

# **Current Trends in Refrigeration Technology**

## **Study Energy Consumption in Refrigeration Technology in Germany**

**Web-Seminar, June 26<sup>th</sup> 2020**

**euramm<sup>o</sup>n**

refrigerants delivered by mother nature

# Current Trends in Refrigeration Technology



The basis is the following study:

## ***„Energy demand for refrigeration technology in Germany***

***An estimation of the energy demand of refrigeration technology in Germany by application areas 2017“***

The study will be published in July 2020.

# Energy demand for Refrigeration Technology in Germany

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This study was realised in cooperation with

- Members of the VDMA working group "Energy Efficiency of Refrigeration Systems",
- Research Council for Refrigeration (Forschungsrat Kältetechnik e.V.),
- Institute of Air Handling and Refrigeration (ILK Dresden),
- Companies and Institutions in the industry,
- VDMA trade association Air-handling Technology.

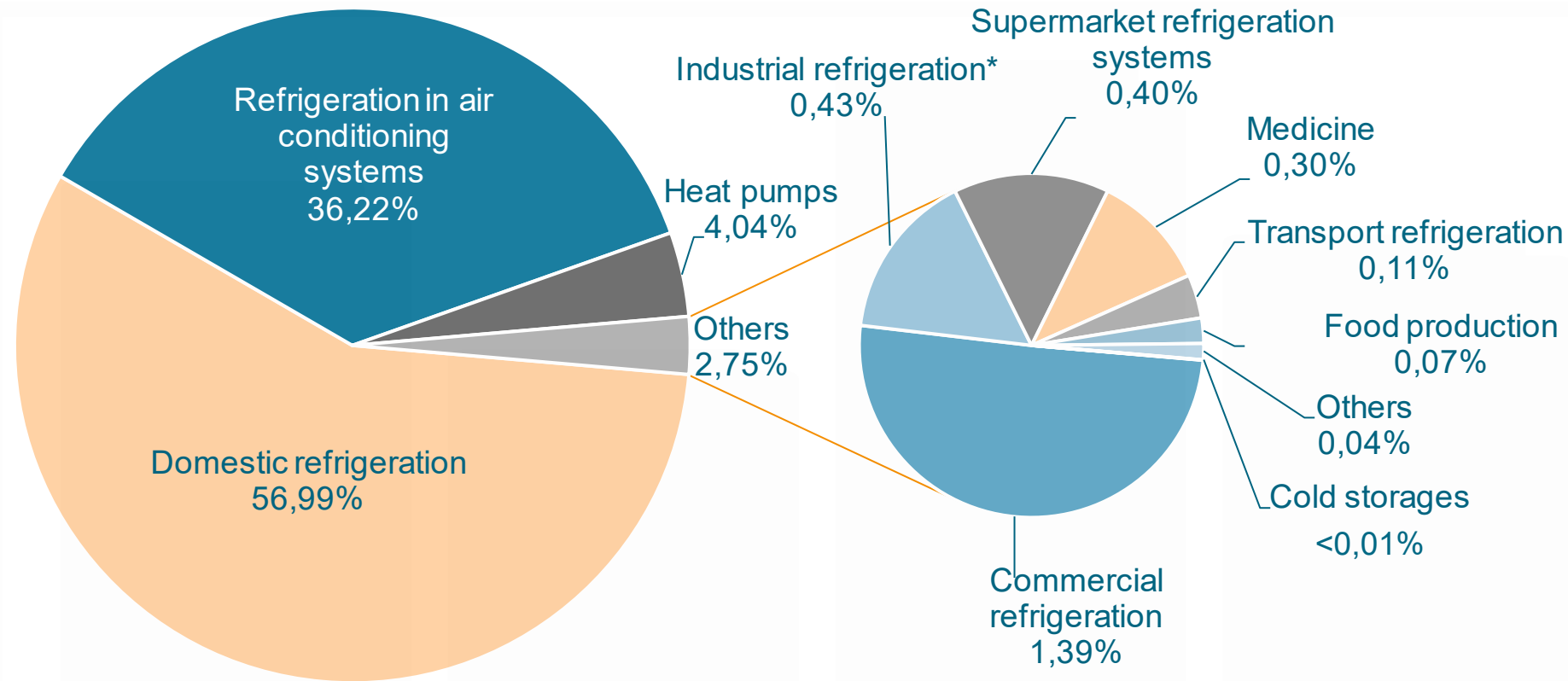
# Energy demand for Refrigeration Technology in Germany



## Segments of Refrigeration Technology:

- 01 Domestic refrigeration
- 02 Supermarket refrigeration systems
- 03 Food production
- 04 Commercial refrigeration
- 05 Transport refrigeration
- 06 Air conditioning systems (air conditioning of buildings and vehicles)
- 07 Industrial refrigeration (without Food industry)
- 08 Medicine
- 09 Cold storages
- 10 Heat pumps
- 11 Others (e.g. sports, military technology, refrigeration in cryogenic applications)

# Total number of Refrigeration Systems – Shares of Stock of Refrigeration Systems in Germany (Base year 2017)



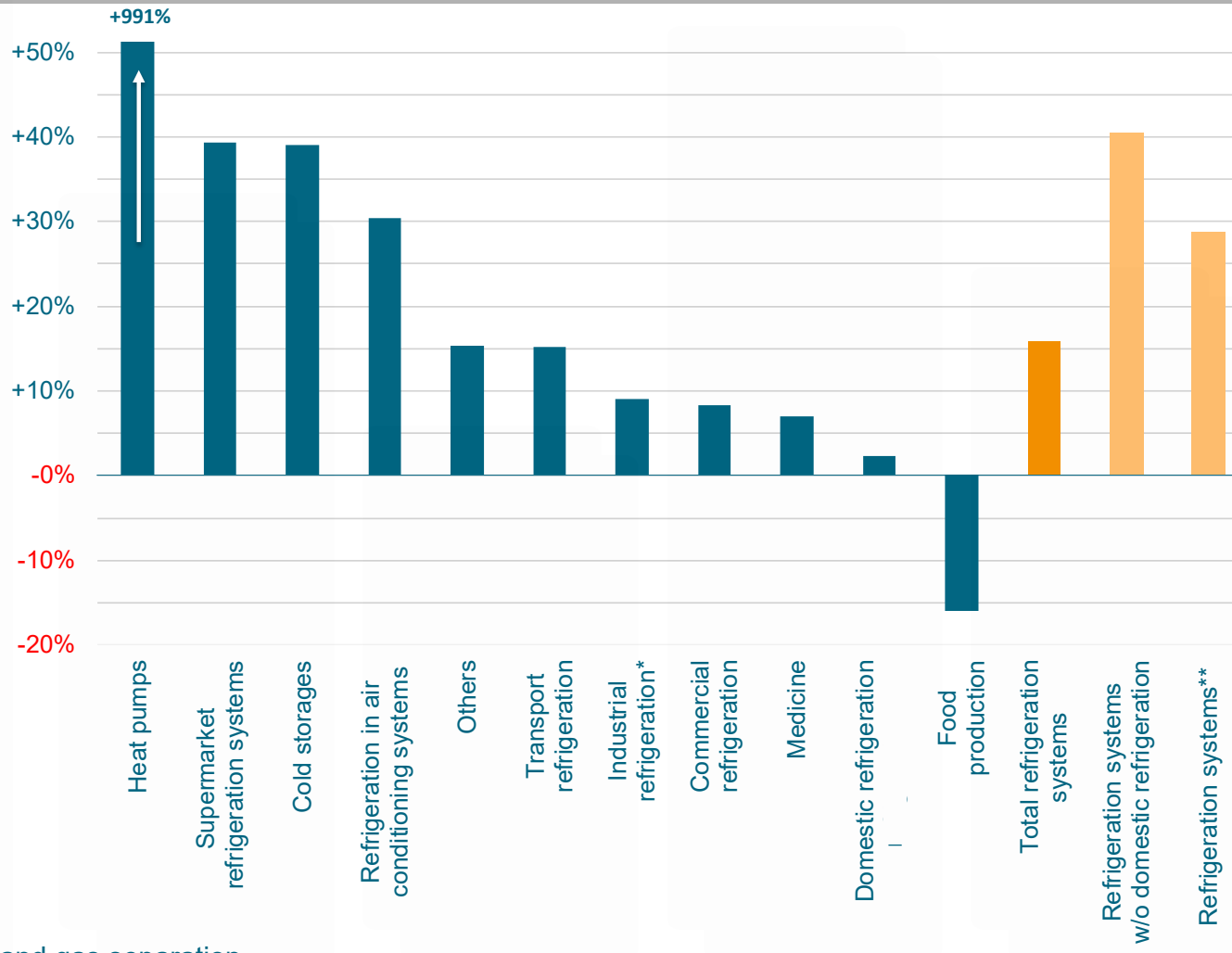
Total number: **144 million systems**

\* including air and gas liquefaction; without food industry

Source: VDMA Air-handling Technology

# Refrigeration – Stock of Refrigeration Systems in Germany

## Rate of Change 2017/2009



\* incl. air and gas separation

\*\* Refrigeration systems w/o domestic refrigeration and heat pumps

Source: VDMA Air-handling Technology

# Key statements – Overview

## Refrigeration in Germany

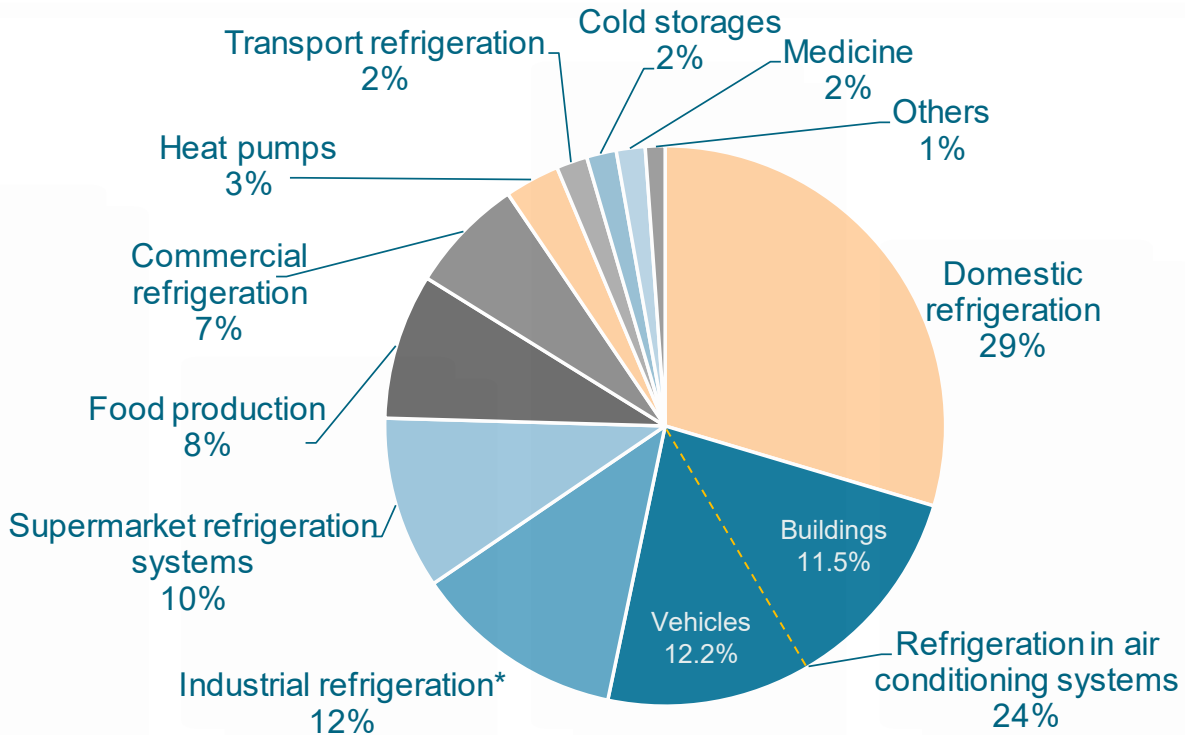
Energy demand by application areas 2009 and 2017 (state of data: September 17th, 2019)

- Total final energy demand for refrigeration
  - 2009: 82 TWh
    - ♦ Thereof 70 TWh electric power
  - **2017: 87 TWh +6%**
    - ♦ Thereof 73 TWh electric power
- In a number of refrigeration systems
  - 2009: 125 million units
    - ♦ Without domestic refrigeration 44 million units
  - **2017: 144 million units +16%**
    - ♦ Without domestic refrigeration **+40%**
- Number of inhabitants Germany 2009: 81,8 million to 2017: 82,8 million +1%



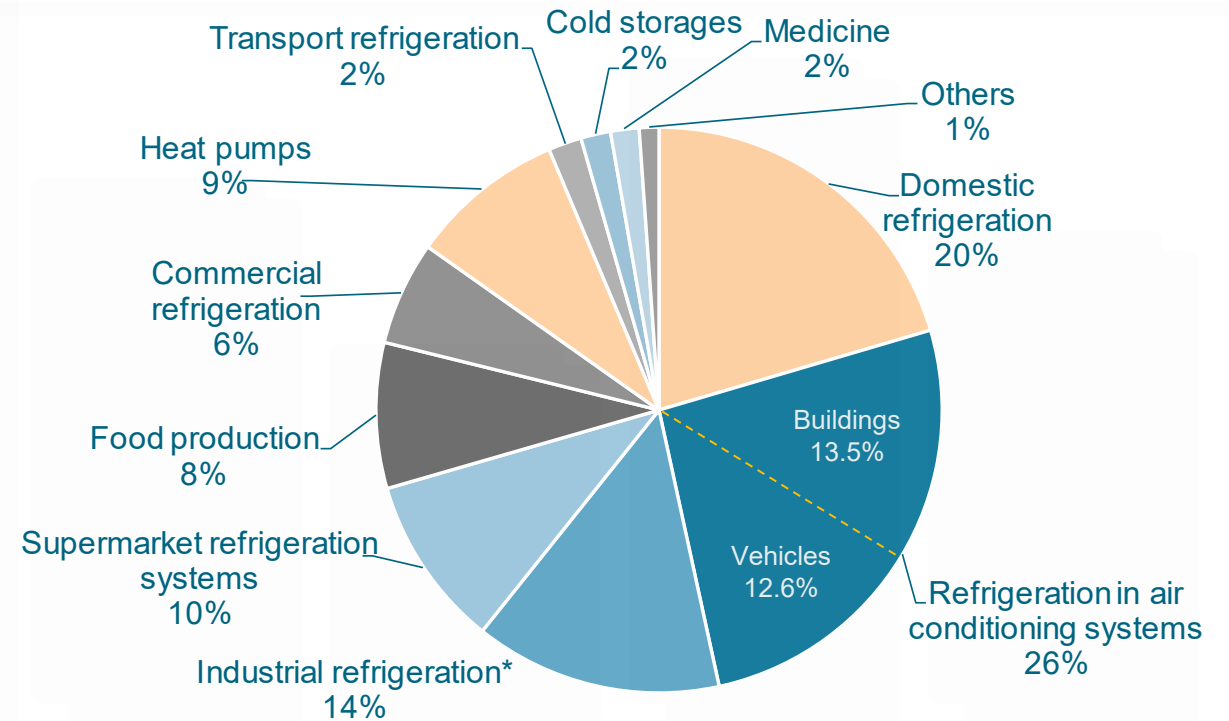
# Refrigeration – Total Energy Demand according to application areas

2009



Total: 82 TWh/a  
\* without food industry

2017

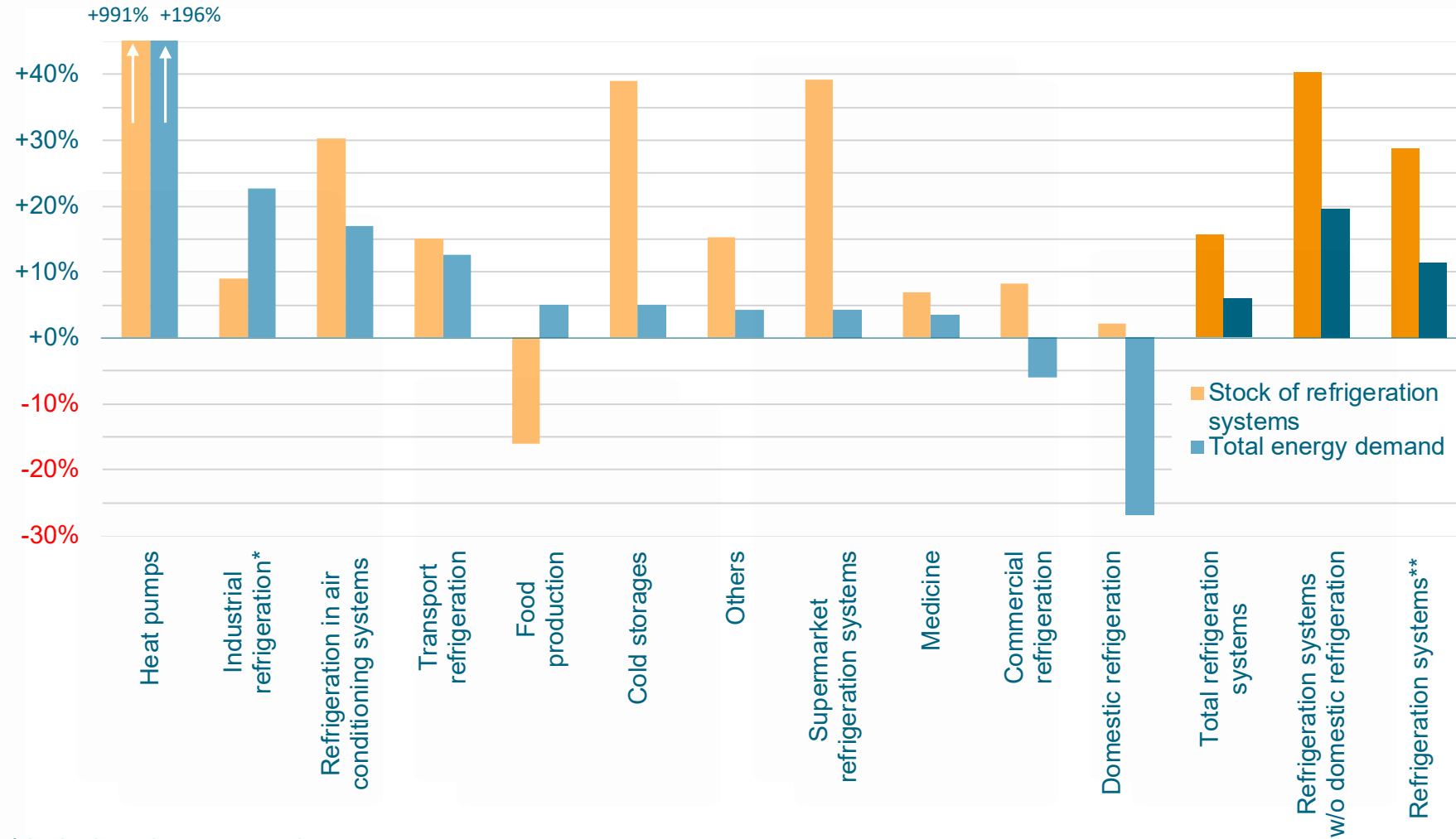


Total: 87 TWh/a  
Source: VDMA Air-handling Technology



# Refrigeration – Stock and Energy Demand by application area

## Rate of Change 2017/2009

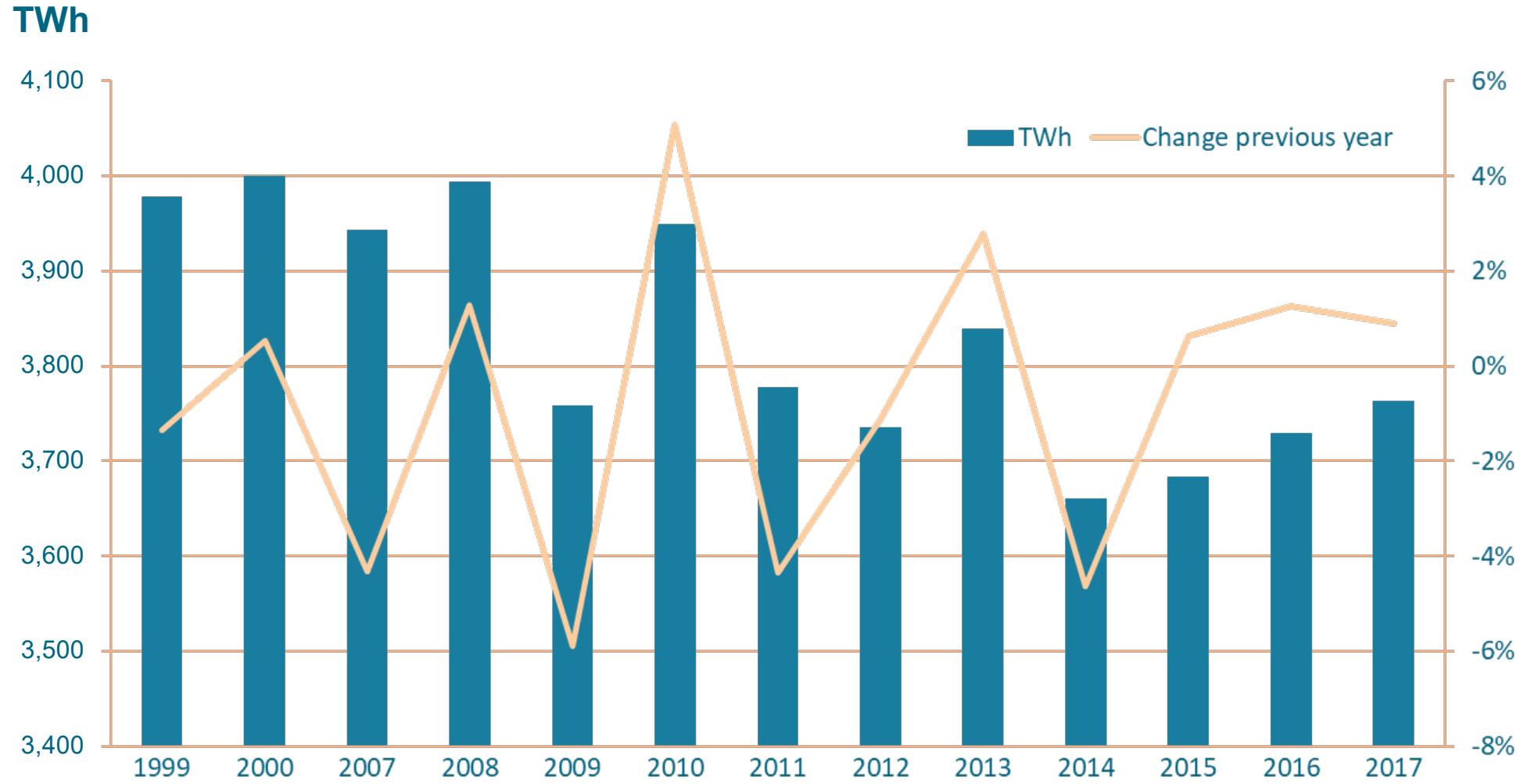


\* incl. air and gas separation

\*\* Refrigeration systems w/o domestic refrigeration and heat pumps

Source: VDMA Air-handling Technology

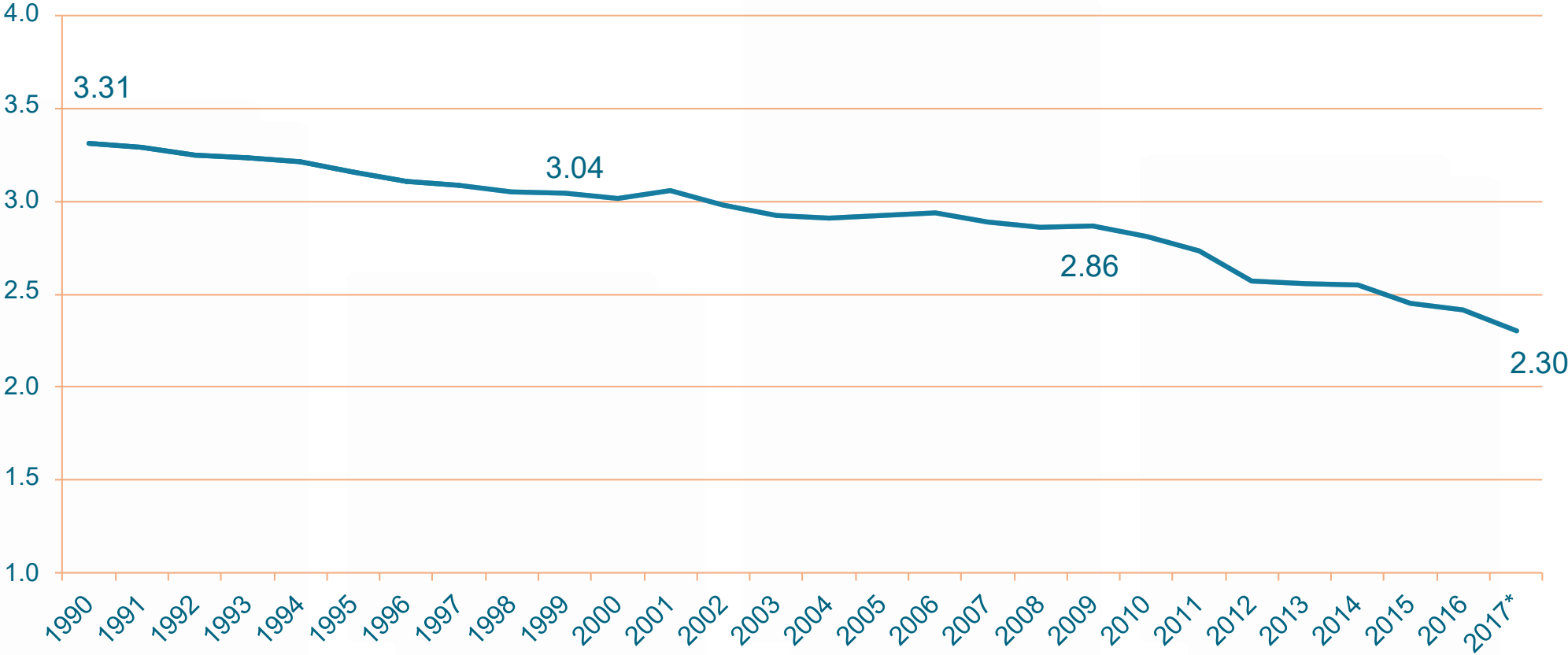
# Primary Energy Consumption in Germany in TWh



Source: VDMA, AGEB

# Development of the Primary Energy Factor for Power Generation in Germany

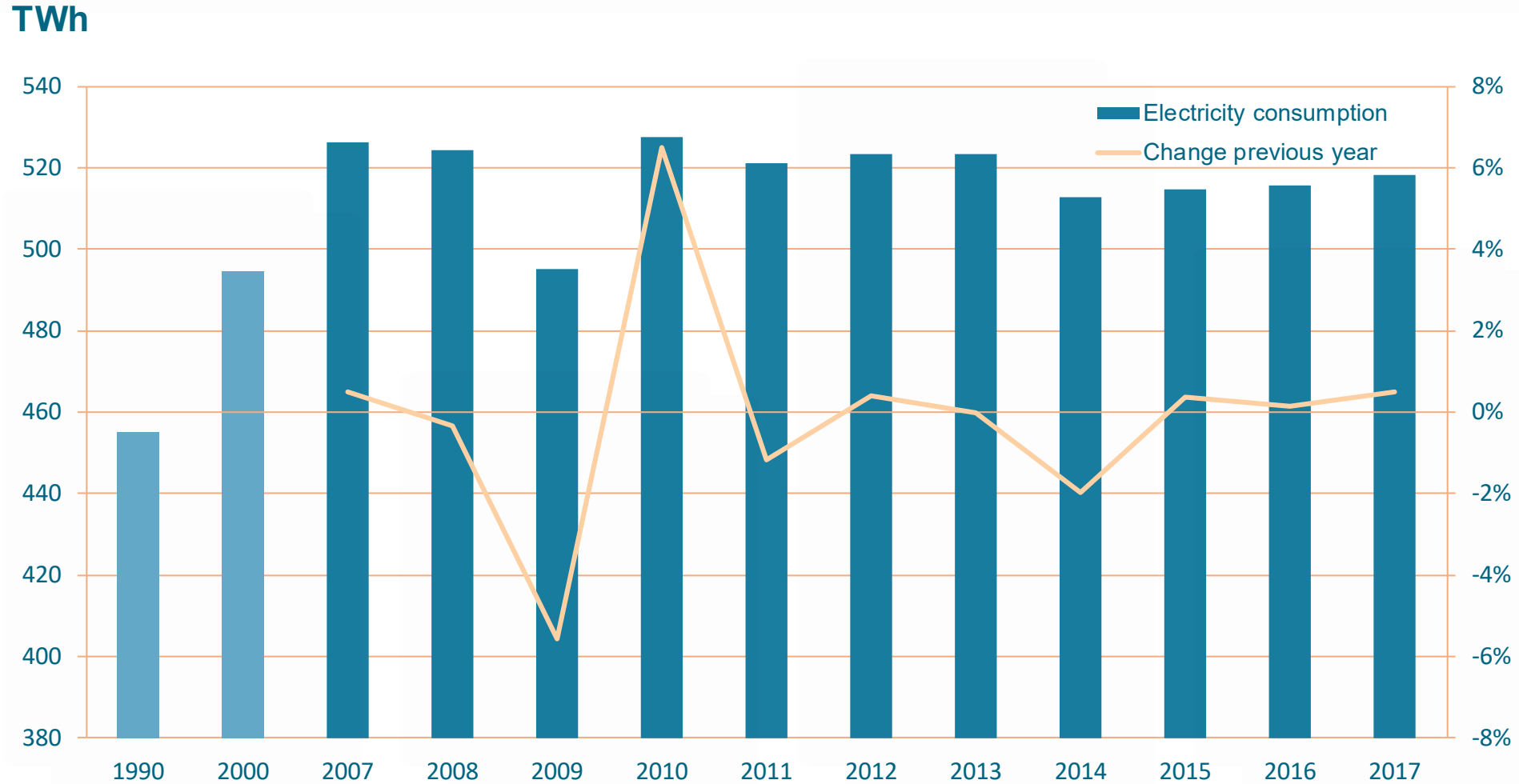
Primary energy factor for Electricity



\* As of 11.04.2019

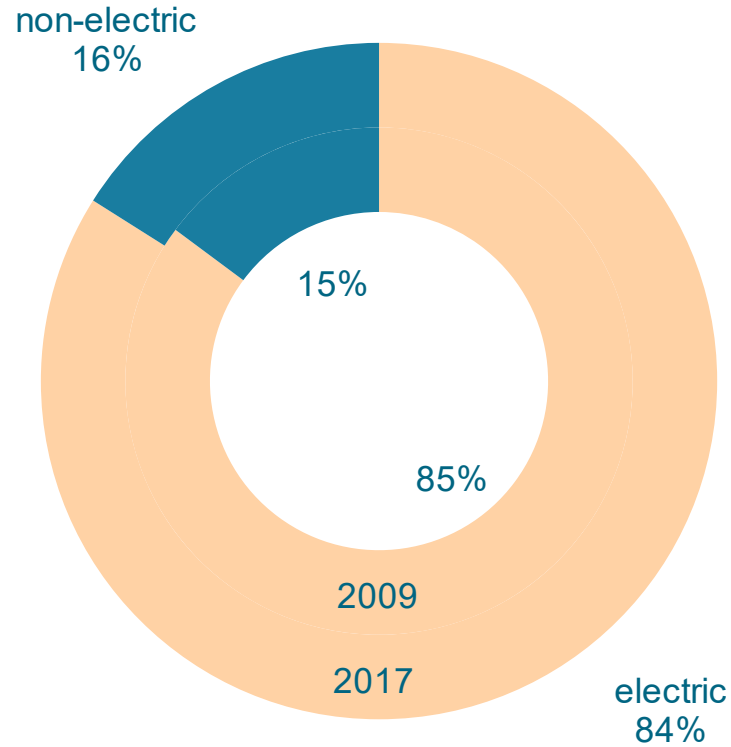
Source: VDMA, AGEb

# Electricity Consumption in Germany (Final Energy Consumption in TWh)



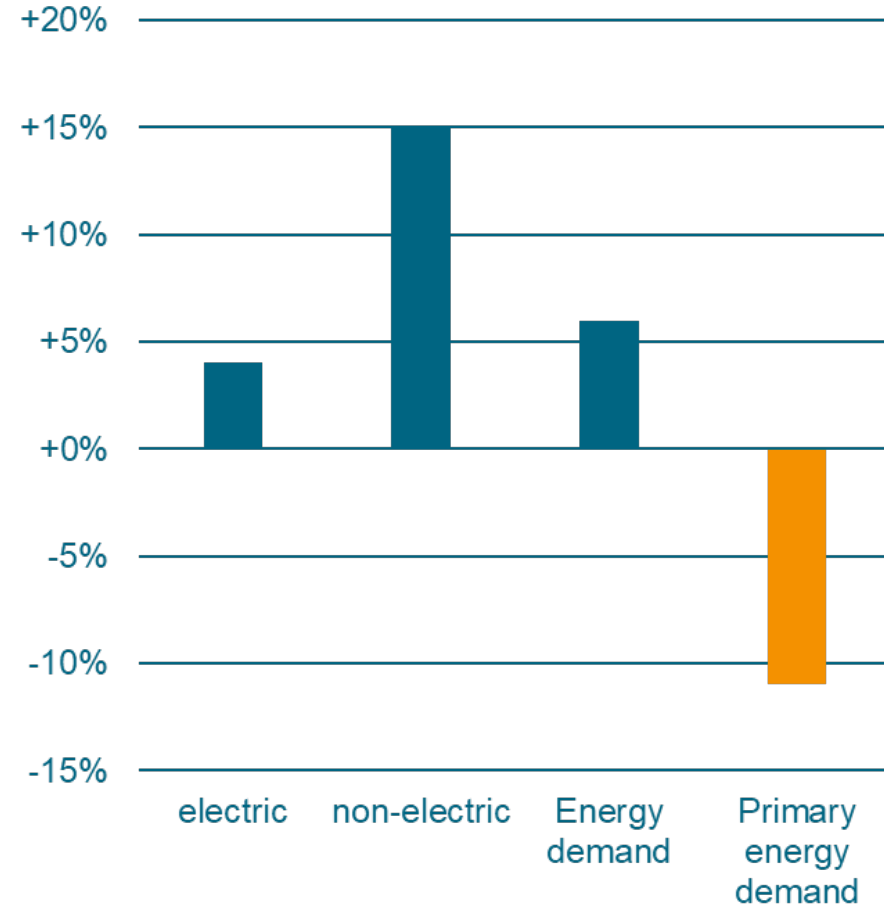
Source: VDMA, AGEB

# Energy Demand for Refrigeration Technology in Germany



Source: VDMA

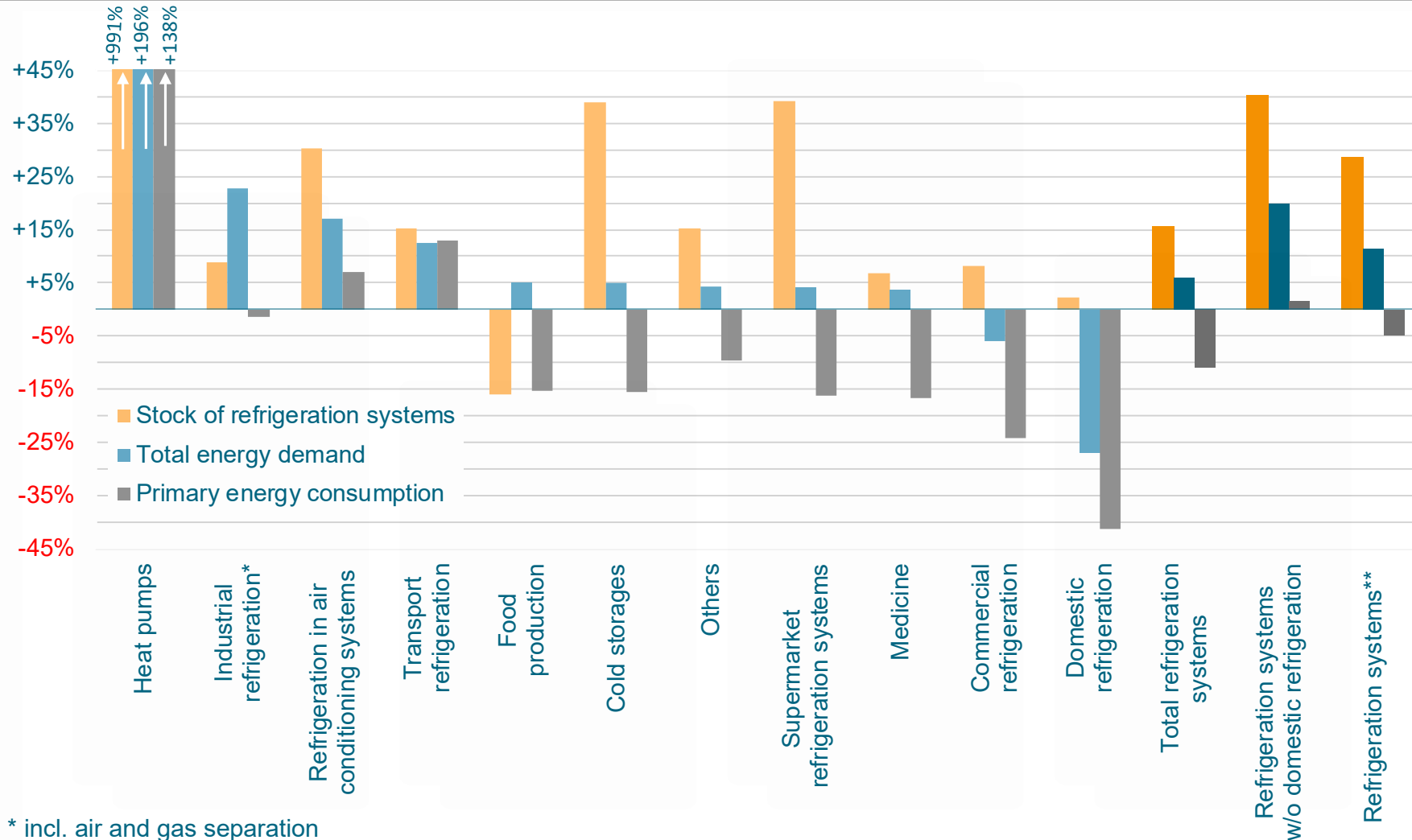
### Change 2017/2009



Source: VDMA

# Refrigeration – Stock and Energy Demand by application area

## Rate of Change 2017/2009



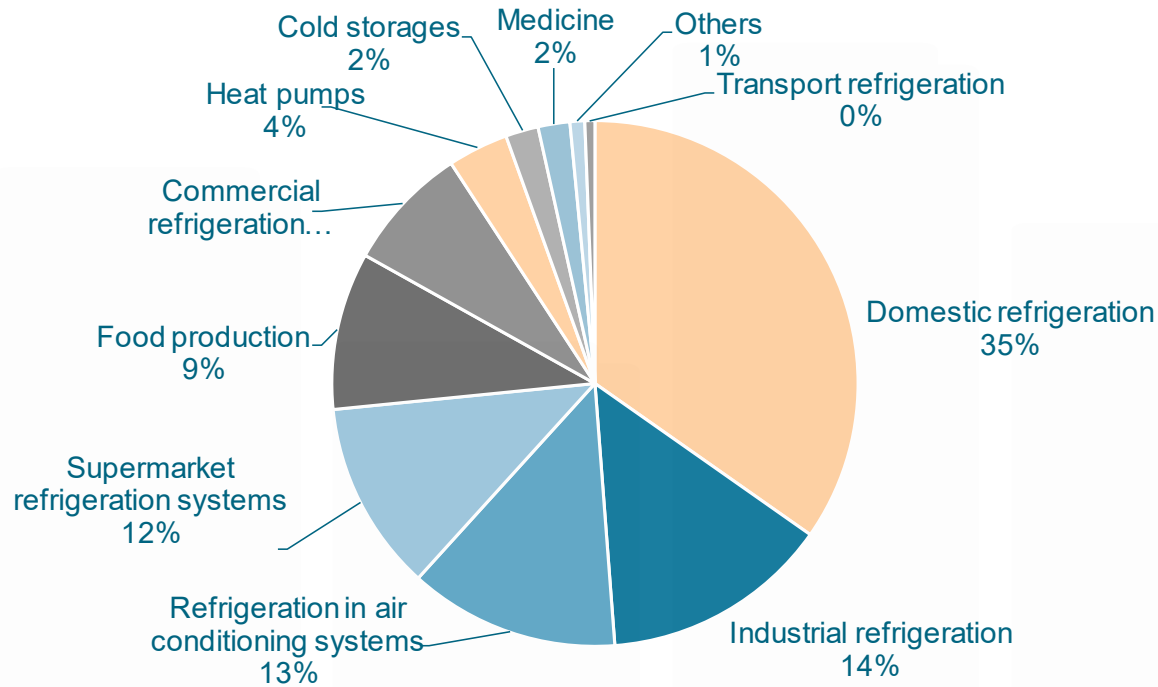
\* incl. air and gas separation

\*\* Refrigeration systems without domestic refrigeration and heat pumps

Source: VDMA Air-handling Technology

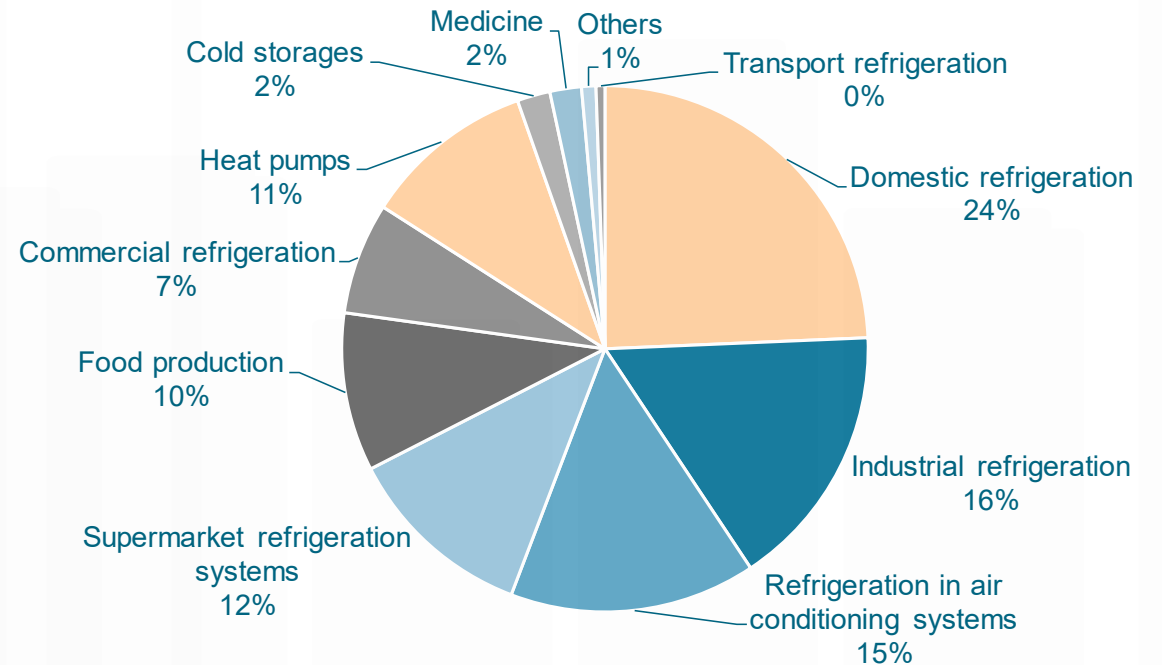
# Refrigeration – Demand for *Electrical* Energy by application area

2009



Total: 70 TWh/a  
\* incl. air and gas separation

2017



Total: 73 TWh/a  
Source: VDMA Air-handling Technology



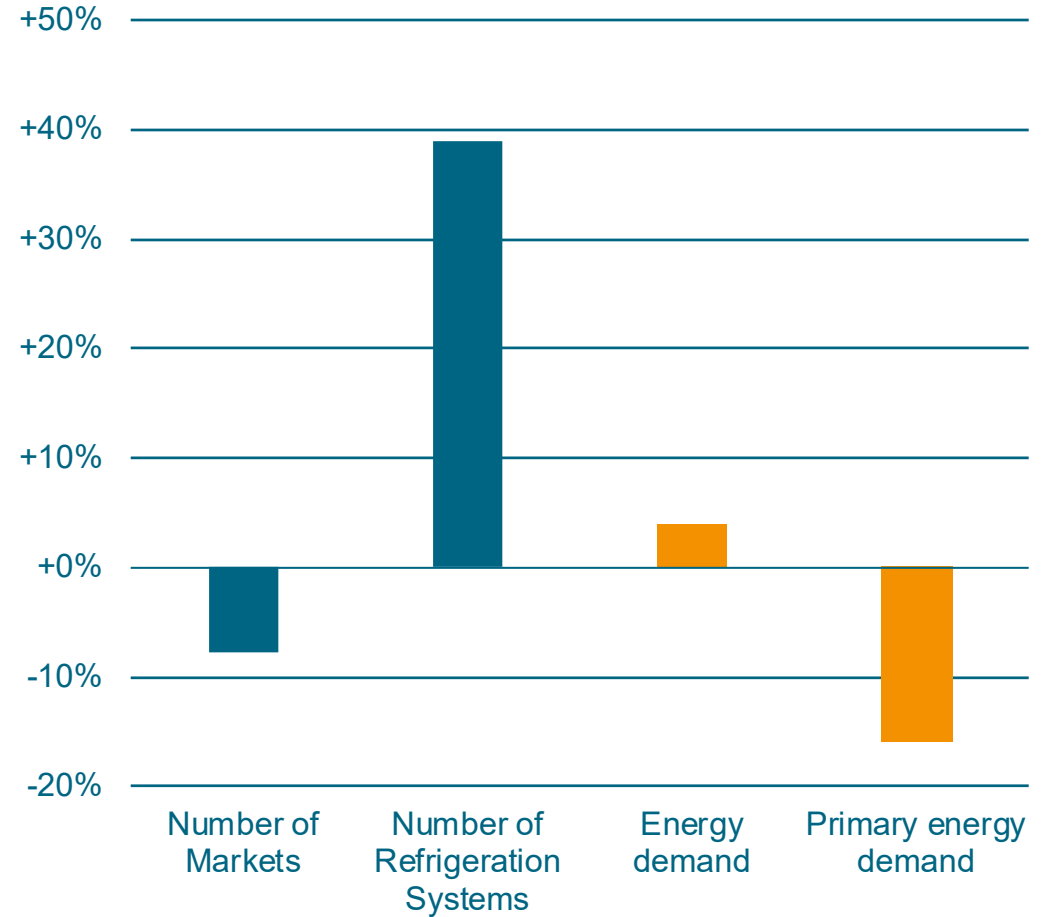
# Supermarket Refrigeration Systems 2009 and 2017

in 1,000 Markets



Source: VDMA

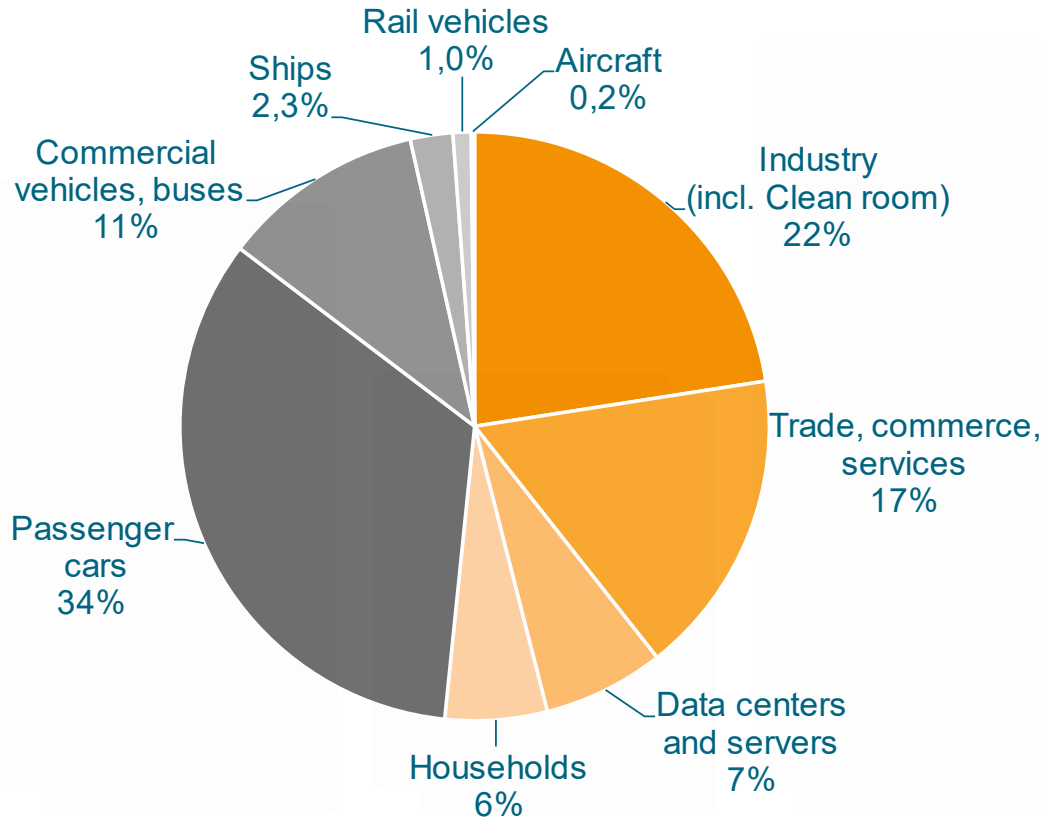
Change 2017/2009



Source: VDMA

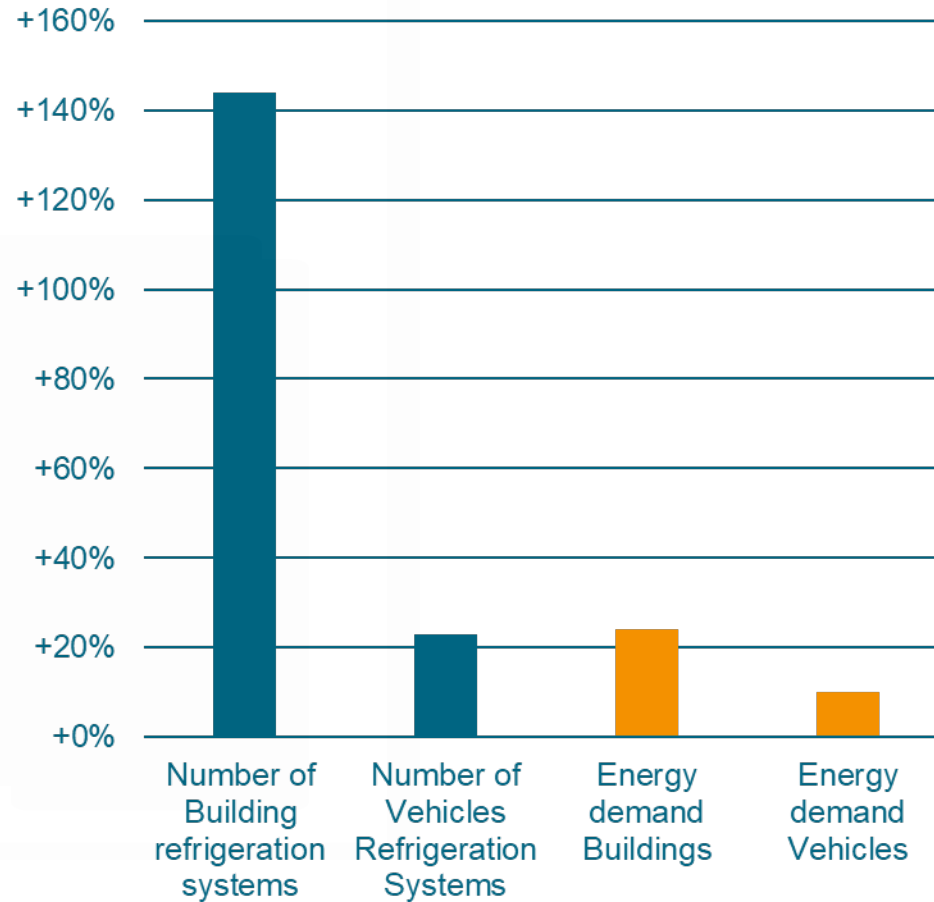
# Refrigeration in Air Conditioning Systems

Shares of Energy Demand 2017



Total 2017: 23 TWh/a  
Source: VDMA Air-handling Technology

Change 2017/2009



# Conclusion

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- The use of refrigeration technology has continued to gain in importance.
- The stock of refrigeration systems has increased by 16% (2017/2009).
- Increasing energy efficiency in refrigeration technology plays an important role.
- In contrast, energy demand grew by only 6% (2017/2009).
- Efficiency gains are being used up through increased use of refrigeration technology.
- The primary energy demand of refrigeration technology fell by 11% (2017/2009) due to the expanded use of renewable energy sources.

***Many thanks for your attention!***

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