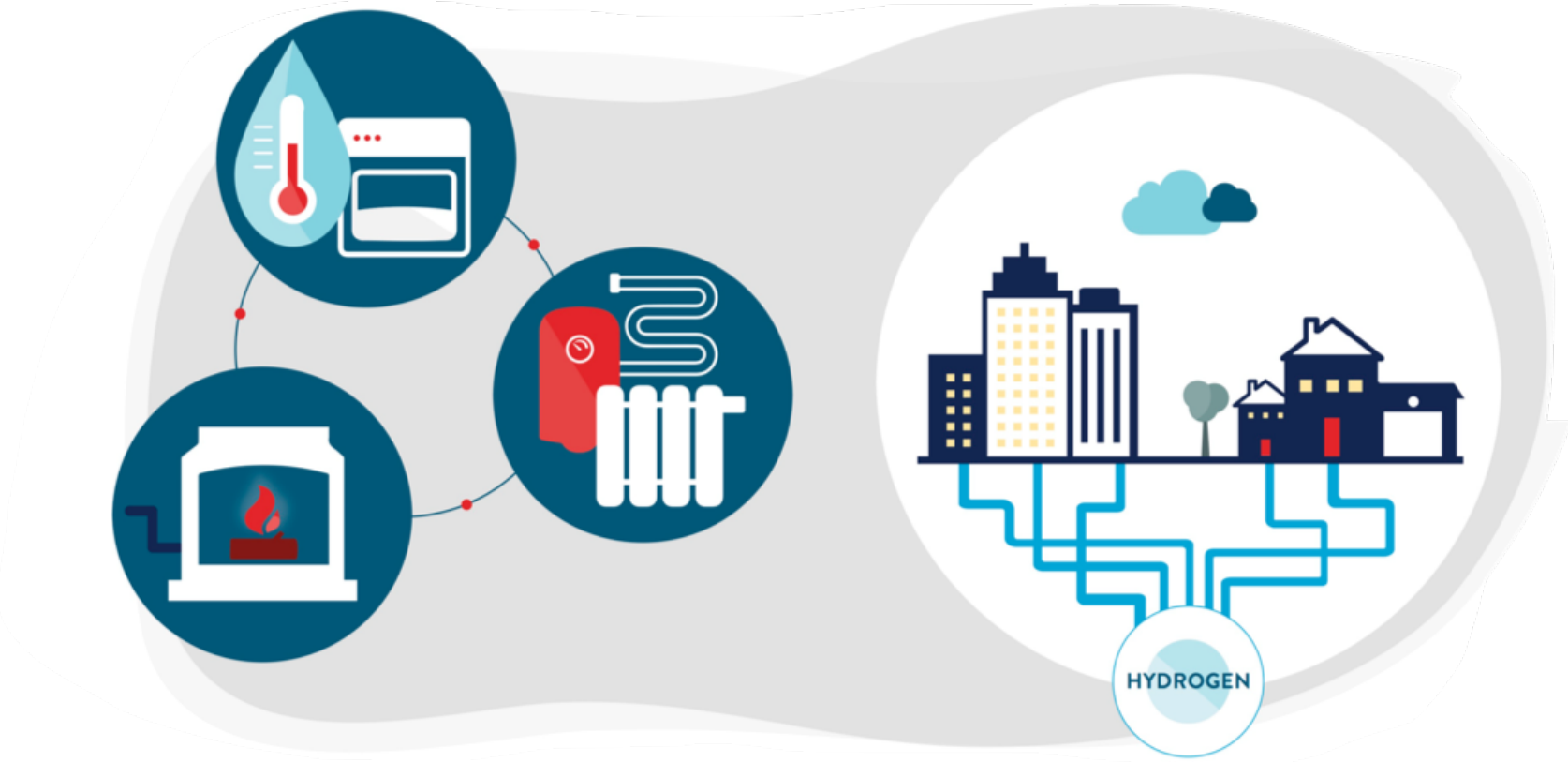
Discussion stalls



Hydrogen gas boilers

Boilers

Boiler type	Minimum rated space heating output	Acceptable range of total output
Combination	24 kW	24 – 32 kW
Regular or System	18 kW	18 – 24 kW

- Simplicity of switching would be helpful (e.g. common back plates?)
- For ease of replacement connections of typical modern compact wall hung boilers are bottom-located
- Water, gas and electrical connections and top-mounted air supply/flue

Boilers

	Combination Boiler	Regular/System Boiler
Average dimensions (H x W x D) mm	722 x 415 x 325	684 x 402 x 313
Minimum dimensions (H x W x D) mm	600 x 390 x 248	600 x 340 x 270
Maximum dimensions (H x W x D) mm	845 x 453 x 474	780 x 450 x 360

Boilers

Gas Quality – Purity

- ISO 14687, Grade A hydrogen gas specification assumed
- Comprises >98%v/v hydrogen

Gas Quality – Odorant

- Odorant of t-butyl mercaptan (TBM) and dimethyl sulphide (Odorant NB), at a concentration of 6 mg/m3 gas

Gas Quality - Supply Pressure

- To the ECV (emergency control valve) 0.07 to 00.025bar
- Internal carcass pressure 20mbar

Boilers

Certification

- Gas Appliances Regulation (GAR)
- Relevant eco design regulations
- WRAS water supply (water fittings)

Efficiency

- Measured efficiency should meet the relevant EN standard
- Manufacturers should aim to achieve appliance efficiency as close to of existing gas products

Estimated development costs by phase

	Phase I Solution Design	Phase II Prototype Development	Phase III Development for Demonstration Trials (WP8)	**Estimated development cost per appliance type ***
Timeline	3 months	12 months	3 months	
Boilers	c.£40k	c.£635k	c.£75k	**£750k**
Cookers		c.£85k		**£200k**
Gas Fires		c.£135k		**£250k**
	~£1.3m	**~£5.6m**	**~£1.6m**	
TOTAL	**£8m - £9m**			

*Development costs (low volume) from BEIS Commissioned report 'Appraisal of domestic appliances' by Frazer Nash Consultancy https://www.gov.uk/government/publications/appraisal-of-domestic-hydrogen-appliances

Hydrogen gas cookers

Cookers

Cooker	Standalone hob	Multiple burner appliance with each burner producing variable heat levels
	Standalone oven incl. grill	Oven unit with variable heat output temps – incl. grill with variable heat range
	Integrated freestanding cooker	Unit to include oven, grill and hob

Cookers

Unit	Height (mm)	Width (mm)	Depth (mm)
Base Unit	890, 900	300, 400, 500, 600, 700, 800, 1000, 1200	500, 600
Wall Unit	600, 740, 760, 900, 990		300
Tall Unit	1975, 2066, 2166, 2266	500, 600	600

Cookers

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Gas Quality - Supply Pressure

- To the ECV (emergency control valve) 0.07 to 00.025bar
- Internal carcass pressure 20mbar

Cookers

Colourant

The design needs to include a method of colouring any visible flame

Consideration is needed ref:

- how long colourant lasts
- how it is replaced

Cookers

Certification

- Gas Appliance Regulation
- Relevant Eco design regulations

Efficiency

- New gas cookers need to comply with the limits specified in Ecodesign regulation EU No 66/2014 as requested under the Energy Related Products (ErP) directive (2009/125/EC)

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Hydrogen gas fires

Gas Fires

Gas Fire	Standard fire	Inset convector with conventional flue
	Middle range fire	Inset glass fronted with balanced flue
	Executive fire	Development of state of the art hydrogen gas fire

Gas Fires

Gas Quality – Purity

- ISO 14687, Grade A hydrogen gas specification assumed
- Comprises >98%v/v hydrogen

Gas Quality – Odorant

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Gas Quality - Supply Pressure

- To the ECV (emergency control valve) 0.07 to 00.025bar
- Internal carcass pressure 20mbar

Gas Fires

Colourant

The design needs to include a method of colouring any visible flame

Consideration is needed ref:

- how long colourant lasts
- how it is replaced

Gas Fires

Certification

- Gas Appliance Regulation (GAR)
- Relevant eco design regulations

Efficiency

- Measured efficiency should meet the relevant product standard, for example BS 7977
- It is expected that manufacturers should aim to achieve appliance efficiency (Net or LHV basis) close to that attained for the reference natural gas product

Estimated development costs by phase

	Phase I Solution Design	Phase II Prototype Development	Phase III Development for Demonstration Trials (WP8)	**Estimated development cost per appliance type ***
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One to one sessions