

TW1-1

Do we need new gas technologies for the domestic and small commercial space heating market?

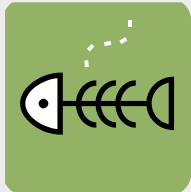
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The space heating challenges

The bad news

The good news



- Natural gas is FOSSILE
Phasing out of fossile fuel policy
But we still have a lot (can we afford not to use it?)



- Heat demand reduction in houses
Infrastructure and heating appliance costs
It is the same issue for other competing options for central heating (e.g. EHP)



- Gas quality change
Will we be able to harmonize gas/appliances?
Harmonization efforts done in EU. Gas sensors.

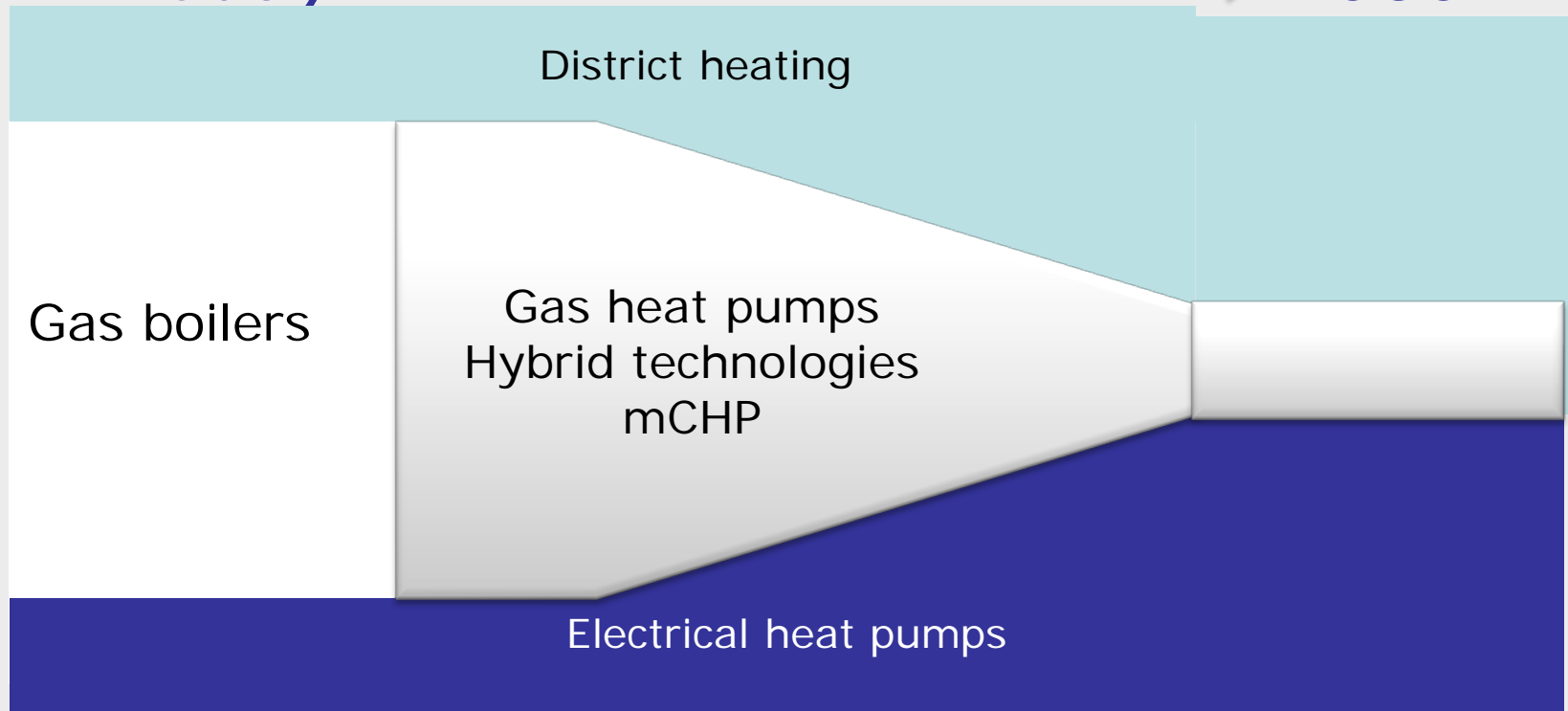


- New gas technologies
Where are they?
Hybrid is there; and so is GAHP!



Towards a fossile-free heating market?

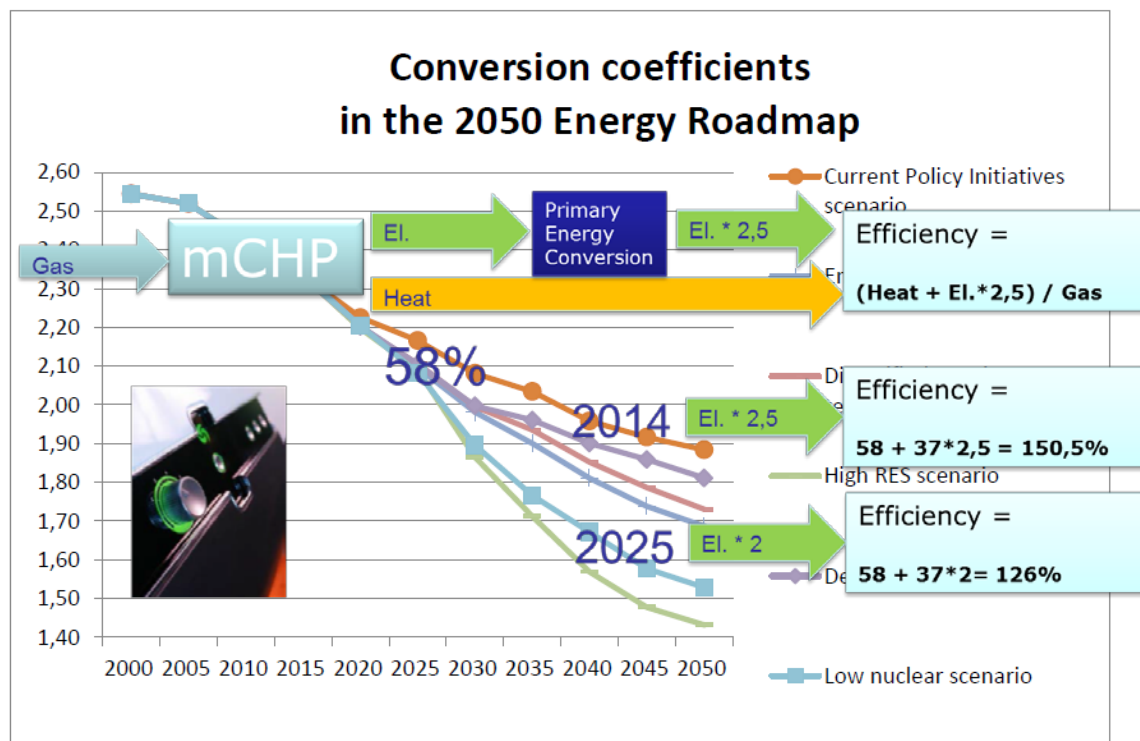
Today  *2050*



Ref. source DELTA

Competition of technologies

Electricity primary conversion factor importance

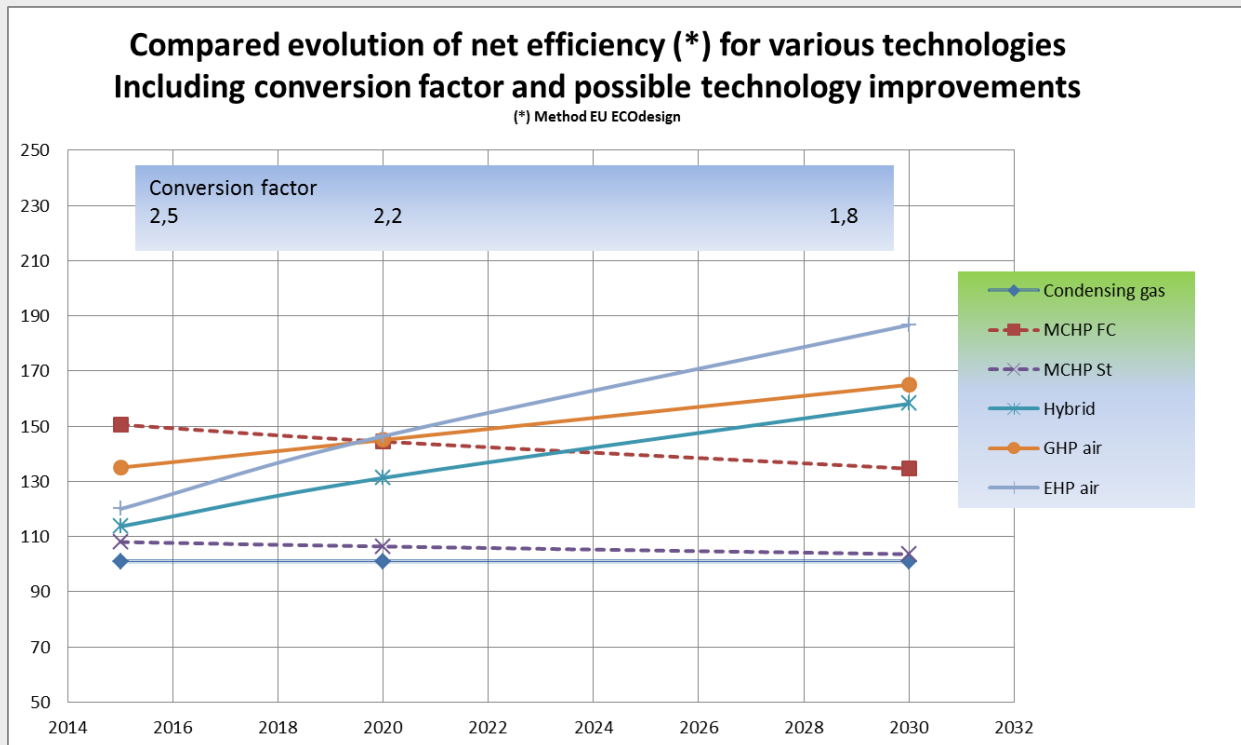


Source Eurelectric

With the development of renewable electricity the **conversion factor will decrease** and as a result:

- mCHP efficiency will decrease
- EHP efficiency will increase

mCHP less and less efficient - EHP more and more efficient!

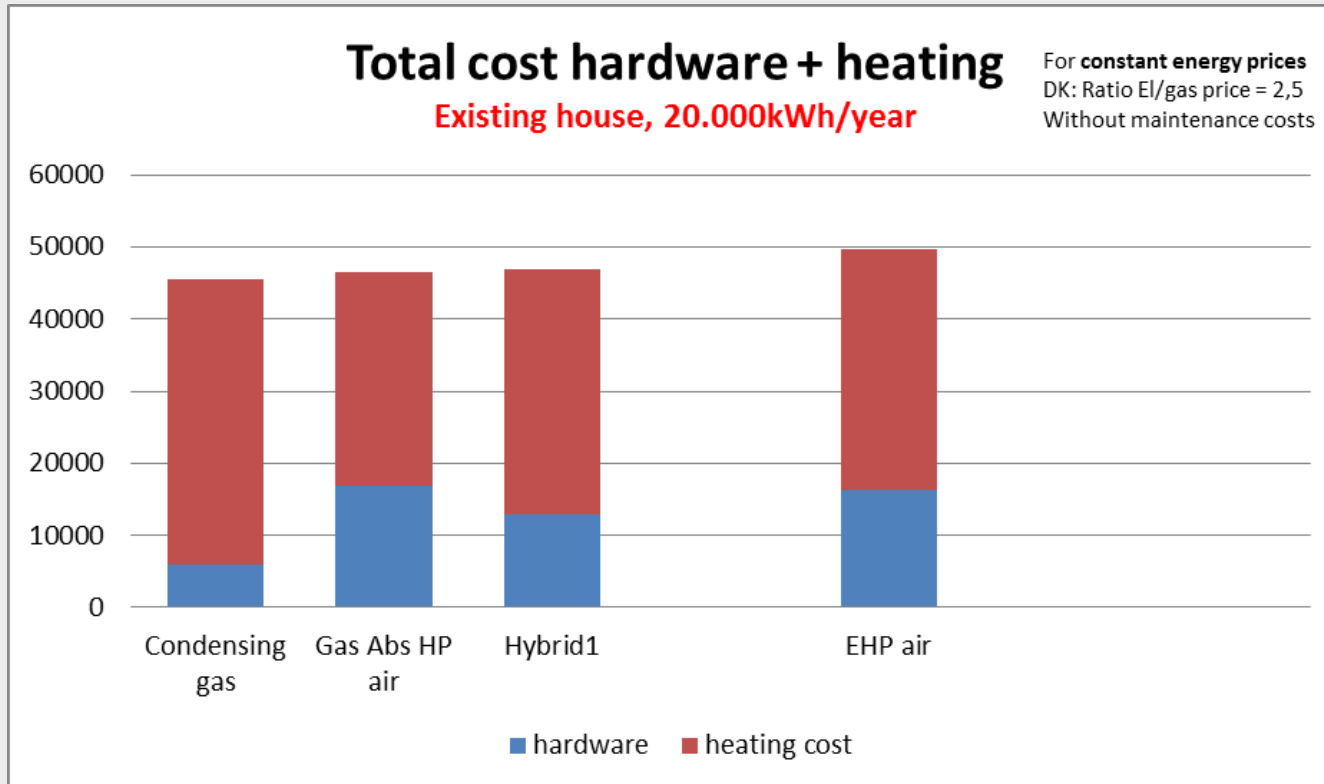


**2020 =
turning point**

Sources:

- Conversion factors and evolution: *Eurelectric*
- Appliances efficiency: *Danish Energy Agency + DGC*

AVERAGE existing house, today



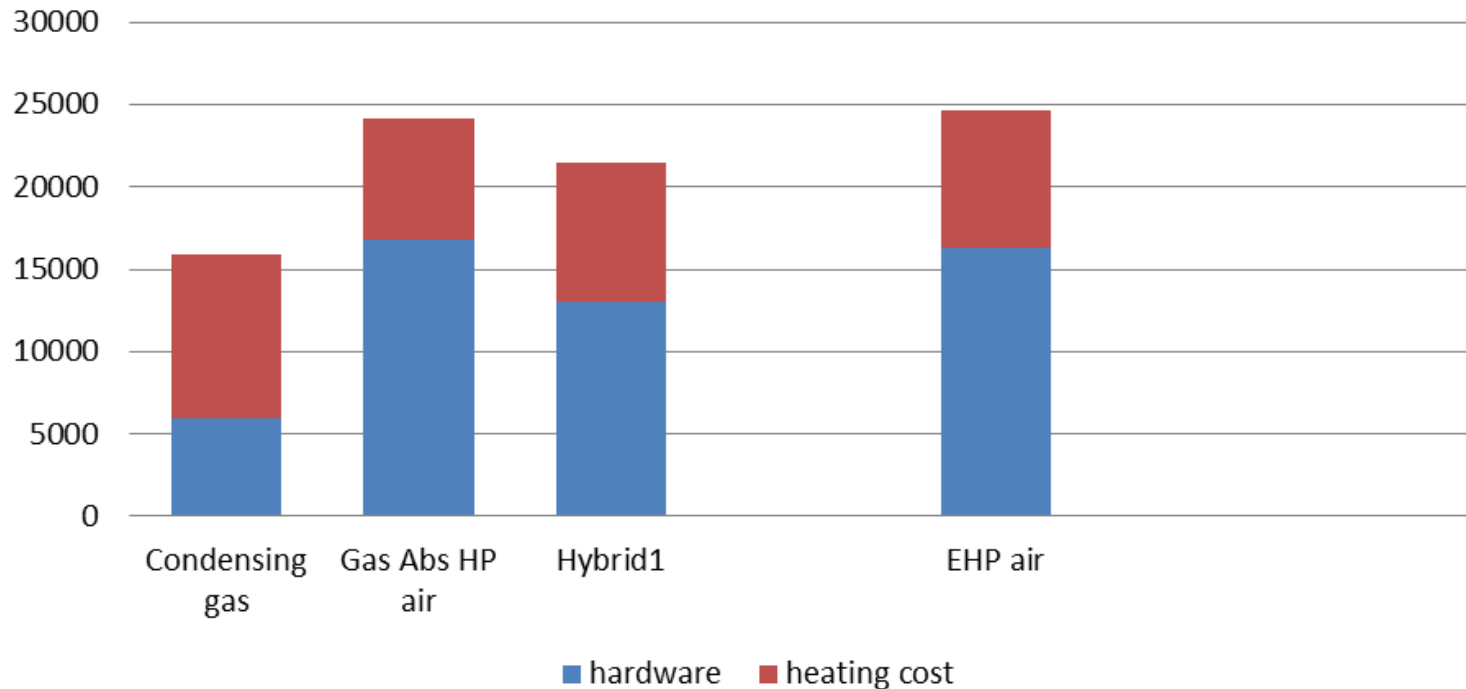
Aggregated costs for 15 years' heating + hardware and installation (DK)
(Costs in Euro)

New or renovated house

Total cost hardware + heating

New / renovated house, 5.000kWh/year

For constant energy prices
DK: Ratio El/gas price = 2,5
Without maintenance costs

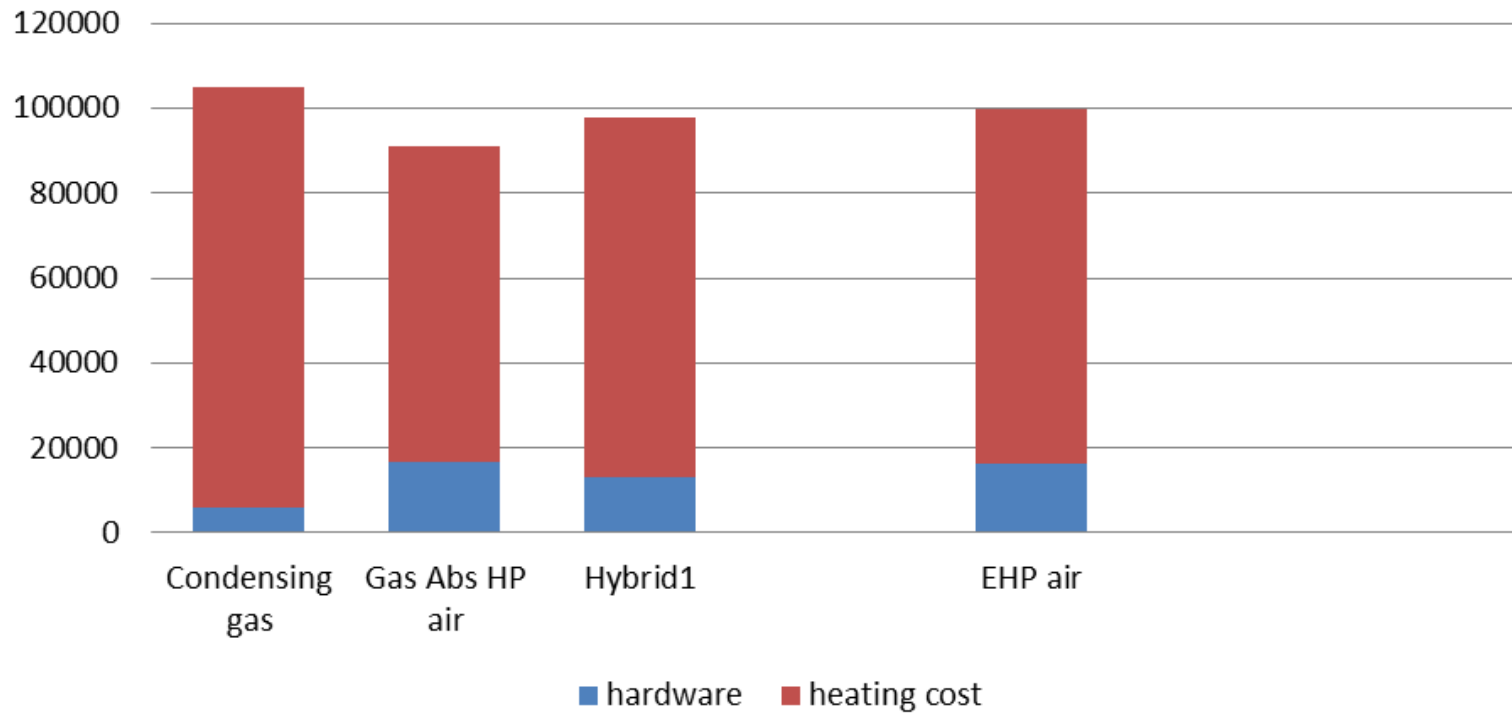


Commercial market

Total cost hardware + heating

Existing house, 50.000kWh/year

For constant energy prices
DK: Ratio El/gas price = 2,5
Without maintenance costs



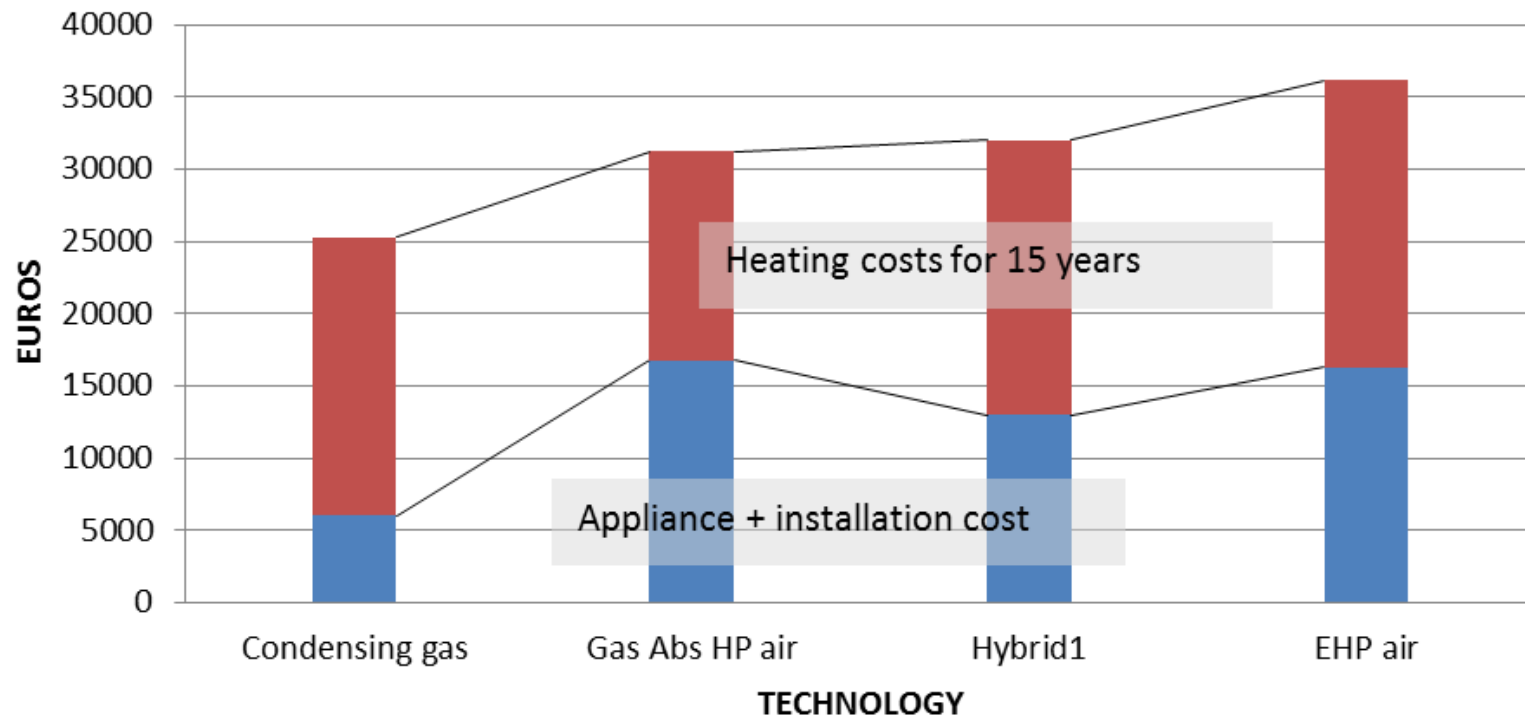
EU situation AVERAGE USER

(Calculated with hardware same price + EU energy prices)

Total cost hardware + heating (15 years)

AVERAGE EU Existing house, 20.000kWh/year

For constant energy prices
Base EUROSTAT 2013



Conclusions: Technologies

- 1) **Condensing gas** boilers is the most cost effective technology for the replacement of existing boilers in the domestic sector.
- 2) Because of the price, **MCHP Stirling** is not good enough to compete with condensing in the domestic sector.
- 3) **Fuel cell** technologies are coming too late in the domestic sector: It may be adapted to commercial users.
- 4) **GHP** is an excellent product with low payback time for commercial users, schools etc. Let the technology be known and installed correctly.
- 5) **GHP** for domestic users: We expect a product that is:
 - Having high efficiency over a wide load range without the need of a backup boiler
 - Reliable
 - Competitive with hybrid.
- 6) **Hybrid** will have an increasing efficiency (due to **conversion factor evolution**)
 - A good option for small and medium houses
 - The technology of the transition Gas-El.?

Looking forward: we need to be creative

Building envelope

- Low heat demand = **central heating** not competitive.
- **Cheap, but efficient air/air el. heat pumps** as customer choice?
- Why not **gas driven air/air heat pumps**?

From appliances to system

- Not one single technology on the market but **plenty of solutions mixing** and optimizing the use of energies and bringing new services.
- Technologies are to be compatible with **renewable and energy storage**.

New smart thinking

- Technologies can be shared between users to decrease the cost.
- Super users may be energy service providers for their neighbours.
- Appliances may be part of a virtual heat and power plant connected via smart grids.

