

**Nürnberg, 28. – 29.9.2011**

**EUROPEAN**

**HEAT PUMP** ● **SUMMIT**  
Powered by Chillventa ● **2011**

**Symposium + Expo**

**Industrial • Commercial • Residential**

**Heating & Cooling • Components & Equipment**

Delta Energy & Environment Ltd  
Registered in Scotland: No SC259964  
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## Hybrid Heat Pumps: A window of opportunity?

Dr. Lindsay Sugden, Delta Energy & Environment

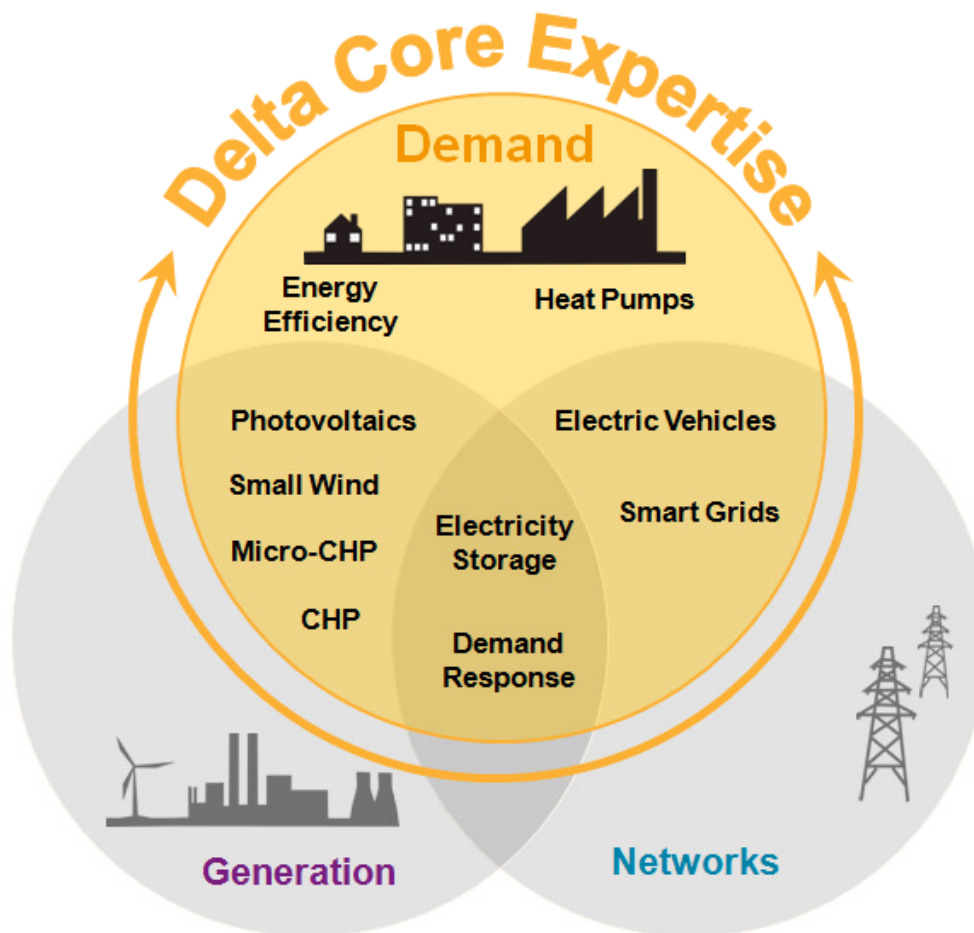
European Heat Pump Summit, Nürnberg 2011

29<sup>th</sup> September 2011

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## Delta Energy & Environment



### Delta provides:

- ▶ Market expertise
- ▶ Commercial insight
- ▶ Strategy & tactics

### Clients:

- ▶ Energy companies
- ▶ Manufacturers
- ▶ Finance sector
- ▶ Policy makers

### How we work with clients:

- ▶ Research Services
- ▶ Specialist Summits
- ▶ Consultancy

## Products & Services

### Research Services

- ▶ Micro-CHP Service
- ▶ ASHP Innovation Monitor
- ▶ GB Microgeneration Research Service
- ▶ Multi-client studies
  - Mass Market Energy Services in Europe
  - Small scale CHP
  - Mini-CHP
  - Electricity Storage

### Summits

- ▶ 'Micro-CHP in Europe': The 6th annual summit, June 2011, Copenhagen
- ▶ 'Energy Services in Europe': The 2nd annual summit, June 2011, Copenhagen
- ▶ 'Electricity Storage in Europe'

### Consultancy

- ▶ Strategy development
- ▶ Market assessments, forecasts, competitor analysis & tactics
- ▶ Technology assessment
- ▶ Innovation
- ▶ Policy analysis & assessment

## Agenda

- ▶ The hybrid opportunity
- ▶ Cornerstones of a strong hybrid market
- ▶ Window of opportunity
- ▶ Conclusions

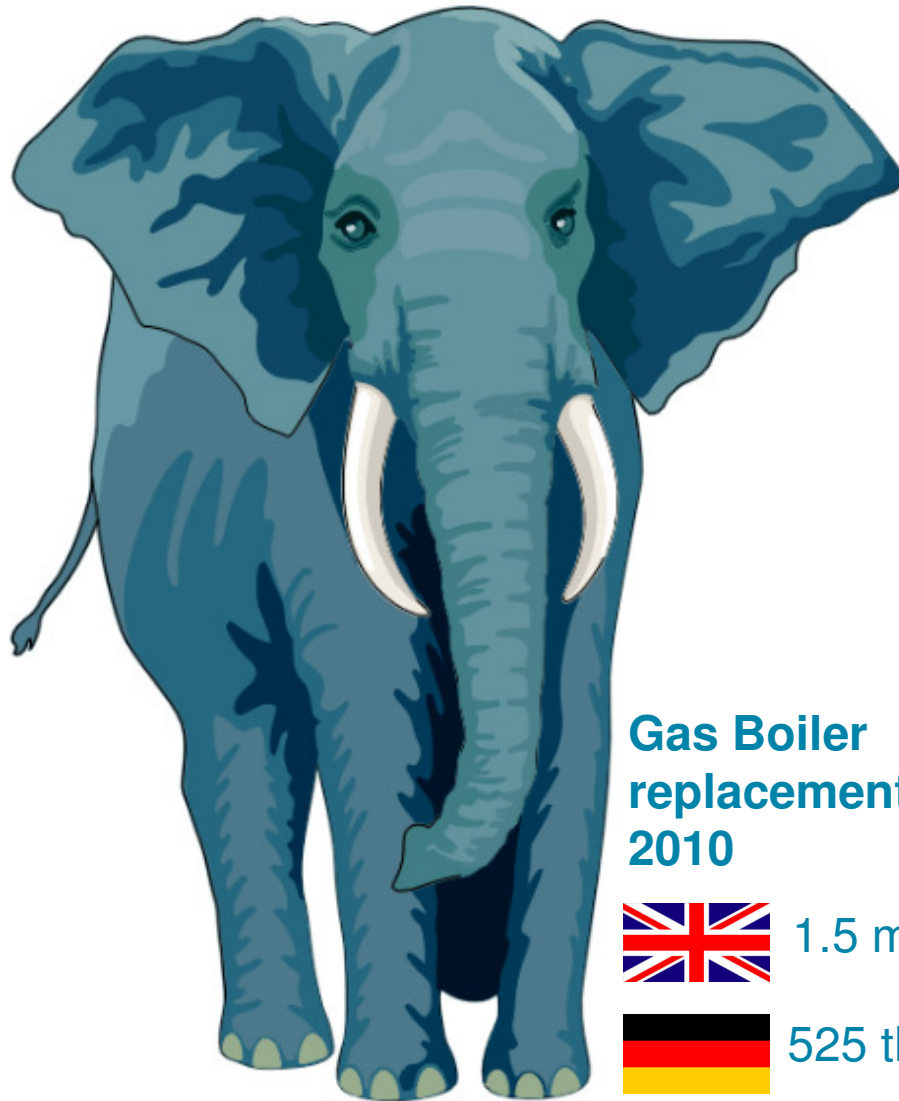
### Defining fossil hybrid HP systems

We define hybrids as ASHPs combined with a fossil fuel-fired boiler, **where the system components are connected via a central control system.**

## Agenda

- ▶ **The hybrid opportunity**
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Current market: The size of the opportunity



**Gas Boiler  
replacements,  
2010**

 1.5 million

 525 thousand

Hybrids...?



**Niche market**

Will it still be niche in 5 years?

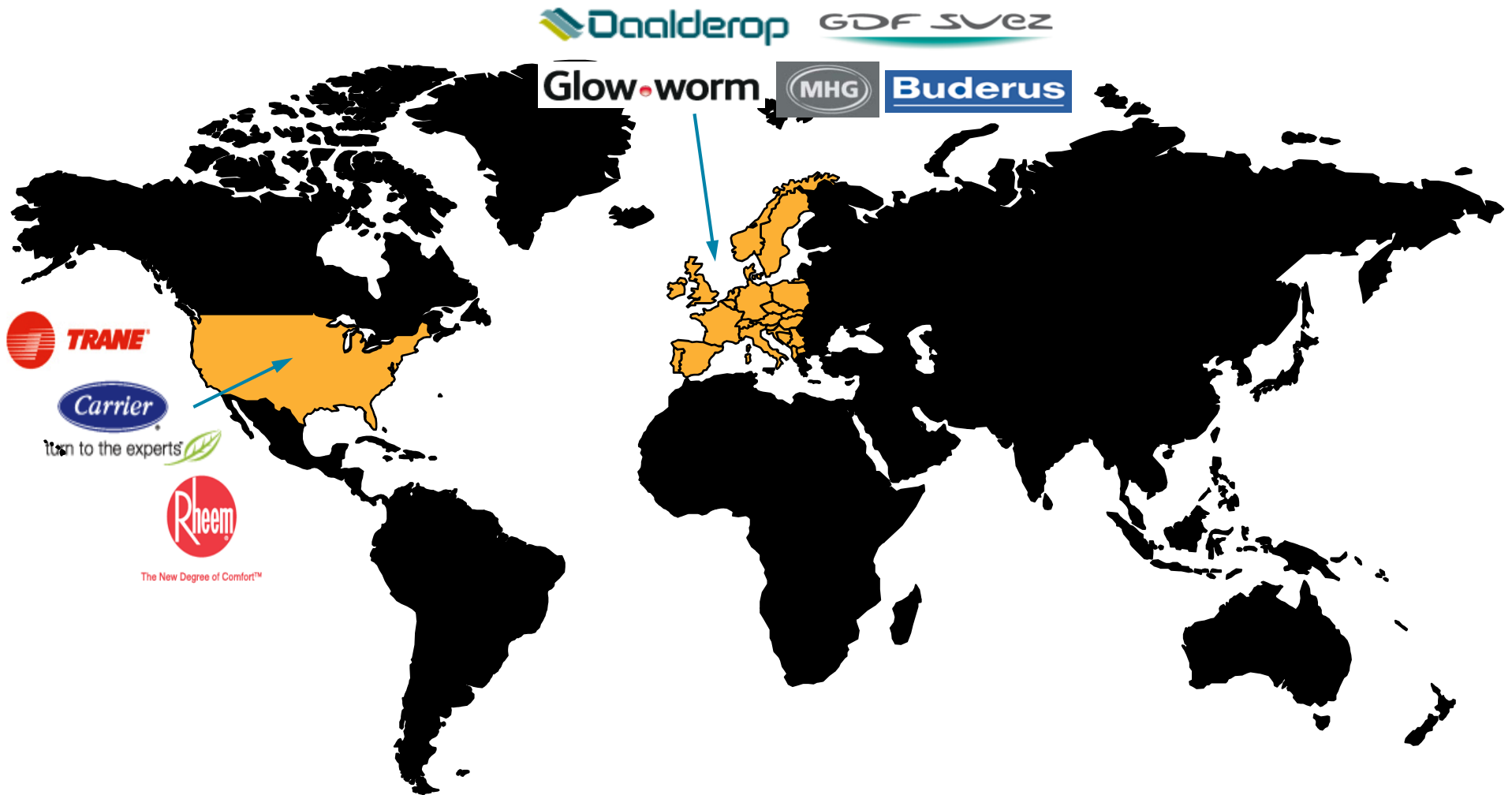


**Heat Pumps, 2010**

 14 thousand

 42 thousand

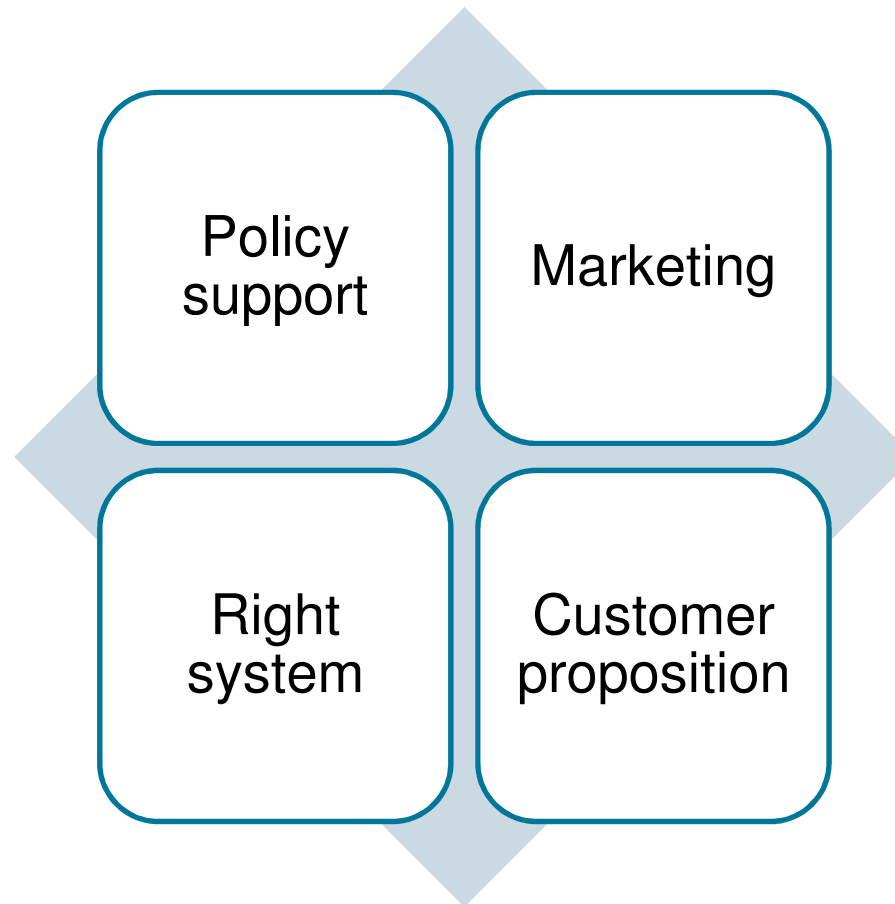
## Current market: hybrid heat pumps



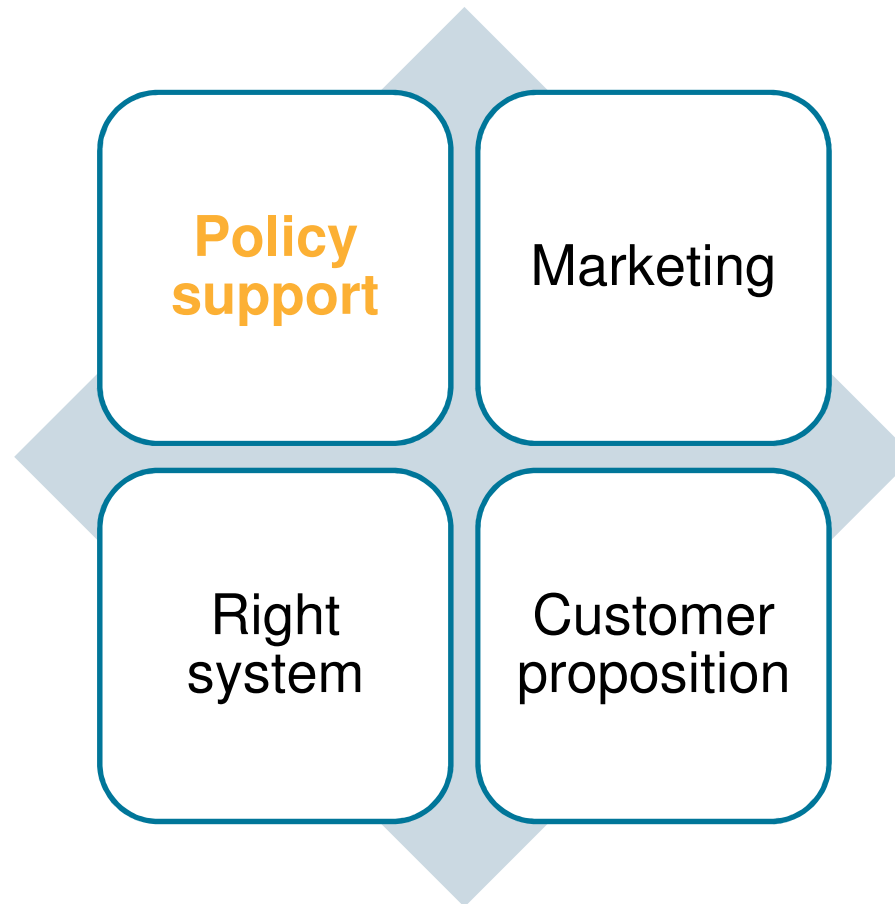
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- ▶ The hybrid opportunity
- ▶ **Cornerstones of a strong hybrid market**
- ▶ Window of opportunity
- ▶ Conclusions

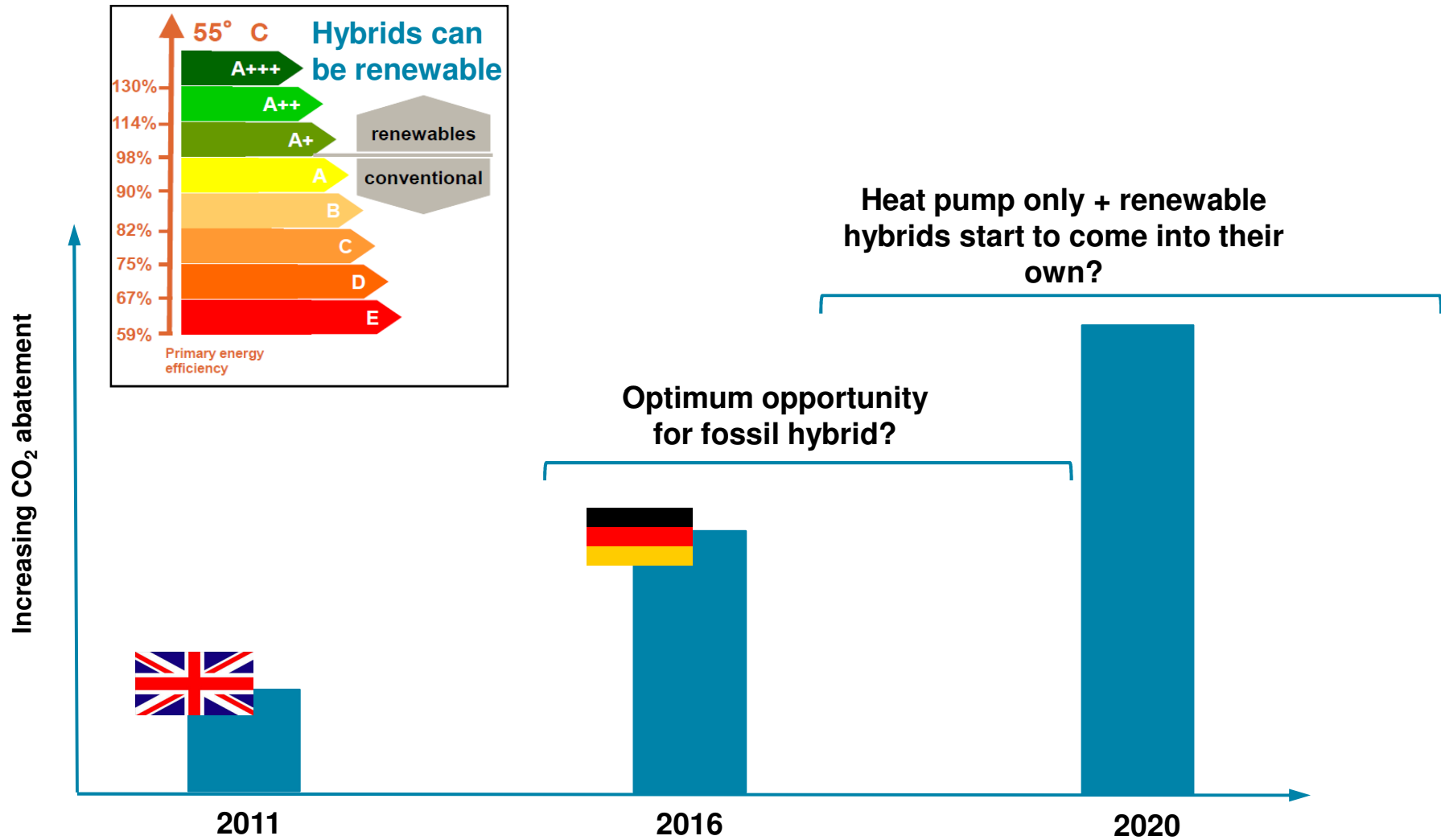
## Cornerstones of a successful market



## Cornerstones of a successful market



Policy support: Hybrids a low cost way to meet building regulations?



## Policy support: Uncertainty for hybrids in retrofit

### Denmark

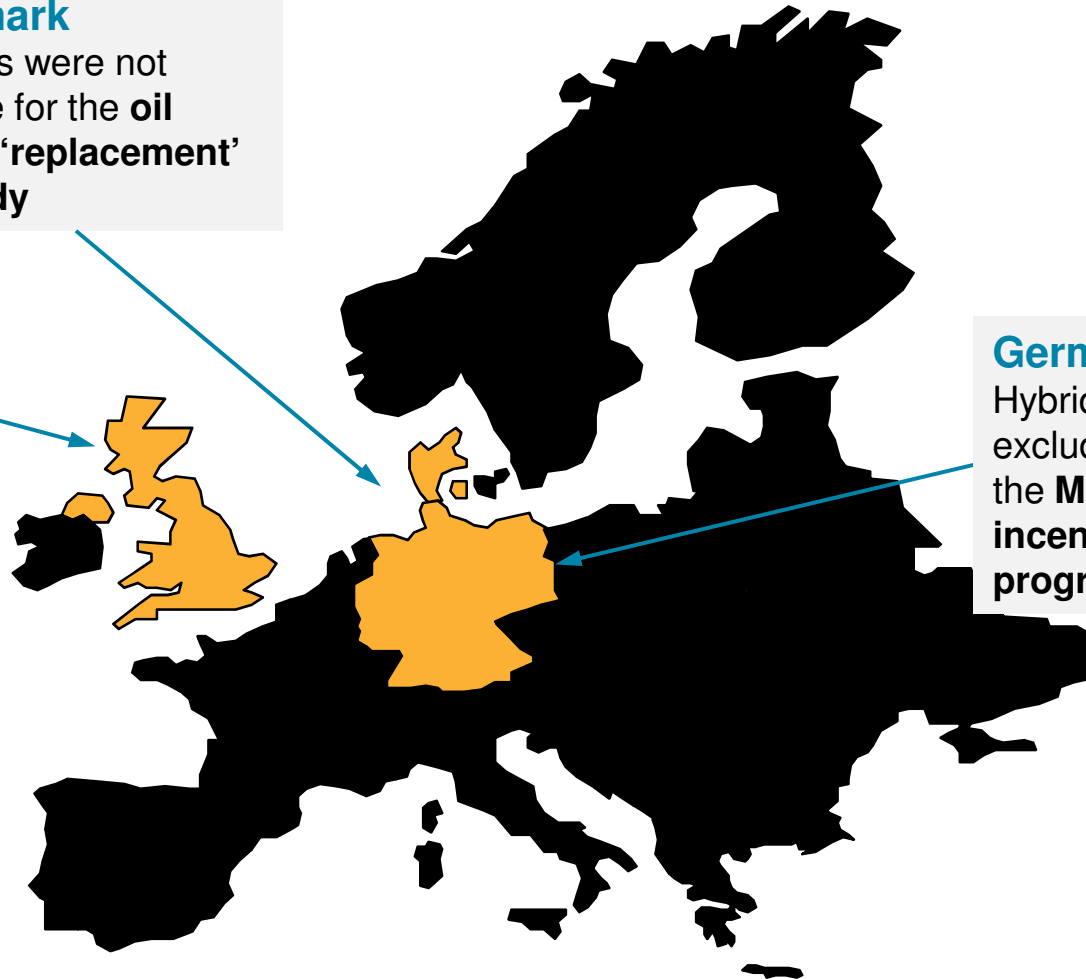
Hybrids were not eligible for the **oil boiler 'replacement' subsidy**

### United Kingdom

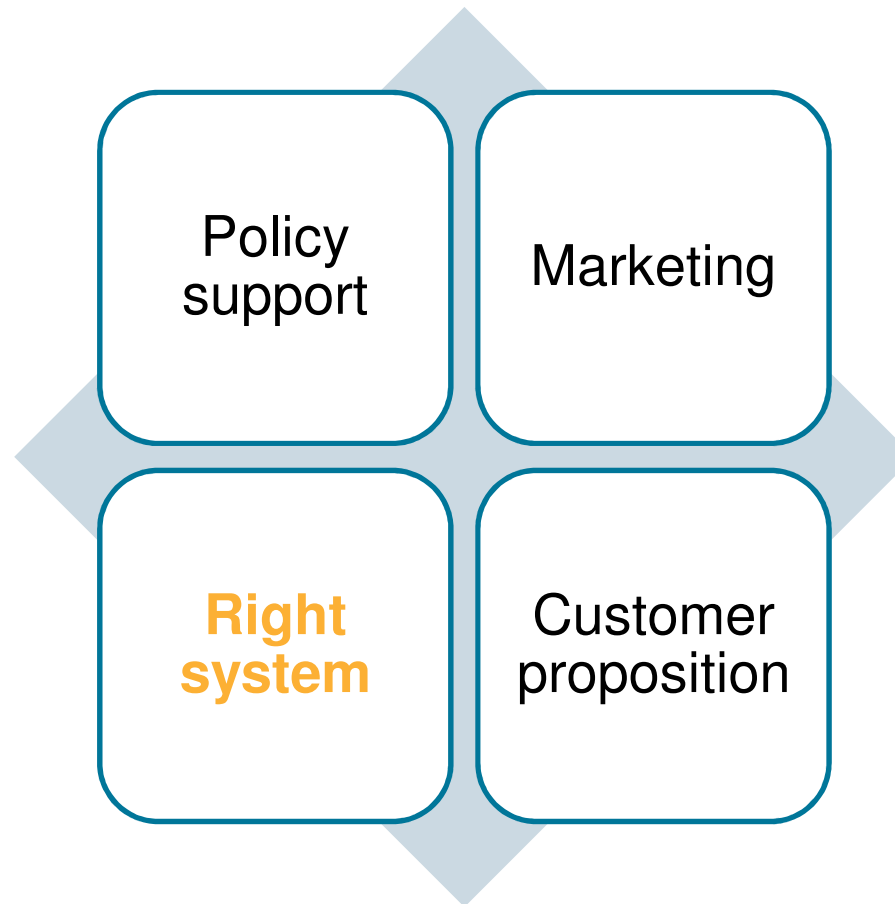
Hybrids may miss out on the **Renewable Heat Incentive**

### Germany

Hybrids excluded from the **Market incentive programme**.



## Cornerstones of a successful market



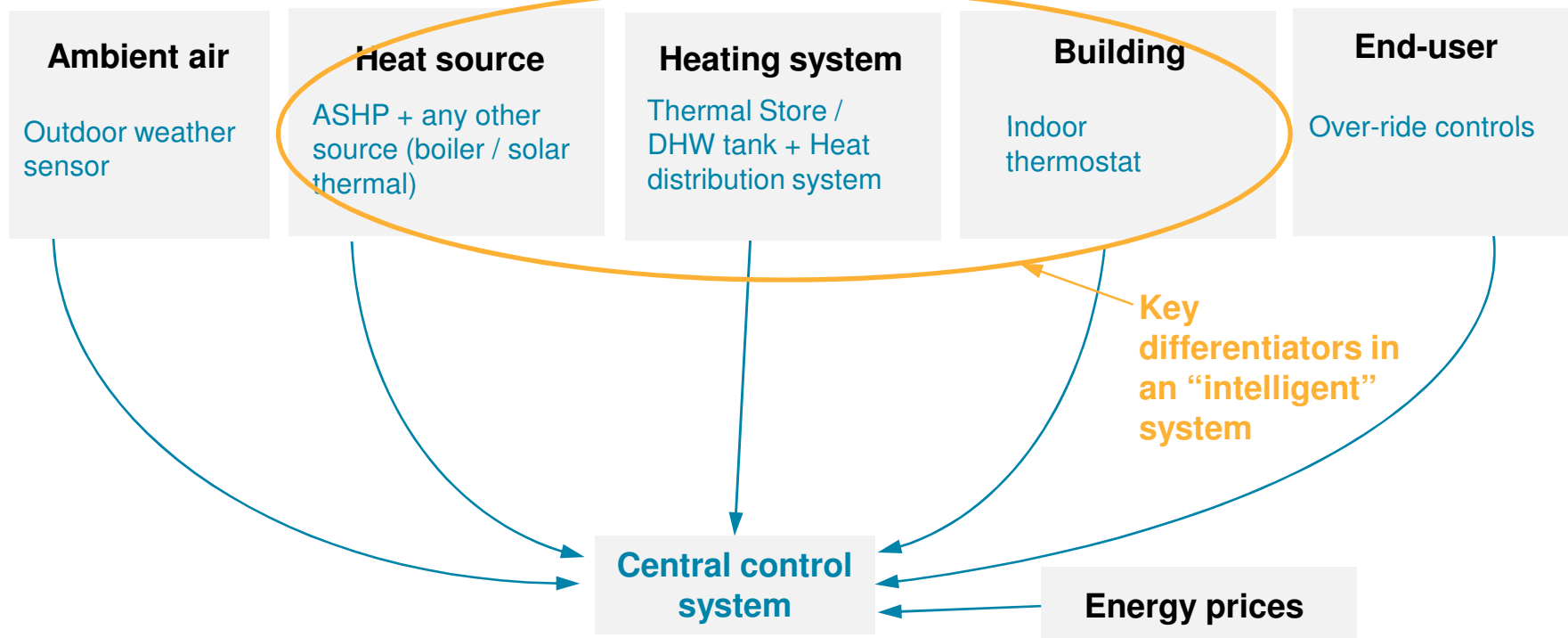
The right system: Advanced control strategies – optimizing performance



**Control system: The 'brain' of the hybrid solution**

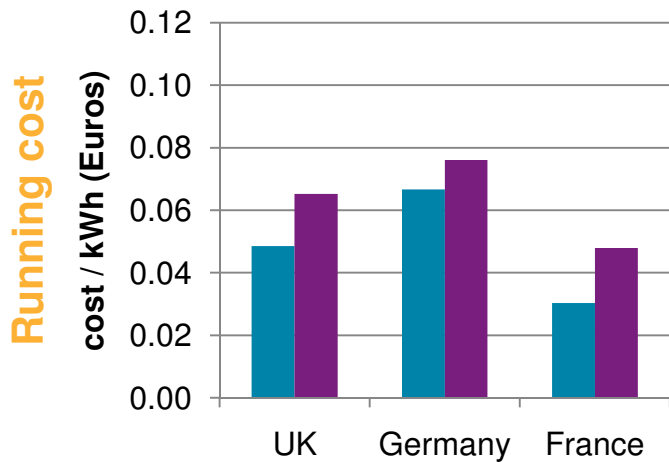
**Simple control:** Ambient air temperature, energy price

**Intelligent control:** Learns behaviour of elements of system

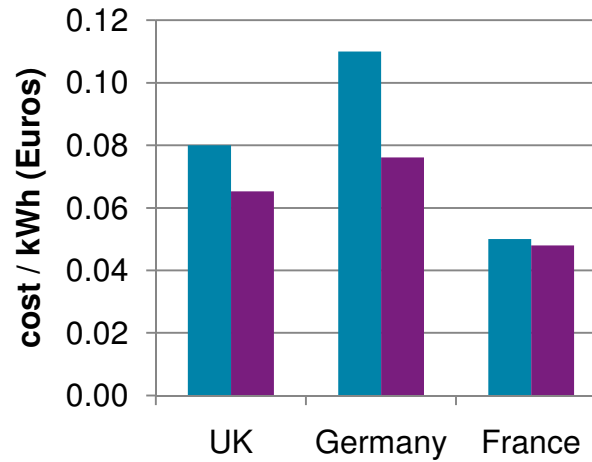


The right system: Configuring to maximise performance

Space Heating ASHP leads

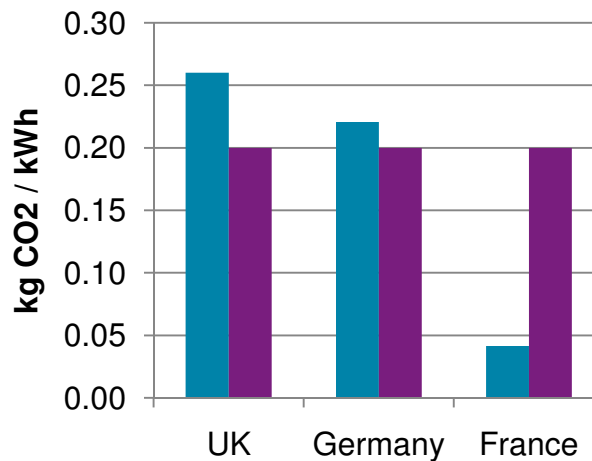
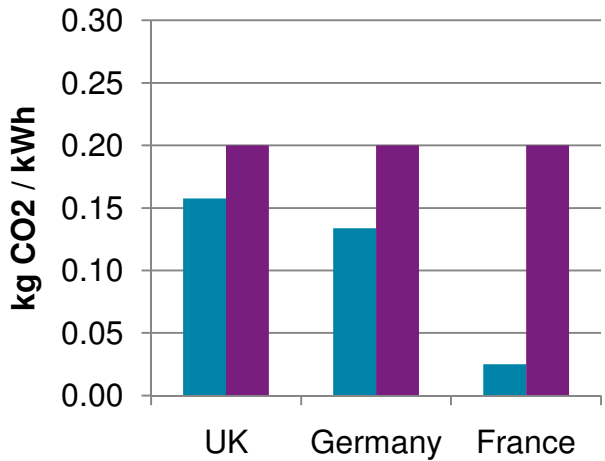


Domestic Hot Water Boiler saves more



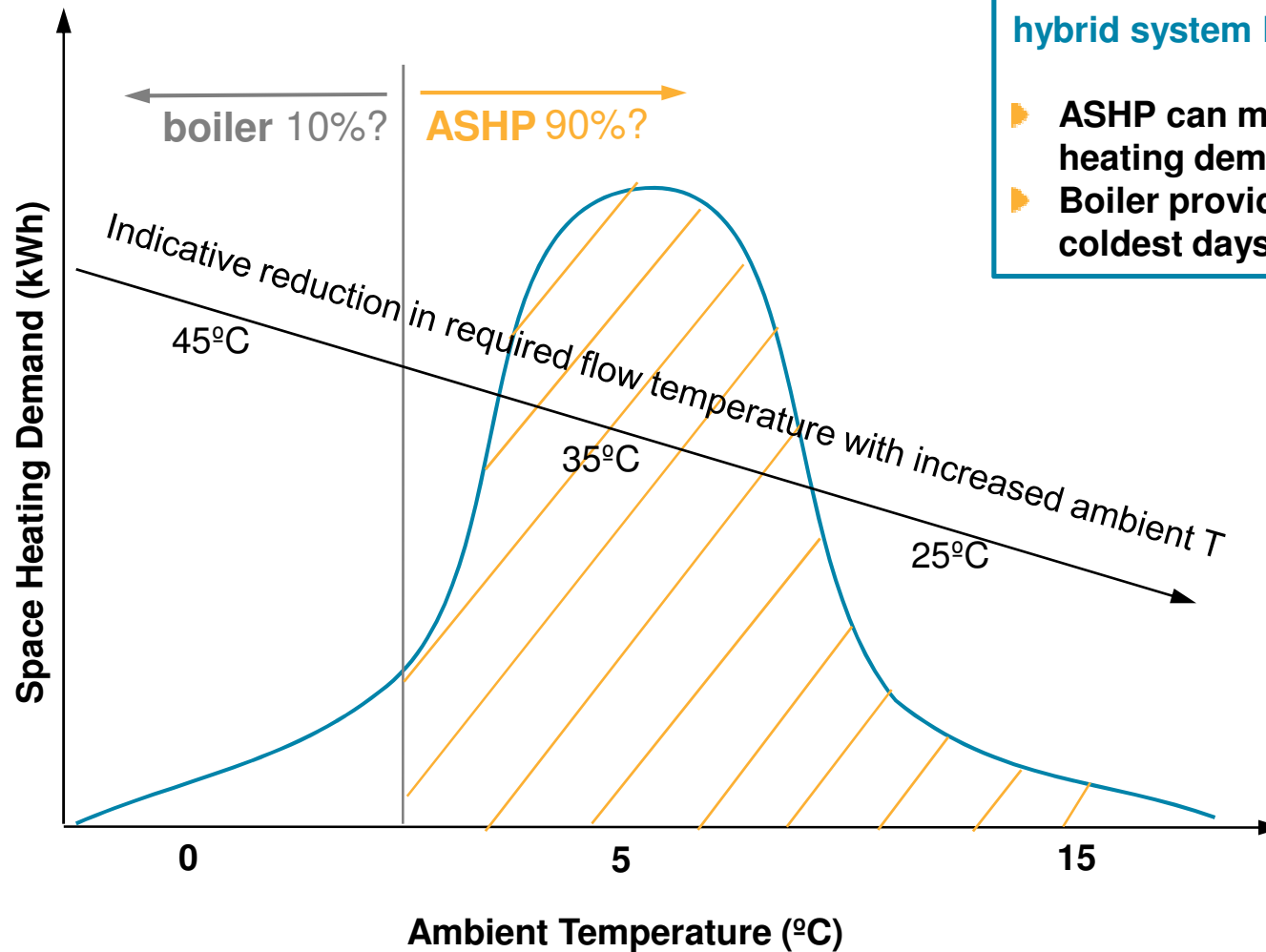
ASHP  
 Boiler

CO<sub>2</sub> emissions



The argument for hybrids: Where the ASHP can focus on space heating & the boiler is run mostly for hot water, overall efficiency gains can be made.

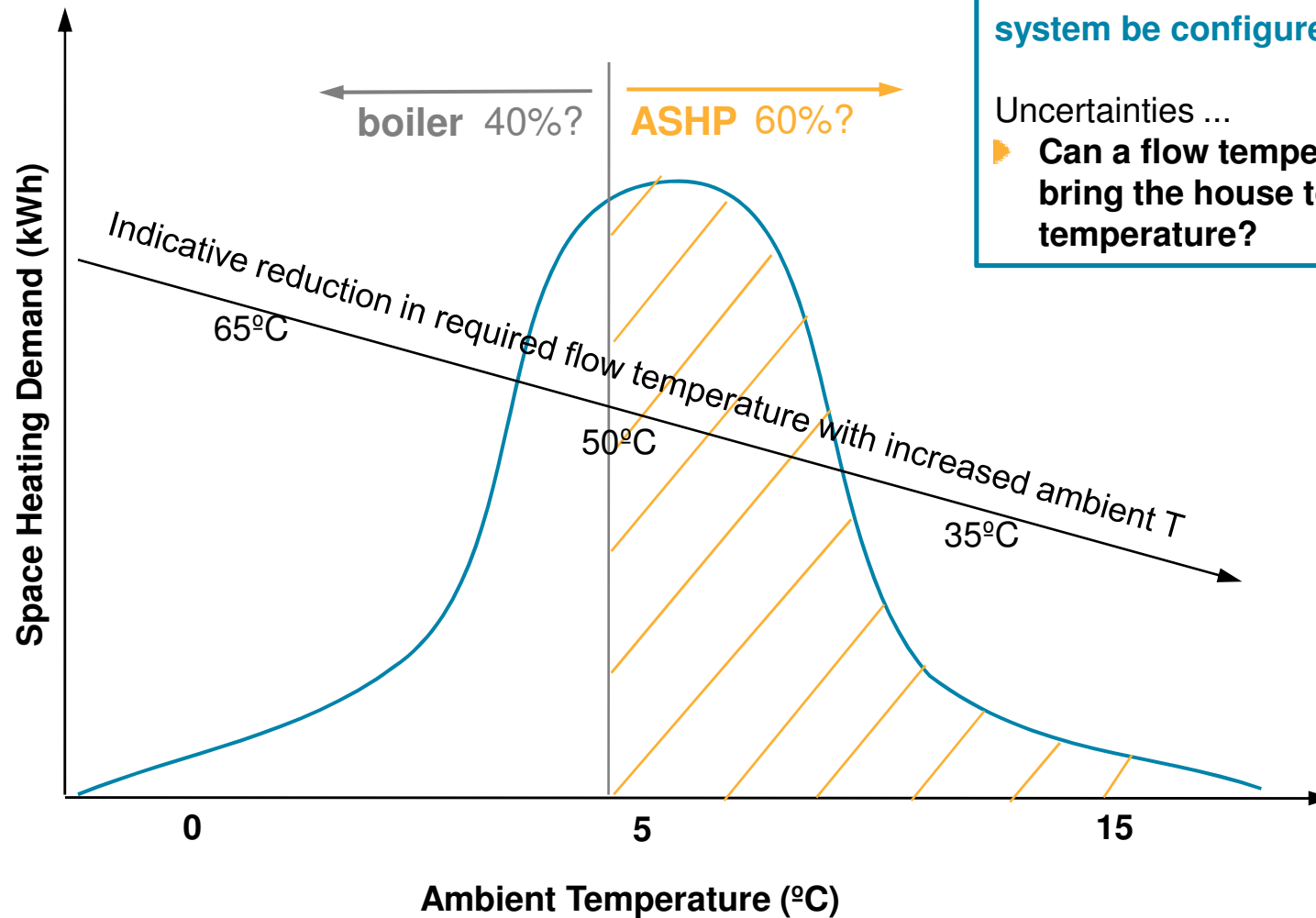
The right system: How much of the space heating demand can a HP meet?



**NEW BUILD: How should a hybrid system be configured?**

- ▶ ASHP can meet bulk of space heating demand
- ▶ Boiler provides back up for the coldest days

The right system: How much of the space heating demand can a HP meet?

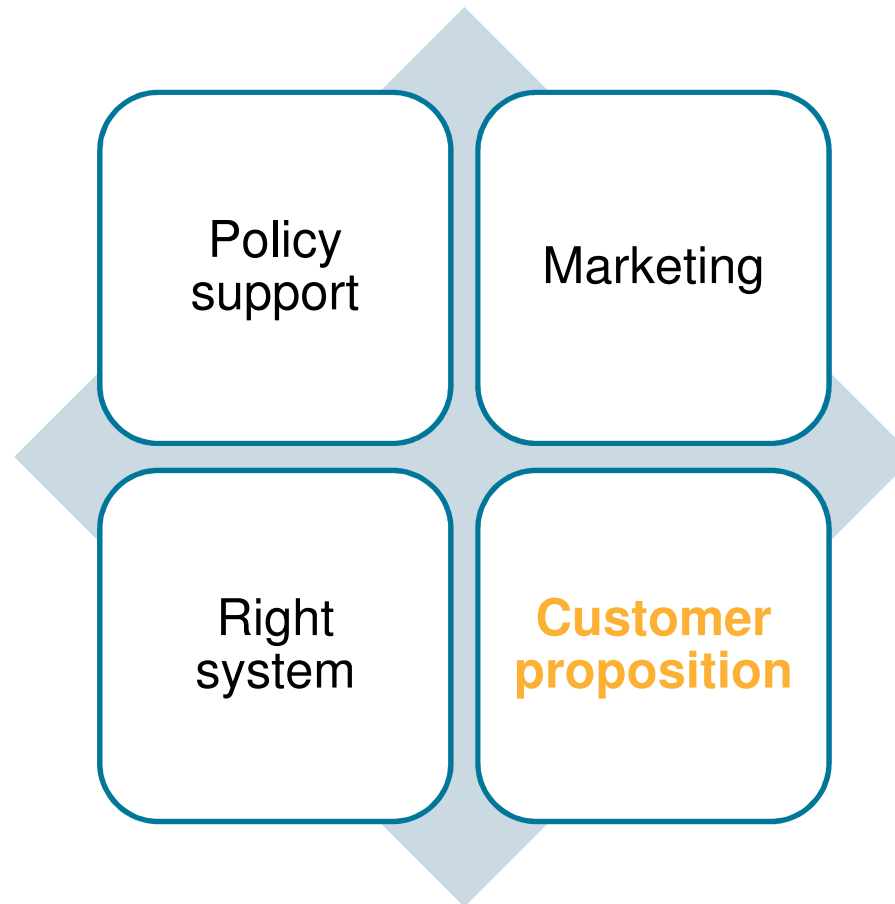


**RETROFIT: How should a hybrid system be configured?**

Uncertainties ...

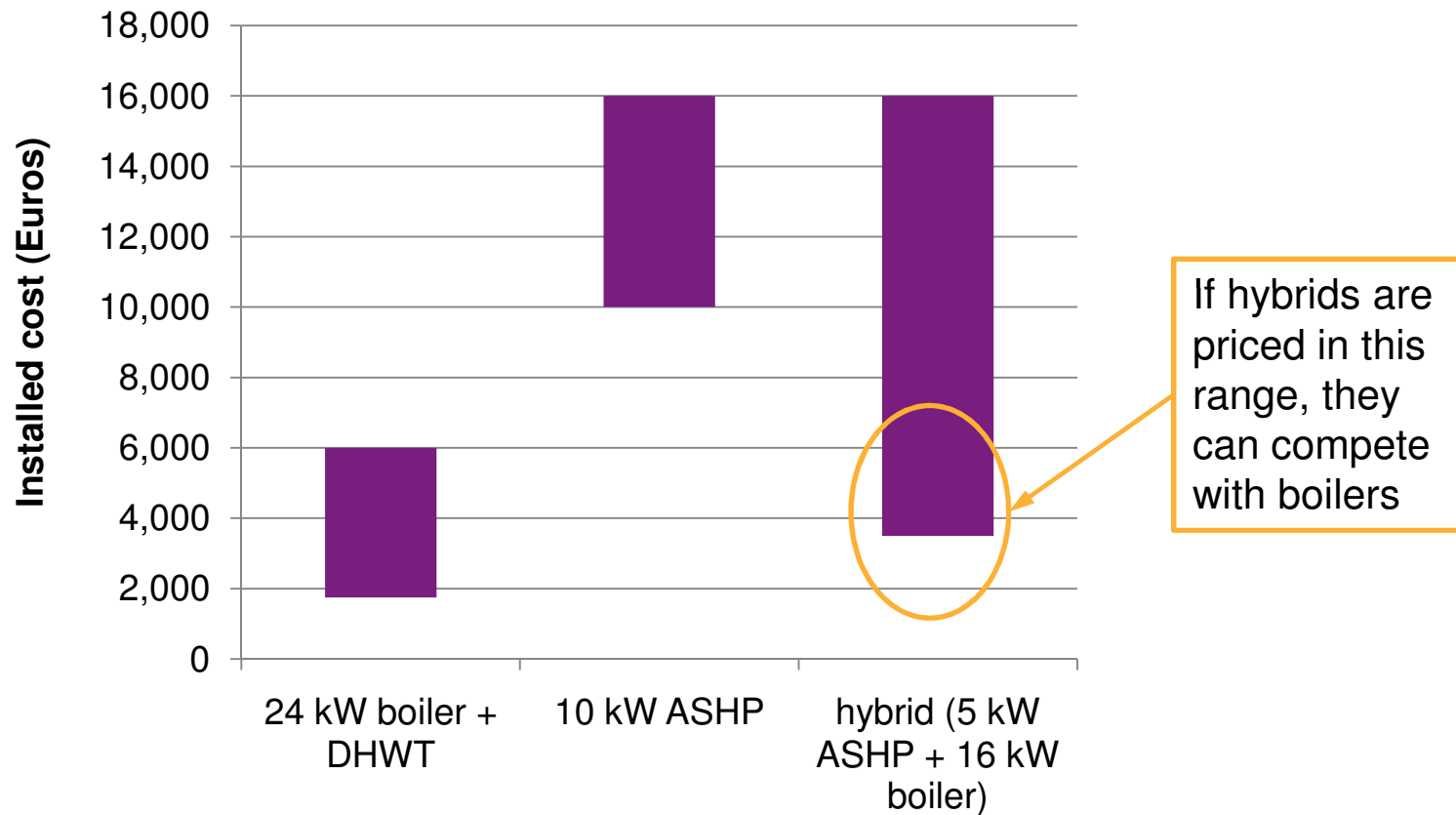
- ▶ Can a flow temperature of 50°C bring the house to the required temperature?

## Cornerstones of a successful market



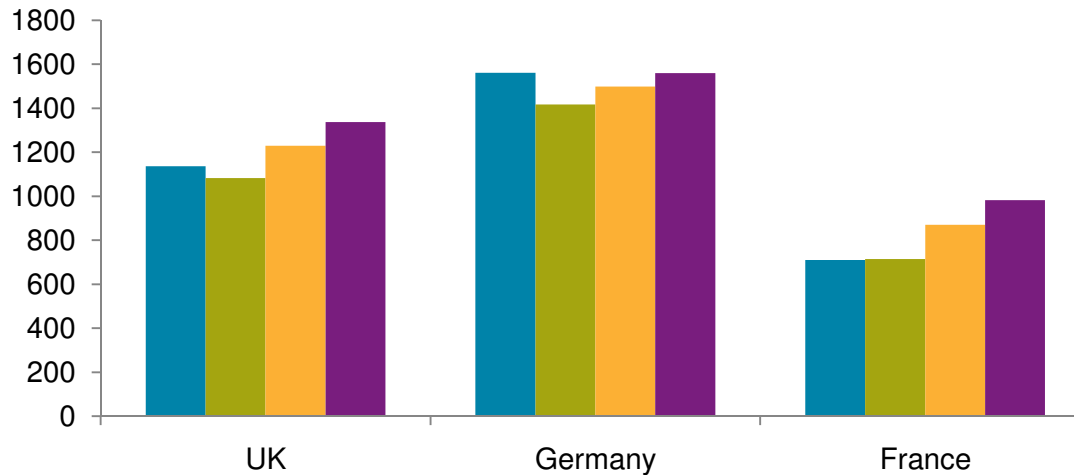
## Customer proposition: Upfront cost

Price point of selected existing hybrids  
relative to boilers / pure ASHPs



## Customer proposition: Running costs

### Running costs (euros / year)



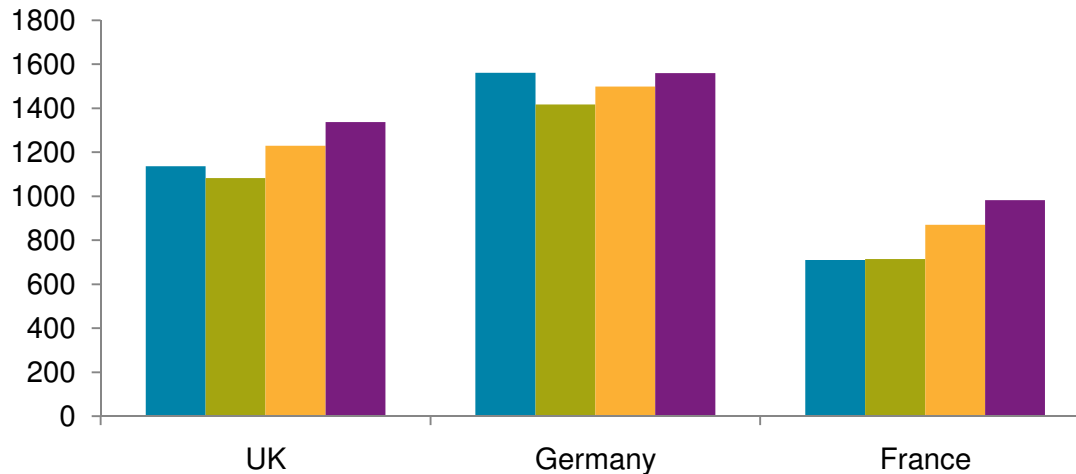
### KEY MESSAGES

- ▶ Hybrids make savings over gas boilers in all markets
- ▶ In the UK / Germany, hybrids also make savings over ASHP alone
- ▶ **This is a key argument for hybrids**

- ASHP 100% Space Heating & DHW
- Space Heating - ASHP 95% / boiler 5%; DHW - Boiler 100%
- Space Heating - ASHP 40% / boiler 60%; DHW - Boiler 100%
- Boiler 100% Space Heating & DHW

## Customer proposition: Running costs

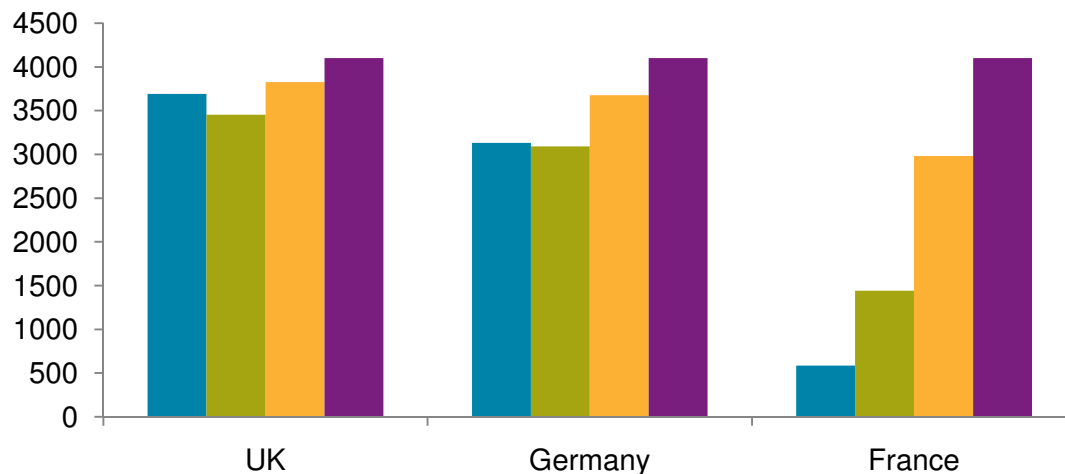
### Running costs (euros / year)



### KEY MESSAGES

- ▶ In the UK & Germany, hybrids strong relative to boilers & ASHPs
- ▶ In France, there are still savings to be made through hybrids, but ASHP alone is strongest.
- ▶ **There are opportunities for hybrids in all markets, but these are strongest in markets with high energy prices and high grid carbon**

### CO<sub>2</sub> emissions (kg CO<sub>2</sub> / year)



- ASHP 100% Space Heating & DHW
- Space Heating - ASHP 95% / boiler 5%; DHW - Boiler 100%
- Space Heating - ASHP 40% / boiler 60%; DHW - Boiler 100%
- Boiler 100% Space Heating & DHW

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## A window of opportunity?

### Key Markets

- ▶ High gas and electricity prices
- ▶ High grid carbon
- ▶ Markets which have traditionally relied on gas.



### New build / retrofit

- ▶ **NEW BUILD:** Already performing well
- ▶ **RETROFIT:** Strong potential, but challenges and some uncertainties remain

### Timeframe of opportunity

**The new build opportunity:** Building regulations will continue to drive hybrids in the next 3-7 years

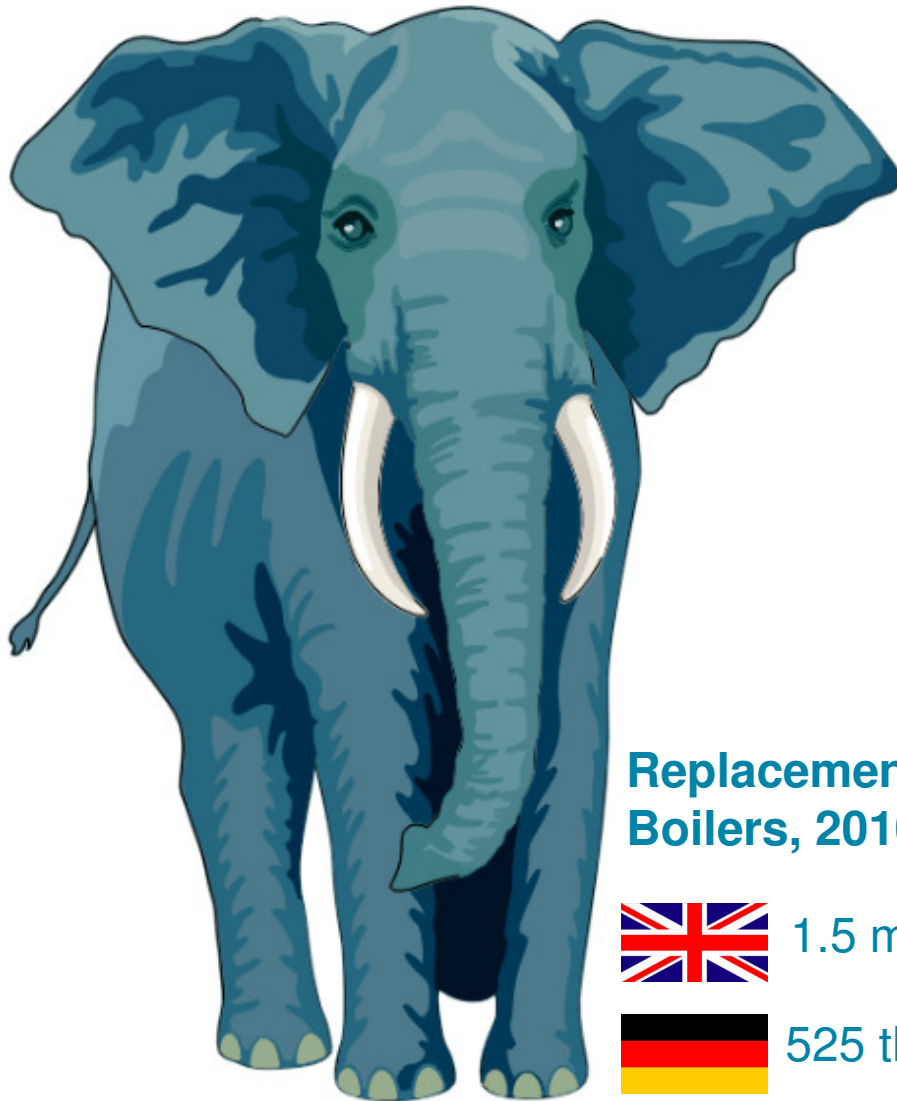
**The retrofit opportunity:** Timing of the opportunity dependent on...

- ▶ **Building regulations** – hybrids a post-2016 opportunity if regulations for replacement systems emerge which favour hybrid solutions?
- ▶ **Rate of reduction in grid carbon** – window of opportunity where grid carbon is high
- ▶ **Rate of technology cost-reduction** – improving customer proposition
- ▶ **Rate of improvements in efficiency** (though technology development, sophisticated control systems, optimised system configuration) – reducing running costs & CO2 emissions

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- ▶ Window of opportunity
- ▶ **Conclusions**

Outlook: The 5 year opportunity



Replacement Gas Boilers, 2010

 1.5 million

 525 thousand

Hybrids...?



2011...  
10 thousand in 2011

2016...  
A few 1000 / yr in key markets...  
Increasing installed base to 100 thousand?



Heat Pumps, 2010

 14 thousand

 42 thousand

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