



Committee on
Climate Change

Independent advice to government on building a
low-carbon economy and preparing for climate
change

CCC Hydrogen Review

Dr. David Joffe

Hydrogen myth-busting

Contrary to what is often said:

- The sunk costs of the gas grid do not mean that economically it's a no-brainer to switch it over to hydrogen and use it to serve boilers as we do at the moment
- There is not enough 'surplus' low-carbon electricity to meaningfully contribute to hydrogen supply at scale
- Gas reforming with CCS may well not be low-carbon enough for very large-scale use by 2050 (although it has an important role in the transition and at more moderate scales)
- An international market in hydrogen may well develop in time, but it is not a certainty and these imports may be no cheaper than domestic production
- Hydrogen is best used selectively, alongside mass electrification – it is not a silver bullet

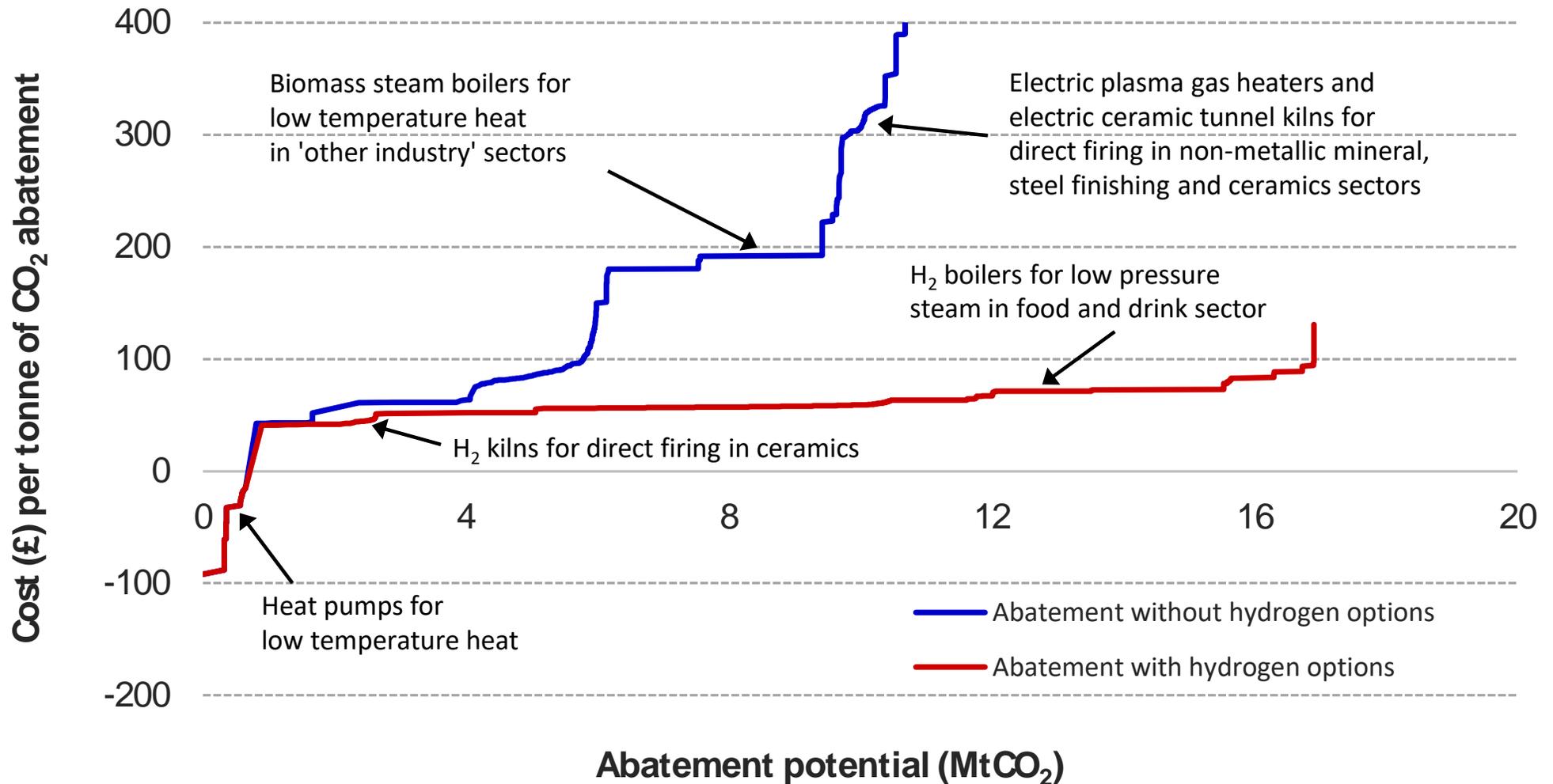


Hydrogen can be a strong complement to electrification and efficiency

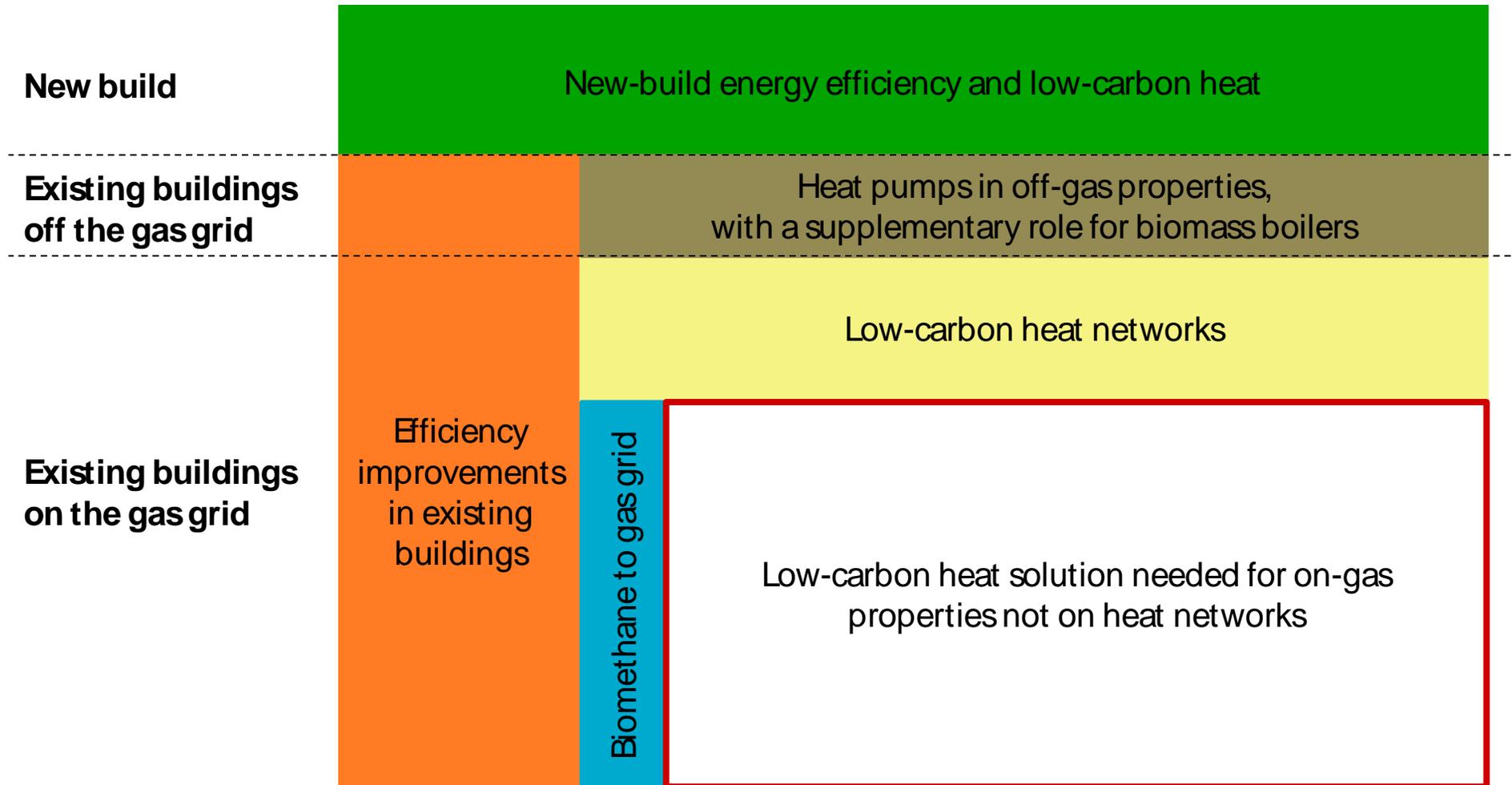
Low-carbon hydrogen is an important potential complement to electrification, especially in replacing natural gas (and potentially oil) in areas where electrification is not feasible:

- Buildings heat for colder winter days
- Industrial process heat
- Flexible power generation (e.g. for peaks)
- Heavy-duty / long-distance transport (e.g. HGVs)

Role of hydrogen in industry

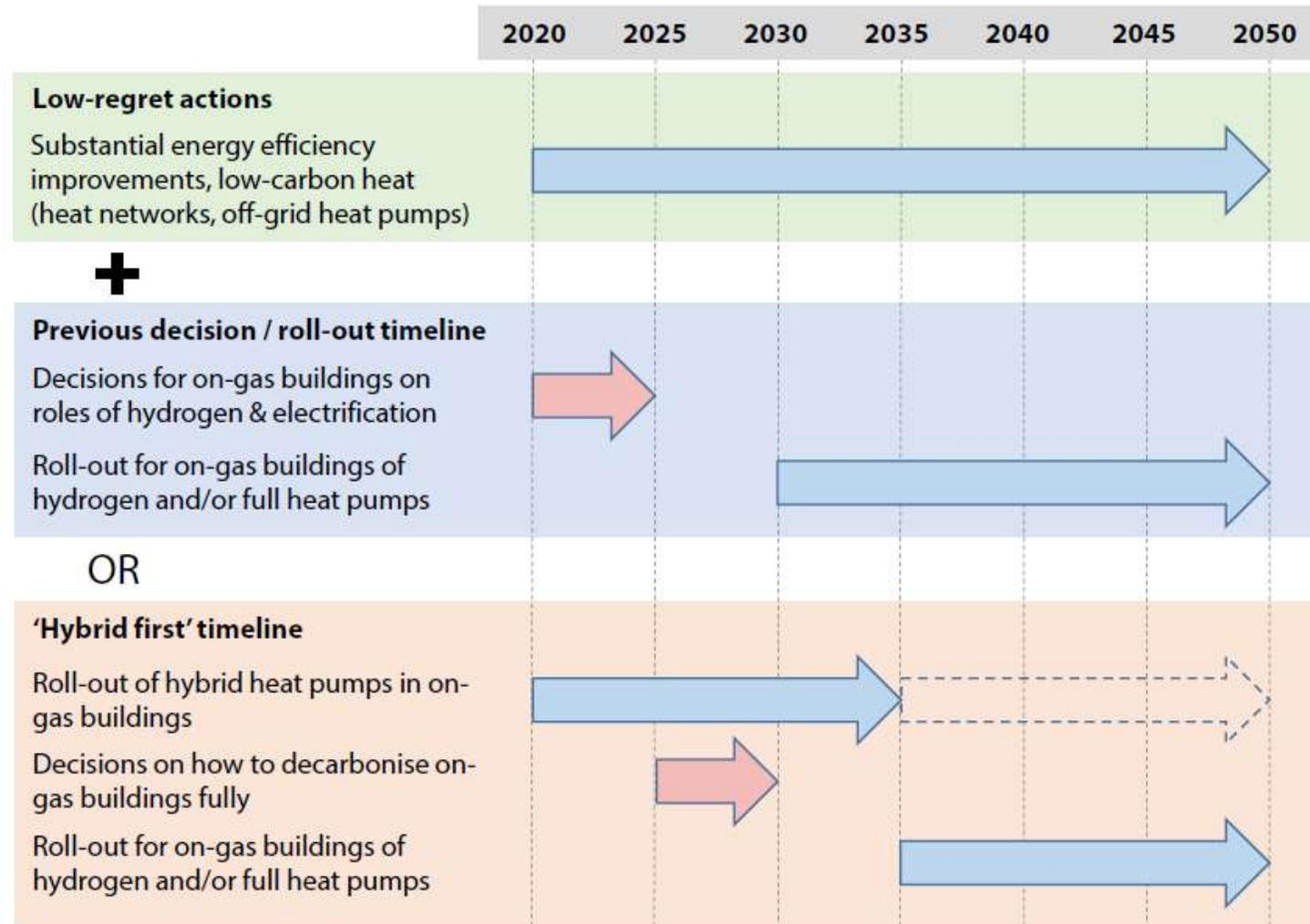


Low-regret actions for buildings decarbonisation (2016)

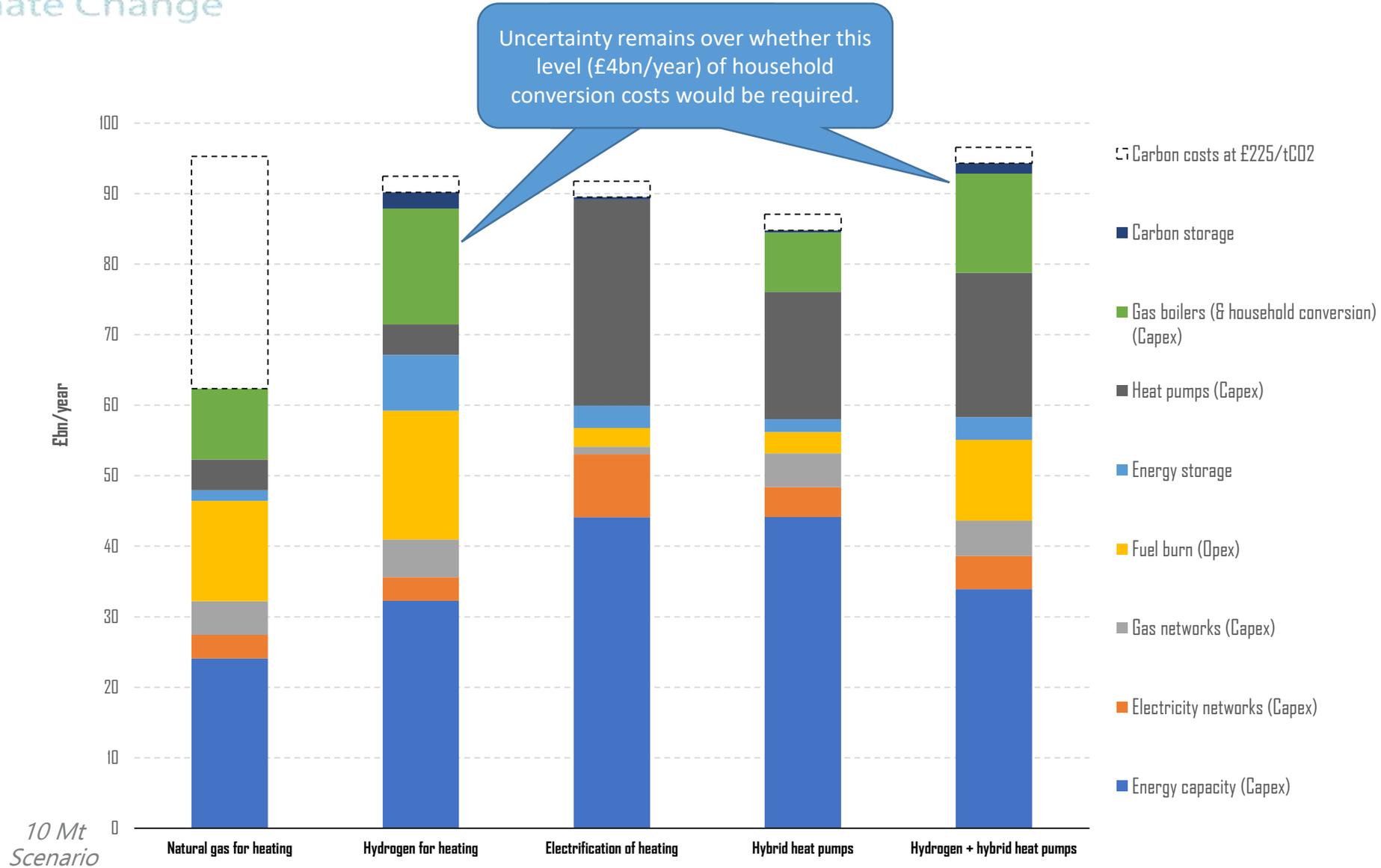


Widespread deployment of hybrid heat pumps can reduce the challenge in getting rid of natural gas and ensure we make the right decisions on what follows

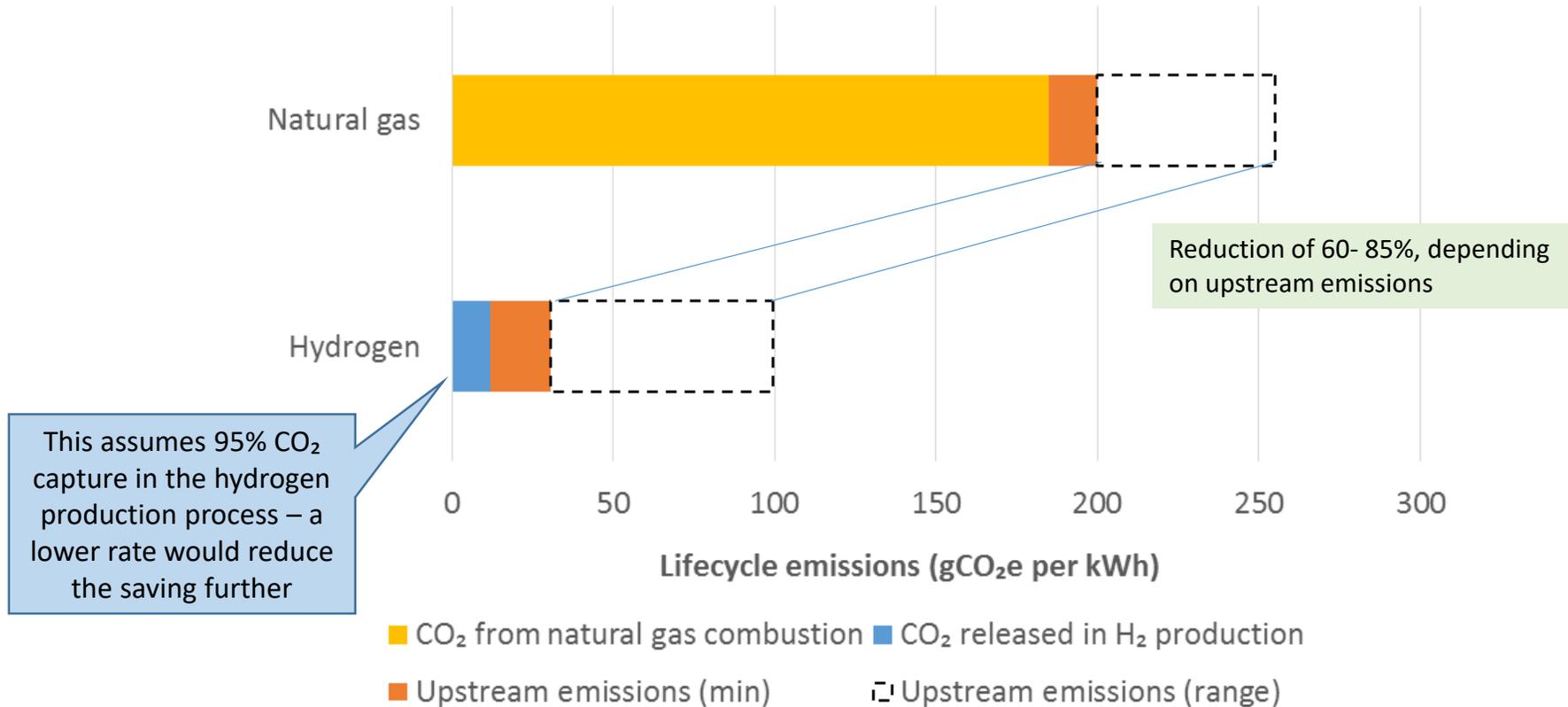
Figure B2. Pursuing a 'hybrid first' approach alongside other low-regret actions



Costs of heat decarbonisation scenarios are within 10% of each other, across alternative heat pathways



Residual emissions of gas reforming are significant even with high CO₂ capture rates



The range of upstream emissions from natural gas production are 15-70 gCO₂e per kWh, which spans the range for LNG and shale in our 2016 shale report

The need for action on hydrogen

Deployment of hydrogen should start in a 'low-regrets' way over the next decade, recognising that even an imperfect roll-out is likely to be better in the long term than a 'wait-and-see' approach that fails to develop the option properly

- Hydrogen production should start at scale as part of a CCS cluster, for use in a range of ways that would not initially require major infrastructure changes (e.g. use in buses, power generation, industry or blending at small proportions into the natural gas supply).
- Hydrogen-ready technologies (e.g. boilers, turbines) should be developed in parallel and their deployment supported by policy.
- Effective policy mechanisms should be put in place that drive adoption of hydrogen technologies where they add most value, as hydrogen's long-term role in the energy system becomes clearer.