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Aligning key transport authorities to build secure infrastructure

The opportunities hydrogen brings to the supply chain and implementing across different modes of transportation

Bill Smith

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Why is this important?

The Overview Effect

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Agenda

- Current activity
- Framework for delivery
- Implementing at pace & scale
- Next steps

Current Activity

Where are we today?

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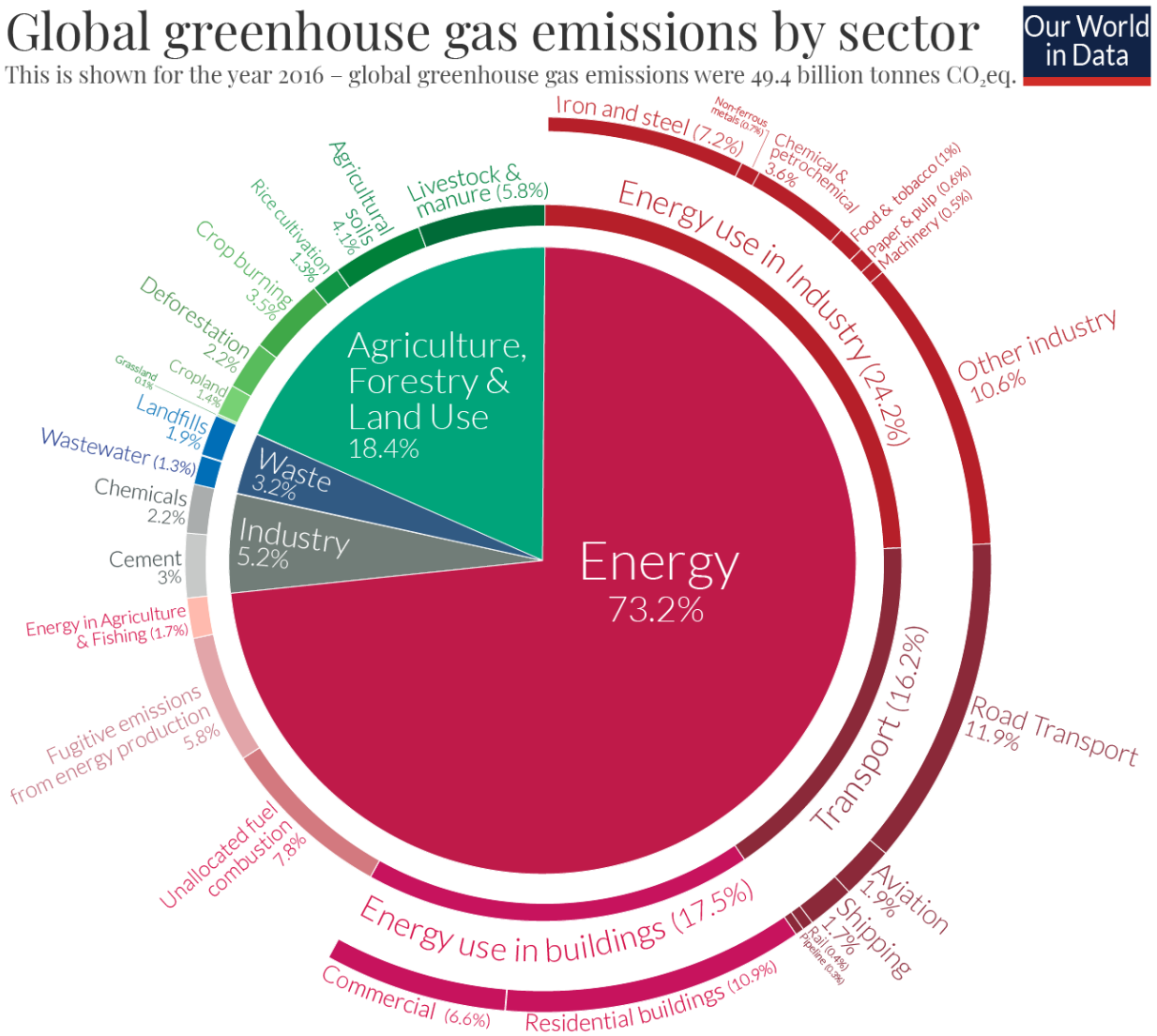
The Opportunity

Potential Hydrogen Demand

- Recognised as a Global issue.
- Scotland in 2020:
- 40 $MtCO_2e$
- Down 51% since 1990
- Down 12% from 2019
- Transport c25%
- With cars generating c40% of that



Sample of potential hydrogen projects across the UK

Scotland

1. Fife Hydrogen Hub
2. Acorn Hydrogen
3. BEIS & Ofgem: H100 Heat Trial
4. CNES
5. EMEC
6. ERM (Dolphyn)
7. ERM (Salamander)
8. H2 Green
9. Hy2GO
10. Cromarty Firth Green Hydrogen
11. Repsol Sinopec
12. Scottish Power (Whitelee)
13. Shetlands Island Council
14. Octopus Hydrogen
15. Kittybrewster HRS
16. Aberdeen Hydrogen Hub
17. BayoTech

North West England

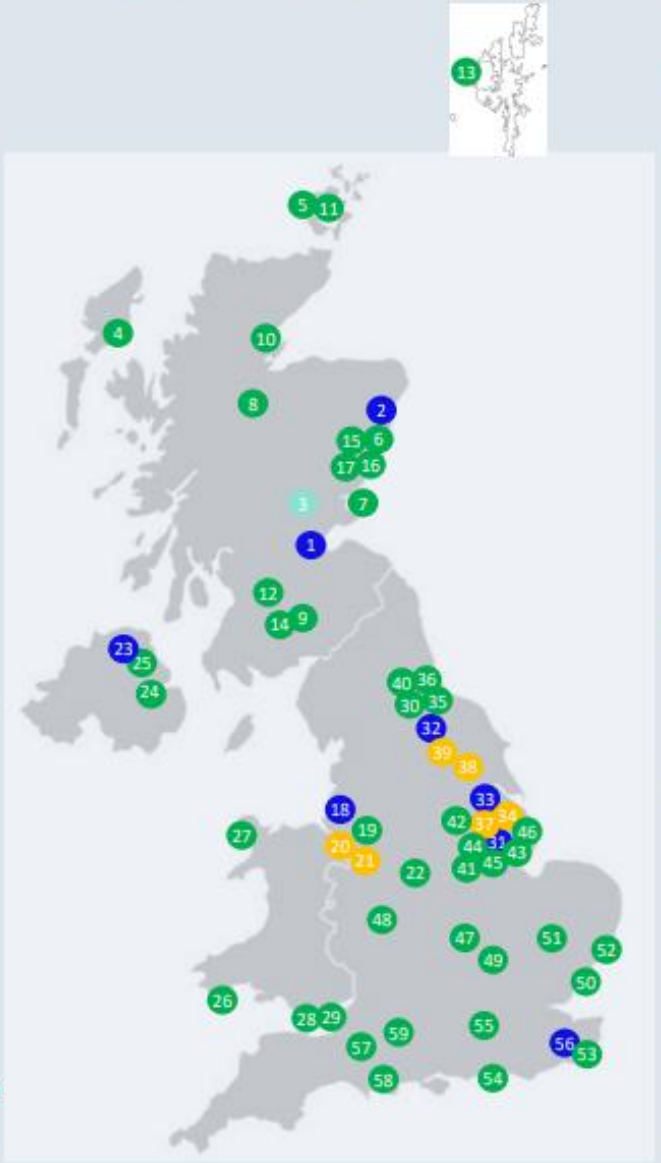
18. Hynet: HPP
19. Trafford Green /Carlton Power
20. Hynet: Phase 2 & 3 pipeline (Cadent)
21. Hynet: Salt Cavern Storage (INOVYN)
22. Octopus Hydrogen

Northern Ireland

23. Skuunaq
24. GenComm/Belfast Met
25. NI Water

Wales

26. RWE Pembroke
27. Mentor Mon
28. Octopus Hydrogen
29. Protium Magor



North East England

30. BP: CCUS enabled hydrogen and green hydrogen
31. Uniper Humber Hub
32. H2NorthEast
33. H2 to Humber Saltend
34. Aldbrough storage (SSE)
35. Protium
36. EDF Tees Green
37. ECC pipeline (Nat Grid Ventures)
38. Project Union (Nat Grid Gas)
39. East Coast Hydrogen (NGN)
40. Tees Valley Transport Hub
41. Octopus Hydrogen
42. Anonymized
43. Project Mayflower

East England

50. Sizewell
51. Octopus Hydrogen
52. Lowestoft Port

South East England

53. Ryze
54. Shoreham Port Green Hydrogen Production
55. Viridor
56. Acorn: Project Cavendish

South West England

57. Bristol Airport
58. Canford Renewable Energy
59. Octopus Hydrogen

Yorkshire & Humber

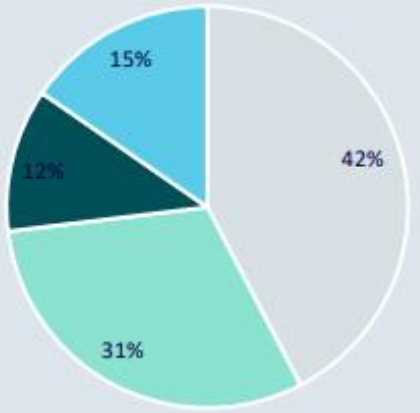
44. Yorkshire Energy Park
45. Oyster Project
46. Gigastack

East & West Midlands

47. Tyseley Energy Park
48. Shropshire Council
49. Octopus Hydrogen /MIRA Technology Park

- CCUS enabled projects
- Electrolytic projects
- Storage & Distribution

Electrolytic end use (indicative)



Mobility (Road, NRMM, Aviation, Maritime) Industry Power Heat

Note: Includes plans and proposals for projects that are in the public domain. Many more projects are under development in all parts of the UK. Total UK pipeline estimated up to 20GW as of April 2022. Location of projects on this map is approximate.

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Scotland's Lead on H_2 & Transport Projects

Scotland Development International

- Long Range Zero-Emission H_2 Flight
- Floating Green H_2 Facility
- H_2 Powered Heating
- H_2 Powered Gin
- H_2 Fuel Cell Powered Heavy Vehicles
- Tidal Powered H_2 Electrolyser
- H_2 Powered Double Decker Bus Fleet
- H_2 Innovation Accelerator Facility
- H_2 Powered Train
- 'Green Space' for H_2 Fuel Manufacturing
- Wind & Solar Green H_2

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Framework for delivery

How do we get there?

Draft Hydrogen Action Plan

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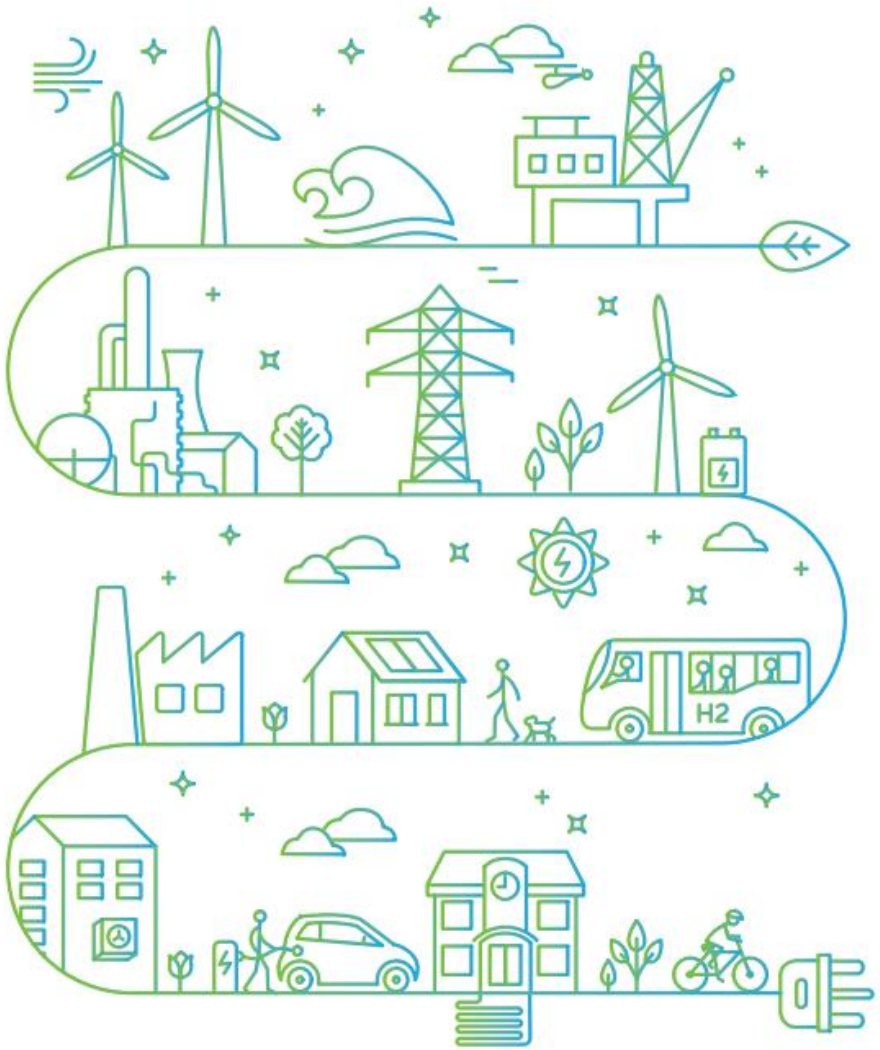
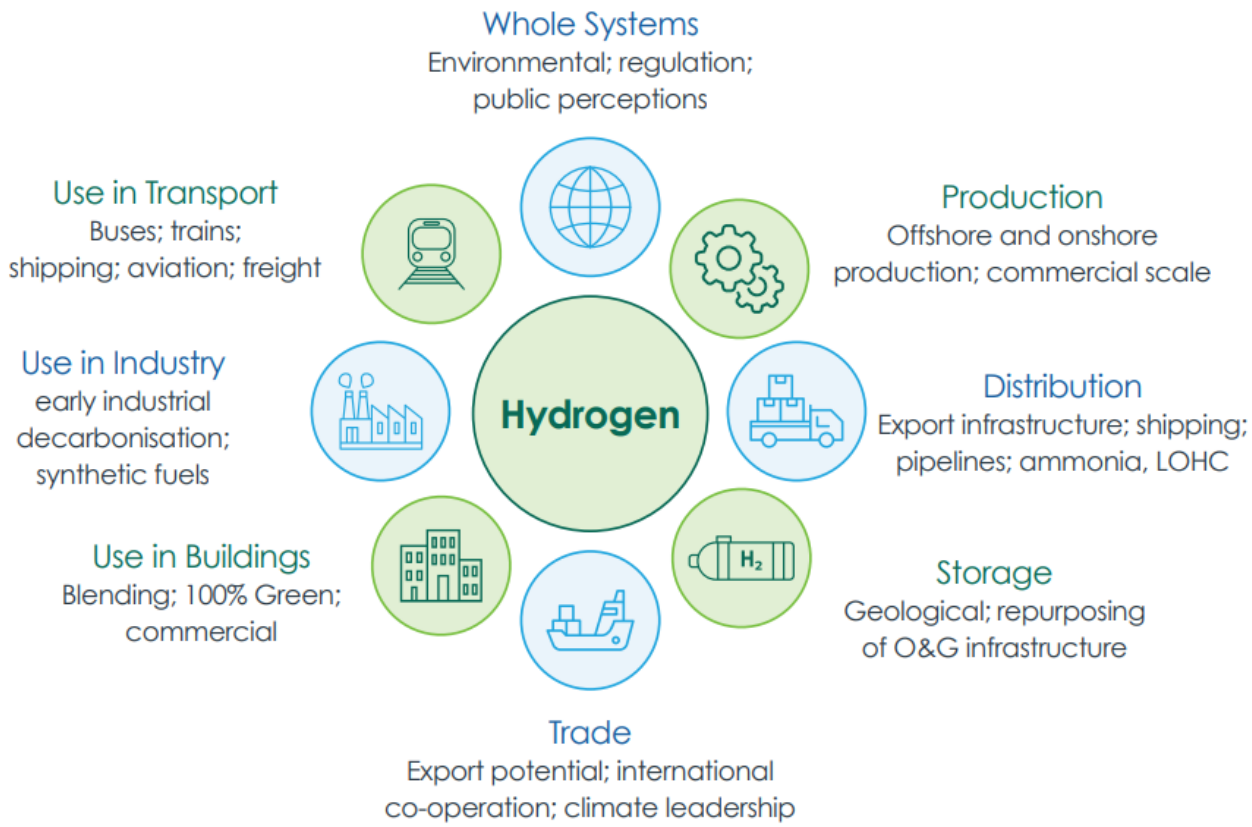


Hydrogen Economy in Scotland



Scottish Government
Riaghaltas na h-Alba
gov.scot

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Implementing and pace & scale

What needs to be considered?

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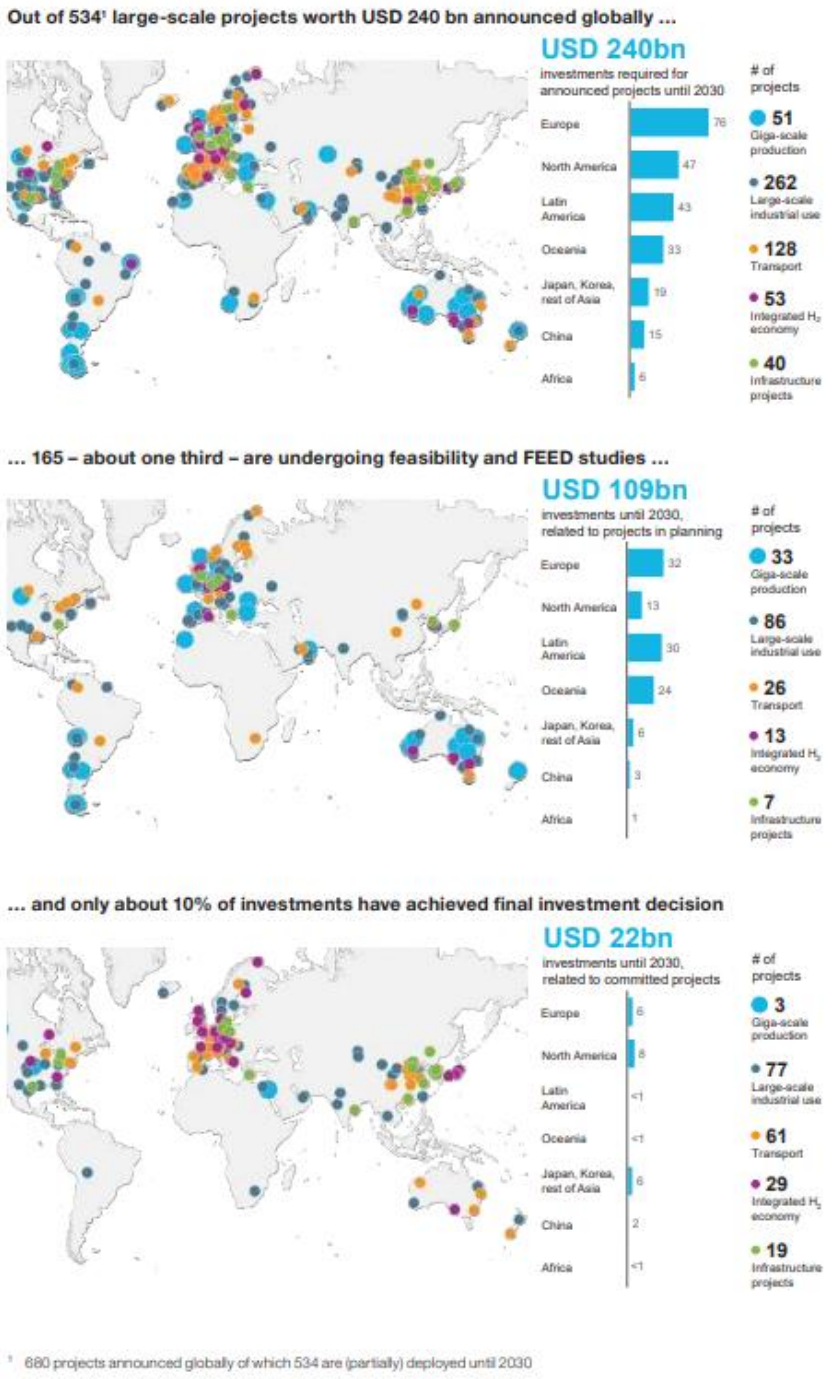
Moving to Delivery



Hydrogen end use: Mobility and steel are driving investments…Most announced investments target the mobility sector, each about 30% of investments.

Source:
McKinsey “Hydrogen Insights 2022”

Implementation

Funding – where will it come from?

Status quo is not sustainable, need change and innovative approaches.

Systems approach – whole life planning to give confidence.

Where is H_2 an appropriate solution?

Transport – long distance and difficult routes.

Logistics sectors – keep vehicles moving.

Linked production and use.

What and where are our Hubs?

Regional and city scale.

Operational – re-fuel/re-energise?

Public and operator facing.

Connected Hubs – corridors.

Risk

Development at pace and scale

Governance required to support roll out.

Cross sector connections.

Technology not proven at scale - reliability.

Joining up production – transfer - use

Prioritise - Rapid scale up focusing on end uses where the greatest gains can be made.

Recognise and manage operational risks and dependencies when scaling up.

Skills and skill gaps

Focus skills and learning in key hubs and clusters.

Focus research on key areas – those will greatest potential.

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Next steps

What now?

Next Steps

- Strong, stable, committed government
- Import learning from other sectors & learn ‘on the job’
- Scale up capability and capacity
- Innovative teams and structures
- Research and Development focused on priority issues
- Look beyond borders – promote cross-border trade

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