

## Heat Deep Dive



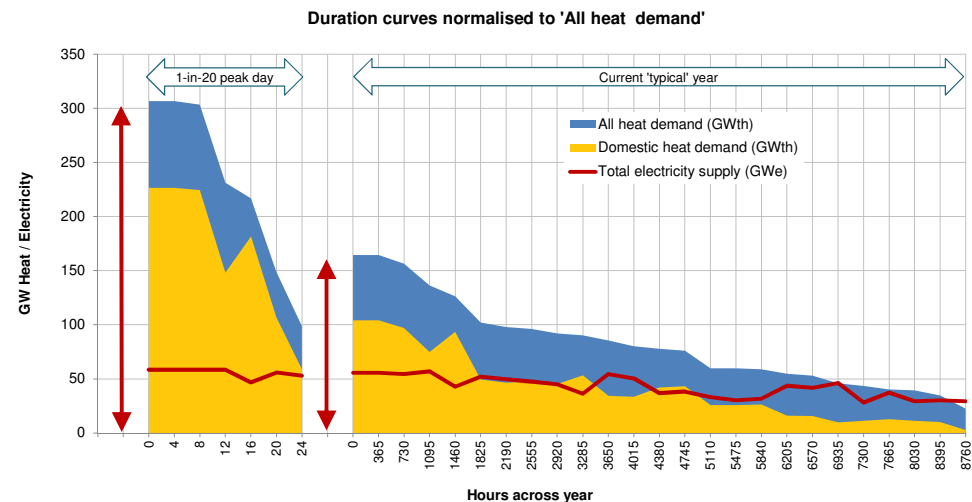
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**HEAT?**

## Pathways for decarbonising heat

- This study undertaken by Redpoint is a full system *cost optimisation* model using DECC core assumptions plus:
- Different demands for different property types across the year and within day.
- Increased technology options (heat networks, hydrogen, gas heat pumps, hybrid heat pumps)



# Cost Optimal pathway by sector: Residential (buildings)



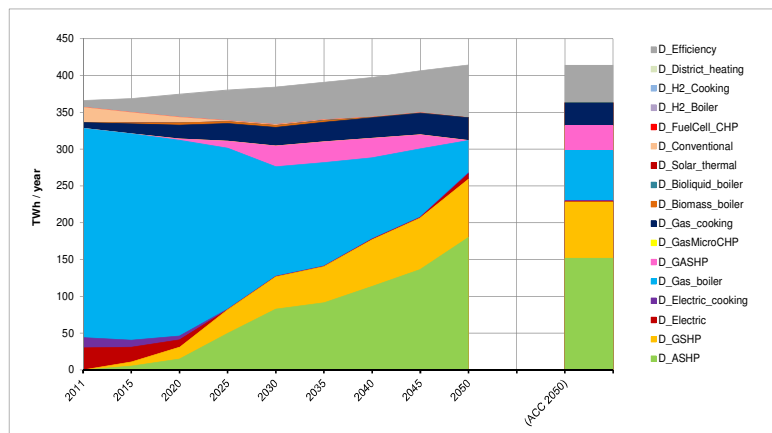
- Energy efficiency and insulation key
- Condensing boilers replace old boilers
- Heat pumps deploy in off gas network properties



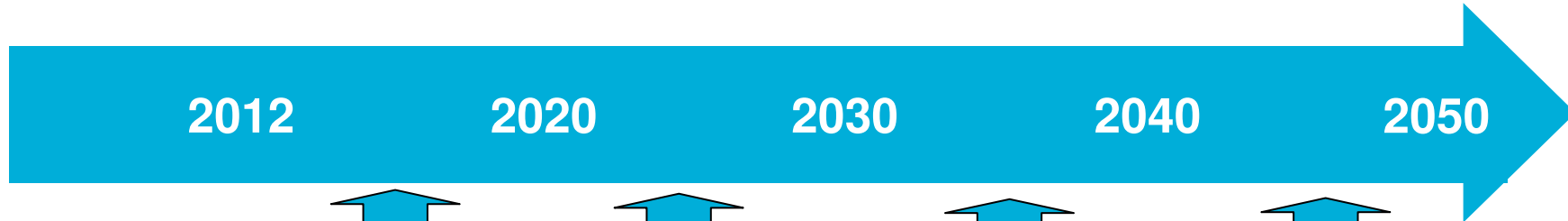
- Efficiency optimised
- Hybrid gas/electric heat pumps start to deploy in on gas network properties
- Gas Heat Pumps start to replace gas boilers

- Heat pumps continue to increase
- Gas/electric hybrids continue to increase

- All heating by hybrids or heat pumps



# Cost optimal pathway by sector: Services (buildings)

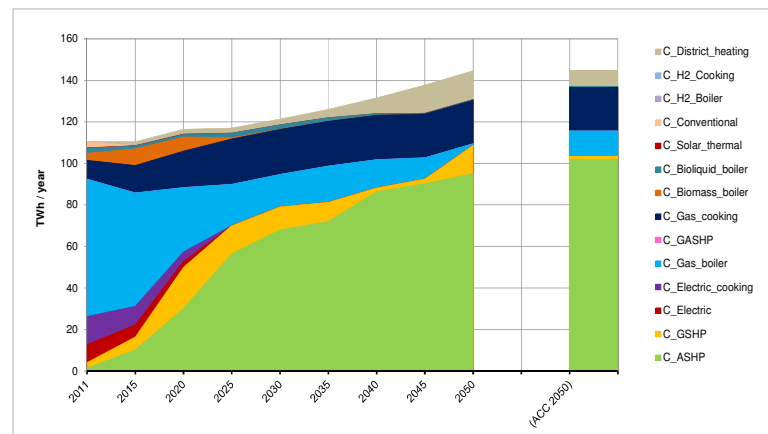


- Rapid transition from gas to Heat pumps
- 50% of gas displaced
- Minor role for district heating

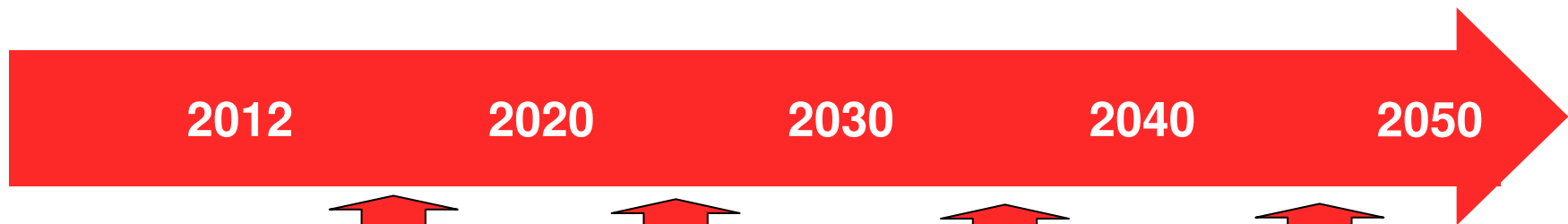
- Air source heat Pumps continues to replace gas
- Ground source heat pumps growth slows

- Air source heat pumps continue to replace remaining gas
- District heating starts to develop

- Gas only for peak day back up
- District heat increases



# Cost optimal pathway by sector: Industrial



- Direct electric replaced by biomass
- Heat networks utilising recovered heat
- Gas/conventional continues in process heat



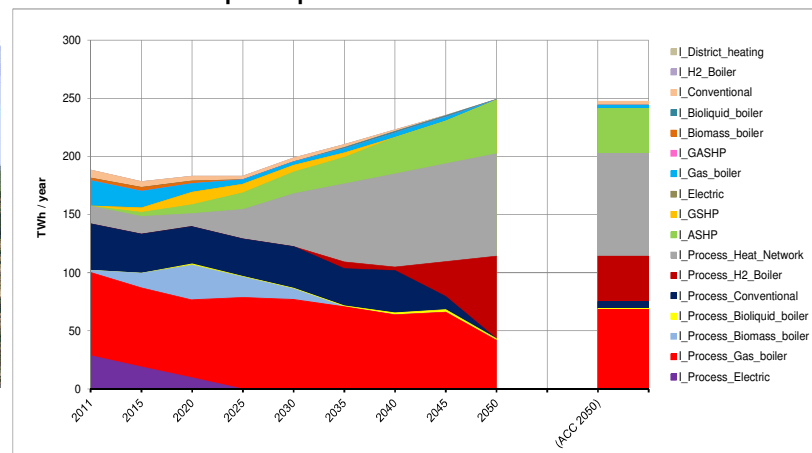
- CHP with CCS
- Heat Networks key
- Gas/ conventional fuel continues in process heat
- Slow build up of heat pumps



- Heat networks increase
- H2 boilers start to deploy
- Gas/ conventional fuel continues in process heat



- Heat networks optimised
- H2 replaces conventional and some gas



## Conclusions

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- Costs of meeting the 2050 target are likely to be in the range of 1-2% of GDP
- Pathways are dependent on electricity decarbonisation, with CCS, Nuclear and Heat pumps playing pivotal roles.
- A balance across technologies and fuels provides the cost optimal route, with different priorities for each sector.
- Gas has a role meeting seasonal and peak demand in buildings through hybrids.
- In scenarios without gas in buildings, energy costs are ~12% higher than with.

## For more info...



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- [Marcus.stewart@nationalgrid.com](mailto:Marcus.stewart@nationalgrid.com)
- Pathways for decarbonising heat :Redpoint
  - [http://www.baringa.com/our\\_point\\_of\\_view/item/uk\\_heat\\_economics\\_study\\_pathways\\_for\\_decarbonising\\_heat/](http://www.baringa.com/our_point_of_view/item/uk_heat_economics_study_pathways_for_decarbonising_heat/)

## Coming soon ...

- 2050 Pathways for Domestic Heat. ENA/DELTA –EE
  - Publication date 16<sup>th</sup> October