Whitepaper

The current state of UK carbon capture research and industry

Implications for the Industrial Strategy

Summary of key findings

- Real time data on research and investment can help to target and support the implementation, monitoring and evaluation of the UK's Modern Industrial Strategy.
- We illustrate its use by focusing specifically on one part of the UK's strategy: carbon capture and storage. The result is an up to-date picture of the sector and immediate areas for focus.
- Nationally, the UK has strengths in carbon capture research:
    - It ranks third globally on key outputs and citations, with strong citations of UK research in patents suggesting commercial potential.
    - The UK has research strength in particular areas of carbon capture. Catalytic hydrogenation stands out as an area of relative UK advantage both in terms of citation impact and patenting.
- There is also an emerging carbon capture industry in the UK:
    - The UK is second only to the US in the number of carbon capture firms by headquarters.
    - UK carbon capture firms are, in line with typical global patterns, predominantly young, small and at seed or venture stages.
- Carbon capture research appears geographically dispersed, but commercial presence is more London-focused.
- A key area of policy focus should be to encourage investment in industry-academic collaborations.
    - The UK is behind international peers in terms of publications in collaboration with industry.
    - UK start-ups and scale-ups also typically receive less external funding than North American and European peers.

Introduction and approach

The Industrial Strategy

The UK's Modern Industrial Strategy, published in June 2025, represents a foundational 10-year plan in support of the government's missions. The Strategy identified eight sectors – the **IS-8** – seen to have high potential for future UK growth. In many cases, the Strategy also identified significant targets to increase private investment in these sectors as a key driver of future growth benefits.

Figure 1: The IS-8 sectors

Sector plans for the IS-8 define more than 30 'frontier industries', based on judgement about the economic potential they represent and the opportunity for policy action to make a difference.[1] These range from space, to hydrogen, to video games, maritime, engineering biology, FinTech, MedTech and legal services. These frontier industries remain, though, relatively broad and high level. **A more granular, real time understanding of their economic potential could support more targeted policy intervention.**

Digging under the hood – carbon capture

This article uses one of the frontier industries – carbon capture, usage and storage (CCUS) – to illustrate how real-time data on research and innovation can provide that more granular insight to improve the chances of meeting the objectives in the Industrial Strategy. CCUS is a critical enabler of the government's 'Clean Energy Superpower' mission and could offer significant economic opportunity as well:[2]

> *"CCUS is essential to decarbonising our energy intensive industries, such as cement, refining and enabling the decarbonisation of sectors such as aviation. It will help both protect vital jobs and create new opportunities in our industrial heartlands."* (p.60)

The sector, not defined in Standard Industrial Classifications (SICs), is inherently difficult to measure. The relatively nascent nature of the sector means different opportunities for research, innovation and commercialisation may need to be supported if the sector is to grow in the UK.

This report uses two different 'real-time' datasets to:

1. Identify **current UK strengths and areas of comparative advantage** in carbon capture research and development, to identify possible areas of future economic advantage that might benefit from current policy support.
2. Understand the **current carbon capture business and investment environment** in the UK compared with competitor countries and regions.
3. Provide a **baseline** that could inform future monitoring and evaluation of the Industrial Strategy and its impact on the carbon capture landscape.

[1] Industrial Strategy Technical Annex (2025), available here.
[2] Clean Energy Industries Sector Plan (2025), available here.

Data sources

The analysis combines two main sources of evidence, summarised briefly below with more details in the annex.

Our analysis focuses specifically on carbon capture. A broader analysis could also capture the wider use and storage aspects of CCUS, though additional specifications of keywords may be needed to exclude e.g. broader energy storage research and business activity that is not specifically related to carbon capture.

Clarivate Web of Science and Web of Science Core Collection

The Web of Science Core Collection is a comprehensive database of research published in academic journals, books and conferences. It covers over 22,000 of the highest impact journals worldwide. The Web of Science platform includes patents and patent citation information derived from our Derwent Innovation Index database.

Keyword searches of the titles and abstracts of research publications were used to identify those relating to carbon capture and focused on the five most recent full calendar years, 2020-2024.

Crunchbase

Crunchbase is a proprietary database of almost 4 million companies globally, focusing on start-ups, scale-ups and investible companies.[3] Data is collated from a combination of information curated by a network of global partners (venture capitalists, executives and investors) and information gathered and summarised using AI algorithms.

The focus on start-ups, scale-ups, mergers and other signals of entrepreneurship and dynamism make it a valuable resource for analysing a business population of keen interest around industrial policy. Its global coverage also makes the dataset particularly valuable for understanding the UK in a wider international landscape.

We used keyword searches of company descriptions to isolate carbon capture companies.

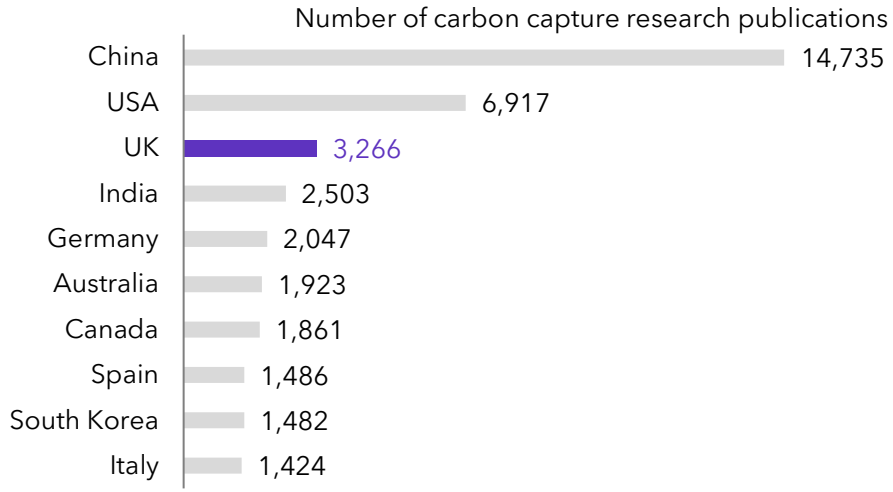
[3] https://www.crunchbase.com/

Key findings: UK carbon capture research

The UK's carbon capture research is among the best in the world

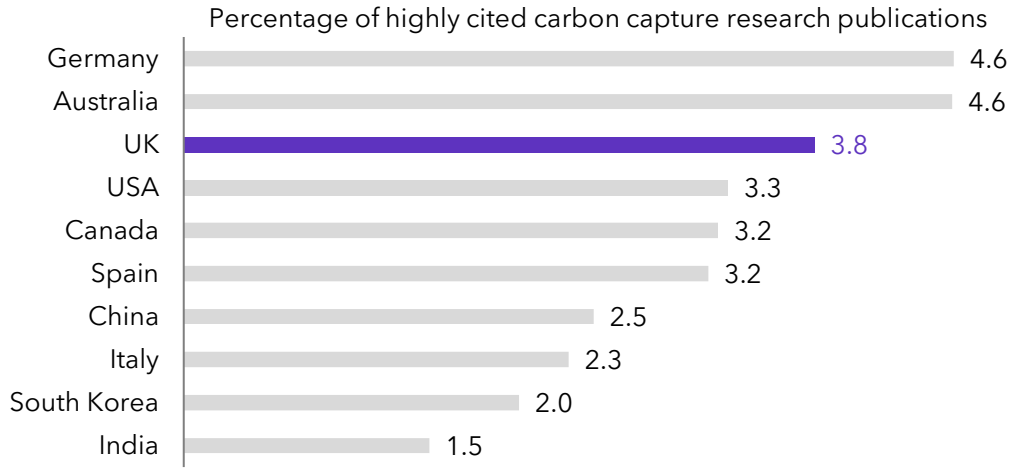
The UK is a global leader in carbon capture research. It is ranked third in the world measured by the number of research publications between 2020 and 2024 (Figure 2), although its research output measured by the number of studies is far smaller than the USA or China.

Figure 2: The carbon capture research publication output of the ten most productive countries, 2020 to 2024



In addition, the research it produces has a high impact on the research community, as shown by the percentage of its carbon capture research that is highly cited (Figure 3).

Figure 3: The percentage of carbon capture research publications in the world's top one per cent by number of citations for the ten most productive countries, 2020 to 2024

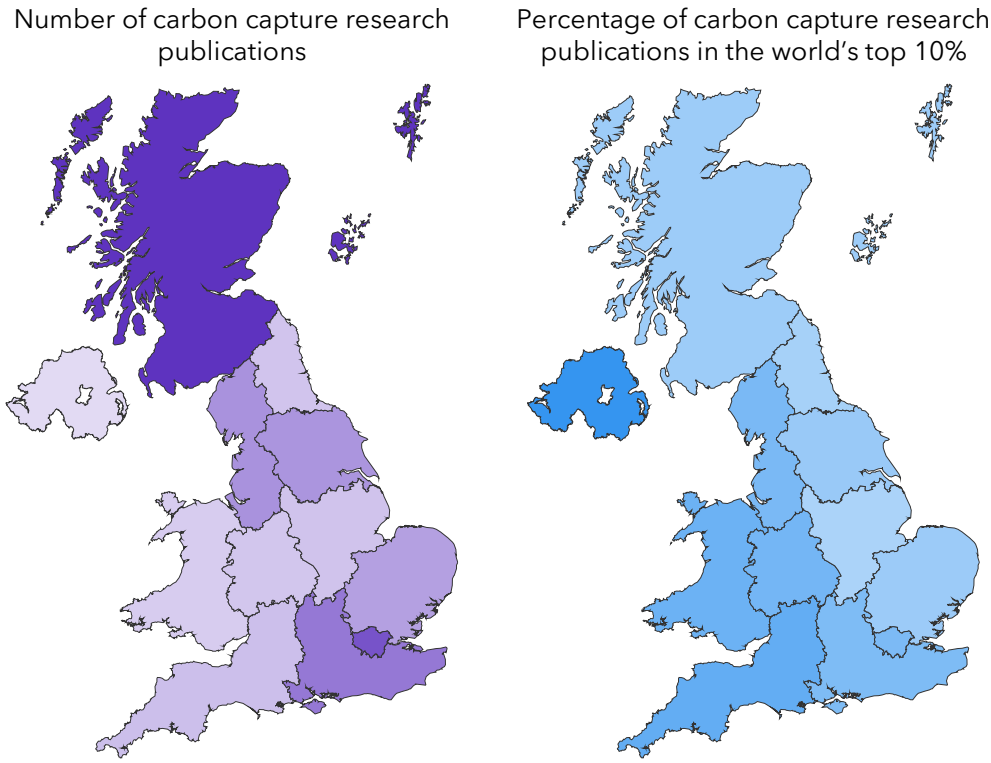


On this basis, the UK is again ranked third in the world but exceeds the performance of both China and the USA.

The UK's carbon capture research capacity and strength are spread across the country

Although there are differences between the regions and nations, both capacity and strength in carbon capture research are distributed across the UK (Figure 4). The regional distribution of research may provide a good starting point for a geographically diverse approach to developing the sector in terms of support for research and innovation.

Figure 4: The regional distribution of the UK's carbon capture research publications and the percentage of these which are highly cited, 2020 to 2024



UKRI is actively supporting the UK's strong position in carbon capture research

Of global research funding agencies, UKRI ranks third in terms of the number of publications in the world's top 1% of most highly cited carbon capture publications that it supports. Indeed, UKRI alone supports more of the most cited carbon capture papers than the EU (which includes multiple funding streams, for example the Horizon programmes, Marie Sklodowska-Curie grants, and the European Research Council).

Figure 5: The world's leading funders of highly cited carbon capture research publications and the number of patent citations those funders' carbon capture research publications receive, 2020 to 2024

	Publications in Top 1%		Citations From Patents	
Funding Agency	n	rank	n	rank
NSFC	224	1	120	1
National Key R&D Program of China	46	2	10	18
UKRI	43	3	47	4
EU	39	4	74	3
US NSF	36	6	40	5
US DOE	34	5	102	2
Fundamental Research Funds for Central Universities, China	27	7	19	10
Australian Research Council	20	8	10	18
China Postdoc Science Foundation	18	9	13	15
NRF, Korea	8	10	14	13

Similarly, UKRI-supported research receives the fourth highest number of citations from patents, indicating that this research is also relevant to commercial innovation, alongside academic inquiry.

On both metrics, the National Natural Science Foundation of China (NSFC) and the US Department of Environment have tended to be world-leaders.

The UK has some of the world's leading carbon capture research organisations

Several UK institutions are strong compared to rest of world using a variety of different indicators (Table 1). Of the UK's fifteen institutions with the highest recent output of carbon capture publications:

- five are ranked in the world's top 50 by citation impact
- five in the world's top 50 by highly cited publications
- 11 are in the world's top 50 by the number of citations they receive from patents.

Table 1: The 15 UK institutions that published the most carbon capture research publications, along with their average citation impact, number of highly cited publications, and the average number of citations from patents, 2020 to 2024. Institutions that are ranked in the top 50 globally using a particular indicator are highlighted in green, and those ranked between 51 and 100 are highlighted in yellow.

	Web of Science Publications	Category Normalized Citation Impact		Publications in Top 10%		Mean Citations from Patents per 100 Publications	
Organisation		n	rank	n	rank	n	rank
Imperial College London	286	1.72	77	70	13	4.55	33
University of Edinburgh	235	1.56	97	42	54	2.55	55
University of Cambridge	173	2.26	25	52	31	9.83	9
University of Manchester	167	1.81	64	48	38	1.80	76
University of Oxford	163	2.48	16	48	38	3.68	41
Heriot Watt University	160	1.43	120	24	125	9.38	10
University of Sheffield	158	1.64	88	28	107	3.16	43
University College London	153	1.85	59	37	68	4.58	32
University of Aberdeen	143	2.14	29	33	84	1.40	86
Cranfield University	126	1.45	116	29	102	15.87	4
University of Nottingham	124	1.17	152	19	146	4.03	38
University of Leeds	119	1.76	71	34	82	4.20	34
University of Exeter	109	2.66	10	39	59	0.00	129
Queens University Belfast	107	2.76	7	46	45	15.89	3
Lancaster University	105	2.10	30	30	96	2.86	46

Three institutions (the University of Cambridge, the University of Oxford, and Queens University Belfast) are in the global top 50 on all three measures. Some institutions have particular strengths in commercially relevant publications: for example, Heriot Watt and Cranfield are both outside the global top 100 in terms of citation impact and highly cited publications, but in the global top 10 for patent citations.

This performance shows that UK research in this field is both academically and commercially relevant.

The UK has particular strengths in carbon capture research that it can leverage

Across the subfields of carbon capture research in which the UK is most active, UK research publications receive more citations from other academic research publications (Figure 6) and patents (Figure 7) than the global average.

This implies that the UK outperforms the global average in terms of academically and commercially impactful research. The UK appears to be particularly strong in producing commercially relevant research in relation to catalytic hydrogenation and meta-organic frameworks.

Figure 6: The category normalised citation impact (CNCI) of the UK's research in six important subfields of carbon capture research, 2020 to 2024

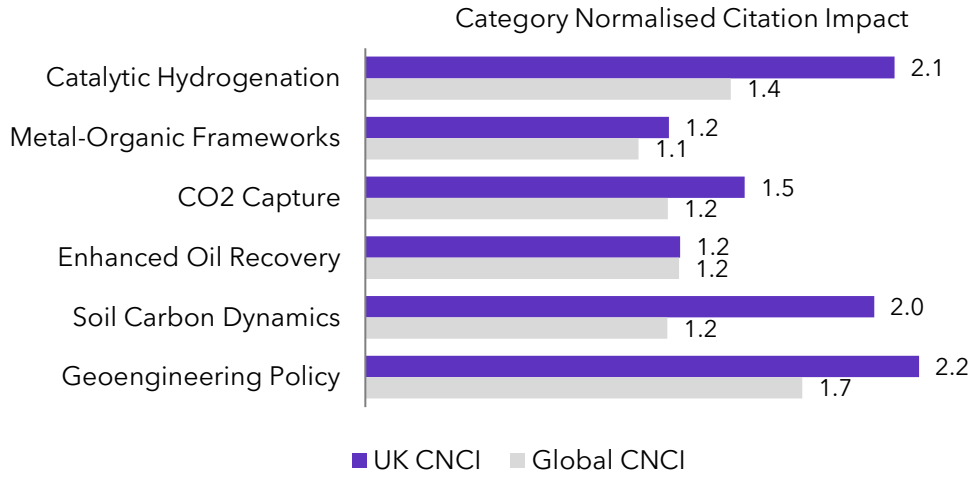
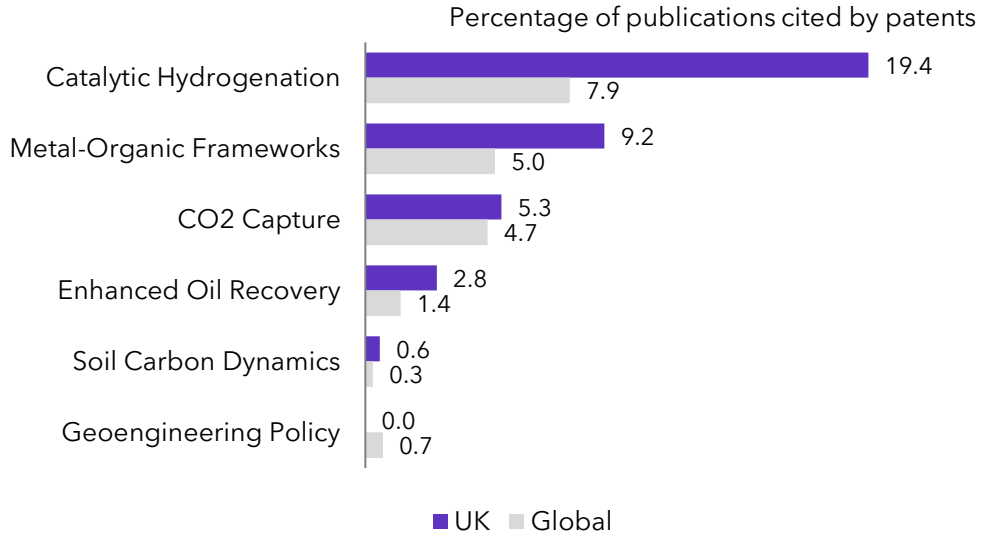


Figure 7: The patent citation impact of the UK's research in six important subfields of carbon capture research, 2020 to 2024



There is an unexploited opportunity for the UK's carbon capture research to support UK industry

The levels of industry collaboration in carbon capture research suggest that industry is relatively inactive in early-stage research in this field (Figure 8). These data also suggest that the UK's percentage of industrial collaboration is relatively modest in relation to other leading countries.

In addition, none of the leading companies that publish carbon capture research are UK-based (Figure 9). The only UK company to publish a substantive number of carbon capture research publications is BP, which is ranked 33rd in the world with ten publications in five years.

Figure 8: The percentage of carbon capture research publications involving industrial collaboration for the ten most productive countries in this field, 2020 to 2024

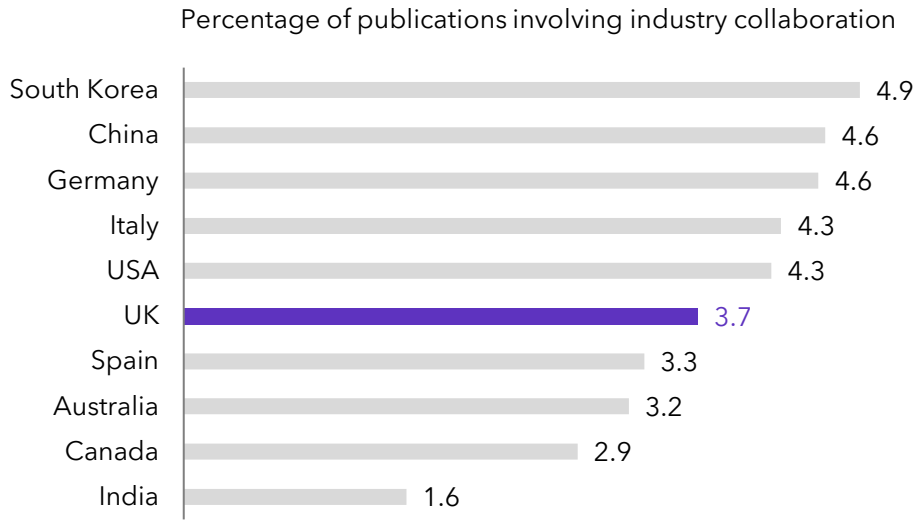


Figure 9: The corporate entities that published the most carbon capture research publications, 2020 to 2024

Company	Country	All Publications	Publications in Top 10%
China National Petroleum Corporation	China	256	36
SINTEF	Norway	217	42
State Grid Corporation of China	China	97	17
Royal Dutch Shell	Netherlands	77	13
China National Offshore Oil Corporation (CNOOC)	China	59	7
Exxon Mobil Corporation	USA	50	14
Research Institute of Innovative Technology for the Earth	Japan	37	4
Total SA	France	34	7
Petronas	Malaysia	32	1

This lack of industry collaboration is despite the UK having a relatively sizeable carbon capture sector (Figure 10), albeit one that is mostly fairly nascent and made up of small, early-stage firms (Figure 12, Figure 13).

Key findings: the UK carbon capture industry

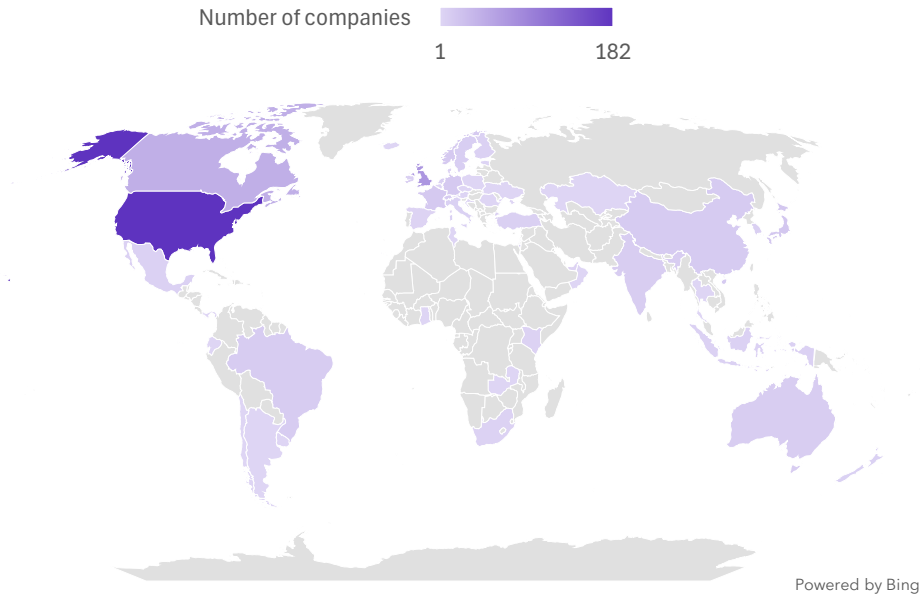
The UK is second only to the US in terms of where carbon capture companies are headquartered

A sample identified in Crunchbase in September 2025 identified 567 carbon capture companies globally. Of these, 71 (13%) were UK headquartered. Only the United States (182, 32%) had more carbon capture companies (Figure 10).[4]

Other countries with significant numbers of companies headquartered there were Canada (44, 8%), Japan (17, 3%), France (14, 3%) and Germany (14, 3%).

The data identifies only where a company is headquartered, rather than where its activity takes place. However, as the sample is overwhelmingly small firms (see below), it is likely that most firms concentrate their activity in their headquartered location.

Figure 10: The geographic location of where carbon capture companies are headquartered, Sept 2025



The UK's carbon capture industry is strongly regionally concentrated in London

Of the 71 identified carbon capture companies in the UK, 42 (59%) are recorded in Crunchbase as located in London. No other region was reported as having more than five companies (the South East and Scotland both recorded five; by contrast, none were recorded in the West Midlands), This may, in part, reflect companies having a headquarters in London but conducting at least some activity in other locations.

A more granular picture of where companies are located was captured by linking the UK-headquartered companies from Crunchbase to their Companies House records. The link was based on company names, when the company was founded, and location of the company. Based on these criteria, the result from the Companies House search that matched best with Crunchbase was used as the 'matched company'. This allowed us to identify the postcode location, rather than only the region as available in Crunchbase.[5] The locations are shown in Figure 11.

While the clear dominance of London is visible, some of the larger companies identified (by revenue estimated in Crunchbase) are headquartered outside London.[6]

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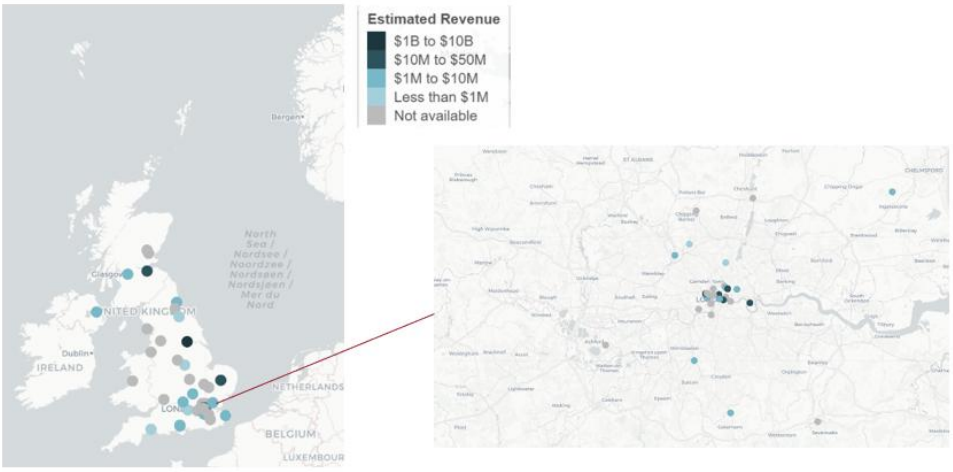
[4] Of the full sample, 39 companies (7%) did not have a named location.
[5] Of the 71 companies, 69 could be successfully matched. Verification suggests that the matches are largely accurate.
[6] Note that none of the companies where revenue data were available had estimated revenues between $50 million and $1 billion.

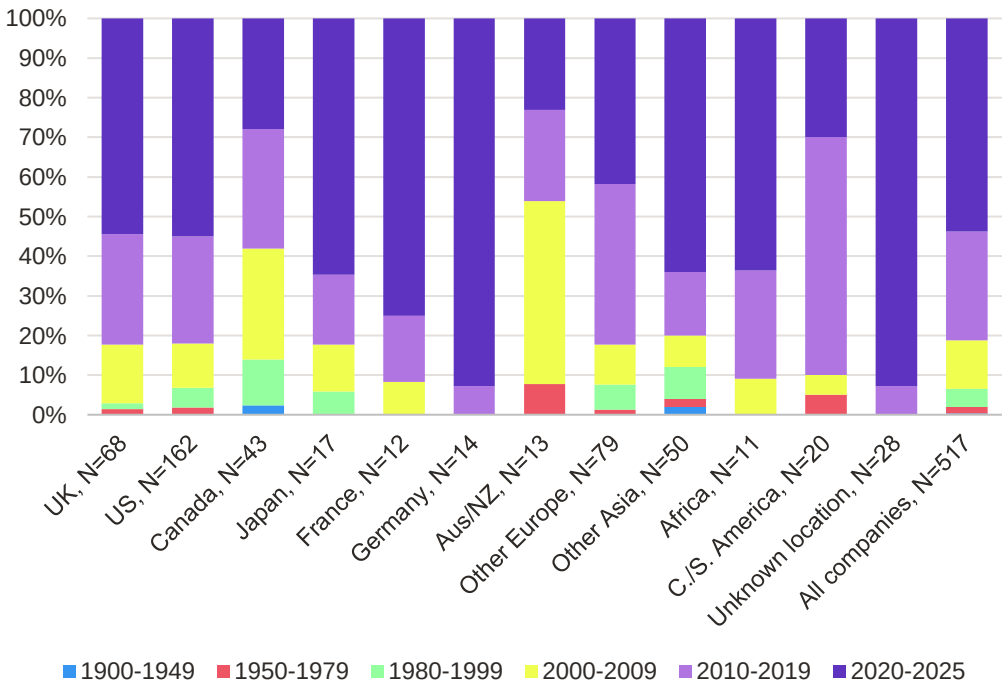
Figure 11: UK location of carbon capture companies, by revenue, Sept 2025



The carbon capture sector is young and emerging, both globally and in the UK

Where data on founding date are available, more than half of carbon capture companies (54%) have been founded since 2020 (Figure 12).[7] This suggests strong recent emerging growth of a nascent global sector. The proportion of UK carbon captured companies founded in the last five years is the same as the global average.

Figure 12: Carbon capture companies by location and year of founding, Sept 2025



Globally, only 7% of carbon capture companies were founded before 2000 (and in the UK this proportion 3%), likely reflecting increased government focus and spending in the sector since then.

[7] Date founded was available for 517 of the 567 identified companies. The chart excludes those with unknown founded dates.

Aligned with carbon capture companies being young, they are also typically small. Globally, 45% of companies (where estimates were available) had fewer than 10 employees.[8] Of UK carbon capture companies, 49% had fewer than 10 employees.

The Crunchbase data characterises the 'stage' of a company in terms of whether it is at seed, venture, IPO, merger and acquisition or private equity.[9] As expected for a young industry made up predominantly of SMEs, firms are typically at seed or early venture stage:

- 'Seed' funding is typically used to cover initial funding to develop a business idea from a concept to a deliverable outcome.
- 'Early Stage Venture' refers to financial support provided to startups during their initial stages of development, and follows 'Seed' funding.

Globally, 79% of carbon capture firms were at these stages; for UK firms, 84% are. This suggests an industry seeking considerable external investment, aligned with the young and small nature of firms in the sector.

Among start-ups, UK carbon capture companies attract typically smaller funding amounts than global competitors, with some exceptions

Analysis of funding data allows us to examine patterns of investment into carbon capture companies and differences between the UK and global peers.

UK carbon capture firms appear to be at least as likely as those in other countries to attract external finance. 62% of UK firms had recorded funding in the data,[10] compared with a global average of 57%, and a US figure, for example, of 59%.

UK firms also appear to have been successful in attracting recent funding. Among firms reporting any funding, 59% of UK firms had received funding in 2024 or 2025, compared with 50% in the USA and 55% globally.

Of particular policy interest is not just whether firms are raising external funding, but the scale of funding being raised. Here, the UK performance is less strong (Table 2).

Table 2: Mean and median external funding per carbon capture firm (among those reporting any funding) among seed/venture or other small firms, Sept 2025

Country / region	No. firms reporting funding	Total funding reported ($)	Mean funding per firm ($)	Median funding per firm ($)
United Kingdom	28	356,700,000	12,700,000	1,900,000
United States	64	2,391,500,000	37,400,000	6,000,000
Canada	20	567,900,000	28,400,000	3,000,000
Germany	10	96,600,000	9,700,000	6,000,000
Other Europe	30	172,900,000	5,800,000	2,900,000
Asia	15	41,000,000	2,700,000	1,400,000
Rest of World	13	31,000,000	2,400,000	400,000

To reduce the impact of outliers and to focus the analysis on start-up and scale-up companies (of keen focus for the Industrial Strategy), we examine the amount of

[8] Estimated number of employees was available for 523 of the 567 identified companies. The chart excludes those with unknown numbers.
[9] Funding stage was only available for 220 of the 567 identified companies. Figures are presented excluding those with unknown funding stage.
[10] It is not possible to distinguish whether firms not reporting funding genuinely had not raised external finance, or whether data were simply incomplete. Given that Crunchbase relies on a range of sources to capture funding, we assume that in most cases this reflects firms genuinely not raising funding rather than incomplete data.

fundraising only for firms classified as at seed or venture funding stages, or (where this information is missing) firms that have fewer than 50 employees. We also exclude firms with very large numbers of funding rounds (more than 8, accounting for the top 5% of firms by numbers of funding rounds among those reporting any funding) to assess 'typical' patterns of funding.

On this basis, the median fundraising by a UK carbon capture small firm is around $1.9 million, compared with $6 million in the US and Germany, $3 million in Canada, and $2.9 million in other European countries. The UK performs better taking a mean average ($12.7 million, well behind the US and Canada but ahead of other European firms), but this appears to reflect a small number of firms attracting very large amounts of funding (up to $212 million for one UK firm).

The UK picture therefore appears to be a small number of very successful carbon capture firms raising significant amounts of external finance, but 'typical' firms receiving less than key international peers, particularly in North America.

Conclusions

Delivery of effective industrial policy requires current information on research and innovation activity. Official data sources often come with significant lags. Real-time data can help to prioritise immediate actions to support the delivery of industrial strategies. It can help to decide where to focus support and to where changes are needed in approach. Given the recent launch of the UK's Modern Industrial Strategy, analysis now can also act as a baseline from which to track progress in key frontier sectors. We illustrate this by analysis looking at the carbon capture sector.

The UK demonstrates notable strengths in carbon capture research, ranking third globally on key metrics such as research publication output and citations. In addition, UK research is frequently cited in patents, indicating strong commercial potential. Within this field, catalytic hydrogenation stands out as an area of relative advantage, both in terms of citation impact and patenting activity, making it a promising focus for attention, and potentially for wider policy support.

There is also an emerging carbon capture industry in the UK suggesting that investment opportunities may exist. The UK is second only to the United States in the number of carbon capture firms headquartered domestically. These firms, consistent with global trends, are predominantly young, small, and at seed or venture stages.

Research into carbon capture appears more geographically dispersed than the commercial carbon capture sector. UK research in this area is strong across the regions and nations, with institutions such as Cranfield and Heriot-Watt performing particularly well in producing research cited in patents—an indicator of high commercial potential. In contrast, the carbon capture industry is heavily concentrated in London, though some larger firms operate outside the capital.

This analysis suggests that a key policy priority could be fostering investment and strengthening collaboration between industry and academia. Currently, the UK lags behind international peers in terms of publications co-authored with industry. Moreover, smaller UK start-ups and scale-ups typically secure less external funding compared to their North American and European counterparts, although some UK firms have achieved notable success in raising finance. A focus on such collaborations could help spread the geographical footprint of the sector and of future opportunities.

Annex: details of data sources

Clarivate Web of Science and Web of Science Core Collection

Clarivate owns and manages the Web of Science Core Collection, which is a comprehensive database of research published in academic journals, books and conferences. It is widely acknowledged to be the world's leading source of citation and bibliometric data. The authoritative, multidisciplinary content covers over 22,000 of the highest impact journals worldwide, including open access journals and over 300,000 conference proceedings. Coverage is both current and retrospective in the sciences, social sciences, arts, and humanities, in some cases back to 1900. The Web of Science also includes patents and patent citation information derived from our Derwent Innovations Index.

The key features of the Web of Science Core Collection are:

- **Publisher-neutral curated quality**: A robust evaluation and curation process by a team of expert in-house editors, carefully selecting content for quality. This ensures our unbiased coverage is consistent and comparable across publishers, countries, and fields.
- **Our curation process is unique**: Using objectivity, selectivity, and collection dynamics as the basic principles of our selection process, we use a single set of 28 criteria to evaluate a journal's quality (24 criteria) and impact (4 criteria). These are dynamic collections, subject to continuous curation, to ensure journals continue to meet our editorial standards and are in the appropriate collection to promote research integrity.
- **Cover-to-cover indexing**: No other resource indexes as deeply and completely as the Web of Science Core Collection. All the journals that we select for inclusion in the collection are indexed cover-to-cover. For each paper, we capture all authors, all author affiliations, abstract and keywords (where present), funding acknowledgements, including agency and grant numbers (if provided), and all cited references.
- **Expansive multidisciplinary discovery**: The Web of Science Core Collection provides comprehensive coverage of the sciences, social sciences and arts and humanities across journals, books, and conference proceedings.
- **We are the world's original citation index**: Web of Science Core Collection provides cover-to-cover indexing across the world's highest-quality and most impactful publications.

Keyword searches of the titles and abstracts of research publications were used to identify those relating to carbon capture and focused on the five most recent full calendar years, 2020-2024.

Crunchbase

Crunchbase is a proprietary database of almost 4 million companies globally.[11] Data about companies is collated from a combination of information curated by a network of global partners (venture capitalists, executives and investors) and information gathered and summarised using AI algorithms. It is not intended to be a comprehensive dataset of all companies in the world; rather it is aimed at investors and business professionals seeking information on investible companies.

For each company, the dataset contains key information about the business, including when it was founded, where it is headquartered, estimates of size (measured by turnover and employment) and information on investments raised. For this analysis, we used information on the number of funding rounds, the value of total fundraising and the date of last fundraising. More granular information is also accessible for more detailed analysis.

The focus on start-ups, scale-ups, mergers and other signals of entrepreneurship and dynamism make it a valuable resource for analysing a business population of keen

[11] https://www.crunchbase.com/

interest for industrial policy. Its global coverage also makes the dataset particularly valuable for understanding the UK in a wider international landscape.

Rather than relying on Standard Industrial Classifications (SICs), companies are allocated to one or more of over 700 'industries'. These include several – for example, 'nuclear', 'solar' and 'wind energy' – relevant to the Clean Energy Industries IS-8 sector.

There is no separately defined 'carbon capture' sector, but we used keyword searches of company descriptions to isolate a set of carbon capture organisations and conducted a review of the companies identified to assess the potential for false positives. There were few such false positives. We also used other filters to limit the search to currently active companies.

The search was conducted in September 2025; as the underlying dataset is constantly updated and refreshed, the reported numbers would be different if the exercise were repeated today.

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