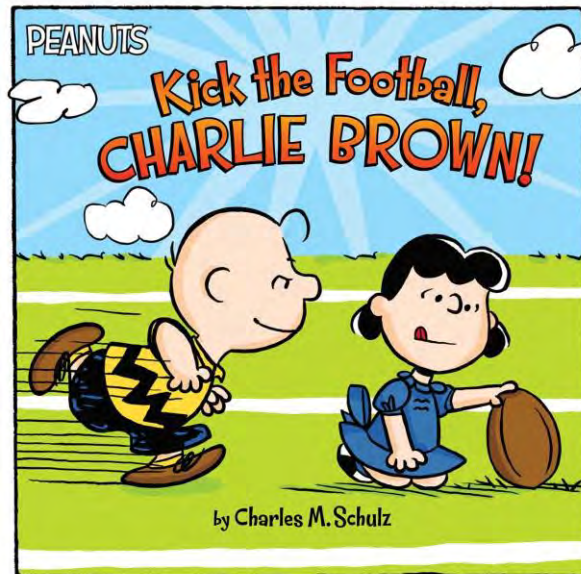




Political Economy of Industrial Decarbonisation



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Today's Session

- Why/why not to decarbonise industrial clusters now
- A tattered history UK CCS competitions
- A renewed focus on industrial clusters
- Industrial Decarbonisation Challenge
- The politics of industrial clusters
- Tensions between support for industry and support for industrial decarbonisation
- A changing role for the public in CCUS deployment and some early insights on the politics of industrial decarbonisation



Pros and Cons of Industrial Decarbonisation

- Many good reasons NOT to prioritise industrial decarbonisation and leave until ‘later’
 - Relatively few ‘easy’ technical solutions/hard to electrify
 - Concerns over leakage and simply shifting emissions abroad
 - International competitiveness considerations makes it difficult for governments to exert much regulatory pressure on energy-intensive firms
- Some reasons for acting sooner
 - Difficult for any one firm to act alone/infrastructure needs
 - Efforts to halt demise of many industrial clusters in AICs
 - Appeal of ‘green industrial clusters’ framing
 - Strong political leverage of industrial areas in national politics of many key countries



A tattered history of UK CCS Competitions

- 1) 2002-2007 First large-scale CCS power/hydrogen project proposed by BP at Peterhead (£500m) **Project cancelled due to 'government delays'**
- 2) 2007-2011 First UK competition (£1bn focused on coal projects Longannet retrofit) **Project cancelled due to 'budget disagreements'**
- 3) 2012-2016 Second UK competition (£1bn with wider remit narrowed down to two projects Peterhead and White Rose) **Projects cancelled 6 months before funding was to be awarded**

Reiner, DM. "Learning through a portfolio of carbon capture and storage demonstration projects." *Nature Energy* 1.1: 15011 (2016).

Little project awareness even locally

EPRG carried out four focus groups in Scotland in January 2017 with 36 citizens: one in Aberdeen ($n=8$), and one in Edinburgh ($n=9$) and two in Peterhead ($n=10$ and $n=9$),

	Peterhead 1	Peterhead 2	Aberdeen	Edinburgh
Knowledge of CCS				
Never heard of it	2	3	2	3
Heard of it, but don't know what it is	3	5	3	3
Know a bit about it	1	1	1	2
Know a lot about it	1	0	0	0
Don't know	3	0	0	1

R Ostfeld and DM Reiner (2020). [Public views of Scotland's path to decarbonization: Evidence from citizens' juries and focus groups](#), *Energy Policy* 140, 111332



Rebooting CCUS -> Focus on Industrial Clusters

UK cancels pioneering £1bn carbon capture and storage competition

Conservative government breaks manifesto promise on project to capture emissions from fossil fuel plants, days ahead of UN climate summit in Paris



▲ Peterhead Power Station on the coast at Peterhead, Aberdeenshire, Scotland UK Photograph: Simon Price/Alamy

Damian Carrington

🐦 @dpcarrington

Wed 25 Nov 2015 16.07 GMT





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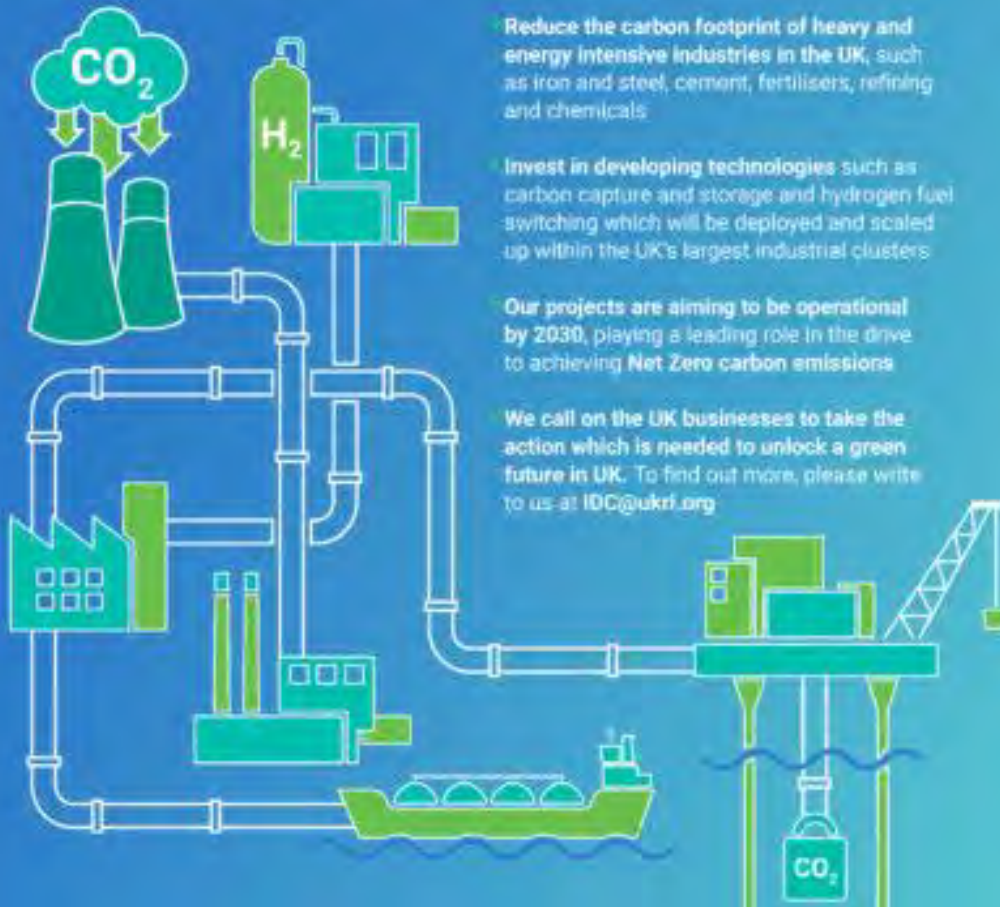
Delivering Clean Growth:

CCUS Cost Challenge Taskforce Report

July 2018

Industrial Decarbonisation Challenge

Accelerating the cost-effective decarbonisation of industrial clusters by developing and deploying low-carbon technologies at scale.



Reduce the carbon footprint of heavy and energy intensive industries in the UK, such as iron and steel, cement, fertilisers, refining and chemicals

Invest in developing technologies such as carbon capture and storage and hydrogen fuel switching which will be deployed and scaled up within the UK's largest industrial clusters

Our projects are aiming to be operational by 2030, playing a leading role in the drive to achieving Net Zero carbon emissions

We call on the UK businesses to take the action which is needed to unlock a green future in UK. To find out more, please write to us at IDC@ukri.org

Industrial clusters have a big impact in the UK:

Secure around
1.5 million jobs

Export goods and services
worth around **£320 billion**

Industry is responsible for a **quarter of all UK gas emissions** and **industrial clusters account** for approximately a **third of total emissions from industry and business**

IDC Programme highlights:

£210m funding matched
by **£261m** from the industry

9 Deployment Projects and
6 Cluster Plans commenced

£20m investment into a **new research and innovation centre**

Early impact:

Number of businesses engaged -
2020: 57 and 2021: 114

IDC organisations contributing
to Government policy: **31**

The IDC is on track to deliver the **world's first net zero cluster by 2040**, with substantial **decarbonisation of all clusters by 2030**

Investments:

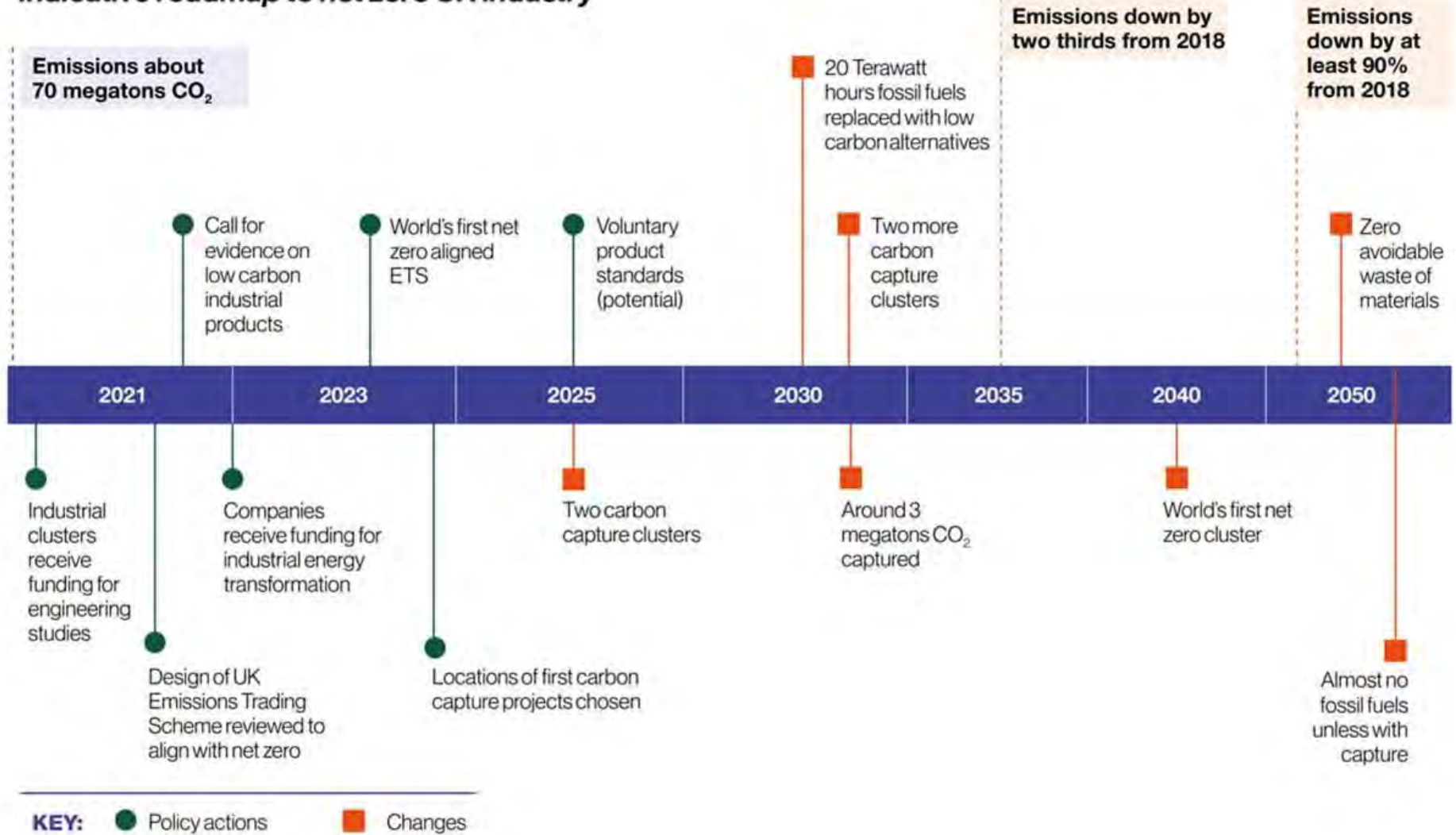
Public funding through
IDC: **£210m**

Further funding made available by
Government to industrial clusters: **£1bn**

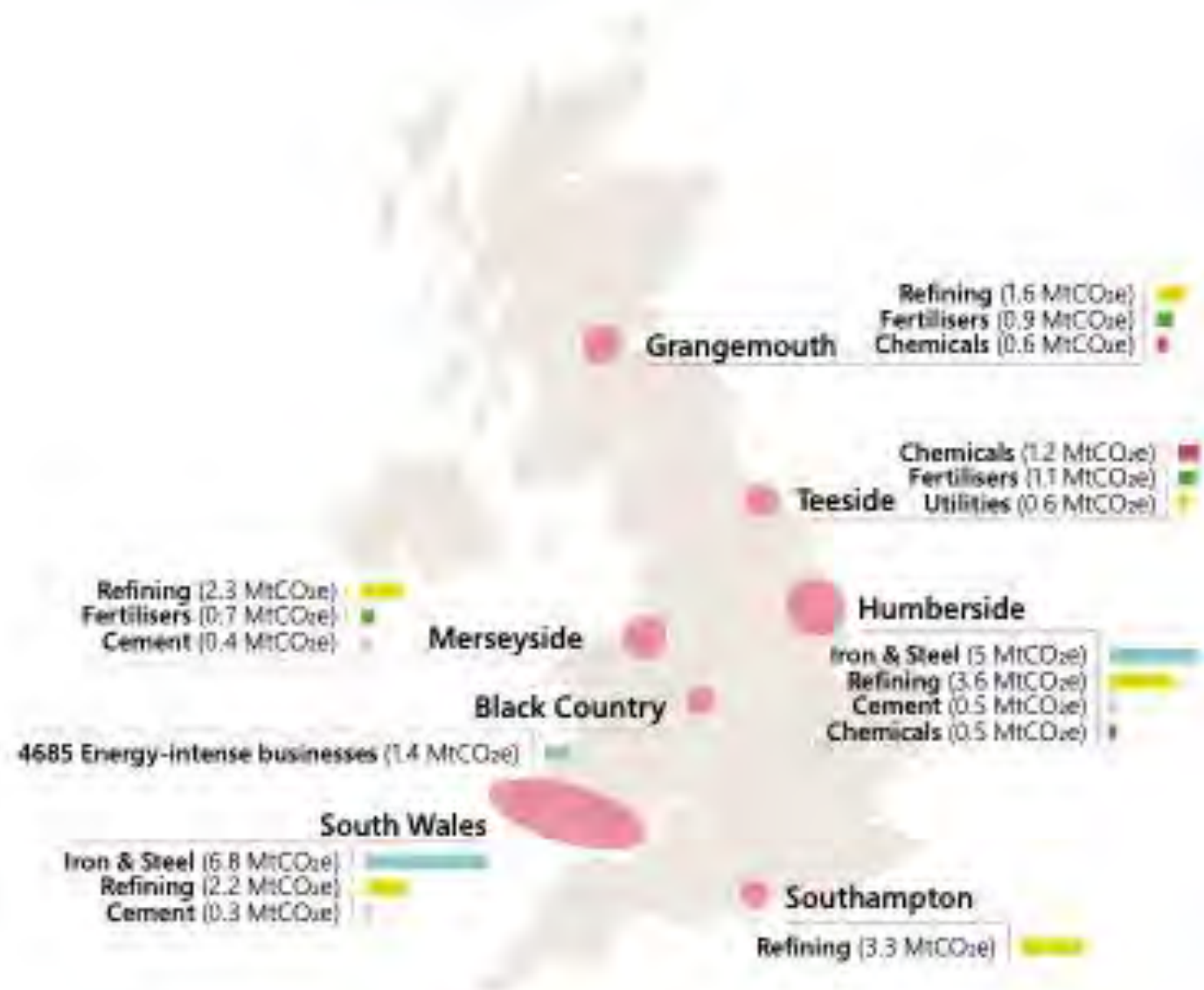
Private investment: **£261m target**

March 2021 Industrial Decarbonisation Strategy released

Indicative roadmap to net zero UK industry



Main clusters



Technologies developed and deployed

- Industrial carbon capture technology
- Offshore subsea storage facilities
- CO₂ and Hydrogen transportation pipelines
- Modern, low-carbon power stations
- Industrial infrastructure
- Flexible, greener energy systems
- Fuel replacement technology



Stretton's Net Zero Infrastructure (NZI) Hub
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Hydro (CCGT)
 A 100MW CCGT power station that will be replaced by a 100MW hydrogen CCGT power station, providing a low-carbon power source.

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South Wales Industrial Cluster (IC)
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Scotland's Net Zero Infrastructure (NZI) Hub
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Net Zero Teesside Onshore
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

The Humber Evidence Partnership (HEP)
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Zero Carbon Humber Partnership (ZCH)
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Humber Zero
 A cluster of low-carbon industrial processes, including ammonia, green hydrogen, methanol, and low-carbon steel production.

Targeting Net Zero in the Humber Region




Graint Evans

Net zero?

Carbon cluster by 2040

will require us to

REMOVE + **REBALANCE**



ISCF

Industry / Challenge Strategy Fund

£170M fund + £261M from industry
To be shared by clusters

- ACADEMIA
- DEPLOYMENT PROJECTS
- CLUSTER ROADMAPS & FEASIBILITY STUDIES

2 phases

- Methodology
- Roadmap delivery

create & share Knowledge

designs & demonstrations

Entry to future competition

UK Energy Transition Possible route

80% CO2 REDUCTION

Aviation shipping transport remains

Power ~ zero carbon

Heat Biocredits

50% energy fossil fuels

MORE PROFOUND CHANGES

NET ZERO

-ve EMISSIONS

Bioenergy H2 as fuel

Carbon Capture & Storage

ALL TOOLS IN THE TOOLBOX

Efficiency, new processes & feedstocks

BECCS

DMCCS

AIR

The Humber Region

MOST ENERGY INTENSE CLUSTER IN UK

~ 95% Refining Iron & Steel Chemicals



The Challenge ?

- Feedstocks
- Highly integrated
- High temperatures
- Long-Lifetime facilities
- High capital changes
- Need to remain competitive

Opportunities

Humber well-placed take advantage of low carbon energy from wind, solar, biomass & CCS



CATCH TECHNICAL

rachael cowin

millions of tonnes of potential storage ~ 1000 yrs capacity

find new ways to use

Bio

CCS

H2

Green H2 for Humber

Green H2 for Scotland

Zero Carbon Humber

High Saltern

Leading Clean Power Hub

H2 as a fuelstock

fossil fuel

natural gas

Green H2

Blue H2

Brown H2

CCS

steam reform

Biomass gasification

Electrolysis

Transport + Store

Industry

Power

EXPORT

zero emission transport

Cluster Plan

ID Optimal Route

Understand Uncertainty

POTENTIAL FUTURES

Legacy Potential

Value beyond 2040

Skills & Training needs

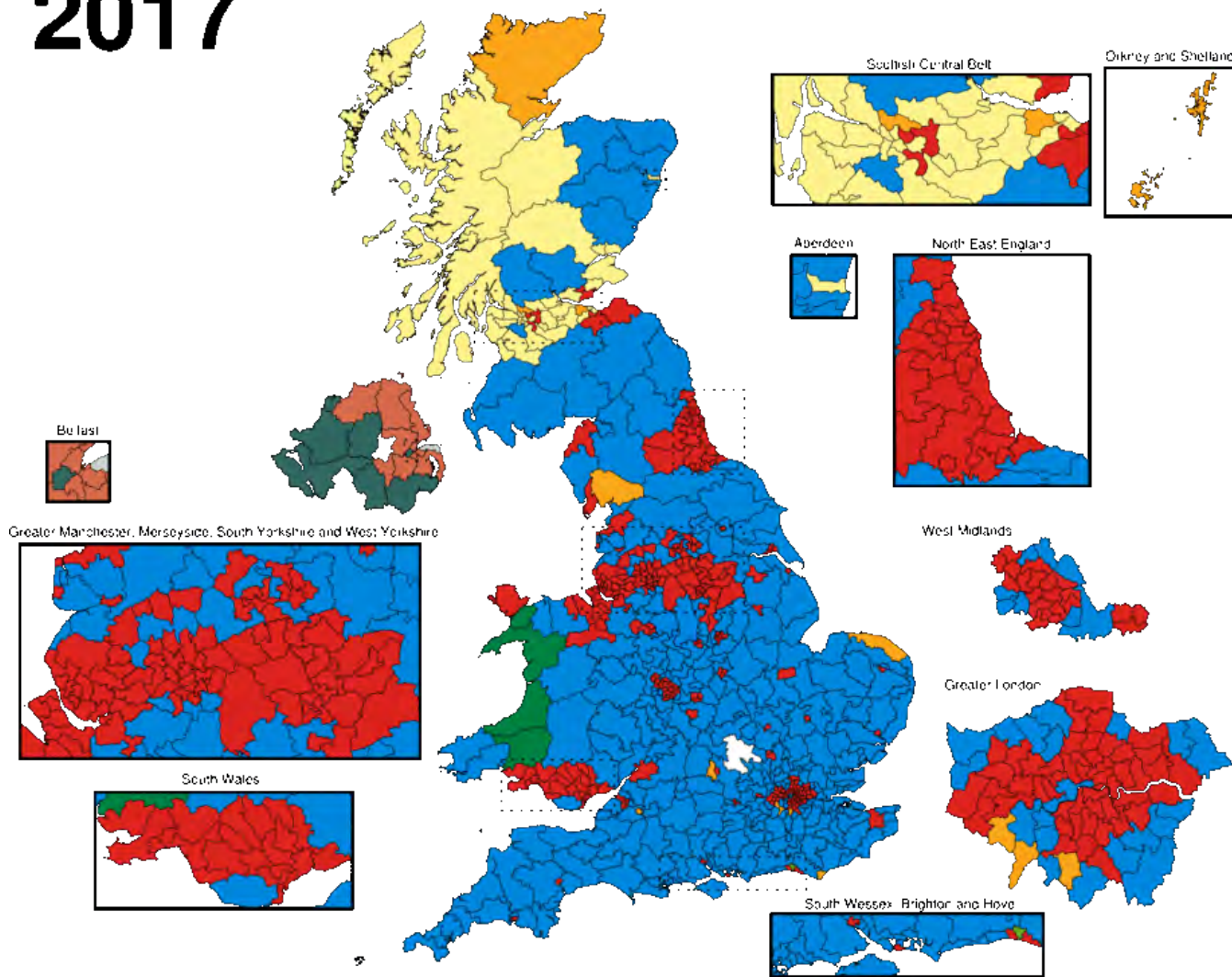
Catch & Humber LEP

Working to deliver net zero by 2040



2017 vs 2019 elections and the eroding 'red wall'

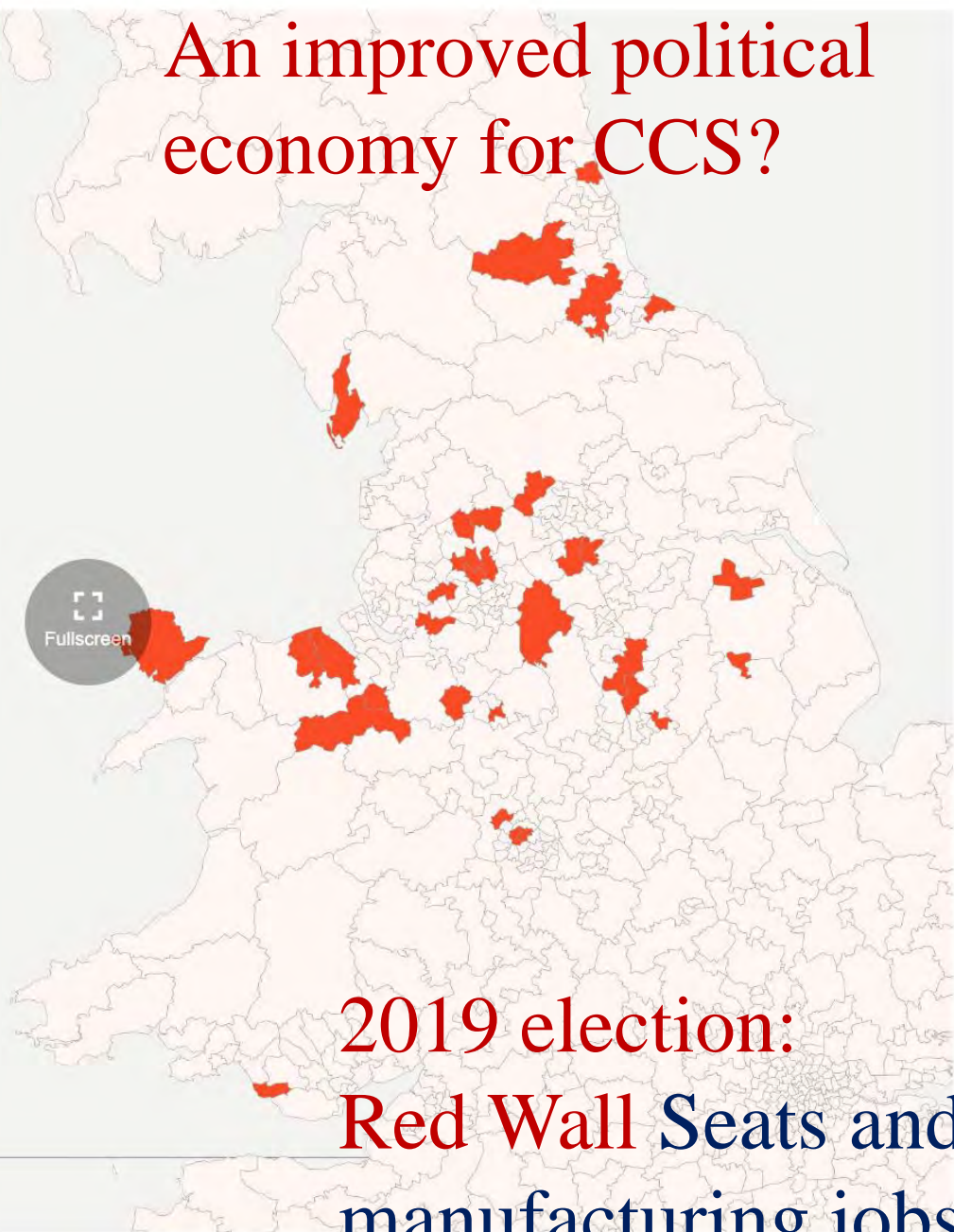
2017



An improved political economy for CCS?

BATTLEGROUND SEATS WITH A SMALLER MAJORITY THAN THE NUMBER OF MANUFACTURING JOBS⁷

#	Constituency	Majority	Manufacturing Jobs	Ratio
1	Bury North	105	4215	40.14
2	High Peak	590	6085	10.31
3	Bolton North East	378	3400	8.99
4	Blyth Valley	712	6065	8.52
5	Stoke-On-Trent Central	670	5265	7.86
6	Heywood and Middleton	663	5100	7.69
7	Bury South	402	2945	7.33
8	Dewsbury	1561	8625	5.53
9	Delyn	865	4600	5.32
10	Bridgend	1157	5805	5.02
11	Burnley	1352	6625	4.90
12	Gedling	679	3065	4.51
13	North West Durham	1144	4805	4.20
14	Wrexham	2131	8535	4.01
15	West Bromwich East	1593	5180	3.25
16	Clwyd South	1239	3345	2.70
17	Hyndburn	2951	7720	2.62
18	West Bromwich West	3799	9140	2.41
19	Keighley	2218	4875	2.20
20	Sedgefield	4513	9275	2.06
21	Barrow and Furness	5789	11290	1.95
22	Copeland	5842	11330	1.94
23	Leigh	1965	3530	1.80
24	Scunthorpe	6451	11435	1.77
25	Wakefield	3358	5615	1.67
26	Ashfield	5733	9170	1.60
27	Warrington South	2010	2830	1.41
28	Vale of Clwyd	1827	2420	1.32
29	Wolverhampton North East	4080	5140	1.26
30	Ynys Mon	1968	2475	1.26
31	Lincoln	3514	4305	1.23
32	Redcar	3527	4240	1.20
33	Wolverhampton South West	1661	1870	1.13
34	Bolsover	5299	5490	1.04
35	Crewe and Nantwich	8508	8730	1.03

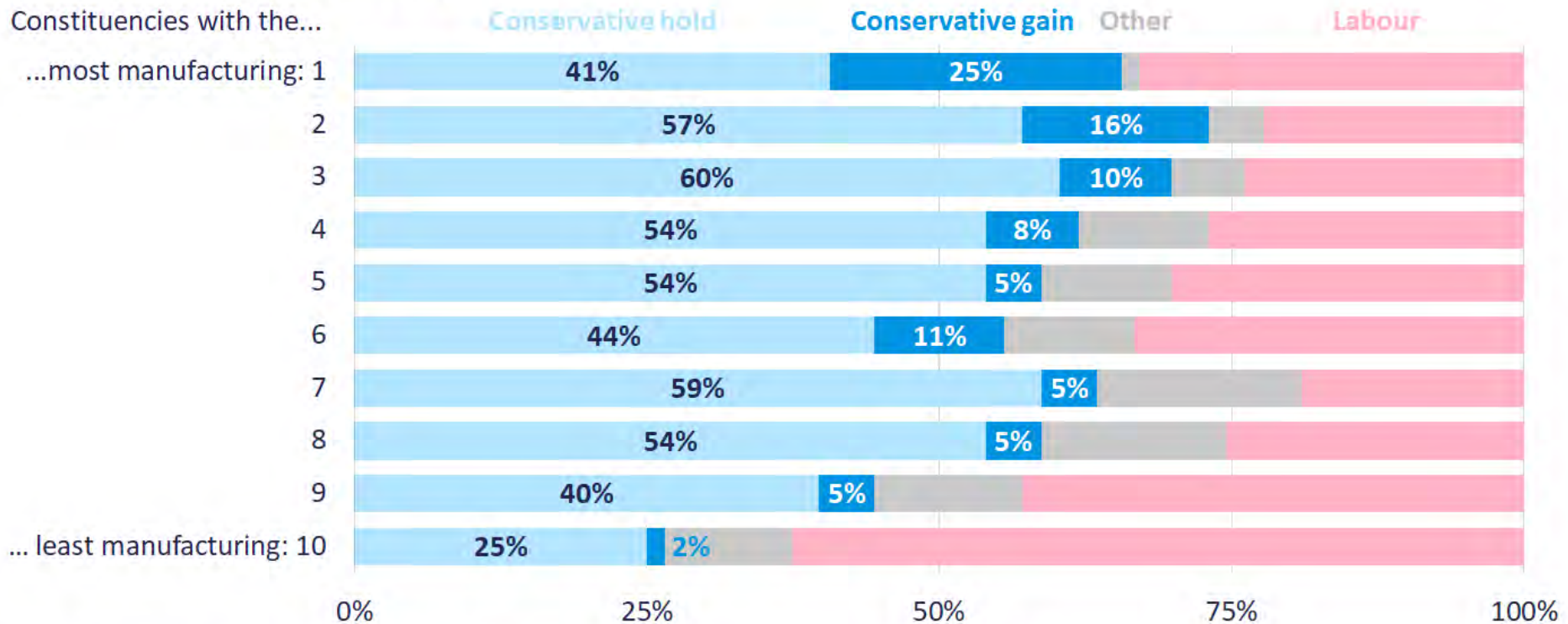


2019 election:
Red Wall Seats and
manufacturing jobs

⁷ Full list of 57 seats can be found in Annex 3

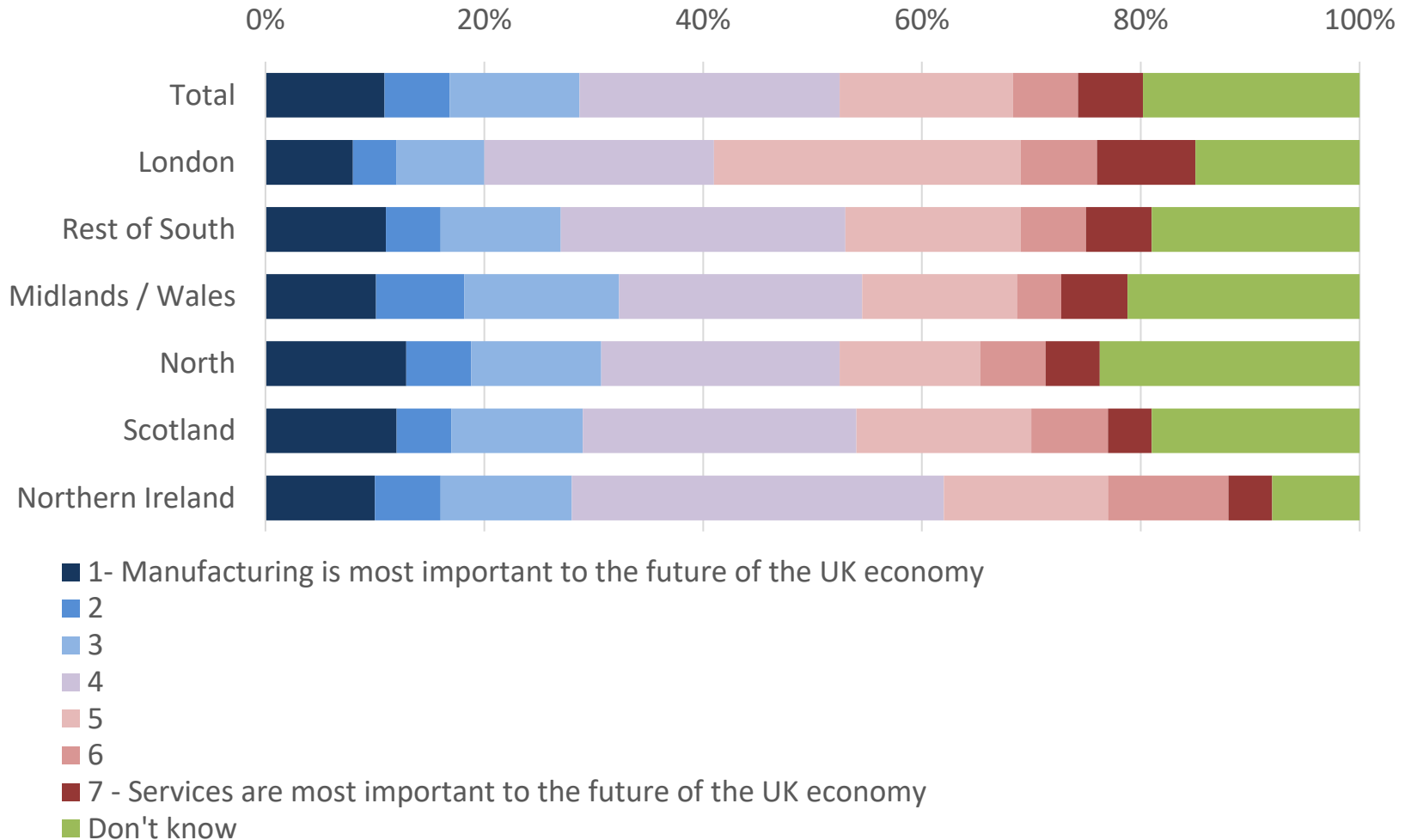
Conservative Gains in 2019 & Manufacturing Jobs

2019 General Election results (GB) vs. manufacturing jobs per constituency



Source: NOMIS Official Labour Market Statistics - Business Register and Employment Survey 2018

Role for manufacturing in UK economy



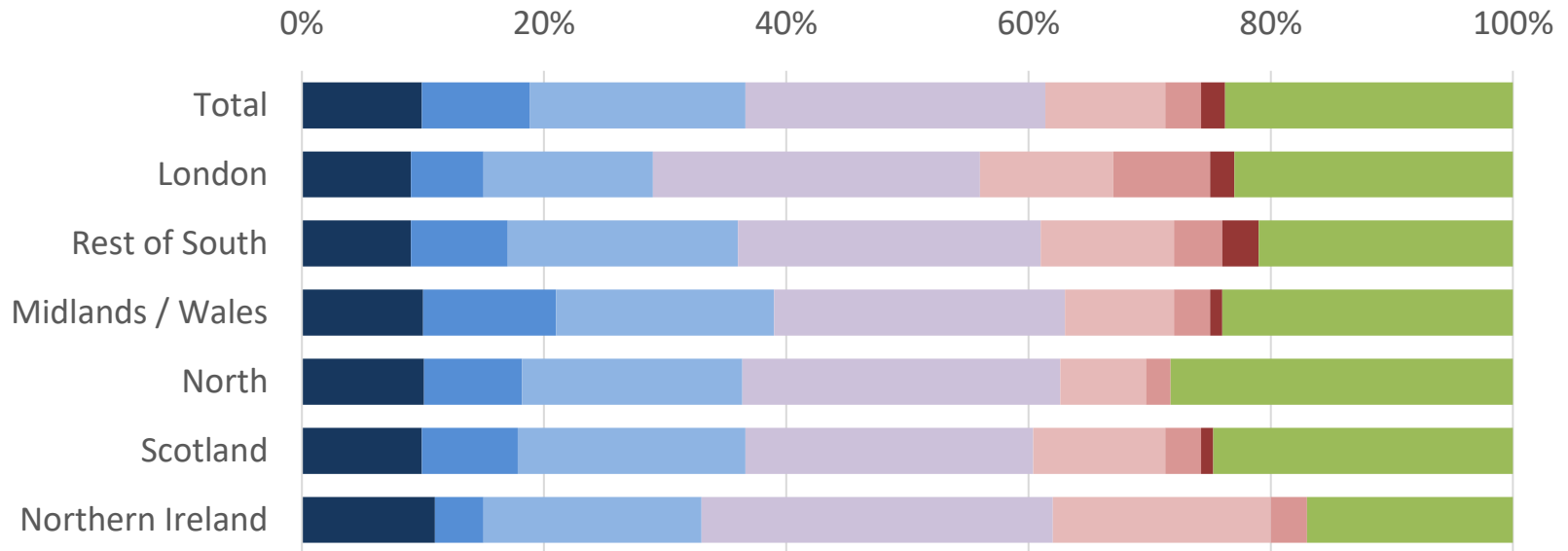
EPRG survey 14-17 June 2021



But very different demographics of support

- For those claiming manufacturing is ‘most important to the future of the UK economy’ there were *some* regional differences, ex: London (8%) vs North of England (13%) but even sharper divisions along other dimensions:
 - Conservative voters (18%) >> Labour voters (6%)
 - Older (65+) respondents (18%) >> Young (18-24) (5%)
 - Lower social grade/’blue-collar’ workers (C2DE) (15%) >> ‘white-collar’ workers/managers (ABC1) (8%)
 - Male (14%) > Female (9%)
 - Brexit referendum vote: Leave EU (19%) >> Remain in EU (7%)

Role for Industrial Clusters in UK economy



- 1- Industrial clusters should play a central role in the future of the UK economy
- 2
- 3
- 4
- 5
- 6
- 7 - Industrial clusters have no role to play in the future of the UK economy
- Don't know

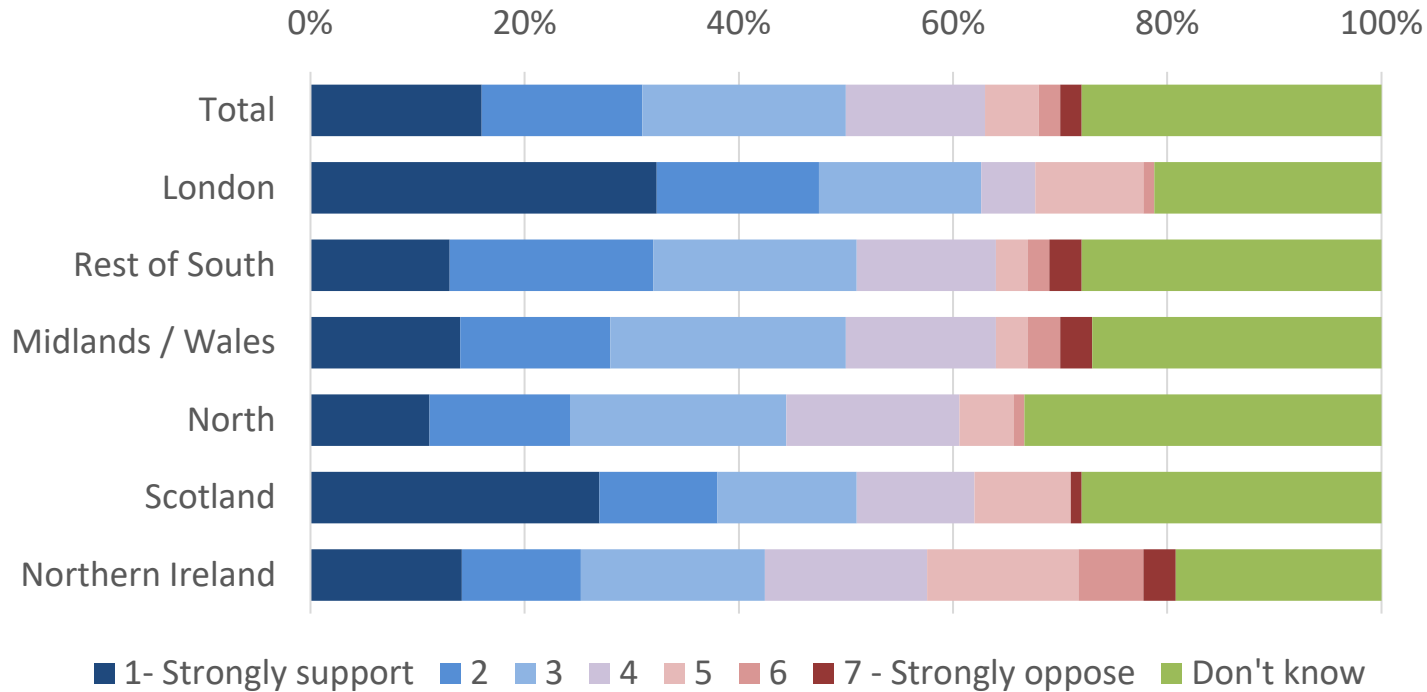


Similar demographic breakdown of support

- Conservative voters (14%) >> Labour voters (8%)
- Older (65+) respondents (20%) >> Young (18-24) (5%)
- Lower social grade/'blue-collar' workers (C2DE) (12%) >> 'white-collar' workers/managers (ABC1) (8%)
- Male (12%) > Female (7%)
- Vote on Brexit referendum Leave EU (16%) >> Remain in EU (6%)



Support for Industrial Decarbonisation Challenge



The UK has recently launched an Industrial Decarbonisation Challenge to enable significant reductions in CO2 emissions from industrial clusters across the UK. The stage one deployment projects, supported by over £261 million in funding from industry and £171 million in government funding, include:

- Scotland's Net Zero Infrastructure (projects near Peterhead and Grangemouth near Falkirk)
- Net Zero Teesside project
- Zero Carbon Humber
- HyNet North West Carbon Capture Utilisation and Storage (CCUS) (near Chester/Liverpool)
- South Wales Industrial Cluster (SWIC)
- Green Hydrogen for Humber

Demographics of support **FLIP** on Decarbonisation

- Stronger regional differences London (32%) vs North (11%)
- Conservative voters (11%) << Labour voters (26%)
- Older (65+) respondents (18%) << Young (18-24) (32%)
- Lower social grade/'blue-collar' workers (C2DE) (15%) < 'white-collar' workers/managers (ABC1) (20%)
- Male (19%) ~ Female (16%)
- Vote on Brexit referendum Leave EU (12%) << Remain in EU (23%)



Some tentative takeaways

- *Key stage in the UK debate was reframing CCUS (and hydrogen) policy to focus on industrial clusters*
- *UK experience offers lessons to other key countries considering industrial decarbonization on the need to align with wider industrial policy/political economy*
- *First steps have been promising but difficulties loom*
 - *Are governments ultimately ready to make the scale of investments necessary?*
 - *Supporters of industrial clusters are not the same as those supporting decarbonising industrial clusters, which may lead to tensions in maintaining support*

Thanks 감사합니다

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Role for different technologies as part of plan to address climate change

EPRG/UKCCSRC survey 14-17 June 2021

