

Climate Innovation Insights offers a platform for reflections and lessons from renowned climate innovation experts to spark discussion about the process of tackling climate change through innovation. The independent opinion pieces discuss best practices, different methodological approaches towards climate innovation and implications for business, society and politics. The series is supported by Climate-KIC, Europe's largest public-private climate innovation partnership.



Ingredients for Climate Innovation Clusters: The UK Case

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Key messages

- The presence of certain 'ingredients' increases the chance that climate innovation clusters will emerge and grow.
- Ingredients include relevant research organisations, networking agents, start-up accelerators, fiscal incentives for businesses, good transport links, political leadership and proximity to markets.
- Identifying and mapping these ingredients allows policymakers, investors and collaborators to determine how to strengthen and enhance activity.
- Analysing the presence or absence of 18 ingredients across the UK shows which locations offer the most promise for accelerating the growth of climate innovation clusters.
- The city and immediate regions around London, Cambridge, Bristol, Manchester and Edinburgh rank most highly.

Introduction

Climate innovation clusters consist of a dynamic mix of start-ups, small and medium-sized enterprises, larger businesses, research organisations, community actors and public bodies. To form a cluster, these organisations are:

- Physically located close together, for example within a city district.
- Committed to learning from each other.
- Focused on turning ideas into solutions that are positive for the climate and the economy.

Those acting within the cluster stimulate innovative activity by promoting intensive interactions, sharing facilities and exchanging knowledge and expertise.

Given that the pace of innovation is not sufficient to avoid catastrophic climate change, climate innovation clusters have the potential to accelerate the production and dissemination of low-carbon and climate-resilience innovations. Prosperous clusters can also drive productivity gains that create dividends for the economy. They attract talented, high-earning people, which generates higher tax revenues and increases the demand for cultural goods and other services.

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Evidence shows that successful innovation clusters benefit from a mix of ingredients that contribute to their development.¹ Mapping the presence or absence of these ingredients offers a useful guide for understanding which locations have the best chance of nurturing the growth of successful climate innovation clusters. It also helps policymakers, investors and other collaborators to identify how to target interventions, to either strengthen weak ingredients or add missing ingredients.

This *Insight* presents research, commissioned by Climate-KIC and undertaken by Sustainability West Midlands (SWM), which explores and maps climate innovation cluster ingredients in the UK

The ingredients needed for a climate innovation cluster

By reviewing the literature on innovation clusters, SWM developed a list of ingredients considered to be important

for increasing the likelihood of climate innovation clusters developing in certain locations. These are both climate-specific and more general (see Table 1). For each ingredient, robust nationwide datasets helped to establish the presence and strength across the UK, supported by interviews with stakeholders to check and enhance the accuracy of the findings.

Where could climate innovation clusters emerge?

Applying this analysis to 31 UK cities and their immediate surroundings, SWM ranked different locations by aggregating the scoring of the presence and strength of all mapped ingredients. Table 2 shows the results of this exercise.

The short case studies that follow give further information on why London, Bristol and Cambridge topped the rankings and offer the highest potential for accelerating the development of climate innovation clusters.

London

- The UK's capital has a 7 per cent annual growth rate in people employed in the low-carbon sector – the highest increase of any UK city.
- The London Local Enterprise Partnership receives the highest amount of European Regional Development Funding; 20 per cent is spent on low-carbon projects.
- London tops the UK competitive index and has the biggest market share of low-carbon goods and services.
- There are numerous excellent education institutions – Imperial College London, King's College London and University College London, for example – that specialise in climate and innovation.
- Challenges include high office costs, and limited connectivity and efficient travel between locations for networking or meetings.



The Queen Elizabeth Olympic Park in London is part of Climate-KIC's Smart Sustainable Districts programme.

Table 1. Ingredients for a successful innovation cluster

No.	Ingredient	Detail	Data interrogated
Climate specific			
1	Research and teaching: good university or universities (or other research bodies)	Strong departments oriented to research relevant to climate change	BIS (2015); Complete University Guide (2016); RCUK (2016); SWM (2016) Location of climate-focused research centres
2		A track record of connectivity with business	BIS (2015); KTP (no date); REF2014 (no date)
3		Strong teaching programmes producing graduates/postgraduates from courses relevant to tackling climate change	BIS (2015); Complete University Guide (2016); MastersPortal (2016); People and Planet (2016)
4		Other organisations offering strong professional education courses relevant to climate change innovation	BIS (2015); SWM (2016); UKSPA (no date)
5	Specialisation*	Clear, smart specialisation evident or emergent, with a significant number of climate-focused businesses already located close to each other	Covered by research into ingredients 7, 8 and 17
6	Corporations*	Existence of major corporations (anchor firms) with climate change-relevant profiles that are making significant research and development investments	No consistent datasets are available for assessing the potential contribution of companies to local climate-relevant research and development (R&D). This ingredient is not included in the scoring, but should to be considered in any intervention approach
7	Markets	Located close to major, relevant markets for climate-related goods and services	BIS (2013); SWM (2016)
8	Accelerator	Existence of start-up accelerator(s) or new business-support mechanisms, with a tailored focus on developing clean technology or climate-resilient businesses	BIS (2015); SWM (2016); UKSPA (no date) Location of local green business support networks Location of Catapult centres
9	Networking agents	Existence of climate change-relevant networking agencies with a track record of convening events that have a mixed participation of researchers and businesses A local business support network	SWM (2016) Location of local green business support networks and other networking agents
10	Political leadership*	Strong, ambitious political leadership or a policy and/or strategy framework for low-carbon and climate-resilient economic transitions	LGA (no date) City uptake and involvement with various UK and Environment Agency low-carbon programmes
11	Funding	Significant state sponsorship of research and development and/or innovation for low-carbon and climate-resilient solutions	BIS (2015); Gov.uk (no date a); SWM (2016) List of previously funded Innovate UK programmes (2010–16)
12	Fiscal incentives*	Long-term certainty of fiscal incentives, such as tariffs associated with energy prices from renewables	SWM (2016)
Non-climate specific			
13	Density	High population density (e.g. associated with a major metropolitan area) and availability of labour	ONS (2015)
14	Competitiveness	High scoring on competitiveness or innovation indices (intellectual property policies, legal frameworks, etc.)	CFORIC (2016)
15	Education	A high proportion of the population with an advanced degree An open immigration policy that allows global talent to move there	Eurostat (2016); ONS (2011)
16	Quality of life	'Liveability' – high scoring on UK quality of life indices	Arcadis (2016); Mercer (2016); uSwitch (2016)
17	A low-cost business environment and an attractive costs profile for new business development	Access to: <ul style="list-style-type: none"> low-cost commercial infrastructure and/or rents (e.g. science parks) low set-up and operating costs specific innovation, science and technology parks tax breaks for innovation 	BIS (2015); Colliers (2016); SWM (2016); UCL (2016); UKSPA (no date)
18	Connectivity	Efficient public transport, cycling and road systems that increase the chances of high attendance at meetings and networking events	Gov.uk (no date b, c); GVA (2014); Transport Scotland (2016); Welsh Government (no date)

* Ingredient not included in the scoring for each city

Bristol

- Low Carbon South West, a membership organisation and sector partnership between businesses, academia, investors, local authorities and regional and national agencies, operates from Bristol.
- The West of England Local Enterprise Partnership, based in Bristol, runs a Low Carbon Industries Working Group.
- Go Green, which provides networking events and encourages members to commit to a sustainability action plan, is based in Bristol.
- Bristol contains the largest number of 'green incubators' in the UK, specifically for low-carbon businesses.
- The Bristol Temple Quarter Enterprise Zone is home to a cluster of small and medium-sized enterprises specialising in low-carbon technologies and heat networks.
- The Avonmouth Severnside Enterprise Area hosts businesses involved in energy, waste and biomass schemes.
- The Bristol SETsquared initiative and Filwood Green Business Park have green credentials for low-carbon start-ups to thrive.
- The University of Bristol is a leader in climate research, while the University of the West of England has a Centre for Community Resilience and develops flood support tools for small businesses.



Temple Quay bridge provides links to the train station and the business district.

Cambridge

- Since 2010 Cambridge has been the third-highest recipient of funding from Innovate UK for climate innovation-related projects.
- Since 2010 the Greater Cambridge Greater Peterborough Local Enterprise Partnership has received the third-highest amount of funding for energy storage, and the second-highest for sustainability-related Innovate UK grants, receiving nearly £49 million in total.
- The University of Cambridge tops the UK's rankings for teaching quality in geography and environmental science, chemical engineering and civil engineering, and is second in geology.
- The SmartLIFE Training Centre has several courses specialising in sustainable construction and low-carbon technologies.
- Research and business connections are a challenge, but relevant postgraduate courses and programmes can feed into support programmes for climate-themed start-ups.



Cambridge is renowned for its research excellence.

Table 2. Locations with the most prevalent and strongest ingredients for climate innovation clusters

	Rank	1	= 2	= 2	4	5	= 6	= 6	= 8	= 8
	City-region	London*	Bristol	Cambridge	Manchester	Edinburgh	Newcastle	Oxford	Birmingham	Nottingham
	Aggregate score	33	30	30	27	24	22	22	21	21
Relative strengths	Attractive business environment						●	●		●
	Business accelerators								●	●
	Climate-focused research, especially on environmental science and resilience		●							
	Competitiveness	●								
	Connections between climate-relevant research and business				●	●				
	Connectivity within city-region							●		
	Dedicated spaces for green business		●							
	Funding record for climate-relevant innovation			●						
	Levels of education and teaching							●		
	Levels of funded projects						●			
	Local markets for low-carbon goods and services		●							
	Networking agents				●	●			●	
	Population density								●	●
	Proportion of institutions with postgraduate degrees	●								
	Quality of life						●			
	Relevant research and teaching	●								
	Relevant, high quality research			●						
	Speed of travelling within city-region			●						
	Strong local markets for low-carbon products				●					
Training and courses available						●				
Relative weaknesses	Climate innovation-relevant research			●					●	
	Commercial rents			●						
	Competitiveness		●		●		●		●	●
	Connection between climate-relevant research and business		●							
	Connectivity within city-region				●					
	Costs of establishing a business/office space	●								
	Few networking agents						●			
	Higher-cost business environment				●	●				
	Local low-carbon markets							●		
	Percentage of people educated to degree level						●			
	Population density							●		
	Quality of life									●
	Relevant teaching									●
	Research-to-business links in low-carbon area			●						
	Slow transport times within the city-region	●	●						●	
Start-up business accelerators						●				

* London has numerous ingredients, including those highlighted in the table.

Conclusions

This study identifies many of the ingredients that improve the chance of climate innovation clusters emerging. Further analysis is required to assess political leadership, local financial support and the potential influence of businesses with relevant R&D spending. Additionally, more evidence is required to judge which of the ingredients are most important in influencing the success of such clusters, allowing relative weightings to refine the results.

While this work may help to guide policymakers and others as to where interventions could add most value, having strong ingredients is not a guarantee of success. Rather, the ingredients need to be combined in a recipe; this is discussed in other briefings in this Insights series (see Mitchell and Thomas, *Insight 1.1*).

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Endnotes

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Climate-KIC UK and Ireland

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Our partnership consists of dynamic companies, the best academic institutions and public authorities. We drive innovation in tackling climate change through creative partnerships large and small, local and global, and between the private, public and academic sectors. The UK and Ireland is a core geographic region within Climate-KIC and is home to some of the most energetic climate innovation clusters and businesses in Europe.

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