Besonderheiten im Wärmemarkt
Specialities of the heating market

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Erneuerbare Wärme für die Energiewende
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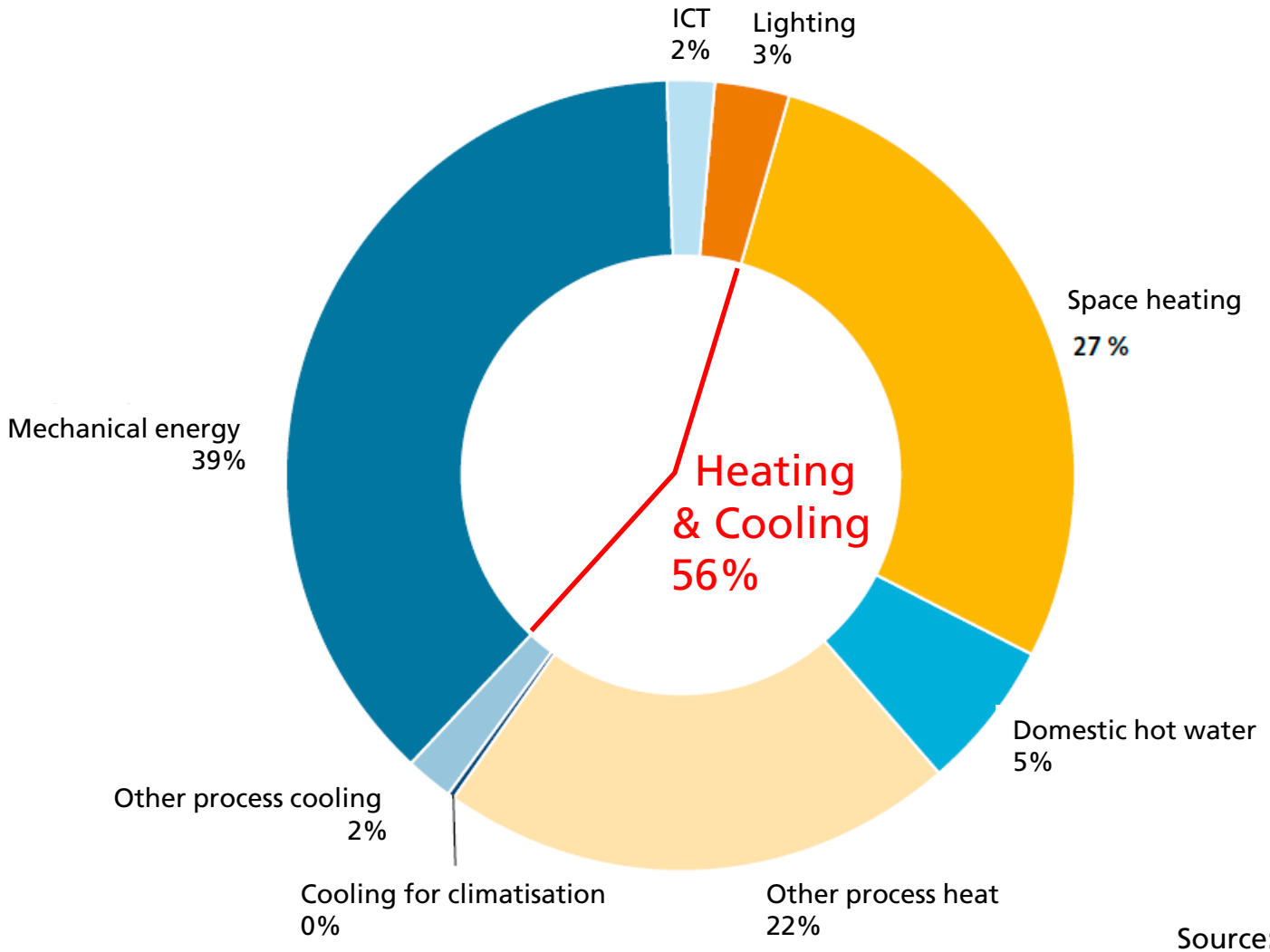
Paris, 26. April 2017

Final energy demand by sectors, Germany 2015

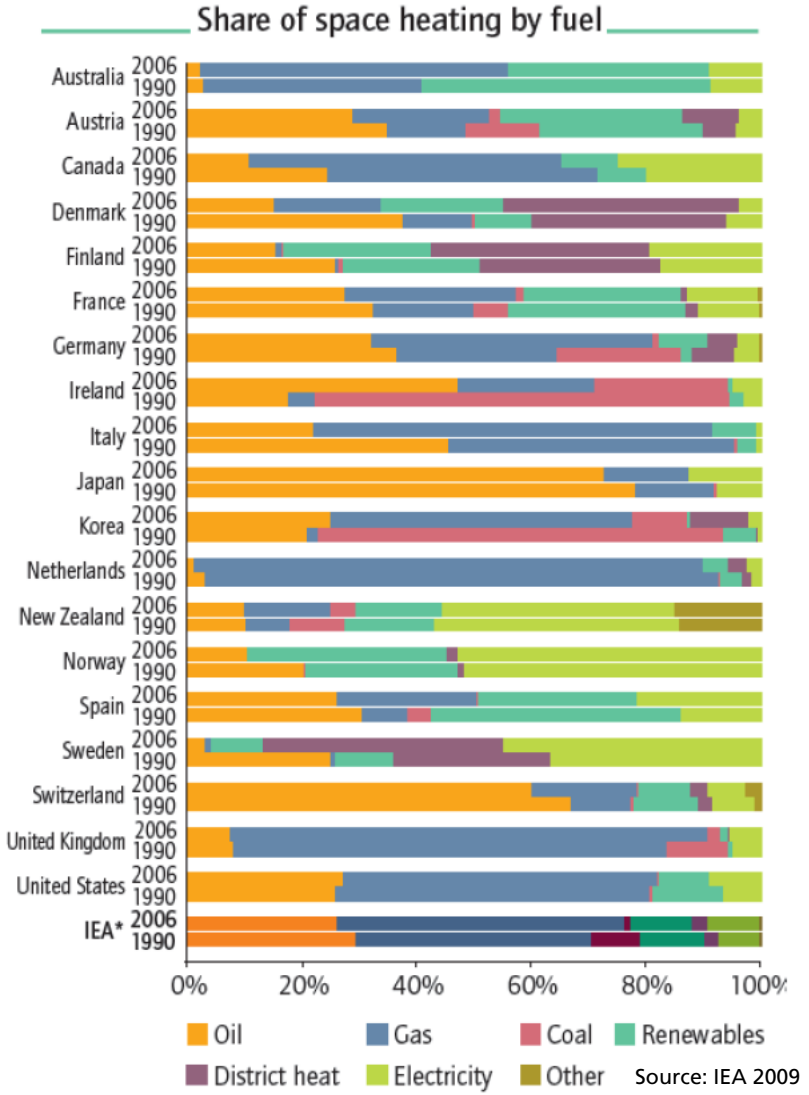
Total demand: 8877 PJ



Source: BMWi 2017

Space heating fuels for different countries

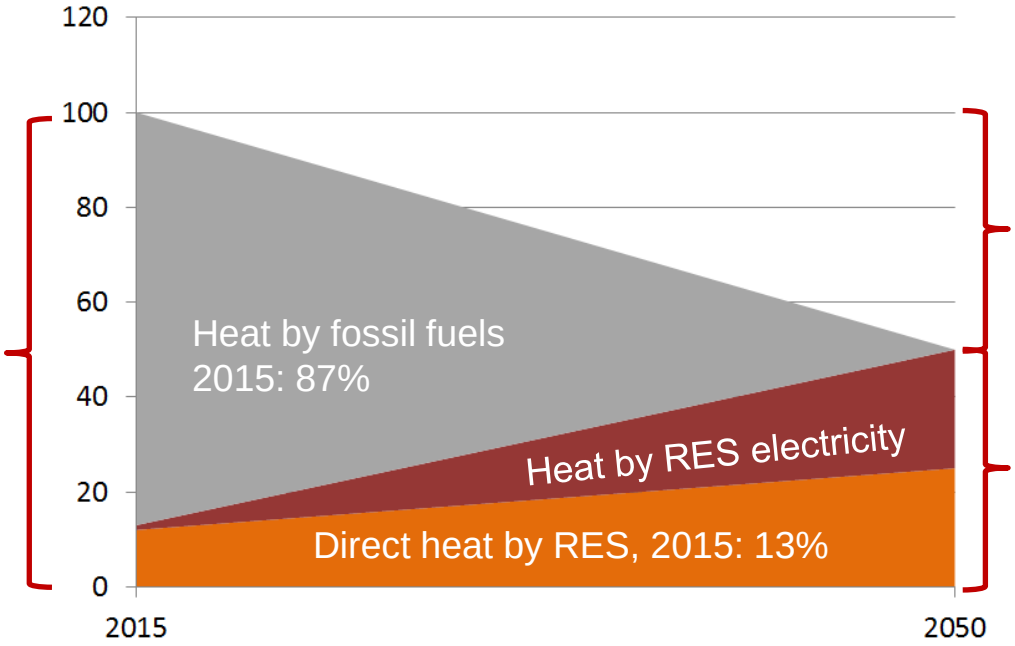
- Space heating fuel mix per country differs a lot from country to country
- Natural gas is dominating, if sufficiently available (at low costs)
- Basic heat supply is provided by oil
- Electricity is used, if sufficiently available from renewable energy sources (hydro)
- Renewable energy sources are mainly biomass (wood)
- District heating plays only in few countries a significant role as distribution technology, in most buildings globally, heat is generated on-site



Challenges of decarbonizing the heating sector

General concept of the German government

Heat demand today: 100%



Heat demand reduction target: 50%
➔ Is this realistic? Today's efficiency rate is not sufficient.

Remaining 50% of today's heat demand shall be covered by RES ➔ The contribution of direct heat generation and heat generated by RES electricity is unclear

Infrastructure question: What is the optimal heating infrastructure? What will be the share of centralized (district heating) and decentralized (per building) heat generation/supply? To which share will the decentralized generation be based on gas (biogas, methane) or on electricity?

Renewable energy sources for heating

Biomass

Solar thermal

APPLICATIONS

Small burners

- Pellets stove
- Wood chip boiler
- Log wood stove/boiler

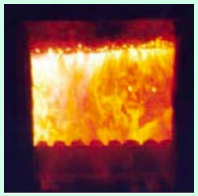
District heating & cooling and process heat

Heat only or combined heat and power

- Pellets boiler
- Wood chips boiler
- Waste & agricultural feedstock boiler

Use of

- Solid biomass
- Bio fuels / bio gas



APPLICATIONS

Domestic hot water & space heating

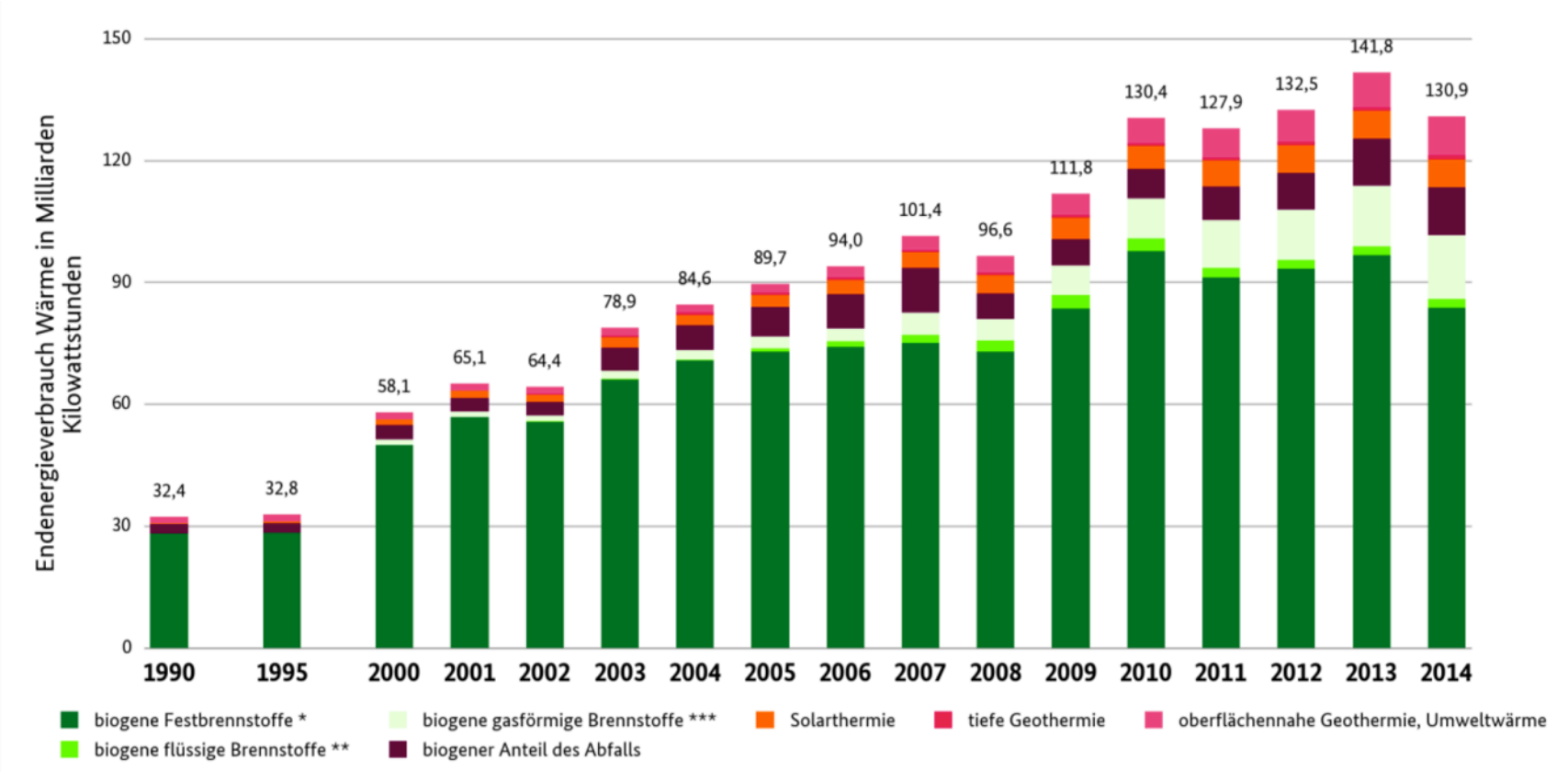
- One/two/multi family homes
- Hotels, hospitals, residential homes,…
- District heating
- Multifunctional façades
- PV-Thermal (PV-T) hybrid collectors

Process heat

- Low up to 100°C
- Medium up to 250°C
- Solar assisted cooling and refrigeration

Development of heat demand by RES in Germany

Biomass dominates the renewable heating sector



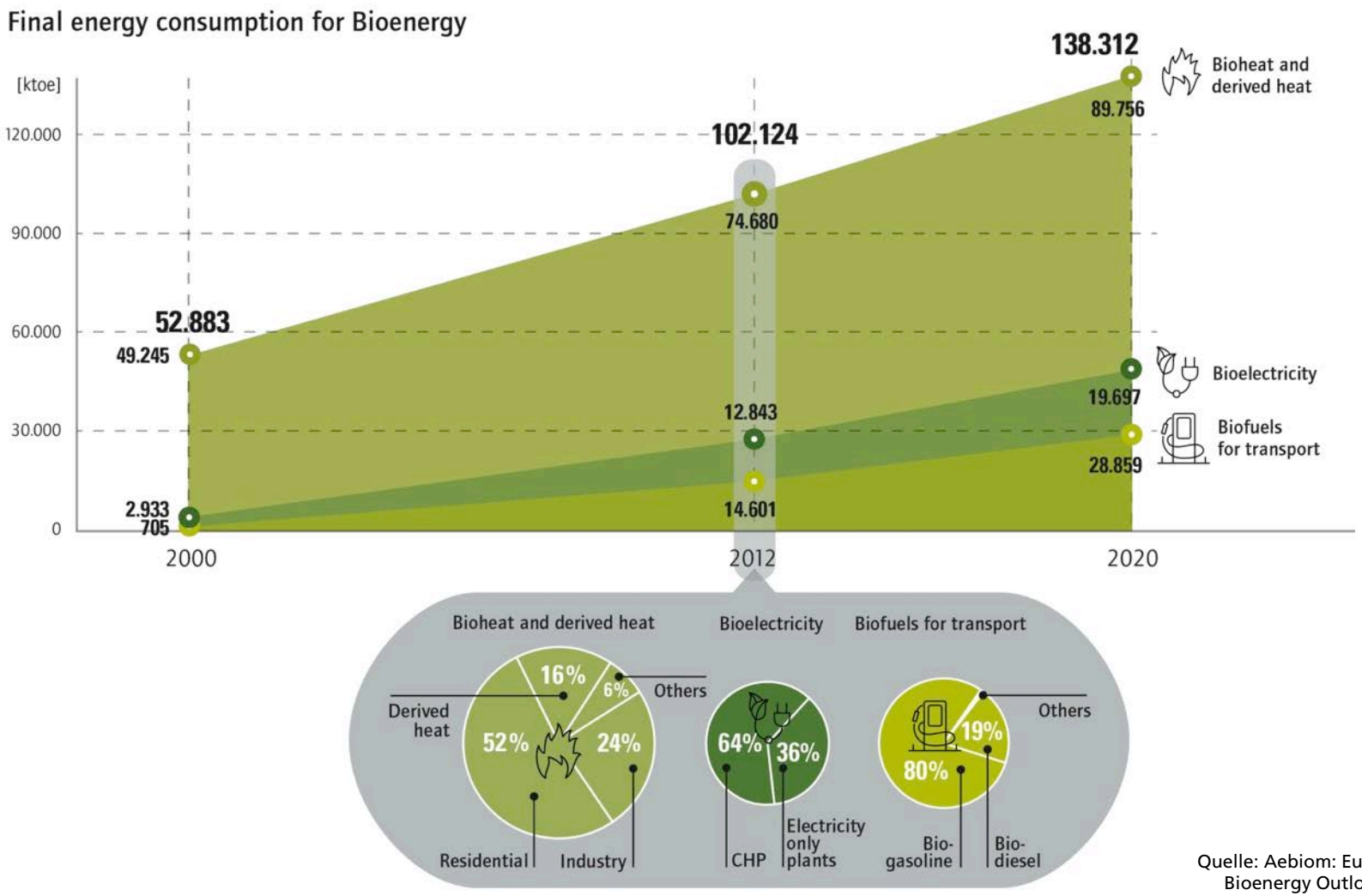
* inkl. biogenem Anteil des Abfalls, ab 2013 inkl. Klärschlamm

** inkl. Biodieselverbrauch in der Landwirtschaft

*** Biogas, Biomethan, Klär- und Deponiegas

Quelle: Erneuerbare Energien im Jahr 2014, BMWi

Biomass dominates the renewable heating sector



Quelle: Aebiom: EuropeAn Bioenergy Outlook 2014

Renewable energy sources for heating

Geothermal

Cross Cutting Technologies

TECHNOLOGIES and APPLICATIONS

Shallow GT

- Geothermal HP
- Underground thermal storage

Applications

- DHW, space heating & cooling
- process heat

Deep GT (>400m)

- Direct heat use
- Comb heat & power

Applications

- District heating
- Agriculture and industrial processes
- Balneology
- Cooling

APPLICATIONS

DHC

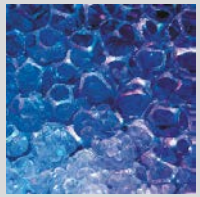
- District heating
- District cooling
- DH&C with seasonal storage

TE Storage

- Water storage
- PCM
- Thermo chemical
- Underground storage (UTES)

Hybrid systems heat pumps

- Innovative system design
- Ground, water and air heat pumps



HP = Heat pump, GSHP = Ground source HP, EGS = Enhanced geothermal systems, DHW = Domestic hot water, GT = Geothermal, UTES = Underground Thermal Energy Storage

RHC-Platform provided a Vision, Strategy and Roadmap for renewable heating technologies

Download: www.rhc-platform.org

Common Vision
2020 - 2050

Strategic Research Priorities of Solar thermal, Biomass, Geothermal and Cross-cutting
➔ **Strategic Research & Innovation Agenda**

Technology Roadmaps of Solar thermal, Biomass, Geothermal and Cross-cutting
➔ **Common Implementation Roadmap**

2011 2012 2013 2014

Special characteristics of the heating market

Why the heating sector is more difficult to be decarbonized than electricity

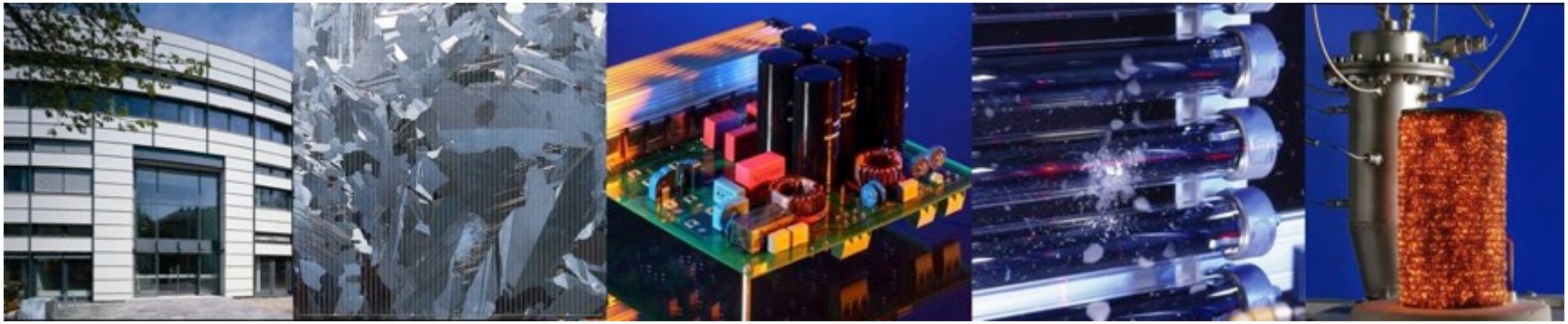
The heating market

- is **heterogeneous and complex** in regards to owners and operators of heating systems, types of heating technologies and size of heating systems, as well as types and size of heated buildings and objects
- is **strongly dependent on international fossil energy prices**, depending on the specific heating fuel mix of the country, influences competitiveness of renewable energy sources significantly
- is **increasingly connected with the electricity market**, therefore, sustainable solutions require systemic solutions including heating and electricity
- **will depend on the progress in building energy efficiency** due to significant heat demand reduction by nearly zero energy buildings, however, the level of remaining heat demand is unclear

Conclusions

- **Main barriers for heating market development are**
  - Competitiveness (price for fossil fuels are often low or subsidized)
  - Complexity of heating systems / concerns on reliability of renewable technologies
  - Integration of electric-heating-(cooling) system must be developed
- **High uncertainty on the future energy supply of heat**
  - To which level will heat demand be reduced?
  - What can be the share of (renewable) electricity in the heating market?
  - What will be the role of centralized heating infrastructure (district heating)?
- **Energy efficiency must be strengthened AND renewable energy sources must be deployed systematically**
  - Technological development of efficiency and RES must be accelerated to increase efficiency and reduce costs
- **Energy system (electricity – heating – cooling – transport) must be optimized as a whole, since heating is increasingly linked to electricity**

Thanks for your attention!



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