Grantham Research Institute on Climate Change and the Environment

Centre for Climate Change Economics and Policy

October 2021

Policy brief

Are 'green' jobs good jobs? Lessons from the UK and EU to inform labour market transitions

Centre for Economic Performance

poid Programme on Innovation and Diffusion

Headline issues

- Green jobs provide good quality employment in Europe. In the UK, they pay higher wages and are at lower risk of automation than non-green jobs, especially for middle- and low-skilled workers.
- However, some groups are underrepresented, especially women and young people.
- Policymakers need to focus on building the skills needed in the net-zero transition, and target transition policies to address regional and demographic imbalances.

This policy brief has been written by **Anna Valero, Jiaqi Li, Sabrina Muller, Capucine Riom, Viet Nguyen-Tien and Mirko Draca.** It summarises a longer report, *Are 'green' jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future,* available from www.lse.ac.uk/granthaminstitute/publications

Summary

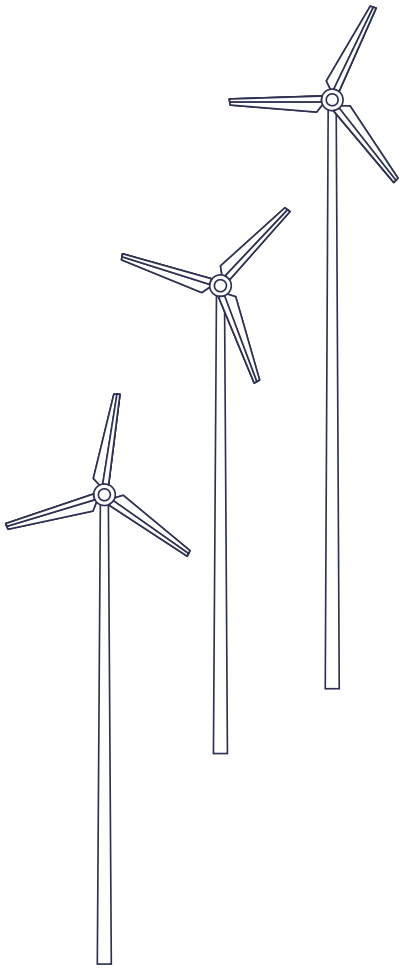
Research that quantifies and analyses green jobs is growing but often follows a relatively narrow definition that does not cover all the jobs that will be important for driving forward the net-zero transition. In response, we applied a broad approach to investigate green jobs in the UK and EU.

We find that around 20% of jobs in the UK and 14 European economies can be considered directly and indirectly green, taking a broad, occupation-level definition of the 'greenness' of jobs.

We find some evidence that greener jobs tend to be 'better' jobs. Workers in some types of green jobs, particularly those that are new occupations related to greening the economy, are likely to be educated to a higher level and be on permanent contracts, though there are differences in these relationships across countries, sectors and regions. For the UK, we also find that greener jobs tend to pay higher wages, and are more resilient to automation.

Greener jobs tend to be occupied by older workers and men. Policymakers will need to ensure equitable access to green, future-fit jobs. Educational and training requirements of 'green' jobs will need to be met with new education and skills policies, including improved incentives for firms and individuals to train.

"As governments worldwide increase their commitments to tackling climate change, there is a growing need to quantify and characterise the 'green economy'."



Analysing the 'green' economy

The transition to net-zero will have far-reaching but unequal effects, as 'dirty' jobs disappear while new jobs aligned with or supportive of the net-zero objective – which we refer to as 'green' – are created. As governments worldwide increase their commitments to tackling climate change, there is a growing need to quantify and characterise the 'green economy', and to identify opportunities to be seized and challenges to be overcome in the transition to the net-zero economy of the future.

To shed light on green jobs and inform policy and future research, in this brief we apply a granular analytical approach to quantify and describe green jobs in the UK and EU economies.

The literature on the quantity and quality of 'green' jobs

There is not yet an agreed definition of what a green job is, making comparing existing research findings difficult. This is despite an increasing number of academic articles and policy reports estimating green jobs and their labour market attributes. 'Top-down' studies that apply a narrow definition of green jobs (based on employment in a set of industries or activities that are directly relevant for decarbonisation) tend to estimate that green jobs account for under 5% of employment in the United States or European economies (e.g. Eurostat, 2021; Georgeson and Maslin, 2019). Broader definitions, including those that take the 'bottom-up', occupation-based approach that we follow in our analysis (see Box 1), yield considerably higher estimates since they account for jobs that are both directly and indirectly affected by decarbonisation (Bowen et al., 2018; Bowen and Hancké, 2019).

How do green and non-green job characteristics compare? Several studies find that directly green jobs require more education and involve more non-routine analytical tasks than non-green jobs (Bowen et al., 2018; Consoli et al., 2016; Vona et al., 2018). Indirectly green jobs tend to be more like non-green jobs.

Impacts of net-zero policies and green investments

A broader question concerns how policies that drive the net-zero transition, and the 'clean' innovations that arise because of it, will affect the demand for skills, via impacts on employment and relative wages of skilled versus unskilled workers. Studies analysing causal relationships find that environmental regulation tends to increase demand for more high-level analytical or technical skills (e.g. Vona et al., 2018 on the United States and Marin and Vona, 2019 on European economies).

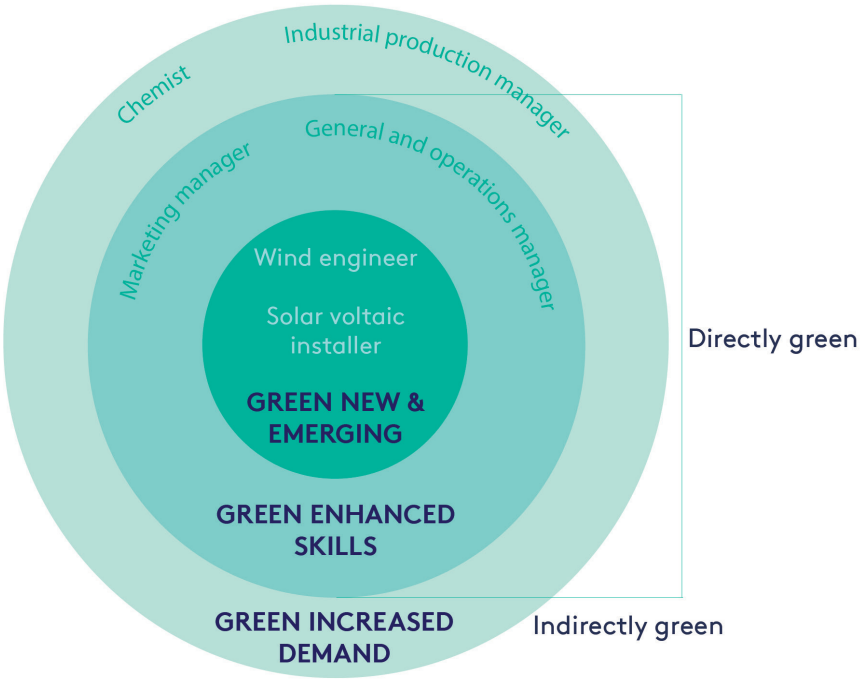
There is evidence (also from the US) that these green investments have created more jobs in areas with pre-existing 'green' capabilities and that such jobs have been manual in nature – though manual labour wages have not risen (Popp et al., 2020). A review of evidence in the UK suggests that net-zero-aligned investments in clean automotive, hydrogen and carbon capture utilisation and storage, renewable energy, and housing energy efficiency can create tens of thousands of jobs in the short term, typically in construction and installation (Unsworth, Andres et al., 2020). In the medium to longer run, job creation opportunities are related to R&D and production of new technologies. There is less conclusive evidence on the link between firm-level 'clean' innovation and jobs.

Box 1. Defining 'green' jobs

In our analysis, we apply an occupation-level classification of 'green jobs' developed by O*NET in the United States. This database can be used to classify occupations based on the greenness of their related task content and applies a relatively broad definition of green jobs within 12 sectors that were deemed to be most affected by decarbonisation.

O*NET classifies any occupation that will be affected by greening as a green job. A consequence of this is that non-green occupations are not necessarily 'dirty' under this definition; rather, they are occupations that are not directly or indirectly judged to be affected by the zero-carbon transition.

Figure 1. Varying greenness of job categories



The O*NET database distinguishes three occupational categories (Figure 1) that differ regarding the effect of the transition to a climate-neutral and sustainable economy on occupations:

- Green new and emerging:

The transition to a sustainable economy leads to the creation of new occupations with unique tasks and worker requirements. This is the narrowest definition of a green job.
Examples: wind energy engineers or solar photovoltaic installers, for whom all tasks are 'green'.

- Green enhanced skills:

The transition to a sustainable economy significantly alters tasks, skills and knowledge requirements for these occupations. With green new and emerging jobs, these can be considered ***directly green***, since they involve explicitly green tasks as defined by O*NET.
Example 1: a general and operations manager for whom new green tasks relate to managing the sustainability of operations, or a marketing manager for whom a new green task might be developing business cases for environmental marketing strategies.
Example 2: a construction labourer who would need to apply weather stripping to reduce energy loss.

- Green increased demand:

The transition to a sustainable economy creates higher demand for these occupations but there are no significant changes in tasks or worker requirements due to greening. Such jobs are considered ***indirectly green*** because they support green economic activity but do not involve any green tasks.
Examples: chemists, materials scientists, industrial production managers.

"We estimate that 17% of jobs in the UK are 'green'."

A variety of jobs in high-carbon sectors (such as in fossil fuel power plants) provide secure and well-paid jobs in the UK and the EU. Therefore, the quality of green jobs will need to be considered as a matter of fairness for workers and to secure the willingness of workers to take them up. The literature analysing related characteristics of 'green' jobs is sparse but indicates that 'green' jobs can provide good quality employment. There is evidence from the US and the UK that 'green' jobs can pay higher wages than the national average.

The UK in focus

We apply O*NET occupational classifications to UK Labour Force Survey data, at the individual level, and estimate that 17% of jobs are 'green' (Table 1). We observe a slight increase in the share of green jobs since 2011, occurring across all types of green jobs.

Table 1. UK-wide estimates of the share of 'green' employment in 2019

Table notes: Sample includes employed and self-employed workers aged 16-65. Labour Force Survey person weights applied to calculate averages of the green max and green mean occupational classifications across individuals.

	Mean
Green (any)	17%
Directly green:	
Green *new and emerging*	5%
Green *enhanced skills*	7%
Indirectly green:	
Green *increased demand*	5%

The sectors with the highest shares of green jobs are utilities, construction, manufacturing, the primary sector and transport (Figure 2). At a broad level, sectors with a high share of 'green' employment also tend to be higher emissions sectors, including occupations such as large good vehicle drivers, and production managers and directors in construction and manufacturing. However, some sectors stand out – finance and insurance activities; professional, scientific and technical; and information and communication have relatively high shares of green employment and low emissions. These include financial accounts managers, IT business analysts, architects and system designers.

We also consider how the shares of green jobs vary across the UK's regions, reflecting their differing occupational and sectoral structures, and find that the pattern differs for the three green job types (Figure 3). For the directly green jobs, we find that enhanced skills jobs are more prevalent across Wales, the Midlands and the South East. This could be driven by the energy efficiency products sector and the Midlands' strong position in the manufacturing of low-emission vehicles (e.g. Unsworth, Valero et al., 2020).

New and emerging jobs have some concentration in the South of England but are otherwise spread quite evenly across the country. Contributing factors could be the prevalence of jobs in the low-carbon service sector, and in waste and biomass, in London and the South East, while the South West shows strengths in low-carbon electricity. Areas with relatively higher shares of increased demand jobs stretch from the Midlands to Northern England, and Northern Ireland.

Figure 2. UK green employment shares across sectors (2019)

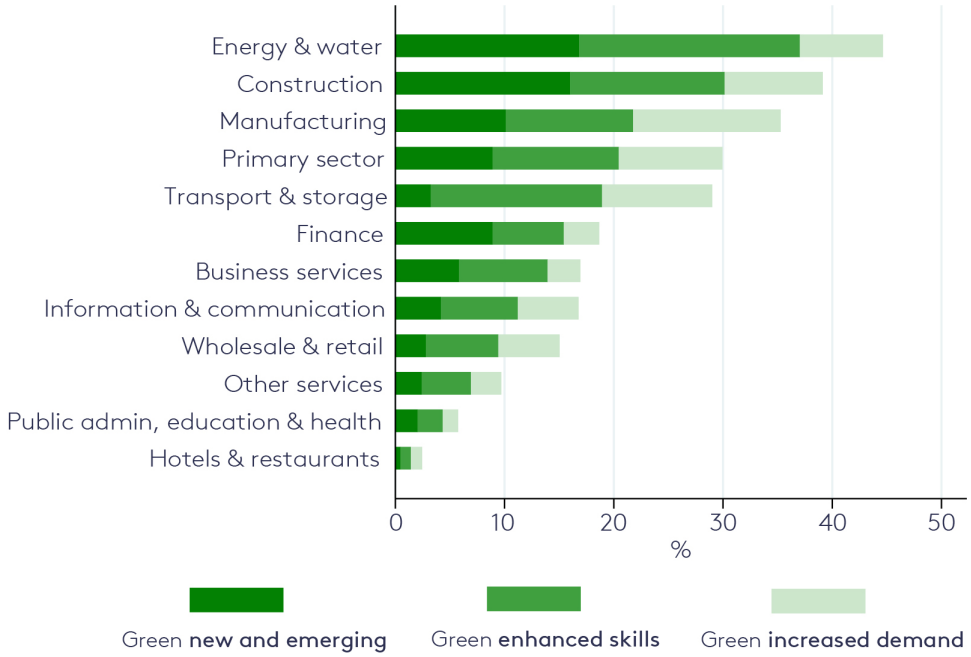
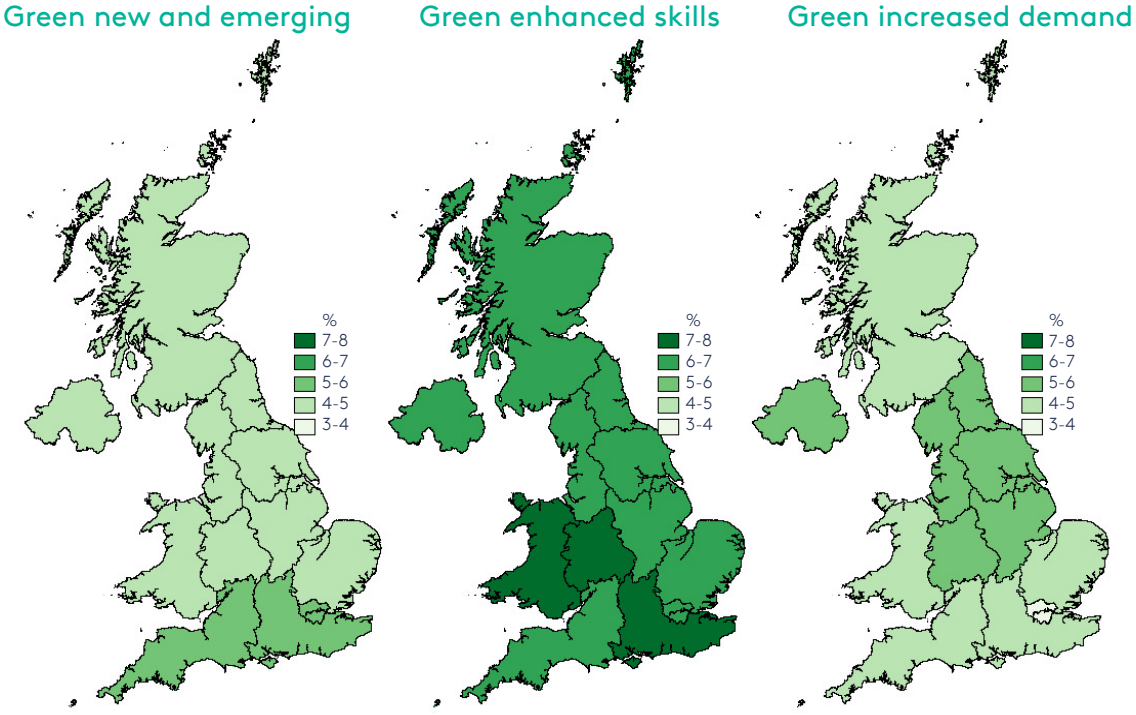


Figure 3. UK green employment shares across regions (2019)



We analyse the characteristics of green jobs and those that tend to hold them and find that the 'green' workforce tends to be more male than female across sectors and professions (even after controlling for detailed sector of work). Directly 'green' jobs in particular tend to be held by older workers who are on permanent contracts – and, in the case of new and emerging jobs, more educated workers who are more likely to have received training on the job.

'Green' jobs in general appear to be associated with a wage premium, particularly at lower skill levels, even after controlling for the education and work experience of the individual. And in an occupation-level analysis, we find that directly green jobs tend to be at lower risk of automation.

"In the EU, the green jobs share ranges from 17% (in Greece) to 22% (in Germany)."

We complement our analysis of the 'stocks' of green jobs with analysis of the 'flows' of new green jobs using data on online job vacancies. This finds a similar share of new green jobs in the UK, at 19%. New green enhanced skills jobs appear to be most concentrated across the Midlands, in a pattern consistent with the stock of jobs.

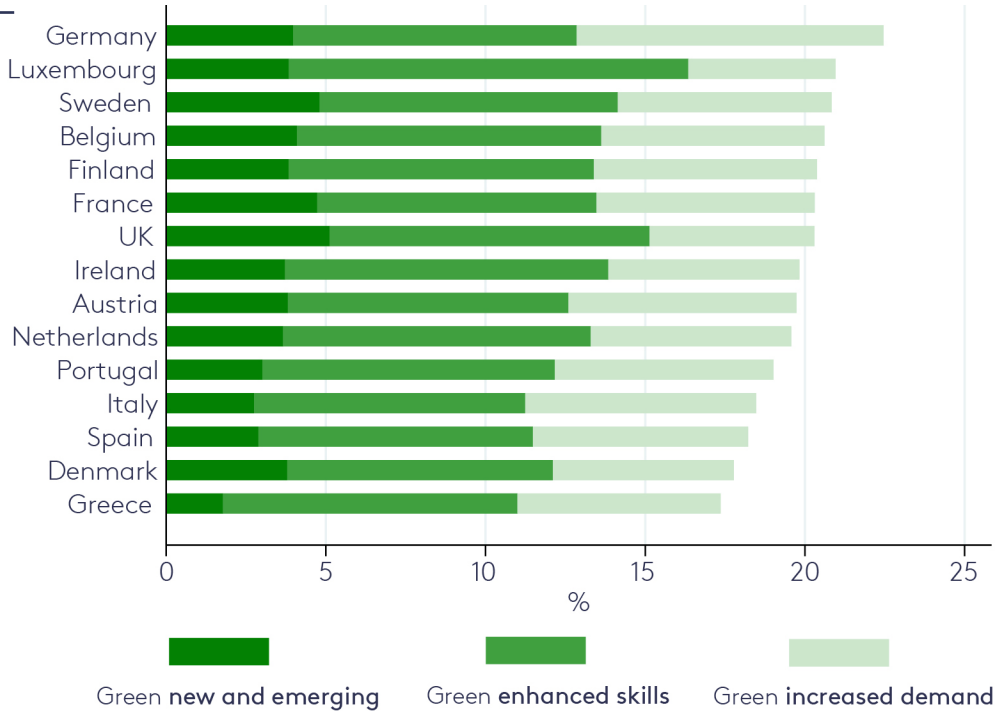
'Green' jobs across Europe

Our analysis of EU Labour Force Survey data reveals a picture broadly consistent with the UK analysis, with the green job share ranging from 17% (in Greece) to 22% (in Germany) – see Figure 4. The indirect and direct green shares of employment are of similar orders of magnitude as in the UK.

Key characteristics of green jobs in the EU are also broadly similar to those in the UK. Green job workers tend to be older, fewer are female, more are higher skill and (for employees) more are likely to be on permanent contracts. New and emerging jobs tend to drive these results, though again the gender result applies across all 'green' job types. There are no discernible differences in training rates, on average.

Some interesting country-level differences emerge, specifically for the education level of 'green' job workers, for example: workers in new and emerging jobs appearing to be more likely to have a university degree in some countries (including Belgium, Greece, Luxembourg, the Netherlands and Spain). In some countries there is a similar relationship for enhanced skills jobs (including Denmark and Luxembourg). This hints at differences in education and skills systems as well as in demographics across these countries. However, there is less granularity in our classifications of green jobs in EU countries due to data limitations. More in-depth analyses are therefore required to draw firm conclusions regarding differences between countries.

Figure 4. Green job shares by country in the EU15[1] (2019)



1. The 15 countries in the EU prior to enlargement in 2004

What's next?

Based on the experience to-date, greener jobs appear to be 'better' than their less green counterparts across some dimensions of job quality observable in our data. Greener jobs command higher wages – and, controlling for individual level education and experience, this effect applies in particular for lower skilled occupational groups. Directly green jobs – in particular, those that are new and emerging in the transition – are at less risk of automation. Note, however, that our analysis does not cover all factors determining job quality. Aspects such as health and safety could not be evaluated in our data.

Our analysis uses data for 2011–19 and reflects the economic and policy environment over the past decade, before the onset of the COVID-19 pandemic. In the context of increasing decarbonisation commitments, these findings can help to inform future policies that can shape the shift to net-zero in a way that will be just and socially equitable.

In this phase of the transition to net-zero, policymakers will need to ensure equitable access to the new labour market opportunities it brings. Particular attention will need to be placed on regions with significant transition needs that currently have a low green job share and on particular demographic groups that are so far underrepresented, i.e. women and young people.

More granular data and research are needed to understand the ease of transition for certain groups in particular places, and the role of industrial, skills and labour market policies for enabling a just transition, given differing institutional contexts.

Conclusions for policymakers

Training and skills programmes will be key for a just transition.

- Changing skill requirements will have implications for how education systems produce the future workforce. Given the significant technological and economic uncertainties, education programmes must create a balance between general and specific skills, building worker resilience and flexibility to change.
- On-the-job training will be an important route for reskilling or upskilling existing workers that need to transition into green occupations. Firm-level investments in skills will need to be incentivised, for example through making government support packages conditional on training provision or introducing (enhanced) human capital tax credits.

Given current imbalances, targeted transition policies and programmes are likely to be required.

All types of green jobs are less likely to be held by women than men, and many tend to be held by older rather than younger workers.

- Given the apparent distributional consequences in the transition to net-zero, targeted recruitment policies or information campaigns will be needed for specific sectors, locations or demographic groups.
- Improved clarity on career paths at different stages in the transition (i.e. as construction activity gives way to maintenance) will be required to ensure that new opportunities are available to underrepresented groups, and transitions are managed effectively.

"In the context of increasing decarbonisation commitments, these findings can help to inform future policies that can shape the shift to net-zero in a way that will be just and socially equitable."

Conclusions for research

While more insights are emerging on the green economy, important gaps remain:

- More information is needed on the ease of transition for specific groups in particular locations.
- Deeper analysis is needed to quantify and describe the jobs within firms that can be classified as green.
- Future research could explore the relationship between national education systems and green job characteristics to identify the most appropriate ways to train or upskill the net-zero workforce in different institutional contexts.
- More research exploring the causal relationship between differences in environmental regulation or 'green' investments across or within countries, and the impacts on labour markets, is also required.

References

Bowen A, Hancké B (2019) *The Social Dimensions of 'Greening the Economy': Developing a taxonomy of labour market effects related to the shift toward environmentally sustainable economic activities.* European Commission and LSE Consulting.

Bowen A, Kuralbayeva K, Tipoe E L (2018) Characterising green employment: The impacts of 'greening' on workforce composition. *Energy Economics* 72: 263-275.

Consoli D, Marin G, Marzucchi A, Vona F (2016) Do green jobs differ from non-green jobs in terms of skills, human capital? *Research Policy* 45 (5): 1046-1060

Eurostat (2021) *Environmental economy – statistics on employment and growth.*

Georgeson L and Maslin M (2019) Estimating the scale of the US green economy within the global context. *Palgrave Communications* 5, 121.

Marin G, Vona F (2019) Climate policies, skill-biased employment dynamics: Evidence from EU countries. *Journal of Environmental Economics and Management* 98

Office for National Statistics [ONS] (2021) *The challenges of defining a "green job".*

Popp D, Vona F, Marin G, Chen Z (2020) *The Employment Impact of Green Fiscal Push: Evidence from the American Recovery Act,* NBER Working Paper 27321

Vona F, Marin G, Consoli D, Popp D (2018) Environmental Regulation, Green Skills: An Empirical Exploration. *Journal of the Association of Environmental and Resource Economists* 5(4): 713-753.

Unsworth S, Andres P, Cecchinato G, Mealy P, Taylor C, Valero A (2020) *Jobs for a strong, sustainable recovery from Covid-19,* CEP Covid-19 Analysis.

Unsworth S, Valero A, Martin R, Verhoeven D (2020) *Seizing sustainable growth opportunities from zero emission passenger vehicles in the UK.*

Read the full report at:

www.lse.ac.uk/granthaminstitute/publications

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

Houghton Street, London, WC2A 2AE

e gri.policy@lse.ac.uk
w www.lse.ac.uk/granthamInstitute
www.climate-laws.org

Dr Anna Valero is a Senior Policy Fellow at the Centre for Economic Performance and the Deputy Director of the Programme on Innovation and Diffusion (POID). Jiaqi Li is a research assistant for Anna Valero and a MRes/PhD student at Warwick University. Sabrina Muller is a Sustainable Finance Policy Analyst at the Grantham Research Institute. Dr Viet Nguyen-Tien is a Research Economist at the Centre for Economic Performance. Capucine Riom is a Phd candidate in Economic Geography at LSE and a research assistant for the Grantham Research Institute and the What Works Centre for Local Economic Growth. Prof Mirko Draca is Professor at Warwick University, Director of the Centre for Competitive Advantage in the Global Economy (CAGE) and a Research Associate at the Centre for Economic Performance.

The authors would like to thank their colleagues and reviewers for their inputs and inspiration.

This brief was made possible through financial support from the Candriam Institute for Sustainable Development. The authors also acknowledge support from the Grantham Foundation for the Protection of the Environment, and the UK Economic and Social Research Council (ESRC) through the Centre for Climate Change Economics and Policy (CCCEP).

The authors declare no conflict of interest in the writing of this brief. The views in this brief are those of the authors and are independent of the host and funding institutions. All errors and omissions remain the authors' own.

Georgina Kyriacou edited and produced this policy brief.

This policy brief is intended to inform decision-makers in the public, private and third sectors. It has been reviewed internally and externally before publication.

We encourage the wide use of this document. All permissions requests should be directed to the Grantham Research Institute on Climate Change and the Environment.

© The authors, 2021. Published by the Grantham Research Institute on Climate Change and the Environment, 2021