

# IDRIC

## Industrial clusters as agents of change? Results from a rapid evidence assessment

Dr Imogen Rattle  
Prof Peter Taylor  
University of Leeds

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Panel 9: Deep decarbonisation of industry

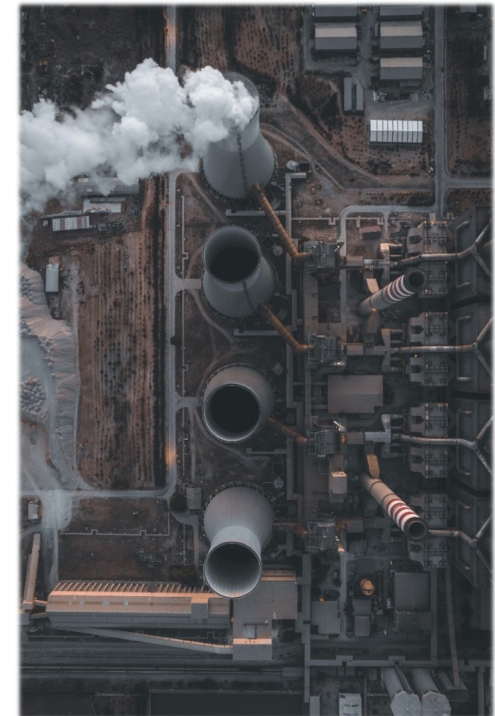


## Contents

- Industrial decarbonisation in context
- Cluster initiatives
- Outline of research
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## The challenges of industrial decarbonisation

- 26% of global CO<sub>2</sub> emissions
- Hard to abate
- Technology relatively immature
- No silver bullet
- Industrial materials essential



## Ways of thinking about industrial decarbonisation

### Intervention

- Demand reduction
- Alternative heat sources and feedstocks
- Carbon Capture Utilisation or Storage (CCUS)

### Sector

- Steel, cement, chemicals
- Paper and pulp, ceramics, glass, food...

### Place

- Industrial clusters
- Dispersed sites

## Why clusters?

- The UK's six largest industrial clusters account for half of sector emissions
- The UK Industrial Decarbonisation Strategy sets the ambition for emissions to reduce by at least two-thirds by 2035 and by at least 90% by 2050
- Industrial clusters prioritised for early deployment of hydrogen and CCUS infrastructure
- Establish the world's first net zero carbon industrial cluster by 2040, with at least one low-carbon industrial cluster by 2030

### THE UK'S LARGEST CLUSTERS BY INDUSTRIAL EMISSIONS ONLY



Industrial Decarbonisation Strategy (p. 119)

## Cluster definition

Places where **related industries** have **co-located**. Benefits include deploying and utilising **shared decarbonisation infrastructure**, enabling industry to **reduce the unit cost** for each tonne of carbon abated as well as opportunities for **resource and energy efficiency** and **learning and innovation** sharing

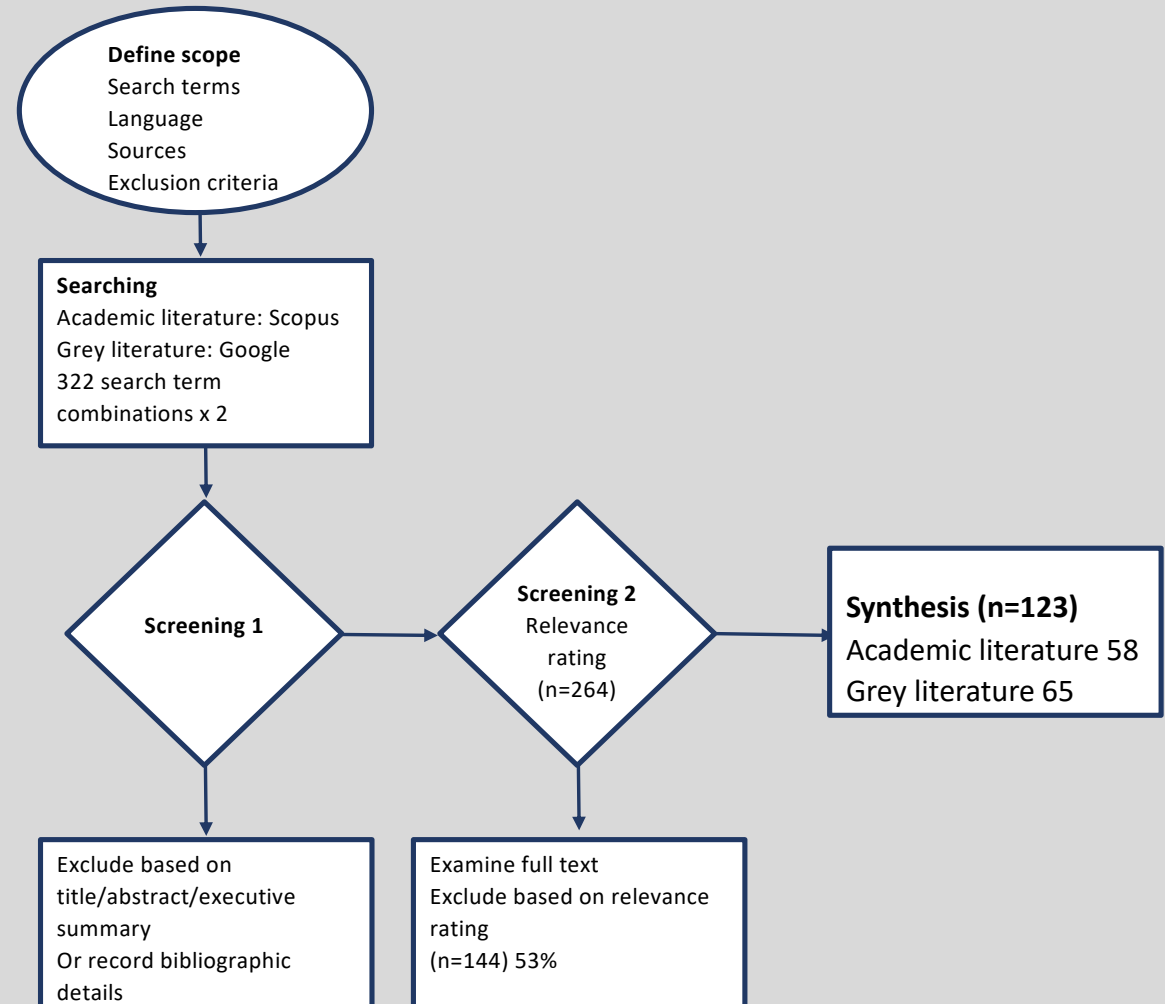
Industrial Decarbonisation Strategy (p. 119)

## Methodology – Rapid Evidence Assessment

- “A short but systematic assessment on a constrained topic.”
- What factors drive the development of low carbon industrial clusters?
  - Policy and business models
  - Configuration
  - Context
  - Governance

## Process

- Search terms drawn from literature and agreed with Steering Group containing cluster representatives, CCC, IEA and IDRIC
- Searching Nov 21-Feb 22
- Two screening stages





## The corpus

- Majority of publications date from the last four years
- Because many initiatives are recent, empirical data are lacking
- Studies on industrial cluster decarbonisation generally focus upon singular interventions, in particular CCS/CCUS
- The challenges of integrating sectors, technologies, clusters with non-clusters, are under researched
- Focus on coastal clusters in North-West Europe, North America and Australia
- New cluster infrastructure initiatives are being announced weekly

## Policy and business models

- *What policies and business models are being adopted to drive decarbonisation of industrial clusters in areas such as infrastructure deployment and innovation?*

### Key findings

- Broad actions at national and supranational level are clear, there is little agreement about what this support should be at cluster level
- Cluster policy is rarely successful at generating new clusters
- The current business model for industrial cluster decarbonisation is being driven by CCS/CCUS
  - Shared infrastructure
  - Blue hydrogen as a secondary revenue stream

## Configuration

- *Is there any evidence to indicate the advantages of particular configurations of sectors or technologies for decarbonising industrial clusters?*

### Key findings

- The presence of one or more high emitting installations to provide an anchor project is more important than sector configuration
- Technology configurations either hydrogen/CCS or electrification and efficiency

## Context

*What factors are influencing how industrial decarbonisation clusters come to be defined as such (including regulatory, geographical, historical, social and political factors)?*

### Key findings

- Clusters self-identify
- Favourable location: proximity to sinks, large quantities of renewable energy and favourable geopolitical location are key assets for industrial decarbonisations clusters
- Historical factors play a key role in forming cluster identity and through it the vision and strategic thinking critical in gaining government funding
- Social and political factors are neglected in industrial cluster decarbonisation literature to date

## Governance

*How are the clusters governed (including how these projects integrate with other regional decarbonisation initiatives and informal institutions)?*

### Key findings

- The industrial decarbonisation clusters identified in this REA employ a centralised structure with a few anchor members at the core
- Strong cluster leadership is a key element of success but there is no ideal form of cluster governance.
- Presently little evidence on involvement of the regional tier in cluster development

Flagship projects	Porthos (NL)	East Coast (UK)	Houston Ship Channel CCS Innovation Zone (US)
<b>Vision</b>	Porthos offers companies the opportunity to reduce their CO2 emissions during the period in which they have not yet made the transition to biobased, renewable or circular. This enables companies to contribute to the Netherlands' climate objectives and to the energy transition, even if the alternatives are still not sufficiently available or developed.)	By its strength in diversity, the East Coast Cluster stands ready to remove 50% of the UK's industrial cluster CO2 emissions, protect thousands of jobs and establish the region as a globally-competitive climate-friendly hub for industry and innovation	<ul style="list-style-type: none"> <li>Initiation stages</li> </ul>
<b>Lead bodies</b>	A partnership between <ul style="list-style-type: none"> <li>Port of Rotterdam Authority</li> <li>Gasunie</li> <li>EBN</li> </ul>	A collaboration between <ul style="list-style-type: none"> <li>Net Zero Teesside</li> <li>Zero Carbon Humber</li> <li>Northern Endurance Partnership</li> </ul>	Coalition of 14 companies led by Exxon Mobil
<b>Project focus</b>	<ul style="list-style-type: none"> <li>Transport and storage infrastructure to offshore depleted gas fields</li> </ul>	25 eligible projects under review <ul style="list-style-type: none"> <li>Power CCUS Projects (6)</li> <li>Hydrogen Projects (4)</li> <li>Industrial CCUS (15)</li> </ul>	<ul style="list-style-type: none"> <li>Transport and storage infrastructure to offshore gas fields</li> </ul>
<b>Funding pathways</b>	<ul style="list-style-type: none"> <li>EU Connecting Europe Facility funding</li> <li>NL grant through the SDE++</li> <li>EU grant Project of Common Interest</li> </ul>	<ul style="list-style-type: none"> <li>UK gov grant through CCS Infrastructure Fund</li> <li>UK gov grant Net Zero Hydrogen Fund</li> </ul>	<ul style="list-style-type: none"> <li>Joint industry/government funding (required)</li> <li>45Q tax credit</li> </ul>
<b>Timelines</b>	<ul style="list-style-type: none"> <li>Final investment decision second half 2022</li> </ul>	<ul style="list-style-type: none"> <li>Decision on successful projects from May 2022</li> </ul>	<ul style="list-style-type: none"> <li>Initiation stages</li> </ul>
<b>Carbon capture potential</b>	<ul style="list-style-type: none"> <li>2.5 million tonnes of CO2 emissions p/a by 2024</li> <li>37 million tonnes of CO2 emissions over 15 years</li> </ul>	<ul style="list-style-type: none"> <li>27 million tonnes of CO2 emissions p/a by 2030</li> </ul>	<ul style="list-style-type: none"> <li>50 million tonnes of carbon dioxide p/a by 2030</li> <li>100 million tonnes of CO2 emissions p/a by 2040</li> </ul>

## Clusters as agents of change?

### Conclusions

- Flagship industrial clusters have the potential to lead on industrial decarbonisation, but they are likely to be finite in number
- The focus on 'big ticket' CCUS and hydrogen risks eclipsing the importance of actively managing strategies for resource and energy efficiency
- There is an urgent need to kick-start industrial decarbonisation in non-coastal areas and dispersed sites

### Next steps

- International comparative case study
- Joint workshops to bring together UK and international cluster stakeholders

# IDRIC

Thank you  
Questions?

[@imogen\\_tweets](#)

[info@idric.org](mailto:info@idric.org)

**@IDRICUK**

<https://idric.org/>





# Appendix: REA search strategy

Technology, sector and decarbonisation keywords	AND	Co-location keywords	AND	Policy keywords
Industr* decarboni*ation OR		Cluster OR Clusters OR Hub* OR Consortium	Innovat* OR	
"Energy intensive" OR			R&D OR	
Steel OR			"Research and development" OR	
Cement OR			Financ* OR	
Refining OR Refinery OR			Grant* OR	
"Chemicals industry" OR			Incentive* OR	
Glass OR			Loan* OR	
Paper AND Pulp OR			Subsid* OR	
Ceramics OR			Tax* OR	
Food AND drink			Polic* OR	
Metal* OR			Regulation* OR	
Kiln* OR			Standard* OR	
Foundr* OR			Instrument* OR	
Furnace* OR			Business AND model*	
"Green hydrogen" AND industr* OR				
"Clean hydrogen" AND industr* OR				
"Blue hydrogen" AND industr* OR				
Electrification AND industr* OR				
"Carbon capture" AND industr* OR				
CCUS AND industr* OR				
DACCS AND industr* OR				
"Greenhouse gas removal" AND industr* OR				
GGR AND industr*				