

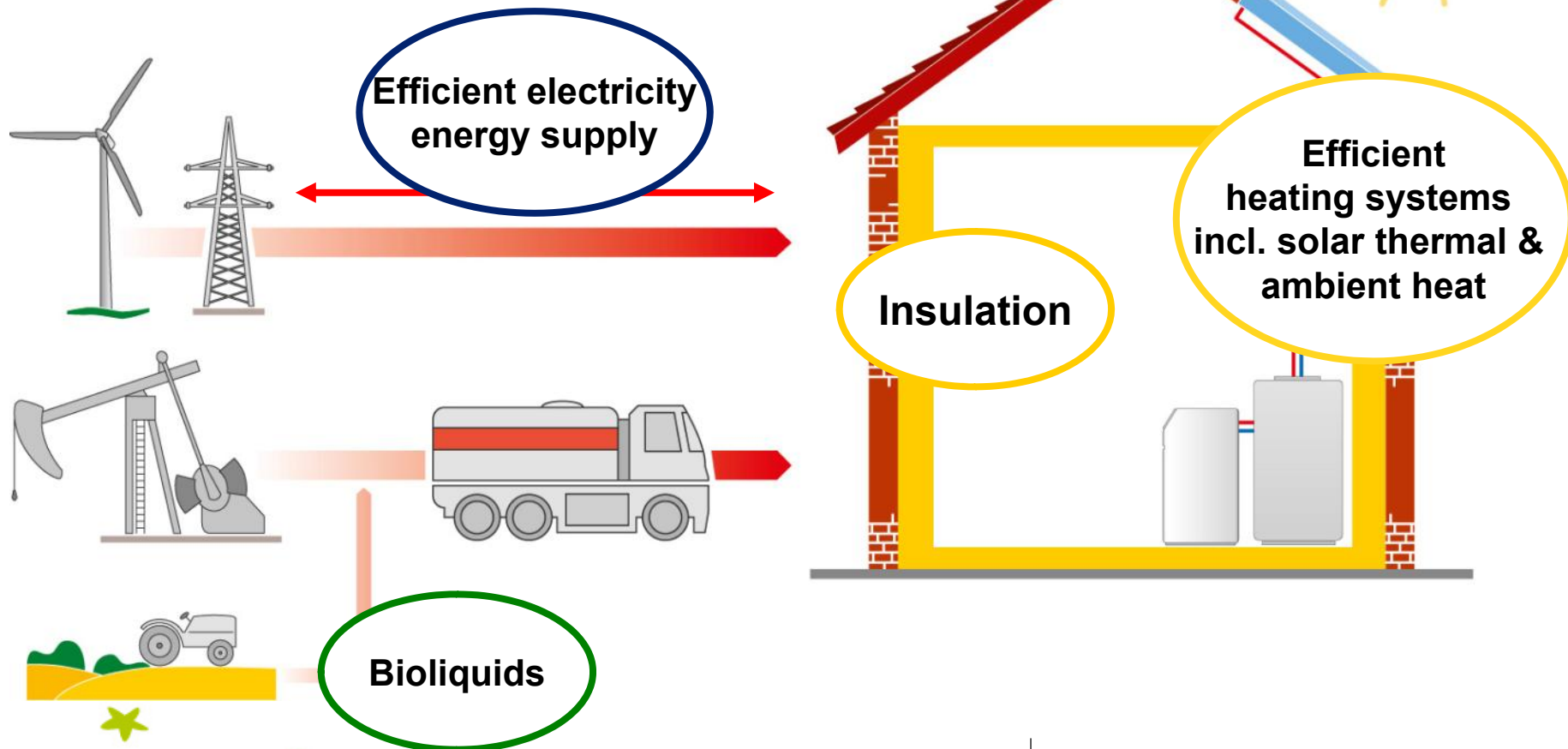


# “Heating system modernisation – A high potential to save energy in buildings”

Dr. Ernst-Moritz Bellinghen

Take a week to change tomorrow

# How to reduce fossil Primary Energy demand of buildings

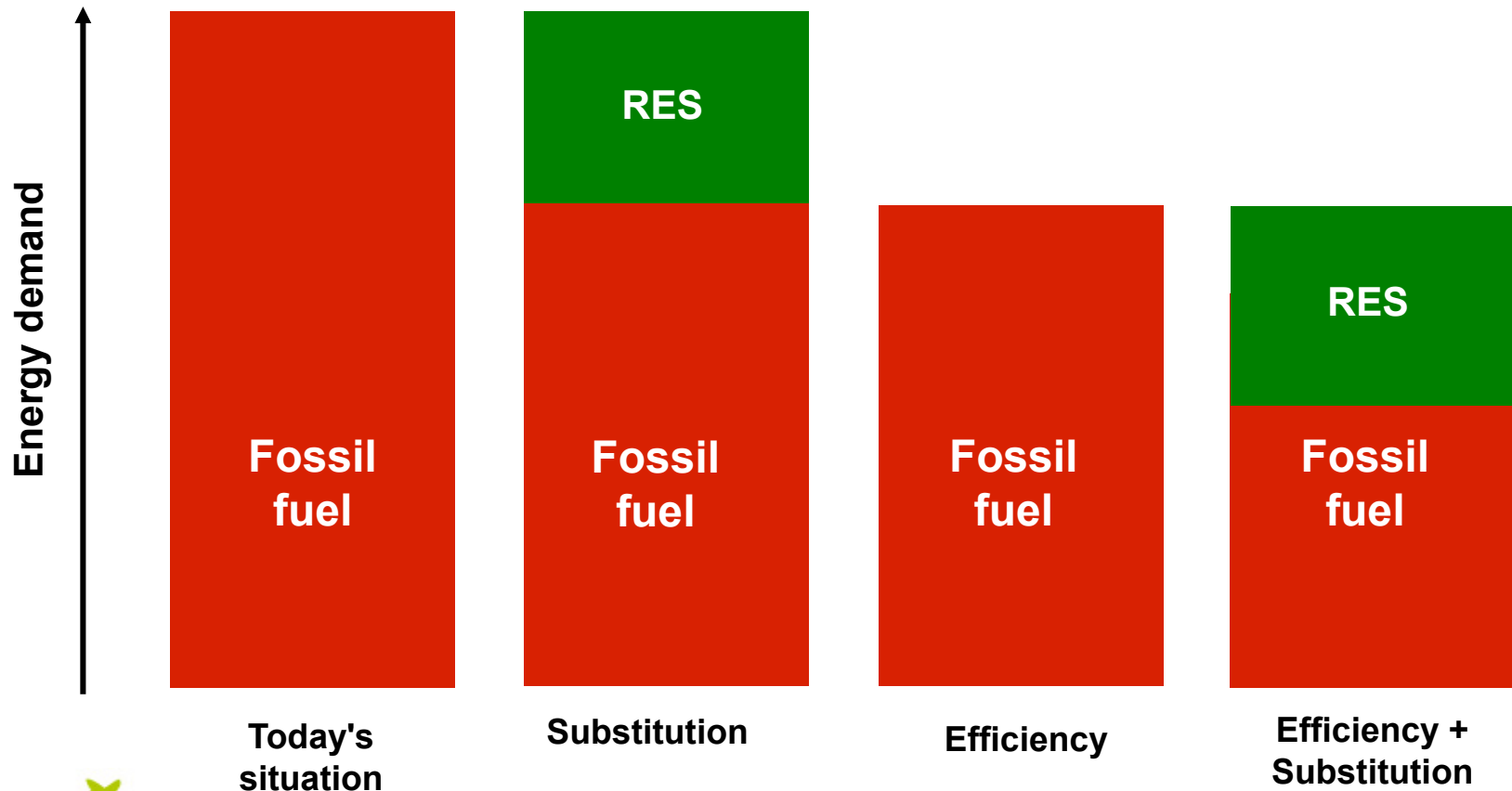


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Take a week to change tomorrow

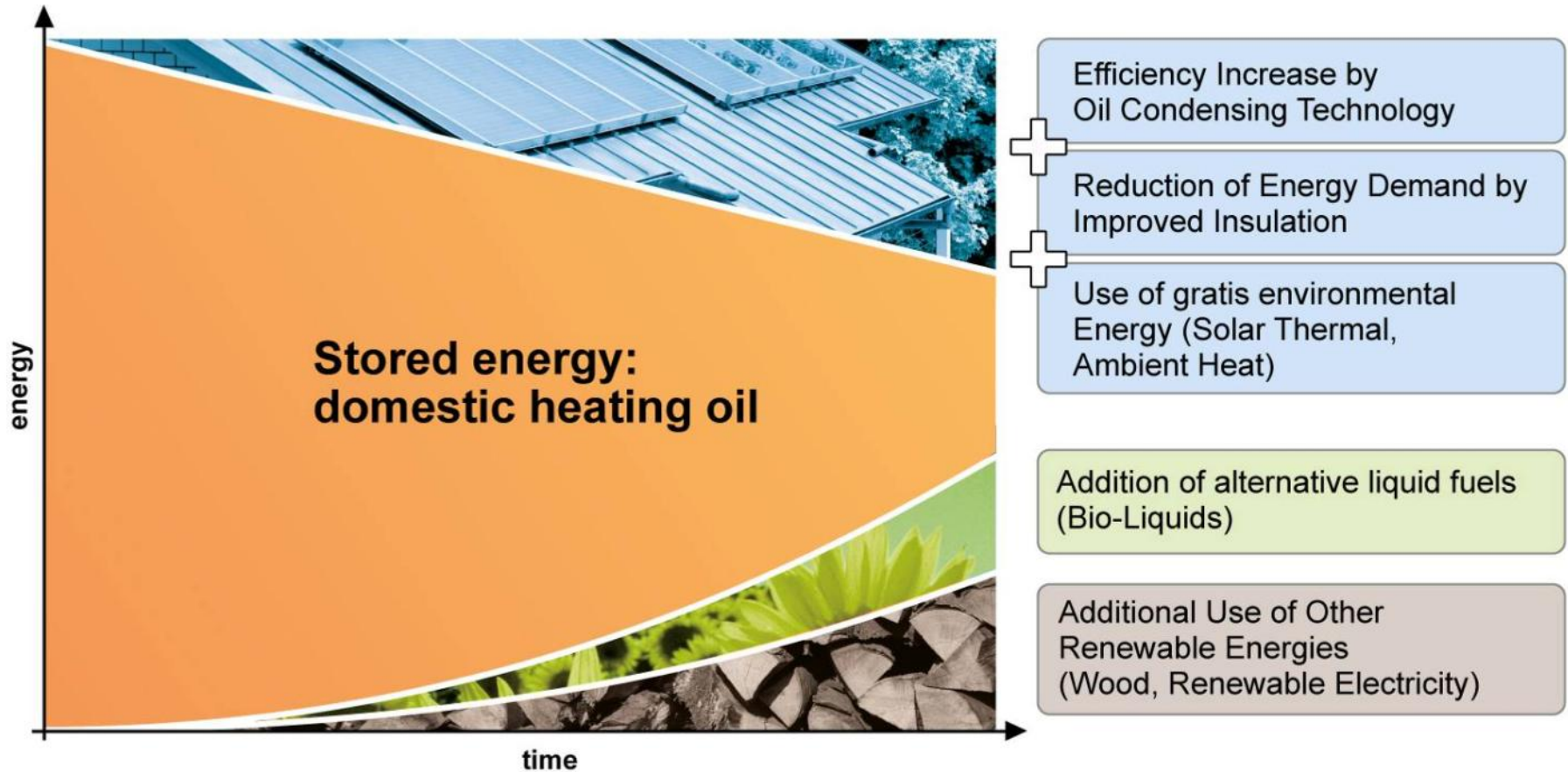
# Efficiency – “Negawatts” – always First Choice



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# Eurofuel's Vision - Now to 2030



# German Example – basic data re. DE heating oil sector

- 30 % Market share heating oil in heating market, 6.1 million customers
- 86 % of oil heating installations in single family houses
- 75 % of houses/ apartments heated with oil are located in buildings built before 1978 (increasing number of complete renovations)
- Average age of oil boilers: > 17 years (many customers would like to renovate these existing heating systems now/ in coming years)

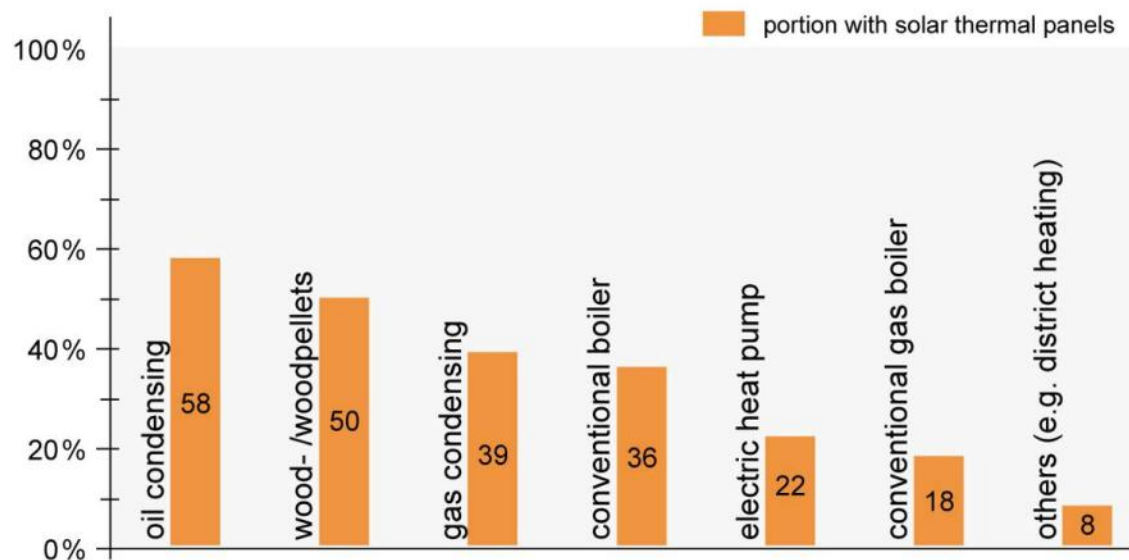


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# Oil heating + solar thermal energy: DE market

- Different options to integrate renewable energy in oil heating systems
- **Oil condensing + solar is already standard – almost 60 % of oil condensing boilers installed in 2008 were oil/ solar thermal hybrid solutions**

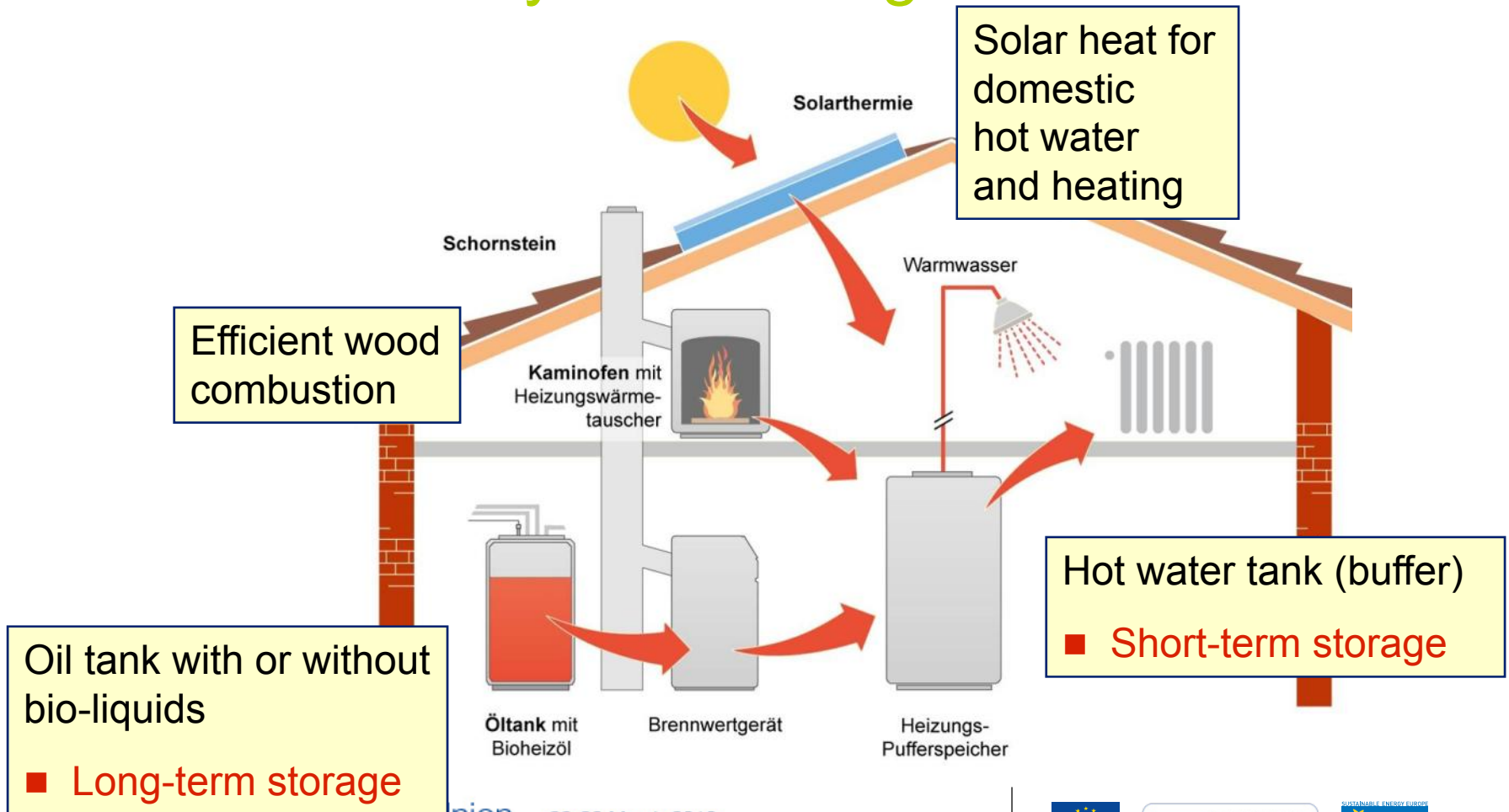


Source: IWO  
market  
research (Feb  
2009)

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# The Multi-fuel Hybrid Heating Solution



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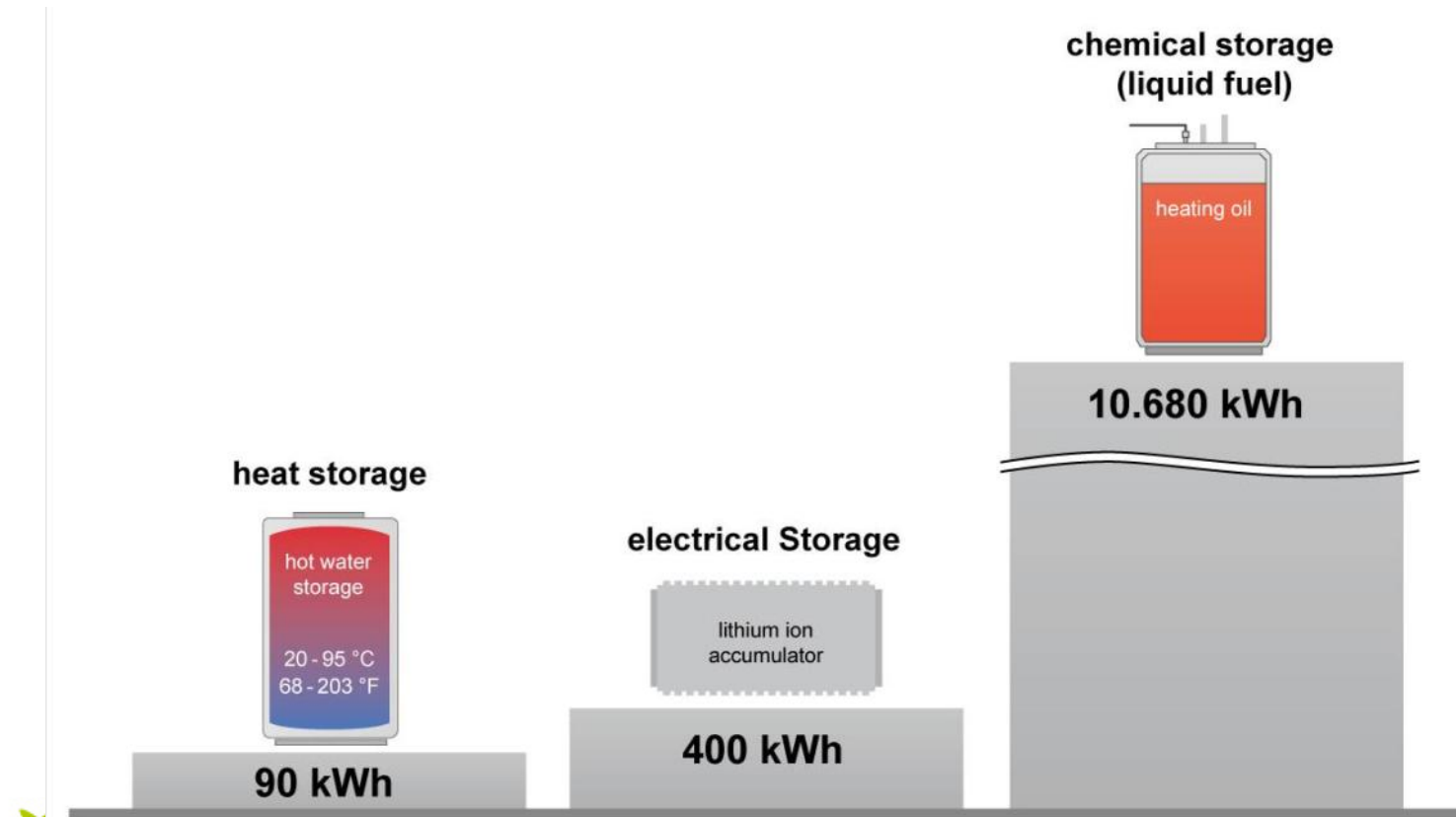
# Advantages of Multi-fuel Hybrid Systems

- Security of supply - several energy sources
- Step-by-step implementation is possible
- Cost-efficient energy saving measures for retrofiting (e.g., compared to advanced insulation techniques)
- Ideal for buildings with existing oil heating (single family houses, own roof, some limited space available for fuel and heating devices)
- Ready for future liquid fuels solutions
  - integration of micro-CHP
  - oil-powered heat pump

# Changes in future electric power supply - important for developing future energy strategy

- Massive increase of renewable share in electricity (mainly wind and photovoltaic)
- Base load power plants (coal and nuclear) cannot react fast enough to cope with varying wind and/or sunshine
- 2 important roles for heating oil:
  - **Control of electric power demand**  
Combination of oil condensing + direct electric heat or electric heat pump, plus smart-metering
  - **Contributor to electricity supply grid**  
Micro CHP-projects (Technology Initiatives, eg DE)

# Energy Storage – Technology Comparison (1000 litres volume as basis)

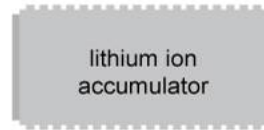


# Comparison of Cost of Energy Storage (90 kWh)

## heat storage



## electrical Storage



## chemical storage (liquid fuel)



volume

**1.000 l**



**450 kg (225 l)**



**8,43 l heating oil**

capacity

**90 kWh**

**90 kWh**

**90 kWh**

investment per  
stored kWh

**~ 11 €/kWh**

**~ 167 €/kWh**

**~ 0,09 €/kWh**

# Full Hybrid system - Smart metering

## Energy source

Solar  
always, when available

Wood  
always, when favoured

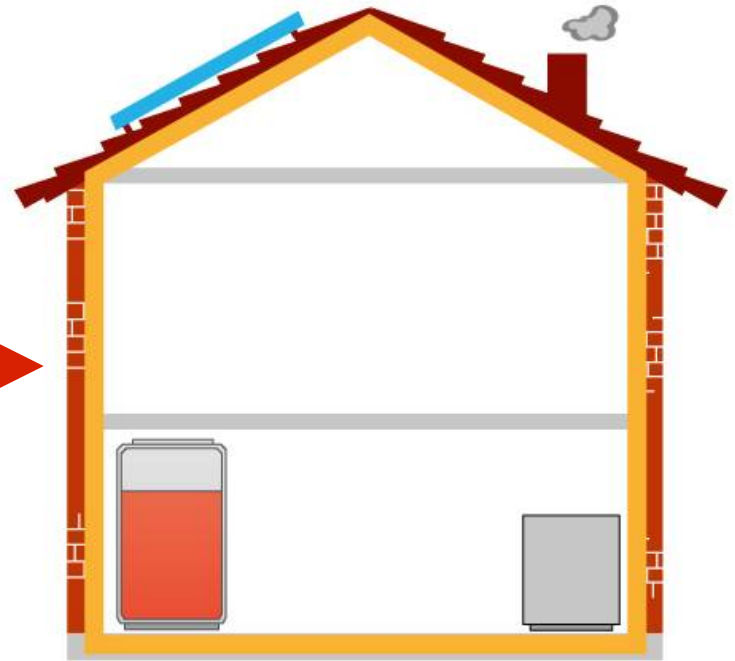
Electricity  
only when over-capacity  
in grid and price is low

Electricity  
always, when micro CHP  
is running + heat demand

Heating oil  
always, when needed



Smart metering device



# Development of future heating systems

## - DE Joint Partner R&D “Quick to Market” Case Studies



- Efficient technologies will be the key to good perspectives for liquid fuels in the heating sector (**increase of efficiency beyond condensing**)
- IWO Germany - “Technology Initiatives” with partners from the heating sector
  - Micro-CHP (combined heat + power)
  - Oil-driven heat pump

# Eurofuel's Strategy – From Here to the Future

- **NOW**

- Oil condensing hybrid solutions with solar thermal panels
- Insulation of buildings to reduce energy demand

- **Short-term**

- Increased use of renewable energies in multi-fuel hybrid systems
  - Solar, Wood, Bio-oil

- **Medium-term**

- Optimization of energy cost via “smart metering”
  - Renewable electricity

- **Long-term**

- New efficient heating technologies
  - Oil-driven heat pump
  - Micro-CHP



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# Conclusions:

## Importance of energy storage is increasing

- Energy demand in existing buildings will decrease
- Seasonal demand will become even more concentrated (ie, during winter months)
- Annual energy demand will decrease more strongly than peak demand. Peak demand is dominated by domestic hot water production
- Strongest increase of renewable energy is in the electric power sector (wind, photovoltaic)
- Consequently it will be necessary to control electrical energy demand (smart metering) or to locally generate electricity (micro-CHP)
- Buildings can contribute if locally-stored energy is available
- 2 reasons for increasing importance of energy storage:
  - Economic fulfillment of seasonal heat demand
  - ★ Control of electric power supply or demand with stored energy

