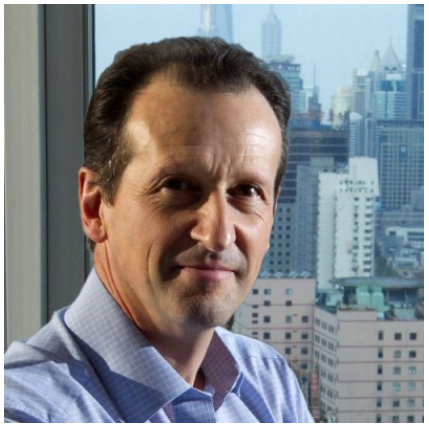
WELCOME

LETI HYDROGEN WEBINAR

A decarbonisation route
for heat in buildings?

The webinar will
begin shortly

Debbie Hobbs
ISG



Chris Twinn
Twinn Sustainability Innovation

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Who are LETI?

LETI

Climate Emergency Design Guide & Embodied Carbon Primer

Downloaded over 40,000 times

In 120 + countries

Download for free from www.leti.London/publications

What is happening this year with LETI

- ***Get involved in Pioneer projects***
- ***Embodied carbon – one pagers***
- ***Case studies-*** *Embodied carbon, operational energy and Whole life carbon*
- ***Clients guide***
- ***Retrofit guide***
- ***Modelling guide***

LETI
HYDROGEN WEBINAR

- A decarbonisation route for heat in buildings?

10th Feb 11:00am

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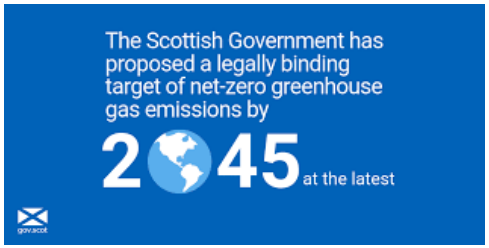
WWW.LETI.LONDON

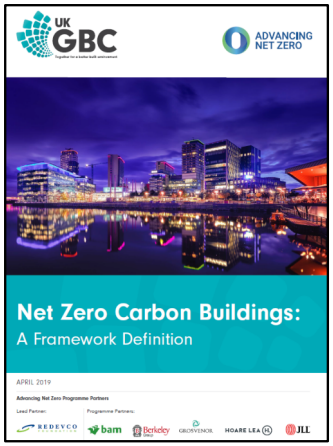
Are clients asking for Hydrogen designs?

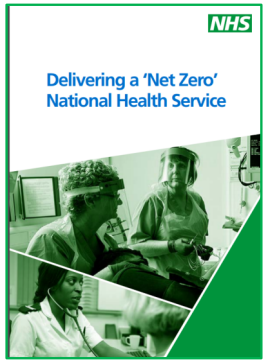
Debbie Hobbs

Group Director of Sustainable Business

Client understanding of Net Zero Carbon ?







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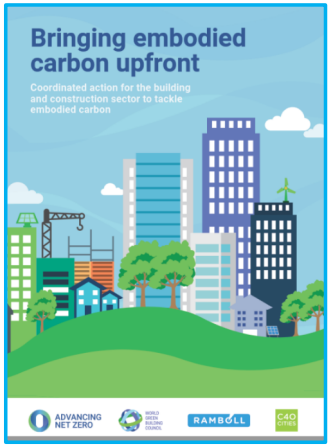

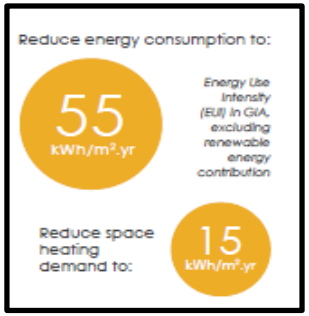

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So how do we get to energy efficient, sustainable buildings ?

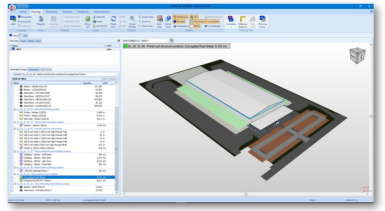
DESIGN for PERFORMANCE

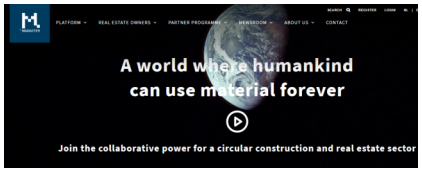
Contracts

-Performance Contracts ?
-Retention linked to performance year 1.2.3

Design

Orientation & structure
Fabric-first
No thermal bridges
DFMA **&D**
Metering strategy
Controls





Life cycle

Life cycle cost versus life cycle carbon?
BIM Materials passport for refurbishment and deconstruction

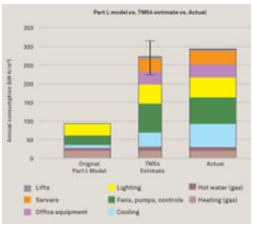
What Fuel Sources – only electricity?

Construct

Zero carbon construction, Airtight
BIM, digital inspections, materials passports ,
Digital twins

Operation & Maintenance

Performance is king!
Who operates?
Who maintains?



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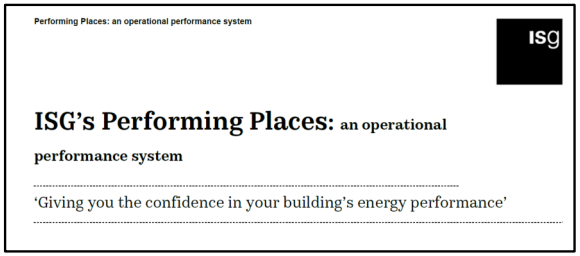
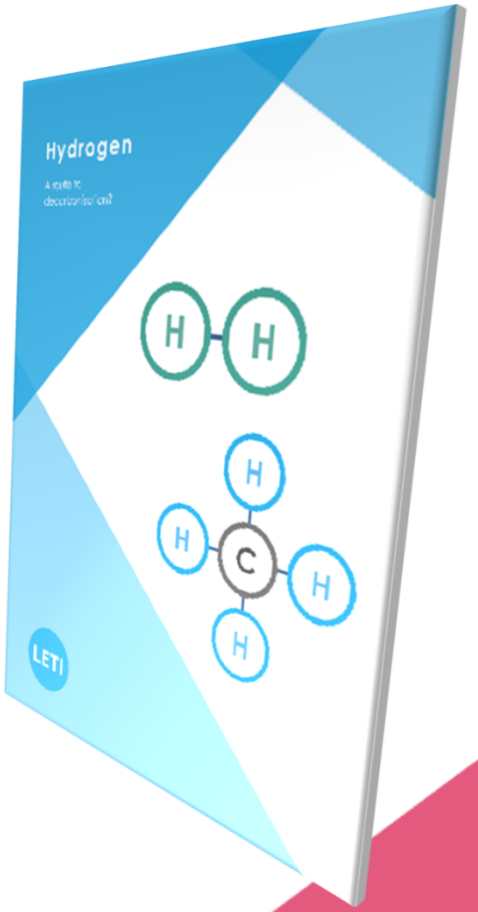


What about existing buildings?

- Who funds retrofit costs ?
- What NO GAS !?
- Surely we would need at least twice the capacity of the current grid if not more?
- Isn't hydrogen the solution ?
- Can't we just switch the gas network to hydrogen – problem solved?
- What's the difference between green/ blue / grey hydrogen?
- LETI have tried to 'de-myth' the 'Hype about Hydrogen'



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- A decarbonisation route for heat in buildings?

10th Feb 11:00am

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Chris Twinn

LETI / TwinnSustainabilityInnovation

Hydrogen: A decarbonisation route for heat in buildings?

- Intro to report / acknowledgements / non-aligned LETI
- Information sourcing
- Which Hydrogen - Grey / Blue / Green?
- How efficient is Hydrogen production & delivery?
- What are other countries doing
- Implementation issues for buildings
- Cost impacts / who pays
- Can Green Hydrogen be expected via the redundant gas pipes?

@LETI_London #BuildNetZero #Hydrogen

https://www.leti.london/hydrogen

further info: chris.twinn@TwinnSustainabilityInnovation.com

BusinessGreen

News | In-depth | Opinion | Energy | Policy | Management | Technology | Investment | Net Zero Now

Infrastructure

'Ready to go': Britain's gas networks seek appr £900m net zero infrastructure plan

The investment plan places a major focus on zero carbon hydrogen | Credit: ITM Power

Energy Networks Association plan touts major push to harness hydrogen and biomethane to heat

The Guardian

Is hydrogen the solution to net-zero home heati

Up to a third of the UK's greenhouse emissions come from central heating. But a switch f natural gas to hydrogen, one of three proposals for greener energy, has experts divided

Stuart Clark

Sat 21 Mar 2020 17.00 GMT

The Telegraph

See all Business

COMMENT

The hydrogen revolution is a marvellous chance for Britain, if it does not throw away the prize

Big Finance is sizing up the opportunities that the gas can offer with Britain in pole position to benefit

AMBROSE EVANS-PRITCHARD

HM Government

The Ten Point Plan for a Green Industrial Revolution

Building back better, supporting green jobs, and accelerating our path to net zero

www.hydrogentaskforce.co.uk

The role of hydrogen

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A look at replacing fossil fuels London, pollution in hydrogen industrial scale hydrogen pow efficient way of producing ene

Presenter: Richard Hollingham

The Guardian

Scottish homes to be first in world to use 100% green hydrogen

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Plan for £900m 'green' hydrogen plant to power homes

11 May 2018

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Press release

PM outlines his Ten Point Plan for a Green Industrial Revolution for 250,000 jobs

Prime Minister Boris Johnson outlines his Ten Point Plan for a Green Industrial Revolution for 250,000 jobs.

Published 18 November 2020

From:

Prime Minister's Office, 10 Downing Street (https://www.gov.uk/government/organisations/prime-ministers-office-10-downing-street) and The Rt Hon Boris Johnson MP (https://www.gov.uk/government/people/boris-johnson)

The Prime Minister today sets out his ambitious ten point plan for a green industrial revolution which will creat support up to 250,000 British jobs

Hydrogen: Up to £500 million, including for triall Hydrogen Neighbourhood in 2023, moving to a equivalent to tens of thousands of homes – befo new hydrogen production facilities.

2. Hydrogen: Working with industry aiming to generate 5GW of low carbon hydrogen production capacity by 2030 for industry, transport, power and homes, and aiming to develop the first town heated entirely by hydrogen by the end of the decade.

Summary

- Number of programmes exploring how customers can use hydrogen to cook and heat their homes
- Blending allows a first step in reducing carbon emissions without changing appliances or customer behaviour
- Recent Gas Goes Green study showed if investment in hydrogen infrastructure began today, it could deliver net savings of £89bn to the bill payer by 2045 – five years ahead of Net Zero targ
- Customer perceptions are being explored to understand wh most important to them

Background

- The UK gas networks (GDN's) have been exploring the use of hydrogen since 2013
- Two approaches
  - Blending hydrogen up to 20% H^2
  - 100% H^2
  - Government are also exploring the opportunity of 100% H^2 with their Hy4Heat programme
- Gas Goes Green launch

HyDeploy HyNet H21 GAS GOES GREEN Hy4Heat

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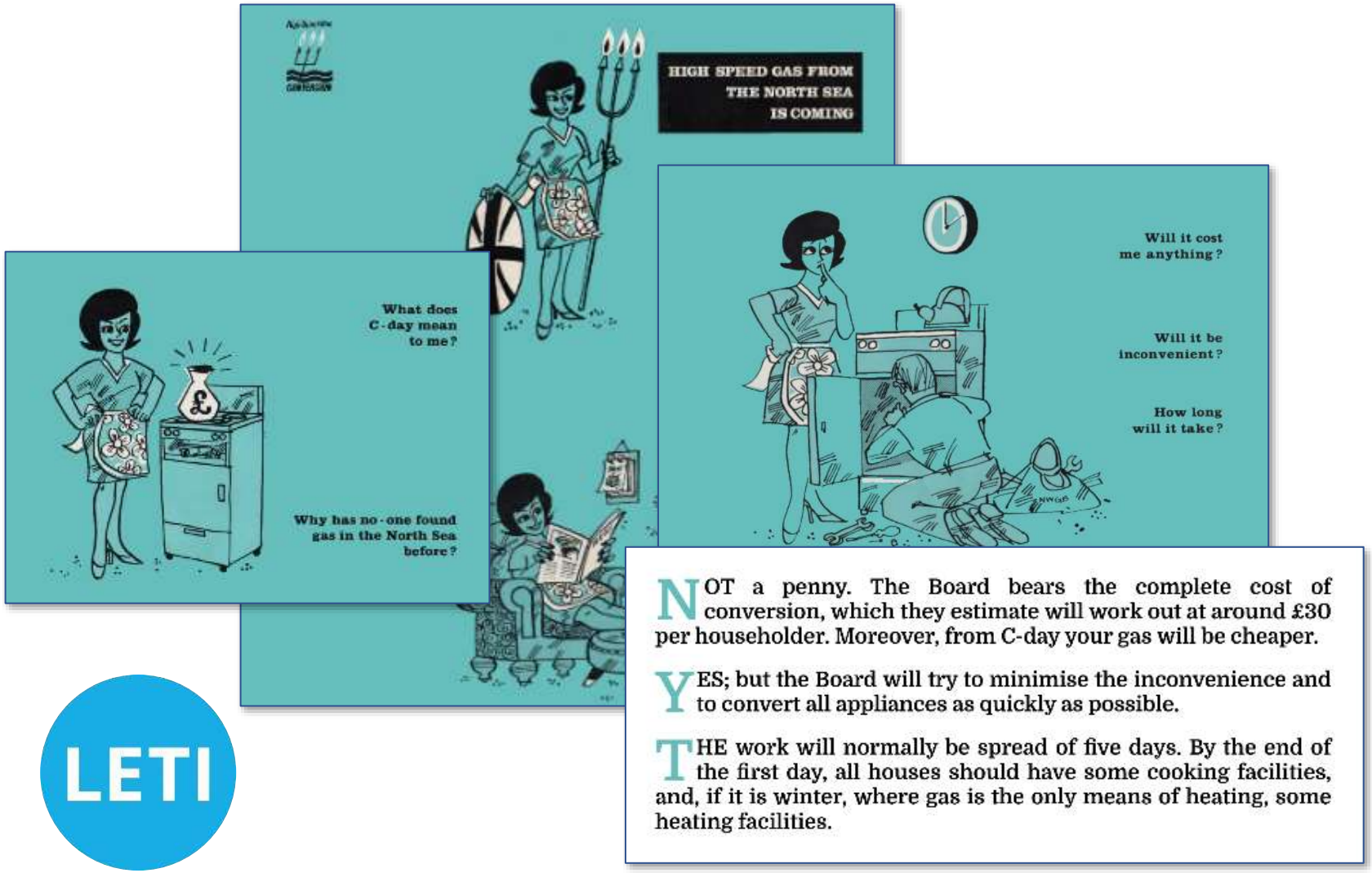
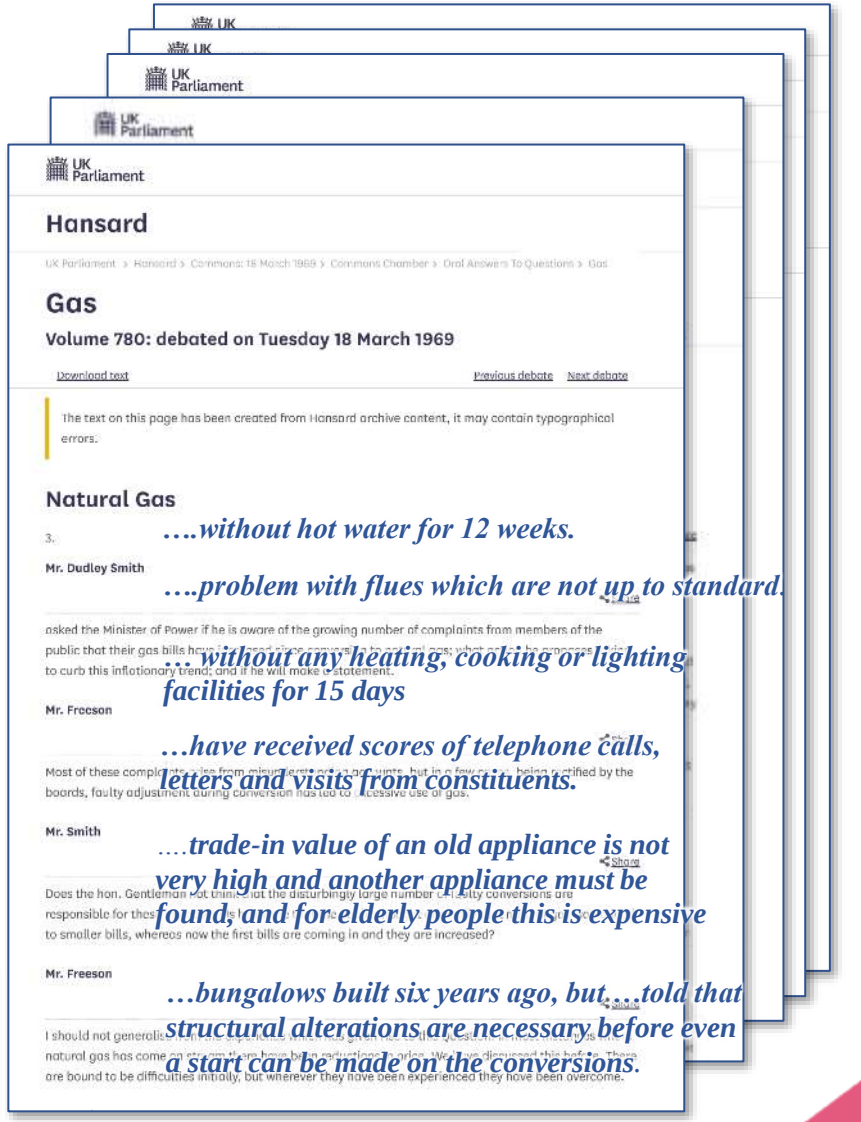
“We’ve did it before”

- but without social media …..!





….without hot water for 12 weeks.

….problem with flues which are not up to standard.

… without any heating, cooking or lighting facilities for 15 days

…have received scores of telephone calls, letters and visits from constituents.

….trade-in value of an old appliance is not very high and another appliance must be found, and for elderly people this is expensive

…bungalows built six years ago, but…told that structural alterations are necessary before even a start can be made on the conversions.

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Which Hydrogen: Grey vs Blue vs Green

- Hydrogen is an energy carrier
- Produced from fossil fuels
- Global production ≈ half of UK potential demand

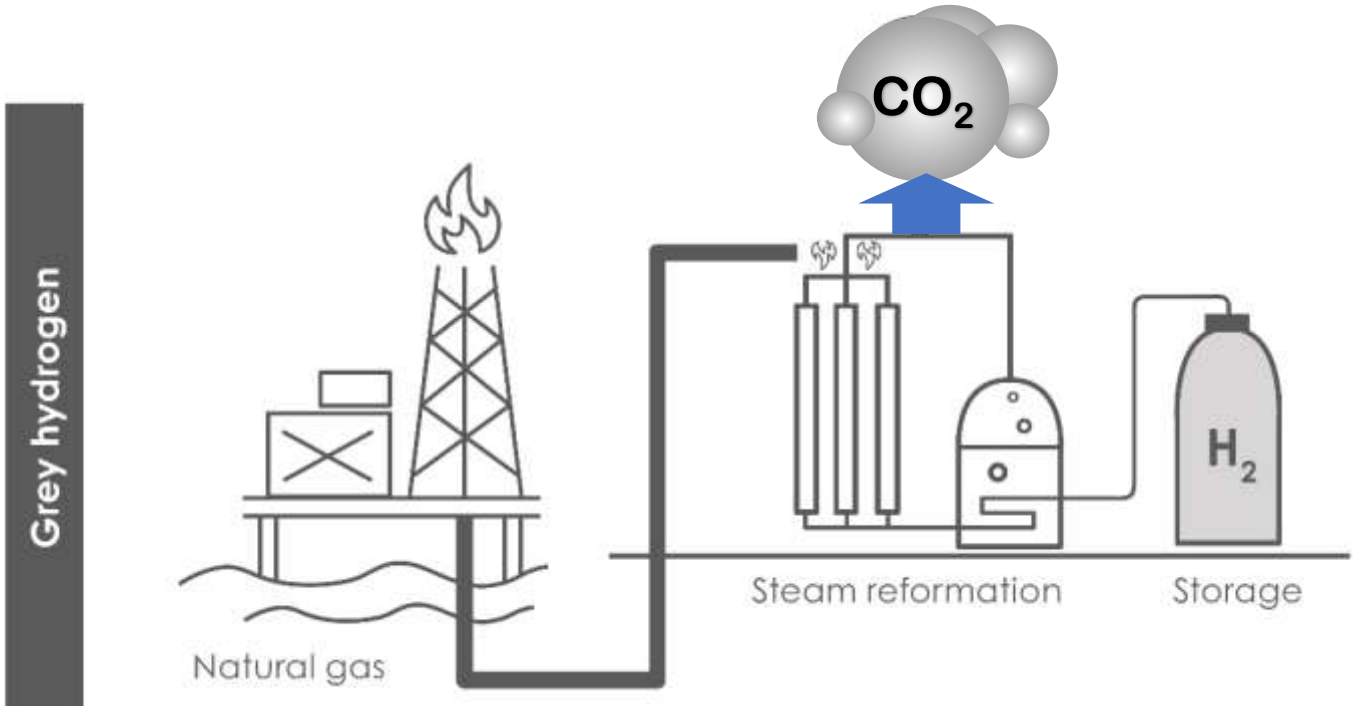


Figure 2 - Grey hydrogen, how hydrogen is currently made

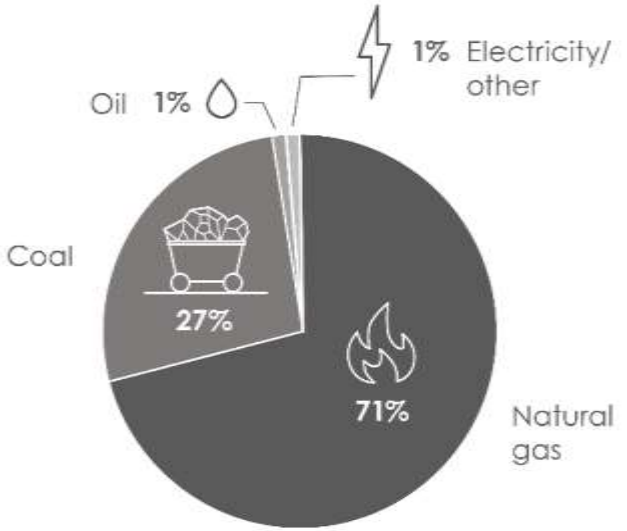


Figure 7 - Current global dedicated hydrogen production, energy input by source. Total current global hydrogen production is 44% of UK current gas demand.

Data source - IEA (2019)

Which Hydrogen: Grey vs Blue vs Green

- CCS to remove ~90% of CO2
- Sequestration needed for ZC
- Upstream natural gas leakage?
- Lock-in to CO_2 emissions if no CCS?
- 20% dosing = as biodiesel in cars?

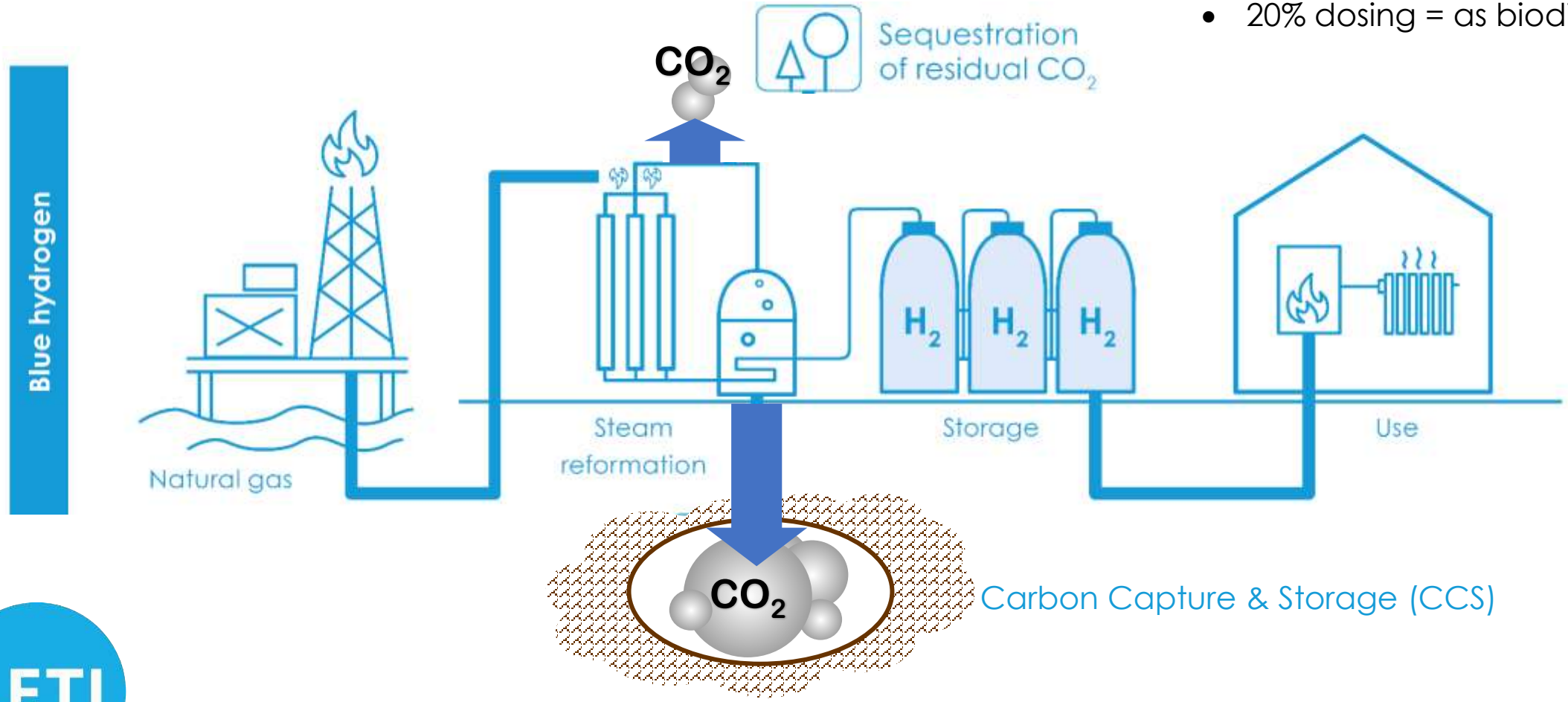


Figure 3 - Blue hydrogen, as advocated by the gas supply industry

Which Hydrogen: Grey vs Blue vs Green

- True Zero Carbon potential
- Lower efficiency than elect
- More wind farms (x1.5?)
- Large scale storage (x3 elect grid?)

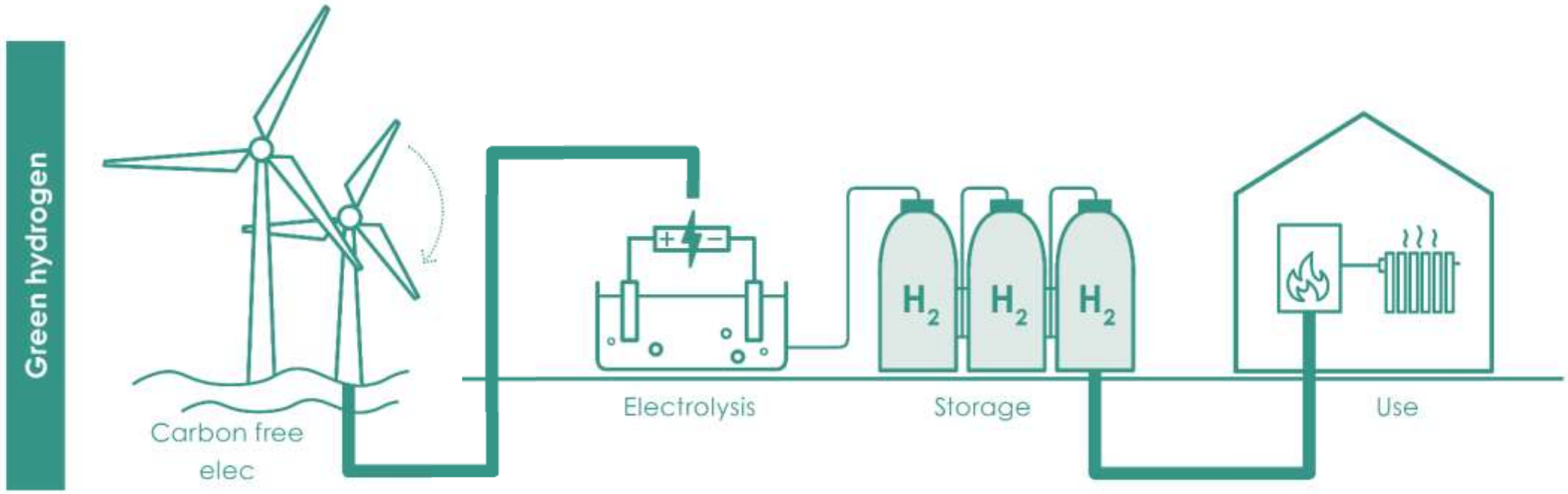


Figure 4 - Green hydrogen, made from renewable energy

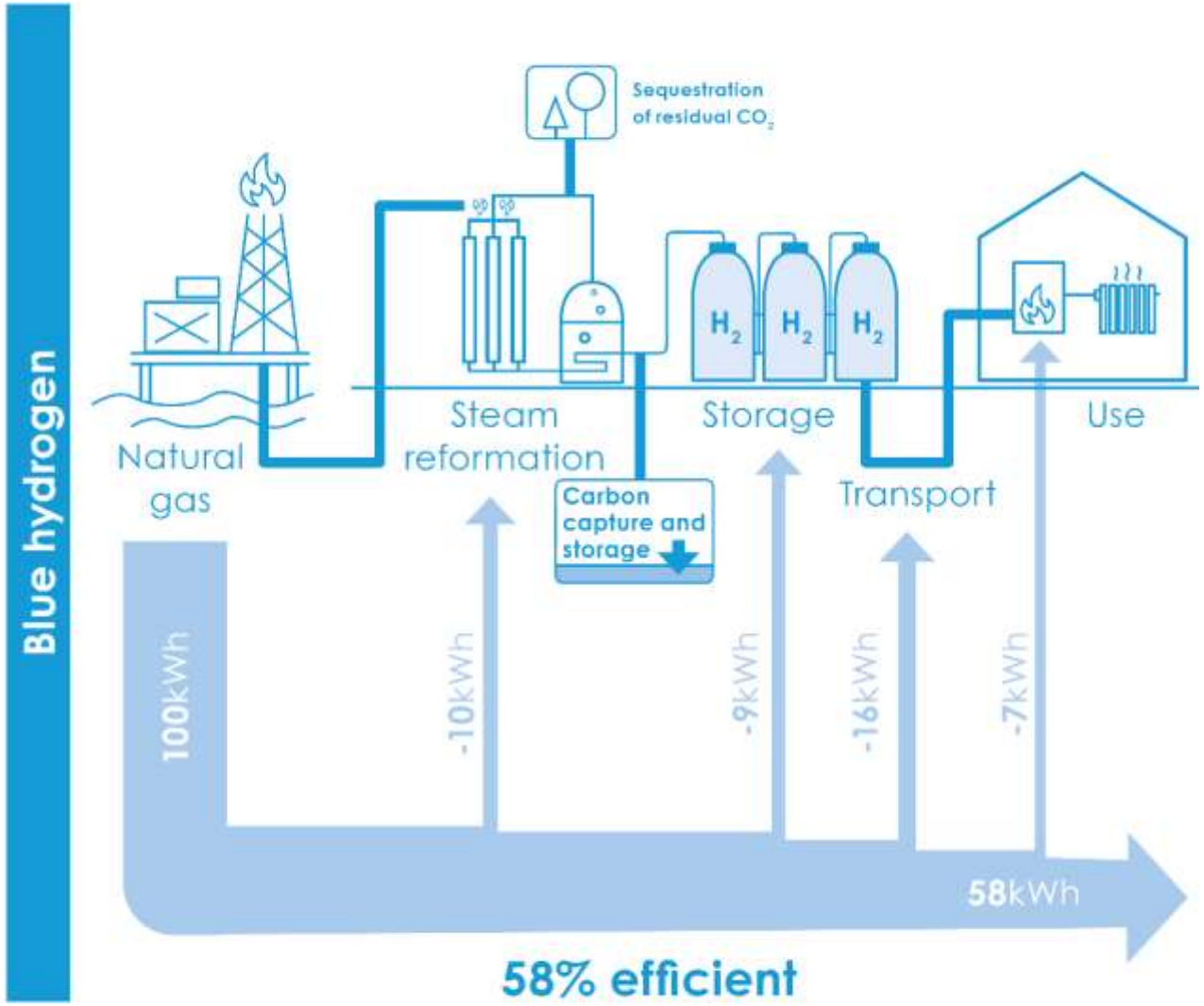
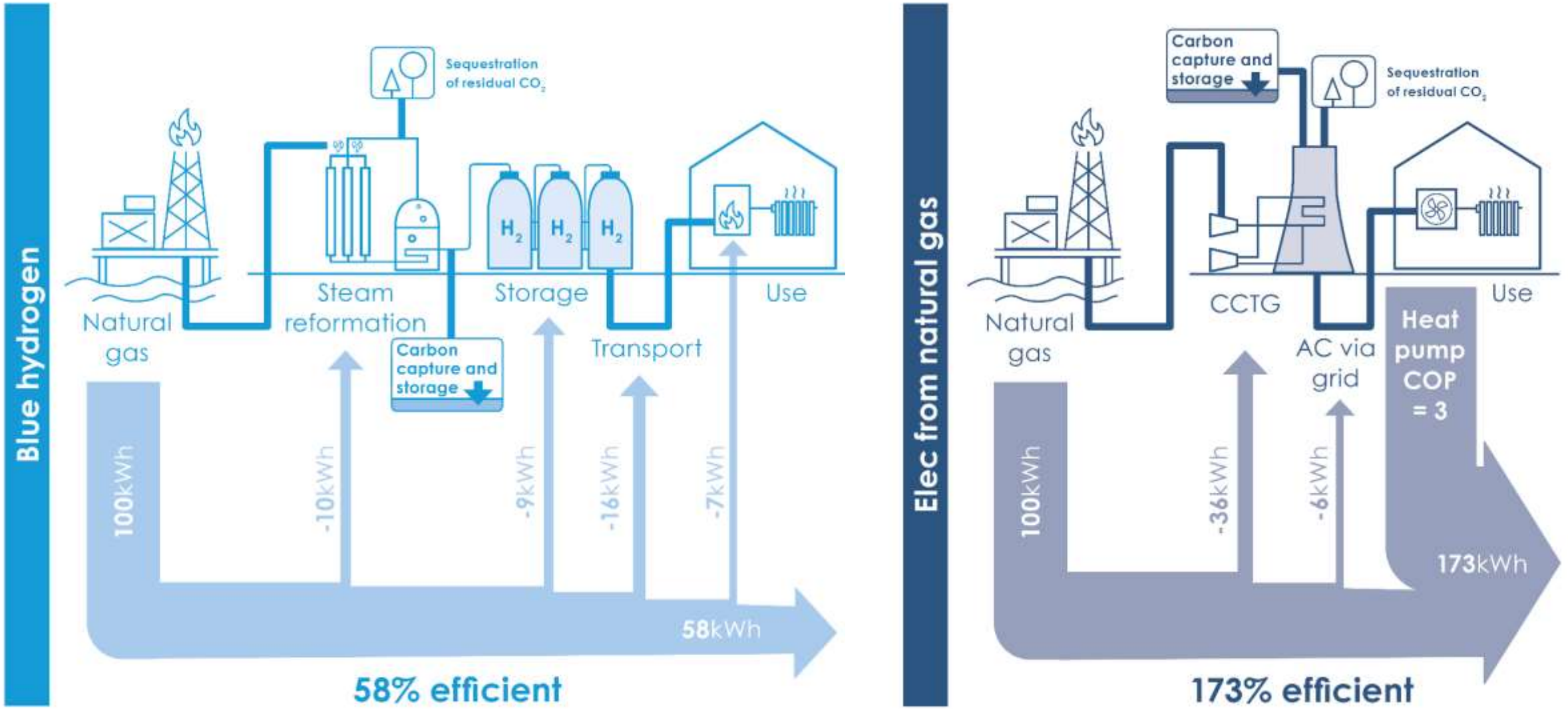


Figure 5 - The difference between blue hydrogen and electricity from natural gas supplying a heat pump



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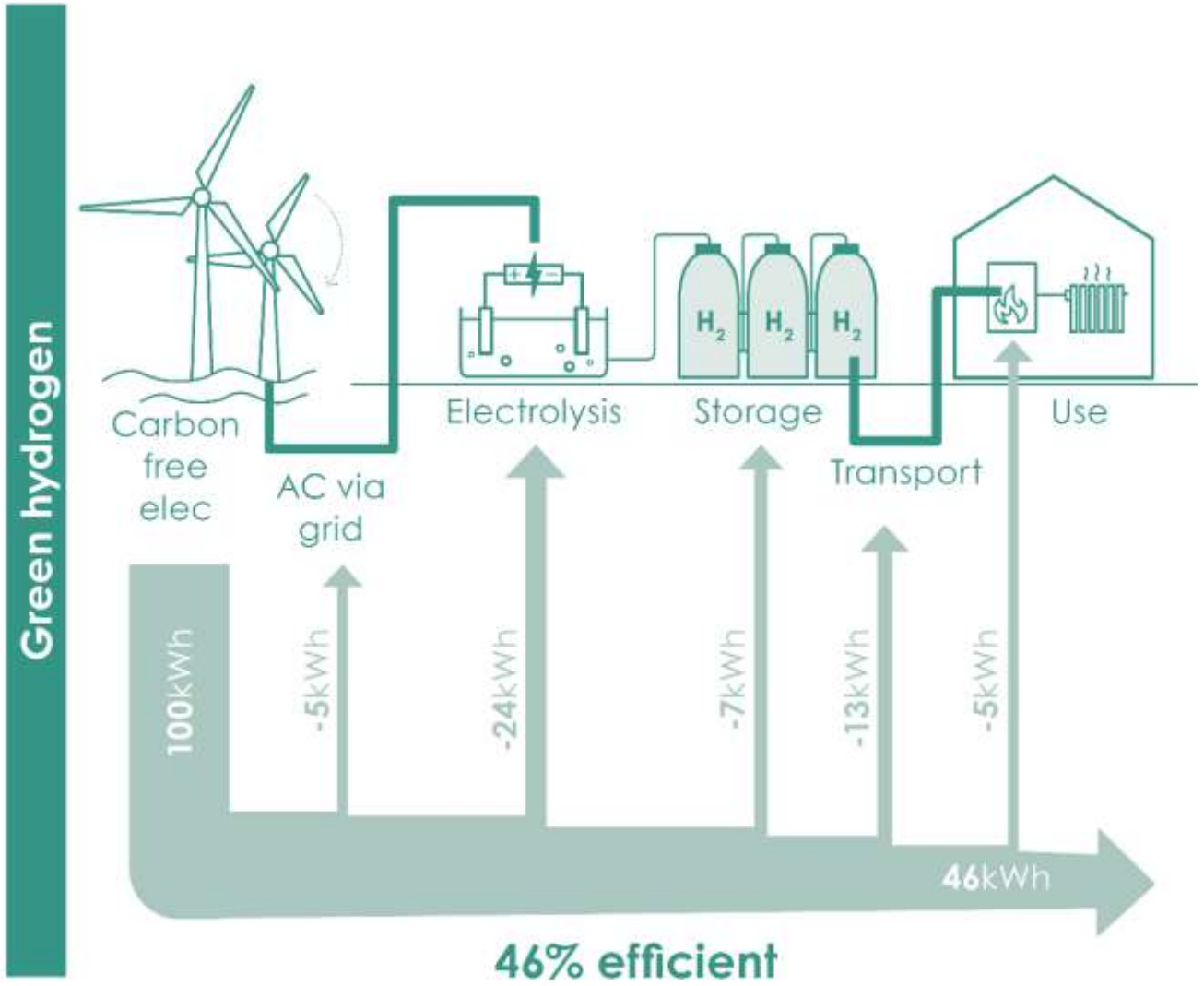


Figure 6 - The difference between green hydrogen and a heat pump supplied by a green grid

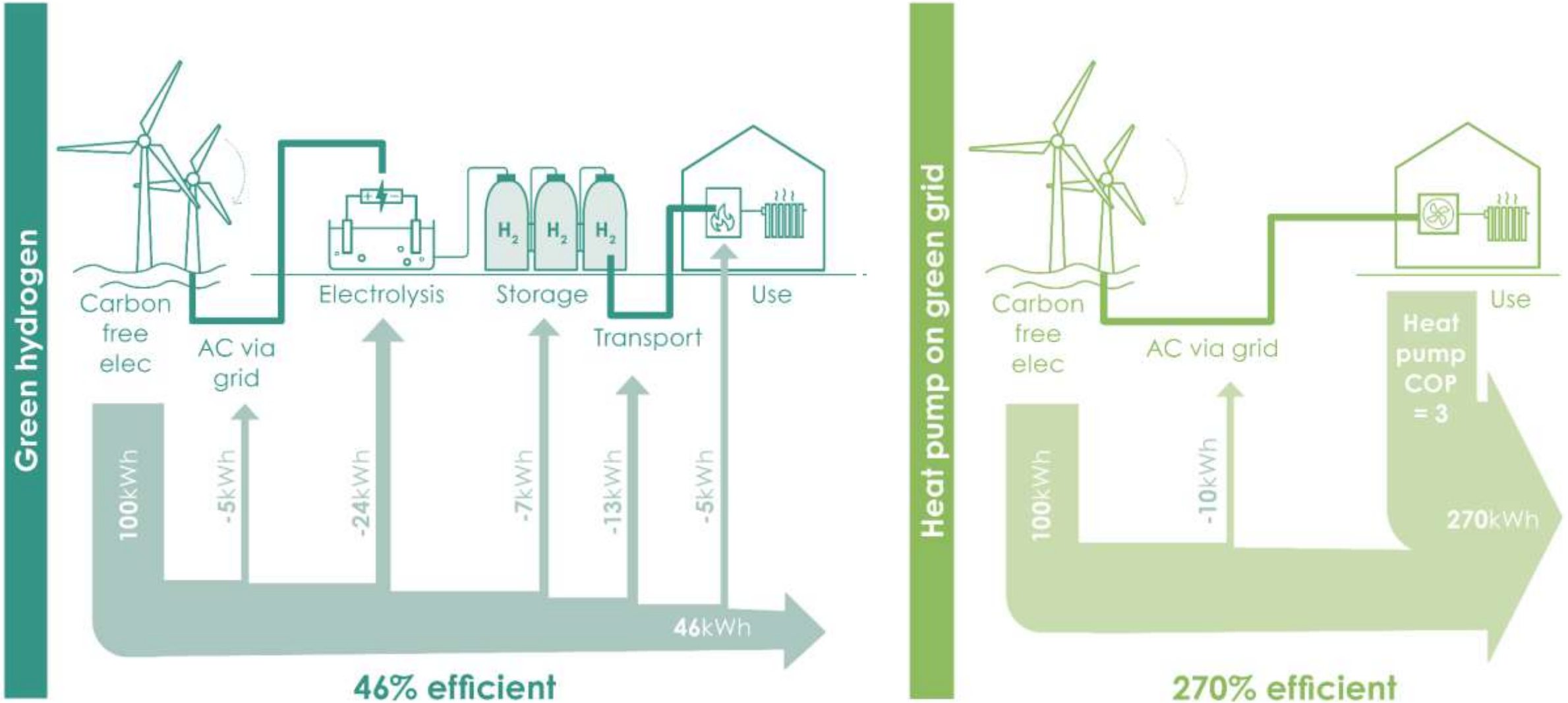
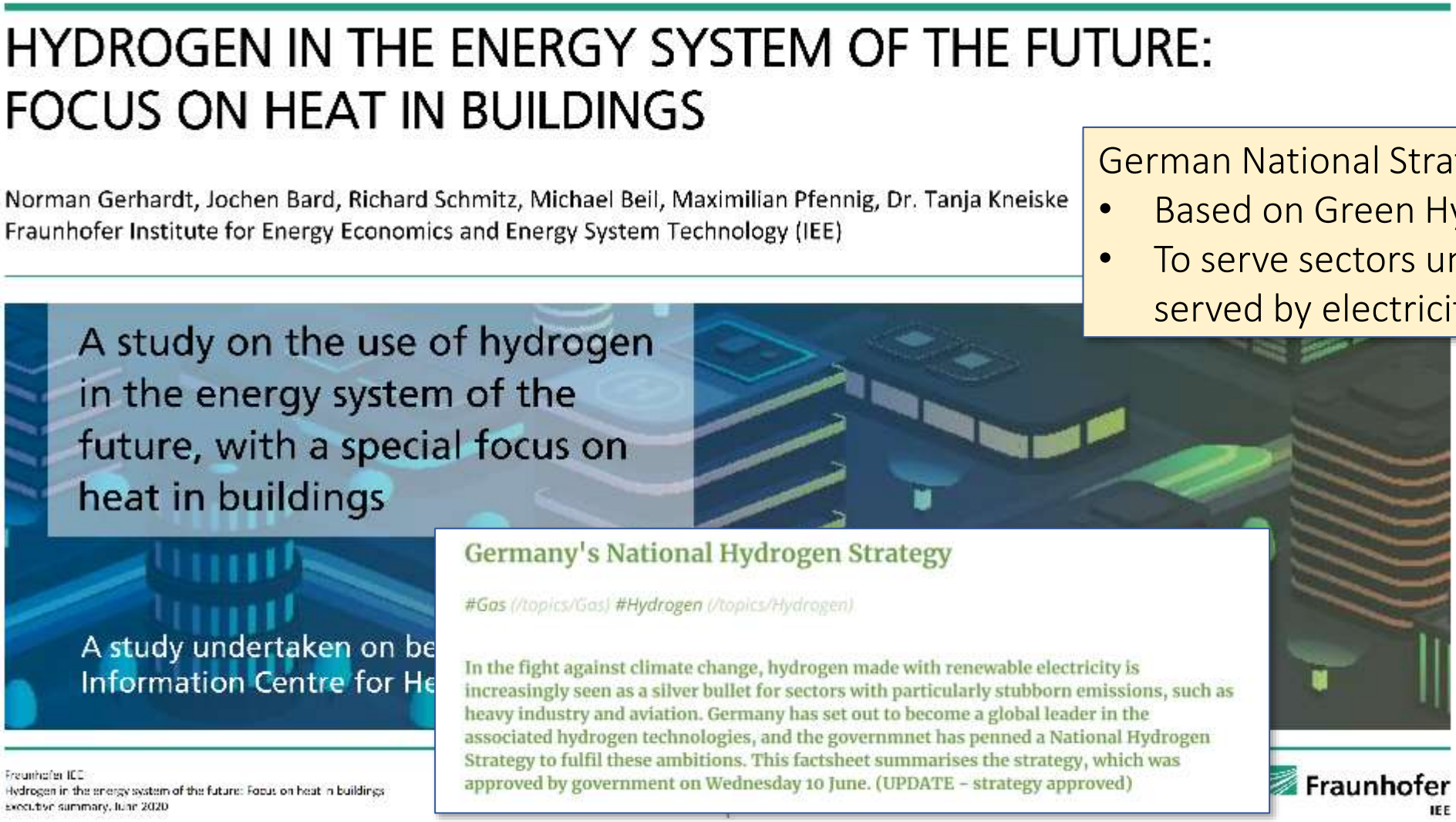


Figure 6 - The difference between green hydrogen and a heat pump supplied by a green grid

What are others doing…



German National Strategy.

- Based on Green Hydrogen
- To serve sectors unable to be served by electricity

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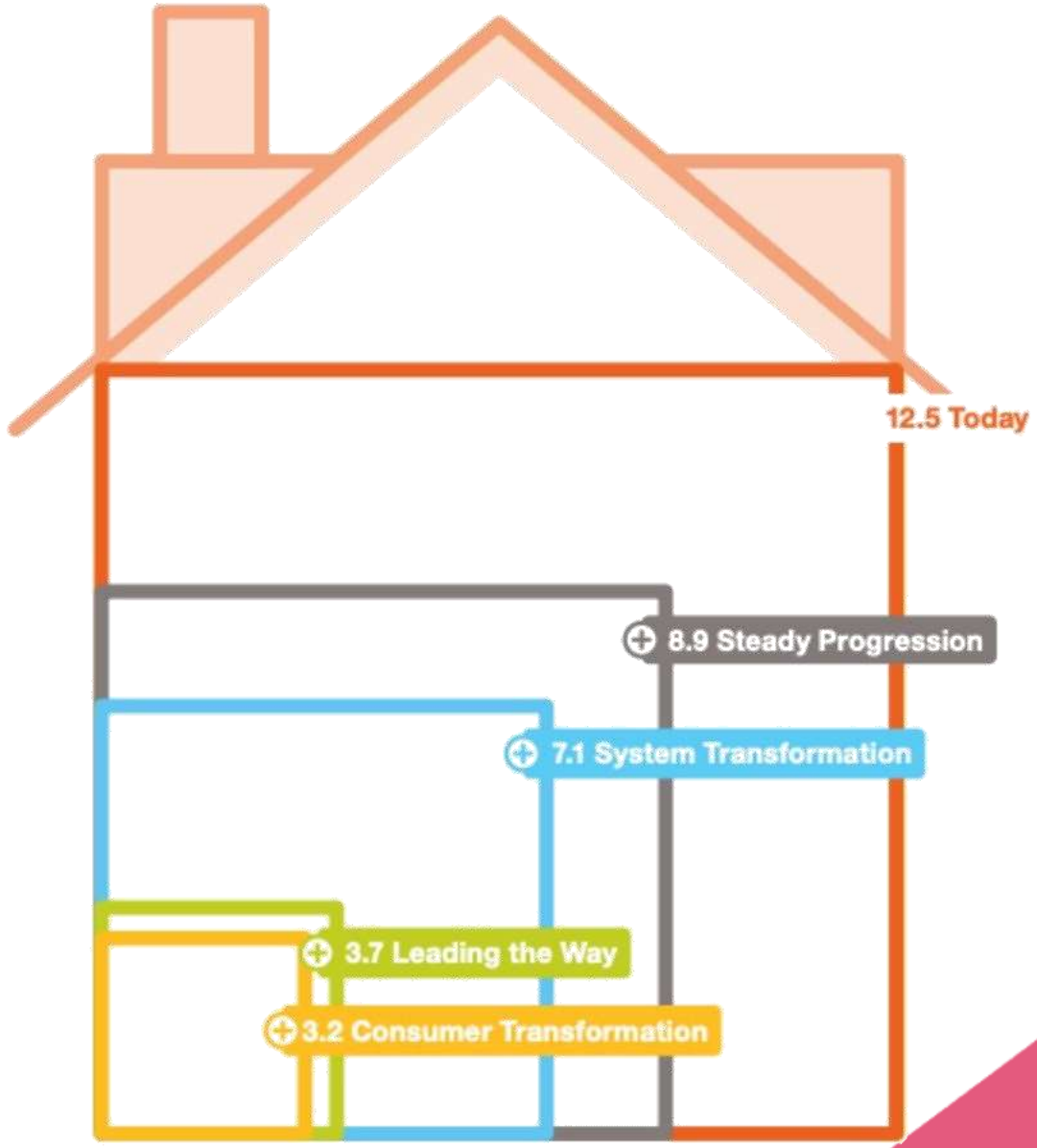
Impact on buildings…

- Thermal performance upgrade not considered
- Complete range of switchover costs overlooked
- In-building pipework switchover liabilities
- Issue of combustion in buildings post-Grenfell
- Little engagement with building occupiers / owners for whom energy / hydrogen switchover not a core business
- Decisions for switchover, or not, likely based on non-energy/carbon rationale (e.g. cost, amenity, expectations and disruption)
- As Green Deal showed - lack of appropriate alignment with building stakeholders can bring a national programme to a grinding halt!



National Grid FES2020

Costs…

- Switchover costs similar to electrical (but appear to exclude sequestration, building retrofit…)
- CCS & future technology upscaling costs fragile
- Grey H_2 lock-in if technology development falters
- H_2 costs assume largescale consumption - not peak lopping – increases £/kWh
- Manufactured H_2 £/kWh higher than NG
- Electrical grid upscaling far more robust
- Elec private investment is far larger - Wind turbines no longer need subsidy…..
- Are Consumers or Government expected to pick up H_2 rollout costs and delivery risk?

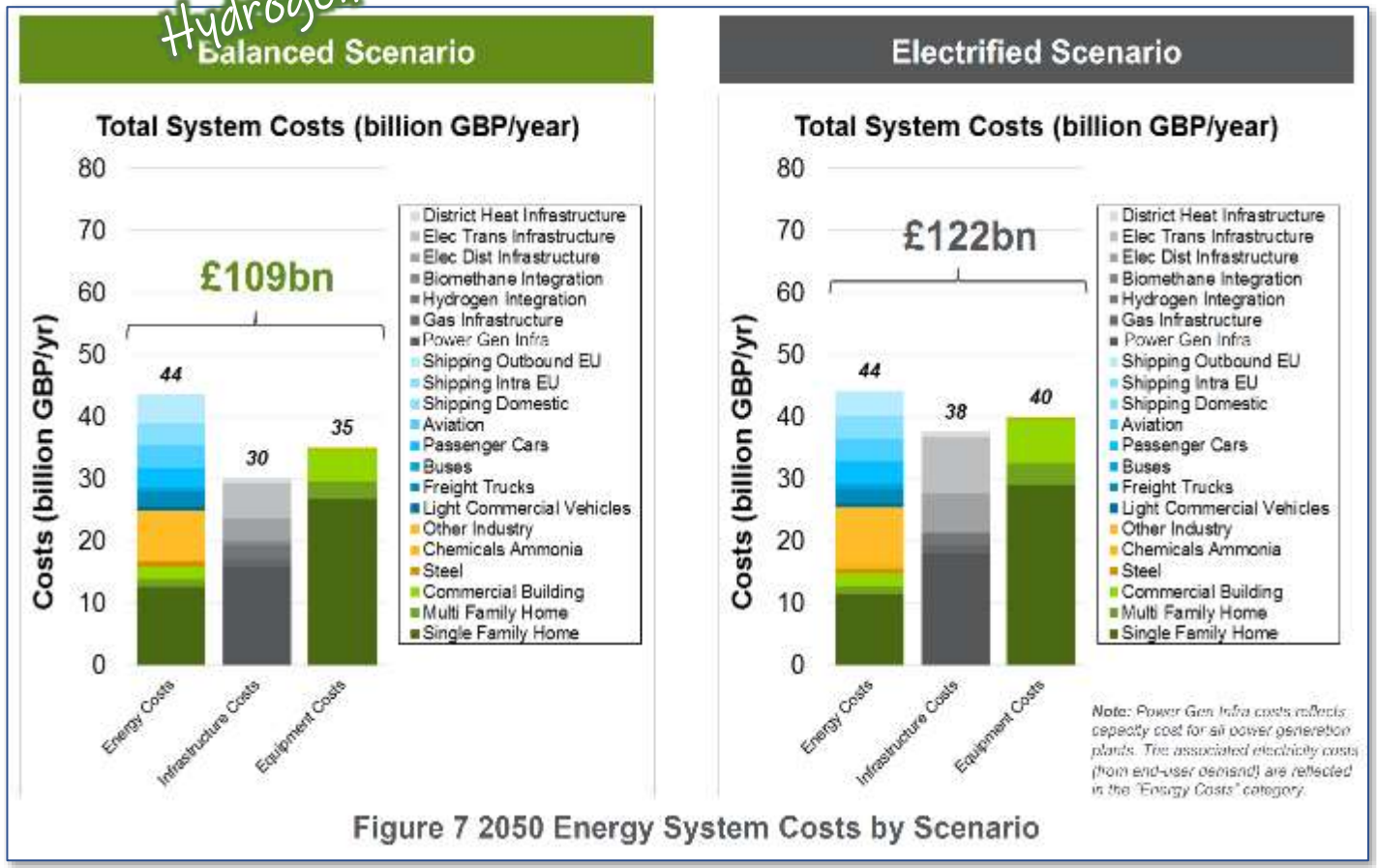


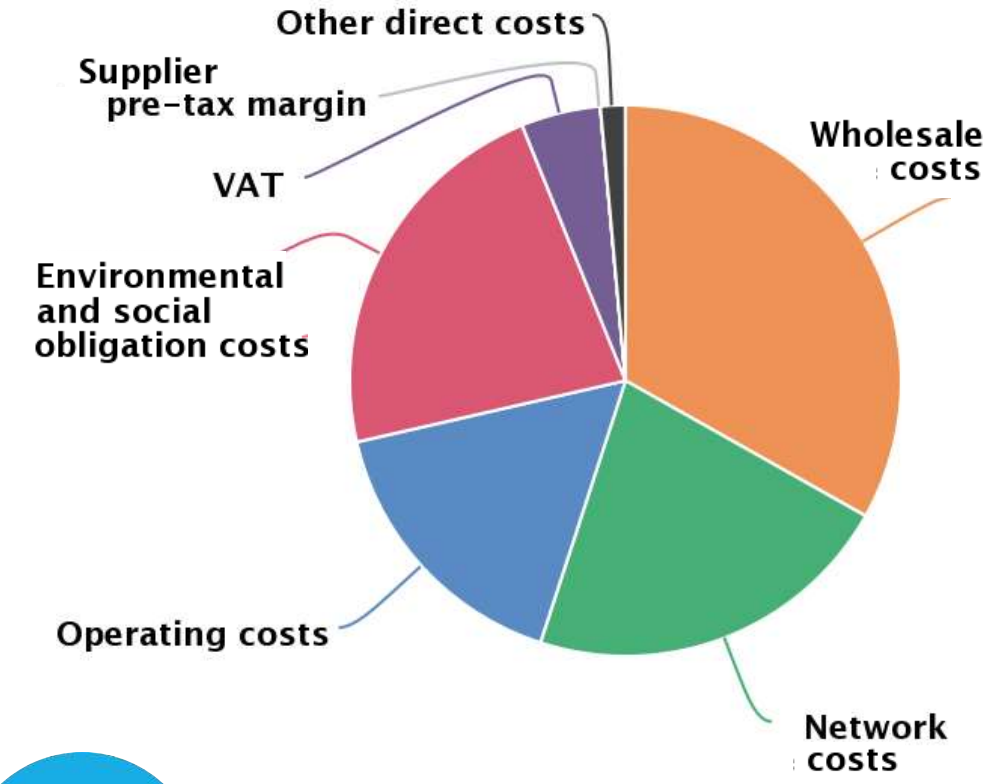
Figure 7 2050 Energy System Costs by Scenario

Pathways to Net-Zero: Decarbonising the Gas Networks in Great Britain

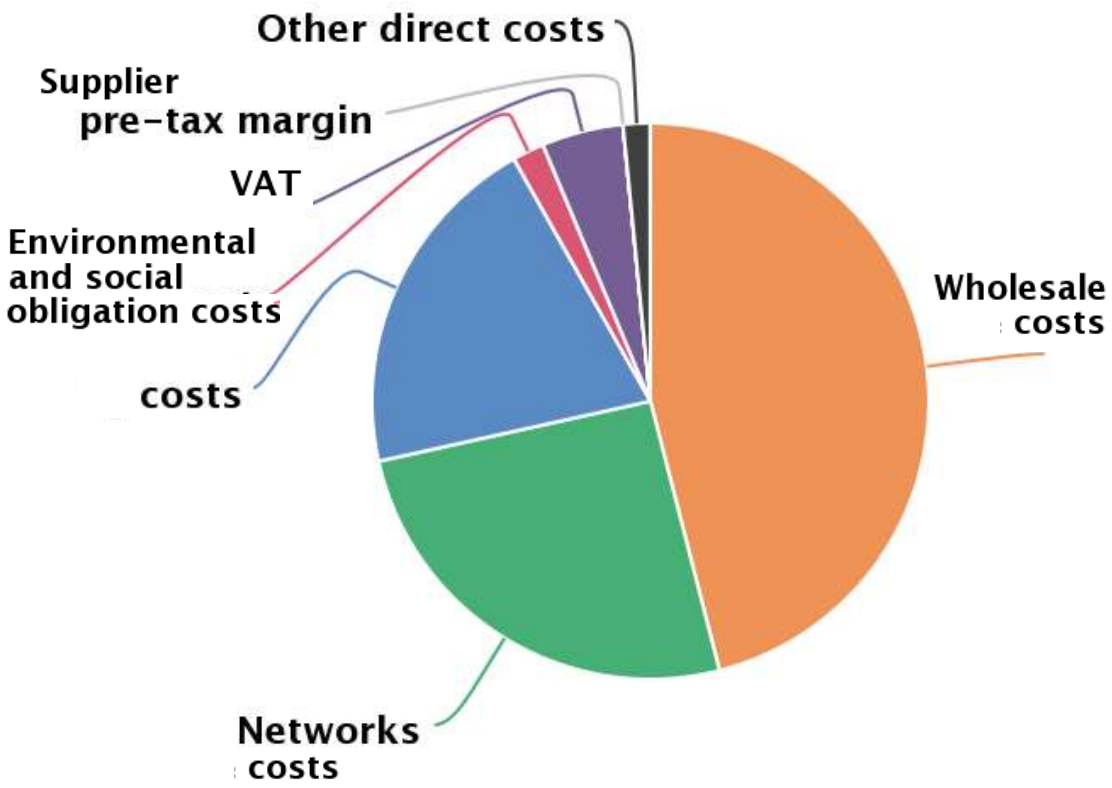
Prepared by Navigant Europe Ltd for Energy Networks Association

Killer diagram?…funding for switchover

Breakdown of an electricity bill



Breakdown of a gas bill



OFGEM Source: Companies' consolidated segmental statements.
Information correct as of: August 2020

Hydrogen as a higher cost premium product?

- Peak CCGT power stations (harnessing its storage abilities)
- High temperature industry
- Long-haul aviation and ~~heavy lift haulage~~
- Perhaps to local consumer networks in the immediate vicinity of other larger users

Gas suppliers *"over-selling 'green-gas' to policy makers in order to protect their interests and detract from the importance and value of electrification"*

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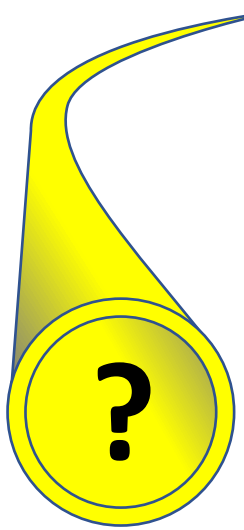
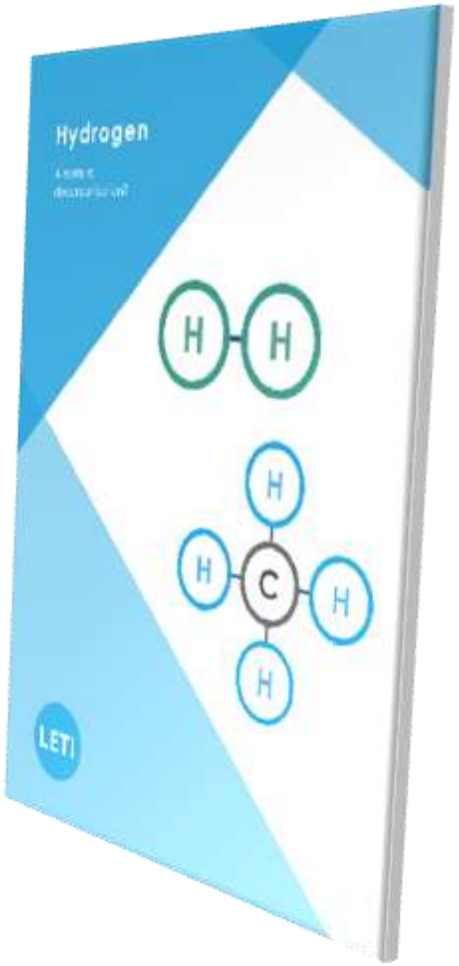
In conclusion

- UK gas-supply industry is not proposing Green Hydrogen
- Proposes unproven CCS and Sequestration technology at scale
- Implementation programme extends CO_2 emitting duration, with potential lock-in risk
- Disruption to buildings and systems severely underplayed
- No inherent benefit for building occupiers /owners to take the risk
- Operating costs expected to be significantly higher for consumers
- Capital funding stream for Switchover not defined
- Investment costs fragile and likely to end up with building consumers





LETI Hydrogen primer
https://www.leti.london/hydrogen

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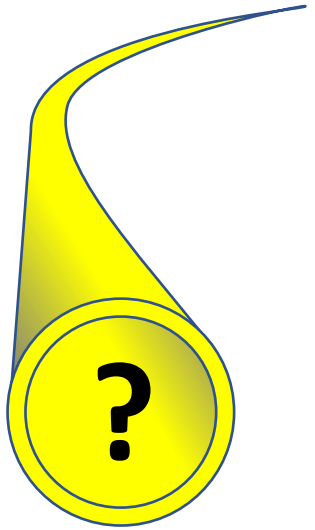

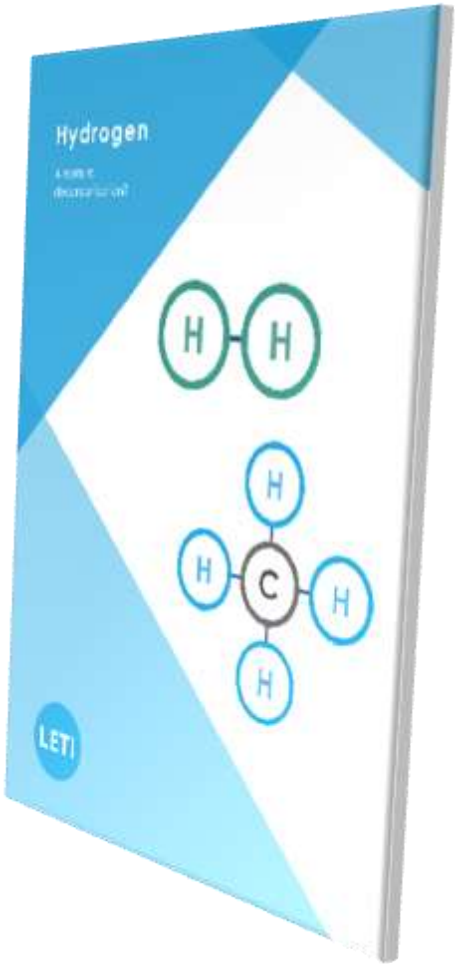

LETI Hydrogen primer
https://www.leti.london/hydrogen

It seems unlikely Zero Carbon Hydrogen via re-purposed gas mains will be available for most buildings for the foreseeable future

LETI HYDROGEN

- A decarbonisation route for heat in buildings?

@LETI_London #BuildNetZero #Hydrogen

https://www.leti.london/hydrogen

further info: chris.twinn@TwinnSustainabilityInnovation.com