

Table of contents

1. Introduction

- 1.1 What do we mean when we talk about hydrogen?
- 1.2 How does it answer the decarbonisation question?
- 1.3 Why hydrogen/what's the size of the opportunity?
Where can it be used most effectively?
- 1.4 How does it help achieve net-zero? Timeline

2. Who are the stakeholders and their roles

- 2.1 Government/regulators
- 2.2 System and network operators
- 2.3 Operators (of various parts of the chain
including electrolysers)
- 2.4 Consumers
- 2.5 Financiers/insurers

3. Production of hydrogen

3.1 Different types of hydrogen (green, blue, grey)

3.1.1 Focus on green hydrogen + electrolysis

3.1.2 Blue hydrogen with carbon capture
(eg, Cadent work)

3.2 What are the differences, how are the different types of hydrogen made?

3.3 Regulation of hydrogen production

3.4 Issues and opportunities

3.4.1 Carbon price

3.4.2 Cost competitiveness

4. Transportation and storage of hydrogen

4.1 Gas/pipeline regulations (transmission and distribution level)

4.1.1 Health and safety issues

4.1.2 Industry codes (UNC, GSMR)

4.1.3 Property issues

4.2 Issues in retrofitting existing stock/consenting to build new pipelines

4.3 Construction/Operation/Decommissioning of pipelines

4.4 Revenue considerations (offtake, price controls, subsidies)

4.5 Issues and opportunities

5. Using hydrogen for industrial processes

5.1 Context and use of hydrogen in industry

5.2 Role of blue hydrogen/CCUS policy dependencies

5.3 Regulations

5.3.1 Health and safety issues

5.3.2 Consenting issues

5.3.3 Property issues

5.4 Construction/Operation/Decommissioning of plant

5.4.1 Risk allocation

5.4.2 Polluter pays principle (especially on CCS)

5.5 Revenue considerations (offtake/cost competitiveness, subsidies)

6. Using hydrogen for heating/cooling

6.1 How and where does this work

6.2 Legal issues

6.2.1 Regulatory framework for heating

6.2.2 Health and safety issues

6.2.3 Consenting issues

6.2.4 Property issues

6.3 Revenue considerations (offtake, price controls, subsidies) – same as pipelines

6.3.1 Interactions with other renewable heat programmes (heat pumps, RHI)

6.4 Consumer experience and equipment suitability

6.5 Issues and opportunities

7. Using hydrogen for transport

7.1 Use in:

7.1.1 Road transport (HGVs and fleets) – alongside EVs

(a) including hydrogen transportation by compressed gas cylinders, HFCs

7.1.2 Rail transport

7.1.3 Marine transport (ferries and freight shipping)

7.2 Legal issues

7.2.1 Regulatory framework for transport

7.2.2 Health and safety issues

7.2.3 Consenting issues – especially retrofitting existing infrastructure

7.3 Revenue considerations

7.3.1 Interactions with other renewable fuel programmes (RTFO)

7.4 Consumer experience and concerns

7.5 Issues and opportunities

8. Using hydrogen for energy system management

8.1 How and where would this work

8.2 Stakeholders

8.2.1 System/network operator

8.2.2 Building operator

8.2.3 Consumers

8.3 Revenue sources

8.3.1 Ancillary services

8.3.2 New services eg, V2G

8.4 Consumer experience (hydrogen as part of energy as a service)

8.5 Issues and opportunities

9. Issues in M&A and financing of hydrogen projects

9.1 Overview

9.1.1 Key structures

9.1.2 Key financing terms

9.1.3 Key requirements for investment

9.2 Issues and opportunities

9.2.1 For investors

9.2.2 For financiers (including
measuring ESG impacts)

10. Conclusion

10.1 Developing the hydrogen economy – what's
the outlook like to 2050?

10.2 What else is needed for net zero and how
can hydrogen play a significant role?

10.3 Who will win the hydrogen race and why?

11. Case studies

11.1 Portugal policy development and green hydrogen

11.2 Germany – Alstom trains

11.3 Singapore

11.4 Australia – coordinated policy approach

11.5 Mining – Mongolia

11.6 ITM Power partnership with Orsted

11.7 Wrightbus – hydrogen buses (across UK cities)

11.8 EU green deal policy

11.9 Danish freeports initiative