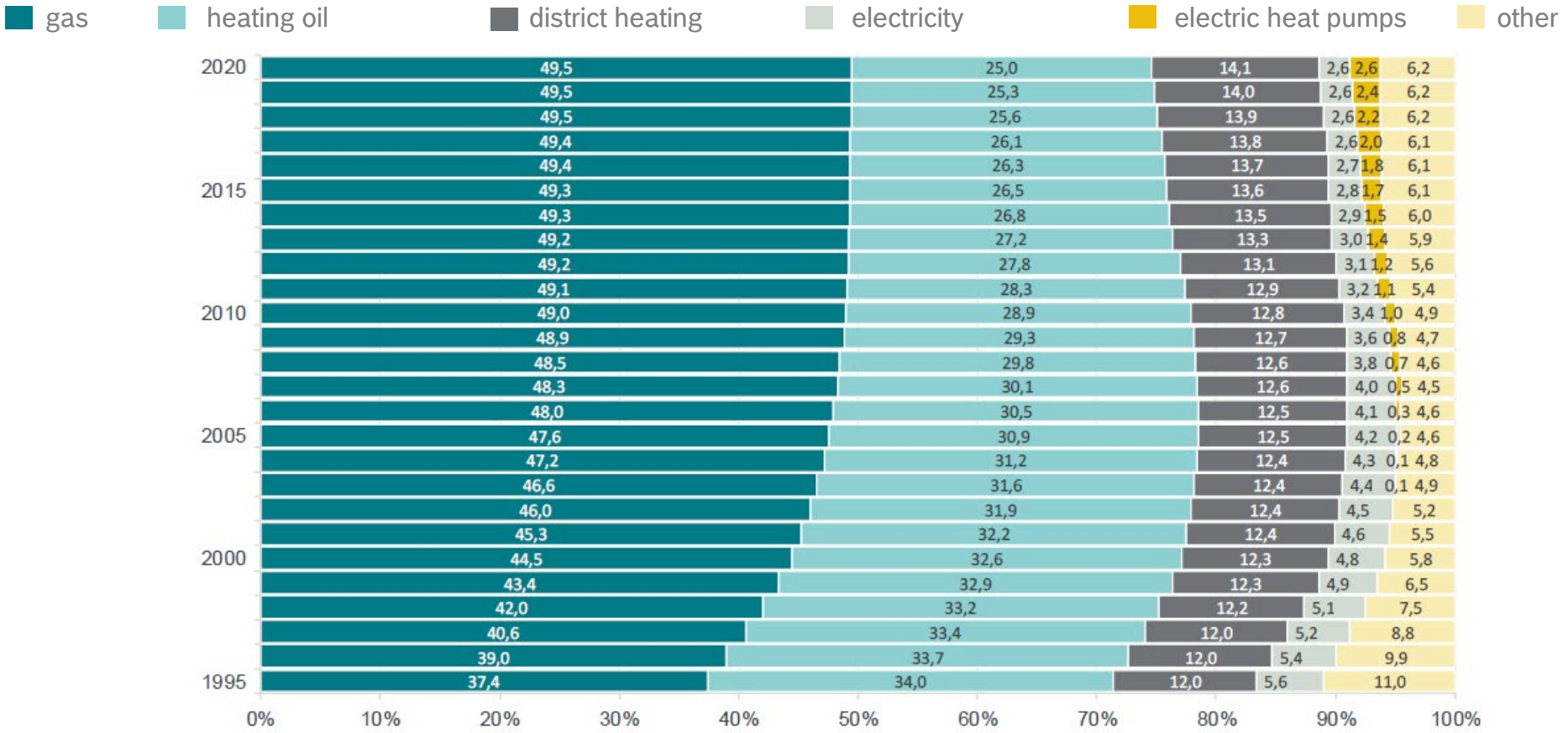
How does Germany heat ?



(Source: Frontier Economics based on BDEW 2020)

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EU-policies: Ambitious and quite concrete

EU Green Deal

Fit-for-55-Package

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A hydrogen strategy for a climate-neutral Europe

EUROPEAN COMMISSION

Brussels, 8.7.2020
COM(2020) 301 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

A hydrogen strategy for a climate-neutral Europe

Hydrogen is enjoying a renewed and rapidly growing attention in Europe and around the world. Hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has many possible applications across industry, transport, power and buildings sectors. Most importantly, it does not emit CO_2 and almost no air pollution when used. It thus offers a solution to decarbonise industrial processes and economic sectors where reducing carbon emissions is both urgent and hard to achieve. All this makes hydrogen essential to support the EU's commitment to reach carbon neutrality by 2050 and for the global effort to implement the Paris Agreement while working towards zero pollution.

locations to more distant demand centres. In its strategic vision for a climate-neutral EU published in November 2018[3], the share of hydrogen in Europe's energy mix is projected to grow from the current less than 2%[4] to 13-14% by 2050[5].

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Group leader Engineering Architecture and Systems at Bosch Thermotechnik

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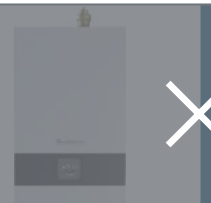
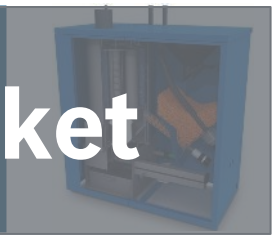
What technology enables green mass market heat supply?

Classic Combustion × **CO_2 Footprint**
Gas and oil fired boilers
Fossil fuels create CO_2 emissions
Currently highly utilised due to low costs

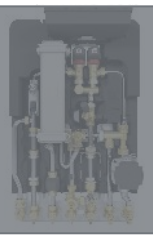
Direct Electric × **Economics**
Valuable electric energy directly utilised
CO_2 footprint depends on electricity mix
Only cost efficient in ultra low energy buildings



Solid Fuel Combustion × **Limited Market**
Pellet and log wood boilers
Carbon neutral renewable fuel
Availability of sustainable wood limited



District Heating × **Availability**
Heat generation with solar or heat pumps
Carbon footprint dependent on heat source
Obligation to use heat grid if available



Renewable H_2 Combustion
Sustainable heating in the size of a gas boiler
Low carbon footprint possible with green H_2
New fuel with uncertainty in price tag

Heat Pump
Highly efficient use of electricity
Carbon footprint low and decreasing
Efficiency highly dependent on building type

Hybrid - Combustion & Heat Pump

Reducing carbon footprint in difficult use cases
Low carbon footprint possible with green H_2

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Challenges on the journey to a green building sector

Installation Space

Heat pumps often require more installation space inside and outside the house compared to a gas/H_2 boiler

Technology Costs

Initial investment with high impact on buying decision. Heat pumps in most use cases more expensive than gas boilers.

Circumstances

Am I willing to invest large amounts in my building? What is my personal plan for the future?

Building Efficiency

Heat pumps are more efficient with low supply temperatures. In existing buildings this requires often intensive renovation.

Operation Costs

Operation costs define large proportion of total costs of ownership. Heat pumps benefit from high efficiency.

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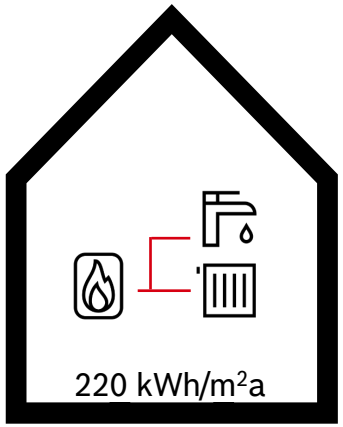
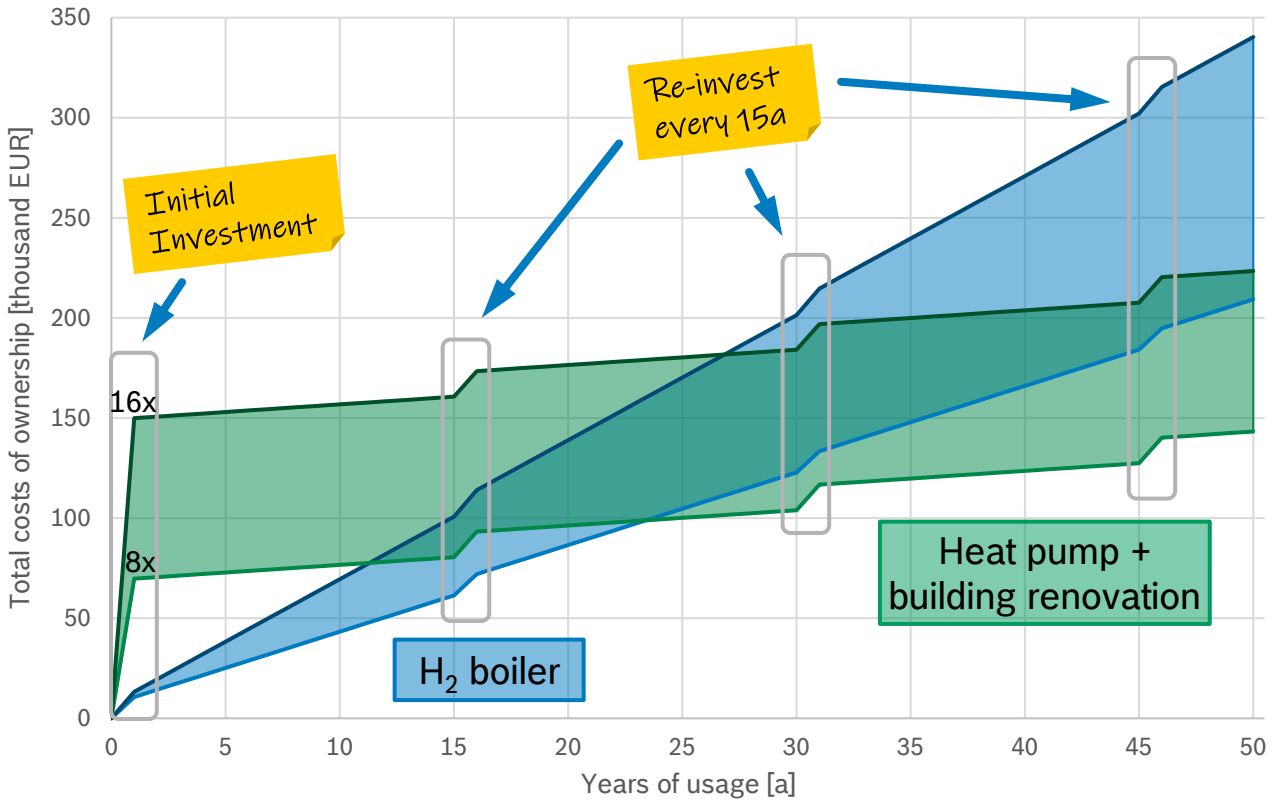
Example for development of total cost of ownership in a single family house

Use Case

- Germany
- Single Family House
- Build 1970s
- High supply temperatures





Take-Aways

- Differences in initial investment are huge
- Heavy renovation pays off on long term
- Result always depends on local situation
- Personal circumstances deciding for buying decision

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Typical use-cases

H_2 Combustion

Urban multi-story building with apartment individual gas boilers

Hybrid

Suburban / rural single-family building with low energy efficiency

Heat Pump

New build / refurbished single-family building with large heating surface

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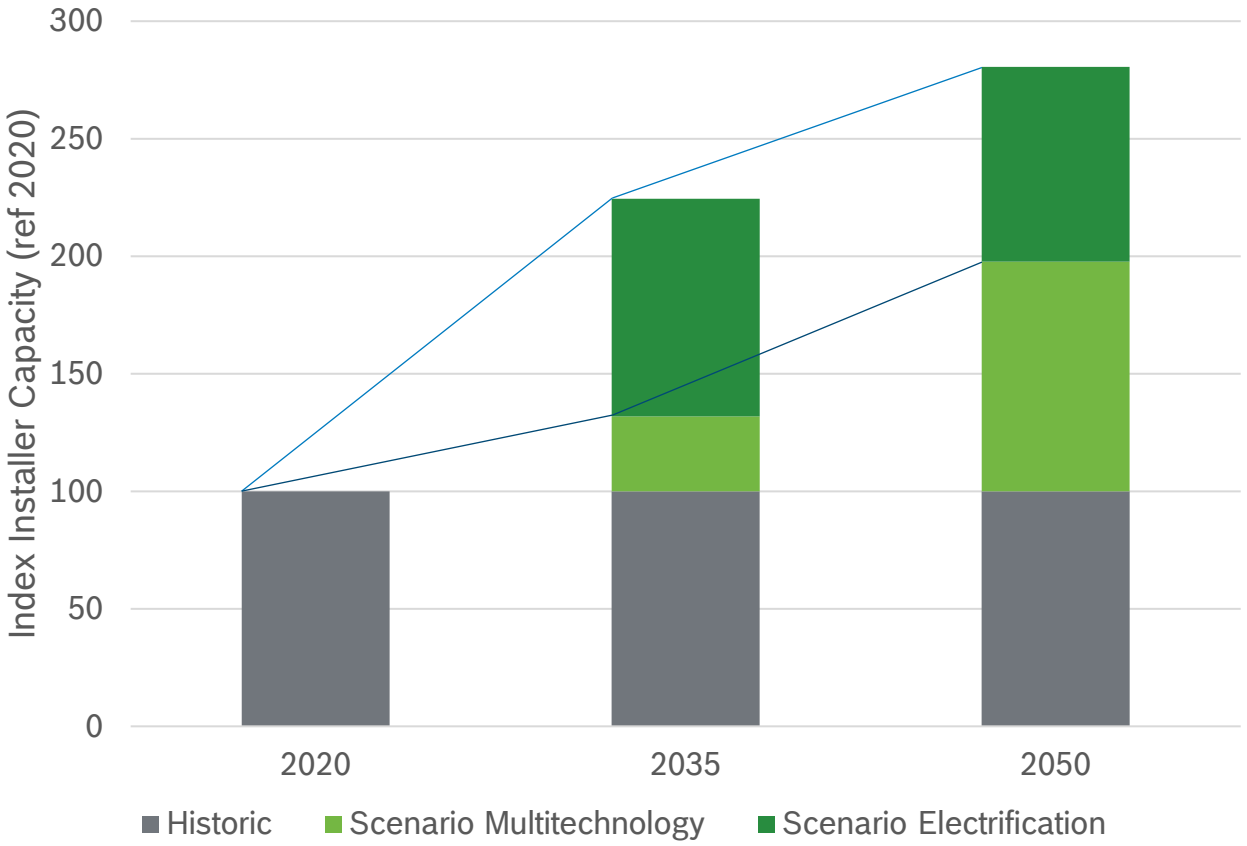
Available installer technology as big driver for multi-technology approach

Typical Installation Times

Combustion:	low
Heat Pumps:	high
District Heating:	medium
Solid Fuels:	high
H2 ready boiler:	low



Take-Aways

- Installer capacity is limited
- Strong electrification will lead to increased capacity shortage
- Education of installers essential

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Political View

Combine economical, social and ecological aspects

Individual Views

Take the individuality of each building into account

Target Achievement

Consider capacity limits of installers

Multi-technology as safeguard of carbon savings in the building sector

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Thank you for your time.