

Work Package 4 Engagement Day



Dr. Steve Loades

BEIS Project Manager Hydrogen Innovation
Science and Innovation for Climate and Energy
(SICE)

Welcome

Agenda

Welcome and introduction	Steve Loades
Energy Innovation: Hydrogen	Mark Taylor
Hy4Heat programme	Heidi Genoni
WP4 Innovation procurement	Steve Loades
WP4 overview	Hannah Steedman
Q&A	Panel
Discussion stalls	Boilers, Cookers, Fires, Procurement
Networking lunch	
One-to-one booked sessions	

Purpose of today

- An overview of Hy4Heat
- An understanding of opportunities in WP4
- Outline the different hydrogen domestic appliances required
- Set out our preferred innovation procurement approach
- A chance to give feedback directly to us
- Opportunity to network and engage with each other

Mark Taylor

BEIS Deputy Director Energy Innovation
Science and Innovation for Climate and Energy (SICE)

Energy Innovation: Hydrogen

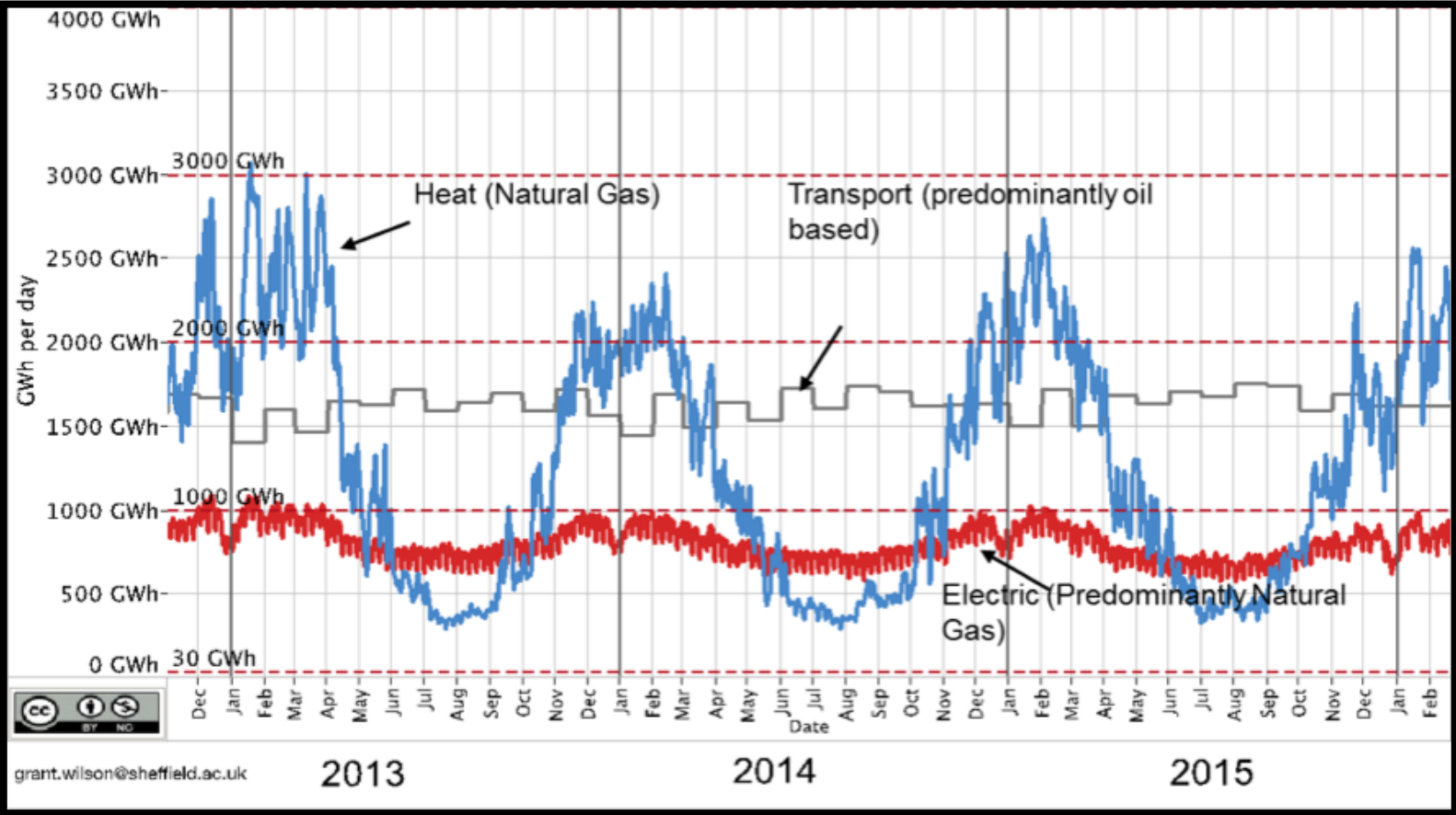
Dr. Mark Taylor

Deputy Director Energy Innovation

Science and Innovation for Climate and Energy (SICE)



The challenge is well understood ...



... global focus through Mission Innovation ...



... collaborating around the world ...



Rt Hon Claire Perry MP

Minister of State for Energy and Clean Growth
UK Department for Business,
Energy and Industrial Strategy

This is an extraordinary moment for international climate collaboration. The global community has come together to tackle the challenge of man-made climate change and to safeguard our planet for future generations.

The launch of Mission Innovation at the signing of the Paris Climate Agreement was a critical moment in building this global movement. It acknowledged that **to decarbonise successfully we need to unlock a huge wave of innovation to fundamentally transform the way we generate and consume energy.**

Delivering this transformation requires **global partnerships of governments and the private sector**, and Mission Innovation is one of the international community's most important vehicles for driving this forward.

The UK is delighted to be part of Mission Innovation and to be collaborating with partners around the world in pursuit of our common goal: accelerating the clean energy revolution.

I am proud to say that since 1990 the UK has reduced emissions by over 40% while growing our economy by over 70%, outperforming the rest of the G7.

This shows that a **low carbon transition goes hand in hand with economic success, proof that clean growth is not only possible, but the best game in town.**

But there is more work for us to do. **We must harness the ingenuity and determination of scientists and engineers in universities and industry across the globe**, to continue to drive the phenomenal progress made to date, and **to succeed in delivering a clean growth revolution.**

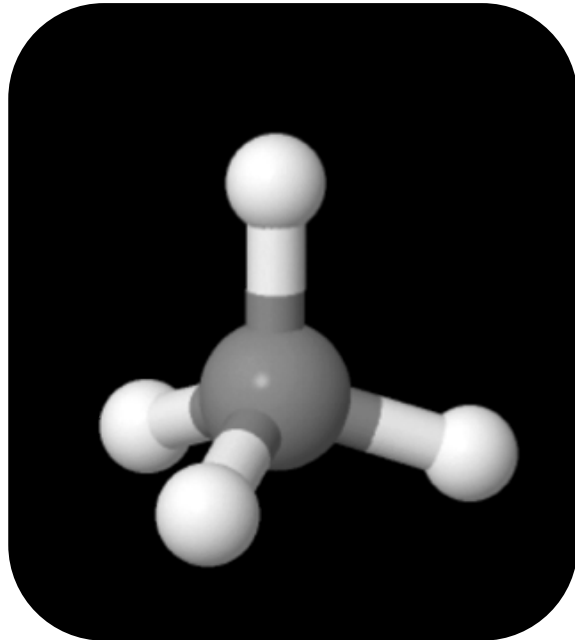
*This is an edited extract from the foreword of MI20 Solutions that is available at:

- <http://mission-innovation.net/wp-content/uploads/2018/05/MI3-MI-2020-Solutions.pdf>

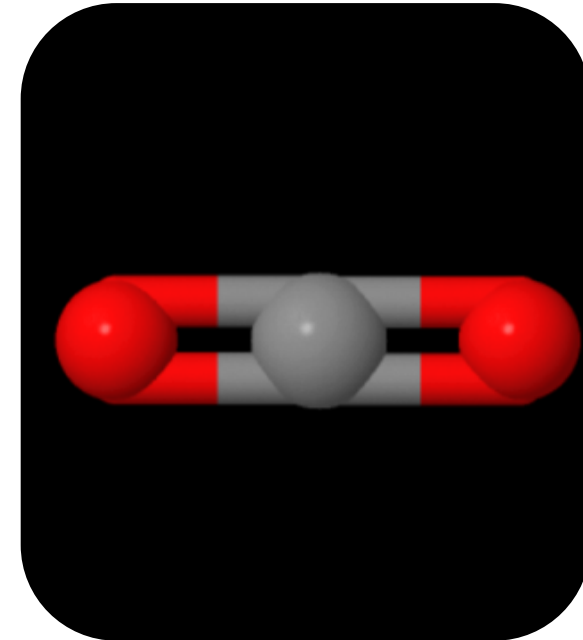


Department for
Business, Energy
& Industrial Strategy

... to address the issue ...



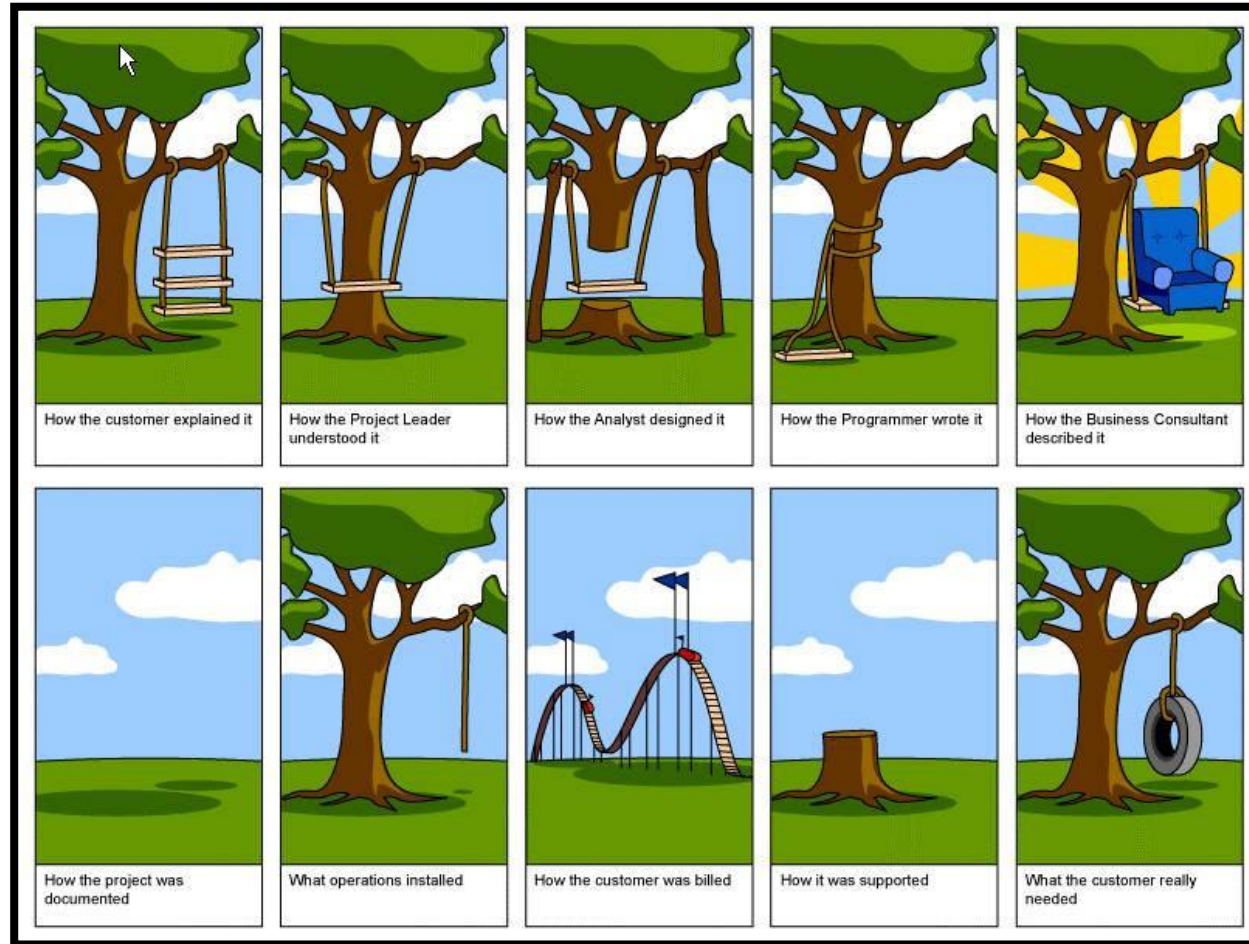
Methane (CH₄)



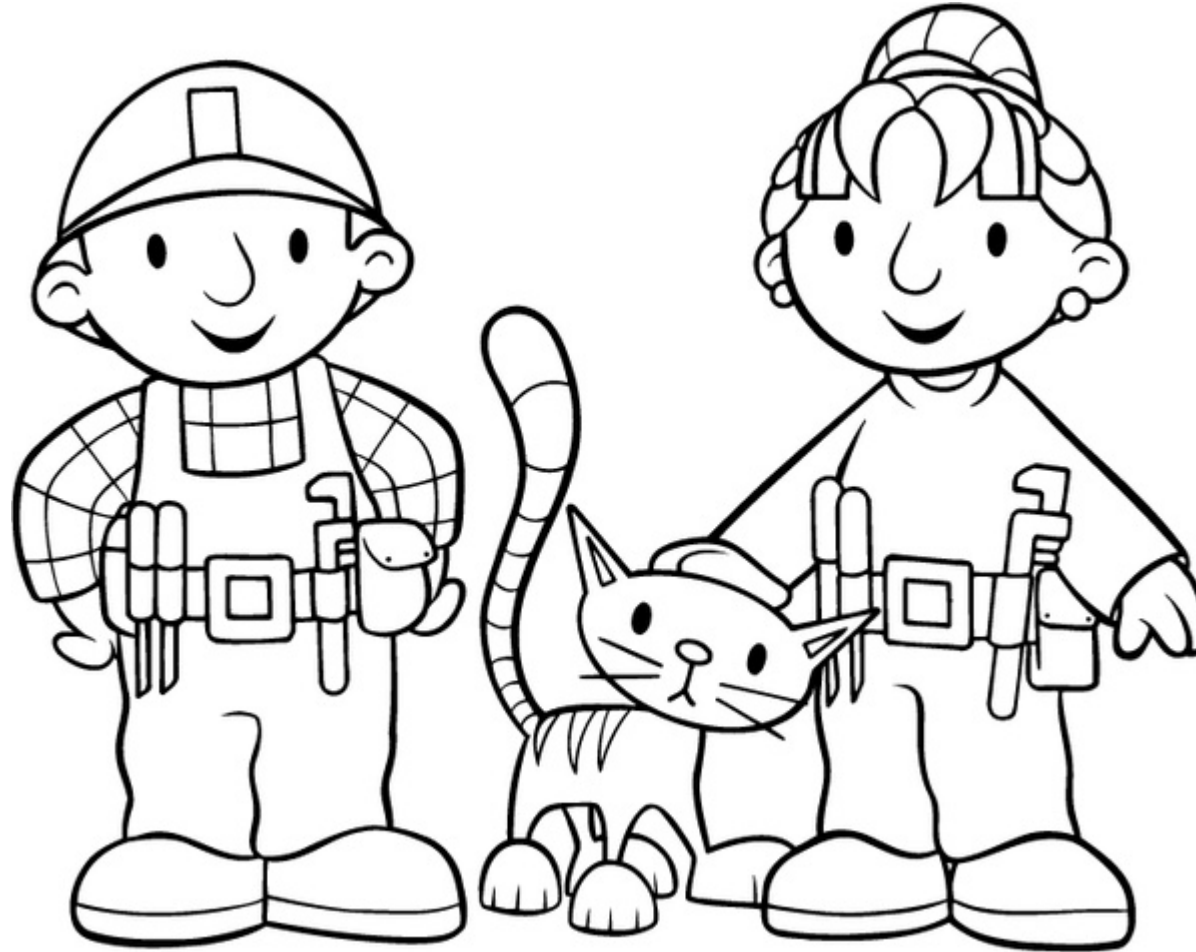
Carbon dioxide (CO₂)



... innovation is difficult ... to get right ...



... so the question is ... 'can we fix it?' ...



... our Energy Innovation Portfolio (EIP) aims ...

To accelerate the commercialisation of innovative, clean, cheap and reliable energy technologies by the mid 2020s

Nuclear
£180m

Driving down costs and building new UK supply chains and skills

Renewables
£15m

Driving down the cost of low carbon electricity at scale

Industry
£100m

Low carbon options for industry, lowering energy costs

Built Environment
£90m

More cost effective energy efficiency and low carbon heating

Smart Systems
£70m

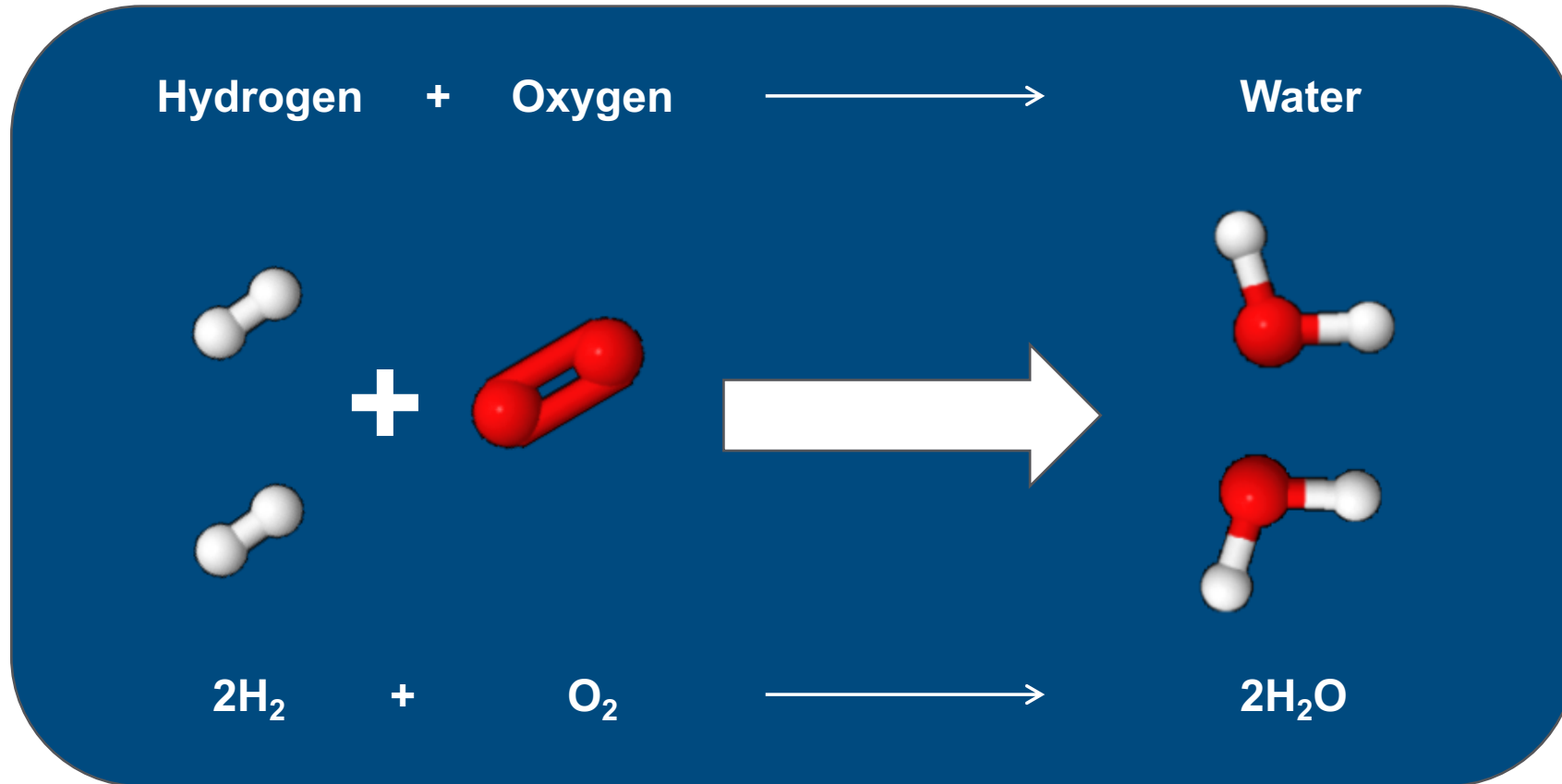
Scaling up flexibility and looking for new storage options

Cross Cutting
£50m

Supporting disruptive innovations (particularly for SMEs), including using innovative finance.



... one option is hydrogen ...



... hydrogen must compete ...

... demonstrate hydrogen as an effective energy source for industry and an economic alternative to current solutions

... develop an appropriate pathway to developing the hydrogen economy seeking synergies to drive this forward

... produce low, or ideally zero, carbon hydrogen in an economic manner

... prove the effectiveness and safety of hydrogen in the domestic environment

... prove safety and effectiveness of hydrogen in the gas network

... develop world class solutions to justify investment and deliver export potential

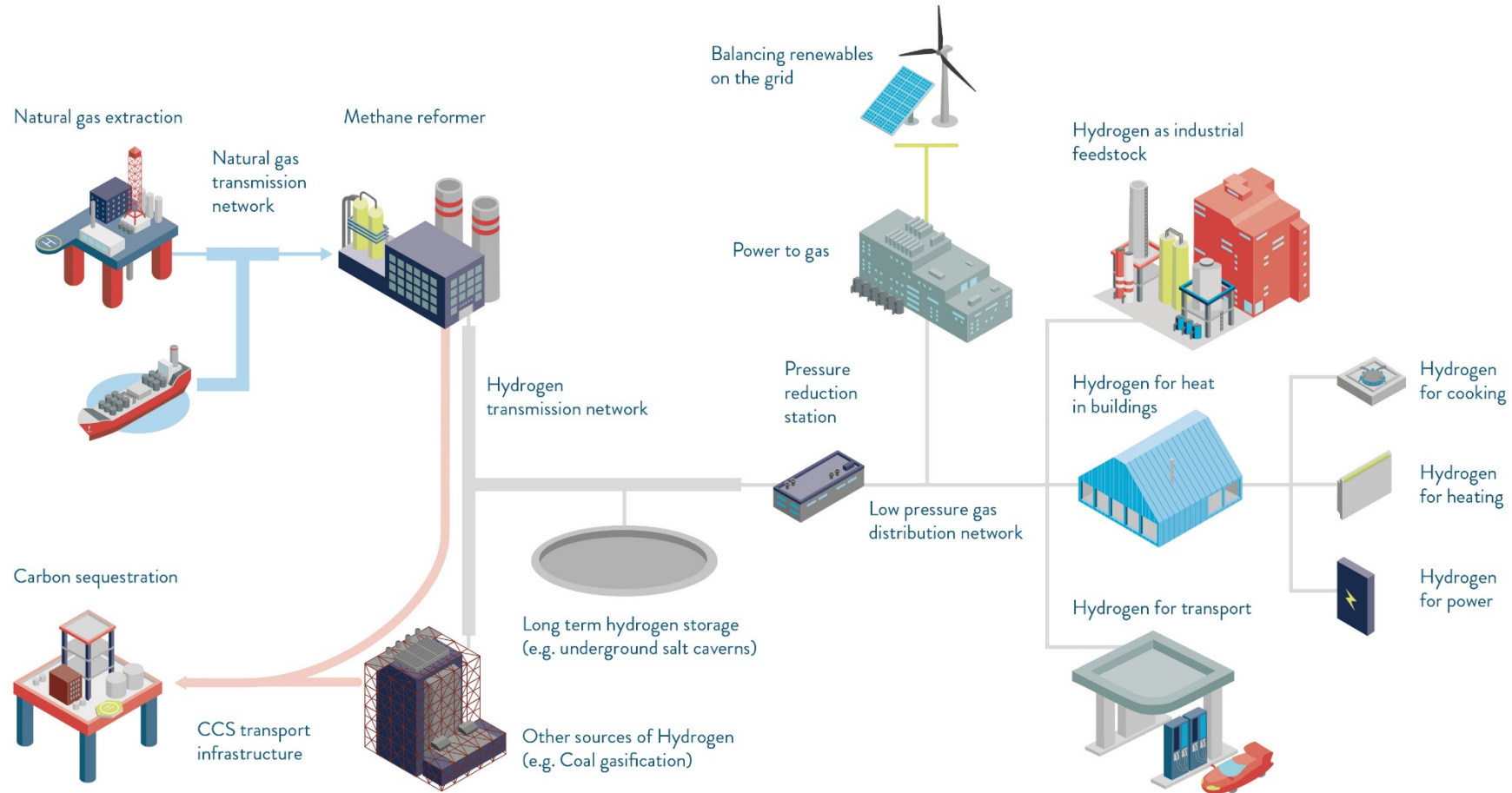
.... convince the public of the merits, safety and effectiveness of hydrogen as part of the solution



and ... prove itself against alternatives



... to develop hydrogen economy ...



... through innovations ... including Hy4Heat

MI Innovation Challenges are global calls to action aimed at accelerating research, development and demonstration (RD&D) in technology areas where MI members believe increased international attention can make a significant impact in our shared fight against climate change.

Hy4Heat is highlighted ...

... new MI Innovation Challenge 8 is hydrogen



Announced at the MI Ministerial in Malmo (May 2018):

‘Accelerating development of a global hydrogen market by identifying and overcoming key barriers to the production, distribution, storage, and use of hydrogen at gigawatt scale’

- will be co-led by Australia, the EU and Germany
- The UK will be a participant

Specific reference to development of hydrogen appliances:

‘Manufacturers will be appointed to develop hydrogen boilers, cookers and fires for test and demonstration’



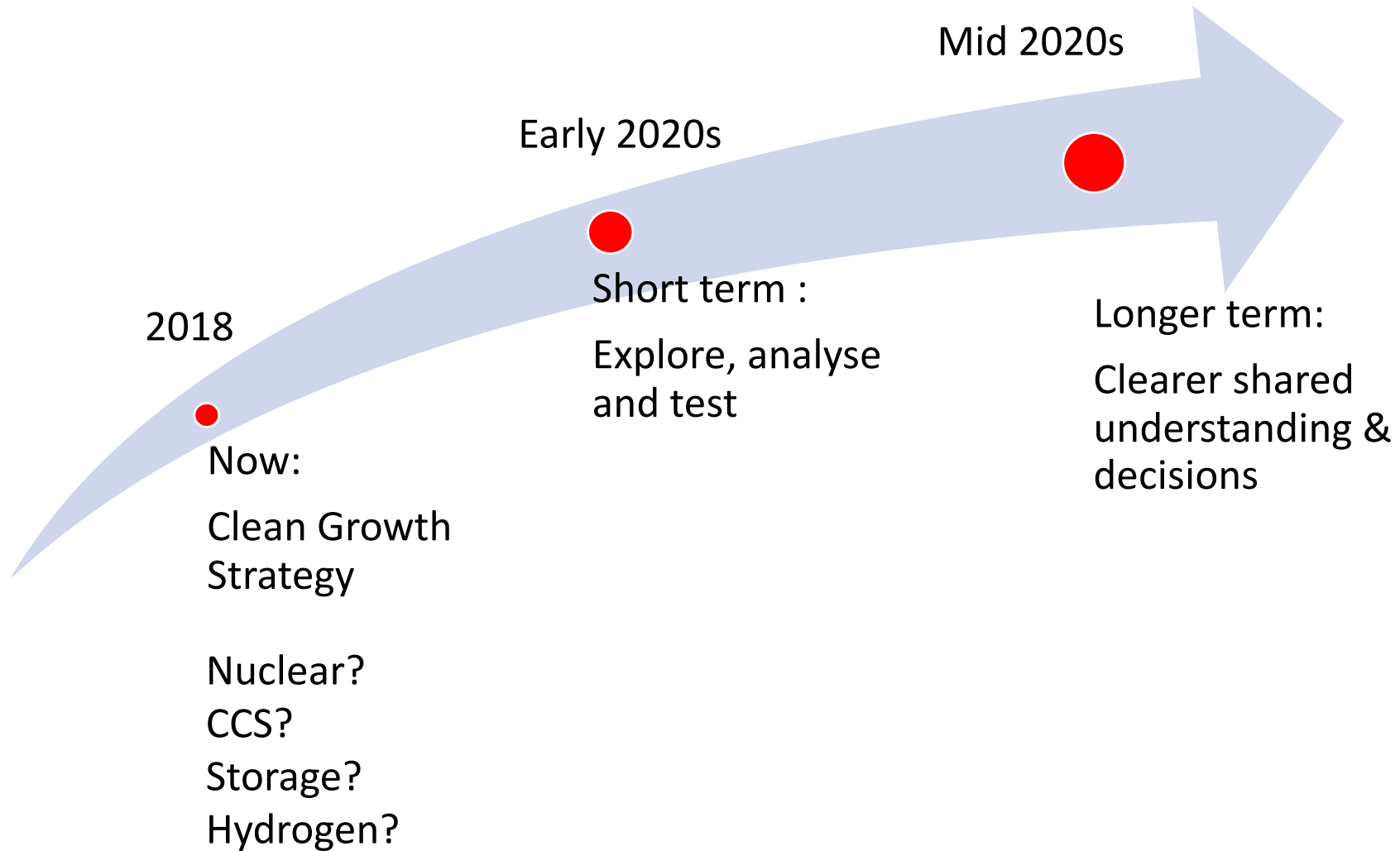


Hy4Heat

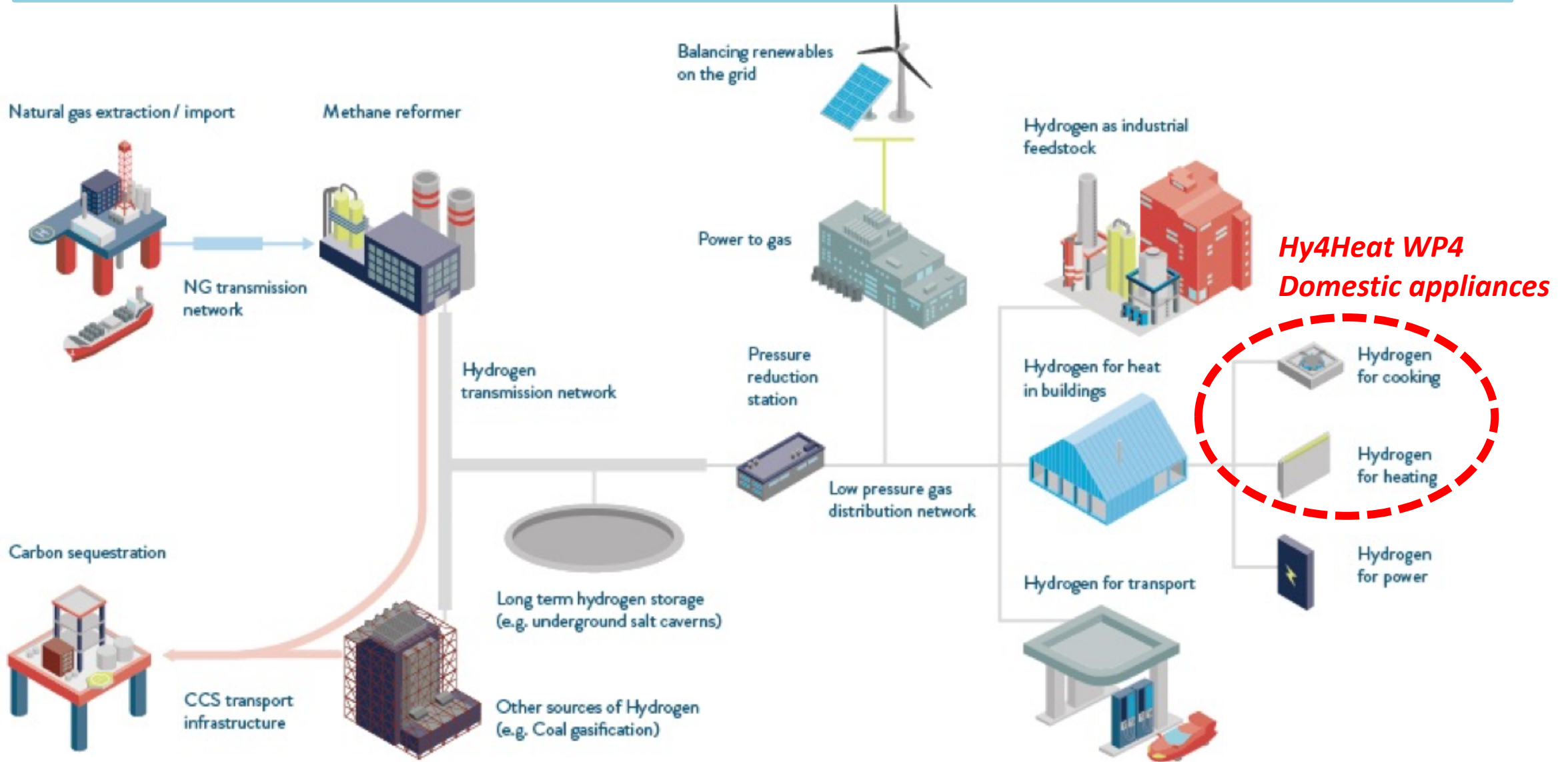
Heidi Genoni

Hy4Heat Programme Manager

Heat strategic context



Possible hydrogen economy



Hy4Heat mission

To establish if it is technically possible, safe and convenient to replace natural gas (methane) with hydrogen in residential and commercial buildings and gas appliances

This will enable the government to determine whether to proceed to a community trial



The Hy4Heat Programme



Hy4Heat Programme overview

2018

2019

2020

2021



WP1&9 PMC Managing WP's in preparation for a Community Trial

Hy4Heat ends



WP2 Quality and standards



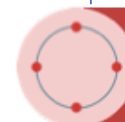
WP7 Safety and risk assessment



WP3 Appliance testing capability



WP4 Development of certified domestic appliances
Boilers, Cookers, Gas Fires



WP8 Demonstration trials



WP5 Commercial appliances
Understanding the market

Potential commercial appliance development



WP6 Industrial appliances
Understanding the market

Potential industrial appliance development

Possible
Community Trial

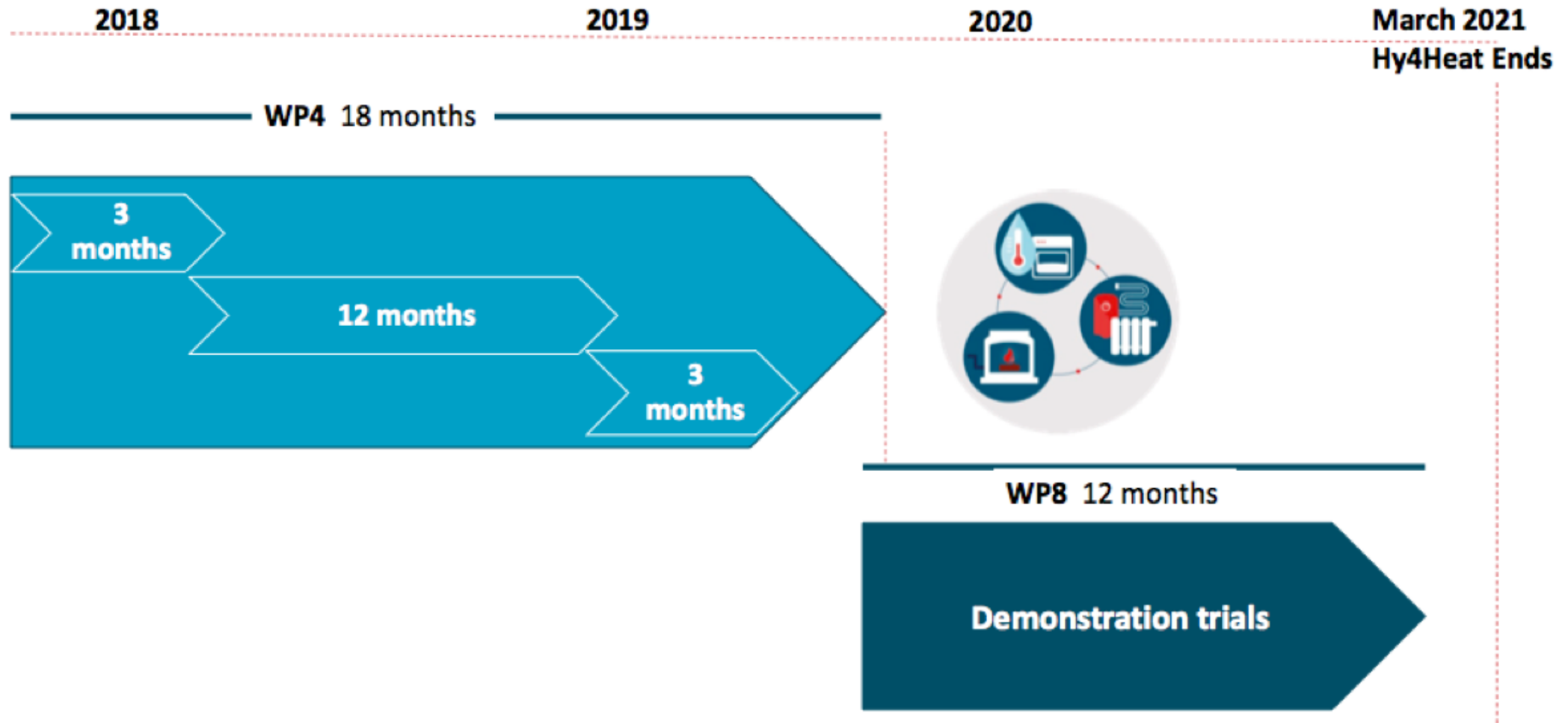


Work package 4 objectives

- Deliver 'like for like' domestic appliances which can demonstrate the safe use of hydrogen as a fuel to meet heat requirements
- Establish a range of certified domestic hydrogen appliances for use in homes



WP4 supports WP8 demonstration trials





Hy4Heat

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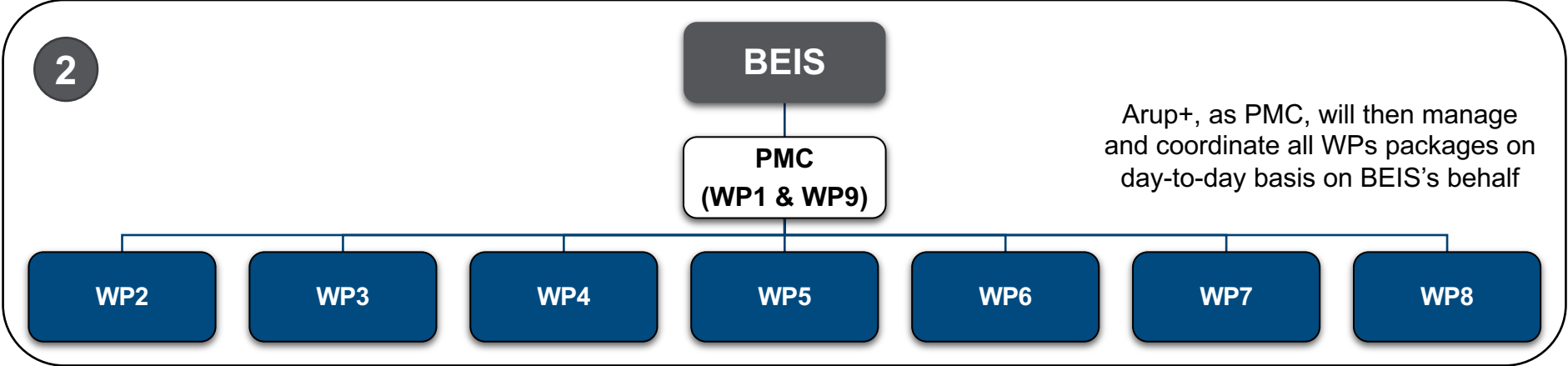
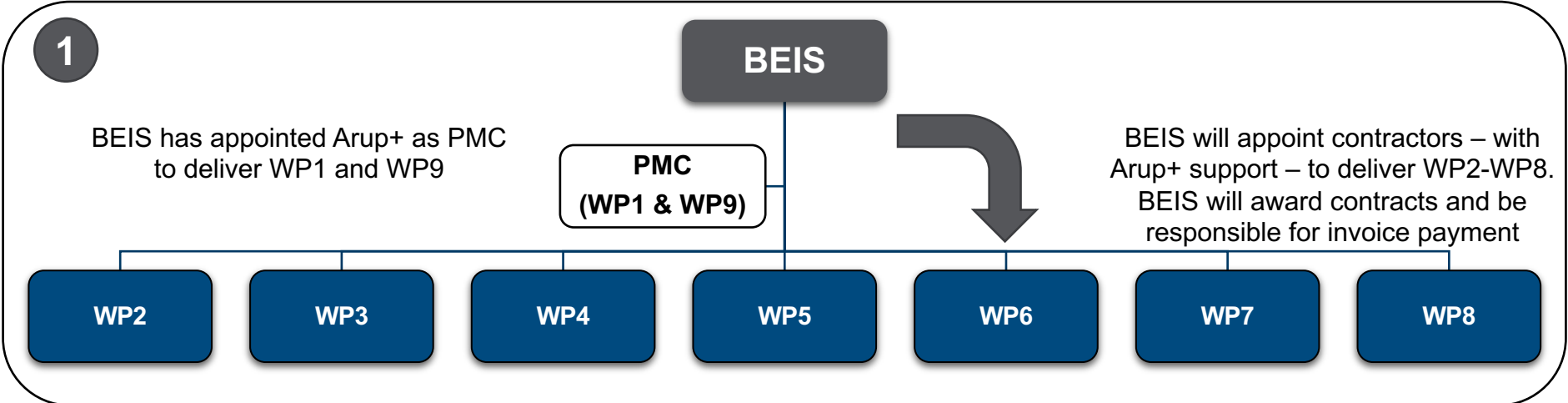
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WP4 Innovation procurement

Dr. Steve Loades



WP procurement and management



Hy4Heat: Procurement exclusion

Arup+ proposal committed to abide by this exclusion ... therefore part of the contract with BEIS

**Invitation to Tender for Programme Management Contractor (PMC) for
UK hydrogen for heat demonstration**
Tender Reference Number: 1318/06/2017

C: Conflict of interest

The appointed programme management contractor for this ITT will undertake a central role in developing the detailed technical design and specification of subsequent work packages (WP2-WP8) and assisting with procurement and award procedures.

BEIS therefore considers that there is no means by which it can ensure compliance with the duty to treat economic operators equally in accordance with regulation 18(1) of the Public Contracts Regulations 2015 other than by excluding the company or consortium appointed to deliver the PMC role for this ITT from the procurement processes for subsequent work packages.

In their tender response, tenderers are required to give a commitment to abide by this exclusion unless they can prove that their involvement in preparing the procurement procedure for subsequent work packages is not capable of distorting competition.



Procurement: WP4 preferred option

Procurement options

- Commercial
- Pre-commercial

For BEIS to procure

- Portfolio of domestic hydrogen appliances
 - ‘like for like’ for the purposes of demonstration trial(s)
 - Boilers, cookers and fires

Preferred option is pre-commercial

- current levels of development and availability of appliances
 - both ‘*prior to commercialisation*’
- higher degree of risk – benefit sharing
 - specifically Intellectual Property (IP)



Why Pre-Commercial Procurement (PCP) ...

Innovation is difficult to get right ...

... strategic innovation doesn't just happen ...

... or at least ...

not what we need ... when we need it ... and at the right price.

It happens as a consequence of ...

coordinated collaboration between ...

government, business, and research.



... Pre-Commercial Procurement (PCP)

Aimed at organisations working on R&D of an ...
... innovative process, material, device, product or service *prior to commercialisation*.



Public sector challenges ...

... innovative ideas from industry

Well-established public procurement process to connect public sector challenges with innovative ideas from industry
... driving improvement in achieving government operational and policy objectives ...
and supporting companies to generate economic growth.



PCP: Sharing of risks and benefits ...

Suppliers receive ...

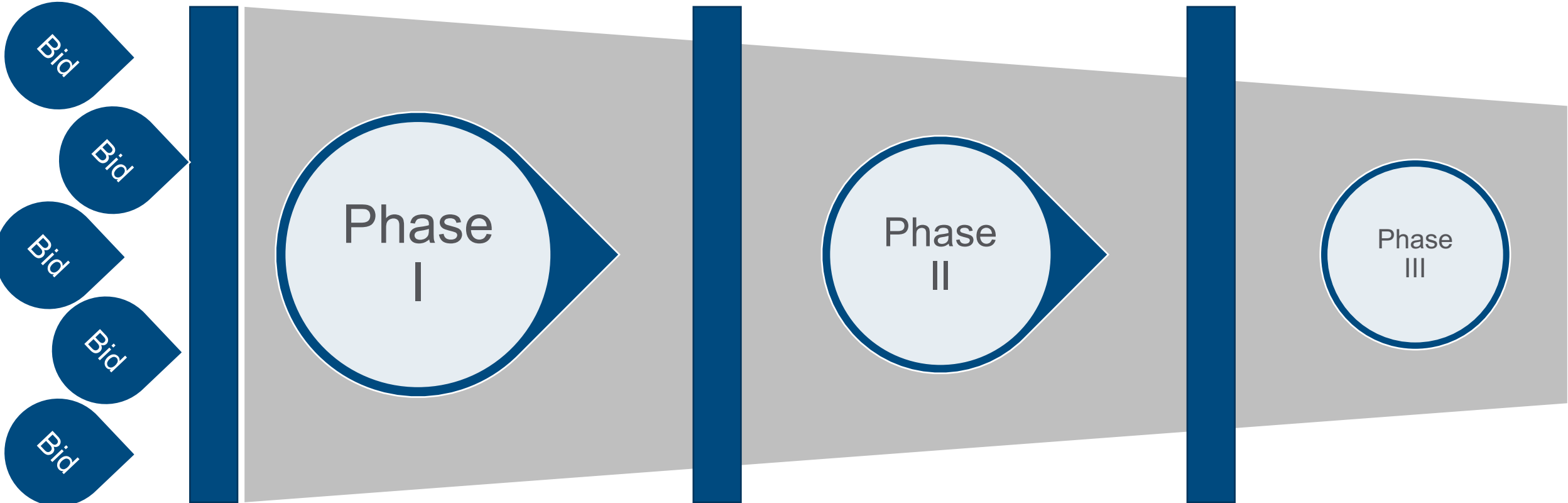
... financial support ... and
... retain any intellectual
property generated ...
... with certain rights of use
retained by BEIS ...
... project outputs are expected to
be shared publicly

... in return, suppliers clearly state

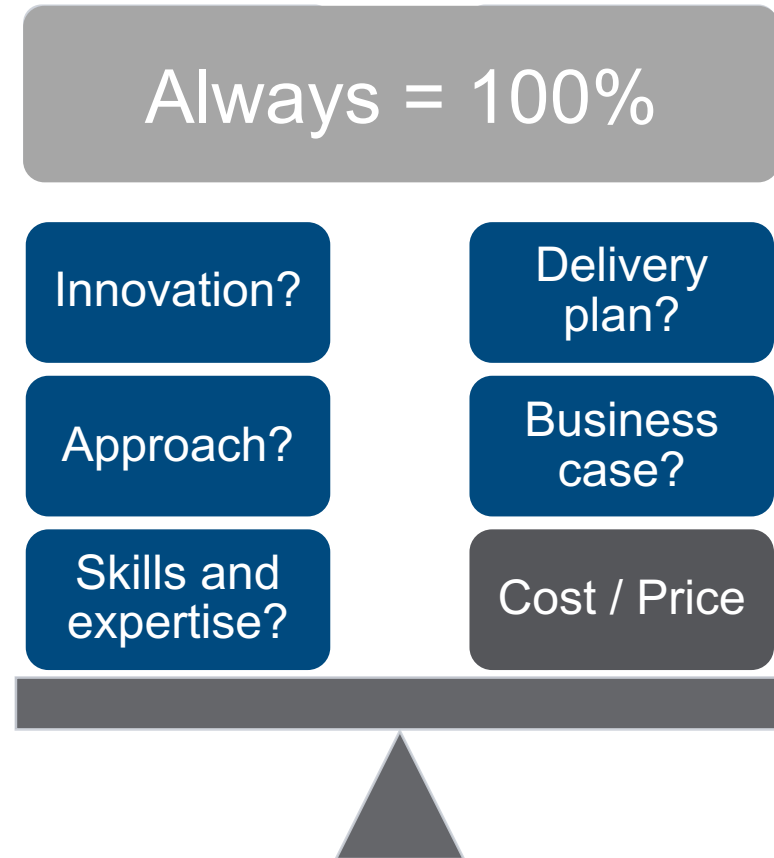
... where cost savings are being
provided to BEIS ...
... compared to exclusive
development contracts where BEIS
reserves all the results and
benefits of the development
(including IPRs) exclusively for its
own use



PCP: Phases and stage gates ...



PCP: Stage gate evaluation criteria ...



At each stage gate

- **Proposals are scored:**

- using a range of weighted quality criteria
- cost / price is always a criterion

- **Proposals are ranked:**

- to determine the bids / proposals ...
- ... to enter the phase

Full / final details will be published in ITT

Nb. Bidders are strongly advised to structure their proposals to cover each of the criteria



PCP: Eligibility ...

ALL organisations ... single entities (large and small), consortia, groups ... are eligible to bid into a PCP competition

Single proposal

- Identify and make clear the lead partner / contractor and contact, proposed role for each partner, the organisation and governance
 - set out how any sub-contractors will be managed and the % of the tendered activity (in terms of £) that will be sub-contracted
 - set out proposed arrangements, if a consortium is not proposing to form a corporate entity

Lead contractor must be the same across all phases

- Recognise that consortium / group arrangements may be subject to future change, but consistent within phases
 - respond in light of the arrangements as currently envisaged and notify any future proposed change, so that a further assessment can be made

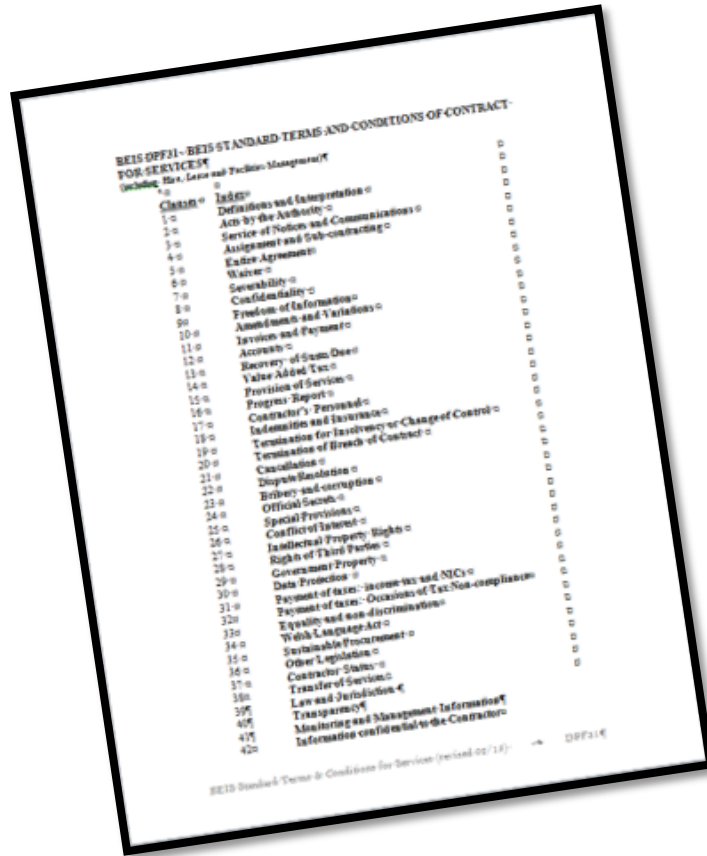
Nb. Need to bid into first phase and be successful ... to be eligible for later phases

BOTTOM LINE ... BE REALISTIC

... if part of multiple bids, which is a business decision ... be sure that you can fully resource them if they are all successful



PCP: Terms and conditions (Ts & Cs) ...



BEIS DPF31 - BEIS STANDARD TERMS AND CONDITIONS OF CONTRACT FOR SERVICES
(Including: Procurement and Project Management)

Clause	Index	
1	Definitions and Interpretation	1
2	Act by the Authority	2
3	Service of Notices and Communications	3
4	Assignment and Sub-contracting	4
5	Entire Agreement	5
6	Waiver	6
7	Severability	7
8	Confidentiality	8
9	Freedom of Information	9
10	Amendments and Variations	10
11	Services and Payments	11
12	Accuracy	12
13	Recovery of Sums Owed	13
14	Value Added Tax	14
15	Provision of Services	15
16	Programme Report	16
17	Contractor's Personnel	17
18	Indemnification and Insurance	18
19	Termination for Insolvency or Change of Control	19
20	Termination of Breach of Contract	20
21	Cancellation	21
22	Dispute Resolution	22
23	Bribery and Corruption	23
24	Official Secrets	24
25	Special Provisions	25
26	Conflict of Interest	26
27	Intellectual Property Rights	27
28	Right of Third Parties	28
29	Government Property	29
30	Data Protection	30
31	Payment of taxes - Income tax and NICs	31
32	Payment of taxes - Occupations of Tax/Non-compliance	32
33	Equality and non-discrimination	33
34	With Language	34
35	Sustainable Procurement	35
36	Other Legislation	36
37	Contractor Status	37
38	Transfer of Services	38
39	Law and Jurisdiction	39
40	Transparency	40
41	Monitoring and Management Information	41
42	Information Confidential to the Contractor	42

BEIS Standard Terms & Conditions for Services (revised 01/13) DPF31 ©

- BEIS standard service contract Ts & Cs are expected to form the basis ...
- ... proposed IPR treatment will be aligned with pre-commercial procurement principles
 - Ownership
 - ...
 - Exploitation
 - ...
- BEIS will publish final version at the time of any ITT publication / competition launch
 - Bids submitted on condition that Ts & Cs are amended will be effectively submitting a non-compliant bid
- The Ts and Cs will be consistent across phases





Hy4Heat

Hannah Steedman

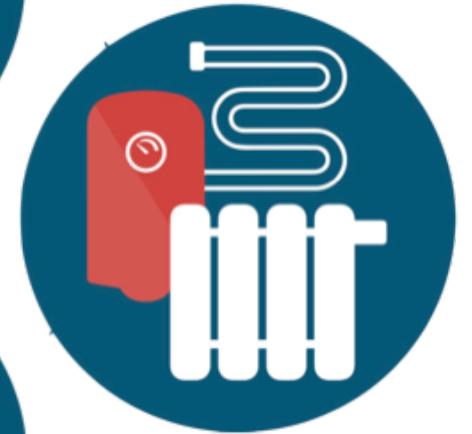
Work Package 4 Manager

Work package 4 objectives

- Deliver 'like for like' appliances which can demonstrate the safe use of hydrogen as a fuel to meet domestic heat requirements
- Establish a range of certified hydrogen appliances for use in homes

WP4 domestic appliances

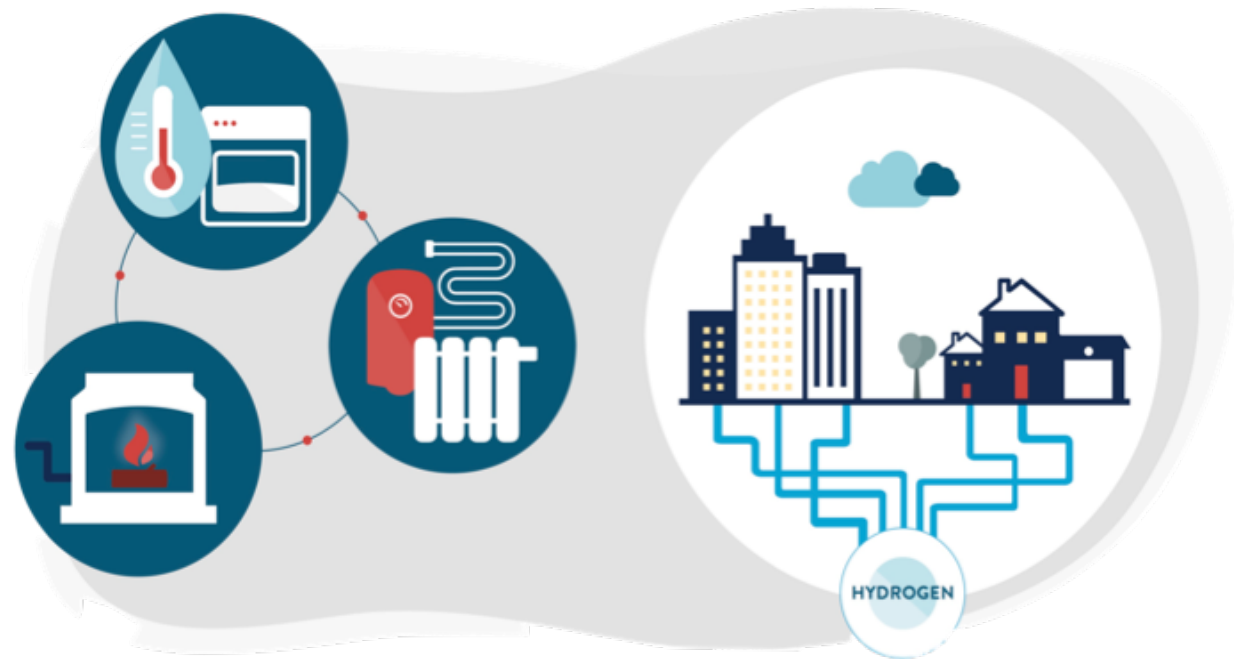
- Development of a range of domestic hydrogen appliances:
 - Boilers
 - Cookers
 - Gas fires
- Safe and fit for purpose



WP4 business plan

As well as developing and testing hydrogen appliances - we need to understand issues related to moving to a higher volume manufacturing scale, such as:

- Cost projections
- Timescales
- Marketing approach
- Customer acceptability
- Installation considerations



WP4 appliances types

Appliance types		Description
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
Boiler	Combi boiler	Suitable for property where no hot water cylinder present
	Regular boiler	Suitable for property where hot water cylinder is present
Cooker	Standalone hob	Multiple burner appliance with each producing variable heat levels
	Standalone oven incl. grill	Oven unit with variable heat output temps– incl. grill
	Integrated freestanding cooker	Unit to include oven, grill and hob

Appliance expectations

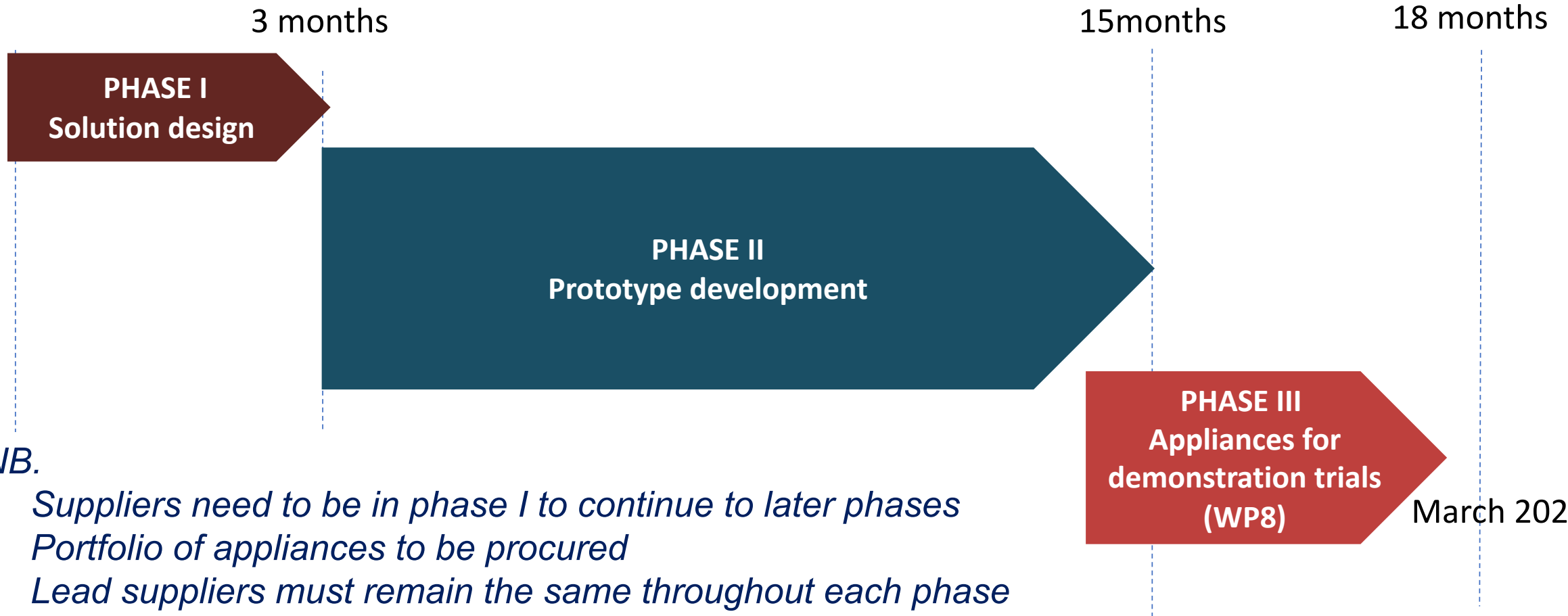
Like for like (very similar / identical) dimensions and appearance to current appliances

- Same appliance casings, back plates, controls, aesthetics, etc.
- Product performance comparable
- Same heat output and functionality
- Environmental impact (point of use and life cycle) emissions no higher, or similar

Appliance briefing note: key elements

- Like for like replacements (except 'executive' gas fire)
- Gas Quality – purity, odorant, colourant and supply pressure
- Certification – GAR, relevant ecodesign regs, etc
- Expected efficiency
- Expected emissions
- Delayed ignition
- Installer and training requirements

PCP phases



NB.

- *Suppliers need to be in phase I to continue to later phases*
- *Portfolio of appliances to be procured*
- *Lead suppliers must remain the same throughout each phase*

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 hydrogen appliances' by Frazer Nash Consultancy <https://www.gov.uk/government/publications/appraisal-of-domestic-hydrogen-appliances>

Tender timetable

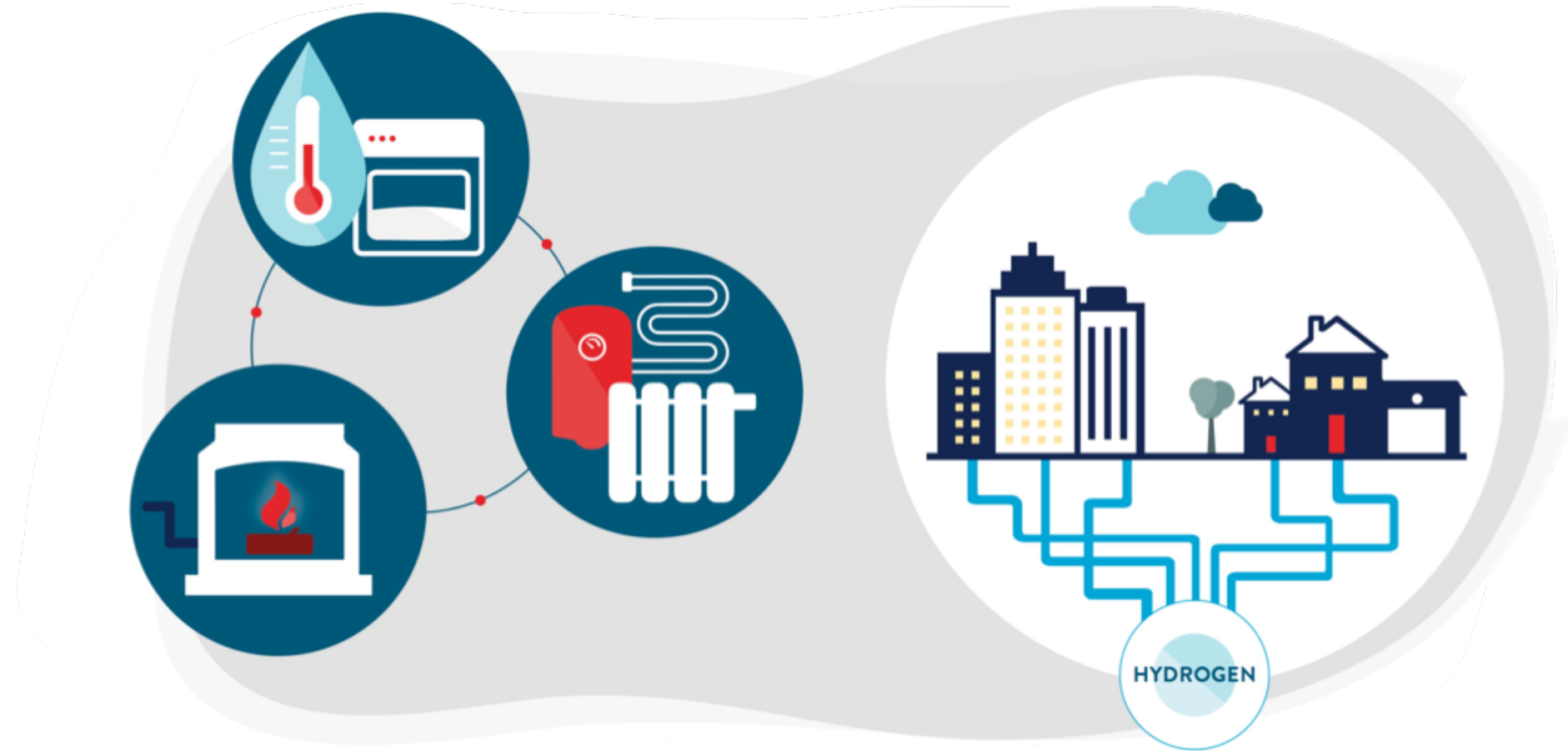
- ITT issued mid July 2018
- Tenders submitted end August 2018
- Tender assessments September 2018
- Contracts awarded early October 2018



Hy4Heat

Q&A and discussion

Discussion stalls



One to one
sessions



Hy4Heat