THE ROLE OF HYDROGEN AND FUEL CELLS IN FUTURE ENERGY SYSTEMS

Daniel Scamman
UCL Energy Institute, University College London

UCL

Imperial College London

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THE HYDROGEN AND FUEL CELL RESEARCH HUB

The Writing Process










* Authors: Iain Staffell, Paul Dodds
  Daniel Scamman, Anthony Velazquez Abad, Niall MacDowell, Kate Ward, Paolo Agnolucci, Lazaros Papageorgiou, Nilay Shah and Paul Ekins
* 57,000 words
* 8 reviewers (academia, industry, government)
* Over 400 comments received

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1. Overview

- The role of hydrogen and fuel cells
- Transport, Heat, Power and Industry sectors
- Economics
- Policies
- Systems approach
- Deployment scenarios

2. H2FC for Transport

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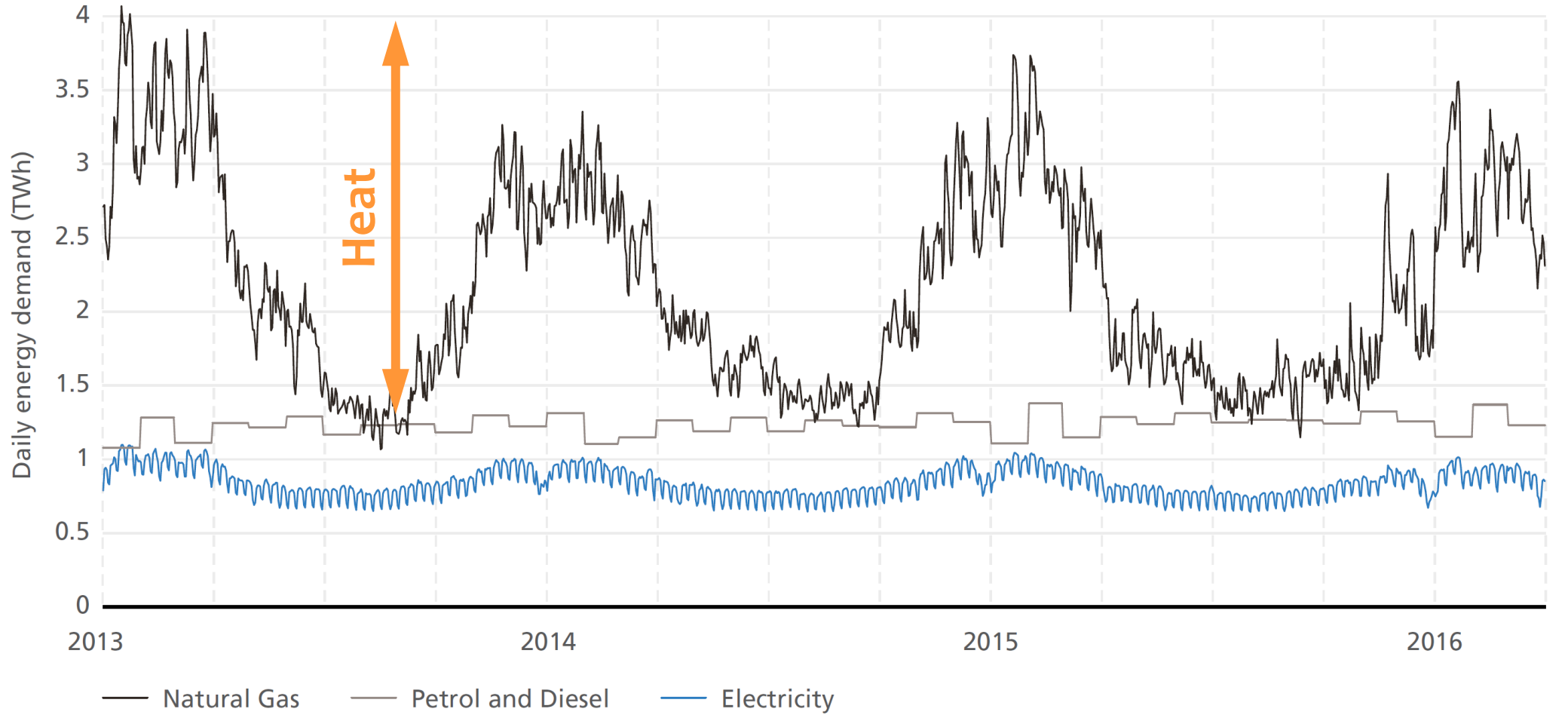
2. H2FC for Transport

* Fuel cell vehicles are now produced by major manufacturers
* Costs can achieve parity with alternatives by 2025–2030
* Driving range and refuelling time match conventional vehicles
* Fuel cell vehicles and hydrogen engines improve urban air quality by producing zero / near-zero exhaust emissions.

3. H2FC for Heat

* Decarbonising heat faces many challenges
* Fuel cell CHP can operate on today's natural gas network
* Hydrogen can decarbonise this network in the longer term
* Households are accustomed to compact powerful heating systems, which could use hydrogen

3. H2FC for Heat



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4. H2FC for Electricity

* Hydrogen can support low-carbon electricity systems
* Fuel cells are controllable and offset electric heat pumps
* Power-to-gas gives large-scale, long-term storage
* Data centres, backup and households are major applications

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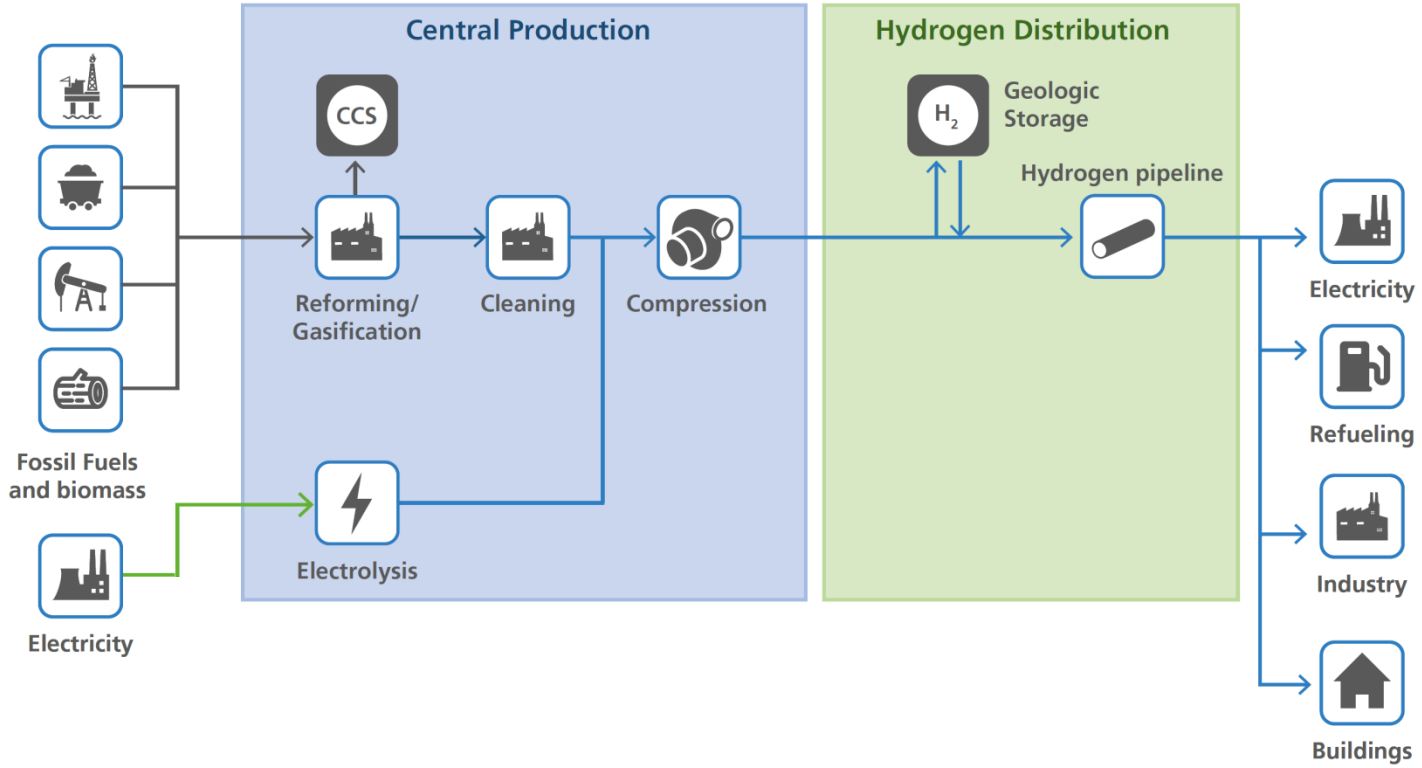
5. H2FC Infrastructure



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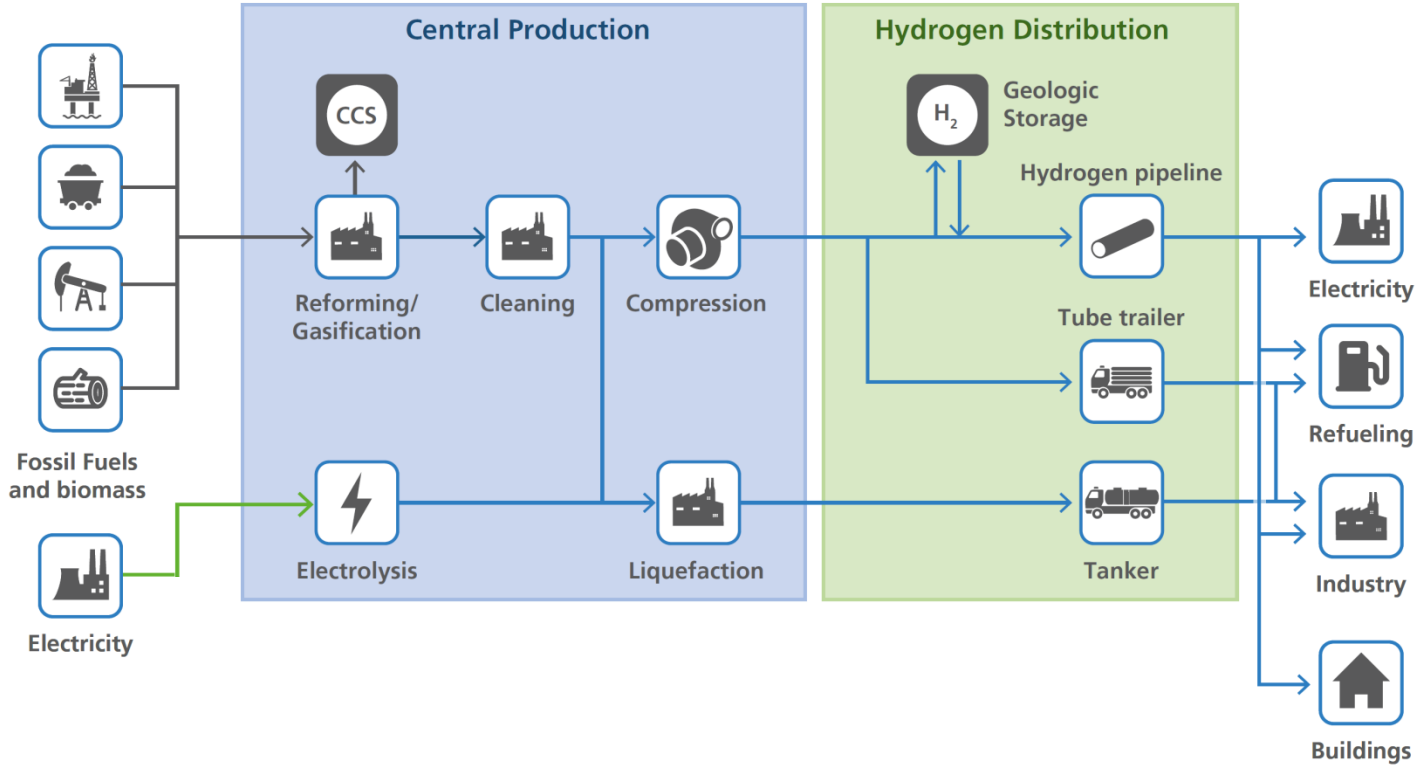
5. H2FC Infrastructure



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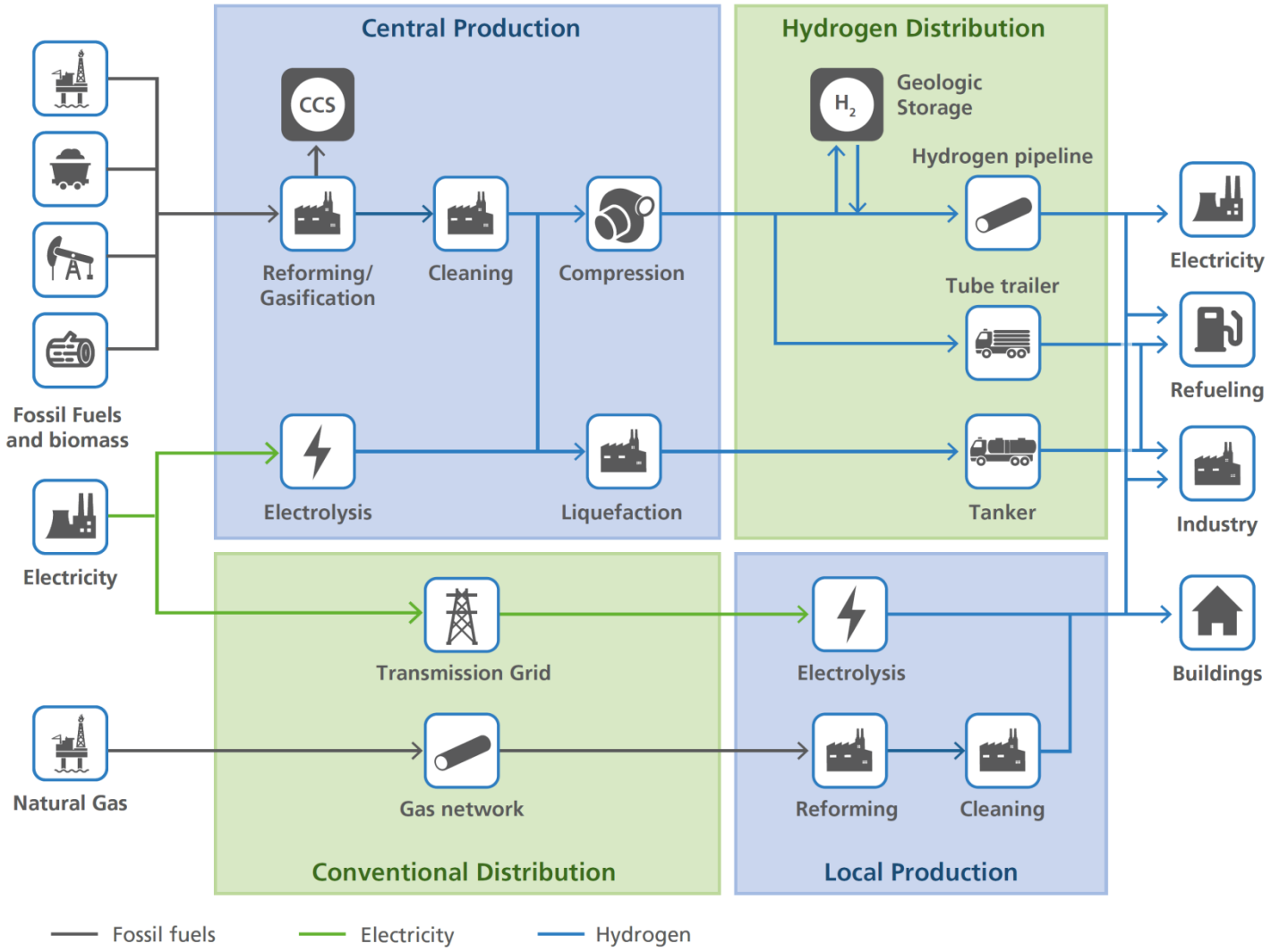

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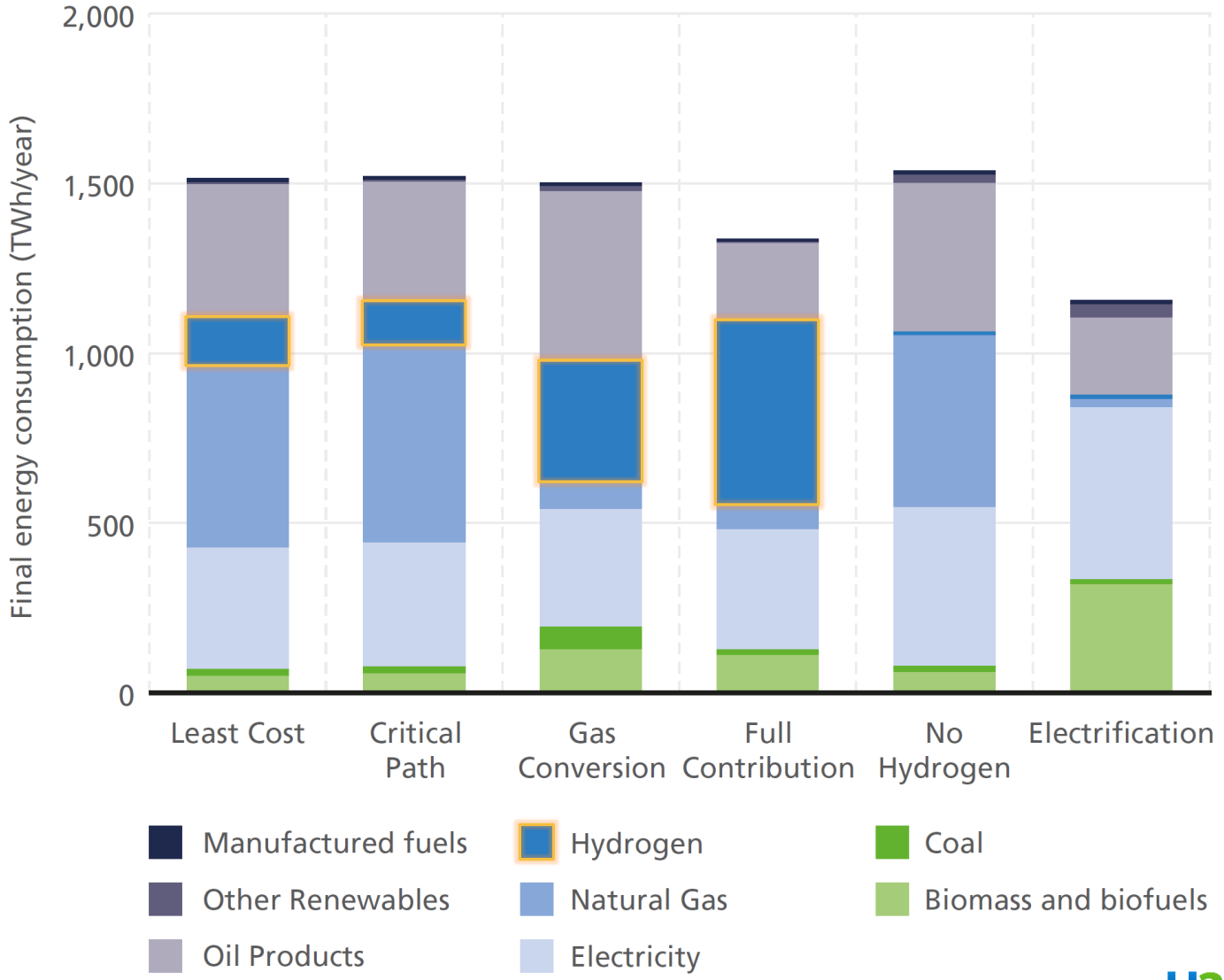
6. H2FC Scenarios (2050)



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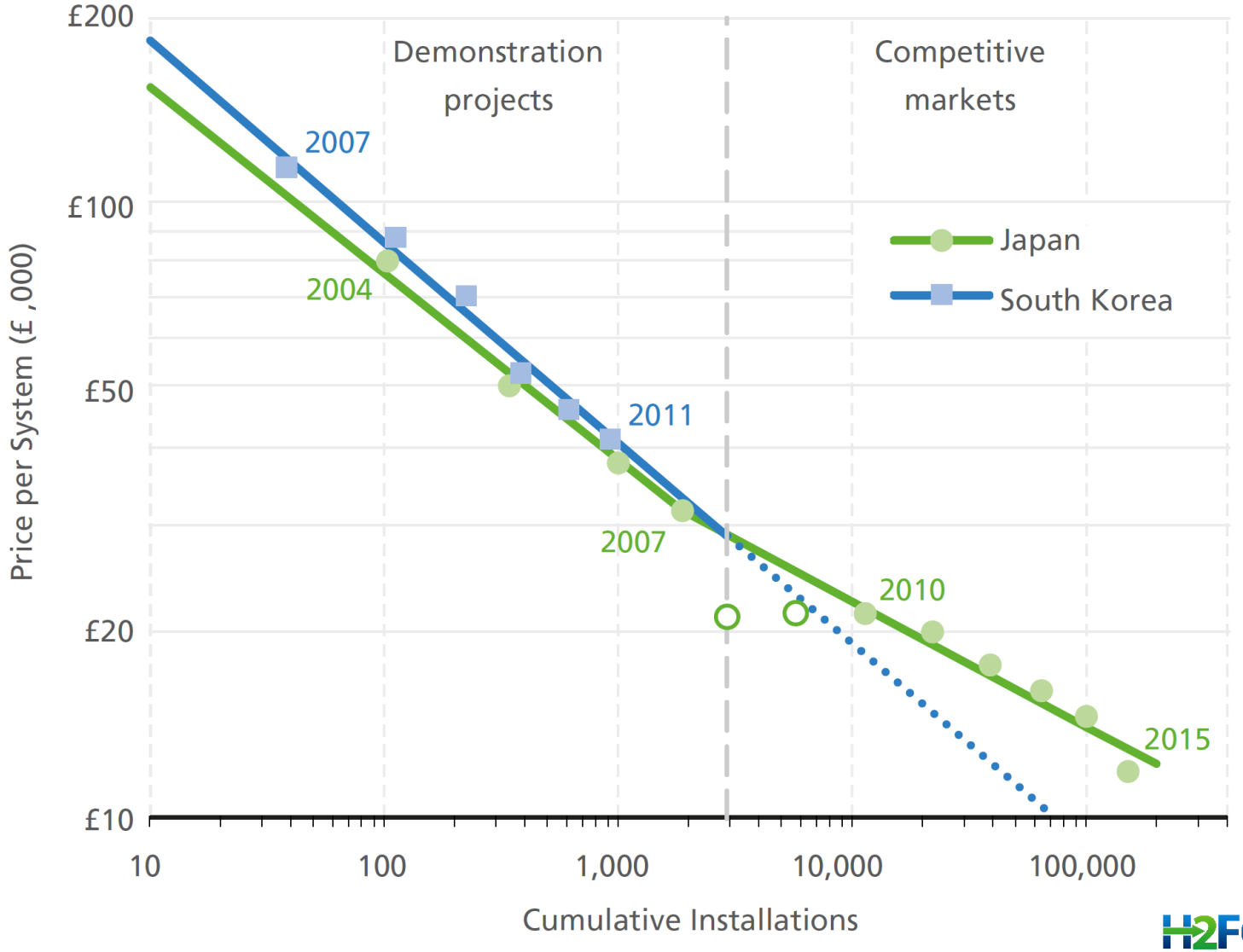
7. H2FC Policy



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7. H2FC Policy

	CHP	Vehicles	Refuelling
Japan	181,500	900 cars	78
Germany	~1,000	100 cars, 14 buses	22
China	n/a	90 cars, 40 buses	4
US	0.7 MW	331 cars, 33 buses	87
South Korea	177 MW	71 cars	7

Uptake to Sep 2016

	CHP	Vehicles	Refuelling
Japan	£500–1,400 per unit	£107m	£45m
Germany	€ 10,200 / kW	€8m for trains	€350m
China	?	£23–58k per vehicle	£500k per station
US	up to $3,000 / kW	$8k per vehicle $0.50 / gallon H_2	$100m in California
South Korea	$31m total	£20k per vehicle	?

Govt. support

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UK	~10	42 cars, 18 buses	14

Uptake to Sep 2016

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South Korea	$31m total	£20k per vehicle	?
UK	n/a	£2m for cars £2.8m for buses	£5m

Govt. support

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To conclude…

Hydrogen and fuel cells:

* are too important to neglect
* make decarbonisation easier
* need greater policy visibility

To see more:

http://www.h2fcsupergen.com/our-work/whitepapers/