OECD Economic Surveys
UNITED KINGDOM

AUGUST 2022

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OECD Economic Surveys: United Kingdom 2022

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Please cite this publication as:
OECD (2022), *OECD Economic Surveys: United Kingdom 2022*, OECD Publishing, Paris, https://doi.org/10.1787/7c0f1268-en.

ISBN 978-92-64-72540-9 (print)
ISBN 978-92-64-31731-4 (pdf)
ISBN 978-92-64-10056-5 (HTML)
ISBN 978-92-64-57053-5 (epub)

OECD Economic Surveys
ISSN 0376-6438 (print)
ISSN 1609-7513 (online)

OECD Economic Surveys: United Kingdom
ISSN 1995-3445 (print)
ISSN 1999-0502 (online)

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Corrigenda to publications may be found on line at: www.oecd.org/about/publishing/corrigenda.htm.

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Foreword

This Survey is published on the responsibility of the Economic and Development Review Committee of the OECD, which is charged with the examination of the economic situation of member countries. The economic situation and policies of the United Kingdom were reviewed by the Committee on 30 June 2022. The draft report was then revised in the light of the discussions and given final approval as the agreed report of the whole Committee on 13 July 2022.

The Secretariat's draft report was prepared for the Committee by Daniela Glocker and Jon Pareliussen, with inputs from Barbara Pels, David Crowe and Tobias Cruse under the supervision of Aida Caldera Sánchez. Statistical research assistance was provided by Steven Cassimon, editorial assistance by Karimatou Diallo and communication assistance by Nathalie Bienvenu. The previous Survey of the United Kingdom was issued in 2020. Information about the latest as well as previous Surveys and more information about how Surveys are prepared is available at https://www.oecd.org/eco/surveys/.

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Basic statistics of the United Kingdom, 2021

(Numbers in parentheses refer to the OECD average) [1]

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million, 2020)	67.2		Population density per km² (2020)	277.8	(38.7)
Under 15 (%, 2020)	17.7	(17.8)	Life expectancy at birth (years, 2020)	80.9	(79.7)
Over 65 (%, 2020)	18.7	(17.4)	Men (2020)	79.0	(77.0)
International migrant stock (% of population, 2019)	14.1	(13.2)	Women (2020)	82.9	(82.5)
Latest 5-year average growth (%)	0.6	(0.6)	Latest general election	December-2019	
ECONOMY					
Gross domestic product (GDP)			Value added shares (%, 2020)		
In current prices (billion USD)	3 187.8		Agriculture, forestry and fishing	0.6	(2.7)
In current prices (billion GBP)	2 317.1		Industry including construction	18.8	(26.2)
Latest 5-year average real growth (%)	0.6	(1.5)	Services	80.5	(71.1)
Per capita (thousand USD PPP, 2020)	46.4	(46.2)			
GENERAL GOVERNMENT Per cent of GDP					
Expenditure (OECD: 2020)	47.3	(48.5)	Gross financial debt (OECD: 2020)	143.1	(133.6)
Revenue (OECD: 2020)	39.0	(38.1)	Net financial debt (OECD: 2020)	105.0	(81.4)
EXTERNAL ACCOUNTS					
Exchange rate (GBP per USD)	0.73		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	0.69		Machinery and transport equipment	31.3	
In per cent of GDP			Commodities and transactions, n.e.s.	17.6	
Exports of goods and services	27.0	(54.6)	Chemicals and related products, n.e.s.	14.6	
Imports of goods and services	28.2	(51.2)	Main imports (% of total merchandise imports)		
Current account balance	-2.6	(0.0)	Machinery and transport equipment	30.4	
Net international investment position	-31.3		Miscellaneous manufactured articles	13.8	
			Manufactured goods	12.2	
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %)	60.4	(56.2)	Unemployment rate, Labour Force Survey (aged 15 and over, %)	4.5	(6.1)
Men	64.4	(64.1)	Youth (aged 15-24, %)	12.3	(12.8)
Women	56.6	(48.7)	Long-term unemployed (1 year and over, %)	1.2	(2.0)
Participation rate (aged 15 and over, %)	62.7	(60.3)	Tertiary educational attainment (aged 25-64, %, 2020)	49.4	(39.0)
Average hours worked per year	1,497	(1,716)	Gross domestic expenditure on R&D (% of GDP, 2018)	1.7	(2.6)
ENVIRONMENT					
Total primary energy supply per capita (toe, 2020)	2.3	(3.7)	CO_2 emissions from fuel combustion per capita (tonnes, 2019)	5.1	(8.3)
Renewables (%, 2020)	13.9	(11.9)	Water abstractions per capita (1 000 m³, 2014)	0.1	
Exposure to air pollution (more than 10 µg/m³ of PM 2.5, % of population, 2019)	54.6	(61.7)	Municipal waste per capita (tonnes, 2020)	0.5	(0.5)
SOCIETY					
Income inequality (Gini coefficient, 2019, OECD: latest available)	0.366	(0.316)	Education outcomes (PISA score, 2018)		
Relative poverty rate (%, 2019, OECD: 2018)	12.4	(11.8)	Reading	504	(486)
Median disposable household income (thousand USD PPP, 2019, OECD: 2018)	25.4	(25.5)	Mathematics	502	(488)
Public and private spending (% of GDP)			Science	505	(487)
Health care (OECD: 2020)	11.9	(9.7)	Share of women in parliament (%)	34.3	(32.4)
Pensions (2017)	6.6	(8.6)	Net official development assistance (% of GNI, 2017)	0.7	(0.4)
Education (% of GNI, 2020)	5.4	(4.6)			

[1] The year is indicated in parenthesis if it deviates from the year in the main title of this table.
[2] Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 80% of member countries.
Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

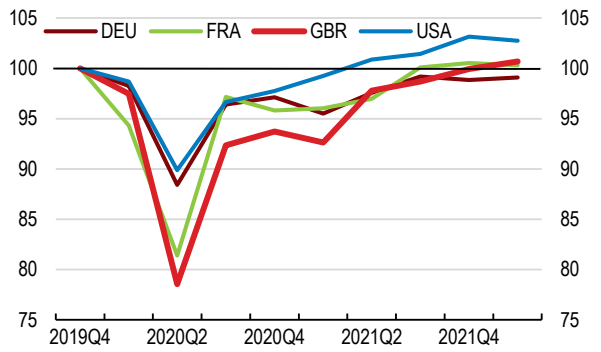
Executive summary

The economy has recovered

The UK economy recovered to the pre-pandemic level by the end of 2021, following an unprecedented contraction in 2020 (Figure 1). A quick vaccination rollout in 2021 allowed a gradual lifting of restrictions. As the economy started to recover at a rapid pace, supply and labour shortages worsened on the back of rising global demand and higher shipping costs. Price pressures rose significantly, aggravated by surging global energy prices following Russia's invasion of Ukraine. Increased barriers to trade and migration resulting from leaving the European Single Market and Customs Union likely added to supply constraints. Amid persisting supply shortages and rising inflation growth has started to slow down.

Figure 1. The economy has recovered

Real GDP, 2019 Q4 = 100



Source: OECD Economic Outlook: Statistics and Projections (database).

StatLink https://stat.link/xwgqod

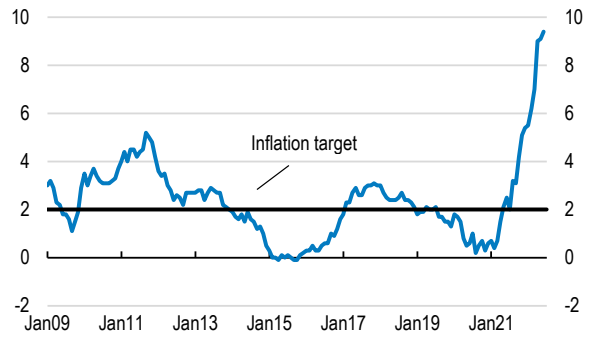
The labour market rebounded quickly and job vacancies have reached record highs. Unemployment has fallen below pre-pandemic levels to 3.7%. Labour force participation has declined since the onset of the pandemic, mainly due to long-term sickness and early retirement by those aged above 55 years.

Trade in goods and services was negatively affected by Brexit and the pandemic. Non-tariff trade barriers with the EU have increased administrative costs. Trade with the EU has recovered somewhat after a sharp drop at the end of the transition period in January 2021, but imports from the EU remain suppressed.

Monetary policy has been normalising on the back of rising inflation pressures (Figure 2). In response to rapidly rising inflation and a tightening labour market, the central bank has gradually increased the policy rate since December 2021 from 0.1% to 1.25% in June, ended asset purchases, stopped reinvesting maturing gilts, and announced the gradual selling of its stock of corporate bonds. A winding down plan for the stock of government bonds will be discussed in August 2022.

Figure 2. Inflation is rapidly rising

Headline inflation (CPI), y-o-y % changes



Source: ONS.

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Fiscal policy has to balance fiscal tightening with supporting growth and investment needs. The government has committed to a gradual medium-term fiscal consolidation plan, with planned increases in tax revenues and increased investment. As cost of living has risen sharply, the government introduced temporary and targeted support measures to aid vulnerable households. The government is on track to reach its new fiscal target, which will put net debt on a declining trajectory. In the longer run, the United Kingdom faces significant fiscal pressures mostly driven by ageing related expenditure and transitioning to net zero greenhouse gas emissions.

The financial sector weathered the pandemic well, and banks hold substantial provisions against future credit losses. Risks from the mortgage market remain contained but rapid house price growth warrants continuous vigilance. Well-developed capital markets and a sound banking system are expected to facilitate the required

reallocation of capital as a consequence of Brexit, the pandemic and net zero transition but the long-term impact on the UK financial sector remains unclear.

Table 1. Economic growth will slow

(Annual growth rates, %, unless specified)

	2021	2022	2023
Gross domestic product	7.4	3.6	0.0
Private consumption	6.2	4.5	0.7
Government consumption	14.3	1.4	0.8
Gross fixed capital formation	5.9	8.0	2.1
Exports	-1.3	0.9	1.5
Imports	3.8	15.7	3.6
Unemployment rate (%)	4.5	3.8	4.3
Consumer price index	2.6	8.8	7.4
Current account balance (% of GDP)	-2.6	-7.2	-7.6
Government fiscal balance (% of GDP)	-8.3	-5.3	-4.1
Government gross debt (% of GDP)	143.1	139.2	138.6

Source: OECD Economic Outlook (database).

Output growth is projected to weaken in 2022 and 2023 (Table 1), as rising living costs weigh on consumption. Business investment will be dampened by rising interest rates and lingering uncertainties. A deterioration in the public health situation and spill-overs from economic sanctions following Russia's invasion of Ukraine are significant downside risks to the outlook.

Raising productivity

Productivity growth has stalled since the Global Financial Crisis on the back of skill mismatches, low innovation and knowledge diffusion, as well as low investment. Productivity gaps are wide across regions.

Regional disparities weigh on aggregate productivity growth. "Levelling up the UK" in terms of productivity and living standards is a key policy priority of the government, but the additional funding announced so far has been limited. Local authorities face a fragmented and complex funding landscape, challenging to navigate for local authorities, risking that capacity constrained local areas miss out on needed funding.

Better infrastructure is key to stronger productivity growth. Public investment has increased in recent years and will remain close to a significant 2.5% of GDP over the coming years under the government's Plan for Growth. However, large investments will be needed to compensate for years of underinvestment and to address long-term challenges such as the net zero transition.

Higher private investment is needed to support productivity growth. Business investment in physical capital, innovation or new processes that would make labour more productive has been subdued due to uncertainties following Brexit and the pandemic.

Skill shortages weigh on productivity. Increasing digitalisation and transitioning to net zero will require intensifying adoption of new technologies. This implies an ever-growing need for workers to update their skills, but participation in continuing education and training is low.

More fully utilising women skills in the labour market would support productivity and growth. A third of women work part-time, roughly three times more than men. Mothers are likely to reduce working hours following childbirth. Parental leave for fathers is short and combined with low female pay replacement rates and a relatively high out-of-pocket price for childcare contributes to gender gaps in labour participation and earnings.

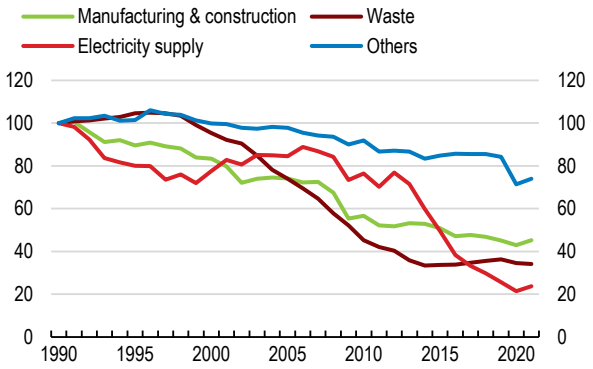
Reaching net zero

The United Kingdom has successfully reduced greenhouse gas emissions in the past, and a broad political consensus supports the target to reduce net emissions to zero by 2050. The UK's strong institutional framework is an inspiration to countries around the world, and the country is pioneering work to embed climate considerations in the financial sector.

Achieving carbon neutrality will require policy to match ambition. Emission reductions so far were largely driven by electricity generation, a sector targeted by the emission trading scheme (ETS), a carbon price floor and a cost efficient renewables auction-design subsidy scheme. A landfill tax and the ETS also drove down emissions in other sectors (Figure 3). Expanding pricing instruments across the economy is an essential building block to reach targets, but well-designed sectoral regulation and subsidies are also needed to boost innovation and overcome a number of hurdles. A clearer transition policy path would allow the financial sector to better support the green transition.

Figure 3. Sectors with an explicit carbon price drove past emission reductions

Greenhouse gas emissions by sector in the UK, index 1990 = 100

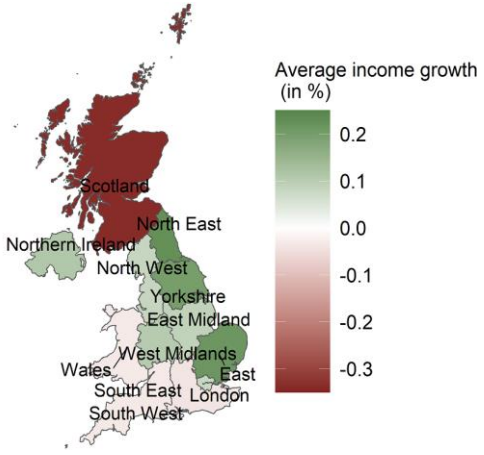


Note: "Others" include buildings, surface transport, agriculture, land use and forestry, f-gases and aviation and shipping (including international aviation and shipping as defined in UK climate targets).
Source: Climate Change Committee, 2022 Progress Report to Parliament.

StatLink https://stat.link/6x0qrg

Britons are conscious about the need to act, but do not necessarily support efficient policies like carbon pricing. This reflects that efficient climate policies will reduce incomes more among less affluent people and those living in sparsely populated areas (Figure 4), unless they are compensated or supported to reduce fossil fuel dependence. Climate change reducing measures will be more acceptable when implemented once energy prices have started to normalise following the current historical high.

Figure 4. Carbon pricing affects regions differently



Note: Income growth from a carbon tax combined with redistributing 30% of revenue as a lump-sum transfer, computed as the average growth in income by decile.
Source: Pareliussen, Saussay and Burke, forthcoming (2022).

StatLink https://stat.link/g4qost

Recycling revenue to support clean technologies and infrastructure increases popular support for direct pricing instruments. Transfers and programmes to support energy efficiency, notably for low-income households, can minimise unwanted distributional effects and strengthen energy security.

MAIN FINDINGS	KEY RECOMMENDATIONS
Supporting a sustainable recovery	
The economy has recovered to pre-pandemic levels. High energy prices and rising cost of living are slowing growth. Monetary policy has started to tighten as inflation increased sharply and persistently.	Continue to progressively raise the Bank Rate to ensure the return of inflation to target, while taking into account any significant changes in economic conditions.
The pandemic and leaving the EU Single Market and Customs Union have weighed on trade. Non-tariff trade barriers with the EU increase administrative costs. Services account for a large share of trade, but the UK-EU agreement focuses mostly on goods.	Discuss with the European Union to reduce non-tariff barriers for EU-UK trade in goods and improve mutual market access for services.
Addressing fiscal challenges	
Following the phasing out of extensive COVID-19 support measures, fiscal policy has to balance fiscal tightening with supporting growth and meeting significant investment needs.	Gradually lower the fiscal deficit and the public debt-to-GDP ratio as planned while ensuring temporary support through income transfers is targeted at low-income households.
Fiscal targets are changing frequently. The government has introduced new fiscal rules and targets in 2021, providing clear guidance about the medium-term plan for returning to debt sustainability. The government announced that its fiscal rules will guide its policy for at least this Parliament and will be reviewed at the start of each subsequent Parliament.	Ensure that future changes to fiscal targets follow a regular process to support credibility of fiscal policy.
In the longer term, fiscal space is pressured by ageing related spending pressures and decreasing fiscal revenues as the economy is transitioning to net zero carbon emission.	Replace the state pensions triple lock by indexing pensions to an average of CPI and wage inflation and provide direct transfers to poor pensioners to mitigate poverty risks.
Raising productivity	
Productivity growth has been sluggish since the Global Financial Crisis. Under an ambitious Plan for Growth, large scale investments in infrastructure, skills and innovations are planned, but investment needs are large. Aggregate productivity is weighed down by regional disparities.	Continue ambitious public investment as planned, and implement existing Levelling Up White Paper proposals to ensure it is well targeted, better streamlined, and with a special focus on improving productivity in lagging regions.
Local authorities face a fragmented funding landscape, which the 2021 Levelling Up White Paper committed to streamline and simplify. Poorer areas have not benefited to the same extent from the allocation of the first round of the new Levelling Up Fund.	Identify and reduce barriers to access funds for local authorities and provide capacity building measures to ensure lagging regions make use of available funds.
Business investment has been slow on the back of Brexit and pandemic related uncertainty, contributing to low productivity growth.	Ensure long-term policy transparency and continuity of government programmes to reduce uncertainties for businesses.
The transition to net zero will provide new job opportunities and require new skills. Adding to existing skill-shortages, quickly rising demand for skills requires the need for re- and upskilling of the exiting workforce.	Use statistical tools to target training to low skilled workers affected by digitalisation and the green transition to strengthen their skills to transit to new jobs.
Women are highly educated but their skills are not fully utilised in the labour market and inequalities in earnings persist. Women adjust working hours to take over care responsibilities. Parental leave pay rates are low, providing little incentives to shift leave to fathers.	Increase funding to reduce the cost of good-quality childcare, in particular for under 2 year olds, giving priority to low income households. Increase the cap on paternity pay and relate it to father's income.
Reaching net zero	
Achieving carbon neutrality will require policy to match ambition. Uncertainty regarding future policy stringency holds back investments.	Build on the Net Zero Strategy, with further concrete deadlines, policies and priorities in line with legal targets.
Private incentives to reduce emissions are inconsistent across sectors and energy sources and too low in a number of sectors, including emission removals.	Commit to gradually expand the UK ETS to all emitting sectors and tighten the emissions cap in line with targets.
Carbon pricing and regulation will in the absence of flanking policies hit low-income households, those in rural areas and those with high heating needs disproportionately at the risk of triggering public resentment.	Allocate a portion of carbon pricing revenues to schemes compensating low-income and fuel-poor households and supporting their green investments.
Recycling revenue to support clean technologies and infrastructure increases popular support for direct pricing instruments.	Allocate a portion of carbon pricing revenue to public investment in green infrastructure, development and deployment of green technologies, including carbon capture and storage.
Different biases and constraints prevent households from making climate-friendly investments in heating, energy efficiency and transportation even when they are profitable. Plans for regulatory back-stops exist, but they need to be translated into concrete policies spurring early action.	Target households' energy use with well-designed regulations phasing in higher energy efficiency, clean heating and zero-emission vehicles.

1 Key Policy Insights

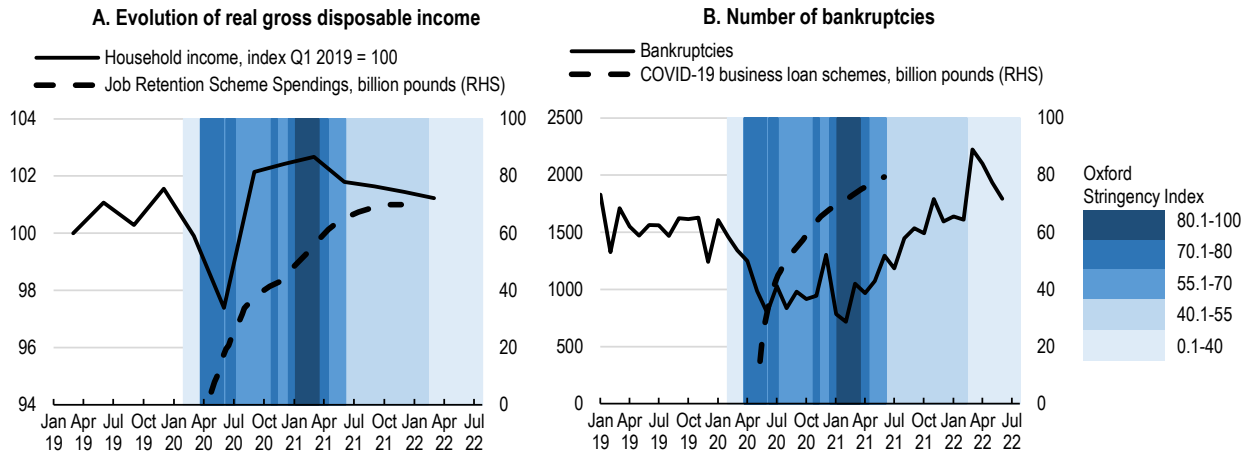
The United Kingdom recovered from the economic shock from the COVID-19 pandemic owing to emergency support packages put in place and a rapid vaccine rollout. However, growth is slowing amid persisting supply shortages and rising inflation. Fiscal policy has to balance gradual tightening with providing well-targeted and temporary support to vulnerable households from rising costs of living, supporting growth and addressing significant spending and investment needs. Accelerating progress towards net zero is fundamental to enhance energy security and reduce dependence on fossil fuels. Policy reforms to support economic reallocation and investments in the green and digital transition can stimulate productivity growth and contribute to reducing disparities across UK regions.

The pandemic and Brexit have magnified structural challenges

The United Kingdom is recovering following the heights of the COVID-19 pandemic. After being severely hit by the pandemic, a quick vaccine rollout in 2021 improved the public health situation and allowed the easing of containment measures. As the economy started to recover in 2021 at a rapid pace, labour shortages intensified on the back of rising global demand and global supply constraints. Price pressures rose significantly, aggravated in early 2022 by surging global energy prices following Russia's invasion of Ukraine. Increased barriers to trade and migration resulting from leaving the European Single Market and Customs Union on 1 January 2021 likely added to supply constraints. Amid persisting supply shortages and rising inflation, growth has started to slow down.

As the immediate impact of the pandemic subsides, the policy focus should shift to addressing long-standing structural challenges that have been magnified by the pandemic and Brexit. The United Kingdom entered the pandemic with weak productivity growth, large regional disparities and an ageing population. Years of underinvestment in public infrastructure resulted in large investment needs. The decade of strong fiscal consolidation ended with the provision of extensive fiscal support during the COVID-19 crisis, which helped to attenuate the loss of household income and allowed businesses to survive (Figure 1.1). However, public debt has increased considerably, calling for a gradual fiscal tightening while also bringing the need to raise productivity and growth to the fore.

Figure 1.1. Fiscal support during the pandemic supported households and businesses



Note: The colour scale of the background reflects confinement stringency based on the Oxford Stringency Index. The Oxford Stringency Index is a composite measure based on 9 response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest response). Panel A: Cumulative job retention scheme spending. Panel B: Registered company bankruptcies. COVID-19 business loan schemes are the cumulative sum of the total value of loans of the Coronavirus Business Interruption Loan Scheme (CBILS), Coronavirus Large Business Interruption Loan Scheme (CLBILS) and Bounce Back Loan Scheme (BBLS). Figures for CBILS, CLBILS and BBLS are based on management information supplied to HM Treasury by accredited lenders and represent their best estimates of the published totals. The value of BBLS loans approved includes extra value from BBLS loans that have subsequently been 'topped-up'. As of 31 May 2021, 106,660 BBLS top-ups had been approved worth GBP 0.95 billion. Data on the recovery loan scheme are missing as they are not available yet with the time dimension.
Source: OECD (2022), Economic Projections and Statistics database; UK government, Coronavirus job retention scheme Statistics: December 2021; UK Government, Monthly Insolvency Statistics December 2021; UK Government, HM Treasury coronavirus business loan scheme statistics; and Oxford COVID-19 Government Response Tracker, Blavatnik School of Government.

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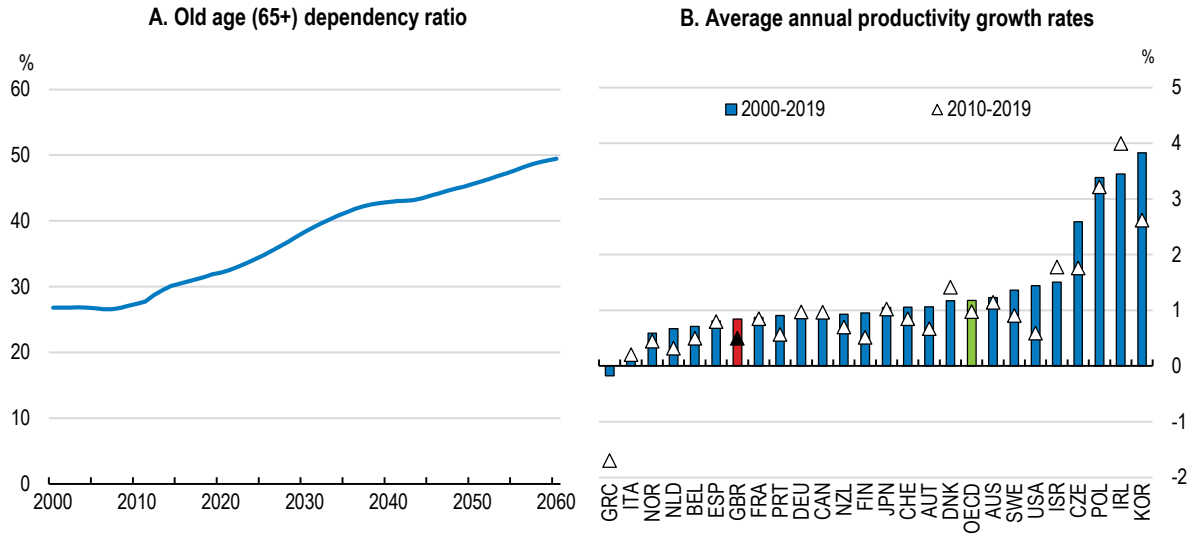
Population ageing, aggravated by potentially lower net migration following Brexit, requires the efficient use of resources to maintain economic growth (Figure 1.2, Panel A). Productivity growth has been almost stagnant over the last decade and is lower than in many other advanced OECD economies (Figure 1.2, Panel B). COVID-19 and leaving the European Union Single Market continue to cast their shadows on the economy. Estimates by the UK Office for Budgetary Responsibility (OBR) suggest that, due to the pandemic, potential output by 2025 will be 2% lower than pre-pandemic trends on the back of higher inactivity rates among older workers, lower net migration, foregone investment, and lower total factor productivity. In addition, the OBR estimates that Brexit will lead to 4% lower productivity after a 15-year period, relative to remaining in the European Union, due to a fall in trade intensity.

Figure 1.2. An ageing population meets low productivity growth



Note: Panel A: Old age dependency ratio is the number of individuals aged 65 and over in relation to the working aged population (25-65 years).
Panel B: Labour productivity is measured as GDP per hour worked at constant prices, USD purchasing power parities.
Source: ONS; and OECD (2022), productivity database.

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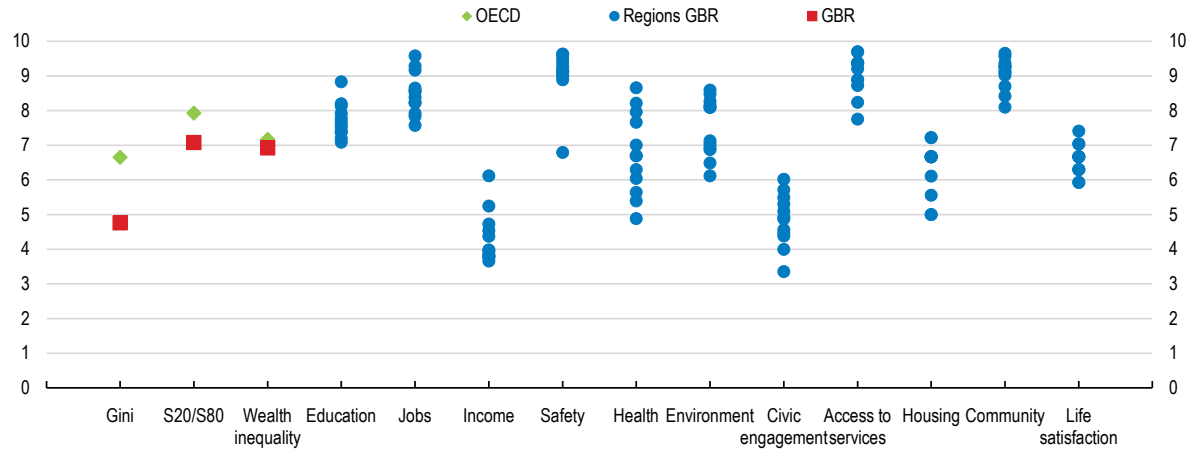
Inequalities in income and wealth were already higher than in most OECD countries before the COVID 19 crisis (Figure 1.3), but have increased further since. In addition, disparities in income, work, education and health are high across UK regions (Figure 1.3). The COVID-19 pandemic also opened up new gaps among people and businesses along dimensions that were previously less significant, such as the ability to work from home and digital access. A highly unequal distribution of skills and qualifications is not only hampering social mobility but has also been contributing to regional disparities, with a concentration of low skills in the least productive regions. Raising productivity and living standards in lagging regions is at the heart of the government's "Levelling Up" agenda and will require significant public and private investment.

Figure 1.3. Income inequality and regional disparities are high

Regional-Wellbeing, 0-10, 10 indicating higher performance relative to other regions (including inequality measures)



Note: The following indicators are used to construct the different indices by topic as appearing in the figure starting from Education: Labour force with at least secondary education (2017), Employment rate and unemployment rate (2017), Household disposable income per capita (2016), Homicide rate (2016), Life expectancy at birth (2016) and mortality rate (2016), Air quality: PM2.5 (2015), Voter turnout (2015), Share of households with broadband access (2017), Rooms per person (2011), Perceived social network support (2014), Self-assessment of life satisfaction (2014). National data is used for Gini after taxes (2019 or latest), S20/s80 ratio (2019 or latest), share of top 5% of wealth (2019 or latest) rescaled using the min-max formula. OECD aggregate refers to a simple average over countries for which data was available. Latest data available are used for more info see source.
Source: OECD Regional Well-Being database.

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The United Kingdom needs to address its long-standing structural challenges to better weather the deep transformations that it is rapidly undergoing. COVID-19 has sped up digitalisation and people are more likely to work and shop from home. Faster digitalisation and the adoption of new technologies imply an ever-growing need for workers to update their skills to meet new skill requirements. Leaving the EU Single Market and Customs Union resulted in restricted access to the United Kingdom's largest trade and investment partners, calling for a new trade strategy. The United Kingdom is committed to become a net zero greenhouse gas emission economy by 2050. CO_2 emissions per unit of GDP have fallen more rapidly in the United Kingdom than elsewhere in the OECD, but continuing the path to net zero will be considerably more challenging in the years to come. Significant investment needs to decarbonise the economy will reduce fiscal space and will require considerable policy changes affecting businesses and people's daily lives. Changes will affect sectors, regions and population groups to varying degree and at different times, but the required labour and capital reallocations across sectors will be challenging.

Against this background, this Survey discusses policies to consolidate a sustainable and inclusive recovery from the COVID-19 pandemic and to adapt to the economic transformations that Brexit and the transition towards net zero by 2050 require. The main policy messages of the Survey are:

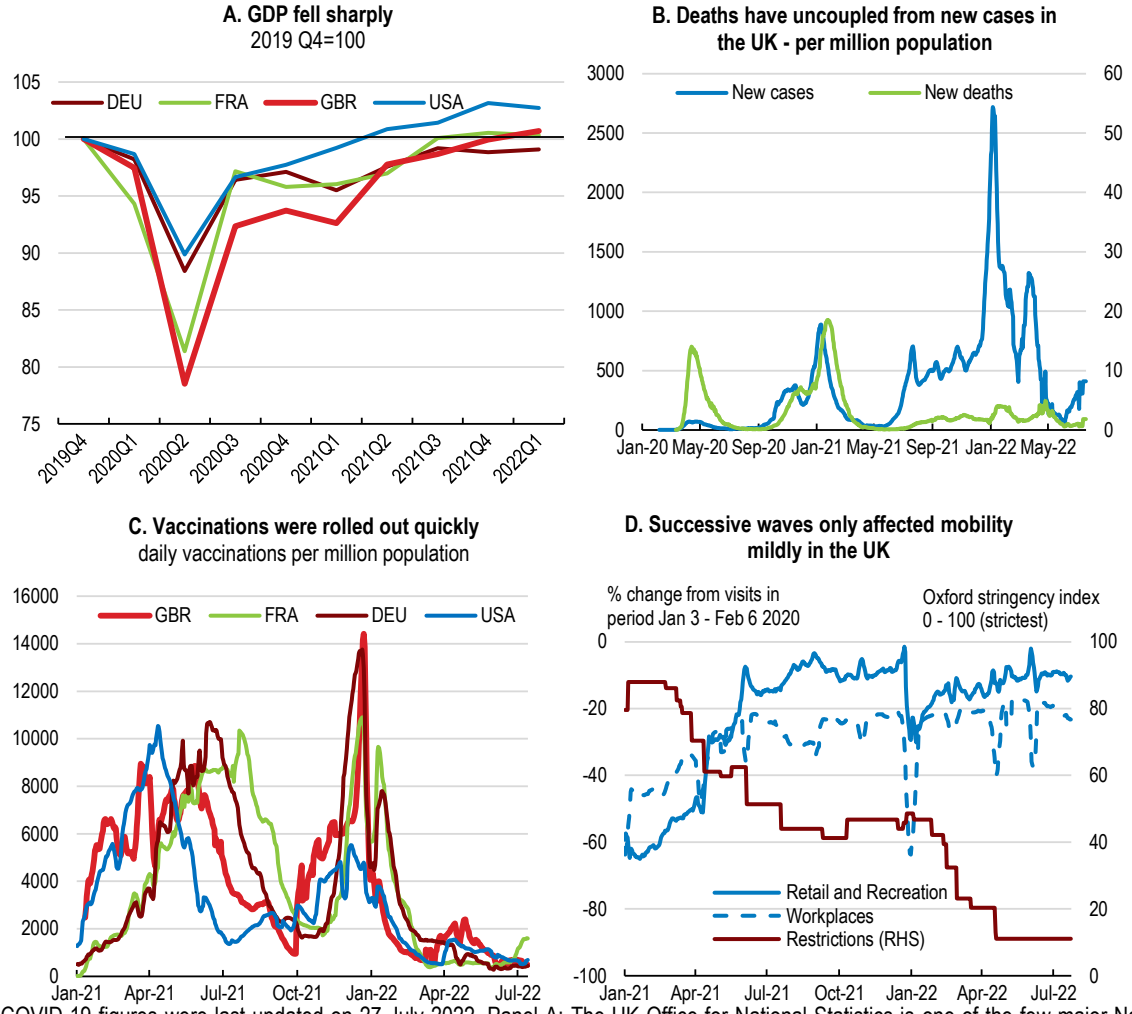
- Following the government's strategy, fiscal policy has to balance gradual fiscal tightening with supporting growth, providing well-targeted and temporary support to protect vulnerable households from high costs of living and addressing significant spending and investment needs to support on-going economic transformations.
- Raising productivity will be key to enhance growth and reduce inequalities across regions. This will require sustained increases in public investment as planned and a substantial rise in private investment. Significant re- and up-skilling are needed to support workers' reallocation and address current and future skill-shortages.
- Achieving net zero greenhouse gas emissions by 2050 calls for timely, coherent and efficient policies across all sectors of the economy, addressing sector-specific market failures, competitiveness and distributional concerns heads-on.

The economy is recovering from the COVID-19 crisis, bringing challenges from leaving the EU to the forefront

Economic growth has slowed after a strong recovery

The economy has rebounded following an unprecedented contraction during the COVID-19 pandemic (Figure 1.4, Panel A), aided by timely government support measures as described in the last Economic Survey (OECD, 2020[1]). As in other OECD countries, the United Kingdom experienced several waves of COVID-19 infections, but a fast initial roll-out of vaccines over the first half of 2021 weakened the link between new COVID-19 cases, hospitalisations and deaths since summer 2021 (Figure 1.4, Panels B and C). With an improved public health situation, COVID-19 related restrictions were gradually eased from April 2021 and economic activities started recovering (Figure 1.4, Panel D). To keep the recovery on track, the government should ensure that the public health situation remains under control by continuing its vaccination efforts in line with international guidance.

Figure 1.4. GDP has recovered on the back of an improved health situation



Note: COVID-19 figures were last updated on 27 July 2022. Panel A: The UK Office for National Statistics is one of the few major National Statistical Institutes to follow the volume indicator approach for most health and education outputs, which is recommended by the European System of National Accounts. This different statistical method may have led to some divergence in reported output declines during the pandemic, but the return to normal should reverse such divergence (see OECD Economic Outlook, Volume 2021 Issue 1, box 1.1 for more details); Panel B: New cases are new confirmed cases of COVID-19 (7-day smoothed) per one million people. New deaths are newly confirmed deaths of COVID-19 (7-day smoothed) per one million people.

Source: OECD (2022), Economic Outlook: Statistics and Projections database; Hale et al., (2022). Oxford COVID-19 Government Response Tracker, Blavatnik School of Government; Google LLC, Google COVID19 Community Mobility Reports; and Roser et al (2022), "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org.

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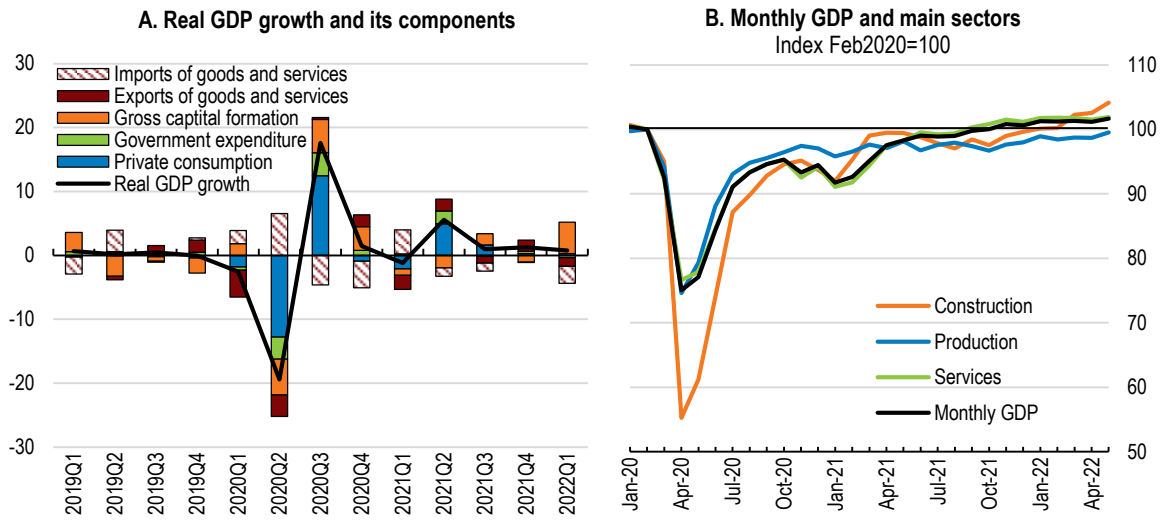
Output recovered to pre-pandemic levels by November 2021, but growth slowed from 1.3% in the last quarter of 2021 to 0.8% in the first quarter of 2022 (Figure 1.5, Panel A). Important sectoral differences remain. The construction sector, heavily affected by the pandemic, was the quickest to recover, reaching pre-pandemic levels by the end of April 2021 (Figure 1.5, Panel B). By beginning 2022, the service sector exceeded pre-pandemic levels, but consumer-facing services, most affected by containment restrictions, still remained 5% below pre-pandemic levels by May 2022. Production output has not recovered to pre-pandemic levels, as early improvements from mid-2020 have slowed due to labour shortages and global supply issues.

Figure 1.5. The economy recovered to pre-pandemic levels



Source: OECD (2022), Economic outlook: statistics and projections database; and ONS.

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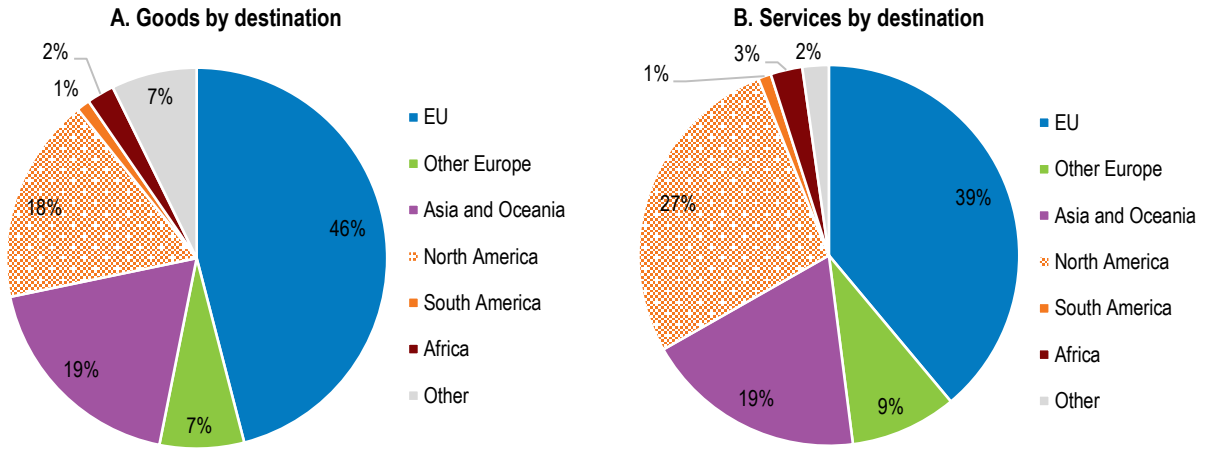
The United Kingdom's departure from the European Union Single Market and the pandemic weigh on trade

Trade has not only suffered from supply bottlenecks and suppressed demand during the pandemic, but also from increased trade frictions with the European Union owing to Brexit (Box 1.1). The European Union was the destination of 46% of UK's goods exports and 39% of services exports and the origin of 49% of both goods and services imports in 2019 (Figure 1.6). Trade in goods with the European Union dropped sharply in January 2021, when the transition period ended, and the United Kingdom effectively left the EU Single Market and Customs Union (Figure 1.7). Since then, trade flows have recovered somewhat, especially UK exports to the European Union. However, recent analysis suggests that the number of trade relationships dropped by one third after January 2021, as trade costs due to administrative burden increased (Box 1.2). While large firms that drive aggregate exports have not yet been severely affected, increased fixed cost have curbed the ability of smaller firms to export (Freeman et al., 2022[2]). Recent interventions to provide SMEs with export support are welcome and should be sustained. Imports from the European Union remain depressed as increased trade costs lead to both UK import activity shifting away from the European Union and EU firms for which the UK market accounts only for a small share of sales reducing exports to the United Kingdom. Services exports and imports declined during the pandemic, with imports from the European Union decreasing the most.

Figure 1.6. The European Union is a major trading partner

Share of exports by sector and destination, 2019



Source: OECD (2022), International Trade Statistics.

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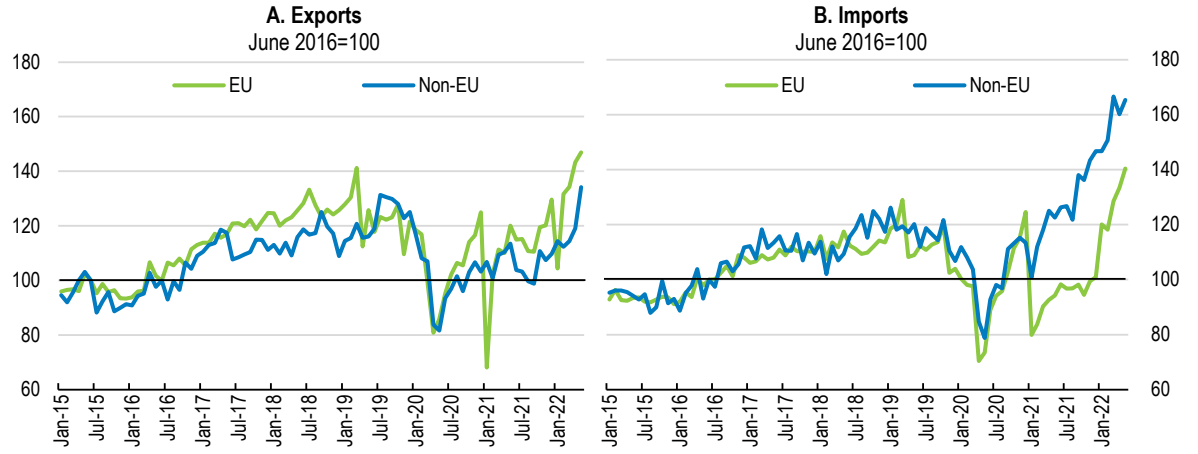
Figure 1.7. Leaving the EU Single Market has affected imports more than exports



Note: Goods imports and exports exclude precious metals. In January 2022 there have been changes to the way HM Revenues and Customs (HMRC) collect data for both imports from and exports to the EU; because of these changes caution should be taken when interpreting these data.
Source: ONS, UK trade: goods and services publication tables.

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The TCA has clarified the post-Brexit trading relationship between the United Kingdom and the EU. Some uncertainties around the Withdrawal Agreement (WA) remain, in particular about implementing the Northern Ireland Protocol (Box 1.1). To support exports to the EU market, the United Kingdom and the European Union should discuss to reduce non-tariff barriers for EU-UK goods trade and improve market access for services. The further phase-in of checks on goods imported from the European Union will continue from next year (2023), including additional sanitary and phytosanitary (SPS) checks, and its impact on trade flows should be monitored closely. Access to comprehensive export support services, especially for SMEs, should continue to be provided (Table 1.1) while targeted support to firms and workers that may suffer from trade frictions could be considered.

Box 1.1. The Withdrawal Agreement, Trade and Cooperation Agreement and the special trade status of Northern Ireland

The Trade and Cooperation Agreement

The United Kingdom and European Union agreed on a comprehensive Trade and Cooperation Agreement (TCA) in 2020 that entered into force on 1st January 2021. The TCA allows for zero-tariff, zero-quota trade in goods between the United Kingdom and the European Union. Although comprehensive in scope as a free trade agreement, it entails significant trade frictions for UK based goods and services exporters. While it guarantees tariff-free access for goods trade, non-tariff technical barriers such as sanitary and phytosanitary requirements and rules of origin are not addressed. The agreement is more limited with regards to services, introducing non-tariff barriers and reduced access to the Single Market and very limited provisions on financial services. The level-playing field provisions in the TCA imply that trade restrictions could be introduced by either side in case of significant divergence in areas such as labour, climate or subsidy policy.

The special trade status of Northern Ireland

The Northern Ireland Protocol is part of the Withdrawal Agreement between the United Kingdom and the European Union. Agreed on 17 October 2019, with provisions applying from 1 January 2021, it arranges the rules for cross-border flows of goods, services and migration between the European Union (i.e., the Republic of Ireland) and Northern Ireland. In light of protecting the peace process and the 1998 Belfast agreements, the intent has been to prevent a hard or soft border between the European Union and Northern Ireland. The Northern Ireland Protocol in the Withdrawal Agreement effectively leaves Northern Ireland as part of the Single Market, avoiding the need for a border between Northern Ireland and the Irish Republic. Northern Ireland hence needs to align itself with Single Market rules with regard to trade in goods. To preserve the integrity of the Single Market, it was agreed that some checks will be required at the sea border between Northern Ireland and Great Britain. Although the agreement benefits Northern Ireland as it gives full access to the EU Single Market, trade with Great Britain has experienced frictions.

On 13 June, the UK government introduced a new bill in parliament that would enable it to unilaterally disapply elements of the Northern Ireland Protocol in the United Kingdom. The bill would empower ministers to introduce changes in four areas of the protocol, covering customs and food safety checks, the application of EU regulations, VAT changes and the role of the European Court of Justice (ECJ). The government's stated aim is to facilitate trade destined for Northern Ireland from Great Britain by reducing custom checks on goods crossing between the two. Before coming into effect, the bill has to be debated and voted on in parliament. The UK government has stated that its preference remains finding a negotiated solution with the EU. The publication of the new bill adds to uncertainty for businesses in Northern Ireland, potentially affecting trade and investment.

Source: UK-EU Withdrawal Agreement, October 2019; UK government, Northern Ireland Protocol Bill 2022.

The UK government is developing a new trade strategy. Having left the European Union and its trade framework, the United Kingdom has replaced the EU external tariff with a new "UK global tariff" under which the number of goods with zero tariffs increased. The openness to services trade has further improved as evidenced by an improved score on the OECD Services Trade Restrictiveness Index, bringing the UK in fifth position out of 38 OECD countries. The UK has also concluded continuity agreements with almost all countries that had trade agreements with the European Union at the time of exit, as well as new agreements with Japan, the EFTA countries (Iceland, Liechtenstein, Norway and Switzerland), Australia and New Zealand. The United Kingdom maintains an interest in a trade agreement with the United States, but has recently shifted attention toward the Indo-Pacific region to benefit from its growth potential

(Department for International Trade, 2021[3]). The United Kingdom is also in the accession process to become a member of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and is negotiating an agreement with India, aiming to reduce barriers for goods and services trade.

The new trade agreements the United Kingdom has finalised so far are unlikely to make up for the loss of EU export market shares. Reduced trade frictions between the United Kingdom and the CPTPP countries and India may boost UK exports in the longer run, but will have a modest impact in the short term as they respectively accounted for just over 8% and 1.5% of UK exports in 2017-2019 (Hale, 2022[4]). Furthermore, the United Kingdom will be competing for these export markets against existing members such as Canada and Japan. A deep trade agreement with the United States could give the United Kingdom exports a bigger boost in the near term, as exports to the United States accounted for 20% of total exports in 2019. In addition to facilitating UK exports to the EU, the government should continue to negotiate new trade deals with other partners. The long-term economic impact of Brexit remains uncertain and will depend on multiple factors including the streamlining of global supply chains in response to Brexit (and the pandemic), access to the EU Single Market, regulatory divergence to the European Union, the relative attractiveness of the United Kingdom driven by policy choices in the United Kingdom and abroad and the number and nature of the UK's new trade agreements.

Box 1.2. The administrative costs of EU-Great Britain goods trade post Brexit

Trade between Great Britain and the European Union faces a range of customs requirements since the UK departure from the EU.

All goods will require:

- Customs declarations;
- Customs duties for goods that do not comply with preferential rules of origin;
- Import VAT;
- Safety and security declarations.

Some goods need additional checks:

- Checks required by international conventions such as endangered species;
- Sanitary and phytosanitary checks including documentary, identity and physical checks;
- Excise duties.

Source: Institute for Government (2022[5]).

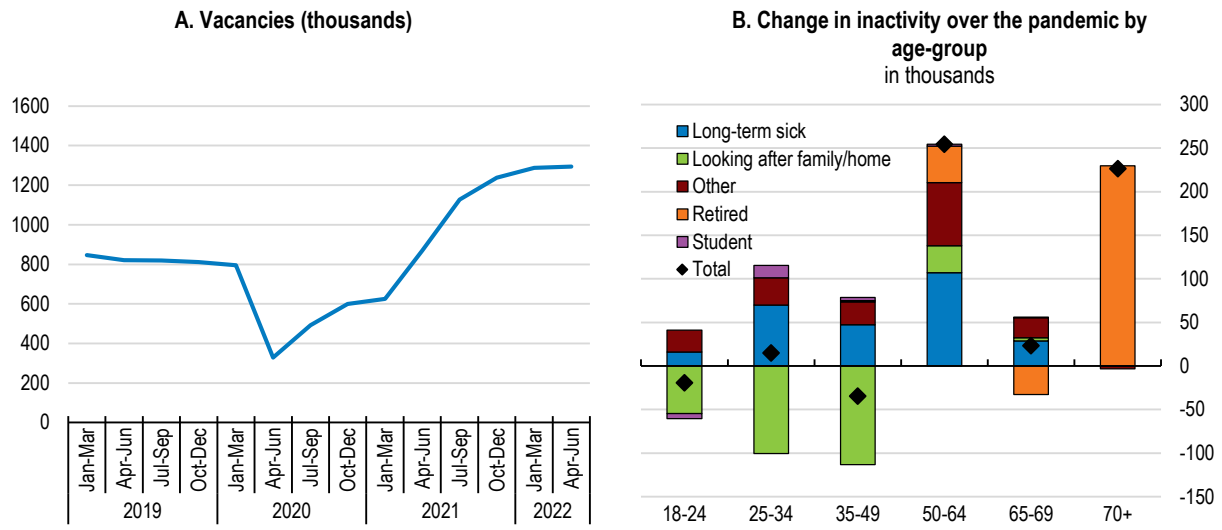
Table 1.1. Past recommendations on international trade

Recommendation in previous *Surveys*	Actions taken since last *Survey*
Keep low barriers to trade and investment with the European Union and others, particularly market access for the service sectors including financial services	The UK-EU Trade and Cooperation Agreement entered into force on 1 January 2021. It allows quota and tariff free trade for goods but introduces a range of technical barriers, whilst there is a more limited number of provisions regarding services within the TCA.
Enhance communication on a no-deal exit from the European Union	A no-deal exit was avoided with the conclusion of the Trade and Cooperation Agreement.
Prepare targeted support to firms and workers that may suffer the most.	SME Brexit support fund launched in February 2021 offering up to GBP 2 000 for smaller businesses to pay for practical support for importing and exporting, such as dealing with new customs, rules of origin, and VAT rules.
Put in place trade facilitation measures to smooth disruptions at the border.	The introduction of further border checks on EU imports is being phased in gradually from 2023.

The labour market is tight

The labour market bounced back quickly from the pandemic shock, with the number of vacancies reaching a record high of almost 1.3 million in the first quarter of 2022 (Figure 1.8, Panel A). Government support through the job furlough scheme helped to keep the rise in unemployment contained during the pandemic (OECD, 2020[1]). After peaking at 5.2% in the fourth quarter of 2020, unemployment fell to a pre-pandemic low of 3.7% in the first quarter of 2022. The gradual phasing out of the furlough scheme ensured a smooth transition and did not lead to a pick-up in unemployment once the scheme ended in October 2021. The COVID-19 crisis disproportionally affected the 16 to 25 years olds, with the employment rate declining, and their economic inactivity and unemployment rates rising by more than those aged 25 and over (Office for National Statistics, 2021[6]). However, individuals aged under 25 were also quicker in finding a job once restrictions eased. By contrast, inactivity rates increased for people aged 55 and older as the pandemic continued, with many of them dropping out of the labour force and entering early retirement. The overall inactivity rate remains above pre-pandemic levels mainly due to people studying and due to long-term sickness (Figure 1.8, Panel B), a development that is not unique to the United Kingdom (Box 1.3).

Figure 1.8. The labour market has rebounded



Note: Panel A: Vacancies exclude agriculture, forestry and fishing. Latest data refers to Mar-May 2022. Panel B: Shows changes between the fourth quarter of 2019 and the fourth quarter of 2021.
Source: ONS, labour market statistics.

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Labour shortages have been partially exacerbated by reduced net migration. Towards the end of 2021, labour shortages predominantly emerged in low-skilled sectors that were particularly affected by the pandemic and those in which a high share of EU-born migrants were working, such as the hospitality sector (13% of workers) and the transport and storage sector (11% of workers) (Office for Budget Responsibility, 2021[7]; Fernández-Reino and Rienzo, 2021[8]). Surveys suggest that half of all firms are having difficulty recruiting new workers, while around one in five firms are having issues retaining existing staff. Although most of the shortages can be explained by economic restructuring due to the pandemic, one in ten firms report that the UK's point-based immigration regime is causing labour shortages (De Lyon and Dhingra, 2021[9]). From 2019 to 2020, immigration is estimated to have fallen between 50% and 60% (Office for National Statistics, 2021[10]), although these numbers should be taken cautiously because of difficulties in data collection during the pandemic and a change in methodology (Box 1.4). Immigration of EU-born nationals decreased slightly more than that of non-EU nationals (around 67% compared to 50%), a trend

that is likely to have continued following the end of free movement of labour between the United Kingdom and the European Union since January 2021. In the context of a tight labour market, the government should ensure that the migration system is sufficiently flexible to quickly address rising labour shortages.

Box 1.3. Labour market participation in the US after the heights of the pandemic

In the US, the employment-to-working age population ratio fell by 10 percentage points between January and April 2020. While the employment fall was more gradual in the UK, reaching a maximum of 2 p.p. in the fourth quarter of 2020 relative to 2019Q4, both countries found themselves in similar situations regarding labour market tightness. Employment in the US gradually recovered, but the aggregate labour force participation rate remains below the pre-pandemic level and about 0.4 percentage points below where the Congressional Budget Office expected it to be in their pre-pandemic forecast. This mostly reflects the significant decline in the participation rate of older workers. In particular, there has been a fall in the share of existing retirees transitioning back into the labour force. In addition, a continued decline in immigration, from a combination of the pandemic along with pre-pandemic policies, has also weighed on labour supply and the participation rate. While concerns about contracting COVID-19 may have kept some from returning to work, especially those previously in face-to-face industries with heightened transmission risk, recent numbers suggest that it is unlikely that there will be a large increase in the number of older workers who have moved into retirement re-entering the labour force.

Source: OECD Economic Survey of the USA 2022, forthcoming.

Box 1.4. EU migration post-Brexit

Before Brexit, free movement rules gave EU citizens the right to live and work in the United Kingdom without requiring permission. As of 1 January 2021, EU citizens (except Irish citizens) who wish to move to the United Kingdom are subject to the same new Points Based Immigration System that also applies to non-EU citizens. The Point Based Immigration System is aimed at the most highly skilled workers, skilled workers, students and a range of other specialist work routes including those for global leaders in their field and innovators. For the skilled worker route, points are awarded for a job offer at the appropriate skill level, knowledge of English and being paid a minimum salary. People will normally need to be paid at least GBP 25 600 per year, have enough money to pay the application fee, the health care surcharge and be able to support themselves. The visa lasts for up to five years before it needs to be extended. Alongside the skilled worker route, several other new routes have opened over 2019 and 2020 including Global Talent, Innovator, Start-up, Graduate, Student and Child Student, Further routes are opened in 2022 for entrepreneurs and highly skilled people, including the Global Business Mobility route (April 2022), the High Potential Individual route (May 2022) and the Scale-Up route (August 2022).

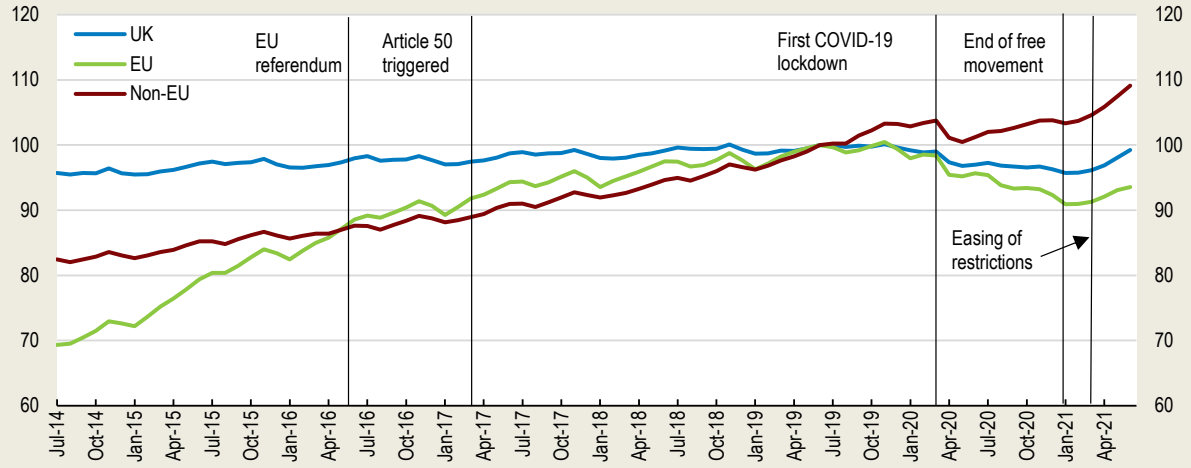
Effect of new rules on EU migration

The end of free movement for EU citizens coincided with the COVID-19 pandemic. It can be expected that both the pandemic and Brexit have fundamentally changed migration patterns in and out of the United Kingdom. The effect is still unclear due to data collection issues and changes in methodology. The usual source for measuring migration in the UK, the International Passenger Survey (IPS), was suspended at the start of the pandemic. Instead, the ONS developed experimental statistical models which indicate that EU net migration was negative in 2020, with an estimated 94 000 more EU nationals leaving the UK than arriving. EU immigration dropped considerably in 2020 compared with previous years, while numbers of EU people emigrating held steady (Office for National Statistics, 2021[10]). In

addition, the ONS estimated the number of migrants in the United Kingdom using payroll information (Figure 1.9), which show a decline in pay-rolled employment held by EU nationals since the onset of the pandemic, and although there is a slight improvement from 2021 onwards, it is not as pronounced as for non-EU nationals.

Figure 1.9. The number of pay-rolled employment held by EU nationals has declined

Change in pay-rolled employments by nationality, June 2019 = 100 (non-seasonally adjusted)



Source: OECD (2021[11]); Office for National Statistics (2021[12]); Figure: Office for National Statistics (2022[13]).

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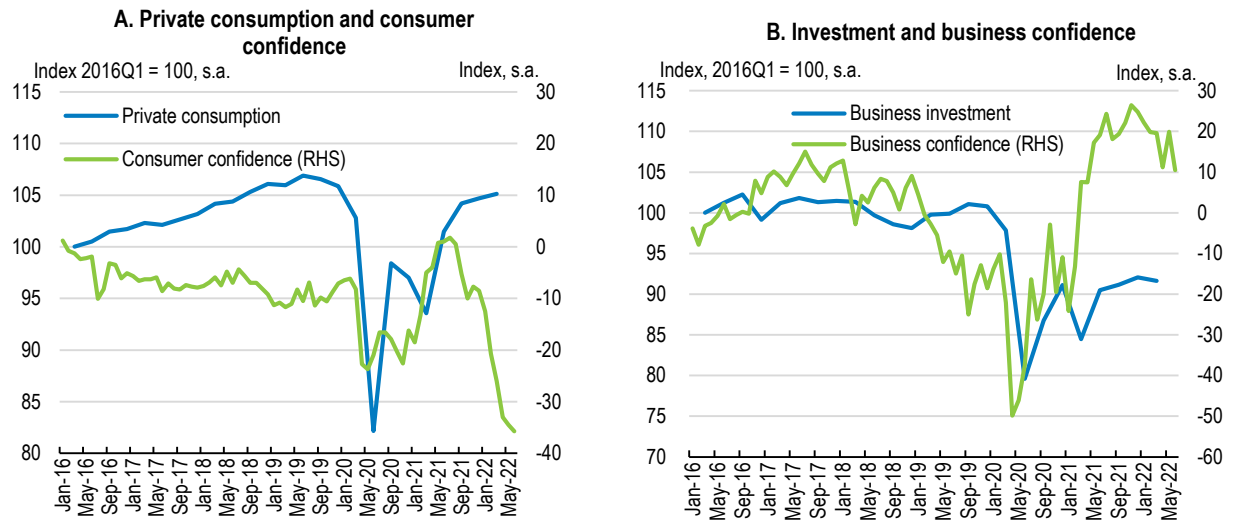
Consumption has supported growth but confidence is deteriorating

Private consumption fuelled the recovery as containment restrictions were eased (Figure 1.10, Panel A). However, consumption remains volatile, in particular as the cost of living is rising as reflected by developments in consumer confidence. While consumer confidence has plummeted amid rising goods and energy prices (see below), further aggravated by spill over effects from the Ukraine war, business confidence so far remains well above pre-pandemic levels. Business investment gradually improved following the COVID-19 crisis aided by tax incentives (Figure 1.10, Panel B), but remains subdued and below pre-pandemic level. To support business investment, the government announced a two-year tax "super-deduction" in the March 2021 budget. Companies investing in new assets between 1 April 2021 and 31 March 2023 can claim a 130% capital allowance on qualifying plant and machinery investments and a 50% first-year allowance for qualifying special rate assets.

Figure 1.10. Investment is recovering but confidence is volatile



Note: Panel B: Business confidence refers to the manufacturing sector. Business investment refers to private non-residential gross fixed capital formation.
Source: OECD (2022), OECD Economic Outlook: Statistics and Projections (database); and OECD (2022), OECD Main Economic Indicators (database).

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Low income households are pressured by rising cost of living

Quickly rising cost of living have resulted in increasing pressure on people's incomes. As a response, the government introduced several measures to aid households with rising energy costs in February and March 2022. In May 2022, the government introduced new measures totalling GBP 15 billion (about 0.7% of GDP), which provide temporary support to households with rising energy costs mainly targeted to those most in need. About 8 million households on means-tested tested benefits will receive a one-off payment of GBP 650 this year paid in two instalments, and one-off payments of GBP 300 will go to pensioner households and GBP 150 to individuals receiving disability benefits. The previously announced energy discount for 2022 is doubled to GBP 400 per household and becomes non-repayable. This targeted and temporary support is welcome as it helps to temporarily ease the financial distress of the most vulnerable households.

The May measures came on top of previously announced measures bringing total support in 2022 to a sizable GBP 37 billion (1.5% of GDP). Previous measures announced include, in March, a GBP 5p per litre cut in fuel duty, an increase in the national insurance threshold, zero-VAT on energy efficiency home improvements and an extra GBP 500 million for the household support fund managed by local councils, and in February a GBP 200 discount on energy bills and a targeted GBP 150 rebate on council tax. These measures are welcome. The May package in particular is better targeted at low-income households and those out of work.

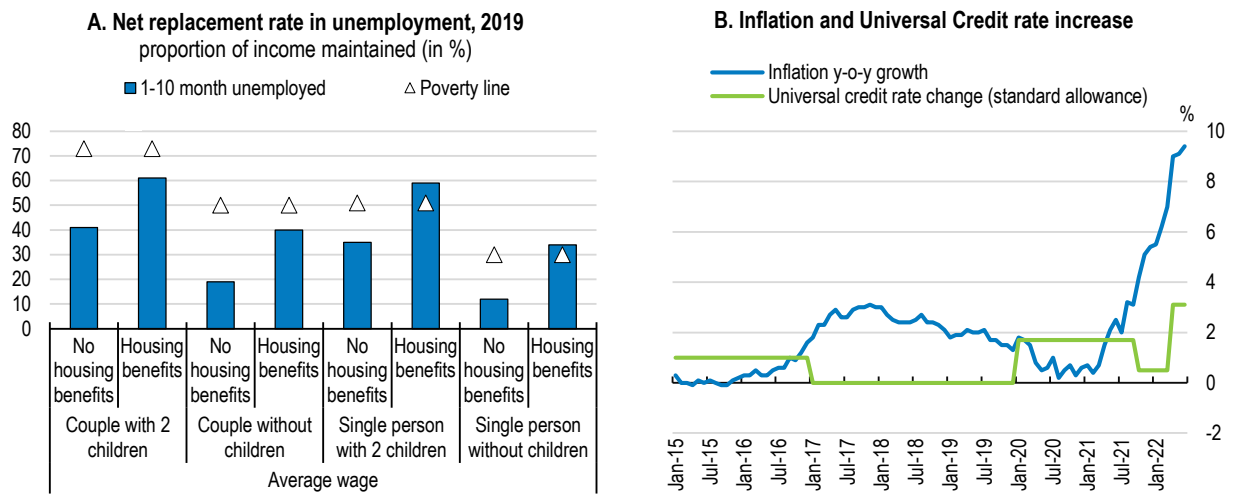
Part of the May support package will be financed by higher borrowing, and GBP 5 billion will be funded by a new Energy Profits Levy. However, to ensure that investment continues to take place in UK oil and gas extraction, the government introduced within the Energy Profits Levy a new 80% investment allowance. While higher UK extraction reduces dependence of imports of fossil fuels, the government should also consider expanding the investment allowance to include renewables to aid the transition to net zero.

Apart from temporarily introduced measures, people with low income, who are out of work or who are unable to work can receive benefits of the Universal Credit, the main support to cover living costs. The Universal Credit integrates a number of the legacy system's benefits and aims at simplifying access and

extending the existing activation efforts across all benefits (OECD, 2020[1]). During the height of the COVID-19 crisis, the government swiftly adapted the claim process and temporarily lifted payments by GBP 20 per week. Although this timely government response successfully avoided an increase in income inequalities during the pandemic, non-working households were worse off in real terms as this temporary support was withdrawn in October 2021 (Brewer and Tasseva, 2021[14]; Bronka, Collado and Richiardi, 2020[15]; HM Treasury, 2020[16]; Waters et al., 2020[17]). Rising inflation since mid-2021 has contributed to a significant decline in real terms of Universal Credit. In the Autumn Budget 2021, the government announced to increase earnings for working universal credit recipients by raising work allowances by GBP 500 a year and reducing the taper rate from 63% to 55%, which reduces the impact of the withdrawal of the GBP 20 per week raise and increases work incentives. This is welcome. However, at the beginning of 2022, the basic level of Universal Credit in real terms had fallen 11.5% below its value when introduced in 2013.

At present, the targeted support to deal with cost of living is sizable and well targeted and will provide support to vulnerable households. However, in the longer term, the government should follow its annual uprating of universal credit as planned and ensure that it is adequate to cover the minimum living standard. Economic restructuring linked to the digital and green transition is likely to accelerate in coming years leading to rising unemployment among workers, especially low skilled workers, and such strengthened safety net could help address persistently high income inequality in the United Kingdom (OECD, 2018[18]). And, already before the pandemic, Universal Credit did not provide a sufficient safety net (Figure 1.11, Panel A). The government froze Universal Credit benefit levels as part of the post-financial crisis fiscal consolidation between 2017 and 2020 (Figure 1.11, Panel B). Moreover, unemployment benefits for many households remain below the levels of many other OECD countries and poverty rates are highest among households out of work (OECD, 2020[1]).

Figure 1.11. Unemployment benefits are low and uprating of Universal Credit has fallen behind inflation growth



Note: The indicator is the ratio of net household income during a selected month of the unemployment spell to the net household income before the job loss. Calculations refer to a jobseeker aged 40 with an uninterrupted employment record since age of 19 until the job loss. For a detailed description of the assumptions underlying the OECD Tax-Benefit model and the related policy indicators, please see the source.
Source: OECD (2022), Social protection and well-being database; UK Government, department for Work and Pensions; and ONS.

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Economic growth will continue to slow

Growth is slowing amid persisting supply shortages and rising inflation. Output is projected to grow by 3.6% in 2022 before stagnating in 2023 due to depressed demand (Table 1.2). Inflation will continue to rise, peaking at just over 10% in the fourth quarter of 2022, driven by increasing global prices of tradable goods and services due to continuous supply bottlenecks and higher global energy prices. Continued tightness of the labour market is expected to feed through to higher wage growth in 2022 and 2023, but with wage growth remaining below inflation. Tighter monetary policy and easing supply constraints over 2023 are expected to help inflation decline to 4.7% by the end of 2023.

Private consumption is expected to slow as rising prices erode households' income. However, spending will be supported by further declines in the households saving rate to below pre-pandemic levels, with some households taking on more debt to keep up with the rising cost of living. Unemployment is set to remain low but gradually increase to 4.5% by the end of 2023 due to weaker demand. Business investment will be supported by the super deduction for some types of investments available until April 2023, although the positive effect will be damped by rising interest rates, high energy prices and lingering uncertainties. Trade intensity with trading partners in Europe will decline, as growth in Europe is expected to slow amid the EU embargo on Russian oil. Public investment will be affected by supply shortages in 2022, hindering planned investment, but is expected to pick up in 2023 with planned spending increases on infrastructure and climate. The general government deficit is projected to decline gradually to 5.3% of GDP in 2022 and 4.1% of GDP in 2023.

Table 1.2. Macroeconomic indicators and projections

Annual percentage change, volume (2019 prices)

	2018	2019	2020	2021	2022	2023
	Current prices (EUR billion)					
Gross domestic product (GDP)	**2,174.4**	**1.7**	**-9.3**	**7.4**	**3.6**	**0.0**
Private consumption	1,412.3	1.3	-10.6	6.2	4.5	0.7
Government consumption	399.0	4.2	-5.9	14.3	1.4	0.8
Gross fixed capital formation	386.5	0.5	-9.5	5.9	8.0	2.1
Housing	112.0	-2.5	-12.2	13.8	7.7	0.0
Business	217.3	0.9	-11.5	0.8	4.3	1.9
Government	57.2	5.0	2.6	9.6	19.2	5.7
Final domestic demand	2,197.8	1.7	-9.5	7.9	4.5	1.0
Stockbuilding[1]	4.9	-0.1	-0.6	0.6	3.5	0.0
Total domestic demand	2,202.7	1.6	-10.2	8.3	8.0	0.9
Exports of goods and services	663.3	3.4	-13.0	-1.3	0.9	1.5
Imports of goods and services	691.6	2.9	-15.8	3.8	15.7	3.6
Net exports[1]	-28.3	0.1	1.0	-1.4	-4.2	-0.7
Other indicators (growth rates, unless specified)						
Potential GDP	. .	1.8	1.5	-1.2	1.1	1.1
Output gap[2]	. .	-0.6	-11.1	-3.3	-0.9	-2.0
Employment	. .	1.1	-0.8	-0.5	0.9	0.5
Unemployment rate	. .	3.8	4.5	4.5	3.8	4.3
GDP deflator	. .	2.0	5.1	0.3	5.7	4.9
Consumer price index (harmonised)	. .	1.8	0.9	2.6	8.8	7.4
Core consumer prices (harmonised)	. .	1.7	1.4	2.4	6.4	5.9
Household saving ratio, net[3]	. .	-1.6	8.2	4.4	-1.5	-5.3
Current account balance[4]	. .	-2.7	-2.5	-2.6	-7.2	-7.6
General government fiscal balance[4]	. .	-2.3	-12.8	-8.3	-5.3	-4.1
Underlying general government fiscal balance[2]	. .	-2.0	-5.1	-6.2	-4.8	-3.0

Underlying government primary fiscal balance[2]	. .	-0.1	-3.6	-3.9	-2.0	-0.2
General government gross debt[4]		118.5	149.1	143.1	139.2	138.6
General government net debt[4]	. .	84.7	109.3	105.0	101.1	100.5
Three-month money market rate, average	. .	0.8	0.3	0.1	1.4	2.4
Ten-year government bond yield, average	. .	0.9	0.4	0.8	1.8	2.5

1. Contribution to changes in real GDP.
2. As a percentage of potential GDP.
3. As a percentage of household disposable income.
4. As a percentage of GDP.
Source: OECD Economic Outlook 111 database.

Risks to the outlook are considerable. Spill-overs from economic sanctions, higher than expected energy prices as the Ukraine war drags on, and a deterioration in the public health situation due to new COVID strains are significant downside risks (Table 1.3). The United Kingdom has limited direct trade and financial linkages with Russia and Ukraine, but higher global energy prices and further economic slowdowns in major European trading partners could add to higher than expected goods and energy prices weighing on consumption and further lower growth. A prolonged period of acute supply and labour shortages could force firms into a more permanent reduction in their operating capacity. Progress in trade deals could support trade and improve the medium- to long-term outlook.

Table 1.3. Events that could lead to major changes in the outlook

Uncertainty	Possible outcomes
Pandemic outbreaks	Reduction of activities where distancing is a concern could lead to firm failures and increased unemployment. Highly contagious forms of the virus could affect the provision of labour due to isolation and quarantine requirements.
Intensified and prolonged geopolitical conflicts in Europe	Spill-overs from Russia's invasion could drive up energy prices, as the Ukraine war drags on, squeezing household incomes and slowing down economic growth on the back of lower consumption.

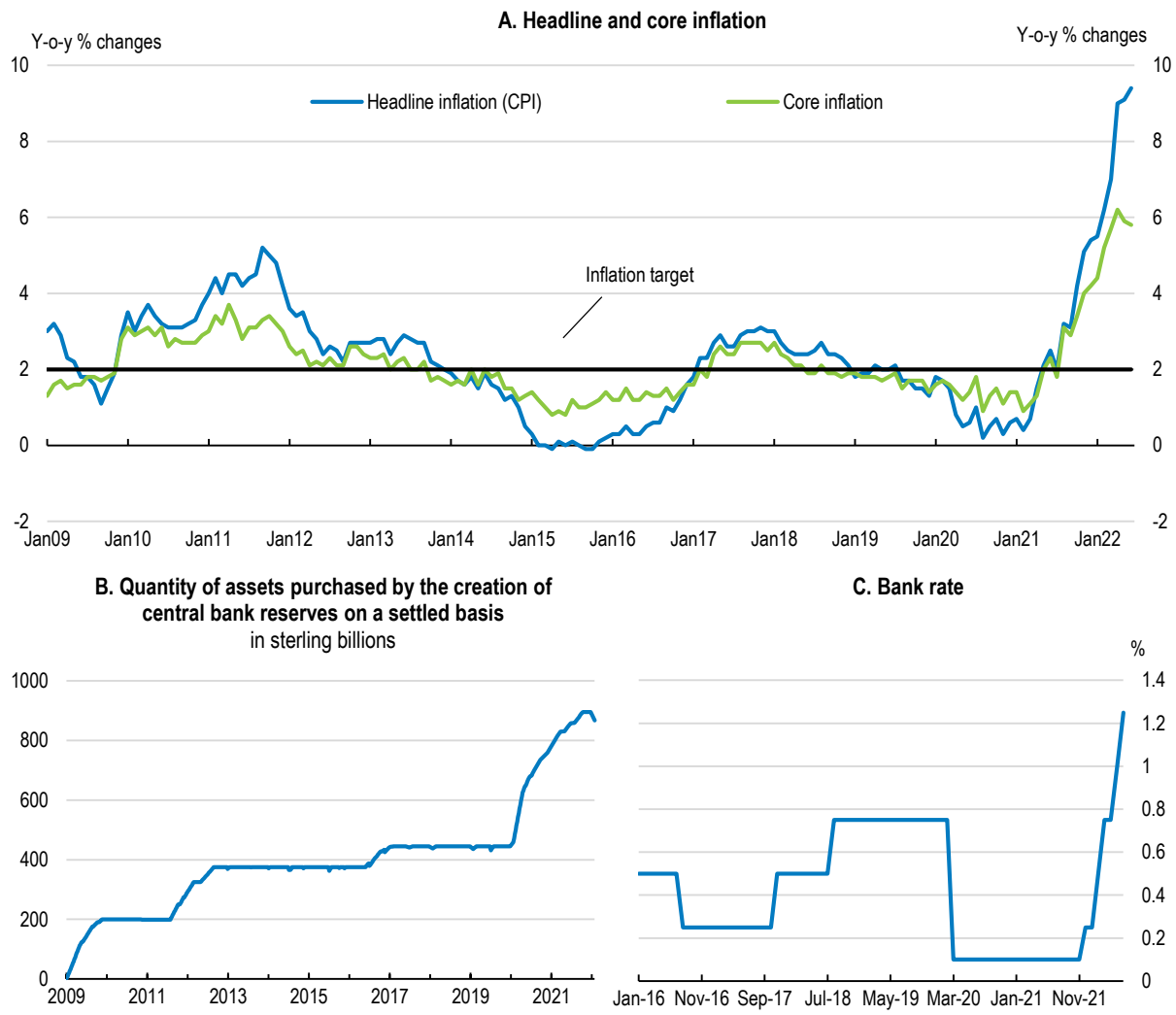
Monetary policy should continue to tighten to curb the risk of a de-anchoring of inflation expectations

Inflationary pressures started to mount in the second half of 2021 on the back of supply and labour shortages and rising energy prices. CPI inflation rose from 2% in summer 2021 to 9.4% in June 2022 (Figure 1.12, Panel A). The surge reflects elevated energy and goods prices, largely determined by global markets, global supply shortages and strong (pent-up) demand for goods exacerbated by higher energy prices following Russia's invasion of Ukraine. Administrative trade costs have increased due to Brexit. Core inflation has significantly picked up as well (Figure 1.12, Panel A) and inflation expectations have increased. Tight labour markets, with high turnover and record vacancies have led to solid wage growth since 2021, reaching 4.8% year-on-year in January 2022 and surveys point at continued strong pay growth in 2022; the government also implemented a 6.6% increase in the minimum wage in April 2022.

Monetary policy, highly accommodative during the pandemic, started tightening from end-2021. In March 2020, the Bank of England (BoE) cut the bank rate from 0.75% to 0.1% and increased its bond purchasing programme over the course of the crisis to a total of GBP 895 billion (about 44% of GDP in 2020) (Figure 1.12, Panel B). Since December 2021, the BoE gradually has increased the policy rate from 0.1% to 1.25% in June, on the back of the recovery and rising inflation pressures (Figure 1.12, Panel C). The BoE ended its quantitative easing program in December 2021. In February 2022, the BoE decided not to reinvest any future maturities and announced to gradually sell its stocks of sterling corporate bonds and end the program towards the end of 2023. A strategy for selling the stock of government bonds will be discussed at the August 2022 monetary policy meeting.

In the context of high inflation and rising wages, further tightening of monetary policy is welcome to support the return of inflation to target and to anchor inflation expectations, which remain elevated at around 6% for the next 12 month as measured by the YouGov/Citigroup survey in June 2022. Clear and carefully communicated forward guidance will be important to limit second-round effects and avoid uncertainty. The decline in asset holdings should continue to follow a predictable and well-communicated strategy to guide markets and reduce financial stability risks. As planned, the Bank should outline a clear quantitative tightening strategy to manage market expectations.

Figure 1.12. Monetary policy, supportive during the crisis, has started to tighten



Source: ONS; and BoE.

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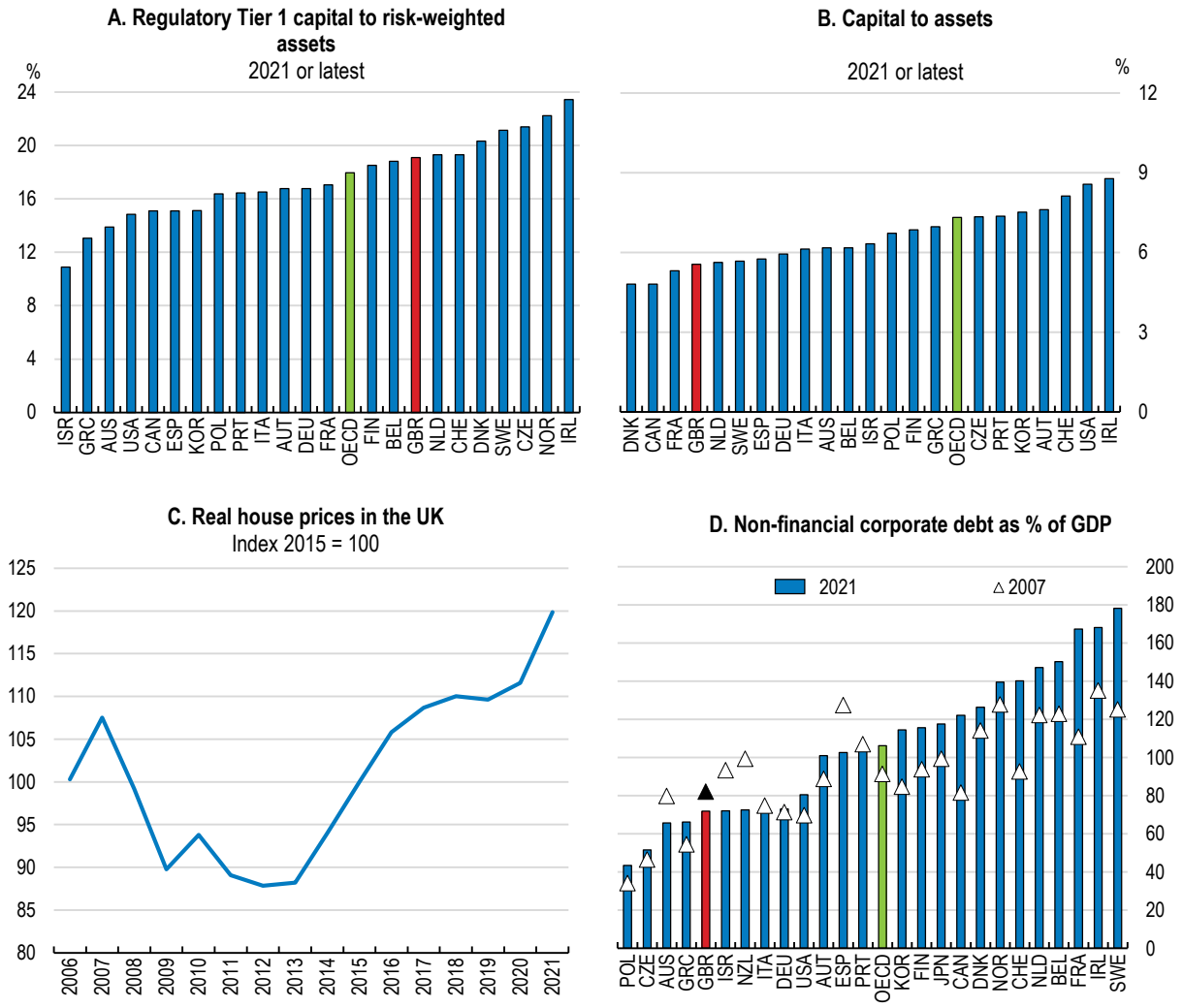
The financial system withstood the shock from the COVID-19 crisis and the withdrawal from the EU Single Market

The banking sector entered the pandemic well capitalised, allowing it to absorb the effects of the pandemic and continue to provide services to households and businesses. While banks are still highly leveraged in gross terms, average risk-weighted capital is around the OECD average (Figure 1.13, Panels A and B).

To prevent financial tightening that could exacerbate the crisis, the Bank of England lowered the countercyclical capital buffer during the pandemic. Multiple government support schemes also softened the pandemic's impact and contained insolvencies. Government loan schemes supported SMEs who bore the brunt of COVID-19. Income support through the furlough scheme and payment deferrals supported households. The share of non-performing loans increased somewhat at the start of the pandemic, but remained relatively low and is gradually declining (Bank of England, 2021[19]).

Figure 1.13. The banking system is well capitalised



Source: IMF (2021), IMF Financial Soundness Indicators Database; OECD (2021) National accounts at a glance; and BIS.

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The economic consequences of the pandemic will take time to resolve and some of the impact is only now becoming visible as support measures are withdrawn. A recent stress test by the Bank of England (2020[20]) suggests that the financial sector could withstand a very severe downturn in addition to the COVID-19 pandemic shock of 2020.

Risks arising from rapidly rising house prices remain contained, but vigilance remains warranted. House prices increased by 11.8% over the year to September 2021 fuelled by increased demand as a result of the pandemic, supply pressures and tax incentives (Figure 1.13, Panel C). But compared to before the

pandemic, high loan-to-value mortgages remain a smaller share of new mortgages (Bank of England, 2021[21]). Most households that benefited from mortgage payment deferrals at the start of the pandemic have restarted full or partial repayments (Bank of England, 2021[22]). In June 2022, the Bank of England's Financial Policy Committee announced the removal of the affordability test, which assesses whether the borrower could afford payments if the policy rate increases by three percentage points above their reversion rate specified in the mortgage contract. Removing this test simplifies the framework and reduces constraints for some borrowers. The Loan to Income (LTI) flow limit, which is seen as more effective, remains in place in addition to the affordability measures of the Financial Conduct Authority (Bank of England, 2021[19]). Because the FCA affordability test is less stringent on average over interest rate cycles, it is important that the effect of simplification is monitored to ensure macroprudential tools contain risks from the mortgage market for the UK banking system and remain effective.

Corporate debt has increased during the pandemic, including borrowing from government support packages, but corporate debt levels remained well below the OECD average as a percentage of GDP in 2020 (Figure 1.13, Panel D). Simulations show that it would take a large shock to impair business ability to service their debt on aggregate (Bank of England, 2021[19]). However, some pockets of risk exist due to the uneven distribution of debt (Bank of England, 2021). For instance, debt held by SMEs has increased. Risks to lenders are limited as the majority of lending through the pandemic occurred with government guarantees, at low and fixed interest rates (Bank of England, 2021[19]). Insolvencies have been rising to pre-pandemic levels (see above), but already before the pandemic, UK's insolvency regime was fairly efficient and greater flexibility was provided through the 2020 Corporate Insolvency and Governance Act. The insolvency regime should therefore be able to deal with a rise in cases (Adalet McGowan and Andrews, 2018[23]; OECD, 2020[1]). In addition, UK banks hold around GBP 31 billion in provisions to deal with future credit losses (Bank of England, 2021[19]).

As the immediate effects of the pandemic fade, macrofinancial vulnerabilities may emerge as the consequences of leaving the European Union and the transition to net zero come to the forefront. With the departure from the European Union, some segments of the financial sector based in the United Kingdom can no longer directly service EU clients through the EU passporting regime as they could previously. Access to EU labour has become more cumbersome due to new visa regulations. However, the transition so far has occurred smoothly (see Box 1.5). The long-term impact of leaving the EU Single Market on the UK financial sector remains uncertain. The government is using its new powers to replace the EU financial services framework and will introduce a financial services and markets bill this year. This will include updating the objectives of the financial regulators and revising capital markets regulation. The government is consulting to better understand how reforms to insurance regulation (Solvency II) would enable insurance firms to invest more in long-term infrastructure products and hold less capital (Glen, 2022[24]). Although some adjustments to insurance regulation are warranted - the European Union is going through a similar process - and incentivising private sector investment in longer term and more illiquid assets is positive, the development of new regulation should be approached carefully and financial stability implications, and costs to policyholders, should continue to feature prominently.

Adjusting to the pandemic, Brexit and net zero will require some reallocation of labour and capital. UK SMEs are largely dependent on bank funding, but larger firms rely heavily on market funding. The resilience of the banking system and a return to risk appetite mean lending conditions to firms remain supportive while large firms maintained access to market-based funding (Bank of England, 2021[19]).

Transitioning to net zero provides investment opportunities, but may also put additional pressures on financial institutions, particularly in the transition phase. Climate change increases the scale and frequency of natural disasters such as floods and storms, raising the claims burden for insurers and re-insurers, even though this will be reflected in premiums over time. In 2021, the Bank has launched the Climate Biennial Exploratory Scenario (CBES) exercise to assess the resilience of major UK banks, insurers, and the wider financial system to different climate scenarios, which is a timely innovation.

Box 1.5. The effect of leaving the European Union on the financial services sector

In financial services, an important source of the UK's comparative advantage, market access between the UK and the EU is to a significant extent managed through equivalence, where either side can grant the other equivalent status in relation to a number of legislated areas. In November 2020, the UK published a guidance document setting out its approach to operating its equivalence framework and granted a package of equivalence decisions in respect of the EEA states. The UK has replicated most of the equivalence determinations in respect of overseas jurisdictions made by the European Commission pre-Brexit. As of November 2021, 32 jurisdictions plus the EEA benefit from UK equivalence decisions The European Union granted equivalence for UK regulatory standards only temporarily and in specific areas, such as derivatives clearing.

Following its departure from the European Union, the United Kingdom needs to establish an independent regulatory framework. At the point of EU exit, directly applicable EU legislation (including that relating to financial services) was brought into the UK law so that it would continue to have effect in the UK after withdrawal. This "retained EU law" was amended as necessary to ensure that it would continue to operate effectively in the UK after exit (a process known as "onshoring"). This provided continuity and stability at the point of exit, but it was not intended to be a permanent approach to financial services regulation. This retained EU law will now be repealed so that regulation in these areas can be brought into line with the UK's domestic model of regulation where the design and implementation of firm-facing rules is the responsibility of the UK regulators (Bank of England (BoE), Prudential Regulation Authority (PRA), and Financial Conduct Authority (FCA)). The goal of the UK government is to create a financial services sector, built around four themes of Openness; Green Finance; Technology; and Competitiveness. The government intends to tailor its approach to financial services regulation to reflect the UK's new position outside the EU, while ensuring it supports and promotes the interests of UK markets and maintains high regulatory standards in the face of new and evolving risks. As announced in the Queen's Speech on 11 May 2022, the government will be bringing forward a Financial Services and Markets Bill, which will deliver on these commitments by implementing the outcomes of the Future Regulatory Framework (FRF) Review as well as a series of important initiatives underpinning the government's vision.

The transition to the new regime on January 1, 2021, went smoothly thanks to joint efforts by financial firms and UK authorities. There are no formal statistics on the number of UK-based financial services jobs that have moved from the United Kingdom to the European Union, but estimates suggest around 7 000 jobs have been relocated by March 2022 (EY, 2022[25]), which remains well below most estimates before EU exit. The long-term impact of EU exit on the UK financial sector remains unclear.

Some aspects of EU exit were phased in gradually, including:

- A **Temporary Transition Power (TTP)** given by HMT to the FCA, PRA and BoE allowed them to temporarily waive or amend rules post-Brexit until end-March 2022 or December 2022. In the areas where TTP relief ended in March 2022, there has been no material disruption as a consequence.
- The **Temporary Permissions Regime** (TPR) allows temporary continued access to the UK market for EEA-based firms that were passporting into the United Kingdom at the end of the transition period (31 December 2020). During the temporary period of access, the firms must seek full authorisation by the Prudential Regulatory Authority (PRA) or the FCA as required in the UK to continue to access the UK market (FCA, 2018). This will happen in a staggered process. Around 1500 EEA-based firms entered the FCA Temporary Permissions Regime at the beginning of 2021. The Temporary Permissions Regimes will expire at the end-2023.

- **Derivative Clearing**: The European Union has granted the United Kingdom temporary equivalence status with regard to clearing, allowing EU derivatives to be cleared in the United Kingdom. This permission expires in 2025.

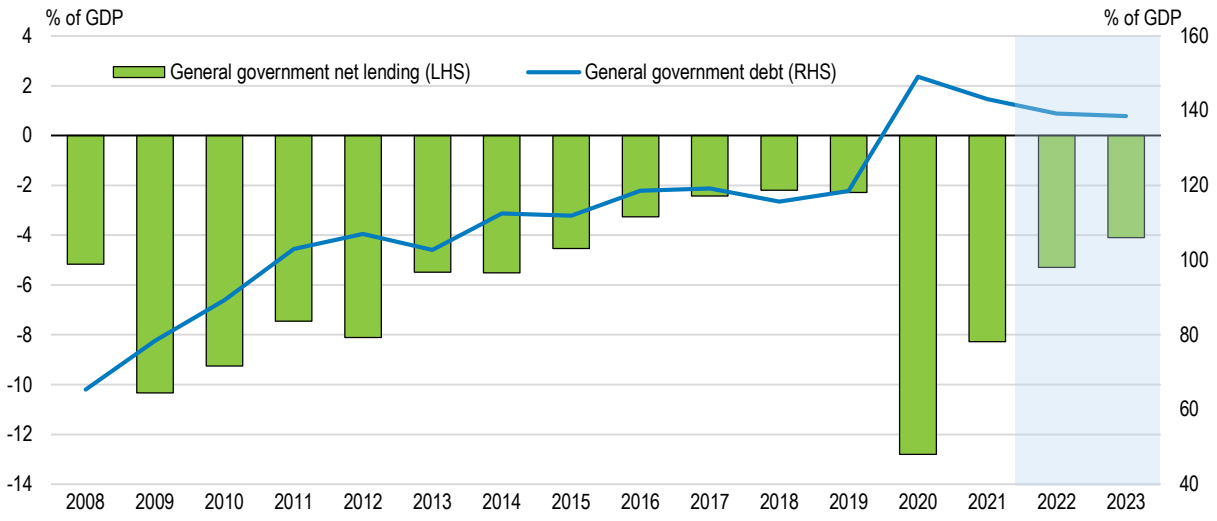
Source: FCA (2021), "Seizing opportunity – challenges and priorities for the FCA". https://www.fca.org.uk/news/speeches/seizing-opportunity-challenges-priorities-fca; FCA (2020), "Onshoring and the Temporary Transitional Power", https://www.fca.org.uk/brexit/onshoring-temporary-transitional-power-ttp; FCA (2018), "Temporary permissions regime", https://www.fca.org.uk/brexit/temporary-permissions-regime-tpr.

Fiscal policy has to balance consolidation with supporting growth and addressing investment needs

Tax increases will contribute to a declining fiscal deficit

The pandemic triggered a strong fiscal response of around 19% of 2020 GDP by September 2021 supporting household incomes and attenuating the rise in unemployment and business insolvencies (IMF, 2021[26]). The budget deficit rose to a record -12.8% in 2020 and gross public debt increased by 36 percentage points (Figure 1.14). As the main support measures were phased out in October 2021, the fiscal balance improved and gross public debt declined to 143.1% of GDP in 2021.

Figure 1.14. The pandemic led to a record high budget deficit that pushed up public debt



Source: OECD (2022), OECD Economic Outlook: Statistics and Projections (database), June.

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The government has committed to a gradual medium-term fiscal consolidation plan and to increased tax revenues. National-insurance contributions rose by 1.25% from April 2022 to fund health and social care spending while tax free allowances and higher rate thresholds for income tax are frozen until 2025-26, a policy that now has a bigger positive impact on revenues than anticipated when introduced in early 2021 due to high inflation. The corporate income tax rate will increase from 19% to 25% in April 2023. These tax changes will result in an increased overall tax intake from 33% of GDP in 2019-20 to almost 37% of GDP in 2026-27 as forecasted by the OBR, despite a hike in the national insurance threshold and a cut to income tax in 2024 (Institute for Fiscal Studies, 2022[27]; Office for Budget Responsibility, 2022[28]). Overall, tax changes will put a higher share of the burden on richer households and will be progressive (Institute for

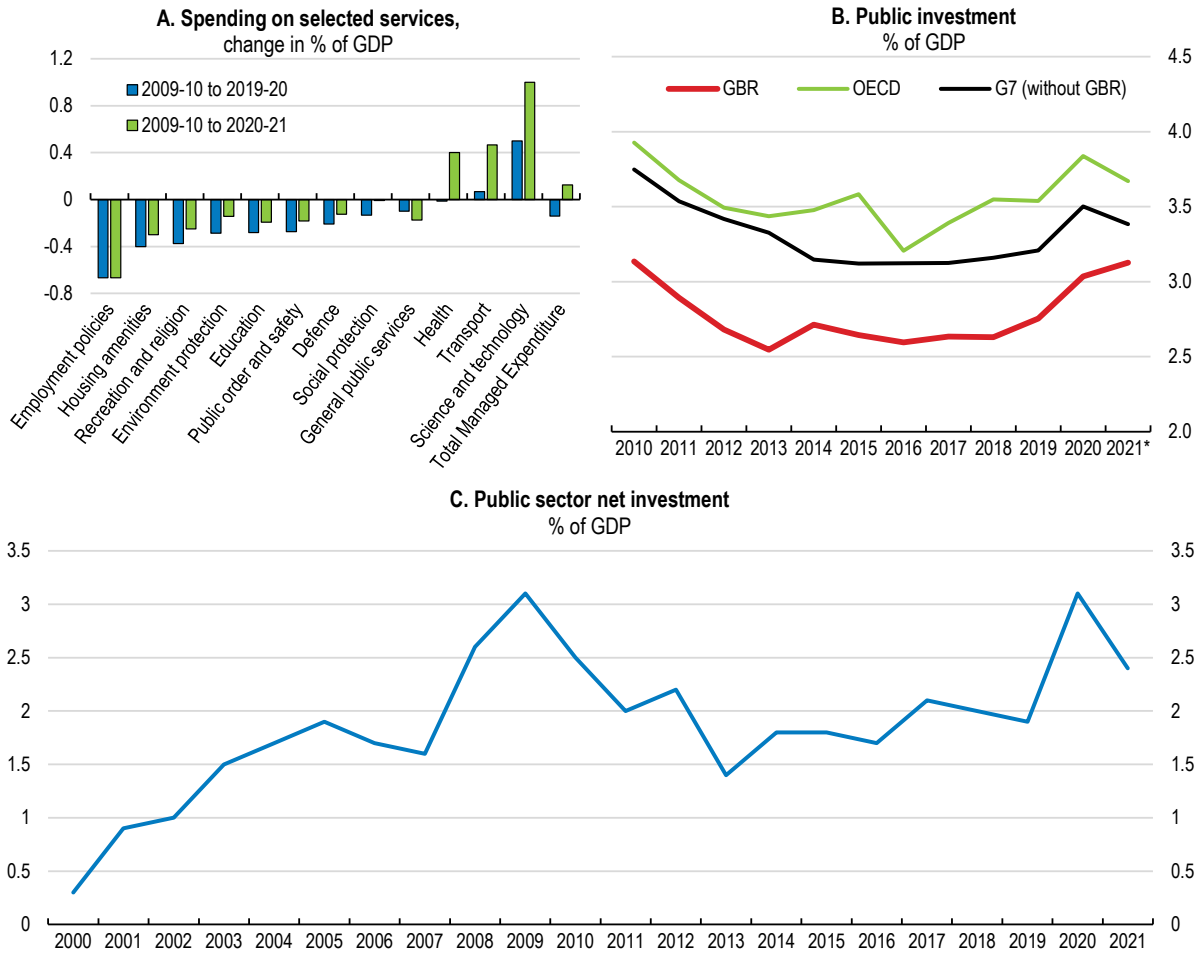
Fiscal Studies, 2022[27]), but still imply a higher individual tax liability for almost all workers in the coming years. Based on government medium term plans, the deficit will fall from about 15% in 2020-21 to around 1% of GDP in fiscal year 2024-25, with the largest fiscal withdrawal happening in 2023-24. Public net debt will fall from 96.5% of GDP in 2021 to 88% of GDP by 2025-26.

Fiscal consolidation will need to accommodate significant investment and spending needs

Fiscal policy will need to balance consolidation with public investment and spending needs. Planned higher spending and investment over the coming years is welcome after a decade of fiscal restraint and low public investment. But current plans still leave some areas (including employment policy and education) with more limited funding than before the global financial crisis (Figure 1.15, Panel A) and substantial investment is needed to address the green transition and levelling up agenda to reduce regional inequality. In 2020 and 2021, the government announced departmental spending increases of over 2% of GDP (Office for Budget Responsibility, 2021[7]). By 2024-25, public spending will be 41.6% of GDP - a historic high - of which 8.4% is allocated to health, 5.4% to pensions, 5% to education and 4.8% to welfare (Office for Budget Responsibility, 2021[7]). Rising inflation and interest rates will lead to a spike in debt interest rate payments in 2022-23 before declining as inflation is forecasted to gradually fall (Office for Budget Responsibility, 2022[28]). The health and social care levy is expected to raise around GBP 18 billion by 2026-27 (Office for Budget Responsibility, 2021[7]). This should be sufficient to cover short-term health funding needs, although other constraints such as staffing shortages might remain and indicators point at intense pressures on the NHS. More funding might be required for social care and to deal with long-term health cost pressures (Paul Johnson et al., 2021[29]). In line with the 2017 Industrial Strategy and the 2021 Plan for Growth (Box 1.7), public sector net investment is projected to be 2.5% of GDP on average per year up to 2026-27 (Office for Budget Responsibility, 2022[28]; 2021[7]). This is above levels observed in the United Kingdom in the previous decades but remains below the OECD average (Figure 1.15, Panels B and C).

Spending and investment needs will remain high over the coming years, limiting the scope for tax cuts and requiring a focus on making the tax system more efficient and fairer. Tax revenues at 33% of GDP are lower than in peer European countries (Figure 1.16, Panel A), but are projected to reach about 37% of GDP the coming years (Office for Budget Responsibility, 2022[28]). A tax review into reliefs and allowances has been announced in the Spring Statement 2022 and is planned to go ahead before 2024 (HM Treasury, 2022[30]), which is welcome. It will be particularly important to review the existing tax and spending mix with a focus on ending reliefs and exemptions that do not serve an economic, social or environmental purpose. Tax breaks that tend to benefit higher-income households can be gradually reduced to improve the effectiveness of the tax system and its redistributive effects. The VAT base is eroded by various (partial) exemptions that exist for a wide range of goods including some financial service activities, some vehicles or gambling and that contribute to significant VAT revenue shortfalls (Figure 1.16, Panel C). Broadening the VAT tax base while compensating poorer households, would reduce distortions and make the tax system more efficient and effective, as discussed in previous Economic Surveys (OECD, 2020[1]; 2017[31]). Council tax could be made fairer and less distortive by adjusting thresholds for higher property values or even a proportional rate and by updating outdated property values that determine the amount due, as recommended in previous Surveys (OECD, 2020[1]; OECD, 2015[32]; Institute for Fiscal Studies, 2020[33]). To improve efficiency, the government should also consider reducing further the gap between national insurance rates for the self-employed and employed, which has increased in 2021 (Johnson, 2021[34]), as recommended in the last Economic Survey.

Figure 1.15. Public investment and spending on services is improving



Note: Panel A: Enterprise and economic development and Agriculture, fisheries and forestry are excluded. Panel B: Public investment refers to gross investment to allow for international comparability; as 2021 data was not yet available for all OECD countries, for the OECD estimate of 2021, data available for 2021 or latest were used. Panel C: Excludes public sector banks.
Source: ONS; and OECD (2022), OECD Economic Outlook: Statistics and Projections (database).

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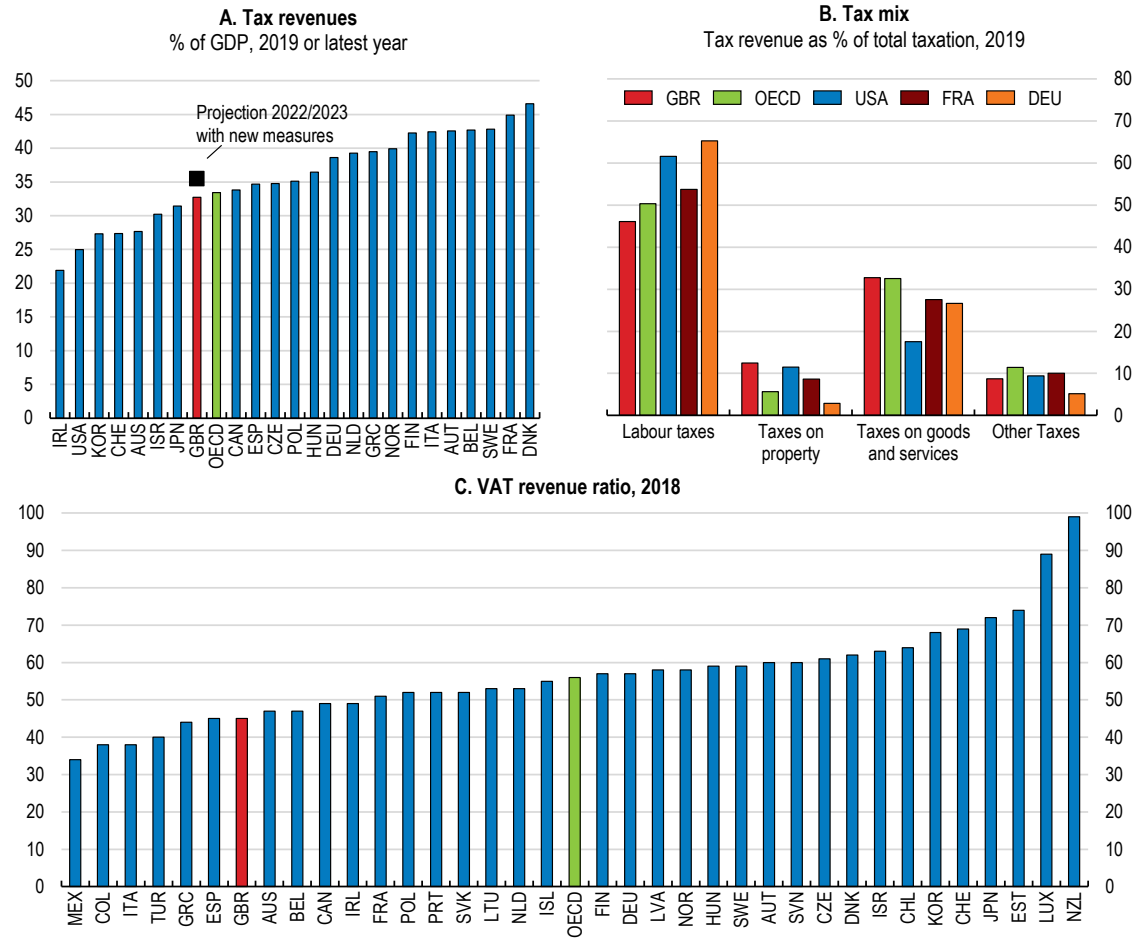
The government proposed new fiscal rules in the October 2021 Budget. A new core target is set as a declining net sector debt ratio (excluding the Bank of England balance sheet), by the third year of the rolling forecast period. Three supplementary targets aim at balancing the budget (excluding public investment) by the third year, ensuring public sector investment remains below 3% of GDP on average across the 5-year rolling forecast period and welfare spending remains below a cap set by the UK Treasury. The framework allows a suspension of the targets in case of a significant negative shock. The independent fiscal advisory council, the Office for Budget Responsibility, forecasts that the fiscal targets will be reached, including a declining net sector debt ratio. Hence, the framework provides guidance about the medium-term plan for returning to debt sustainability. Fiscal rules were introduced in the late 1990s and were revised in 2010. Since 2010, they have been revised three times amid large economic shocks. It should be ensured that changes to fiscal targets are both credible and relevant. Sweden for example reviews its fiscal target regularly under a disciplined process, thus revisions to the target are carried out in a predictable and credible way. The government has announced that its fiscal rules will guide its policy for at least this Parliament and will be reviewed at the start of each subsequent Parliament to support credibility and confidence in the UK's long-term fiscal trajectory.

Figure 1.16. Tax revenues are lower than in peer countries



Note: Tax revenues for GBR in 2022/2023 are projections from the last Economic Outlook report of the OBR.
Source: OECD (2022), OECD Tax Revenue Statistics (database); and OBR Economic and fiscal outlook - October 2021.

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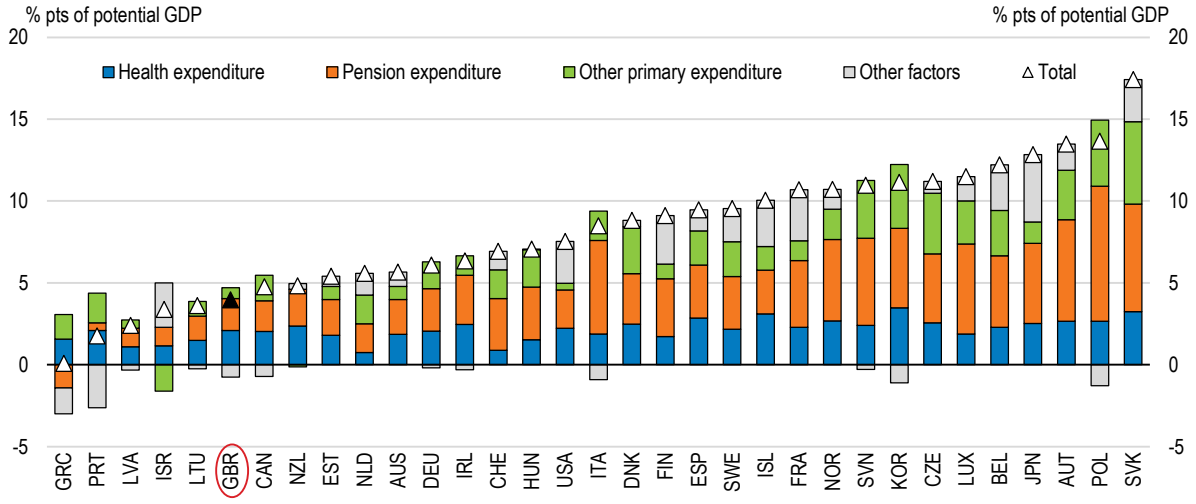
Ageing related expenses will put pressure on public finances

In the coming decades, the United Kingdom faces significant fiscal pressures mostly driven by ageing related increases in health, long-term care and pension expenditures. In a cross-country comparison these pressures appear mild as the structural primary revenue, or corresponding savings, would have to increase close to 5 percentage points of GDP to keep the current debt-to-GDP ratio constant (Figure 1.17). However, this does not take into account the effects of the green transition, which will require investment and lead to reduced revenue in the case of unchanged policy (Chapter 2). Under a baseline scenario of fiscal consolidation of about 1.5 percentage points of GDP over the next 10 years and no further reforms, ageing related costs would push up the public debt-to-GDP ratio close to 250% by 2060 (Figure 1.18, blue line). Transitioning to net zero will create some shortfalls in revenues, most importantly in fuel excise duty, which provides annual revenues of about 1.6% of GDP. Shifting to electric vehicles and phasing out all new petrol and diesel cars and vans by 2030 according to government plans will result in a gradual loss and increase in the public debt-to-GDP ratio beyond 250% by 2060 (Figure 1.18, orange line). As discussed in Chapter 2, the fuel excise duty targets a number of externalities from road use and is an important revenue source. It should therefore be replaced by a new system to tax road use. Greenhouse gas related revenues from an expanded UK ETS or carbon tax can help finance necessary green investments, offset negative distributional effects of carbon pricing and help secure public acceptance (Box 1.6).

In the absence of improved productivity to sustain economic growth, long-term fiscal sustainability will depend on prudent policies and the implementation of reforms. Spending on state pensions and pensioner benefits is expected to increase from 6% of GDP in 2021-22 to 8.2% in 2067-68 (Office for Budget Responsibility, 2021[35]). To contain the rise, the retirement age is set to gradually increase to 67 years by 2028 and has to be reviewed regularly as per the Pension Act 2014. Under triple lock rules state pensions are increased by the highest of inflation, average earnings growth or a flat 2.5% rise, which is expensive. The triple lock is suspended for one year over 2022-2023 and should be eliminated, as recommended in the previous Survey (OECD, 2020[1]). Replacing the lock with the indexation of pensions to an average of CPI and wage inflation would help to contain public debt substantially (Figure 1.18, green line; Box 1.6). Already replacing the triple lock with a more flexible system that allows deviations in case of unusual high earnings or inflation would give the government more control over long-term pension liabilities. In the United Kingdom, voluntary private occupational pension plans contribute more to gross pension replacement rates than state pensions (OECD, 2021[36]). The replacement rate for state pensions is lower than in many OECD countries putting pensioners without access to a private pension at risk of poverty. The reform of the triple lock should therefore be complemented by targeted direct transfers to limit the impact on poorer pensioners and limit poverty risks.

Figure 1.17. Ageing and health related expenditures add to future fiscal pressure

Change in structural primary revenue to GDP between 2021 and 2060 needed to stabilise the gross debt-to-GDP ratio, % pts of potential GDP



Note: The chart shows how the ratio of structural primary revenue to GDP must evolve between 2021 and 2060 to keep the gross debt-to-GDP ratio stable near its current value over the projection period (which also implies a stable net debt-to-GDP ratio given the assumption that government financial assets remain stable as a share of GDP). The necessary change in structural primary revenue is decomposed into specific spending categories and 'other factors'. This latter component captures anything that affects debt dynamics other than the explicit expenditure components (it mostly reflects the correction of any disequilibrium between the initial structural primary balance and the one that would stabilise the debt ratio).
Source: Simulations using the OECD Economics Department Long-term Model.

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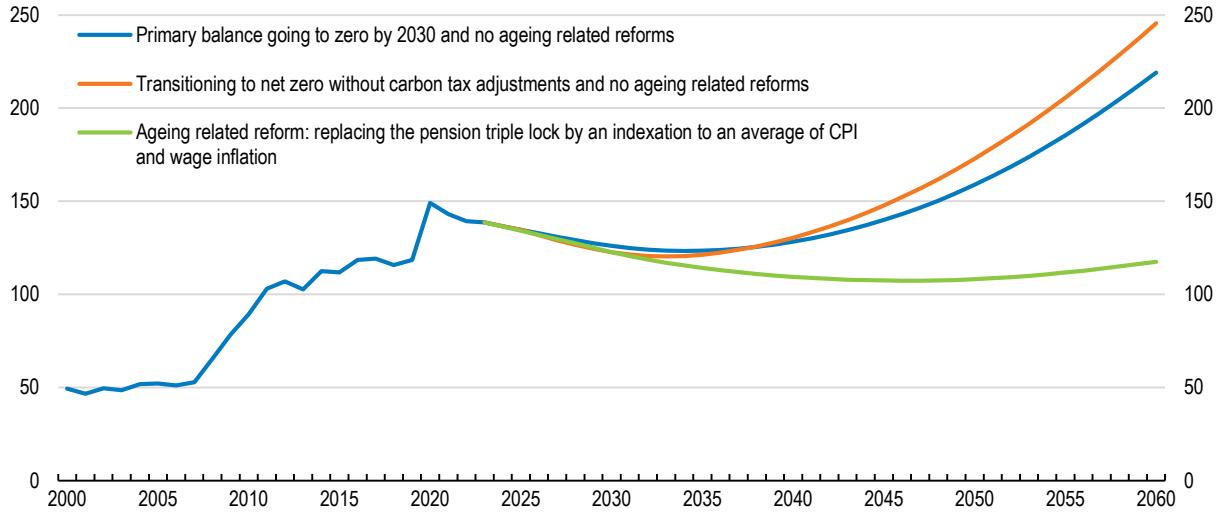
Figure 1.18. Reforms are needed to stabilise public debt

Gross government debt, % of GDP



Note: The baseline scenario assumes a fiscal consolidation allowing to reach a zero primary balance (which for simplification of the model includes interest receipts) by 2030 followed by a deterioration because of ageing costs. The baseline scenario assumes that the trip-lock pension is maintained. The pension reform scenario shows the impact of moving from trip-lock pension to CPI indexation. The fuel levy scenario shows the impact of early action on fuel levy in line with the OBR fiscal risk report which assumes a significant decline in the fuel levy from 2030 as new petrol and diesel cars will be banned from sales. Further general assumptions of the model are outlined in Guillemette (2021).
Source: OBR Fiscal risks report July 2021; and simulations based on the OECD Economics Department Long-term Model.

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Table 1.4. Past recommendations on fiscal policy

Recommendations from past Surveys	Action taken
Replace the pensions "triple lock" by indexing pensions to average earnings and ensure adequate income is provided to poorer pensioners.	For the 2022-2023 financial year the earnings element of the triple lock was temporarily suspended given extremely high 2021 earnings
Set a stable medium-term framework to improve guidance to policy and markets	In 2021, the government has introduced a new fiscal framework including a core target of a declining net sector debt ratio, excluding the Bank of England balance sheet, by the third year of the rolling forecast and three supplementary targets.
Align social security contributions between self-employed and employed, by increasing contributions paid by the self-employed.	Reform to off-payroll working rules (IR35), designed to ensure individuals working like employees but through an intermediary, usually a personal service company (PSC), pay broadly the same Income Tax and National Insurance contributions (NICs) as those who are directly employed, were introduced for the private and voluntary sectors in April 2021 (public sector already in 2017).

Box 1.6. Quantifying the impact of selected recommendations

This box summarises potential long-term impacts of selected structural reforms included in this Survey on GDP (Table 1.5) and the fiscal balance (Table 1.6). The quantified impacts are merely illustrative. The estimated fiscal effects include only the direct impact and exclude behavioural responses that may occur due to policy change.

Table 1.5. Illustrative GDP impact of selected recommendations

Policy	Scenario	Impact
Policies to reduce income inequality	Increased labour efficiency through 10% reduction of income inequality	+0.3% of potential GDP on average over next 10 years
Reduce the cost of childcare for parents	Increase family benefits in kind by 10%	+0.5% of GDP per capita after 10 years

Source: OECD calculations using the OECD Economics Department's long-term model; OECD calculations based on the framework in Égert and Gal (2017), "The Quantification of Structural Reforms in OECD Countries: A New Framework", OECD Economics Department Working Papers, No. 1354.

Table 1.6. Illustrative fiscal impact of recommended reforms

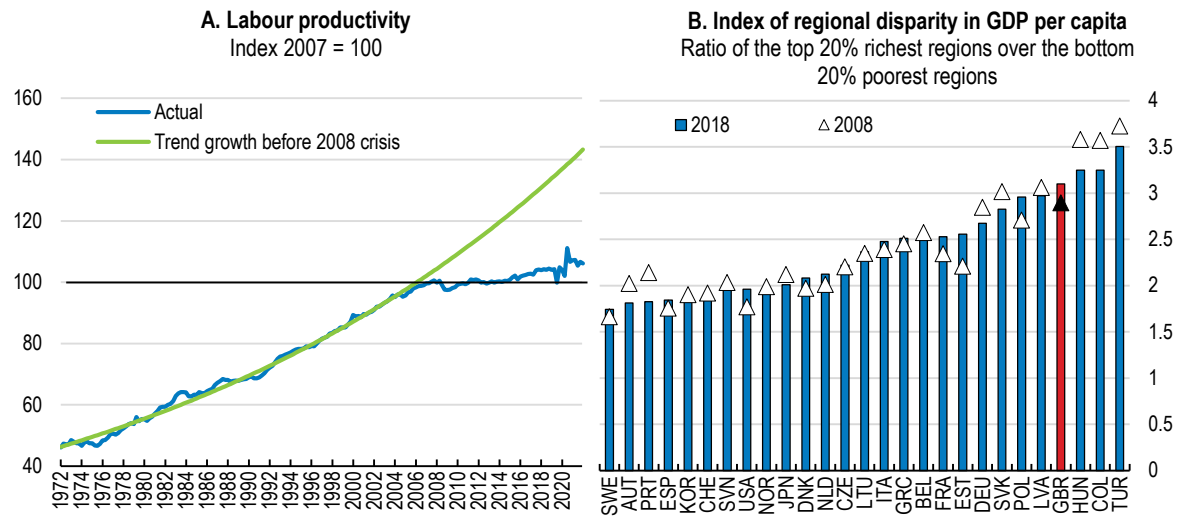
Measure	Description	Net fiscal impact; percentage of GDP
Reduce the cost of childcare for parents	Increase family benefits in kind by 10%	-0.2% on average over next 10 years
Increase the cap on paternity pay and relate it to father's income		↓
Shifting to an average of CPI and wage indexation of pensions		1.9% on average over next 10 years
Broadening VAT tax base	Broadening the VAT tax base to the level of the OECD average keeping the standard rate	1.5%
Increase property taxes through the council tax	Doubling the rates for bands E, F, G, and H, and E (last survey)	0.4%
Expanding the emissions trading scheme and/or implementing well-designed carbon taxes.		↑

Source: OECD calculations based on the OECD Economics Department's long-term model.

Raising productivity

Productivity growth in the United Kingdom has been sluggish since the global financial crisis (Figure 1.19, Panel A). Previous OECD Surveys identified a range of issues, such as skill mismatches, low innovation and knowledge diffusion, low digital adoption in particular by SME's, as well as low private and public investment (Kierzenkowski, Machlica and Fulop, 2018[37]; OECD, 2020[1]; OECD, 2017[31]). Low aggregate productivity in the United Kingdom is also a product of large regional disparities, which have further increased over the last decade (Figure 1.19, Panel B). Structural reforms to raise productivity across regions will be crucial for managing shocks and the transition to net zero over the coming years as it will to help sustain employment and wages and thereby living standards and well-being.

Figure 1.19. Productivity performance has been poor since the financial crisis



Note: Panel A: Labour productivity refers to real GDP divided per total hours worked. Pre-crisis labour productivity trend growth is calculated between 1972 Q1 and 2007 Q4, and is projected from 2008 onwards. Panel B: The GDP per capita of the top and bottom 20% regions (TL3) are defined as those with the highest/lowest GDP per capita until the equivalent of 20% of national population is reached.
Source: OECD (2022), OECD Economic Outlook: Statistics and Projections (database); and OECD Regions and Cities at a glance 2020.

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After a decade of low public investment and low productivity growth, the government recognises the need to deliver higher productivity through the private and public sector with three priorities: capital, people and ideas (HM Treasury, 2022[38]). It therefore developed an ambitious plan to support productivity in the United Kingdom and aid the digital and green transition. The government's Plan for Growth outlines an agenda to facilitate structural transformation towards greener and more inclusive growth, centred on investments in infrastructure, skills and innovation, as well as leveraging the new opportunities from leaving the European Union (Box 1.7). The Plan for Growth replaces the 2017 Industrial Strategy continuing with a tendency to change policy frameworks as new governments come in. Some long-term stability was maintained by keeping the National Infrastructure Commission and continuing the Industrial Strategy's sector deals, but the Industrial Strategy Council that oversaw the progress on the Industrial Strategy has been disbanded. An overarching independent body overseeing progress and implementation of all individual elements of the Plan for Growth is missing, but could help to increase transparency and accountability and ultimately stimulate private investment.

Box 1.7. Plan for Growth – Build back better

In March 2021, the government published its Plan for Growth for the post-COVID-19 world replacing the 2017 Industrial Strategy. The plan focuses on infrastructure, skills and innovation as pillars to deliver three strategies: the levelling up agenda to deliver equal opportunities and quality of life through the UK; the Net-Zero Strategy to deliver a decarbonised economy by 2050; and a Global Britain vision, including trade policy and regulatory reforms in the financial sector, to deliver domestic prosperity through deeper integration into the global economic and financial system.

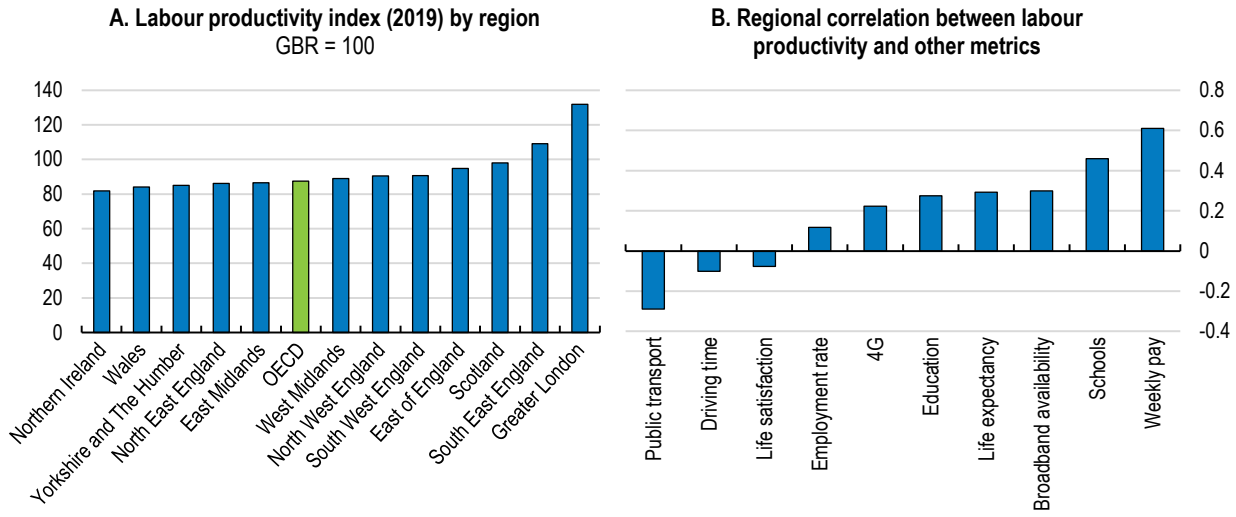
Pillar \ Key Policy	Levelling Up the Whole of the UK	Supporting the Transition to Net Zero	Support the Vision for Global Britain
Infrastructure	Connect people to opportunity via the UK-wide Levelling Up Fund and UK Shared Prosperity Fund, as well as the Towns Fund and High Street Fund, to invest in broadband, roads, rails, cities and in local areas (Levelling Up Fund). Gross public investments allocated amounts to around GBP 600 billion by 2026-27, taking public sector net public investment to 2.5% on average per year up to 2026-27.	GBP 30 billion in funding for climate change priorities between 2021 and 2025, set out in the Net Zero Strategy and Spending Review 2021. This includes GBP 500 million for grants to install new home heating systems and replace boilers	Open new trade and investment hubs.
	Crowd in private investment through the new UK Infrastructure Bank		
Skills	Use the UK Shared Prosperity Fund to improve public services in education and skills in struggling regions, including a strong focus on improving adult numeracy.		Various targeted high skilled visa reforms, alongside a global outreach strategy.
	• Introduce the Lifetime Skills Guarantee to enable lifelong learning through free fully funded Level 3 courses, rolling out employer-led skills bootcamps, and introducing the Lifelong Loan Entitlement. • Take steps to improve the apprenticeship system for employers, through enabling the transfer of unspent levy funds and allowing employers to front load apprenticeship training. • reforming technical education to align the post-16 technical education system with employer demand • Provide technical qualifications by opening 9 additional Institutes of Technology (IoTs), bringing the total number to 21. Funding for additional hours in the classroom for 16–19 years old		
Innovation	Develop innovative hubs of high-value activity in core cities.		Pursue regulatory reforms to unlock cutting-edge technologies and boost competition
	• Increase public investment in R&D to GBP 20 billion a year by FY24/25, part of the government's objectives to increase R&D spending to GBP 22 billion by 2026/27 and economy-wide R&D investment to 2.4% of GDP in 2027. • Review of R&D tax reliefs. • Consult on measures to address barriers posed to pension funds when looking to invest in high growth innovative companies. • Introduced GBP 375 million "Future Fund: Breakthrough" to address the scale up gap for innovative businesses and other equity products. • Launch the Help to Grow program to support over 100 000 SMEs improve their productivity through management training and digital adoption		

Source: HM Treasury (2021[39]).

Reducing the regional productivity gap is at the core of the Plan for Growth

Weak average productivity outside of London holds back aggregate productivity, reinforcing regional disparities along several quality of life dimensions (Figure 1.20, Panel A). Strong regional concentration of certain economic sectors, agglomeration benefits, and regional skill mismatches explain most of the productivity differentials. For example, the higher concentration of knowledge intensive services in the densely populated and highly productive South facilitates access to skills and knowledge diffusion (OECD, 2017[31]; OECD, 2020[40]). Regions that are more productive also have better infrastructure facilitating agglomeration benefits, such as good broadband availability, 4G coverage and transport infrastructure (Figure 1.20, Panel B).

Figure 1.20. Inequalities across regions are high



Note: Panel A: Productivity index for regions in the UK is based on gross value added per hour. Productivity of OECD relative to the UK is based on GDP per hour. Panel B: Correlation between productivity (Gross value added per hour worked) and different metrics displayed on the horizontal axis by local authority districts.
Source: ONS; OECD (2022) Regional well-being database; OECD (2022), Regions and cities database.

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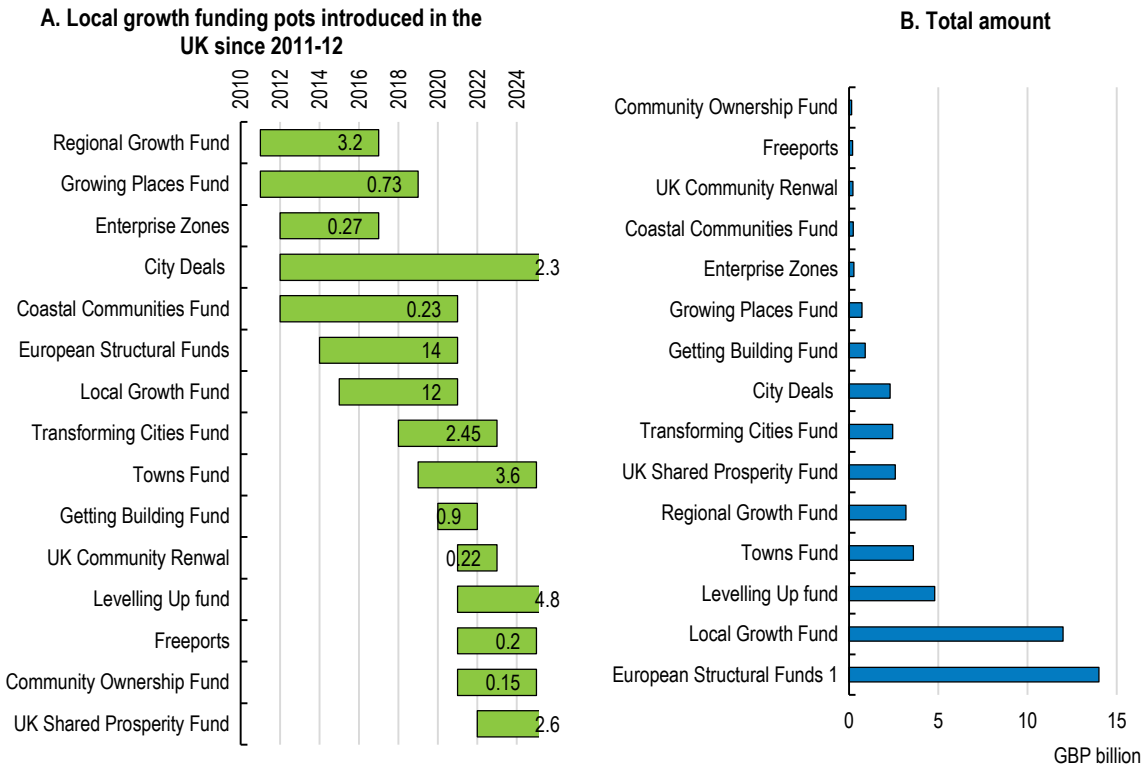
"Levelling up the Whole of the United Kingdom" is a priority of the government to reduce regional disparities (HM Government, 2022[41]). Apart from infrastructure investments and targeted spending in poorer areas outside London and the South East, the levelling up strategy envisions greater empowerment for local governments through a new framework for devolution in England and set up 12 medium-term "missions" or objectives, to be reached by 2030. The UK governments has the statutory duty to produce an annual report assessing progress against the missions, and a new Levelling Up Advisory Council will support Ministers by advising on the design, delivery and impact of levelling up policy. A new body that will be tasked with local government data, transparency and outcomes is under discussion. Improving subnational data collection and strengthening the monitoring framework would be a welcome development, as is the medium term perspective of the policy framework. Still, the missions are ambitious and a longer term perspective beyond 2030 is warranted. The 2021 Spending Review set out the funding for the Levelling Up strategy until 2024, but funding needs should be evaluated and set out beyond the current budget and in line with the timeline of the missions.

England is very centralised and local councils have less power than devolved authorities in Scotland, Wales and Northern Ireland (OECD, 2017[31]). Until now, only metropolitan areas were able to strike devolution deals, but the new devolution framework for England extends to every area of England that wants one. Depending on the agreed setup, local authorities will get greater powers and functions ranging

from a strategic role in service delivery to the ability to adjust property taxes through the council tax and supplement on business rates. Greater devolution of power creates more incentives for local leadership to raise productivity and improve service delivery, while transfers from the central government provide some degree of risk sharing. In particular, redistribution of income and resources may be an important aspect for reducing spatial disparities in the early phase, but going forward further decentralisation of power and tax revenue could be considered, as is for example the case in Finland or Sweden (OECD, 2020[42]). It should be ensured that devolution is designed in such a way that the integrity of the tax system is maintained and that government fragmentation is reduced by providing clarity on local responsibilities. Platforms for dialogue could further stimulate exchange and co-operation within and between different layers of government.

Figure 1.21. Local authorities need to deal with numerous growth funding funds



Note: The amount of European Structural Fund converted using an exchange rate of GBP 1 = EUR 1.18. The amount of Levelling Up funds includes GBP 0.3bn from Towns Fund. GBP 1.5bn of UK Shared Prosperity fund in 2024/25
Source: UK Levelling Up White Paper (2022).

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Several funds are available for local governments to support levelling up their area, but the funding landscape is fragmented and challenging to navigate for local authorities with limited administrative capacity (Figure 1.21). Most recently, the government allocated a total of GBP 4.8 billion by 2026 to the Levelling Up Fund, a competitive fund, which provides funds for local infrastructure that improves everyday life. For round one, about 77% of the GBP 1.6 billion allocation in Great Britain will go to the places defined as being in the highest need according to the index created for the Levelling Up Fund (HM Treasury, 2021[43]; Department for Levelling Up, Housing and Communities, 2021[44]). However, analysis using the index of Multiple Deprivation shows that some of England's most deprived areas received no or far less funding from the Levelling Up Fund, than some of the richer ones (Centre for Inequality and Levelling Up,

2022[45]). Thus, 60 of the 100 most deprived places according to the index of Multiple Deprivation missed out on the Levelling Up fund in the first round. Although those local authorities may bid and receive funds in the upcoming rounds, it should be ensured that more deprived areas are not constrained in their capacity to access those funds. Identifying and eliminating barriers to local funds early on will be crucial to ensure that areas in most need receive needed funds. Creating a single information source and streamlining administrative requirements for funding available to the local level would increase transparency and ease administrative procedures.

Table 1.7. Past recommendations on regional productivity

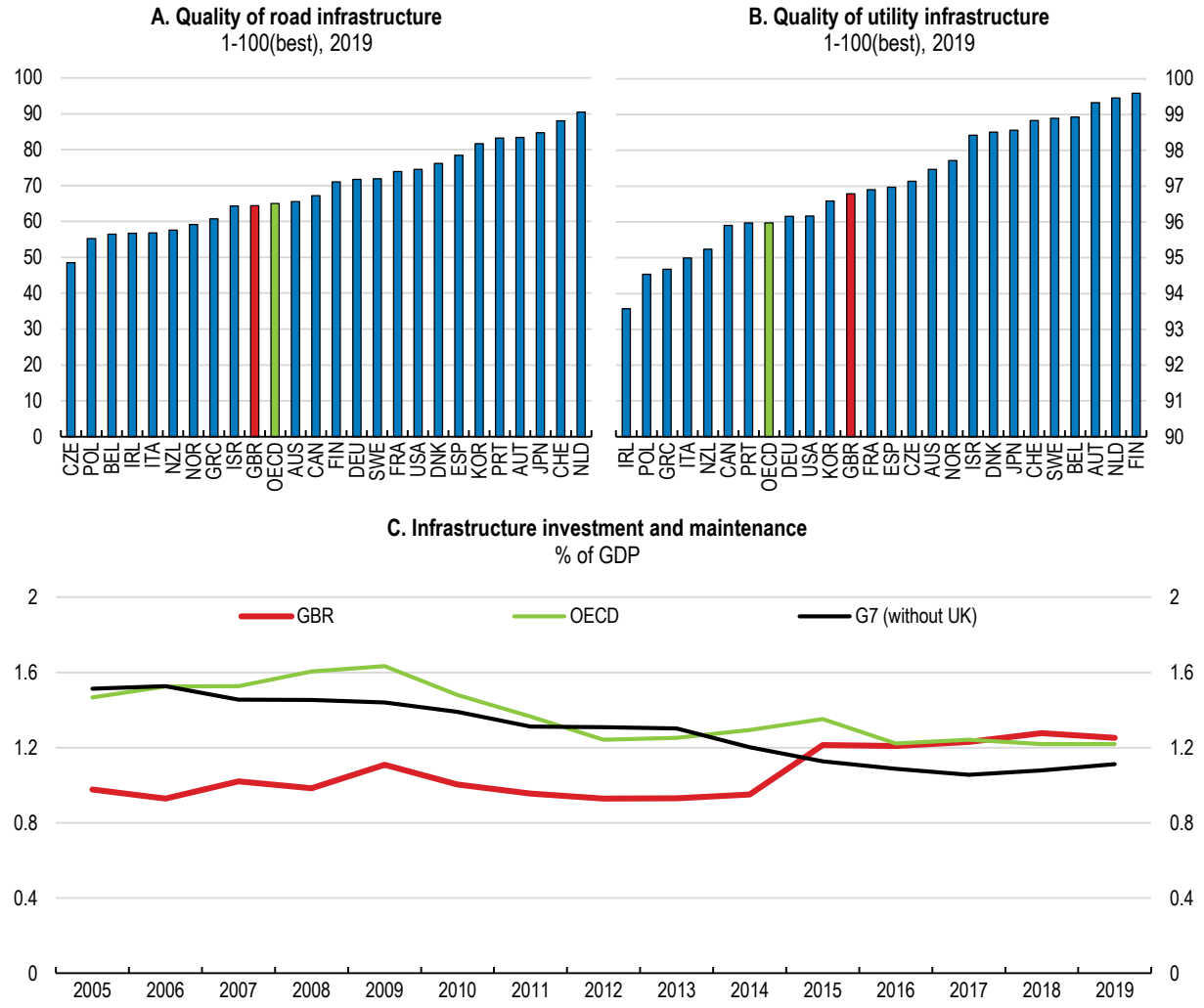
Recommendation in previous *Surveys*	Actions taken since the last *Survey*
Invest in improving inter- and intra-city transport links where such investments can foster agglomeration effects and unlock related productivity benefits	The government is committed to investing GBP 4.2 billion in intra-city transport settlements from 2022-23 for city regions. The 2021 Integrated Rail Plan commits GBP 96 billion to improve rail capacity in the Midlands and North but cancelling the eastern leg of HighSpeed2.

Addressing infrastructure needs will be key for unlocking faster productivity growth

Public investment has increased and should be sustained to support the Levelling Up Agenda and the Net Zero transition. Years of under-investment in public infrastructure have resulted in a significant infrastructure deficit weighing on productivity. Although infrastructure quality in the United Kingdom ranked 11th in the world in 2019 according to the World Economic Forum (2019[46]), it lags behind comparable European economies such as France, Germany and the Netherlands. The country underperforms for example with respect to the quality of its road and utility infrastructure (Figure 1.22, Panels A and B). Only recently public investment as a share of GDP has increased as the UK government started to address infrastructure investment needs (Figure 1.22, Panel C). Within the 2021 Plan for Growth, GBR 600 billion of gross public capital investment by 2026-27 will be devoted to broadband, roads, rail and cities (Box 1.7), areas that have been previously identified as needing upgrades and further investment (Jones and Llewellyn, 2019[47]; HM Treasury, 2022[48]). These plans translate into higher public capital investment of 2.5% of GDP over the coming fiscal years (Office for Budget Responsibility, 2022[28]). This is a substantial increase compared to pre-2017 levels, remaining within the 3% cap set in the fiscal rules.

Substantial private infrastructure investment is also needed. The government's strategy aims for a mix of public and private investment with private investment dominating in the regulated industries (energy, utilities and digital) (Figure 1.23). While the regulatory system has generated investment and improved performance (National Infrastructure Commission, 2019[49]), it increasingly faces challenges it was not designed to address. Managing increasing risks of floods and drought, transitioning to full fibre digital networks and achieving net zero emissions by 2050 calls for significant private investment. The government should therefore consider to follow the advice of the National Infrastructure Commission and broaden the network sector regulators' duties to include resilience to the impacts of climate change, net zero and increasing transparency through providing long-term strategic guidance (National Infrastructure Commission, 2020[50]). In the case of broadband provisioning, the government is working with private telecoms operators to rollout gigabit-capable connectivity to the hardest to reach areas of the UK. The government's GBP 5 billion investment is subsidising gigabit rollout to uncommercial premises, which will help the government realise its target of providing gigabit connectivity to 85% of the UK by 2025 and 99% of the country by 2030.

Figure 1.22. Total investment in infrastructure has been low until recently



Note: Panel C: Infrastructure investment and maintenance in rail, road, air, inland waterways and sea. OECD and G7 (without UK) unweighted averages. Only public investment on infrastructure and maintenance is taken into account. Total investment on infrastructure and maintenance could be higher due to complementary spending through PPP, limiting international comparability.
Source: World Economic Forum, The Global Competitiveness Index dataset, Geneva; and OECD (2022), ITF Transport Statistics database.

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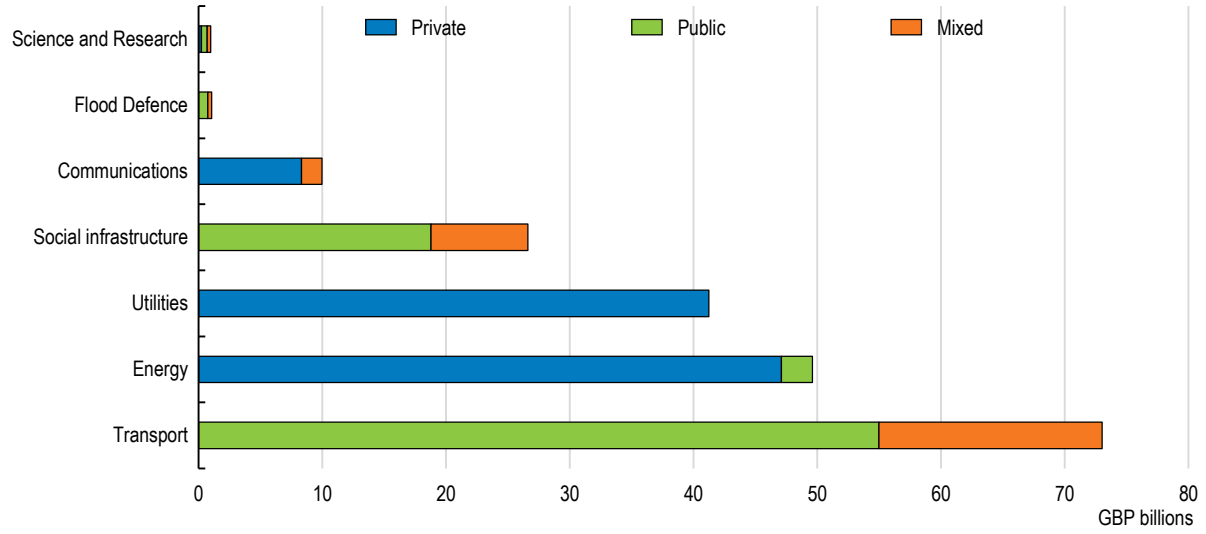
To unlock private capital for the funding of large investment needs, the government launched the UK Infrastructure Bank (UKIB) in the summer of 2021. This is a welcome development but will only partially offset the loss of the European Investment Bank (EIB) funding. The UKIB will lend and provide equity financing and guarantees for projects that support regional economic growth and tackle climate change across sectors. It is focused on clean energy, transport, water and waste projects and it is foreseen it will disburse around GBP 1.5 billion per year (Office of Budget Responsibility, 2021[51]), about a third of previous EIB financing prior to the referendum. The UKIB will also take over the UK Guarantee Scheme, which can currently issue up to GBP 40 billion in guarantees, though the bank will initially be able issuing only GBP 10 billion initially (Office for Budget Responsibility, 2021[7]). To guide markets, existing investment strategies should be fleshed out and medium term objectives should be created, in particular with respect to the green transition.

Figure 1.23. Planned national infrastructure projects need substantial private investment

Funding mix of planned investment in the government national infrastructure pipeline from 2021/22 to 2024/25 by sector, GBP billions



Source: UK Government, National Infrastructure and Construction Pipeline 2021 paper.

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The government is currently consulting on reforms to the prudential regulation of the insurance sector. One of the objectives of the review is to incentivise insurance companies to invest more in long-term infrastructure assets and enable the insurance sector to play a significant role in supporting the government's objectives in relation to the provision of long-term capital to support growth, including investment in infrastructure (see financial stability section). The pension sector has also been asked by the government to voluntarily invest more in UK infrastructure projects and local government pensions schemes face a 5% target of investment in projects that support local areas (HM Government, 2022[41]). Removing barriers to private sector investment, such as adjustments to financial regulation, could unlock capital, but the resulting higher risk taking and hence financial stability implications should be explicitly taken into account.

Public investment management is sound, but could improve in some areas to increase the return to public investment. A dedicated task force, the Infrastructure and Project Authority, reporting to the Cabinet Office and HM Treasury, has developed a Transforming Infrastructure Performance roadmap to 2030 that includes an action plan and the list of infrastructure projects in the pipeline, an overview of planned procurement and investment necessary to implement the National Infrastructure Strategy (Infrastructure and Ports Authority, 2021[52]; Infrastructure Projects Authority, 2021[53]). As recommended in the last Survey, further improvements in the public investment management framework, including better coordination between national and subnational government levels, would be welcome (OECD, 2020[1]) (Demmou and Franco, 2020[54]). Better project selection procedures and ex-post evaluation of large investment projects was advised by the Resolution Foundation (Bailey et al., 2021[55]). A recent National Audit Office report also recommends further improvements in the spending evaluation framework, such as further clarification of responsibilities, oversight and publishing evaluation analysis (National Audit Office, 2021[56]).

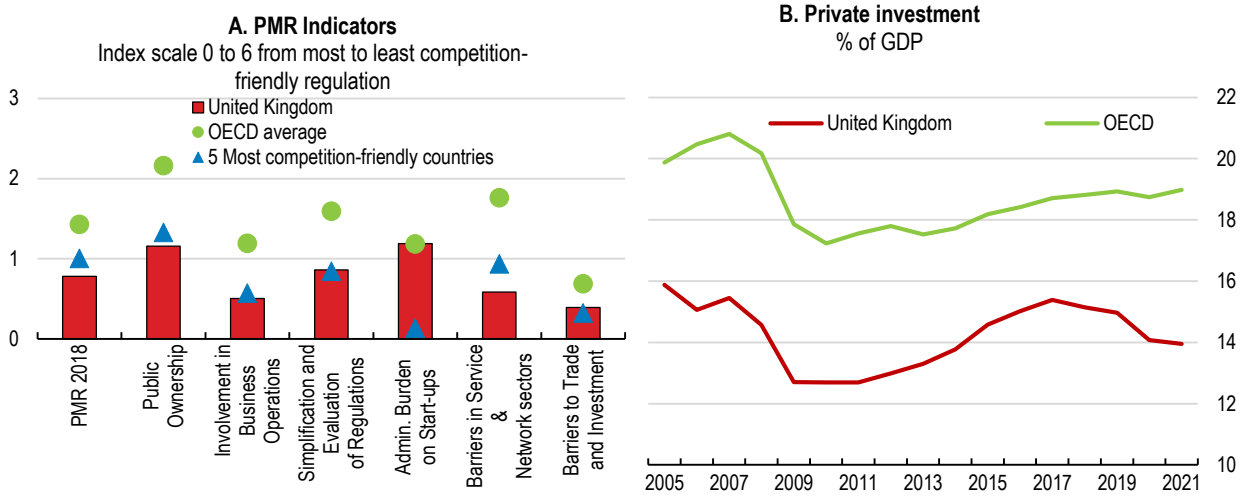
Table 1.8. Past recommendations on infrastructure investment

Recommendations in previous *Surveys*	Actions taken since the last *Survey*
Ensure continuity in government support through the Industrial Strategy, a multidimensional approach to boost investment, innovation and skills intended to foster productivity growth.	The Industrial Strategy was replaced by the Plan for Growth in 2021, which offers a similar multidimensional approach, but the independent Industrial Strategy Council was abolished
Prioritise digital infrastructure, particularly in deprived regions, in the allocation of the planned increase in public investment. Ensure sound governance of infrastructure investments.	The government is subsidising the rollout to 20% of premises for which installing high speed broadband access is considered uncommercial while mobile operators are expected to fund access to high-speed broadband to 80% of premises.
Continue to change existing investment rules to remove barriers for UK pension funds to diversify their portfolios to increase the financing pool available to young firms, in light of the ongoing review.	Local Government Pension schemes face a target of 5% for investment in local infrastructure schemes as per the Levelling up White Paper.
Secure venture capital public funding over the long term and provide clarity to investors in terms of how EU funding will be replaced.	The government set up the Future Fund in 2021, a temporary co-investment scheme to inject funds in start-ups and by the end 2021 265 firms had converted loans into equity shares

Improving productivity through higher private investment in ICT and innovation

Businesses in the United Kingdom have been lagging behind their peers in other OECD countries in investing in physical capital, innovation or new processes that would make labour more productive (OECD, 2020[1]; 2017[31]). While the United Kingdom has competition friendly product market regulations that should support investment (Figure 1.24, Panel A), uncertainties following the 2016 Referendum and more recently the COVID-19 pandemic weighed on aggregate private investment (Bank of England, 2021[57]; OECD, 2020[1]) (Figure 1.24, Panel B). Spending on digitalisation has increased as the COVID-19 crisis and subsequent lockdowns have pushed firms towards teleworking and investing in digital innovation. Business surveys indicate that in particular service sectors, which have been lagging behind in digital adoption as highlighted in the last Economic Survey, seem to have been given the necessary boost (Valero, Riom and Oliveira-Cunha, 2021[58]). Still, further investment in ICT is needed for the United Kingdom to catch up to its peers, in particular investments to support the adoption of productivity enhancing techniques and to create an environment that can utilise benefits from big data processing and Artificial Intelligence (Sorbe et al., 2019[59]).

Figure 1.24. Product market regulations are lean but private investment is low



Note: Panel B: OECD unweighted average of 23 countries for which comparable data on private investment were available.
Source: OECD 2018 PMR database – information refers to laws and regulation in force on 1 January 2018; and OECD (2022), Economic Outlook: Projections and Statistics Database.

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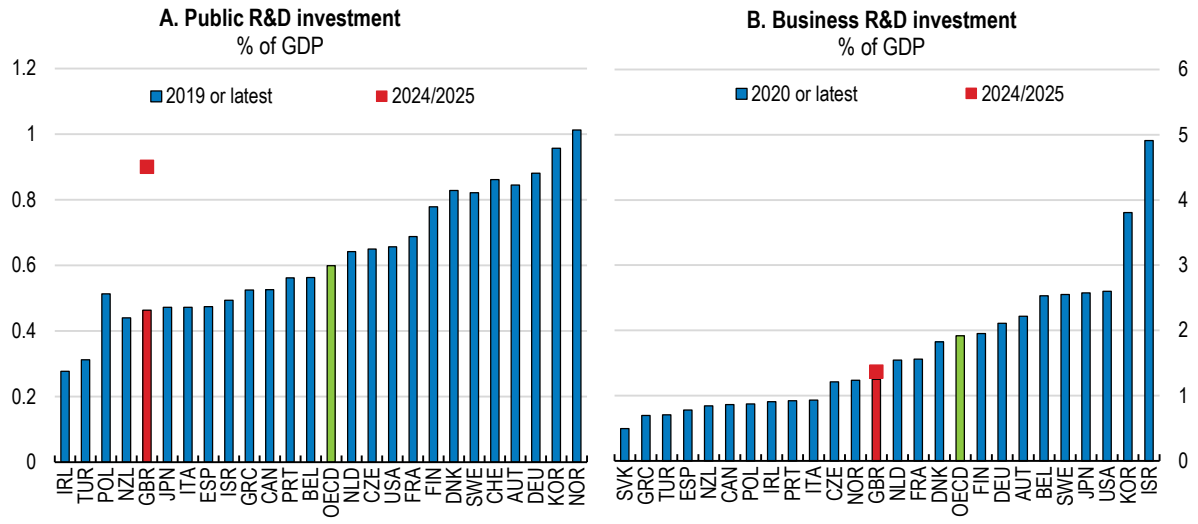
Innovation will be key to stronger productivity growth, but private and public spending on Research and Development (R&D) in the United Kingdom has been relatively low compared to peer countries (Figure 1.25). As public R&D investment induces private investment - every pound the government spends is estimated to stimulate, on average, around GBP 2 of private investment (HM Treasury, 2021[60]) – the government has boosted spending. Aiming to bring public and private R&D investment together to 2.4% of GDP by 2026-27, the government announced to increase public R&D investment to GBP 20 billion by 2024-25 (almost 1% of GDP per year). To support the Levelling Up agenda (see above), regions outside London and South East England are targeted. These developments are welcome and will raise public R&D investment to the level of OECD peers (Figure 1.25, Panel A). To further crowd in private investment, the government announced to broaden the scope of qualifying expenditure for R&D tax credits to include data and cloud computing from April 2023. This expansion is welcome as it will allow the R&D support system to cover data driven research, benefitting improvements in research, product development and productivity in the UK.

Figure 1.25. Planned public R&D investment will be above the OECD average



Note: Panel A: Planned investment as percentage of GDP as projected by OBR in its Autumn forecast. Panel B: The target of the UK government is that investment in R&D increases to 2.4% by 2027. Assuming a constant growth rate over the time period for Business R&D investment and keeping Public R&D investment at 0.9% over the period 2025-2027, business investment is estimated to reach 1.37% in 2024/2025 and 1.5% in 2027.
Source: OECD (2022), Main Science and Technology Indicators database; and ONS.

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Good access to finance is critical for advancing digitalisation and stimulating innovation, particularly among smaller firms. Although equity markets are more developed than in many OECD countries, difficulties to access finance persist especially for investment in intangibles by young and digital firms. In addition, information asymmetries make it harder for some SMEs to navigate financial markets and identify the right type of finance to suit their needs. The government is committed to increasing firms' ability to access primary and secondary markets and is exploring proposals how the regulatory regime can be amended to facilitate this (HM Treasury, 2022[61]). The government could for example explore new digital financing solutions, such as peer-to-peer lending and crowdfunding could be explored.

Table 1.9. Past recommendations on investments supporting digitalisation and R&D

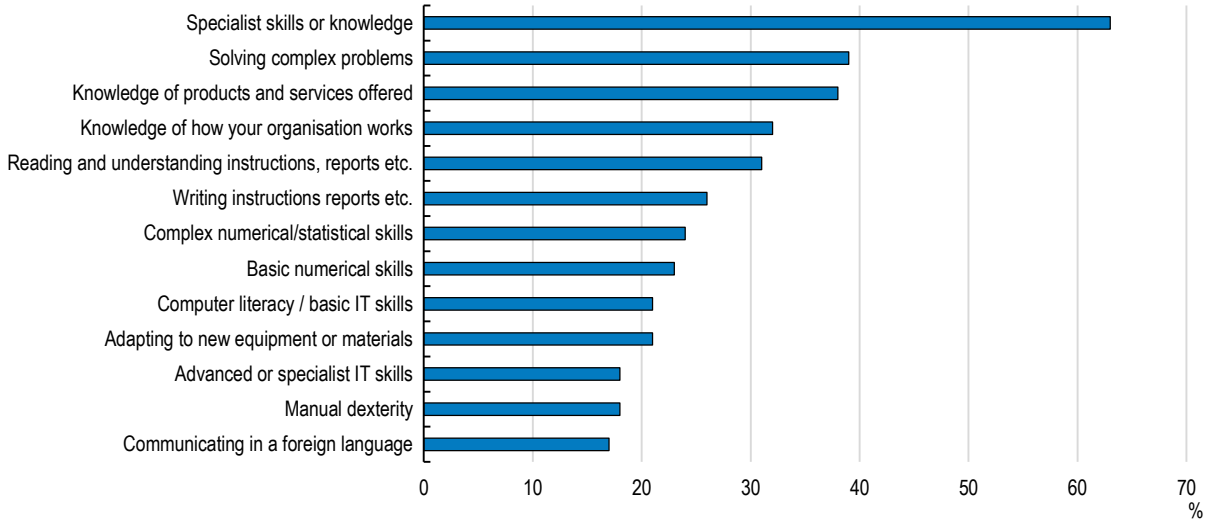
Recommendations in previous *Surveys*	Actions taken since the last *Survey*
Refine the competition framework to adapt it to the digital economy: enable greater personal data mobility and systems with open standards; adopt a broader approach to merger assessment including an evaluation of the overall economic impact of mergers.	A Digital Markets Unit (DMU) was set up within the CMA in April 2021 to monitor and regulate the behaviour of platforms with significant market power. A competition framework for digital markets is in the process.
Prioritise digital infrastructure, particularly in deprived regions, in the allocation of the planned increase in public investment. The government may invest directly in high-speed fixed networks or incentivise private investment, including by competitive tendering, tax exemptions, low interest loans or lower spectrum fees	The government is subsidising the rollout to 20% of premises for which installing high-speed commercial broadband is uncommercial
Continue to boost direct funding to R&D to raise innovation levels	Direct public funding will be increased to GBP 22 billion by 2026/27. The scope of qualifying expenditure for the R&D tax credit was announced to be broadened to include data and cloud computing.

Skills shortages weigh on productivity growth

Over the last two decades, the share of highly skilled workers in employment in the UK increased while the share of low and middle-skilled workers fell (Cominetti et al., 2022[62]). This development has likely been accelerated by COVID-19, and will continue as routine tasks are increasingly automated (OECD, 2019[63]). Already before current acute labour shortages in the hospitality sector and transport and storage in response to the pandemic and the end of free movement for EU nationals following Brexit (see above), vacancies in particular in business services, health and social work could not be filled due to lacking skills. Businesses reported difficulties in filling about one in four vacancies due to skill shortages, mostly in specialist and technical fields (Winterbotham et al., 2020[64]) (Figure 1.26). Keeping up with rapid progress in digital technologies also require transversal skills, such as complex problem solving, analytical skills and creativity, which allow people to adjust to changing skills demands (OECD, 2021[65]). The transition to net zero will add to the need of re- and up-skilling due to sectoral shifts and increasing demand for new skills as highlighted in Chapter 2.

Figure 1.26. Type of technical and practical skills missing in the labour market

Specialist and technical skills found difficult to obtain from applicants, 2019



Note: Employers could cite more than one skill lacking among applicants for each of their skill-shortage vacancies, thus the sum of percentages can be greater than 100%.
Source: UK government, Employer Skills Survey 2019 research report.

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The government recognises the need for lifelong learning opportunities to upgrade and reskill the existing workforce to quickly meet rising skill needs. However, adult participation in continuing education and training is low, in particular among low-skilled workers, and decreased by over one million between 2011/12 and 2018/19. To reverse this trend, the government has increased resources for lifelong learning, allocating around GBP 2 billion to the National Skills Fund in the period up to 2024/25. Investment by the National Skills Fund will support free courses in areas where skill shortages are prevalent or emerging, such as healthcare, education, STEM fields, digital technologies and fields related to net zero (Department for Education, 2021[66]). Free courses are available to anyone aged 19 and above without A-Level qualifications and to everyone earning below the annual national living wage. Short, flexible 12-16 week training is offered through employer-led digital boot-camps for anyone aged 19 and above to retrain, top up skills, or gain new specialist skills in order to meet critical skill needs. These measures respond to the strong need for training opportunities for the low-qualified and low income earners emphasised in the last Survey. Uptake and effectiveness should be closely monitored to ensure that targeted groups take up training and education opportunities. Statistical tools could help to improve targeting training to low skilled workers affected by digitalisation and the green transition, while carefully targeted campaigns to raise awareness of learning opportunities can stimulate further uptake, as has been done in the Netherlands, for example (OECD, 2021[67]).

Skill accumulation and on-the-job training suffered during the pandemic as many workers were furloughed. Businesses in the United Kingdom invest less in training than their counterparts in other European countries. While tertiary education attainment is comparatively high, only 18% of 25-64 year olds hold an upper secondary or postsecondary vocational qualification – significantly less than the OECD average of 27% (OECD, 2020[68]). Moreover, 32% of 25-64 year olds only have below upper secondary education, compared to an OECD average of 22% (OECD, 2020[68]). Pursuing vocational routes can be one way to increase educational attainment for people with lower qualifications, in particular for those leaving school early. In the United Kingdom however, apprenticeships are often used by businesses to upskill their workers rather than recruit and train new hires (Kuczera and Field, 2018[69]; Winterbotham et al., 2020[64]). Within the Plan for Jobs, the government introduced a payment to employers in England for each new apprentices hired between August 2020 and March 2022 (HM Treasury, 2020[70]). The government should evaluate the effectiveness of these payments in concert with incentives created by the apprenticeship levy introduced in 2017. Businesses with an annual pay bill of GBP 3 million pay an apprenticeship levy, and to recover some of that tax payment, businesses might be inclined to provide training to their employees through the apprenticeship system rather than other forms of training. Thus, the proportion of businesses only offering apprenticeships to existing employees increased slightly since the introduction of the apprenticeship levy, from 6% in 2016 to 10% in 2019 (Department for Education, 2020[71]). The government should monitor whether this development effectively crowds out low skilled and young people seeking to transition into employment via the apprenticeship system.

Active labour market policy programmes focus on a “Work first” approach over work quality and skill adequacy, which could lead to lower productivity through skill mismatch. With the launch of the Plan for Jobs in July 2020, the government increased spending on active labour market policies, in particular on the number of staff working with job seekers and on programmes facilitating labour reallocation, such as the Sector-Based Work Academy Programme. It also aims to prevent long-term unemployment among younger people through measures like the “Kickstart” and tackle long-term unemployment through its “Restart” programme.

Spending on ALMPs announced during the Autumn 2021 Budget amounts to over GBP 6 billion over the next three years, which comes on top of the GBP 3.6 billion additional funding for 2021- 2022 announced in Spending Review 2020 with the Plan for Jobs (HM Treasury, 2021[60]). Increased spending on ALMPs is welcome, but the outcome of the programmes should be monitored closely and, if necessary, adjusted, for example by increasing guidance and counselling services for medium and low skilled workers (OECD, 2021[72]). A focus should be on matching workers’ skills with employers’ needs. Since February 2022, the

government requires the unemployed to look for jobs outside their preferred line of work already after one month, down from three months. Non-compliance will lead to payment sanctions in their Universal Credit in order to increase work incentives. It is important that these job search requirements balance faster return to work with risks of increasing skill mismatch from pushing unemployed to the next job available regardless of skill adequacy.

Future skill shortages have to be addressed through the education of today's young people. In the United Kingdom, 15-year-olds perform above the OECD average in reading, mathematics and science, but, as in other systems, their performance is influenced by socio-economic background. Moreover, schools in disadvantaged areas often have larger class sizes and less experienced teachers (OECD, 2019[73]). During the pandemic, school closures further increased inequality as access to digital infrastructure necessary for remote learning varies by socio-economic background and children in poorer areas have been disproportionately affected by disruption in the delivery of school education due to higher COVID-19 incidence rates (Xu et al., 2022[74]). Reading test scores in the United Kingdom in autumn 2020 showed learning loss equivalent to around 2 months of progress, which was even larger for those from more disadvantaged backgrounds (Department for Education, 2021[75]). To reduce the growing learning gaps, the government has made GBP 4.9 billion available since the academic year 2020-21 to support education recovery through additional classes for 16-19 year-olds and tutoring courses for the most disadvantaged pupils (HM Treasury, 2021[60]). This investment is welcome, but does not reverse the drop of spending per pupil of 9% in real terms between 2009–10 and 2019–20 in England and more funding as announced in the 2021 Spending Review is warranted (Waltmann et al., 2021[76]). The Levelling Up Agenda provides a framework to investigate whether allocated spending is sufficient to tackle inequalities in education. Where shortcomings are found, additional funding should be allocated prioritising the most deprived schools.

Table 1.10. Past recommendations on skills development

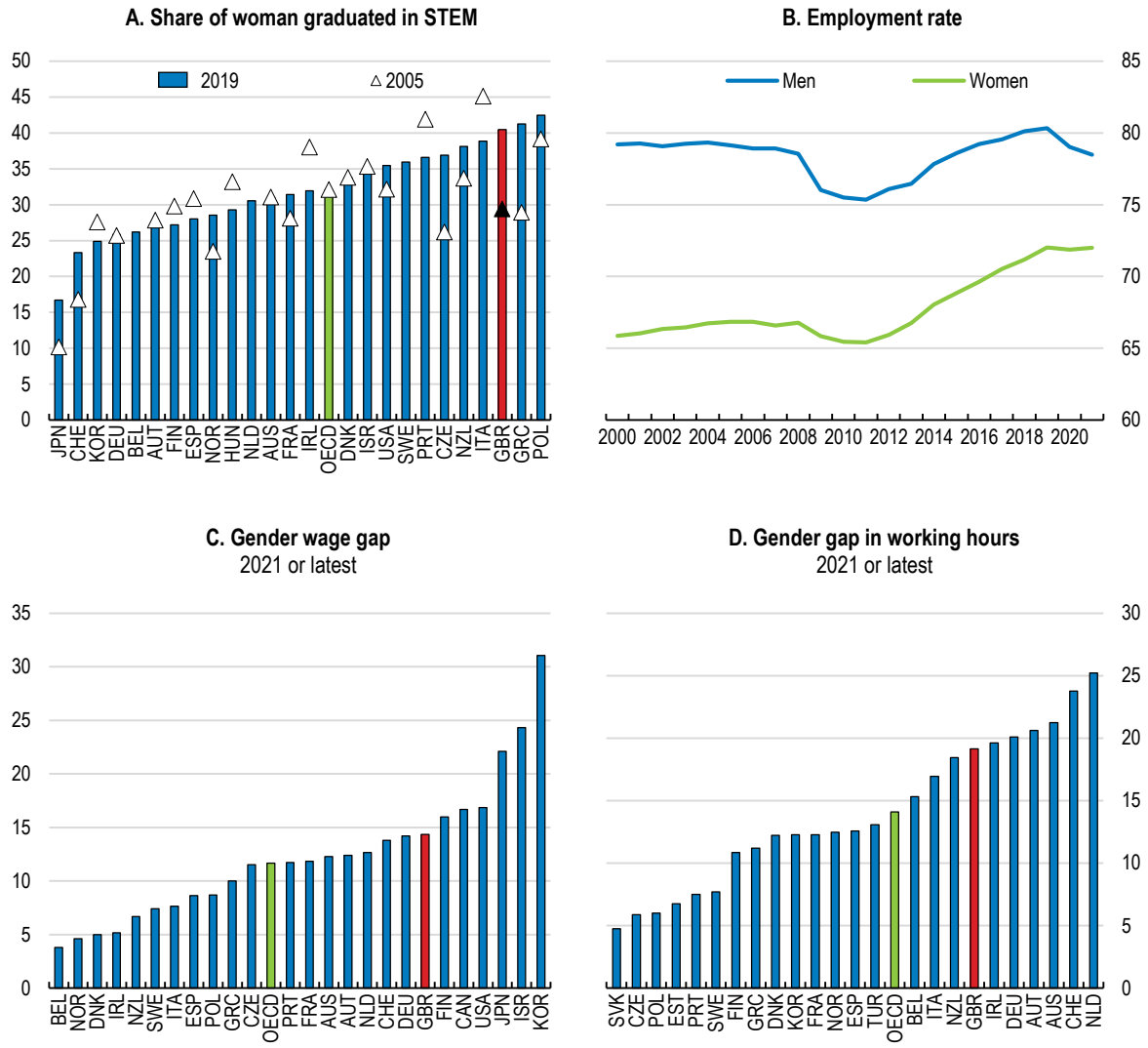
Recommendation in previous *Surveys*	Actions taken since the last *Survey*
Develop digital skills of low-skilled workers, including through further increasing public spending on training.	The National Retraining Scheme was integrated into the National Skill Fund. A series of free level 3 qualifications for adults aged 19 and over, who do not already have a level 3 qualification or higher, or whose earning is under the National Living Wage annually (GBP 18,525) will also be able to access these qualifications for free, regardless of their prior qualification level.
Better target the apprenticeship system to favour the access of low-skilled workers. Introduce individually targeted programmes for low-wage and low-skilled workers to improve their lifelong learning opportunities	

Reducing gender inequality to draw on a wider pool of skilled labour

Increasing female employment would help to reduce gender earnings gaps and address skill shortages. Women in the UK have made major advances in education, but their skills are often not fully utilised in the labour market. In 2008, the share of women holding tertiary education overtook the one of men (OECD, 2022[77]) and the share of women graduating in STEM fields has risen throughout the years reaching about 40% in 2019 (Figure 1.27, Panel A). Female labour market participation has steadily increased (Figure 1.27, Panel B), and is well above the OECD average (OECD, 2022[78]). However, a third of women work part-time, roughly three times more than men. Important gender inequalities persist. The wage gap has only declined moderately in the past 15 years, and in 2020, working women earned 13% less than men, a larger gap than in many European countries (Figure 1.27, Panel C).

Gender norms, parental leave entitlements and access to affordable and high-quality childcare all play a part in penalising motherhood. Estimates suggest that women in the United Kingdom experience a sharp and persistent drop after the birth of the first child, and even 10 years later earnings are 44% lower, whereas father's earnings remain virtually unaffected (Kleven et al., 2019[79]). Women spend more time in unpaid work than men suggesting that they are more likely to reduce work and take over care work (Figure 1.27, Panel D). In 2018, over half of mothers (56.2%) said they had made a change to their employment for childcare reasons, compared with only 22.4% of fathers (Office for National Statistics, 2019[80]).

Figure 1.27. Gender gaps continue to persist



Note: Panel A: OECD average based on countries for which data was available in both years. STEM refers to Natural sciences, mathematics and Statistics; Engineering, manufacturing and construction; and Information and Communication Technologies (ICT's). Panel C: The gender wage gap is defined as the difference between median earnings of men and women relative to the median earnings of men. Data refer to full-time employees. Panel D refers to the gap between women's and men's average usual weekly working hours on the main job as a share of men's working hours, total declared employment. 15-64 year-olds.
Source: OECD (2022), Labour Force Statistics.

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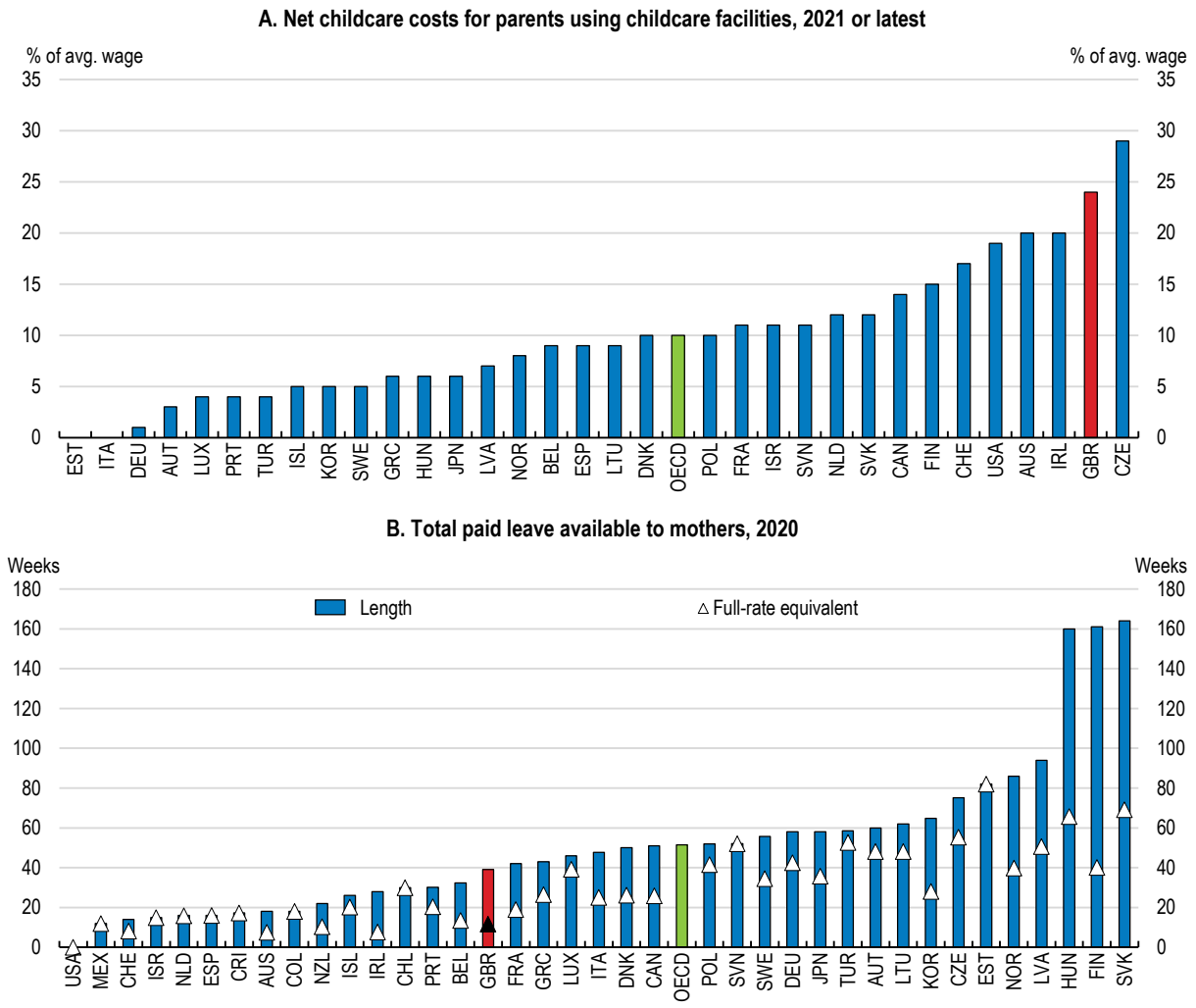
Improving access to affordable and good quality childcare would help. As highlighted in the last Survey, childcare costs to parents are amongst the highest in the OECD (Figure 1.28, Panel A). In particular, costs for childcare for children under two years are high, which may explain why less than a third of children under the age of two taking up child care in a formal institution compared to 90% of three to four year olds for whom more government support exists (Farquharson and Olorenshaw, 2022[81]; Department for Education, 2019[82]). However, the average hours spent in formal childcare across age groups is 22 hours, well below the OECD average of about 31 hours (OECD, 2016[83]). Expanding access to full-time high-quality child-care would allow mothers to increase working hours and reduce the duration of the career break, as well as support social mobility for children from disadvantaged backgrounds.

Figure 1.28. Childcare costs in the UK are high

Net childcare costs for parents using childcare facilities, percentage of the average wage, 2020 or latest



Note: Panel A: Net costs paid by parents for full-time centre-based childcare, after any benefits designed to reduce the gross childcare fees. The simulation shown concerns a family with two children. Both adults work full-time at 67% of the average wage. Panel B: Information refers to paid parental leave and subsequent periods of paid home care leave to care for young children. The graph refers to paid leave entitlements in place as of April 2020. The full-rate equivalent is calculated as the average payment rate times the length of the leave. See source for more details.
Source: OECD (2022), Social protection and Well-being database; and OECD Family Database: Public policies for families and children (PF2.1).

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Parental leave policies are favouring entrenched gender roles. Paid maternity leave at 39 weeks is around the OECD average, but replacement rates are amongst the lowest in the OECD (Figure 1.28, Panel B). The statutory maternity pay consists of 6 weeks at 90% of average gross earnings and up to 33 weeks at the lesser of the statutory rate of GBP 151.97 per week or 90% of average gross weekly earnings. Paternity leave is available for two weeks at 90% of earnings up to a maximum of GBP 151.97 per week. Since 2015, parents can share 50 weeks of parental leave and up to 37 weeks of pay among them (Atkinson, O'Brien and Koslowski, 2021[84]). Low replacement rates with leave pay capped at GBP 151.97 per week create disincentives for the uptake of shared parental leave of fathers, especially in those families where the father is the main family income earner. Eliminating or increasing the cap on paternity pay, as is done

for the mothers during the first 6 weeks, should be considered to limit the earnings shortfall for fathers. Data on the uptake of leave is not routinely collected. To understand the full extent of the problem, the government should improve the monitoring framework and evaluate the coverage and uptake of shared parental leave and its appropriateness in addressing gender inequalities.

Table 1.11. Past recommendations on childcare provision

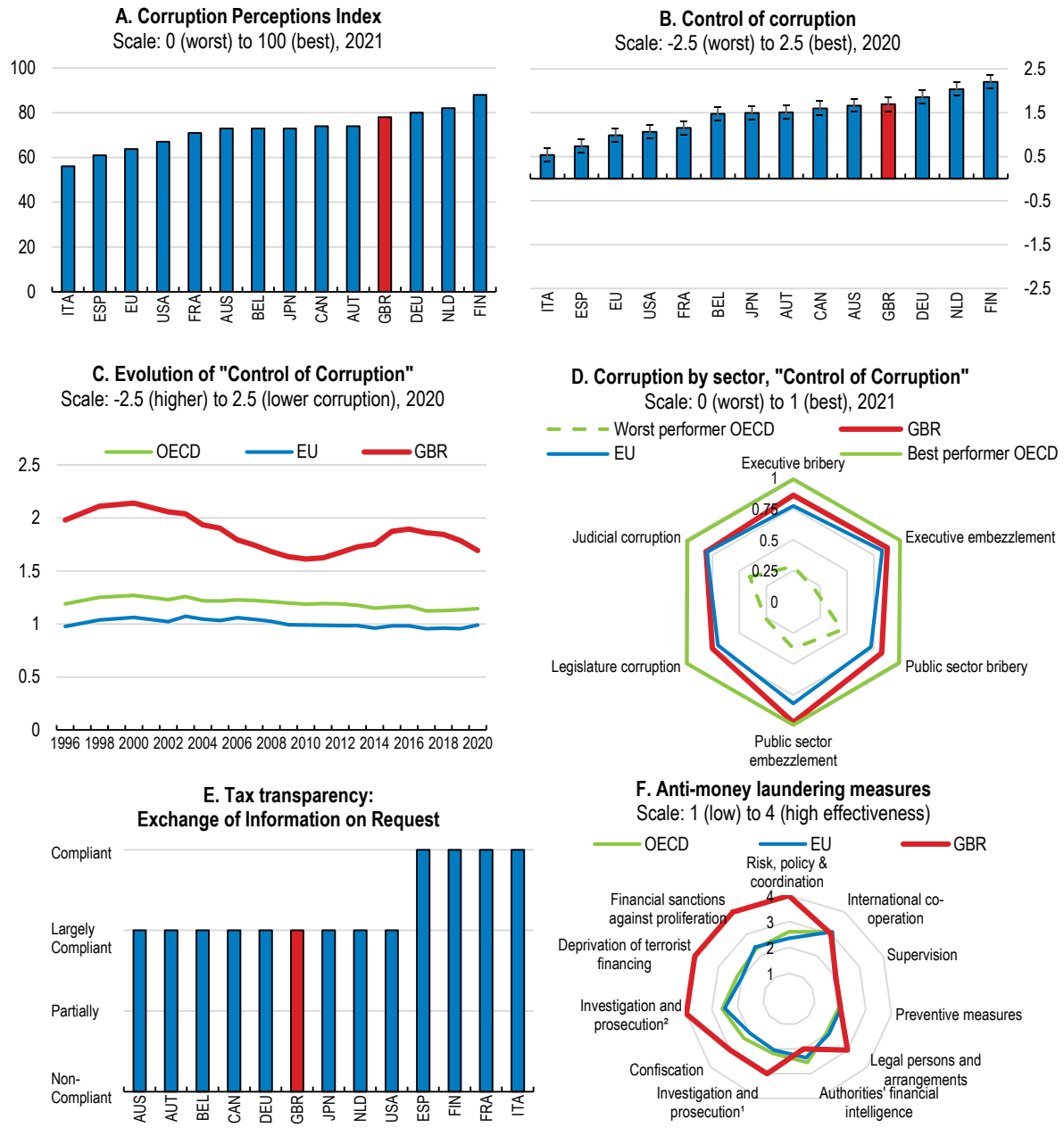
Recommendations in previous *Surveys*	Actions taken since the last *Survey*
Strengthen efforts to make good-quality childcare less costly	No action taken

Maintaining trust in government institutions

Transitioning to net zero will affect people's lives. To get their buy in, trust in the government will be crucial. This has been highlighted by the pandemic, which showed that trust in public institutions was important for people to understand and comply with extraordinary measures (OECD, 2021[85]). In the United Kingdom, indicators of perceived corruption are low by international comparison (Figure 1.29). The October 2021 Additional Follow-Up report by the OECD Working Group on Bribery in International Business Transactions found that the United Kingdom had made further progress in implementing the Working Group's recommendations from its 2017 Phase 4 evaluation of the United Kingdom. However, more progress is still needed to better detect foreign bribery through anti-money laundering reporting, to increase resources for law enforcement, to clarify corporate liability for foreign bribery, and to enhance safeguards ensuring prosecutorial independence.

Public trust in the government could benefit from strengthening oversight of the Ministerial Code. In recent years, the public perception of the extent to which public power is exercised for private gain deteriorated, though the United Kingdom still scores significantly better than the OECD and the EU average (Figure 1.29, Panel C). In its latest report, the Committee for Standards in Public Life recommended placing the Independent Advisor on a statutory basis (The Committee on Standards in Public Life, 2021[86]). This recommendation should be followed as it could increase independence of the Independent Advisor and by allowing initiating investigations and determining findings of breaches of the Ministerial Code, greater compliance could be achieved. Going one step further, greater independence could be achieved if the independent Advisor would also be charged with the sanctioning of rule breaking. While under the current arrangements the Prime Minister may ask the independent Adviser for confidential advice on the appropriate sanction, the decision power lies with the prime minister.

Figure 1.29. Corruption appears to be low



Note: Panel B shows the point estimate and the margin of error. Panel D shows sector-based subcomponents of the "Control of Corruption" indicator by the Varieties of Democracy Project. Panel E summarises the overall assessment on the exchange of information in practice from peer reviews by the Global Forum on Transparency and Exchange of Information for Tax Purposes. Peer reviews assess member jurisdictions' ability to ensure the transparency of their legal entities and arrangements and to co-operate with other tax administrations in accordance with the internationally agreed standard. The figure shows first round results; a second round is ongoing. Panel F shows ratings from the FATF peer reviews of each member to assess levels of implementation of the FATF Recommendations. The ratings reflect the extent to which a country's measures are effective against 11 immediate outcomes. "Investigation and prosecution¹" refers to money laundering. "Investigation and prosecution²" refers to terrorist financing.

Source: Panel A: Transparency International; Panels B and C: World Bank, Worldwide Governance Indicators; Panel D: Varieties of Democracy Project, V-Dem Dataset v11. Panels E and F: OECD Secretariat's own calculation based on the materials from the Global Forum on Transparency and Exchange of Information for Tax Purposes; and OECD, Financial Action Task Force (FATF).

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Table 1.12. Findings and recommendations

FINDINGS (Main findings in bold)	RECOMMENDATIONS (Key recommendations in bold)
Supporting a sustainable recovery	
The economy has recovered to pre-pandemic levels. High energy prices and rising cost of living are slowing growth. **Monetary policy has started to tighten as inflation increased sharply and persistently.** The BoE announced to gradually sell its stocks of sterling corporate bonds and end the program towards the end of 2023. A strategy for government bonds sales will be discussed at the August 2022 monetary policy meeting.	**Continue to progressively raise the Bank Rate to ensure the return of inflation to target, while taking into account any significant changes in economic conditions.** As planned, communicate a clear medium term strategy for reducing asset holdings to manage market expectations.
The pandemic and leaving the EU Single Market and Customs Union have weighed on trade. Non-tariff trade barriers with the EU increases administrative costs. Services account for a large share of trade, but the UK-EU agreement focuses mostly on goods.	**Discuss with the European Union to reduce non-tariff barriers for EU-UK trade in goods and improve mutual market access for services.** Continue to provide access to comprehensive export support services, especially for SMEs. In addition to facilitating UK export to the EU, continue to negotiate new trade deals while ensuring their costs and benefits remain in balance.
The labour market is tightening and labour shortages have been partly exacerbated by reduced net migration.	Ensure that the migration system is sufficiently flexible to address quickly rising labour shortages.
Income inequalities are high and unemployment benefits for many households remain below the levels of many other OECD countries and poverty rates are highest among households out of work.	Continue to uprate universal credit annually to ensure that it is adequate to cover the minimum living standard.
The banking sector is well capitalized on average. House prices have increased but macrofinancial risks remain contained. The Bank of England announced the removal of the affordability test to simplify the framework. The Loan-to-Income flow limit remains in place in addition to the less stringent affordability measures by the Financial Conduct Authority.	Monitor the effect of the removal of the affordability test to ensure macroprudential tools remain effective to contain risks from the mortgage market for the UK banking system.
Addressing fiscal challenges	
Following the phasing out of extensive COVID-19 support measures, fiscal policy has to balance fiscal tightening with supporting growth and meeting significant investment needs.	**Gradually lower the fiscal deficit and the public debt-to-GDP ratio as planned while ensuring temporary support through income transfers targeted at low-income households .**
Fiscal targets are changing frequently. The government has introduced new fiscal rules and targets in 2021, providing clear guidance about the medium-term plan for returning to debt sustainability. The government announced that its fiscal rules will guide its policy for at least this Parliament and will be reviewed at the start of each subsequent Parliament.	Ensure that future changes to fiscal targets follow a regular process to support credibility of fiscal policy
In the longer term, fiscal space is pressured by ageing related spending pressures and decreasing fiscal revenues as the economy is transitioning to net zero carbon emission.	**Replace the state pensions triple lock by indexing pensions to an average of CPI and wage inflation and provide direct transfers to poor pensioners to mitigate poverty risks.**
There is scope to improve the efficiency and fairness of the tax system. A tax review has been announced in the Spring Statement 2022 to go ahead before 2024.	Make council tax fairer by adjusting thresholds for higher property values and by updating property valuation. Broaden the tax base by phasing out inefficient and regressive exemptions, for example by removing partial VAT exemptions. Reduce the gap between the rates of national insurance contributions between employed and self-employed people.
Raising productivity	
Productivity growth has been sluggish since the Global Financial Crisis. Under an ambitious Plan for Growth, large scale investments in infrastructure, skills and innovations are planned, but investment needs are large. **Aggregate productivity is weighed down by regional disparities.**	**Continue ambitious public investment as planned, and implement existing Levelling Up White Paper proposals to ensure it is well targeted, better streamlined, and with a special focus on improving productivity in lagging regions.**
Local authorities face a fragmented funding landscape, which the 2021 Levelling Up White Paper committed to streamline and simplify. Poorer areas have not benefited to the same extent from the allocation of the first round of the new Levelling Up Fund.	**Identify and reduce barriers to access funds for local authorities and provide capacity building measures to ensure lagging regions make use of available funds.** Streamline administrative requirements for funding available to local governments.

The Levelling-Up strategy monitors progress through missions to be achieved by 2030. Funding plans are not set out beyond the current budget.	Evaluate longer-term funding needs in accordance with the missions' timeline. Ensure that devolution deals do not create government fragmentation by defining clear responsibilities within and across levels of government.
The UK Infrastructure Bank (UKIB) was established in the summer of 2021, but will only partially offset the loss of access to the European Investment Bank (EIB).	Expand existing investment strategies and create medium term objectives for the UKIB, in particular with respect to the green transition, to guide markets.
Business investment has been slow on the back of Brexit and pandemic related uncertainty, contributing to low productivity growth	**Ensure long-term policy transparency and continuity of government programmes to reduce uncertainties for businesses.**
The transition to net zero will provide new job opportunities and require new skills. Adding to existing skill-shortages, quickly rising demand for skills requires the need for re- and upskilling of the exiting workforce.	**Use statistical tools to target training to low skilled workers affected by digitalisation and the green transition to strengthen their skills to transit to new jobs.** Ensure that training opportunities for adults are of high quality and respond to identified skills need. Increase guidance and counselling efforts to improve targeting if found necessary. Remain flexible to adjust programme design or curricula of newly introduced programmes, such as Kickstarter programme.
Transversal and strong foundational skills will be essential for the future of work. While UK 15-year-olds perform above the OECD average at age 15, substantial performance differences between schools and between students from different socio-economic backgrounds remain. Businesses often use the apprenticeship system to upskill their employees rather than to recruit and train new workers. This reduces apprenticeship opportunities for young people seeking to transition into employment.	Target additional resources to support the highest quality teaching in schools in the most deprived areas. Monitor the incentives set by the apprenticeship levy and ensure apprenticeships are taken up by low skilled workers and early school leavers.
Women are highly educated but their skills are not fully utilised in the labour market and inequalities in earnings persist. Women adjust working hours to take over care responsibilities. Parental leave pay rates are low, providing little incentives to shift leave to fathers. Data on the uptake of parental leave is not routinely collected.	**Increase funding to reduce the cost of good-quality childcare, in particular for under 2 year olds, giving priority to low income households.** **Increase the cap on paternity pay and relate it to father's income.** Improve data collection of the uptake of parental leave in order to be able to evaluate effectiveness of current policies in reducing gender gaps.
The October 2021 Additional Follow-Up report by the OECD Working Group on Bribery in International Business Transactions found that the United Kingdom had made further progress in implementing the Working Group's recommendations from its 2017 Phase 4 evaluation of the United Kingdom. However, more progress is needed to address foreign bribery.	Ensure adequate resources for law enforcement, clarify aspects of corporate liability for foreign bribery, and strengthen measures to ensure that prosecutions are not influenced by considerations of national economic interests, the potential effect upon relations with another state or the identity of the natural or legal persons involved.
Despite low levels of corruption measured using international indicators, trust in national government has declined.	Give more power to the Independent Advisor, allowing to initiate investigations and determine findings of breaches of the Ministerial Code.

References

Adalet McGowan, M. and D. Andrews (2018), "Design of insolvency regimes across countries", *OECD Economics Department Working Papers*, No. 1504, OECD Publishing, Paris, https://doi.org/10.1787/d44dc56f-en. [23]

Bailey, A. et al. (2021), *Euston, we have a problem. Is Britain ready for an infrastructure revolution?*, https://www.resolutionfoundation.org/app/uploads/2020/03/Euston-we-have-a-problem.pdf (accessed on 10 March 2022). [55]

Bank of England (2021), *Financial Stability Report - December 2021*, https://www.bankofengland.co.uk/financial-stability-report/2021/december-2021 (accessed on 7 March 2022). [19]

Bank of England (2021), *Financial Stability Report - July 2021*, https://www.bankofengland.co.uk/financial-stability-report/2021/july-2021 (accessed on 18 November 2021). [21]

Bank of England (2021), *How have payment holidays supported mortgage borrowers during the Covid crisis?*, https://www.bankofengland.co.uk/bank-overground/2021/how-have-payment-holidays-supported-mortgage-borrowers-during-the-covid-crisis (accessed on 20 December 2021). [22]

Bank of England (2021), *Influences on investment by UK businesses: evidence from the Decision Maker Panel | Bank of England*, https://www.bankofengland.co.uk/quarterly-bulletin/2021/2021-q2/influences-on-investment-by-uk-businesses-evidence-from-the-decision-maker-panel (accessed on 13 December 2021). [57]

Bank of England (2021), *Monetary Policy Report - November 2021*, https://www.bankofengland.co.uk/monetary-policy-report/2021/november-2021 (accessed on 18 November 2021). [89]

Bank of England (2020), *Interim Financial Stability Report*, http://www.bankofengland.co.uk/report/2020/monetary-policy-report-financial-stability-report-may-2020. (accessed on 18 November 2021). [20]

Brewer, M. and I. Tasseva (2021), "Did the UK policy response to Covid-19 protect household incomes?", *The Journal of Economic Inequality*, Vol. 19/3, pp. 433-458, https://doi.org/10.1007/s10888-021-09491-w. [14]

Bronka, P., D. Collado and M. Richiardi (2020), "The Covid-19 crisis response helps the poor: the distributional and budgetary consequences of the UK lockdown", *Covid Economics, Vetted and Real Time papers*, CEPR, https://cepr.org/file/9614/download?token=gkU2Wi40 (accessed on 10 January 2022). [15]

Centre for Inequality and Levelling Up (2022), *Funding Levelling Up: The story so far*, University of West London, https://www.uwl.ac.uk/media/6298/download. [45]

Cominetti, N. et al. (2022), *Changing jobs? Change in the UK labour market and the role of worker mobility*, Resolution Foundation, https://economy2030.resolutionfoundation.org/wp-content/uploads/2022/01/Changing-jobs.pdf (accessed on 11 January 2022). [62]

De Lyon, J. and S. Dhingra (2021), "Real-time updates on the UK economy: trends, expectations and implications from business survey data Real-time updates on the UK economy trends, expectations and implications from business survey data", *Covid-19 Analysis Series*, No. 26, Centre for Economic Performance, https://cep.lse.ac.uk/pubs/download/cepcovid-19-026.pdf (accessed on 14 January 2022). [9]

Demmou, L. and G. Franco (2020), "Do sound infrastructure governance and regulation affect productivity growth? New insights from firm level data", *OECD Economics Department Working Papers*, No. 1609, OECD Publishing, Paris, https://doi.org/10.1787/410535403555. [54]

Department for Business, Energy and Industrial Strategy (2021), *UK Innovation Strategy Leading the future by creating it*. [90]

Department for Education (2021), "Skills for Jobs: Lifelong Learning for Opportunity and Growth", https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957856/Skills_for_jobs_lifelong_learning_for_opportunity_and_growth__web_version_.pdf (accessed on 11 January 2022). [66]

Department for Education (2021), *Understanding progress in the 2020/21 academic year - Interim findings January 2021*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/962330/Learning_Loss_Report_1A_-_FINAL.pdf (accessed on 11 January 2022). [75]

Department for Education (2020), *Employer Skills Survey 2019: Apprenticeships and Traineeships*. [71]

Department for Education (2019), *Childcare and Early Years Survey of Parents in England, 2019*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/853358/CEYSP_2019_Report.pdf (accessed on 21 January 2022). [82]

Department for International Trade (2021), *Made in the UK, Sold to the World*, https://www.gov.uk/government/publications/export-strategy-made-in-the-uk-sold-to-the-world/made-in-the-uk-sold-to-the-world-web-version#executive-summary (accessed on 7 March 2022). [3]

Department for Levelling Up, Housing and Communities (2021), *Levelling Up Fund: first round successful bidders - GOV.UK*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034498/LUF_bidders_list.ods (accessed on 30 May 2022). [44]

EY (2022), "EY Financial Services Brexit Tracker: Movement within UK financial services sector stabilises five years on from Article 50 trigger". [25]

Farquharson, C. and H. Olorenshaw (2022), "The changing cost of childcare", *IFS Report*, No. R210, Institute for Fiscal Studies, http://www.nuffieldfoundation.org. (accessed on 24 May 2022). [81]

Fernández-Reino, M. and C. Rienzo (2021), *Migrants in the UK Labour Market: An Overview*, The Migration Observatory, http://www.migrationobservatory.ox.ac.uk (accessed on 15 December 2021). [8]

Freeman, R. et al. (2022), "Unravelling deep integration: UK trade in the wake of Brexit", No. 1847, Centre for Economic Performance, https://cep.lse.ac.uk/pubs/download/dp1847.pdf (accessed on 26 April 2022). [2]

Glen, J. (2022), *Speech by John Glen MP, Economic Secretary to the Treasury, to the Association of British Insurers Annual Dinner*, https://www.gov.uk/government/speeches/speech-by-john-glen-mp-economic-secretary-to-the-treasury-to-the-association-of-british-insurers-annual-dinner (accessed on 7 March 2022). [24]

Hale, S. (2022), *A presage to India Assessing the UK's new Indo-Pacific trade focus*, https://economy2030.resolutionfoundation.org/wp-content/uploads/2022/01/A-presage-to-India.pdf (accessed on 7 March 2022). [4]

HM Government (2022), *Levelling Up the United Kingdom*, http://www.gov.uk/official-documents (accessed on 7 March 2022). [41]

HM Government (2021), *Green Jobs Taskforce - Report to Government, Industry and the Skills sector*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf (accessed on 7 March 2022). [87]

HM Government (2020), *The Ten Point Plan for a Green Industrial Revolution - Building back better, supporting green jobs, and accelerating our path to net zero*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf (accessed on 7 March 2022). [88]

HM Treasury (2022), *Chancellor Rishi Sunak's Mais Lecture 2022*, https://www.gov.uk/government/speeches/chancellor-rishi-sunaks-mais-lecture-2022 (accessed on 1 July 2022). [38]

HM Treasury (2022), *National Infrastructure Strategy*, https://www.gov.uk/government/publications/national-infrastructure-strategy (accessed on 7 March 2022). [48]

HM Treasury (2022), *Spring Statement 2022*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1062708/Spring_Statement_2022_Print.pdf (accessed on 25 May 2022). [30]

HM Treasury (2022), *Wholesale Markets Review: Consultation Response*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057897/Wholesale_Markets_Review_Consultation_Response.pdf (accessed on 24 May 2022). [61]

HM Treasury (2021), *Autumn Budget and Spending Review 2021: A Stronger Economy for the British People*, http://www.gov.uk/official-documents (accessed on 13 December 2021). [60]

HM Treasury (2021), *Build Back Better - our plan for growth*, http://www.gov.uk/official-documents. (accessed on 15 December 2021). [39]

HM Treasury (2021), *Levelling Up Fund : Prospectus*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/966138/Levelling_Up_prospectus.pdf (accessed on 30 May 2022). [43]

HM Treasury (2020), "Impact of COVID-19 on working household incomes: distributional analysis as of May 2020", https://www.gov.uk/government/publications/impact-of-covid-19-on-working-household-incomes-distributional-analysis-as-of-may-2020 (accessed on 10 January 2022). [16]

HM Treasury (2020), *Plan for Jobs*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/898421/A_Plan_for_Jobs__Web_.pdf (accessed on 24 May 2022). [70]

IMF (2021), *Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic*, International Monetary Fund, https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19 (accessed on 31 March 2022). [26]

Infrastructure and Ports Authority (2021), *Analysis of the National Infrastructure and Construction Pipeline 2021*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1016759/Analysis_of_the_National_Infrastructure_and_Construction_Pipeline_2021.pdf (accessed on 8 March 2022). [52]

Infrastructure Projects Authority (2021), *Transforming Infrastructure Performance: Roadmap to 2030*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1016726/IPA_TIP_Roadmap_to_2030_v6__1_.pdf (accessed on 7 March 2022). [53]

Institute for Fiscal Studies (2022), *Incomes and personal tax and benefit measures*. [27]

Institute for Fiscal Studies (2020), *Revaluation and reform: bringing council tax in England into the 21st century*, https://ifs.org.uk/publications/14761 (accessed on 28 March 2022). [33]

Institute for Government (2022), *The GB-EU border*. [5]

Johnson, P. (2021), "It's time we stopped treating the self-employed as an afterthought", https://ifs.org.uk/publications/15842 (accessed on 18 January 2022). [34]

Jones, R. and J. Llewellyn (2019), "Improving Infrastructure", *National Institute Economic Review*, Vol. 250, pp. R61-R68, https://doi.org/10.1177/002795011925000119. [47]

Kierzenkowski, R., G. Machlica and G. Fulop (2018), "The UK productivity puzzle through the magnifying glass: A sectoral perspective", *OECD Economics Department Working Papers*, No. 1496, OECD Publishing, Paris, https://doi.org/10.1787/e704ee28-en. [37]

Kleven, H. et al. (2019), "Child Penalties across Countries: Evidence and Explanations", *AEA Papers and Proceedings*, Vol. 109, pp. 122-126, https://doi.org/10.1257/pandp.20191078. [79]

Koslowski, A. et al. (eds.) (2021), *United Kingdom Country Note*, https://doi.org/10.18445/20210817-144100-0. [84]

Kuczera, M. and S. Field (2018), *Apprenticeship in England, United Kingdom*, OECD Reviews of Vocational Education and Training, OECD Publishing, Paris, https://doi.org/10.1787/9789264298507-en. [69]

National Audit Office (2021), *Evaluating Government Spending*, https://www.nao.org.uk/wp-content/uploads/2021/12/Evaluating-government-spending.pdf (accessed on 7 March 2022). [56]

National Infrastructure Commission (2020), *ANTICIPATE, REACT, RECOVER. Resilient infrastructure systems*, https://nic.org.uk/app/uploads/Anticipate-React-Recover-28-May-2020.pdf (accessed on 27 March 2022). [50]

National Infrastructure Commission (2019), *Strategic Investment and Public Confidence*. [49]

OECD (2022), *OECD Labour Force Statistics 2021*, OECD Publishing, Paris, https://doi.org/10.1787/177e93b9-en. [78]

OECD (2022), *Population with tertiary education* (indicator), https://doi.org/10.1787/0b8f90e9-en (accessed on 11 January 2022). [77]

OECD (2021), *Government at a Glance 2021*, OECD Publishing, Paris, https://doi.org/10.1787/1c258f55-en. [85]

OECD (2021), *International Migration Outlook 2021*, OECD Publishing, Paris, https://doi.org/10.1787/29f23e9d-en. [11]

OECD (2021), *OECD Economic Surveys: Netherlands 2021*, OECD Publishing, Paris, https://doi.org/10.1787/dd476bd3-en. [67]

OECD (2021), *OECD Skills Outlook 2021: Learning for Life*, OECD Publishing, Paris, https://doi.org/10.1787/0ae365b4-en. [65]

OECD (2021), *Pensions at a glance 2021*, https://www.oecd-ilibrary.org/finance-and-investment/pensions-at-a-glance-2021_2770acc6-en (accessed on 28 March 2022). [36]

OECD (2021), *Scaling up policies that connect people with jobs in the recovery from COVID-19*, https://read.oecd-ilibrary.org/view/?ref=1093_1093054-x7l2bpj5jy&title=Scaling-up-policies-that-connect-people-with-jobs-in-the-recovery-from-COVID-19 (accessed on 10 March 2022). [72]

OECD (2020), *Education at a Glance 2020: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/69096873-en. [68]

OECD (2020), *Enhancing Productivity in UK Core Cities: Connecting Local and Regional Growth*, OECD Urban Policy Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9ef55ff7-en. [40]

OECD (2020), *OECD Economic Surveys: United Kingdom 2020*, OECD Publishing, Paris, https://doi.org/10.1787/2f684241-en. [1]

OECD (2020), *OECD Regions and Cities at a Glance 2020*, OECD Publishing, Paris, https://doi.org/10.1787/959d5ba0-en. [42]

OECD (2019), *OECD Employment Outlook 2019: The Future of Work*, OECD Publishing, Paris, https://doi.org/10.1787/9ee00155-en. [63]

OECD (2019), *PISA 2018 Results (Volume II): Where All Students Can Succeed*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/b5fd1b8f-en. [73]

OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*, OECD Publishing, Paris, https://doi.org/10.1787/9789264301085-en. [18]

OECD (2017), *OECD Economic Surveys: United Kingdom 2017*, OECD Publishing, Paris, https://doi.org/10.1787/eco_surveys-gbr-2017-en. [31]

OECD (2016), *OECD Family Database - Enrolment in childcare and pre-school*, http://www.oecd.org/els/soc/PF3_2_Enrolment_childcare_preschool.pdf (accessed on 28 February 2018). [83]

OECD (2015), *OECD Economic Surveys: United Kingdom 2015*, OECD Publishing, Paris, https://doi.org/10.1787/eco_surveys-gbr-2015-en. [32]

Office for Budget Responsibility (2022), *Economic and fiscal outlook - March 2022*, http://www.gov.uk/official-documents (accessed on 28 March 2022). [28]

Office for Budget Responsibility (2021), *Economic and fiscal outlook - October 2021*, https://obr.uk/efo/economic-and-fiscal-outlook-october-2021/ (accessed on 13 December 2021). [7]

Office for Budget Responsibility (2021), *Fiscal risks report - july 2021*, http://www.gov.uk/official-documents (accessed on 17 December 2021). [35]

Office for National Statistics (2022), *Changes in payrolled employments held by non-UK nationals during the coronavirus (COVID-19) pandemic and EU Exit periods*, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/articles/changesinpayrolledemploymentsheldbynonuknationalsduringthecoronaviruscovid19pandemicandeuexitperiods/2022-03-01 (accessed on 23 May 2022). [13]

Office for National Statistics (2021), *A01: Summary of labour market statistics*, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/summaryoflabourmarketstatistics (accessed on 14 January 2022). [6]

Office for National Statistics (2021), *Long-term international migration, provisional*, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/longterminternationalmigrationprovisional (accessed on 14 January 2022). [10]

Office for National Statistics (2021), *Measuring migration: the story behind the headlines*, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/articles/measuringmigrationthestorybehindtheheadlines/2021-09-17. [12]

Office for National Statistics (2019), *Families and the labour market, UK*, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/familiesandthelabourmarketengland/2019 (accessed on 19 January 2022). [80]

Office of Budget Responsibility (2021), *Economic and fiscal outlook - March 2021*, https://obr.uk/efo/economic-and-fiscal-outlook-march-2021/ (accessed on 15 December 2021). [51]

Paul Johnson, C. et al. (2021), *An initial response to the Prime Minister's announcement on health, social care and National Insurance*, Institute for Fiscal Studies, https://ifs.org.uk/publications/15597 (accessed on 7 March 2022). [29]

Sorbe, S. et al. (2019), "Digital Dividend: Policies to Harness the Productivity Potential of Digital Technologies", *OECD Economic Policy Papers*, No. 26, OECD Publishing, Paris, https://doi.org/10.1787/273176bc-en. [59]

The Committee on Standards in Public Life (2021), *Upholding Standards in Public Life - Final report of the Standards Matter 2 review*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1029944/Upholding_Standards_in_Public_Life_-_Web_Accessible.pdf (accessed on 5 January 2022). [86]

Valero, A., C. Riom and J. Oliveira-Cunha (2021), "The business response to Covid-19 one year on: findings from the second wave of the CEP-CBI survey on technology adoption", *Covid-19 Analysis Series*, No. 024, Centre for Economic Performance, http://cep.lse.ac.uk (accessed on 4 March 2022). [58]

Waltmann, B. et al. (2021), *2021 annual report on education spending in England*, The IFS, https://doi.org/10.1920/re.ifs.2021.0204. [76]

Waters, T. et al. (2020), *The effects of coronavirus on household finances and financial distress*, Institute for Fiscal Studies, https://doi.org/10.1920/bn.ifs.2020.bn0298. [17]

Winterbotham, M. et al. (2020), *Employer Skills Survey 2019*, Department for Education, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925744/Employer_Skills_Survey_2019_research_report.pdf (accessed on 3 March 2022). [64]

World Economic Forum (2019), *The Global Competitiveness Report 2019*, https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf (accessed on 21 December 2021). [46]

Xu, X. et al. (2022), *Inequality and the Covid crisis in the United Kingdom*, The IFS, https://doi.org/10.1920/wp.ifs.2022.0122. [74]

2 Reaching net zero

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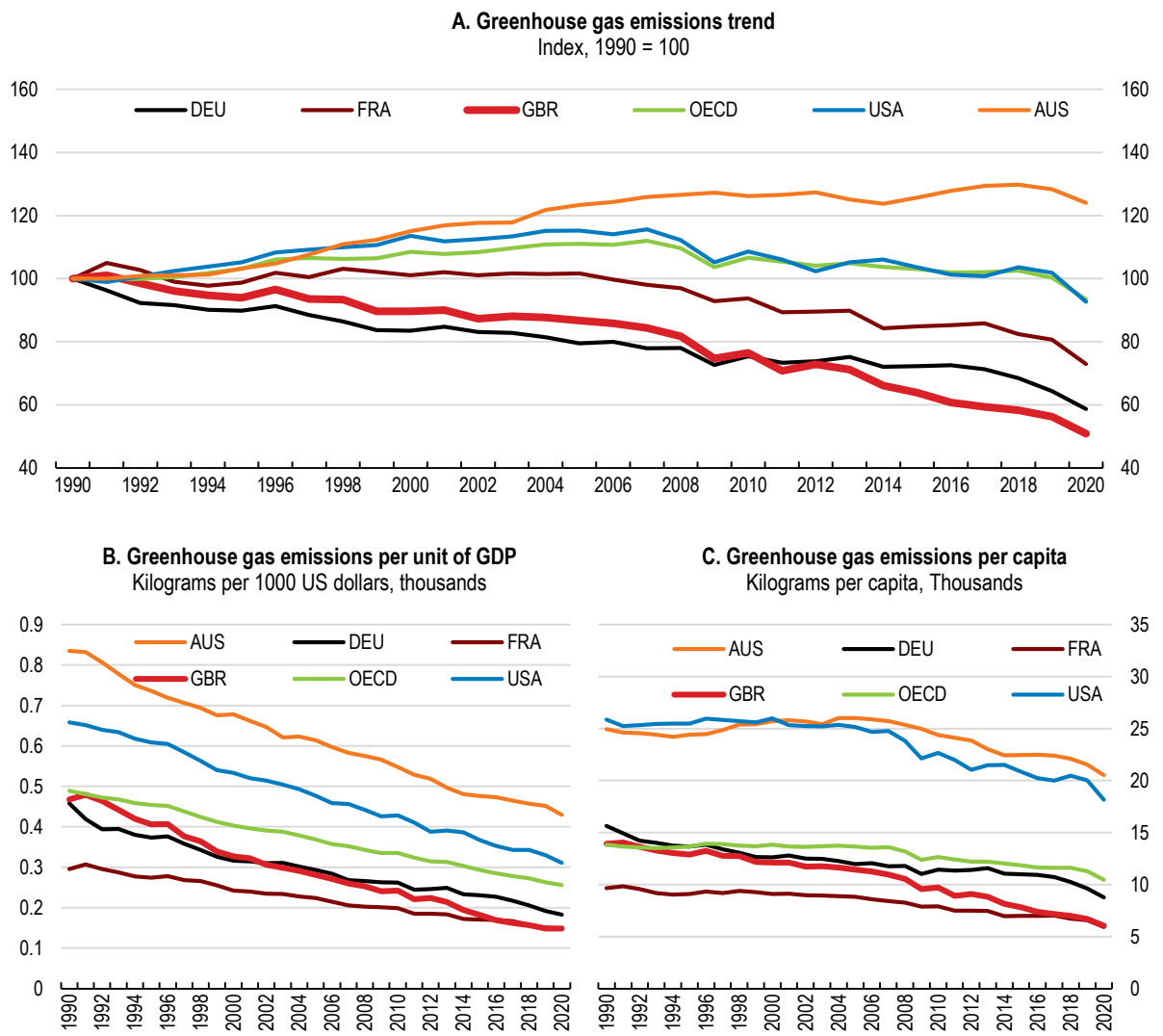
The United Kingdom is among world leaders in reducing domestic greenhouse gas emissions, and a broad political consensus supports the target to reduce net emissions to zero by 2050. The UK's strong institutional framework is an inspiration to countries around the world, and the country is pioneering work to embed climate considerations in the financial sector. Achieving carbon neutrality will require policy to match ambition. Emission reductions so far were largely driven by electricity generation, a sector targeted by explicit pricing instruments and a cost efficient renewables auction-design subsidy scheme. Expanding pricing instruments across the economy is an essential building block to reach targets. Such measures will be more effective if complemented by well-designed sectoral regulation and subsidies, and more acceptable if implemented once energy prices have started to come down from historically high levels. Britons are conscious of the need to act. However, winning their acceptance of the needed policies may require targeting carbon revenue to compensate low-income households and investments in green infrastructure and new technologies. A mechanism defusing fears that effective policies undermine competitiveness, preferably internationally agreed, would facilitate effective policies towards emission intensive trade exposed industries.

The United Kingdom reduced emissions by 40% from 1990 to 2019, among the largest reductions in the OECD (Figure 2.1, Panel A) and the largest among G20 countries, while GDP increased by 78%. Greenhouse gas emissions per unit of GDP were reduced almost by a factor of three since 1990 (Figure 2.1, Panel B). Emissions per capita have also fallen considerably (Figure 2.1, Panel C). In 2019, it was the first G7 country to create a legally binding target to bring net GHG emissions to zero by 2050 to deliver on the Paris Agreement. This ambition is supported by a strong institutional framework, which has inspired similar climate legislation across the world (Caselli, Ludwig and Van Der Ploeg, 2021[1]), and broad political and public support. In 2021, the UK was also the first among advanced economies to set a net zero strategy (BEIS, 2021[2]).

Figure 2.1. The United Kingdom has been among OECD leaders in the reduction of greenhouse gas emissions



Note: Total greenhouse gas emissions excluding land use, land-use change and forestry.
Source: OECD (2022), Environment database.

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The United Kingdom is experiencing widespread climate change. The average temperature is around 1.2°C warmer than in the pre-industrial period (1850-1900). The sea level has risen by 16 centimetres above pre-industrial levels, and episodes of extreme heat, intense rainfall and associated flooding have become more frequent. The United Kingdom is expected to experience warmer, wetter winters and hotter, drier summers, along with more frequent and intense extremes. The continued sea level rise will increase risks of coastal flooding and affect the functioning of coastal infrastructure (Climate Change Committee, 2021[3]; OECD, 2022[4]). While not within the scope of this chapter, adaptation measures also need to be stepped up to increase resilience against inevitable climate change. Progress in adaptation has been slow, with high levels of risk from climate change in most sectors of the economy (Box 2.1).

Box 2.1. Key climate change adaptation recommendations from the Climate Change Committee

The Climate Change Committee's (CCC) progress report on adaptation (2021[3]) concludes that the UK Government's National Adaptation Programme has not improved resilience to the changing climate to the extent intended under the UK Climate Change Act. Of the 34 priority areas assessed in the 2021 progress report on adaptation, not one was demonstrating strong progress in adapting to climate risk. Policies developed without sufficient recognition of the need to adapt to climate change undermine their goals, steer behaviour in directions that lock in climate risks, and store up costs for the future. The CCC recommends a robust plan for adaptation with measurable targets to assess progress. They also gave 50 concrete recommendations, of which the following key actions were highlighted:

- Restore 100% of upland peat by 2045, including through a ban on rotational burning.
- Bring forward proposed plans to address overheating risk in homes through building regulations.
- Make the Government's next round of adaptation reporting mandatory for all infrastructure sectors.
- Build a strong emergency resilience capability for the United Kingdom against climate shocks, learning from the COVID-19 response.
- Implement a public engagement programme on climate change adaptation.

Source: Climate Change Committee (2021[3]).

Overall, the future cost to the United Kingdom from climate change has been estimated to 3%-9% of GDP by 2050 (Guo, Kubli and Saner, 2021[5]). Nonetheless, the most severe consequences of climate change will come after 2050, and are expected to be severe even if very challenging to predict. Furthermore, the extent of damage depends heavily on adaptation policies in the United Kingdom and on efforts to reduce emissions globally (HMT, 2021[6]). Key adaptation measures in the UK include improving land use and soil health; building buildings in places and with qualities, such as better insulation, that make them resilient to climate change, and retrofitting existing ones; investing in flood defences; implementing nature-based solutions; and upgrading the resilience of supply chains and infrastructure such as electricity transmission. For comparison, the cost of reaching Net Zero by 2050 is estimated at 0.6-2% of GDP by 2050, depending on sources (OBR, 2021[7]; OECD, 2022[4]).

COVID-19 and associated restrictions on mobility reduced emissions by around 13% in 2020, but very little of this reduction is set to be permanent, as structural changes to the underlying economy are expected to be relatively limited. Some changes to working and consumption patterns might persist beyond COVID-19, but their effects on emissions are uncertain and may go in both directions. For example, more teleworking reduces emissions, while a shift away from public transit towards more private car use increases them (Climate Change Committee, 2021[3]). Since March 2020, the United Kingdom has introduced successive packages of support measures equivalent to 15% of 2020 GDP, one of the largest fiscal responses to the COVID-19 crisis globally. As part of this package, green measures are estimated at 1.2% of GDP. Support for public transport services, cycling and walking is prominent (OECD, 2022[4]).

Russia's invasion of Ukraine and subsequent sanctions have led to increasing energy prices and will likely increase the use of coal in electricity generation in the short term. The cost-of-living shock is best handled by supporting low-income households, as energy price support is regressive and runs counter to climate targets. In the longer term, the combination of high fossil fuel prices and a re-assessment of the economic and political costs of energy import dependency boosts the case for domestic clean energy and energy efficiency.

Moving towards net zero is compatible with continued strong GDP growth and prudent fiscal policy, but will be challenging. For instance, climate policies will change the sectoral composition of the economy, boost investment, inflation and interest rates (Pareliussen, Saussay and Burke, 2022[8]). Some sectors are highly responsive to price signals while various market failures such as coordination failures, bounded rationality and liquidity constraints hold back action in others. Clean technologies are readily available and price competitive in some cases, unaffordable, on the testing stage, or not yet developed in others. Furthermore, the green transition will create winners and losers, and may challenge peoples' attitudes and beliefs. This difficult political economy has played an important role in limiting the coverage of effective and efficient policies in the UK. Explicitly pricing emissions assigns the cost transparently, while benefits from lower emissions, public revenues and considerable co-benefits are distributed thinly across the population. Explicit pricing is therefore often less favoured politically than other less transparent policies, such as subsidies where costs are distributed thinly across taxpayers, or regulations carrying hidden and unevenly distributed costs (D'Archangelo et al., 2022[9]).

Important challenges to take into account in the transition include:

- managing the overall economic effects of mitigation action, including concerns about productivity, unemployment, inflation and public debt,
- transforming the energy system and boosting clean energy supply at unprecedented speeds,
- managing the risk of emission-intensive, trade-exposed industries losing competitiveness if one country's action is not followed up internationally, and
- avoiding negative distributional effects and building public acceptance of efficient policies.

Against this background, this chapter outlines a cost-effective, inclusive and comprehensive strategy to reach carbon neutrality by 2050, in line with the United Kingdom's ambitions. The analyses and recommendations are informed by new OECD research on the macroeconomic and distributional consequences of different policy options (Pareliussen, Saussay and Burke, 2022[8]) as well as on people's attitudes towards climate change and climate policies (Dechezleprêtre et al., 2022[10]). The chapter is structured as follows: the next section gives a brief overview of UK climate targets and institutional set-up. The third section discusses policy options to reduce greenhouse gas emissions in the context of multiple market failures. The fourth section discusses how to improve political acceptability of ambitious climate policy. The fifth and last section discusses concrete climate policy options in their sector-specific context.

A brief overview of UK targets, trends and institutional set-up

The United Kingdom has a strong institutional framework emphasising evidence-based policy making, which has inspired countries around the world. The 2008 Climate Change Act was adopted based on a cross-party consensus. It defines the 2050 net zero target and defines a process to legislate 5-year carbon budgets – the cumulative volume of greenhouse gas emissions allowed at the national level for a 5 year period – 12 years ahead of time. These targets are statutory and open the Government to litigation if not met. The Act directs that these targets should be established by the Government based on advice from an independent expert body, the Climate Change Committee (CCC), which reports on progress to meet the targets to the Parliament. In addition to advising and monitoring compliance with the targets, the Climate Change Committee has become a trusted knowledge broker and has contributed to a more constructive debate on climate change issues (Caselli, Ludwig and Van Der Ploeg, 2021[1]). The Act also requires the

Government to publish a climate change risk assessment every five years and to develop a National Adaptation Programme to respond to the risk assessment.

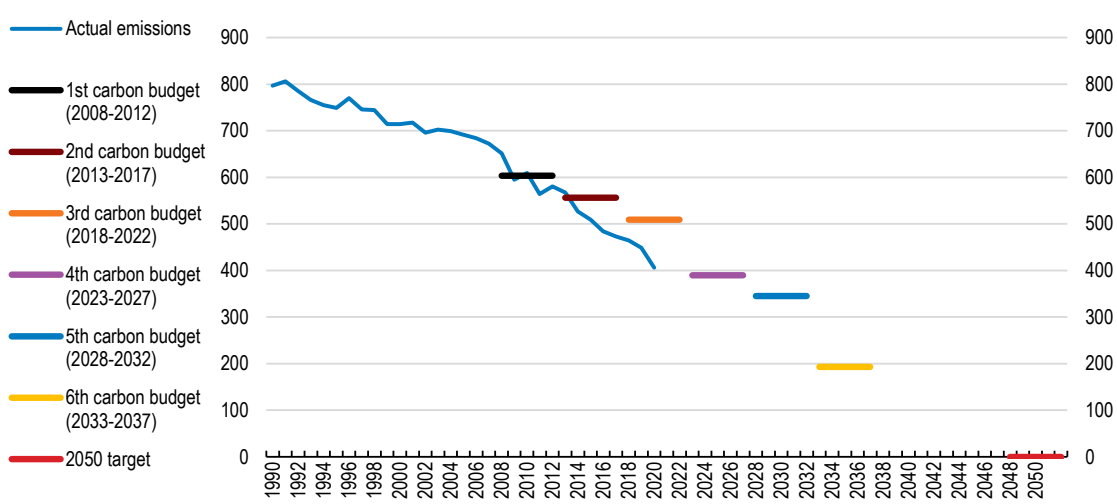
The permanent nature of the CCC has helped to ensure that the United Kingdom's overall direction of travel on climate change remains focused on the long-term target (Climate Change Committee, 2020[11]). The UK framework has inspired institutional set-ups in other countries, including Denmark, France, Germany, Mexico, New Zealand and Sweden. For example, France's 2015 Law on Energy Transition for Green Growth instituted five-year carbon budgets complemented by the creation of the High Council on Climate (HCC), a climate policy watchdog, in 2018 (OECD, 2021[12]).

Notwithstanding an overall strong institutional framework, a broad range of actors at different levels of government share responsibility for environmental outcomes and policies, broadly or in specific sectors. This may stand in the way of policy coherence. The Department of Business Energy and Industrial Strategy (BEIS) has the overall coordinating responsibility for climate change, complementary to the Climate Change Committee's role as a climate policy watchdog. The responsibility for environmental policy and regulation resides with the devolved administrations of England (served by the UK Government), Scotland, Wales and Northern Ireland. HMT is responsible for taxes, and a UK ETS authority with representatives from the UK and devolved governments is responsible for the UK ETS. Bank of England and the Financial Conduct Authority together play a leading role internationally to improve the way the financial sector can support the transition toward a sustainable economy. Line ministries are responsible for their respective sectors, coordinated by the Cabinet Committees on Climate Strategy and Climate Action (Climate Change Committee, 2021[3]). Building on existing structures to improve coordination between institutions and a shared understanding of each institution's role will be essential to achieve broad and deep emission reductions while minimising negative side effects.

Carbon budgets contribute to a stable and credible institutional framework for the government and the private sector. The United Kingdom met its first and second carbon budgets (2008-12 and 2013-17) and is on track to reduce emissions more than mandated by its third budget (2018-22) (Figure 2.2) (Climate Change Committee, 2021[3]). In 2021, following CCC's recommendations, the Government set the sixth carbon budget (CB6, 2033–37) to cut emissions by 78% by 2035 in order to set the United Kingdom on the path to net zero. For the first time the target also includes the United Kingdom's share of international aviation and shipping emissions.

Figure 2.2. Emission reduction targets have so far been met

Million tonnes of CO_2 emissions



Source: OECD (2022), Environment database; and Climate Change Committee.

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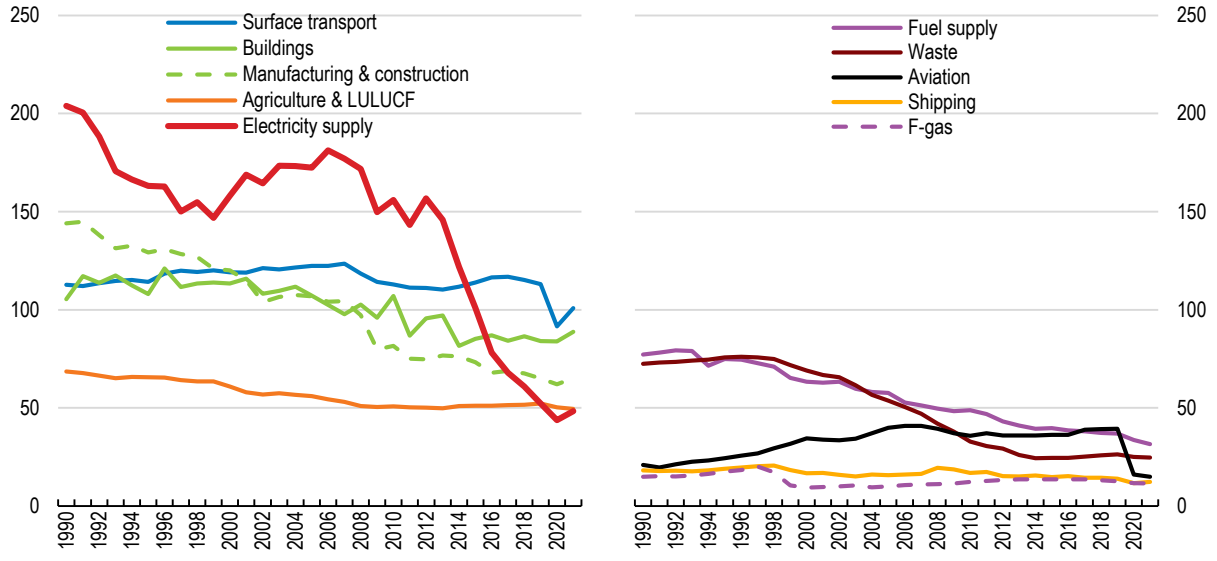
Continuing this success in the future will require considerable efforts. Electricity production has so far been the largest source of emission reductions, with the shift in electricity generation from coal to gas and, in the past decade, to renewable energy. Sectoral shifts away from heavy industry towards services and higher value-added, less polluting manufacturing have also contributed (Figure 2.3) (Caselli, Ludwig and Van Der Ploeg, 2021[1]).

Figure 2.3. Emission reductions have been driven by greening electricity supply

Annual historical emissions in million tonnes of CO_2 by sector in the United Kingdom



Note: LULUCF is an abbreviation for land use, land-use change and forestry. Fluorinated gases (F-gases) is a family of human-made gases used in a range of everyday products as well as industrial applications. The sectoral emissions for aviation and shipping include the United Kingdom's share of international aviation and shipping emissions, and are CCC estimates.
Source: Climate Change Committee, 2022 Progress Report to Parliament.

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Progress is slower in other sectors and projections show that without additional policies the UK is not yet on track to meet the fourth (2023 to 2027), the fifth (2028-2032) and the sixth budget (2033-2037), as well as the net zero target (Climate Change Committee, 2021[3]). This uneven progress reflects to a large extent the uneven coverage of effective policy instruments. In the past, it was possible to successfully concentrate policy action and emission reductions on particular sectors while shielding others. Such differentiation is no longer an option with the target of reaching net zero emissions. All sectors will need to be covered by effective policies going forward and early policy action will make the transition more gradual and less costly. Energy security concerns and surging fossil fuel prices related to Russia's invasion of Ukraine add to the urgency of the transition.

Key policy instruments for a net-zero economy

A successful transition to net zero requires a strategic, system-wide approach targeting all emitting sectors and new policy measures, building on the Net Zero Strategy, with further concrete deadlines, policies and priorities in line with legal targets. Sectors including buildings, transport and agriculture will also need to accelerate their decarbonisation to meet the target (Table 2.1). Moreover, some sectors, such as industry, agriculture and aviation are difficult to decarbonise completely, and greenhouse gas removals (GGR), like land use and forestry and carbon capture and storage are therefore essential to compensate for the residual emissions arising from these sectors (Figure 2.4, Panel A).

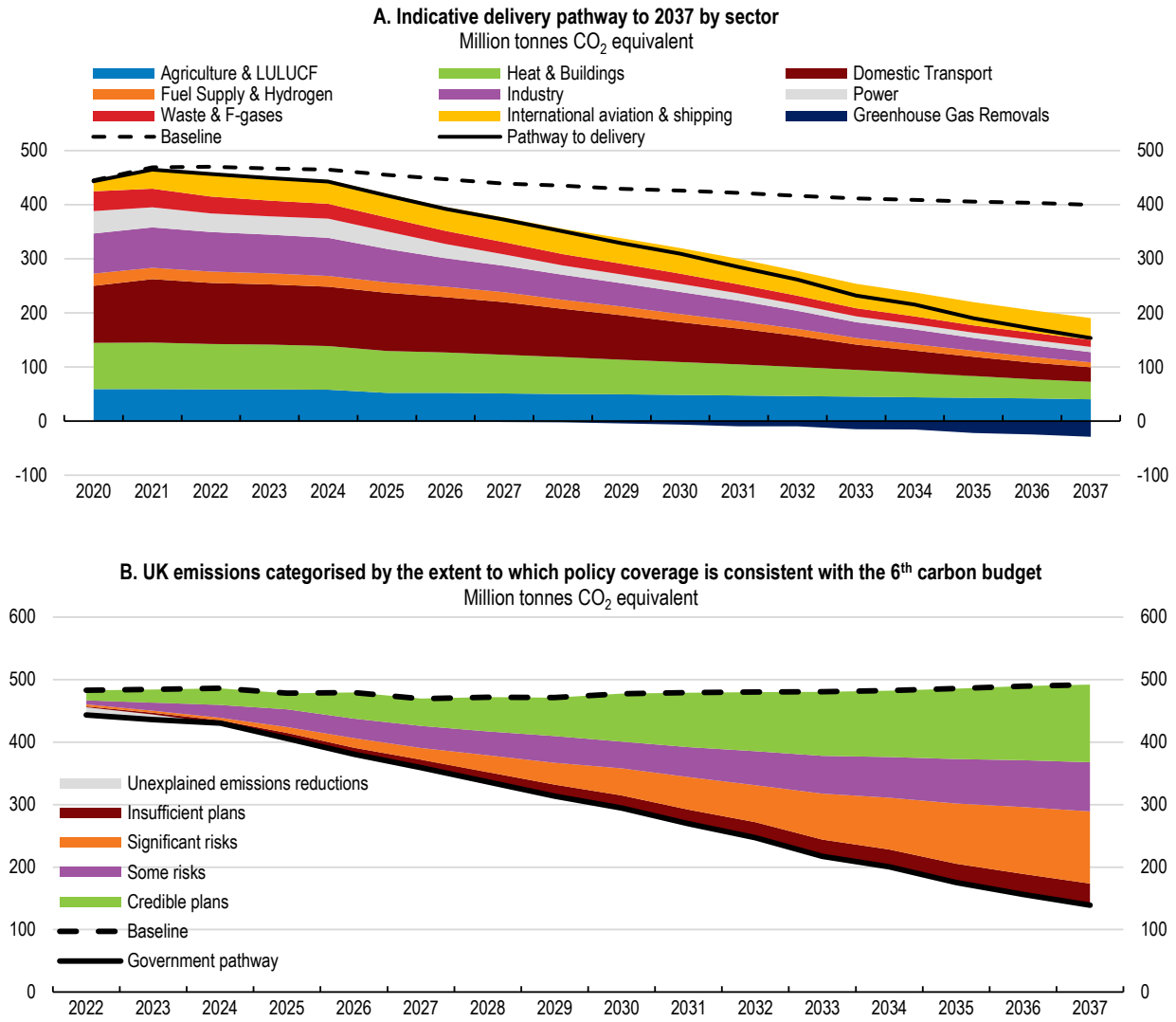
Table 2.1. Emission reduction policies, targets and recommendations by sector

Sector	Sector share of 2019 emissions	Reductions 1990-2019	2019-2030 reduction target	Main policies in place	Key recommendations as they apply to individual sectors
Electricity generation	11%	72%	71-76%	UK ETS, Carbon Price Support (tax), Contract for difference auctions in renewable energy, transmission network investments.	Boost public investment in transmission networks, green infrastructure, research, development and deployment, preferably through further expanding the use of competitive auction designs.
Transport	23% (in addition 4% in international aviation and shipping)	5%	35-45%	Excise duty on transport fuels, zero emission vehicle mandate planned phased in from 2024 to 2035 for cars and trucks, technology development support to manufacturers, public investment in charging infrastructure and tradable performance standards.	Include transport fuels in the UK ETS. Phase in zero-emission vehicles by regulation, as planned. Boost public investment in green infrastructure and public transit, preferably through competitive auction designs.
Heat and buildings	17%	17%	25-37%	Environmental and social charges on electricity are not matched for gas, which is the dominant heating source, building standards, various schemes to support energy efficiency and heat pumps, plan to phase out new fossil heating systems by 2035.	Include heating fuels in the UK ETS. Support investments in residential energy efficiency and clean heating systems, preferably through competitive auction designs. Increase energy efficiency requirements in building standards and introduce minimum requirements in rental housing, as planned. Accelerate the phasing-out of new fossil fuel heating systems. Boost public investment in research and development in residential energy efficiency and clean heating systems.
Agriculture, forestry and land use	12%	24%	17-30%	Support for tree planting and peat restoration, on-going agricultural support review to tilt support towards environmentally sustainable actions.	Include agricultural emissions and natural emission removals in the UK ETS. Tilt support towards competitive auctions and payments for ecosystem services. Boost public investment in research, development and deployment.
Fuel Supply	5%	61%	37-45%	UK ETS and extensive regulatory framework. Hydrogen clusters designated.	Boost public investment in research, development and deployment, preferably through competitive auction designs. Coordinate and support green infrastructure to transport hydrogen and carbon dioxide,
Manufacturing and refining	15%	53%	40-50%	UK ETS (large emitters).	Engage with the EU to avoid further trade barriers from its planned carbon border adjustment mechanism. Boost public investment in green infrastructure, research, development and deployment, preferably through competitive auction designs.
Waste and f-gases	5% (waste), 3% (f-gases)	61%	50-57%	Landfill charge, F-gas import quotas.	Include waste treatment, notably incineration, in the UK ETS.
Emission removals		N/A	1-12m tonnes per year by 2030	Support available for R&D and demonstration projects. Carbon capture and storage is in principle covered by the UK ETS if it relates to an ETS-covered emission source.	Include engineered emission removals in the UK ETS. Boost public investment in green infrastructure, research, development and deployment, preferably through competitive auction designs.

Note: The Government is consulting on the potential inclusion of emission removals and waste incineration in the UK-ETS (UK ETS Authority, 2022[13]).
Source: Net Zero Strategy; Author's compilation based on various sources.

The government's ten point plan for a green industrial revolution and the Net Zero Strategy (2021[2]) outlines a direction to reach net zero and intermediate targets, and signal a number of policy actions to come. The Net Zero Review (2021[6]) analyses key issues to take into account in policy design, and various sectoral strategies go more in-depth sector by sector, as discussed throughout this chapter. These strategies are significant steps toward net zero, but urgently need to be followed up by concrete and comprehensive policies in sectors where policy coverage is inconsistent with targets, as identified by the Climate Change Committee (Figure 2.4, Panel B).

Figure 2.4. Policy needs strengthening to reach future targets



Note: Panel A: For more information on the assumptions of the baseline model see the technical appendix to the Net Zero Strategy report in the source. Panel B: The baseline is an adjustment to the Government's Net Zero Strategy baseline, with the impact of some policies removed so that they can be assessed. The unexplained emissions reduction is emissions reduction that could not be attributed to a plan published by the Government.

Source: UK Government (2021), Net Zero Strategy: Build Back Greener; and Climate Change Committee, 2022 Progress Report to Parliament.

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This section argues that emissions pricing should remain an important element of such an ambitious package of climate policy. Further improvement in financial sector regulations and more consistent use of shadow pricing in the public sector can help. Flanking measures will continue to be needed to complement carbon pricing such as regulation, standards, public investment, innovation incentives and other institutional reforms (Table 2.2). Education, good and easily accessible information, policy transparency and consistency can increase the efficiency and effectiveness of any of the policy options outlined below and reduce the overall cost of reaching emission targets (HMT, 2021[6]; D'Archangelo et al., 2022[9]).

Table 2.2. Assessment criteria for climate policies

Policy instrument	Cost efficiency	Acceptability	Implementation in the United Kingdom
Greenhouse gas taxes and emissions trading schemes.	Highly cost efficient. Dynamic incentives for continuous improvement and innovation. Revenue raising. Administrative costs depend on if the tax base is already measured and other structures are in place.	Prices and impact on the cost of living are visible, which may lower acceptability. Revenue recycling can increase acceptability. Emissions trading scheme might be slightly more acceptable than a tax	The UK emissions trading scheme covers emissions in manufacturing, fuel supply, refining and air transport corresponding to around a quarter of domestic emissions. The Carbon Price Support is a carbon tax acting as a price floor alongside the ETS for electricity generation.
Taxes on polluting goods or activities.	Low to high depending on how broadly it is applied and to which extent the tax base is a close proxy to GHG emissions. Revenue raising.	Low acceptability because prices and impact on the cost of living are visible.	A landfill tax, a transport fuel excise duty and a climate change levy (not based on fuels' carbon content) exist. Charges on electricity consumption favour untaxed fossil fuels for residential heating.
Shadow prices in public procurement and cost-benefit analyses.	Potentially high, depending on implementation.	High acceptability, as it is financed by general taxation.	Carbon values are mandatory for public sector cost-benefit analyses.
Green financial policy, including updating policy to reflect systemic risks and strengthening disclosure requirements.	High to the extent that it contributes to correctly price and reduces financial risks and helps investors act on preferences for green investment.	High.	The Bank of England and the Financial Conduct Authority are at the international frontier of efforts to green financial sector regulation and supervision.
Environmental regulation	Low to high. High monitoring costs to identify most effective actions. Command and control regulations give little encouragement to innovate, but regulatory design can increase efficiency, for example with tradable performance standards.	Moderate.	Energy efficiency requirements in the building code. Input requirements in transport fuels. Tradable performance standards in car manufacturing. Hydrofluorocarbon import quotas.
Environmental subsidies	Low to high. Competitive design can boost cost-efficiency. Tends to pick winners and penalise entrants. Has a role to play to support research, development and deployment.	High.	Contract for Difference renewable energy auction scheme. GBP 26 billion of public spending on net zero planned from 2021 to 25.

Note: The table shows a subset of major policies. It is neither a complete list of policy options nor a complete list of existing UK policies.
Source: Adapted from Pisu et al. (2022[9]).

Net zero requires investment and will have economic and fiscal consequences

Effective climate policies are fully compatible with continued economic growth, but will have a number of economic consequences. Redesigning production processes or reallocating resources within firms could trigger productivity increases that are larger than those predicted by usual macroeconomic models. At the same time, resources might need to be shifted from consumption to investments, some capital might be scrapped ahead of its useful service time, and some economic activities would consume more resources for the sole benefit of reducing emissions. Empirical evidence indicates that larger, more productive, low-emission and well-managed firms are better equipped to respond to more stringent policies and are thus able to raise their productivity and gain market share, while other firms can suffer negative effects (OECD, 2021[14]). Furthermore, market-based instruments minimise the social costs of reducing emissions by making it expensive to pollute while giving the polluter flexibility to reduce emissions in the least costly way (OECD, 2021[15]; Albrizio, Kozluk and Zipperer, 2017[16]).

New UK-specific integrated macro- and microeconomic modelling illustrates some of the economic and distributional consequences of an economy-wide policy package (Box 2.2). The most striking result of these simulations is that large emission reductions are realised regardless of the scenario considered, with higher carbon prices resulting in larger reductions, with fairly limited macroeconomic (Figure 2.5, Panel A) and distributional consequences.

Box 2.2. Net zero integrated macro- and microeconomic modelling

The OECD and LSE's Grantham Research Institute modelled UK-specific policy scenarios to move towards net zero in an integrated macro-micro framework. Results are presented as differences from a baseline of unchanged policies. Macroeconomic simulations feed into a microsimulation model to map macro-consistent distributional effects and redistribution packages.

The ThreeME model is a Computable General Equilibrium (CGE) model of neo-Keynesian inspiration with hybrid economy-energy features developed by OFCE (French Economic Observatory at Sciences Po), since 2008 with the support of the French Environmental Agency, ADEME and Netherlands Economic Observatory (ThreeME, 2022[17]). While the current study is the first time the model has been calibrated to the United Kingdom, it has earlier been used in French, Mexican, Indonesian, Tunisian and Dutch studies.

Three carbon price scenarios (low, medium and high) are modelled, converging over time towards the UK government's official shadow price trajectories ("carbon values") in their high, medium and low variants, with the following assumptions:

- Low carbon price: GBP 100 in 2030, GBP 189 in 2050.
- Medium carbon price: GBP 140 in 2030, GBP 378 in 2050.
- High carbon price: GBP 280 in 2030, GBP 568 in 2050.

The shadow price on emissions represents how much more profitable the sum of climate policies makes green production and consumption compared to polluting activities. It is modelled as a uniform carbon (equivalent) tax, but could in principle come from an emission trading scheme, regulations, subsidies or a combination of instruments. For reference, UK ETS allowances traded between GBP 68 and 88 in the first three months of 2022, but is complemented by renewable energy subsidies. One notable difference to price signals from regulations and subsidies is that the model operates with carbon tax revenues, which are redistributed to households and businesses according to different scenarios:

- "Standard" scenario: Redistribution to households and business sectors without transfers between firms and households. However, transfers can occur from carbon-intensive sectors to the rest of the economy.

- "Households" scenario: Total receipts are distributed to households.
- "Firms" scenario: Total receipts are distributed to firms.
- "Export exposure" scenario: As in the standard scenario, but the distribution of receipts among firms is adjusted to distribute more to sectors with high trade exposure (measured by the ratio of exports to output).
- "Neutral GDP" scenario: A share of revenue is withheld so that the overall GDP impact from 2040 to 2050 is zero. Remaining revenues are distributed as in the "Standard" scenario.

Residual emissions remain in all scenarios. This reflects three important features of the ThreeME model and of the scenarios considered: the model does not consider negative emissions, which will be needed to reach net zero; it is built around carbon pricing. the rigidity of demand for carbon intensive goods is governed in the model by elasticities of substitution that are calibrated on historical data – as such they may underestimate the potential for future adjustments.

Microsimulations are built on the ONS household expenditure survey (the Living Costs and Food Survey). For each revenue redistribution and carbon tax scenario in the macro model, four distribution scenarios are explored:

- Unmitigated impacts of the carbon tax.
- Uniform lump-sum redistribution of available tax receipts across all households.
- Calibrating a lump-sum redistribution to all households equal to the average carbon tax paid by households in decile 4, measured at the national level. This translates into a net gain for deciles 1-3, who pay less carbon taxes (but a larger share of their income) than higher-income households.
- Calibrating a lump-sum redistribution so that not a single decile 4 household in any region experiences a loss.

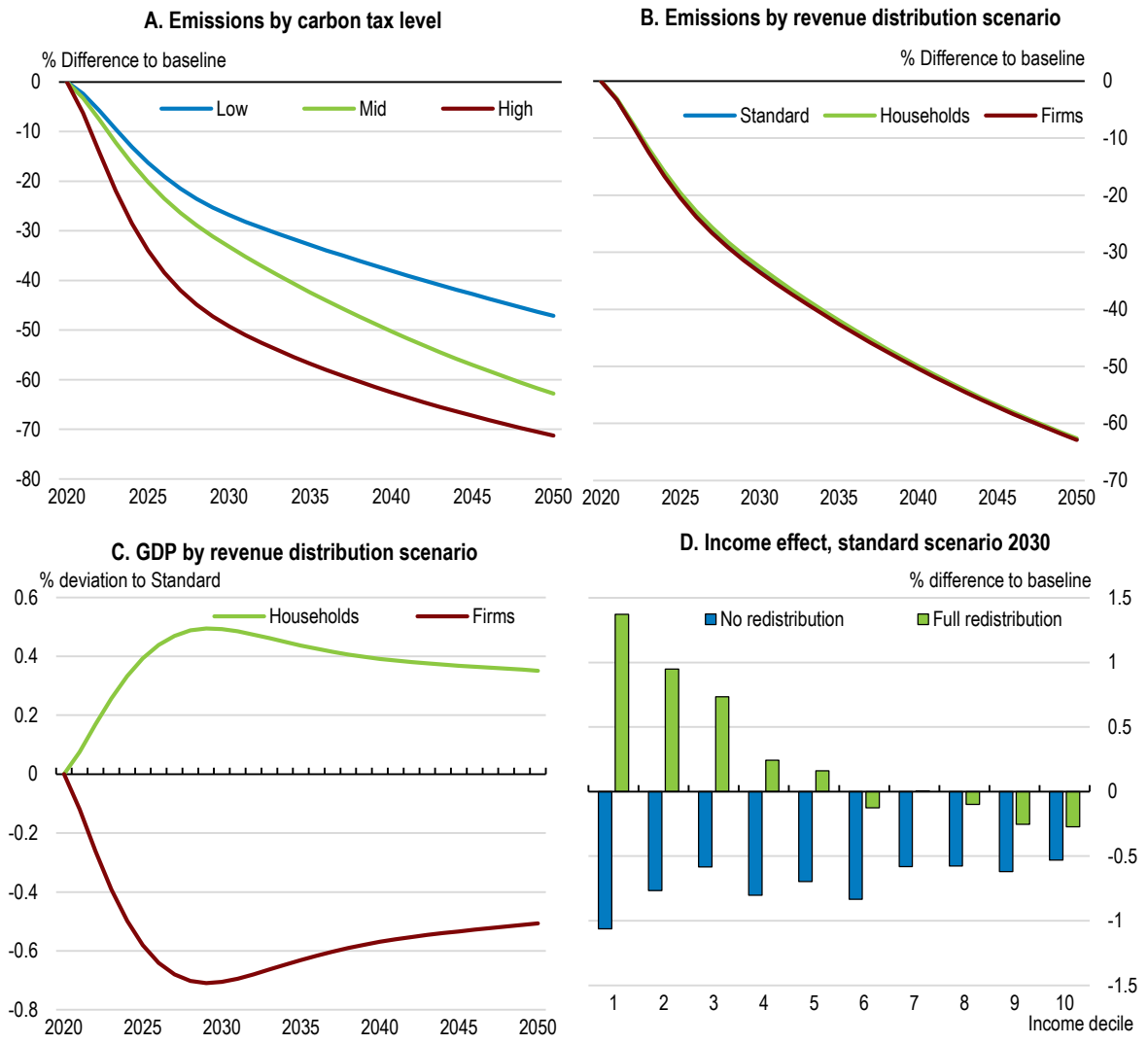
The two models are linked by disaggregating household consumption by the representative household in ThreeME using microdata from the expenditure survey, along with its corresponding carbon footprint. Macroeconomic outputs include GDP, investments, fiscal balance, inflation and labour market outcomes, as well as sectoral shares, while distributional consequences are available by income level, household type and geography.

Source: Pareliussen, Saussay and Burke (2022[8]).

A second main finding is that how proceeds are distributed have almost no effect on emissions (Figure 2.5, Panel B). How proceeds are handled within the broader fiscal stance and how they are distributed does play an important role in offsetting undesired macroeconomic and distributional effects. Indeed, the United Kingdom's experience in the 1980s and 90s when market reforms and rapid structural change boosted productivity and employment growth at the cost of rising unemployment (Card et al., 2004[18]) underscores the importance of sound macroeconomic policies supporting the transition.

Redistribution of carbon tax revenues affects GDP, with a higher fiscal multiplier if these revenues are distributed to households rather than firms (Figure 2.5, Panel C). The revenue is more than enough to offset negative income effects in the bottom half of the income distribution (Figure 2.5, Panel D).

Figure 2.5. Revenue redistribution matters little to emissions but can offset undesired effects



Note: The carbon price signal is here modelled as uniform carbon (equivalent) tax, but could in principle come from an emissions trading scheme, regulations, subsidies or a combination of instruments. The low carbon price starts at GBP 100 in 2030 and rises to GBP 189 in 2050. The medium carbon price starts at GBP 140 in 2030, rising to GBP 378 in 2050. The high carbon price starts at GBP 280 in 2030, rising to GBP 568 in 2050. Revenues are redistributed with shares equal to sector shares in output in the "Standard" scenario. All revenues are distributed to households and firms in the "Household" and "Firm" scenarios, respectively. Firms' proportional share of revenue is redistributed to firms according to their export exposure in the "Export exposure" scenario. The "Neutral GDP" scenario holds back a share of revenue (45%) to achieve average GDP growth as in the baseline from 2040 to 2050. Remaining revenues are distributed as in the "Standard" scenario. Panel D "full redistribution" implies lump-sum transfers to all households, summing up to carbon taxes paid by households.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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Regardless of the overall GDP and distributional effects, the policies needed to reach net zero are set to trigger a large change in the industrial structure, with the transition in general benefitting those sectors and firms able to adapt and seize opportunities in the green economy. Sectors of the economy will be affected differently, as illustrated in Table 2.3, with notable output and employment losses in fuel supply and energy-intensive industries contrasting gains in employment and output in most other sectors. However, much of the structural change will take place within sectors. For example, construction, aviation and shipping are set to reduce emissions by 60-70% compared to the baseline while boosting output by 3-4%. This will require investments, notably in energy efficiency, zero emission energy and compatible equipment. In the GDP neutral scenario, annual investments are set to increase to 6% above baseline by 2050, not

accounting for notable investments outside the scope of the model. Investments in major emitting sectors are set to increase considerably, from 10% in buildings to 39% in agriculture and land use, while the simulations do not point to a need for additional investments in the services sector, accounting for two-thirds of UK output, but less than 10% of emissions.

Table 2.3. Sectors of the economy will be affected differently by net zero

% difference from baseline, 2050

Sector	Emissions	Output	Investment	Employment	Wages
Agriculture and land use	-42%	-3.11%	39%	1.19%	6%
Aviation and shipping	-63%	3.28%	27%	4.68%	6%
Construction	-70%	3.74%	10%	3.96%	6%
Fuels	-60%	-35.52%	33%	-7.64%	-8%
Industry-energy intensive	-51%	-6.93%	22%	-3.63%	7%
Industry-non-energy-intensive	-65%	-1.81%	28%	-0.30%	6%
Services	-63%	-1.66%	0%	-0.33%	6%
Surface transport	-58%	0.92%	24%	1.59%	6%
Economy-wide	-63%	0.06%	6%	-0.03%	5%

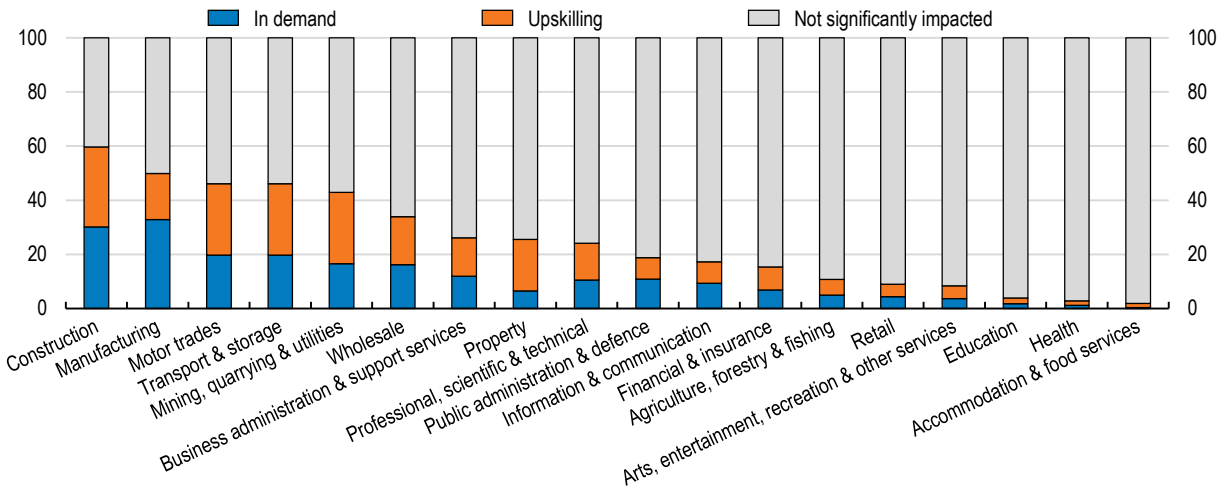
Note: The carbon price signal is here modelled as uniform carbon (equivalent) tax, but could in principle come from an emissions trading scheme, regulations, subsidies or a combination of instruments. Results based on a "Medium carbon price" starting at GBP140 in 2030, rising to GBP378 in 2050. The "Neutral GDP" scenario holds back a share of revenue (45%) to achieve average GDP growth as in the baseline from 2040 to 2050. Remaining revenues are distributed proportionately to sectors as in the "Standard" scenario.
Source: Pareliussen, Saussay and Burke (2022[8]).

The green economy will change the composition of the labour market, with falling employment and wages in some sectors offset by increases in others (Table 2.3) and changing skill needs also within sectors. This will only translate into a durable net employment gain to the extent labour supply meets demand in terms of both skills and location. There is a risk that unemployment increases throughout the transition if skills supply does not match demand. The United Kingdom has a resilient economy with flexible regulations in labour- and product markets that are likely to limit the pain of the transition. High-skilled people are more likely to be employed, adapt more easily to changing skill needs and have more access to training. The average level of education and skills is high in the United Kingdom, but a considerable share of the population also lacks basic literacy and numeracy skills strongly correlated with employment and the ability to learn new skills and adapt to a changing labour market.

The transition to net zero will provide new job opportunities and require new skills. Anticipating emerging skill needs and providing the up-skilling and re-skilling needed to limit labour market exclusion therefore should be an integrated part of policy measures to transit to net zero (OECD, 2021[19]). Supplying the skills needed for the green transition notably within housing energy efficiency and clean heating and to ensure resilience of energy supply is all the more challenging in the context of current labour shortages and structural change following the pandemic, leaving the EU single market and on-going trends of digitalisation and automation. The UK's ability to address existing skill shortages and rapidly approaching future skill needs will depend partly on reskilling the existing workforce, but participation in continuing education and training is low (Chapter 1). As the economy transitions to net zero, some sectors will be affected disproportionally by the demand for specific skills (Figure 2.6). New economic activities and technology will need new skills and many existing occupations and sectors will experience a "greening" of their jobs, requiring workers to adapt (HM Government, 2021[20]). Some of the demand will rise quickly. For example, to meet the net zero target, the government aims to install 600 000 heat pumps per year by 2028 (HM Government, 2020[21]), but there were only 900 heat pump installers in the United Kingdom in 2019. It is estimated that between 7 500 and 15 000 heat pump installers need to be trained every year for the next seven years (HM Government, 2021[20]). Training opportunities should be of high quality and respond to identified skill needs, with increased use of guidance, counselling and statistical tools to target training and match it to identified skill needs (Chapter 1).

Figure 2.6. The transition to net zero will need substantial re- and upskilling

Jobs affected by net zero transition by sector, % of total jobs



Note: Jobs requiring upskilling: These are existing jobs that require significant changes in skills and knowledge. These include specialised jobs in the manufacturing and extractive sectors, such as petroleum engineers and heavy equipment operators, whose skills need to be adapted to a net-zero economy. Jobs in demand: These are existing jobs that are expected to be in high demand due to their important role in the net-zero economy. These include specialised positions in the green economy, such as wind turbine installers, but also the skills and expertise of welders, builders and engineers already working to build the infrastructure of a green economy.
Source: Place Based Climate Action Network (PCAN), Just Transition Jobs Tracker.

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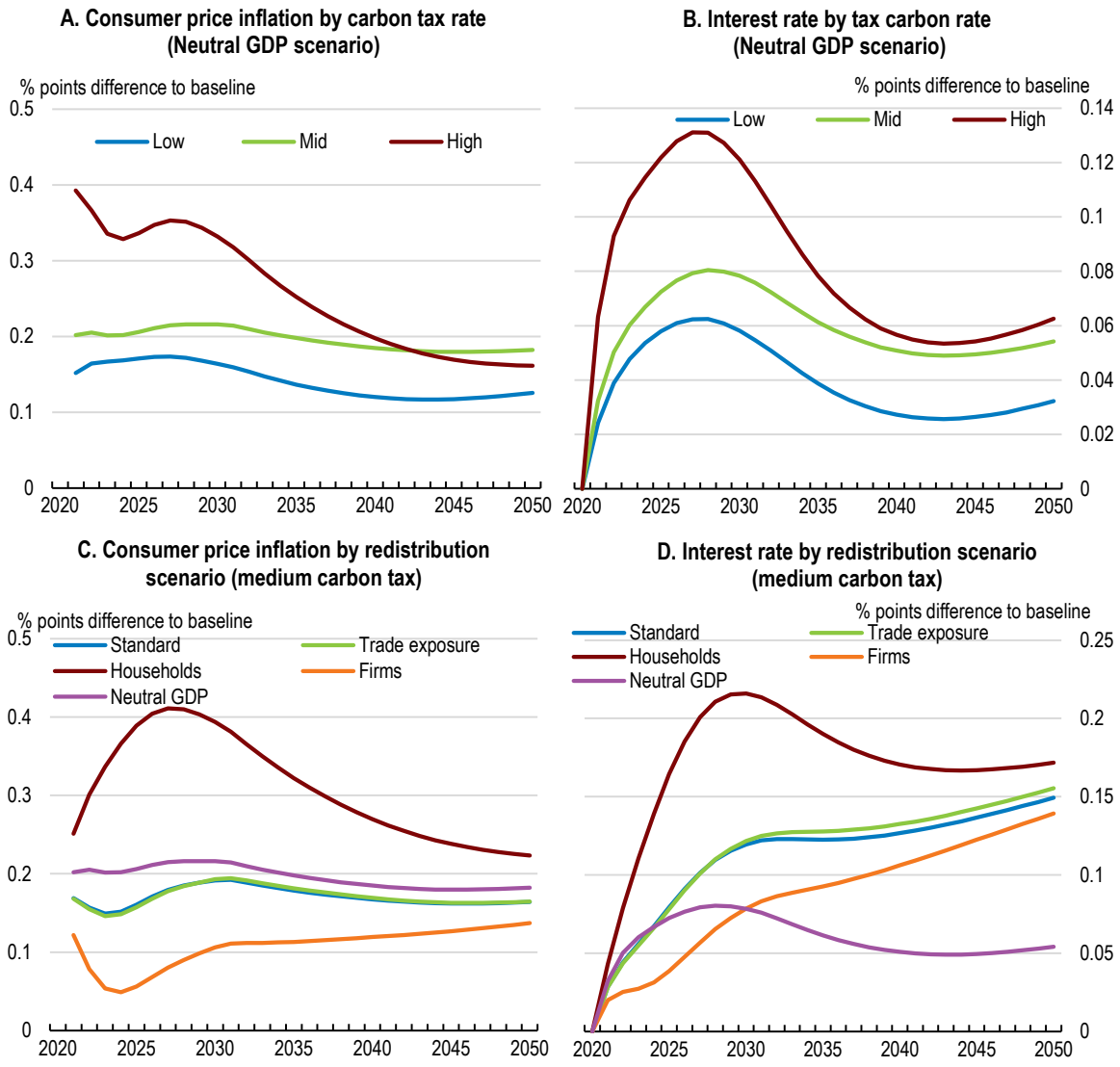
Structural change will drive competition for skills, and increasing investments boost the competition for capital resulting in higher wages, inflation and interest rates. Inflation and interest rates will increase with policy stringency (Figure 2.7, Panels A and B). Furthermore, inflation and interest rates will be sensitive to the overall macroeconomic stance and to which extent revenue is recycled to parts of the economy with high fiscal multipliers (Figure 2.7, Panels C and D). However, the inflationary effects of the green transition are likely to be moderate compared to recent price increases.

Fiscal effects of the transition depend largely on the policy instruments used. Fiscal effects include direct expenditures, indirect effects as people and businesses adapting production and consumption change the tax base, eligibility for transfers and public services, and direct effects on tax revenue. Direct pricing instruments generate revenues, but a diminishing tax base will over time erode these as well as current revenues charged on fossil fuels. OBR (2021[7]) estimates carbon tax revenues to peak immediately at 1.5% of GDP and gradually decline towards 0.5% in 2050 (despite a steadily increasing tax rate) as the tax base shrinks. The impact of regulations also depends on how they affect tax bases. For example, the base for the fuel excise duty will erode as fossil fuel cars are phased out over the next couple of decades, with a potential revenue loss corresponding to 1.6% of GDP (OBR, 2021[7]). Findings by Pareliussen, Saussay and Burke (2022[8]) support the OBR's finding that the tax base erodes over time, but with considerable initial revenue gain (Figure 2.8). A temporary increase in greenhouse gas related revenues from the UK ETS or a carbon tax may coincide with the need to subsidise positive externalities and compensate those most affected by the transition (HMT, 2021[6]). However, given the current environment of historically high energy prices, implementation should be delayed until energy prices show signs of normalisation.

Figure 2.7. Inflation and interest rates are sensitive to policy stringency and revenue use



Note: The carbon price signal is here modelled as uniform carbon (equivalent) tax, but could in principle come from an emissions trading scheme, regulations, subsidies or a combination of instruments. The low carbon price starts at GBP 100 in 2030 and rises to GBP 189 in 2050. The medium carbon price starts at GBP 140 in 2030, rising to GBP 378 in 2050. The high carbon price starts at GBP 280 in 2030, rising to GBP 568 in 2050. Revenues are redistributed with shares equal to sector shares in output in the "Standard" scenario. All revenues are distributed to households and firms in the "Household" and "Firm" scenarios, respectively. Firms' proportional share of revenue is redistributed to firms according to their export exposure in the "Export exposure" scenario. The "Neutral GDP" scenario holds back a share of revenue (45%) to achieve average GDP growth as in the baseline from 2040 to 2050. Remaining revenues are distributed as in the "Standard" scenario.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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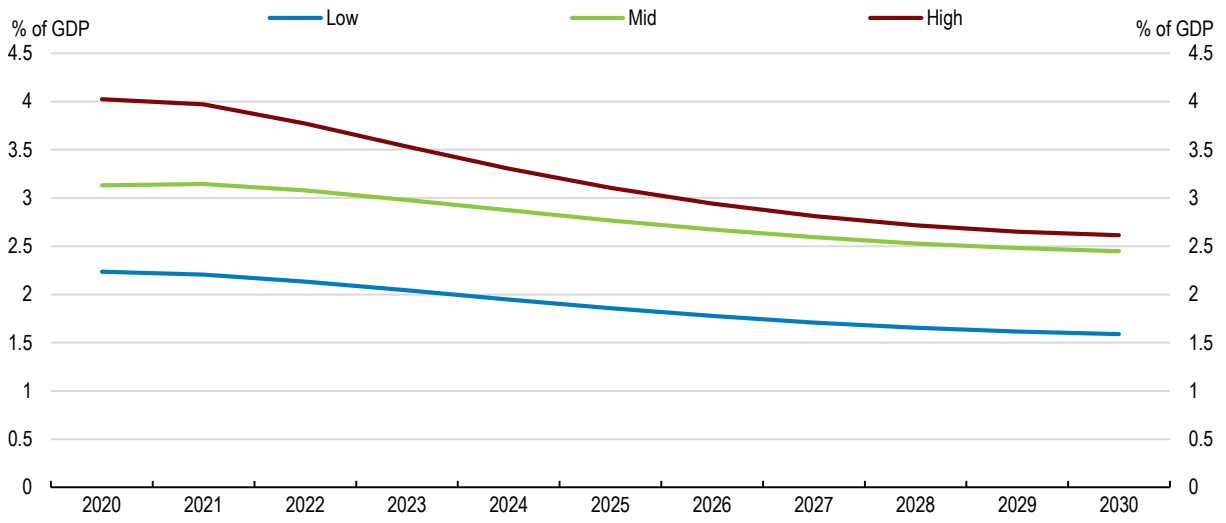
Figure 2.8. Emissions pricing can provide fiscal space to support the transition

Carbon revenues by tax rate



Note: The carbon price signal is here modelled as uniform carbon (equivalent) tax, but could in principle come from an emissions trading scheme, regulations, subsidies or a combination of instruments. The "Neutral GDP" scenario holds back a share of revenue (45%) to achieve average GDP growth as in the baseline from 2040 to 2050. Remaining revenues are redistributed with shares equal to sector shares in output. The low carbon price starts at GBP 100 in 2030 and rises to GBP 189 in 2050. The medium carbon price starts at GBP 140 in 2030, rising to GBP 378 in 2050. The high carbon price starts at GBP 280 in 2030, rising to GBP 568 in 2050.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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Expanding the coverage of emissions pricing to reach net-zero

The main policy instruments available to price greenhouse gas emissions directly are taxes on greenhouse gas emissions and "cap-and trade" emissions trading schemes. The United Kingdom and other OECD countries rely on both emissions trading schemes and CO_2 (equivalent) taxes. Emission pricing has been essential for the United Kingdom to nearly eliminate coal from electricity production, as discussed below. In an emissions trading scheme, tradable emissions permits, summing up to the overall cap on emissions, are issued and sold or allocated for free to participants who can trade them freely. The cap is reduced over time to meet emission reduction targets. An emissions trading scheme sets the quantity of emissions ("the cap") and lets the market find the price, while a tax sets the price and lets the market set the quantity (D'Archangelo et al., 2022[9]). The two systems share their tax base, so systems and requirements for measuring and reporting are similar. In addition, an ETS requires market infrastructure already existing in the United Kingdom, and similar to other financial and commodity markets. The environmental effectiveness of these two instruments is largely equivalent, as the ETS cap can be adjusted over time to hit a desired price level, and a tax can be adjusted over time to hit a desired quantity. For these reasons, the policy choice between a CO_2 equivalent tax and an ETS should be a pragmatic one.

The United Kingdom set up the world's first multi-industry carbon trading system in 2002 as a pilot for the EU Emissions Trading Scheme (EU ETS). The UK Emissions Trading Scheme (UK ETS) – a spin off from the EU ETS upon departure from the EU – is the main explicit pricing instrument in the United Kingdom. The scheme covers approximately 25% of current emissions, including electricity generation, manufacturing, refineries, petroleum extraction, and domestic, UK-EEA, and UK-Gibraltar aviation. It follows similar rules to the EU ETS with a few differences, such as a slightly different cost containment

mechanism and a carbon tax (the Carbon price support) acting as a price floor which is seen as instrumental in near-eliminating coal from electricity supply, as explained below. A transitional auction reserve price of GBP 22 per allowance representing one metric tonne of CO_2e might be replaced by a supply adjustment mechanism in the future. The Government has issued consultation that includes proposals to align the ETS cap with the net zero objective by January 2024 and the future of free allocations, as well as calling for evidence on expanding the scope of the ETS within existing sectors and to additional sectors such as domestic shipping, and energy-from waste as well as greenhouse gas removals (UK ETS Authority, 2022[13]). Moreover, other price-based measures target other sectors. The fuel excise duty incentivises emission reductions in road transportation, the climate change levy is a tax charged on business and public sector energy use. The waste sector is subject to a landfill tax, and import quotas of F-gases create scarcity reflected in market prices.

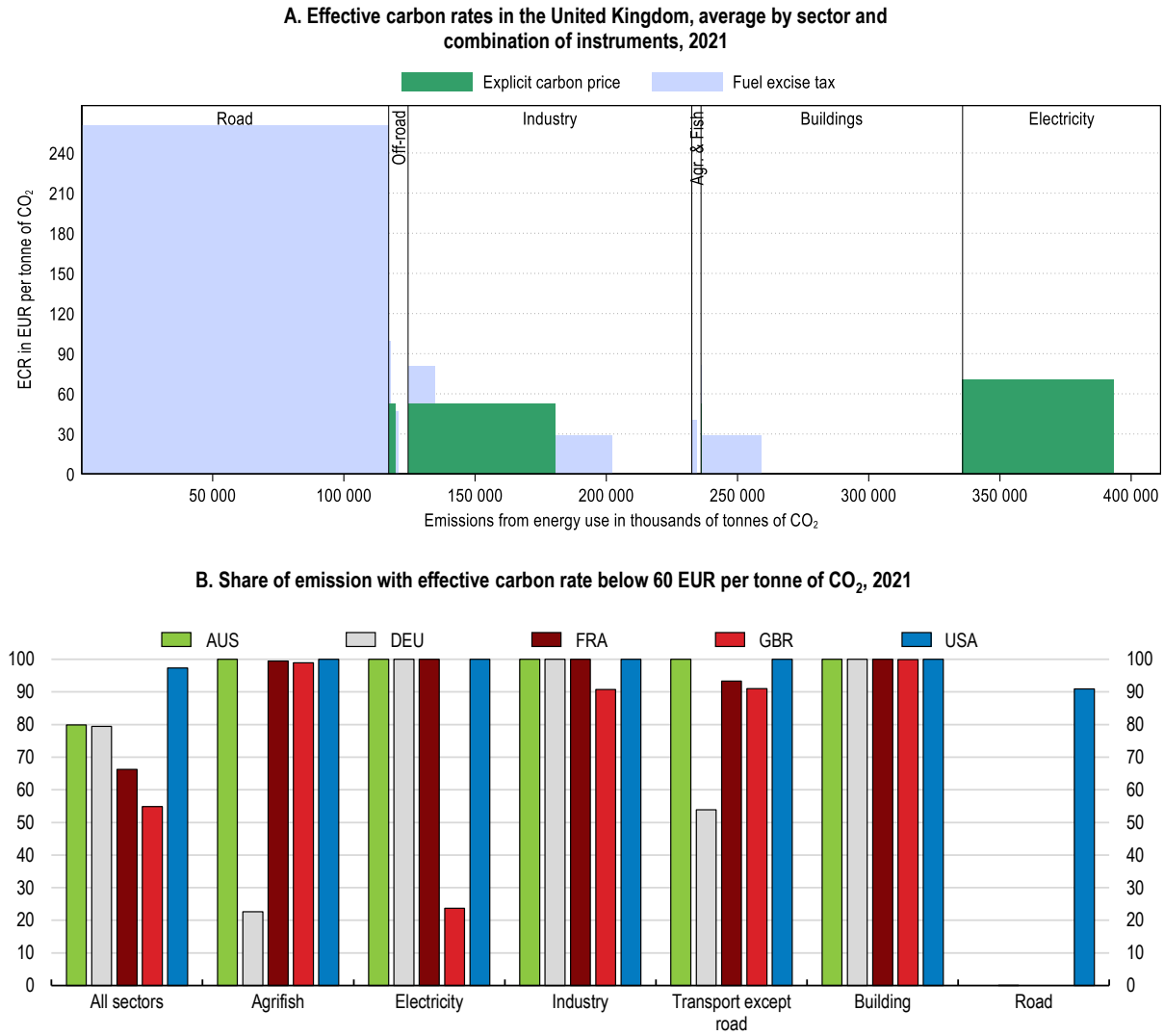
The main problem in the United Kingdom, as in most other countries, is that a considerable amount of emissions are not covered by pricing instruments at all, or only by very weak instruments (Figure 2.9). Reduced VAT rates, tax reliefs and other supports subsidise amongst others fossil fuel consumption on domestic fuel and power supply, domestic passenger transport, diesel used in off-road vehicles and kerosene for heating (NAO, 2021[22]). The “Ring-fence” corporate income tax enables a 100% first year allowances for capital expenditure by the oil and gas sector. In addition, operators can fully deduct decommissioning costs from their corporate profits in the year in which they are incurred. However, contrary to some other G7 countries, the United Kingdom is not tracking support measures with potential environmentally harmful impacts. Going forward, the United Kingdom should systematically track and quantify support measures with potential environmentally harmful impacts and adjust policy accordingly.

Compared with other European OECD countries, the price signals from the sum of tradeable emission permit prices, carbon taxes and fuel excise taxes (“effective carbon rates”) are high in the road transport and electricity sectors but low in others, especially in the residential and commercial sectors (Figure 2.9, Panel A). In 2021, only 45% of carbon emissions from energy use were priced above EUR 60 per tonne of CO_2. The complex system of explicit (ETS, Carbon price support) and implicit (climate change levy, fuel duty and different tax treatments) carbon prices sends inconsistent signals across sectors and fuels (Figure 2.9, Panel B) (OECD, 2022[4]). Departments have a limited understanding of the environmental impact of their policies (NAO, 2021[22]). Moreover, renewed freezes of the fuel duty and vehicle excise duty for heavy goods vehicles, suspension of the heavy goods vehicle road user levy and reduced rates for air passenger duty for domestic flights run counter to climate objectives (OECD, 2022[4]). More recently, the fuel duty was temporary cut (until March 2023) by GBP 0.05 per litre, corresponding to GBP 22 per tonne CO_2 for petrol and GBP 19 for diesel, to respond to soaring prices in the context of Russia’s invasion of Ukraine.

The United Kingdom is considering expanding the scope of the UK ETS in existing sectors, such as: calling for evidence on the inclusion of upstream oil and gas venting sectors, and to sectors currently not subject to an explicit carbon price, including domestic shipping, and energy-from waste. Expanding ETS coverage across domestic sectors can increase policy efficiency and reduce volatility, as factors driving emissions vary across different sectors of the economy. Such expansion should also be technically straightforward for some major emission sources not covered by the Government’s proposal. Notably, fuels for transportation, machinery and heating could be included upstream in the value chain based on the carbon content of refined products, as was done in Quebec, California and the German carbon pricing system that became operational in January 2021 (D’Archangelo et al., 2022[9]). Including upstream emissions directly in the UK-ETS would necessitate legal amendments, as ETS emissions are currently defined at the point of emissions. Other sources, such as livestock and dairy farming and land-use emissions would be more challenging to include due to technical and measurement issues, some of which could be resolved. The government does not currently propose to include agricultural emissions, but is calling for evidence on monitoring and reporting of emissions from agriculture. The New Zealand emissions trading scheme does for example include forestry, and agricultural emissions are set to be included in the ETS or in a separate

pricing mechanism from 2025 (See Box 2.4 below). Going forward, the United Kingdom should commit to gradually expand the UK ETS to all emitting sectors and tighten the emissions cap in line with targets. In case it proves difficult to expand the ETS across sectors as envisioned, carbon taxation is an equivalent alternative from the environmental perspective. A carbon tax could be phased in with a gradually increasing tax rate to give businesses and households time to adapt. The timing of implementing carbon pricing also matters. The government should consider the pressures on the cost of living when phasing in price signals.

Figure 2.9. Carbon prices differ considerably across sectors



Note: Emissions-weighted average by sector and combination of instruments (explicit carbon price only, fuel excise only, both, none) in each country. The ETS price is the average ETS auction price for the first semester of 2021, with the exception of the UK where it is based on information for the period in which they were operational (UK: 19/05/2021-30/06/2021). Where applicable, ETS coverage estimates are based on the OECD's Effective Carbon Rates 2021, with ad-hoc adjustments to account for recent coverage changes. Emissions refer to energy-related CO_2 only and are calculated based on energy use data for 2018 from IEA, World Energy Statistics and Balances 2020. The figure includes CO_2 emissions from the combustion of biomass and other biofuels. For more information, see source.
Source: OECD (2021), Carbon Pricing in Times of COVID-19: What Has Changed in G20 Economies?, OECD, Paris, https://www.oecd.org/tax/tax-policy/carbon-pricing-in-times-of-covid-19-what-has-changed-in-g20-economies.htm.

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Linking the UK ETS to the EU ETS remains an option to "give serious consideration", as stated in the EU-UK Trade and Cooperation Agreement (European Commission, 2021[23]). Linking the UK to the EU ETS carries advantages and disadvantages, but is technically straightforward. It can be done by full participation, as is the case with EFTA countries in the EU ETS, or by formal linking through a bilateral or international agreement. In an international agreement, countries mutually accept each other's emission certificates. A third option is indirect linking in which both schemes unilaterally accept a common asset, for example external offsets governed by the Paris agreement or allowances from a third-party ETS.

Linking emissions trading schemes in general enhances overall welfare, since it increases the price in the scheme with lower-cost abatement available (or a more generous cap) and lowers it in the system with a high marginal cost of abatement (or a tighter cap). The marginal emission reduction determining the market price in an ETS is often realised by switching electricity production from coal to gas. Since coal and gas are internationally traded, this fuel switching cost will act in the direction of convergence even in the absence of linking. This mechanism has led prices in the UK ETS and EU ETS to largely move in tandem since the UK's departure. Industry expectations about a future link between the two systems might play a role as well. An additional advantage of linking is that it would make it easier for the UK financial sector to continue to play an important role in a growing market. While in general being favourable, linking can be politically difficult, since it will mean a transfer from the high-price to the low-price system where permit holders can sell their surplus for a profit until prices align. Formal linking also reduces the scope to unilaterally expand and develop the ETS or related policies like a UK specific approach to carbon leakage in line with domestic policy targets in future years.

Both the UK ETS and the EU ETS have built-in market stabilisation mechanisms to avoid extremely high or low prices. When the UK ETS Cost containment mechanism (CCM) is triggered, the UK ETS Authority, made up of HM Government, the Scottish Government, Welsh Government and Northern Ireland Executive, work together to consider what intervention, if any, HM Treasury should authorise. The ETS Authority decided not to release any additional allowances into the market when CCM was triggered for the first time in December 2021. This decision was prudent, as high prices reflected commodity market fundamentals, notably a shortage of natural gas. A release of additional allowances would not have changed this and would only have limited effects on energy bills, of which ETS compliance constitutes a small share.

Consistent use of shadow prices in public spending can improve efficiency and policy coordination

The United Kingdom has a robust framework for monitoring and evaluating public spending programmes. The Government's 'green book' describes how major public sector investment projects are assessed and helps government officials appraise the costs and benefits of policies, projects and programmes. A review of the green book in 2020, however, concluded that it had failed to support the Government's objectives of reaching net zero (HMT, 2020[24]). The new green book requires all projects to consider their impacts on carbon emissions, whether or not they directly target the net zero objective, it provides further guidance on how emissions should be assessed and clearer objectives (OECD, 2022[4]), which is a significant step forward.

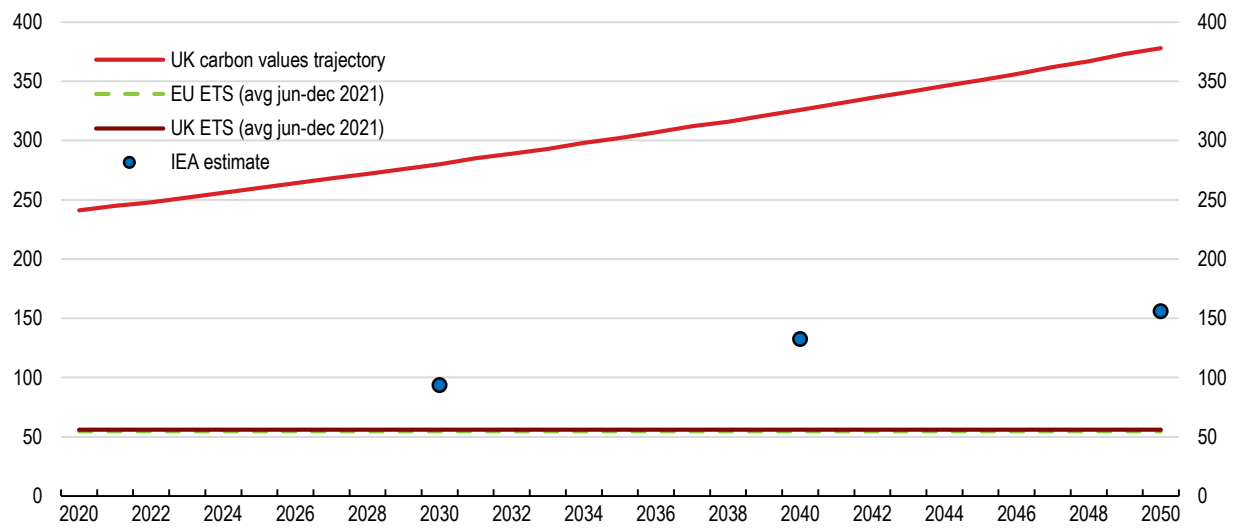
Greenhouse gas emissions values ("carbon values") are used across the government for valuing impacts on GHG emissions resulting from policy interventions. The United Kingdom first integrated carbon values in green book cost benefit policy appraisals and ex-post policy evaluations in 2002. Since 2009, a 'target consistent' approach has been used to estimate the values, where these are calculated as the marginal abatement cost of meeting domestic targets, rather than a "(global) social cost of carbon" approach. The cost trajectory published in 2021 and set to be updated every five years extrapolates IPCC estimated carbon values in 2040 (GBP 326 in 2020 prices) with a 1.5% growth rate (BEIS, 2021[25]; HMT, 2020[26]). A social cost of carbon approach to shadow pricing, the approach followed by for example the United

States, is in principle better aligned with climate science and the global nature of climate change. However, the target consistent approach is appropriate in the UK context, as it aligns the official cost trajectory with national legally binding ambition and the cost of reducing emissions under national jurisdiction. The transparent methodology is also appropriate, as true carbon values are inherently uncertain and a more complex methodology would likely not improve accuracy.

Carbon values could be used more actively to coordinate and speed up policy development across government. A clear mandate and clear expectations for Departments to bring sectoral policies in line with the carbon values would help optimise investment decisions and reduce uncertainty and cost for the private sector (HMT, 2021[6]). However, carbon values are very high compared to current carbon prices in the United Kingdom and elsewhere (Figure 2.10). This indicates that the combined incentives facing the private sector from carbon pricing, regulation and subsidies will need to increase considerably to reach net zero. It also calls for phase-in periods in the case of explicit pricing instruments and regulations to allow people and businesses to adapt.

The Climate Change Committee recommended a "net zero test" for new policy initiatives, as today's decisions on for example road building, fossil fuel production, planning and expansion of waste incineration may be incompatible with net zero and may send mixed messages to the public (Climate Change Committee, 2021[3]). Cost-benefit analyses integrating carbon values are already in principle testing whether new policy initiatives align with the net zero target. Instead of another net zero test, additional efforts should ensure that target-consistent carbon values are consistently applied in all cost-benefit analyses across government and systematically considered in decision-making, and that the projects with the highest net benefits are pursued.

Figure 2.10. The UK carbon trajectory is considerably higher than price signals facing the private sector



Note: UK carbon values represent net zero consistent marginal abatement cost. IEA estimates for net zero consistent CO_2 prices for electricity, industry and energy production in selected advanced country regions, consider the effects of other policy measures alongside CO_2 pricing, such as coal phase-out plans, efficiency standards and renewable targets. These policies interact with carbon pricing; therefore the marginal cost of abatement can be considerably higher than the CO_2 price shown in the figure. More information can be found in the World Energy Outlook table B.2.

Source: UK Government: Valuation of greenhouse gas emissions: for policy appraisal and evaluation; Ember Climate, Daily Carbon Prices; IEA World Energy Outlook; and OECD (2022), Economic Outlook: Statistics and Projections database.

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Garnering the financial sector to finance the transition to net-zero

The United Kingdom has been at the forefront of global efforts to green the financial system. The financial sector has an important role to play in financing the green transition, and the United Kingdom's role as a global financial hub extends the benefits of greening finance well beyond national borders. However, the financial sector does not work in isolation; it can only be a facilitator, delivering climate-friendly investment in response to effective policies. A clearer transition policy path would allow the financial sector to better support the green transition.

Demand for more environmentally friendly investment portfolios combined with insufficient emission reduction policies and lacking climate risk assessment and disclosure has left a vacuum in the United Kingdom and elsewhere. There is a need for the public sector to step in to channel finance to its best uses and avoid counterproductive market dynamics such as blanket portfolio exclusions of firms or sectors on simple criteria including their current emission intensity. These firms provide valuable products and services, and they can potentially play an important part in reducing emissions if spurred by conscious shareholders and policy action (BoE, 2021[27]). From April 2022, over 1 300 of the largest UK-registered companies, including traded companies, banks and insurers and private companies with over 500 employees and GBP 500 million in turnover will be mandated by law to disclose climate-related financial information. There is also scope to develop new financial products and scale up existing ones, such as "green mortgages" explicitly taking into account savings from residential energy efficiency investments (HMT, 2021[6]).

The United Kingdom is working actively to improve the UK's financial sector resilience by better assessing and disclosing risks from climate change and transition risks from a changing policy and investor landscape, and integrating these risks into the supervisory framework. Such efforts, along with a taxonomy of environmentally friendly activities will make environmentally friendly investment opportunities more attractive relative to polluting ones. In 2021, HM Treasury extended the remits of the Monetary Policy, Financial Policy and Prudential Regulations Committees of the Bank of England to also include supporting net zero and the green transition (HMT, 2021[28]; HMT, 2021[29]; HMT, 2021[30]). A similar extension was made to the recommendations for the Financial Conduct Authority (HMT, 2021[31]). The United Kingdom also issued its first green bonds in 2021, raising GBP 16 billion for clean transportation, renewable energy, energy efficiency, pollution prevention and control, living and natural resources and climate change adaptation in accordance with the Green Financial Framework (HMT, 2021[32]).

The Bank of England and the Financial Conduct Authority were the first central bank and regulator to set supervisory expectations for banks and insurers on how to manage climate-related financial risks in 2019. These expectations covered governance, risk management, scenario analysis and disclosure (BoE, 2019[33]). This was followed by a letter to regulated firms in 2020 and guidance on climate-related financial risk management by the end of 2021. A subsequent report discusses consequences for the regulatory capital framework (PRA, 2021[34])The Financial Conduct Authority and the Bank established the Climate Financial Risk Forum (CFRF) in 2019, bringing together representatives of banks, insurers and asset managers to build capacity and share best practices. In June 2020, the CFRF published its guide to help the financial industry approach and address climate-related financial risks (CFRF, 2020[35]), with more detailed guides focussing on risk management, scenario analysis, disclosure, innovation and climate data and metrics following in 2021.

Following an exploratory stress test covering insurance companies in 2019 (BoE, 2019[36]), the Bank launched the Climate Biennial Exploratory Scenario on financial risks from climate change (CBES) in 2021, with results expected in May 2022. This stress test explores the resilience of the UK financial system to the physical and transition risks associated with three scenarios (Table 2.4), with the aim of capturing and understanding climate related risk across the financial system and interactions between banks and insurers. It will not be used by the Bank to inform capital requirements (BoE, 2021[37]). Results from the CBES revealed notable data gaps and large variation in individual banks and insurance companies climate

risk assessment capabilities. The exercise shows that climate risks are likely to create a drag on the profitability of UK banks and insurers, with the lowest cost associated with the scenario with early, well-managed action. Insufficient action will hit businesses and households vulnerable to physical risk hard. At the same time it is in the interest of the financial sector to manage climate-related financial risks in a way that supports the green transition over time (BoE, 2022[38]). The Bank is also working to climate-proof its operations by publishing its own climate-related financial disclosure annually, aligned with the Task Force on Climate-Related Financial Disclosures recommendations; by taking steps to greening their corporate bond holdings (BoE, 2021[27]; BoE, 2021[39]); and by reducing the climate footprint of its physical operations. The United Kingdom should adapt financial sector regulation and supervision as climate-related risks and vulnerabilities are uncovered by stress-tests and related activities.

Table 2.4. The UK financial sector is exposed to climate change related risks

Summary of impacts in 2021 Climate Biennial Exploratory Scenarios

	Early action	Late action	No additional action
Transition risks	Medium, with an early and orderly transition starting in 2021 and shadow prices peaking at USD 900.	High, with a late and disorderly transition starting in 2031 and shadow prices peaking at USD 1100.	Limited, with limited transition happening and shadow prices remaining low at USD 30.
Physical risks	Limited, with mean global warming up 1.8 degrees Celsius and UK sea level rising 16 cm by 2050.	Limited, with mean global warming up 1.8 degrees Celsius and UK sea level rising 16 cm by 2050.	High, with mean global warming up 3.3 degrees Celsius and UK sea level rising 39 cm by 2050.
Impact on output	Temporarily lower, with UK growth rates averaging 1.4% year 6-10, 1.5% year 11-15 and 1.6% year 26-30.	Sudden contraction, with UK growth rates averaging 1.5% year 6-10, 0.1% year 11-15 and 1.6% year 26-30.	Permanently lower, with UK growth rates averaging 1.4% year 6-10, 1.4% year 11-15 and 1.2% year 26-30.

Note: Colour codes correspond to different levels of risk: green = limited; orange = medium; red = high. Shadow prices relate to the United Kingdom, and are expressed in 2010 USD. Scenarios run from 2021 to 2050. Early Action: the transition to a net-zero economy starts in 2021 so carbon taxes and other policies intensify relatively gradually over the scenario horizon. Late Action: The implementation of policy to drive the transition is delayed until 2031 and is then more sudden and disorderly, with material short-term macroeconomic disruption. No Additional Action: no new climate policies are introduced beyond those already implemented.
Source: Bank of England (2021[37]).

The United Kingdom engages to promote best practices to address climate risks to the financial sector and furthering understanding of the macroeconomic impacts of climate under different transition paths in various international fora including the OECD, G7, the IMF, the Basel Committee on Banking Supervision (BCBS), the Sustainable Insurance Forum (SIF) and the Financial Stability Board (FSB). The Bank of England founded the Network of Central Banks and Supervisors for greening the Financial System (NGFS) together with Banque de France and six other central banks and financial supervisory authorities in 2017. This group aims to share best practices and contribute to the development of environment and climate risk management in the financial sector. Its purpose is to define and promote best practices to be implemented within and outside of the membership of the NGFS and to conduct or commission analytical work on green finance. NGFS has since grown to 114 members and 18 observers (as of 13 April 2022), including the Financial Conduct Authority (NGFS, 2021[40]). It has issued six core recommendations covering financial stability monitoring and supervision, own-portfolio management, bridging data gaps, awareness and intellectual capacity, internationally consistent disclosure and supporting the development of a taxonomy of economic activities.

Engaging in international cooperation and market mechanisms

Potential efficiency gains from better aligning carbon prices do not stop at national borders. Engaging in international cooperation and market mechanisms can enhance welfare by reducing emissions where it is less expensive. Linking to the EU ETS is a concrete option under consideration, with advantages and disadvantages as outlined above. The Paris agreement allows offsetting residual emissions by emission reductions abroad. Any emission rights transferred will be added to the transferring country's emission cap (National determined contribution, NDC). This eliminates in principle the concerns of the Kyoto Protocol

that project-based emission reductions might be inaccurately measured, and therefore indirectly increase emissions outside of the project boundaries (Box 2.3).

Box 2.3. Cooperative approaches to reach Paris Agreement emission pledges

In the Kyoto Protocol, countries with quantified commitments (Annex 1 countries) could pool their emission reduction commitments and reach them collectively, as was done by members of the European Union. Alternatively, deficit countries could buy emission quotas from countries with a surplus, or from certified emission-reducing projects abroad. Similar mechanisms to reach national targets (National determined contributions, NDCs) in cooperation, or by trading emission reductions in an international framework supervised by the Conference of the Parties (COP), exist in the Paris agreement Article 6. COP 26 in Glasgow operationalised these mechanisms with more detailed rules ("The Paris Rulebook").

A central principle to avoid double-counting is that if emission rights (Internationally Transferred Mitigation Outcomes, ITMOs) are transferred, these count tonne for tonne as emissions in the transferring country. A hypothetical example illustrates how this works: Should the United Kingdom decide to accept European Union Allowances (EUAs, the emission rights traded in the EU ETS) as valid currency in the UK ETS, and to assign zero allowances to UK ETS entities, these entities would need to buy EUAs equal to their emissions. Their emissions would in this case count towards the EU NDC, while the UK ETS sector would have achieved net zero emissions.

Source: UNFCCC (2015[41]; 2021[42]).

The United Kingdom, including its financial sector, has considerable experience in developing and participating in carbon markets, and should continue to engage constructively, evolving the international rulebook and facilitating private sector involvement. However, such trade should be handled with care to ensure that it does not contribute to higher global emissions. If trading with countries whose NDCs are inconsistent with net zero, the prospect of selling emission rights might discourage them from tightening their targets. Furthermore, such trade depends on trust that trading partners will indeed fulfil their net zero-consistent NDCs, demonstrated by clear plans and timely policy action (Climate Action Tracker, 2021[43]). Going forward, the United Kingdom should engage in cooperative approaches established under the Paris agreement, including the potential linking of the UK-ETS to other emission trading schemes, conditional on credible commitments aligned with net zero in partner countries.

Well-designed subsidies, regulations and standards should be part of the policy mix

Regulation and subsidies can be valuable components of the policy mix where cost-effective measures are targeted. However, ill-designed and uncoordinated regulations, subsidies and pricing instruments may increase the cost of decarbonisation by complicating performance monitoring, blurring price signals and blunting economy-wide incentives. Furthermore, traditional subsidies and command and control regulations give weaker "dynamic" incentives to research, develop and go above and beyond set standards (D'Archangelo et al., 2022[9]), and they risk being less effective and more costly than assumed before implementation (HMT, 2021[6]). Ex-post performance reviews and evaluations can help, and should be an integral part of policy planning and design (OECD, 2014[44]). Given these pitfalls, regulations and subsidies need to be well-designed and selectively targeted to specific well-identified cases of market failure. These are often sector-specific and therefore discussed in their sector context below. Some considerations nonetheless apply across sectors:

Some sectors and emissions sources, like aviation, shipping, heavy goods transportation and meat production will require considerable technological development to decarbonise (IEA, 2021[45]). The necessary research and development (R&D) will be underfunded absent policies assigning a cost on greenhouse gas emissions. R&D funding suffers an additional major market failure, as the social value of

R&D exceeds the private value in general (positive externality). Asymmetric information between the technology developer and potential lenders can lead to liquidity constraints. Subsidising green R&D can help overcome these market failures. There is also a role for policy to take on the risk to bring to market untested and uninsurable solutions, and steepening technology learning curves by scaling up more developed technologies. Policy support can also help overcome other market failures putting new technologies at a disadvantage, such as a bias towards status quo (inertia) and a poor understanding of the benefits from new technologies (information failures). Coordination failures may prevent network effects, which occur when the value of a service increases with the number of people using the service, form being realised (Dechezlepretre and Cervantes, 2022[46]). This can for example happen in the case of electric vehicle charging stations, hydrogen and CO_2 pipelines (HMT, 2021[6]). However, the risk of public intervention distorting competition is higher for technologies at or close to commercialisation, and these risks need to be properly understood and addressed in policy design. Subsidies to low-carbon technologies are systematically the most favoured climate policy compared to carbon pricing, bans or regulations. Similarly, support for a carbon tax is largest if its revenues are used to fund green infrastructure or to subsidise low-carbon technologies (Dechezleprêtre et al., 2022[10]).

The United Kingdom Contract for difference (CfD) auctioning scheme for renewable energy licences is a good practice example of cost efficient subsidy schemes (LCCC, 2021[47]). Reaching net zero and reducing dependence on imported fossil fuels call for accelerating CfD auctions and lifting the 5GW cap on solar and onshore wind in the coming auction round. The CfD could also serve as a model to expand the use of competitive auction designs to maximise value for money of public support policies across sectors of the economy. Other prominent public support vehicles, including the new UK Infrastructure Bank and the Scottish National Investment Bank, will help mobilise green private investment and promote green finance. All in all, the 2021 Autumn Budget and Spending Review outlines the public spending contribution to Net Zero (GBP 26 billion) and other green objectives (GBP 4 billion) over 2021-25 (OECD, 2022[4]).

Regulation can be particularly useful to target households' energy use to phase in higher energy efficiency, clean heating and zero-emission vehicles. While businesses unresponsive to explicit pricing signals will lose market share and responsive ones will grow in a competitive market, the case is less clear for households. Market imperfections including information failures, liquidity constraints, inertia, split incentives and hyperbolic discounting will therefore blunt households' behavioural responses even in cases where explicit emission prices make it profitable to go green (HMT, 2020[48]). Well-designed regulations and standards can also help overcome coordination failure and realise network effects, for example by setting technical standards for electric vehicle charging stations and connectors (D'Archangelo et al., 2022[9]).

The UK building code already sets energy efficiency requirements, but these can be tightened. Minimum energy efficiency requirements have been in place for social housing for some time, and are planned implemented also for private rentals. Minimum performance standards coupled with energy labels have contributed to increasing energy efficiency in new buildings and appliances in the United Kingdom and the EU. The United Kingdom also uses fleet-wide performance standards, where car producers need to meet maximum tailpipe emissions, averaged over all cars sold in a given year, to reduce average emissions per car. Such policies have also reduced tailpipe emissions in the EU and the United States, amongst others, and are more efficient if they are tradable and tightened over time.

Mobilising political support for low-carbon policies

Even though the need to reduce greenhouse gas emissions is widely recognised and supported by a broad majority of the UK population and across the OECD (Dechezleprêtre et al., 2022[10]), concrete policies often fail to gain political traction or are hollowed out by exemptions, reduced ambition and compensatory measures blunting incentives for necessary structural change. Political economy hurdles to national policy action often revolve around industry's fear of losing competitiveness and households' fear of the increased cost of living. Local resistance can also be an issue, notably to investments in renewables.

Defusing competitiveness concerns

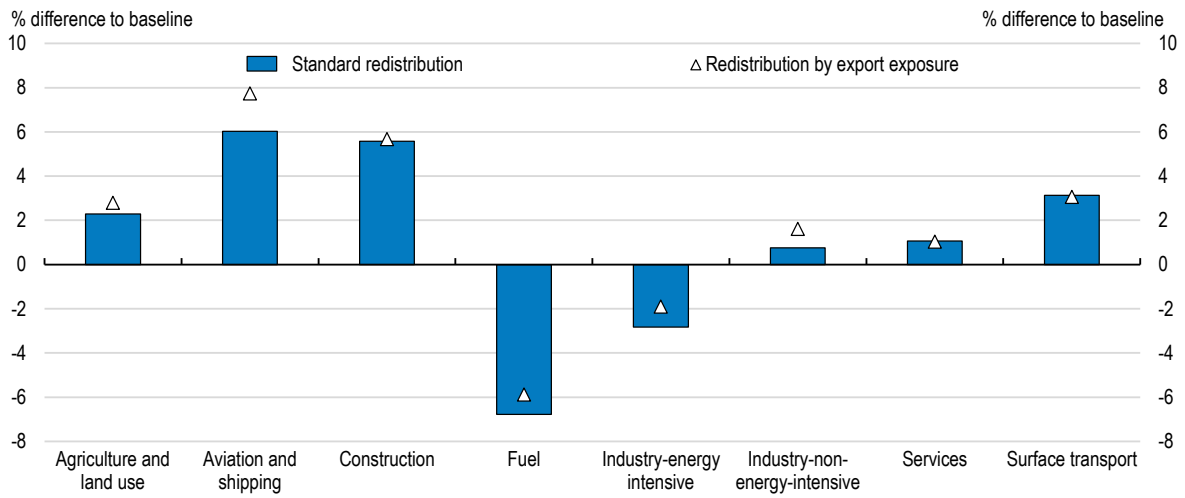
Carbon leakage is a term describing cases when climate policies in one country result in production and investment moving to other more lax jurisdictions. This will lower prices on emission-intensive products in both importing and exporting countries and spur excessive consumption, with increasing global emissions as a result (OECD, 2021[14]). Real or perceived carbon leakage and competitiveness concerns are often met, in the United Kingdom and elsewhere, by lowering policy ambition and by subsidies such as tax rebates on energy inputs or free allowances for emissions covered by emissions trading schemes.

Cross-country evidence from OECD and BRICS countries finds no evidence of losses of competitiveness from stringent environmental policies so far (OECD, 2021[14]). Companies base their decisions on where to locate production and investments on a range of factors including political stability and business climate, access to skills, input factors, infrastructure and markets. The vast majority of UK businesses produce mostly either for the home market or have low emissions compared to the value of their output, or a combination of the two. Even a sharp increase in the cost of emitting greenhouse gases in the United Kingdom carries little risk of carbon leakage for these businesses (HMT, 2021[6]). Some industrial and agricultural sub-sectors may nonetheless risk carbon leakage should the United Kingdom tighten policy considerably ahead of its main trading partners (HMT, 2021[6]).

Compensating these industries by means of subsidies, tax rebates and free allowances would benefit shareholders at the expense of the taxpayer, but would come with very limited positive effects. This point is illustrated in macro simulations where tax revenue is targeted to companies according to their export exposure. These subsidies only yield marginal improvements in output and employment in fuel supply and energy intensive industry, those industries most affected by stringent climate policies, compared to a scenario where revenues are redistributed proportionally to output (Figure 2.11). This is because climate policies aim to trigger structural change. A monetary incentive designed to block such structural change would imply compensating according to the carbon tax bill or a close proxy thereof, and would blunt the incentives to reduce emissions.

Figure 2.11. Reaching net zero requires structural change

Employment by sector under different revenue recycling scenarios (2050)



Note: The carbon price starts at GBP 140 in 2030, rising to GBP 378 in 2050. Revenues are redistributed with shares equal to sector shares in output in the "Standard" scenario. Firms' proportional share of revenue is redistributed to firms according to their export exposure in the "Export exposure" scenario.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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Defusing competitiveness concerns would pave the way for more ambitious and efficient domestic policies. Solid research and information dissemination might help, but the concept of leakage is intuitive and fits easily into perceptions of industrial decline, lost competitiveness and jobs. Concrete policy action addressing the root cause would therefore likely be more efficient. The best way to achieve this is through international cooperation, regulating emissions at their source in line with the internationally agreed production-based emission accounting framework. Such cooperation does not need to cover all emissions in all jurisdictions to be effective, only trade-exposed emission-intensive sectors in the largest producer countries (Nachtigall et al., 2021[49]). Sectoral deals on steel, road transport, aviation, and shipping were agreed during COP26, in an encouraging move forward. Furthermore, the idea of better measuring and harmonising direct and indirect price signals in leakage-exposed sectors is gaining traction in international organisations and fora such as the OECD, IMF and G20, with the United Kingdom's active engagement (IMF and OECD, 2021[50]; HMT, 2021[6]).

In the absence of effective international action, a Carbon Border Adjustment Mechanism (CBAM) to tax imports of a range of high-emission industrial products can in principle level competition between high-stringency and low-stringency jurisdictions. A CBAM has considerable practical and legal challenges, including that it would need to be compliant with WTO rules, it would need to consider how to account for different regulatory approaches in producing countries, and it might lead to substitution, where the most emission intensive production is simply exported elsewhere (OECD, 2020[51]; HMT, 2021[6]). Other options, like output-based carbon pricing rebates combined with a domestic excise duty on certain leakage-exposed products could also be considered (OECD, 2021[15]), but also face challenges and trade-offs.

The United Kingdom has no concrete plans to introduce a CBAM, but has committed to consult later this year on carbon leakage mitigation options, including CBAM and product standards. It may also be affected by EU efforts to introduce one. The EU CBAM is planned to be legislated in 2022, operational in 2023 at the earliest, and fully implemented from 2026. Under the proposal, importers of iron and steel, cement, fertiliser, aluminium and electricity would need to surrender import certificates linked to weekly EU ETS prices, with a deduction for any carbon price already paid. The free allowances currently handed out to these sectors in the EU ETS are proposed to be phased out over a ten-year period after implementation. The EU CBAM proposal is asymmetric in the sense that it does not include a refund for exports (European Commission, 2021[52]). The United Kingdom should engage with the EU to avoid additional trade barriers from the CBAM.

Addressing distributional concerns

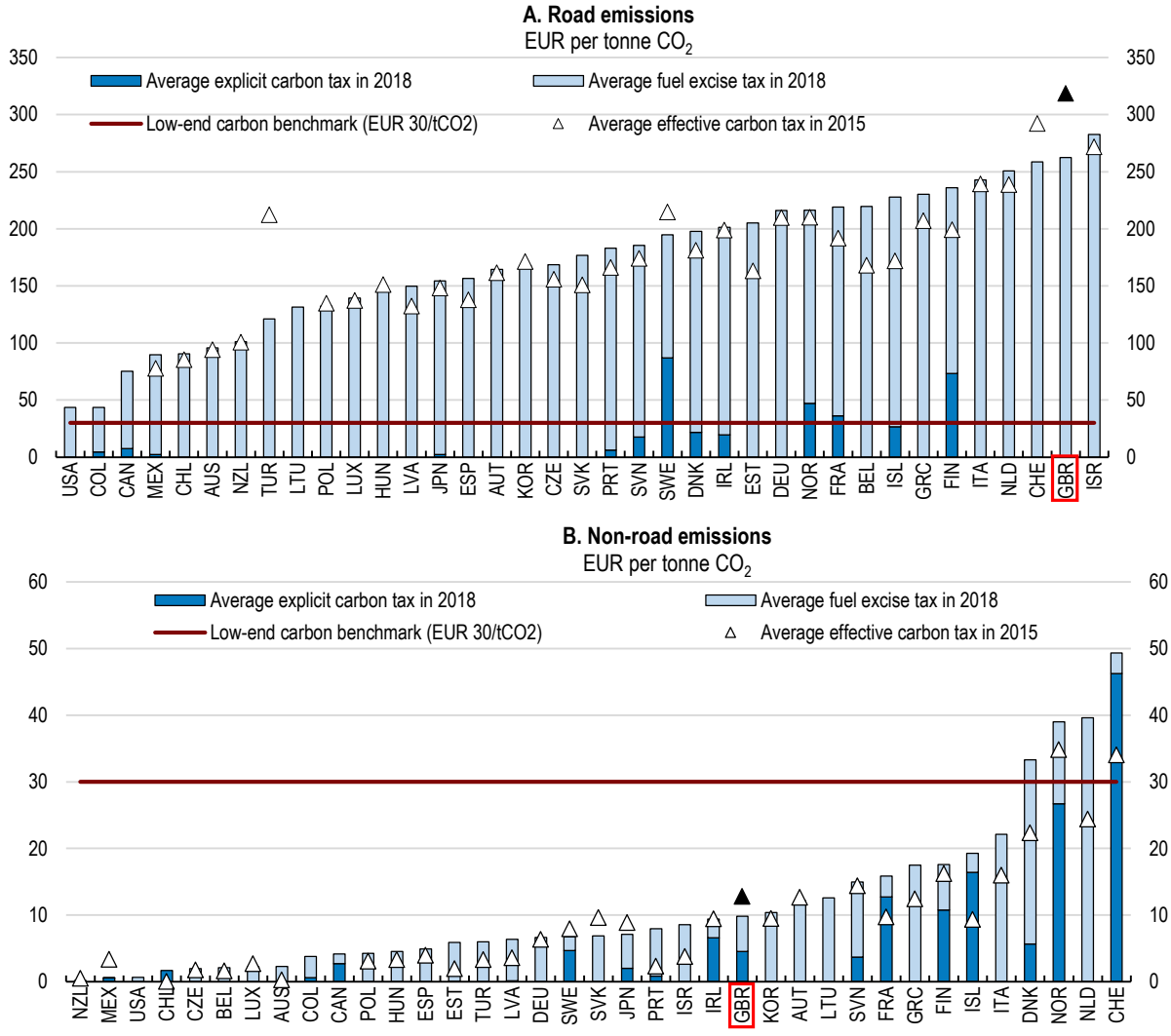
Households directly produce greenhouse gas emissions from residential energy consumption and transport. Waste handling is also a complex task involving households and businesses, national, devolved and local authorities. Taken together, these sectors generate approximately half of UK greenhouse gas emissions. Potential emission reductions are held back by inconsistent price signals, various market failures and concerns about acceptability and distributional effects. Overcoming these hurdles and the various market failures reducing the effectiveness of pricing policies targeted at the household sector calls for a policy mix of direct pricing, subsidies and regulation, but also education and information.

Explicit pricing instruments tend to be regressive unless compensated. Although this is not universally true, the danger of triggering cost of living shocks can be a considerable hurdle to efficient policies, as exemplified by riots in Chile and the French yellow vest movement. Such unrest is not inevitable, as OECD countries including the Netherlands, Switzerland, Norway and Denmark are taxing fossil fuels both in heating and transportation at substantial rates. A number of countries tax CO_2 emissions from these sources directly, although at low rates except in the Nordics (Figure 2.12).

A carbon tax on transport fuels would be largely progressive in the United Kingdom, as the share of income spent on transport increases with income. Conversely, a carbon tax on heating fuels would be regressive,

hitting low-income households disproportionately. The combined first-order effect of taxing emissions from household heating and transport would be regressive in aggregate (Burke et al., 2020[53]).

Figure 2.12. A number of countries tax non-transport fossil fuels



Note: 2018 tax rates as applicable on 1 July 2018. The average effective carbon tax rate in 2015 is the sum of the average explicit carbon tax rate in 2015 and the average fuel excise tax rate in 2015, as reported in Taxing Energy Use 2018, converted in 2018 prices using OECD inflation data. CO_2 emissions are calculated based on energy use data for 2016 from IEA (2018), World Energy Statistics and Balances. Emissions from the combustion of biofuels are included. Note that changes in average effective tax rates over time are also affected by inflation, exchange rate fluctuations, and changes in the composition of the energy mix. The comparison excludes 2015 rates for the United States and Canada as data on subnational taxes was not available for 2015. 2015 data for Colombia and Lithuania are missing because they were not yet covered in the previous vintage of TEU. For more information see the source.
Source: OECD, Taxing Energy Use 2019.

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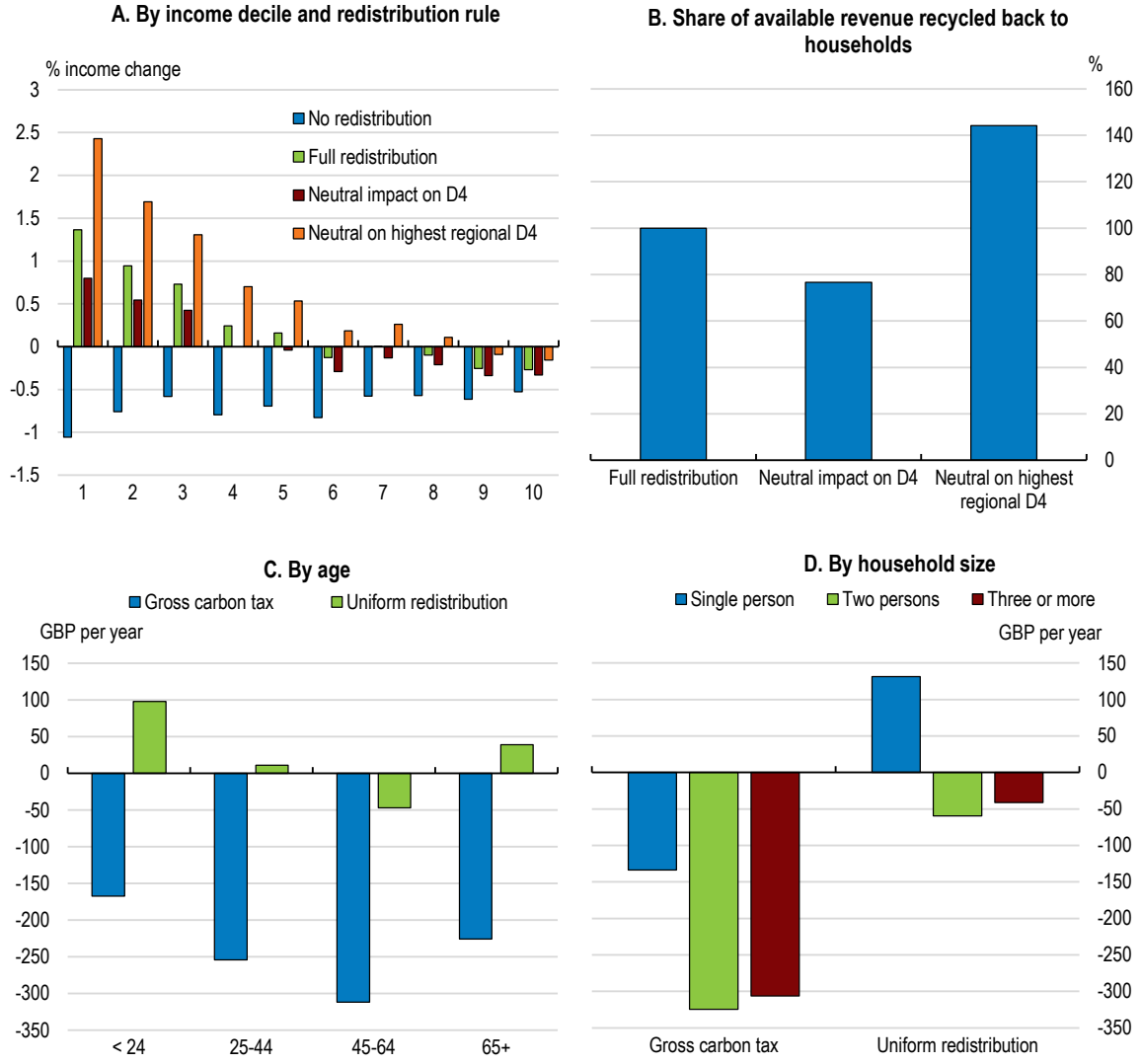
These first-order distributional effects do not capture that taxes and emission trading schemes also generate revenue to finance public services and transfers, which are overall progressive in the United Kingdom and across the OECD (Chapter 1). Households will be affected differently within each decile of the income distribution depending notably on their occupation, housing and transport needs, but will also have opportunities to adapt their investments and consumption to minimise costs and maximise benefits of the transition.

Figure 2.13. Revenue recycling can turn carbon taxation from regressive to progressive



Note: The carbon price signal is here modelled as uniform carbon (equivalent) tax, but could in principle come from an emissions trading scheme, regulations, subsidies or a combination of instruments. GDP neutral scenario with a medium carbon price trajectory. The "Neutral GDP" scenario holds back a share of revenue (45%) to achieve average GDP growth as in the baseline from 2040 to 2050. Remaining revenues are distributed proportionately to sector shares in output. The medium carbon price starts at GBP 140 in 2030, rising to GBP 378 in 2050. Four redistribution scenarios are explored in a microsimulation model: Unmitigated impacts of the carbon tax; Uniform lump-sum redistribution of available tax receipts across all households; Calibrating a lump-sum redistribution so that decile 4, measured at the national level, experiences no losses; Calibrating a lump-sum redistribution so that not a single decile 4 household in any region experiences a loss.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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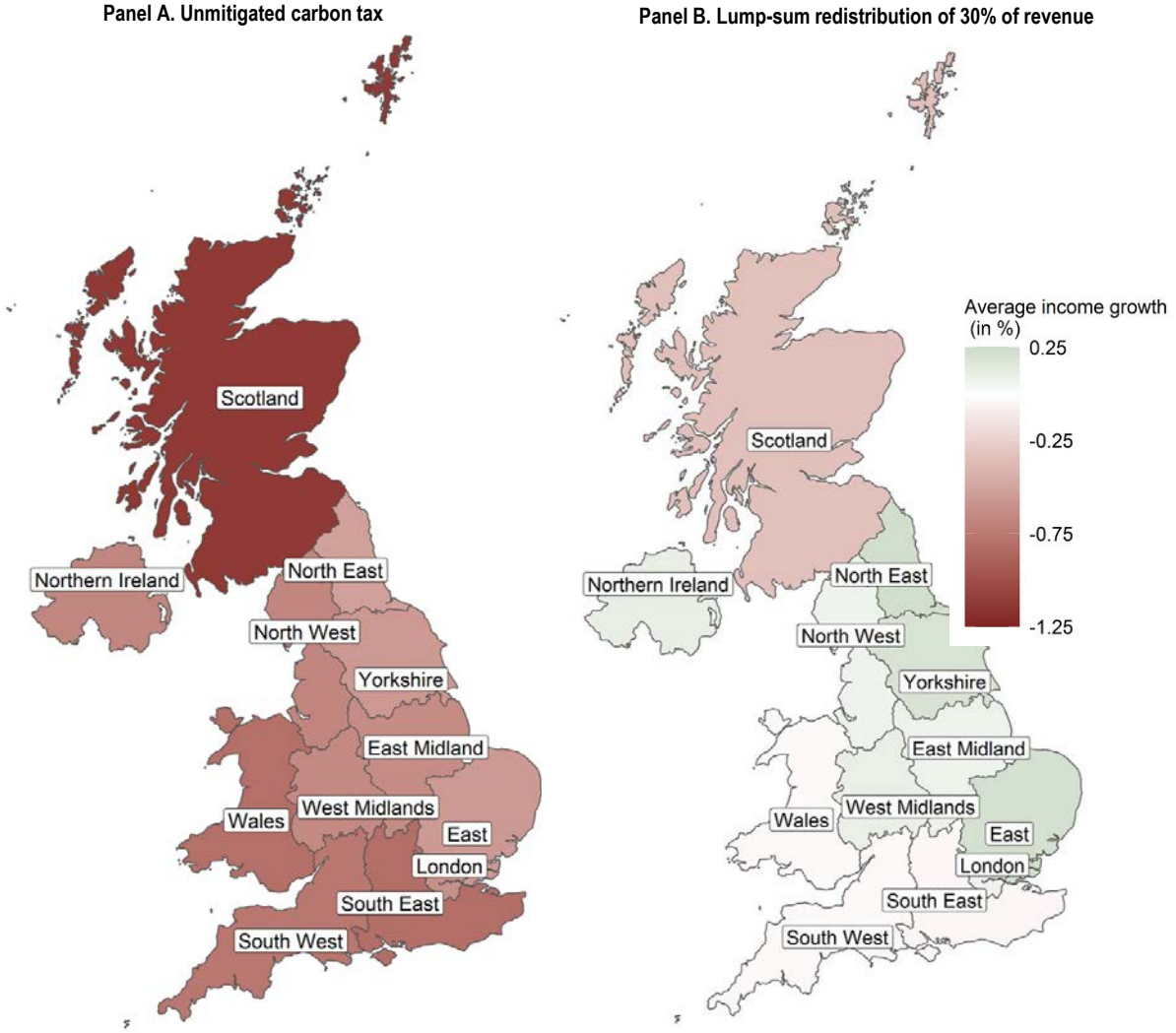
Explicit revenue earmarking is generally to be discouraged as it creates rigidities in spending priorities leading to inefficient allocation of resources. However, in some cases it can be a useful tool for governments to commit and clearly communicate how the additional revenues will be used in order to overcome public resistance and allow broader, more efficient and durable policies (D'Archangelo et al., 2022[9]). Burke et al (2020[53]) estimate that redistributing 19% of the revenue from a GBP 50 tax per tonne of CO_2 as a targeted cash transfer could make the tax progressive. Redistributing 70% of tax revenue as a lump-sum to all households would achieve the same end. Consistent with this, Pareliussen, Saussay and Burke (2022[8]) find that the direct effect of carbon pricing in a GDP neutral scenario with macroeconomic consequences as outlined above is regressive, with the largest income losses in deciles one, four and six. A lump-sum redistribution of the revenues available under an overall prudent fiscal stance

(corresponding to 45% of total revenues) turns the policy package highly progressive, with income gains except in the two top deciles. Distributing 77% of available revenues (30% of total revenues) is sufficient to neutralise income losses in decile four and turn losses into gains in the lowest three tenths of the income distribution (Figure 2.13, Panels A and B).

There are also large variations within income deciles due to for example differences in housing size and transportation patterns. There is an age dimension, with a lower impact on young households who typically live in smaller houses and consume less transport fuels (Figure 2.13, Panel C) and household size, with larger households more affected (Figure 2.13, Panel D).

Figure 2.14. A carbon price affects regions differently



Note: GDP neutral scenario. The redistribution scenario implies a lump-sum redistribution scaled to offset the first-order income effect from a carbon tax for the 4th income decile at the national level. This implies a redistribution of 30% of total tax revenue. Income growth is defined as % income growth within each decile, averaged over deciles.
Source: Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", OECD Economics Department Working Papers (forthcoming).

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The effect of carbon pricing also has geographical dimensions, varying between rural and urban areas and diversified versus single-industry urban centres focussed on heavy industry. Scotland would be particularly affected because it is colder and more rural than other regions of the United Kingdom, and therefore using more heating and transport. Scotland is also home to the petroleum industry. Wales, the South East and South West would also be more affected than the national average (Figure 2.14, Panel A). Redistributing

30% of total tax revenue as above would ensure that a majority of the population in a majority of regions increased their disposable income, with gains notably in the lower part of the income distribution. Even so, negative income effects would remain on average in those regions most affected at the outset (Figure 2.14, Panel B).

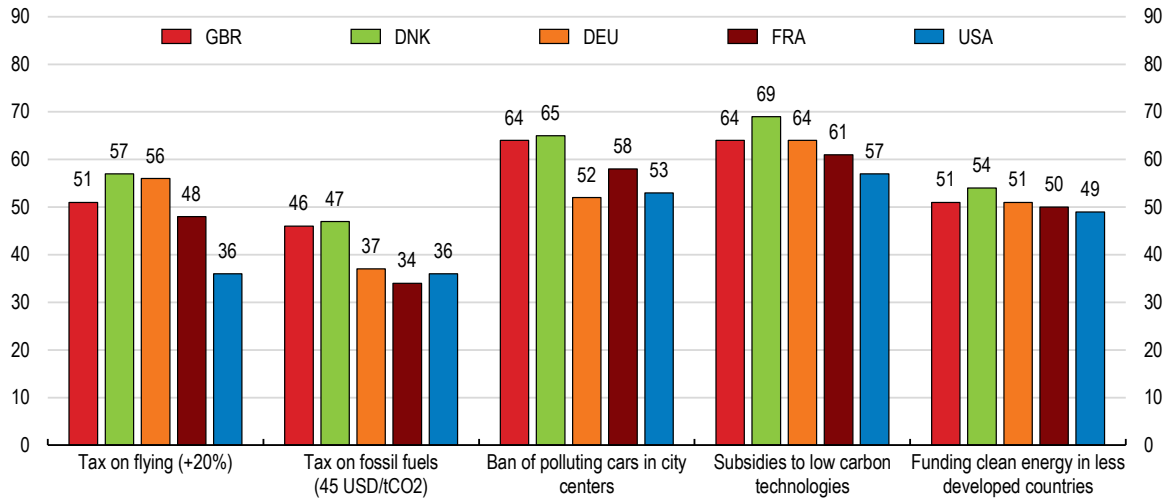
As illustrated above, recycling carbon revenues to make the overall policy package progressive means that low-income households will gain on average, but not that every low-income household will gain. Targeted capital subsidies, notably for housing energy efficiency improvements and electric vehicle charging infrastructure would on the other hand benefit the most emission-intensive households and regions disproportionately. Burke et al (2020[53]) estimate that using 33% of the revenue from a GBP 50 tax per tonne of CO_2 for housing energy efficiency measures can ensure fuel-poor households are not adversely affected. Geographically targeted support should also be considered in a transition period. However, compensating every household according to their actual exposure is not feasible without compromising the environmental effectiveness of the tax. Some will gain and some will lose, even though gains from climate action outsize losses over the longer term.

Even households set to gain, and who support the objective of mitigating climate change, might not support efficient policies. Indeed, a new OECD survey of more than 1,700 representative respondents in the United Kingdom and several other countries analyses the public acceptability of carbon pricing and other climate policies. Similar to other OECD countries, a large majority of Britons believe that climate change is real (94%), an important problem and that it is the United Kingdom's responsibility to fight it (83%). At the same time, only a minority is willing to change their lifestyle by limiting driving (40%) or reducing their beef consumption (46%) (Dechezleprêtre et al., 2022[10]).

The British are relatively supportive of climate policies like subsidies and regulations, but less supportive of a carbon tax on fossil fuels (Figure 2.15). At 46%, support for a tax on fossil fuels (equivalent to 45 USD/t CO_2) is nonetheless higher than in France, Germany and the United States. A majority (64%) supports non-tax policies, including banning polluting cars from city centres and subsidising low carbon technologies. A small majority (51%) supports a tax on flying that would increase ticket prices by 20% (Dechezleprêtre et al., 2022[10]).

Figure 2.15. A majority of Britons support climate policies, except a fossil fuel tax

Proportion of people supporting the following measures, 2021 data



Note: The figure shows the share of people either supporting or strongly supporting the policy measures.
Source: Boone, L., Dechezleprêtre, A., Fabre, A., Kruse, T., Planterose, B., Sanchez-Chico, A., and Stantcheva, S. (forthcoming), Understanding public acceptability of climate change mitigation policies across OECD and non-OECD countries, OECD publishing, Paris.

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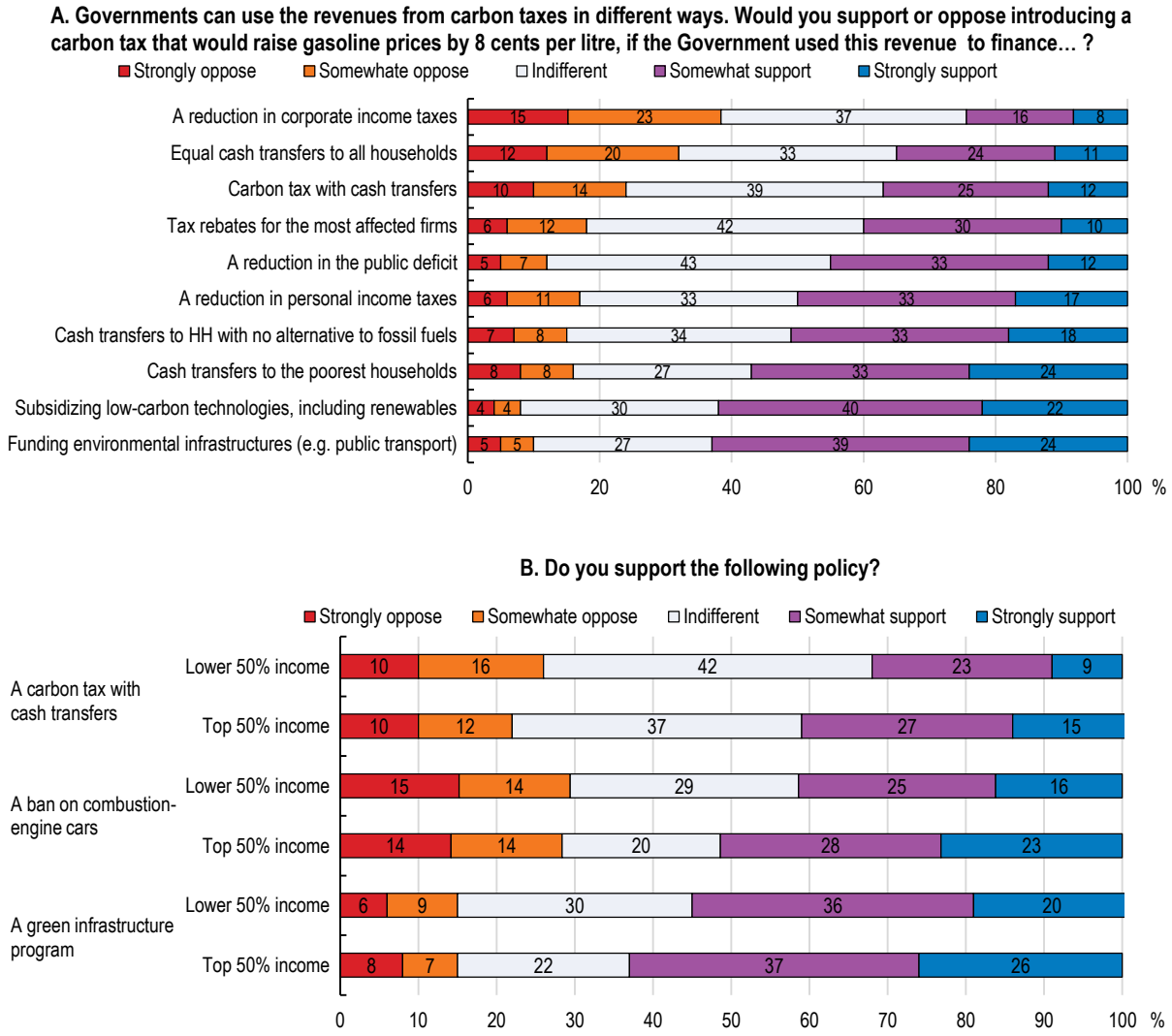
Targeted and transparent use of the revenues from carbon pricing can increase public support. A majority (58%) of respondents consider income inequality in the United Kingdom a serious issue, and 57% would support a carbon tax with revenue earmarked for transfers to the poorest households. The highest levels of support for a carbon tax (over 60%) are found when revenues finance low-carbon infrastructure and technologies (Figure 2.16). High-income groups are generally more supportive of climate policies. When British survey participants were given information on the expected local impacts of climate change and the effects of climate policies, they tended to be more supportive of climate policies, particularly a carbon tax with transfers (Dechezleprêtre et al., 2022[10]). The government should therefore engage in education and information campaigns increasing knowledge and awareness on how explicit pricing instruments work.

Figure 2.16. Stated support for climate policies



Source: Boone, L., Dechezleprêtre, A., Fabre, A., Kruse, T., Planterose, B., Sanchez-Chico, A., and Stantcheva, S. (forthcoming), Understanding public acceptability of climate change mitigation policies across OECD and non-OECD countries, OECD publishing, Paris.

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Based on the above, designing a publicly acceptable integrated policy package targeting emissions from the household sector with efficient pricing policies seems within reach. Such a policy package might however be more acceptable if implemented once the currently high energy prices have started to decline. This policy package should create a clear link between revenue-generating carbon pricing and transfers to low-income and fuel-poor households, offsetting first-order regressive effects and supporting their green investments, notably in housing energy efficiency improvements. A third leg of support in such an integrated package should allocate a portion of carbon pricing revenue to public investment in green infrastructure, development and deployment of green technologies, including carbon capture and storage. It should be accompanied by accurate and easily accessible information about climate change, policy effectiveness and how revenues are distributed. These expenditures are also warranted on economic and distributional grounds.

The optimal timing of pricing emissions and associated revenue does not fully align with the optimal timing of these complementary measures. Furthermore, tax and spending decisions should each be considered on their merits rather than being pinned together, both for efficiency reasons and fiscal flexibility reasons Rather than directly earmarking revenues year by year, carbon pricing and complementary measures could be presented as a multi-year package, for example releasing funds for energy efficiency improvements, information and education up-front, before pricing is fully phased in, and releasing funds for infrastructure and technology according to needs.

Targeting policies to sectoral context

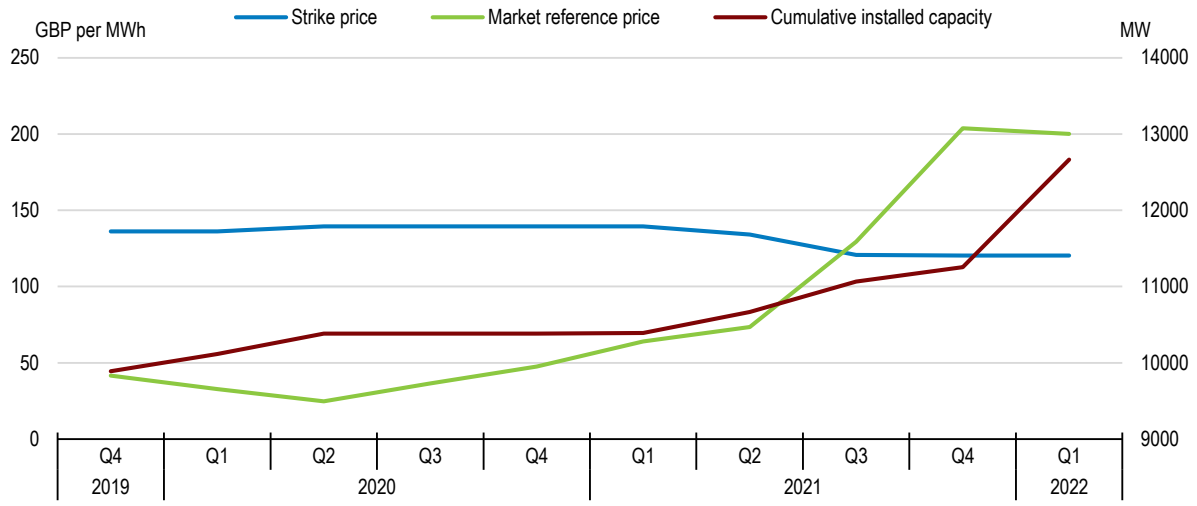
Electricity supply

Increasing clean energy supply is vital for the green transition and to increase energy security. UK Electricity demand is set to roughly double by 2050 to substitute for fossil fuels in industry, buildings and transportation and produce hydrogen as planned in the Hydrogen Strategy. Meeting increased demand while phasing out unabated greenhouse gas emissions from the generation mix will require roughly a quadrupling of renewable and nuclear electricity capacity supported by the Contract for Difference (CfD) scheme. The government has an ambition to add notably 50 GW of offshore wind and 24 GW additional nuclear capacity (HM Government, 2022[54]). Electricity generation emitted 58 Mt CO_2 equivalent emissions (CO_2e) in 2019, 11% of total greenhouse gas emissions. A spectacular 72% reduction from 1990 was driven by replacing coal generation with gas and renewables and increasingly energy-efficient appliances. This success reflects an effective mix of pricing, subsidies and regulations, and should serve as inspiration on how to reduce emissions across the economy. The UK ETS (previously the EU ETS) gives a strong carbon price and the Carbon Price Support acts as a price floor. Later it has been supplemented by a commitment to phase out coal for electricity generation entirely from 2024.

The UK ETS incentivises clean over fossil fuel electricity production. However, renewables are characterised by high capital costs and low marginal costs and price uncertainty over the lifetime of a new plant is therefore a significant barrier for investment in high capital-cost technologies (D'Archangelo et al., 2022[9]). The Contract for difference (CfD) scheme complements pricing by awarding a 15 year fixed price for new renewable electricity generation. The contract price is set in competitive auctions (Figure 2.17) (HMT, 2021[6]; Climate Change Committee, 2021[3]; BEIS, 2021[2]). The CfD scheme is well suited to overcome this hurdle and steepen technology learning curves for technologies at early stages of commercialisation. It is a well-designed subsidy, as it encourages competition and minimises the fiscal cost of reaching policy goals through its auction design. Indeed, in recent auctions the strike price for allocations to established technologies has been below the market-derived reference price, which means that instead of receiving a top-up, successful bidders are likely to pay the government-owned Low Carbon Contracts Company (LCCC, 2021[47]).

Figure 2.17. Contract for Difference auctions have made the United Kingdom a leader in offshore wind

CfD quarterly average prices under allocation round 1 and 2 and installed capacity of offshore wind



Note: Only contracts that fall under allocation round 1 or 2 are considered. Strike prices and market reference prices are quarterly averages.
Source: Low carbon contracts company, Actual CfD Generation and avoided GHG emissions dataset; and UK government, Energy Trends: UK renewables.

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Separate auctions for less established technologies, as in the United Kingdom (LCCC, 2021[47]), is a way to scale up solutions for the future, and could inspire competitive subsidy designs also in other sectors, provided policy objectives are clear and outputs are measurable. Examples where an auction design could be considered include carbon capture and storage, hydrogen and charging networks, housing energy efficiency, tree planting and peatland restoration. However, sector- or technology-specific auctions face a dilemma: grouping technologies together risks crowding out technologies at a current cost disadvantage but high future potential, while more narrowly targeted auctions may waste resources by picking unviable technologies and reducing competition.

In early 2022 the Scottish government auctioned out 25 GW offshore wind development rights, including 13 GW for floating wind turbines, far outstripping the initial aim of about 10 GW. This is an important step towards target achievement, even though these projects still need to secure support through the CfD and go through planning procedures.

The transition will require considerable upgrades to the transmission network, and a considerable increase to long-term electricity storage and flexible generation capacity to match weather-dependent variations in renewable electricity supply with daily, weekly and seasonal variations in demand. The cost of this transition can be greatly reduced by using already available technologies to manage demand and increase the flexibility of the system. Home battery storage, including from electric vehicles ("Vehicle-to-grid"), combined with smart meters and smart contracts, can help households optimise their electricity consumption and even feed the grid in times of high demand, provided that barriers to flexibility on the grid are removed (BEIS, 2021[2]; BEIS, 2020[55]; BEIS and Ofgem, 2021[56]; BEIS, Ofgem and Innovate UK, 2021[57]).

The large-scale expansion of renewables, grid and nuclear capacity is set to meet resistance from affected neighbourhoods. Local resistance led to a ban on public support for on-shore wind in 2016, lifted in 2020 when on-shore wind again became eligible for CfD auctions. Local resistance to land-based infrastructure for offshore wind is also emerging as the sector expands. Planning and coordination can help alleviate the problem, as well as making sure that there are local benefits in terms of jobs, infrastructure and local tax income. The Government has launched a review to explore this issue (BEIS, 2021[2]).

The government aims to increase the share of nuclear power in electricity supply from today's 16%, while a number of reactors are slated for closure. Concerns have been raised about the profitability of nuclear power compared to renewable alternatives when the risk of delays and cost overruns as well as life-time social costs are taken duly into account. On the other hand, nuclear is a good low-carbon complement to intermittent supply from wind and solar power. The Regulated Asset Base model is expected to help secure private financing for new nuclear by offloading some of the risks of delays and cost overruns to consumers, where this offers clear value for money. The United Kingdom is also providing considerable support through the GBP 385 million Advanced Nuclear Fund to the development of small modular reactors and advanced modular reactors (BEIS, 2020[55]). OECD countries including France and Korea are increasingly seeing nuclear power as part of a low-carbon electricity generation mix while others, notably Germany, are phasing it out. The European Commission has in its taxonomy labelled nuclear power as sustainable. The approach to nuclear energy should continue to be pragmatic, handling issues of profitability and financial risk sharing as well as nuclear safety and waste concerns responsibly and taking the full range of associated costs and benefits into account.

Fuel supply and hydrogen

Extraction, transportation and storage of fossil fuels emitted 26 Mt CO_2e in 2019, equalling 5% of UK emissions. Emissions fell 61% from 1990, driven by falling petroleum production, efficiency gains and closing of coal mines. Emissions from the petroleum sector are covered by the UK ETS and a comprehensive licensing and regulatory framework (BEIS, 2021[2]). The petroleum sector will need to reduce emissions and employ its skills and resources to help realise technological solutions such as carbon capture and storage and floating offshore wind (BEIS, 2021[2]; BEIS, 2021[58]; BEIS, 2020[55]; Climate Change Committee, 2021[3]).

Global fossil fuel energy demand will need to fall considerably in the coming decades to meet the targets of the Paris agreement, but natural gas will play a role as a transition energy source. Demand for petrochemical products including plastics, fertilisers, digital devices, medical equipment and detergents is set to continue growing for at least until 2050 (IEA, 2018[59]). Furthermore, even though the United Kingdom only imports a small share of its oil (8%, to be phased down over 2022 as part of sanctions) and natural gas (4%) from Russia, Russia's invasion of Ukraine has led to a reassessment of the economic and strategic value of domestic and diversified energy supply. Crude oil production in the United Kingdom is less emission intensive than the global average (Masnadi et al., 2018[60]). Oil and gas extraction is set to continue declining in the mature UK sector of the North Sea. Strictly limiting petroleum production in the United Kingdom would likely contribute to increasing supply elsewhere, with an uncertain net effect on global emissions. Allowing new development in the sector, in line with the Energy security strategy (2022[54]) is therefore appropriate, but should be conditional on continuous improvements in emission intensity and strict environmental policies. Furthermore, the sector should contribute to the United Kingdom's overall climate targets by advancing green technologies such as hydrogen production, carbon capture, usage and storage and floating offshore wind.

Hydrogen can potentially play an important role in reducing greenhouse gas emissions. It has potential to replace hydrocarbon inputs into industrial and chemical processes, and to feed fuel-cell electric heavy goods vehicles. Along with battery storage and further expansion of pumped hydropower storage, it is a promising solution to help match intermittent supply of wind and solar electricity with demand. Surplus electricity supply is in this case used to extract hydrogen from water by electrolysis, after which it is stored and used for electricity production when needed. Low-emission hydrogen can also be extracted from natural gas, either by conventional steam methane reforming combined with carbon capture and storage, or by emerging zero-emission solutions like methane pyrolysis (BEIS, 2021[2]; BEIS, 2021[58]; Sánchez-Bastardo, Schlögl and Ruland, 2021[61]).

The United Kingdom plans to develop up to ten gigawatts of low-carbon hydrogen production capacity by 2030 (HM Government, 2022[54]). The UK ETS already incentivises its use in electricity generation and industry, but government intervention can help realise network effects and steepen technology learning curves subject to careful cost-benefit analyses. The government has embarked on adapting the regulatory framework and it is creating a subsidy mechanism funded by a planned GBP 240 million Net zero hydrogen fund to provide capital and development subsidies to new hydrogen production facilities. Revenue support will be provided through a new Hydrogen Business Model (HBM), initially funded through the GBP 140 million Industrial Decarbonisation and Hydrogen Revenue Support scheme. From 2025, HBM contracts will be funded via a levy, similar to renewables CfDs, subject to consultation and legislation. It also sees a potential role for hydrogen replacing natural gas in residential heating, and is set to assess the value for money of blending up to 20% hydrogen into the existing gas network (BEIS, 2021[58]). Even though hydrogen may turn out to be a cost-efficient solution to some particular challenges, it is an energy carrier with considerable energy losses, first when the hydrogen is produced, then when it is transformed back into heat or electricity. This puts hydrogen at a considerable disadvantage compared to already proven and available alternatives like heat pumps for buildings and batteries for light-duty vehicles.

Manufacturing and refining

Manufacturing and refining emitted 78 Mt CO_2e in 2019, 15% of the UK total. Emissions fell 53% from 1990, mainly due to the changing structure of the UK manufacturing sector, improved energy efficiency, and a shift to low carbon fuels. The sector accounts for 8% of GDP, provides 2.5 million jobs and supports an additional 5 million jobs across the value chain (BEIS, 2021[2]). Energy intensive industry is covered by the UK ETS, and the planned tightening of allocations in accordance with net zero could raise questions around lost competitiveness and impending carbon leakage.

Most manufacturing sectors are little exposed to potential carbon leakage, but some industries, notably basic metals, refineries and non-metallic minerals, combine high carbon intensity with high trade openness. These could become victims of carbon leakage if the United Kingdom tightened policy considerably ahead of its main trading partners (HMT, 2021[6]).

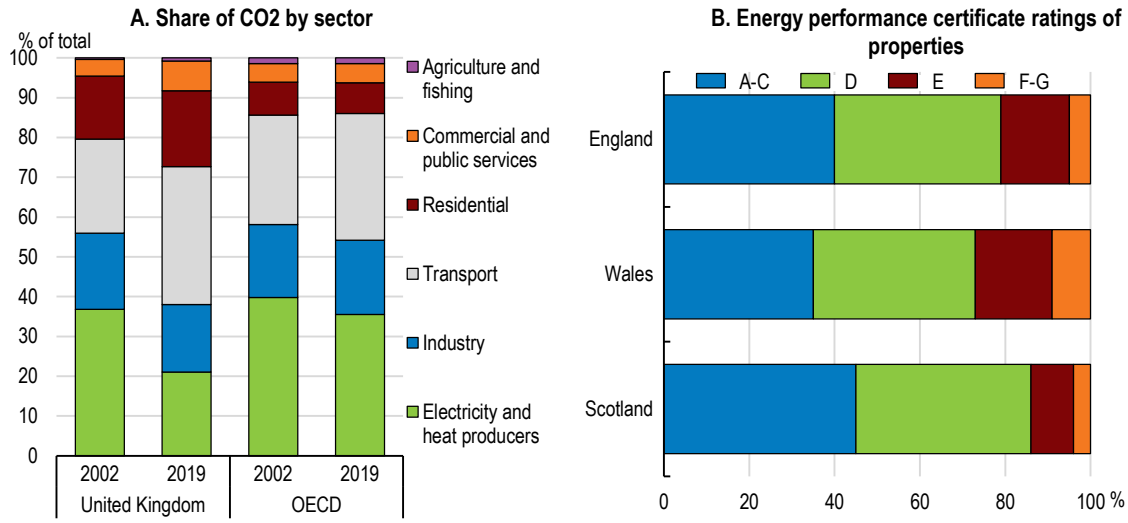
Around half of industry emissions come from geographically concentrated industrial clusters (BEIS, 2021[2]). Stringent emission-cutting policies could affect jobs and incomes around these clusters, notably to single-industry urban centres. Diversified industrial clusters across the United Kingdom can contribute to, and benefit from, the large investments needed in the green transition. Their strong industrial base makes them well placed to expand and create new green manufacturing in areas such as batteries and electric car components, heat pumps, equipment for renewable energy and transmission networks. The Government has mobilised GBP 26 billion of government capital investment for the green industrial revolution, which will support considerable job creation. Furthermore, the designation of net zero and hydrogen clusters with associated support, notably to reduce process emissions, support CCUS and boost domestic production and R&D into heat pumps should help the transition (BEIS, 2021[2]). As discussed above, the macroeconomic effects of such structural change would be manageable, and redistribution and targeted support could help mitigate some negative side-effects. Additional support, notably to single-industry urban centres, might be needed in the future, and should focus on smoothing the transition for workers by investing in skills and supporting those who lose out.

Residential buildings

In 2019, buildings emitted 88 Mt CO_2e, 17% of total UK emissions, of which 69Mt CO_2e, 15% of the total came from residential buildings (Figure 2.18), the rest from commercial and public buildings. The prime source of these emissions is fossil fuel for heating, notably gas boilers, the dominant heating technology in UK homes. Since 1990, residential emissions have fallen by approximately 14%, driven by increased energy performance and improved efficiency of fossil-fuelled boilers. Phasing out emissions by 2050 in

line with the net zero target and the Heat and Buildings Strategy will require heating systems with zero-emission energy carriers such as clean electricity or hydrogen in the overwhelming majority of UK homes and continuous efforts to improve energy performance (BEIS, 2021[2]; BEIS, 2021[62]).

Figure 2.18. Carbon emission reductions from the housing sector are held back by low energy efficiency



Note: Panel A: CO2 Emissions from fuel combustion. Emissions are calculated using IEA's energy balances and the 2006 IPCC Guidelines. See http://wds.iea.org/wds/pdf/WorldCo2_Documentation.pdf for more details. Commercial and public services include final consumption not elsewhere specified. Industry includes other energy industries. Panel B: England and Wales 2021, Scotland 2019.
Source: IEA CO2 emissions from fuel combustion database; and Resolution Foundation, Shrinking footprints.

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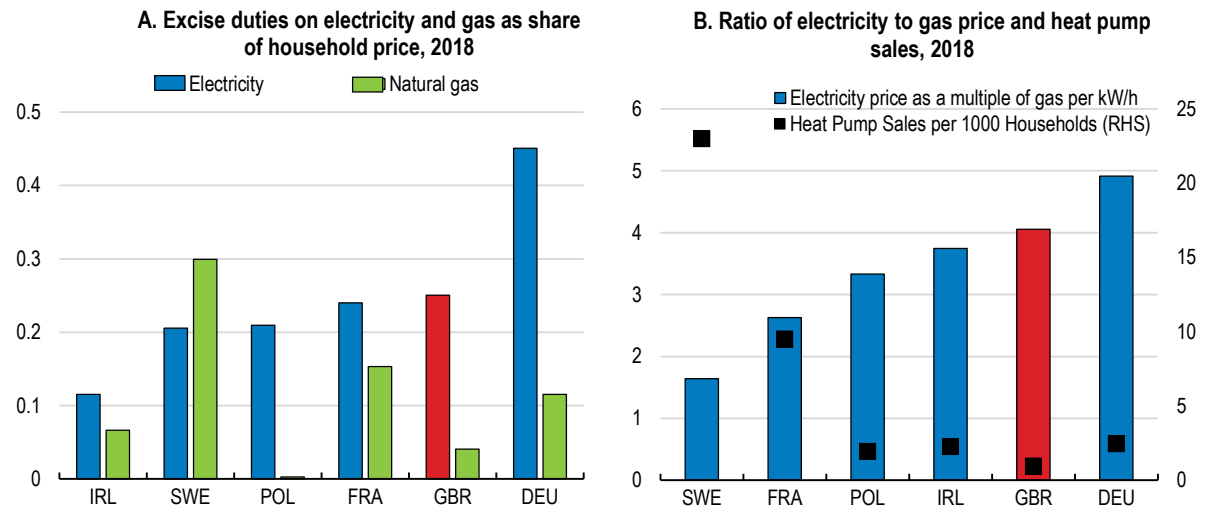
Pricing of emissions in the sector is currently inconsistent, leaving gas heating less expensive than electric heat pumps (Figure 2.19). Taxes and charges on electricity equivalent to a price of GBP 70-80 per tonne of CO_2 are in part financing renewable electricity subsidies. In contrast, fossil fuels for heating are practically untaxed. Charges on electricity and fossil fuel for heating should be aligned to their respective greenhouse gas emissions. The government has launched a call for evidence, aiming to make a decision to rebalance electricity and gas prices in 2022 (OECD, 2019[63]; HMT, 2021[6]).

This planned rebalancing is welcome and should extend to pricing emissions explicitly by broadening the scope of the UK ETS to cover heating fuels according to their carbon content, as discussed above. However, this may not be enough to tip the cost of clean heating sources below those of dirty ones immediately and in all circumstances. The government is therefore also providing grants through the Boiler Upgrade Scheme. Even if clean sources become less expensive than dirty ones over their lifetime they require considerable up-front investments. Liquidity constraints, information failure, split incentives between landlords and tenants and consumer biases such as present bias, loss aversion, supply and skill constraints may hold back action at the scale needed (Gillingham, Newell and Palmer, 2009[64]; BEIS, 2021[62]). The government announced in its Heat and Building Strategy to give homeowners grants of GBP 5 000 to install heat pumps from April 2022 (HM Government, 2021[65]). Furthermore, the government plans to phase out the installation of new and replacement gas boilers by 2035 (2030 in Scotland). Phasing out the installation of high-carbon fossil fuel boilers in homes not connected to the gas grid by 2026 (2025 in Scotland) (BEIS, 2021[2]; BEIS, 2021[62]) is therefore complementary to this policy. It carries the co-benefit of clarifying policy direction to industry.

Figure 2.19. Low charges on gas for heating hold back heat pump investments



Source: Eurostat; and European Heatpump Market (EHPA) Stats - http://www.stats.ehpa.org/hp_sales/country_cards/.

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A second pillar to reduce residential heating emissions and manage electricity demand is to continue improving the energy efficiency of buildings. It is complementary to policies promoting heat pumps, as conventional heat pumps work more efficiently in well-insulated buildings. Energy efficiency standards for new buildings can achieve large energy savings at a limited additional investment cost. The "Future Home Standard" will ensure from 2025 that new homes produce at least 75% lower CO_2 emissions compared to those built to current standards, which is welcome (BEIS, 2021[62]).

Despite considerable improvements over the past decade, 47% of UK homes still have an Energy efficiency rating (EER) of D (Ministry of Housing Communities and Local Government, 2021[66]). The cost of insulating existing buildings depends less on household income than on a number of factors including age, size, property type (apartment vs detached/semi-detached) and building technique (HMT, 2021[6]). Social housing is for example twice as likely to be insulated as privately rented housing. Rural households will in general face larger investment costs than urban ones, as they tend to live in detached housing with relatively large surface (HMT, 2021[6]).

Incentives for landlords in the private rental market to make their homes more energy efficient are low. Energy savings benefit the renter, but the costs would fall on the property owner. Already, almost 27% of fuel poor households rent in the private rental market (HM Government, 2021[65]), and they will be particularly vulnerable to rising fuel prices as the economy transitions to Net Zero. Therefore, the Government's plan to mandate a minimum energy efficiency level also for private rentals in the future is welcome.

Energy efficiency investments are generally more profitable the lower the initial energy efficiency of a building, but the initial investment cost is higher. The housing cost burden is particularly large for low-income households. In the United Kingdom, housing-related expenditure amounts to 25% of final household consumption expenditure. Credit constraints and the consumer biases applying to investments in heating systems therefore also apply to energy efficiency investments. The average cost of upgrading the energy efficiency rating to C for owner-occupier households in the bottom fifth of the income distribution corresponds at GBP 8600 to their average annual after housing costs income, justifying support (Corlett and Marshall, 2022[67]). Support for energy efficiency improvements is also a key policy to avoid adverse distributional effects of carbon pricing, as outlined above.

A number of support schemes for energy efficiency improvements exist, including the Homes Upgrade Grant and the Social Housing Decarbonisation Scheme (HMT, 2021[6]). Furthermore, the GBP 4 billion Energy Company Obligation, a policy to support low-income households in the least energy efficient households over energy bills. However, current funding is mainly aimed at public buildings, low-income and social housing. Introducing a large-scale support scheme for residential energy efficiency and clean heating systems with competitive bidding and results-based payments, also including home-owners, would be a useful complement to carbon pricing and regulations in a comprehensive policy package. However, a previous lack of consistency of home energy efficiency support schemes (OECD, 2022[4]) should be rectified to provide clear policy direction, for example with competitive bidding and payments based on clearly defined and measurable outputs. Such action should be supplemented by well-identified regulatory action and efforts to inform the public about the savings and co-benefits involved. Mobilising private sector providers and upskilling the construction workforce will also be a key success factor going forward, complicated by current shortages of qualified personnel in construction (Chapter 1).

Transport

Domestic transport emitted 122 Mt CO_2e in 2019, (27% of total emissions) making it the highest emitting sector in the United Kingdom. Road transport accounted for 91% of the total. Light duty vehicles such as cars and vans account for 72%, while heavy-duty road vehicles such as trucks and coaches are responsible for 18% of the sector total. Transport emissions only declined by 5% between 2019 and 1990, while total emissions fell 44%. An increase in activity and vehicle size practically cancelled out the improved energy efficiency of new vehicles. With international emissions included, transport emissions have increased by 10% since 1990, driven by a significant increase in aviation (Department for Transport, 2021[68]).

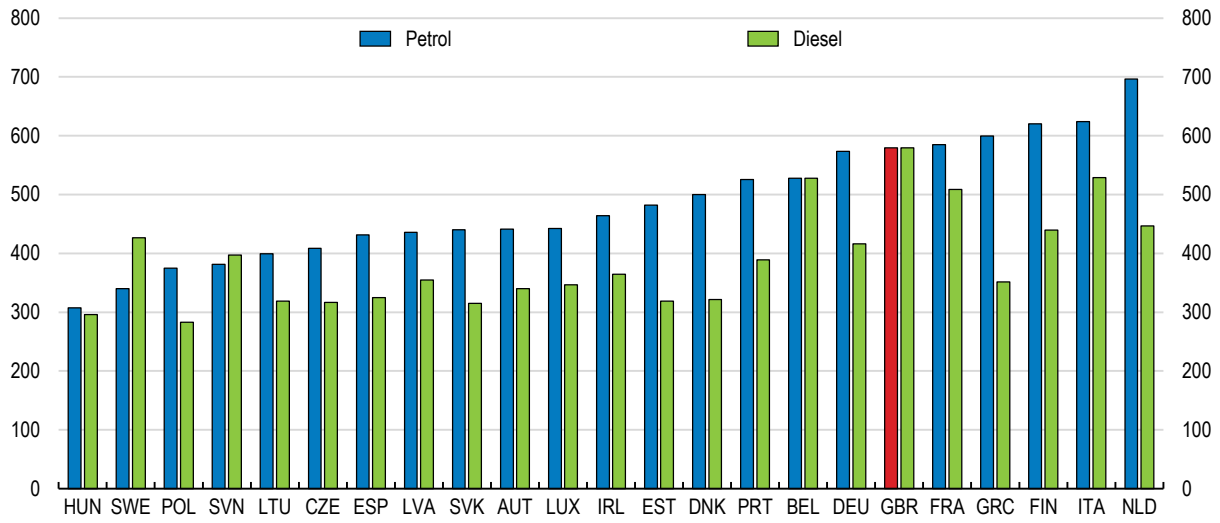
Reducing the emission footprint of road transport will mainly need to rely on reducing emissions within the current mix of transport modes for freight and passengers, as the required changes needed to the spatial distribution of the population to move a substantial proportion of freight and passenger kilometres to sustainable modes are not viable by 2050. Encouraging compact development around transport nodes, and financial incentives to travel by rail, public transport shared mobility and active transport can nonetheless make a valuable contribution. The 2021 Transport Decarbonisation Plan aims to shift travel from road to rail, public transport and active transport, among other priorities (OECD, 2022[4]). Changes to spatial planning could help concentrate development within the catchment area of amenities and public transit, thus limiting urban sprawl and discouraging car dependency (OECD, 2021[69]). The National Model Design Code guides Local Authorities on how to reflect decarbonisation priorities in their own design codes.

The United Kingdom does not apply an explicit carbon tax on transport fuels. However, a fuel excise duty of 57.95 pence per litre is applied to fossil fuels. This would equate to a duty on carbon of GBP 314.80 per tonne CO_2 for petrol and GBP 268.07 per tonne CO_2 for diesel (BEIS, 2021[70]) and helps incentivise emission reductions in the sector. The tax is an important revenue stream for the Exchequer (OBR, 2021[7]), and covers other negative externalities of driving, such as local pollution, noise, road wear and the cost of accidents in addition to greenhouse gas emissions (ITF, 2018[71]). After a sustained rise between 1990 and 2009, the fuel duty has been frozen since March 2011. This policy has been acclaimed as reducing households' cost of living, but encourages high-carbon modes of transport. As the duty is a set at a nominal level, this has seen the real cost of the duty eroded. However, the duty remains high relative to EU countries (Figure 2.20) (Bolton, 2021[72]). More recently, the fuel duty was temporarily cut (until March 2023) by GBP 0.05 per litre for the main rates to respond to soaring prices in the context of Russia's invasion of Ukraine. This tax cut reduces the tax incentive for fuel savings by GBP 22 per tonne CO_2 for petrol and GBP 19 for diesel. Targeted support for low income households would be more effective in counteracting the soaring cost of living. A number of OECD countries have introduced such price supports, which are likely to drive market prices on fossil fuels (pre-tax) higher than what would otherwise be the case.

The vehicle excise duty (VED) has been partially based on CO_2 emissions since 2001, almost tripling the number of diesel cars. A reform introducing a criterion on NOx emissions reversed this trend from 2017. After a new car has spent a year on the road, VED is charged at a flat rate. This encourages more energy efficient vehicles entering the fleet, but reduces the incentive to choose low-polluting second-hand vehicles. The Government ran a Call for Evidence to reform the VED to reduce overall emissions from road transport in 2020 (OECD, 2022[4]).

Figure 2.20. The fuel excise duty remains high relative to European OECD countries

Excise duty on petrol (unleaded) and diesel (as a propellant), GBP per 1000 litres



Source: European Commission (2021), Excise duty tables: Part II Energy products and Electricity.

StatLink https://stat.link/rzy3lg

The Decarbonising Transport Strategy sets out the government's intention to ban the sale of non-hybrid petrol and diesel light duty vehicles from 2030 and require all light duty vehicles to have zero tail pipe emissions by 2035 (Department for Transport, 2021[73]). The long and clearly communicated lead-in time gives manufacturers time to gradually transition to zero emissions vehicles and avoid a regulatory cliff edge. Furthermore, options are being explored to gradually tighten tradable emissions standards or introducing and gradually tighten a mandatory share of zero emissions vehicles sold (Department for Transport, 2021[74]). The chosen approach will force a transition, and thereby overcome information failure and various biases that could otherwise hold back the widespread adoption of electric vehicles on a sufficient scale and timeline to meet climate targets. Experience from Norway, where electric vehicles reached a market share of 75% of new cars sold in 2020 (IEA, 2021[75]) shows that economic incentives can spur a transition towards electric vehicles, but at a high abatement cost and with benefits principally flowing to high income households (OECD, 2019[76]).

The Decarbonising Transport Strategy proposes to require all new heavy goods vehicles to have zero tailpipe emissions from 2035 (under 26 tonnes) and 2040 (all vehicles). The technological pathway towards zero-emission heavy goods vehicles is less clear, but some mix of electric vehicles, technology which would allow vehicles to draw power from the grid while in use (route electrification) and fuel cell electric vehicles are assumed to be capable of eliminating their tailpipe emissions by 2050 (Lyons, Curry and Rohr, 2021[77]). Given these uncertainties, interventions in the short term should seek to support R&D in across a range of technologies.

Electrification of the vehicle fleet will undermine the tax base for the fuel excise duty, currently equivalent to 1.7% of GDP (HMT, 2021[6]). This calls for an alternative way to tax the negative externalities of road use and replace lost revenue. The government should move towards a new road pricing regime differentiating charges between fossil fuel and zero emission vehicles. This reform should happen as soon as possible, as it will increase charges on electric vehicle use, and is likely to meet increasing resistance as an increasing share of the population owns an electric vehicle. Such a system should continue to put a price on CO_2 emissions from fossil fuel powered cars, preferably by including fossil fuels in the UK ETS, as discussed above. Coordinating implementation with the planned rebalancing of electricity and gas charges and a wider package of carbon pricing and complementary spending as outlined above could help increase public acceptance.

The electric vehicle charging network presents consumers and suppliers with a network and coordination problem. An insufficient national charging network excludes those without a dedicated charging space from electric vehicle ownership and causes range anxiety even for those with local charging available. The low penetration of electric vehicles holds back private sector charging infrastructure investment. Government intervention to stimulate demand and supply for electric vehicle charging is therefore appropriate (Li et al., 2017[78]), focussing on coordination of networks in main travel corridors and support for charging infrastructure to complete networks in places where demand is currently insufficient.

Even though electric vehicles are projected to become cheaper than fossil fuelled ones when lower cost of use are taken into account, their higher purchase price dictate that early adopters will be high-income households. The profitability of owning an electric vehicle also differs considerably between households who have access to home charging and those confined to public charging. This differential is set to widen considerably in the future as vehicle to grid revenues become available to households with home charging (Corlett and Marshall, 2022[67]). The government should encourage the shift towards low and zero-carbon vehicles, including with financial incentives to invest in recharging stations particularly in remote areas. Considerable support is already provided to electric vehicle early adopters, boosting the case for private investment in charging infrastructure. In addition, GBP 1.3 billion will be provided to support the expansion of public and domestic charging infrastructure. Regulations are also being introduced to ensure new buildings have appropriate charging provision (Department for Transport, 2021[79]).

In addition to supporting the transition to zero carbon alternatives for private vehicles and road freight, aviation, shipping and rail will also need to transition. The United Kingdom aims to phase out diesel only trains from the network by 2040, replacing them with line electrification and hydrogen and battery trains where this is not viable (BEIS, 2021[2]). While emissions technologies enabling the full decarbonisation of aviation are not yet available, zero-emission solutions including sustainable aviation fuels and hydrogen or electric powered aircraft engines are being tested, notably for short-haul flights.

Waste and F-gases

Emissions from waste and F-gases combined amounted to 40 Mt CO_2e in 2019, or 8% of total greenhouse gas emissions. Of this, 5% of UK emissions came from waste handling, consisting of waste to landfills, waste incineration without energy recovery and wastewater treatment. Emissions fell by 71% from 1990, largely driven by reducing the methane emitted from biodegradable waste decomposing on landfills. 3% of UK emissions came from F-gases, overwhelmingly from the release of HFCs into the atmosphere. HFCs are largely used to replace ozone-depleting gases regulated by the Montreal Protocol since 1989. F-gas emissions fell by 10% from 1990 to 2019 (BEIS, 2021[2]).

In the special case of HFCs, which are used directly as product components, mainly as refrigeration gases, creating scarcity of the input itself is equivalent to explicit pricing policies. HFCs are highly potent greenhouse gases, and their phase-out is prescribed by the Kigali amendment to the Montreal Protocol. In the United Kingdom (as in the EU), imports of HFCs are restricted by a gradually tightening quota (BEIS, 2021[2]). These quotas create scarcity, and the price response incentivises substitution and research into

commercially viable alternatives (European Commission, 2020[80]). Quota limits have reduced HFC consumption by 55% since 2015, putting the United Kingdom on track to meet its Montreal protocol commitment to cut consumption by 85% by 2036 (BEIS, 2021[2]).

The main policy instrument behind emission reductions in the waste sector is the landfill tax, which corresponds to approximately GBP 80 per tonne of CO_2e (HMT, 2021[6]). This tax along with increasing public awareness have greatly reduced the volumes of landfilled biodegradable waste. Municipal waste generation fell between 2005 and 2019, although both GDP and population grew over this period. Municipal waste generation per capita is below both OECD and OECD Europe averages. Previously landfilled waste is increasingly incinerated, although recycling and composting also grew. CO_2 emissions from incineration are 25 times less potent than methane emissions from landfilling, but they are emissions nonetheless. The United Kingdom, unlike many European OECD countries, does not tax emissions from incineration, but the inclusion of incineration into the UK ETS is part of the call for evidence to reform the ETS (UK ETS Authority, 2022[13]). The statutory target of recycling or composting 50% of household waste was met in Wales and Northern Ireland, but not for the United Kingdom as a whole, largely reflecting different practices among local authorities. Contaminated sites and illegal landfilling and waste exports remain challenges. The 2021 Environment Act may help, as it establishes a common approach for collection of recyclables in household waste in England and a UK-wide electronic waste tracking system to tackle waste crime, including illegal exports. Furthermore, in 2020, environment agencies and police forces across the United Kingdom formed a unit for waste crime to address the problem of organised crime groups operating in the sector (OECD, 2022[4]).

Agriculture

Agriculture, notably livestock production, emitted 46 Mt CO_2e in 2019, 10% of total UK emissions, mostly methane. Devolved Governments have the primary responsibility for agricultural policy and decarbonisation. In contrast to England, Scotland and Wales, 26% of Northern Ireland's emissions come from agriculture. Agricultural emissions fell by approximately 13% since 1990. The Net Zero Strategy estimates that emissions could be reduced to 39 Mt CO_2e by 2035, including net removals from land use and forestry. Further emission reductions are assumed from replacing 20% of meat and dairy consumption by plant based alternatives (Climate Change Committee, 2021[3]). This is in line with current trends for meat consumption (Stewart et al., 2021[81]), but not for dairy. Eliminating emissions from the agriculture sector is complicated by measurement issues, a difficult political economy and hard to abate biological processes involved in food production (BEIS, 2021[2]).

Following the exit from the EU and its Common Agricultural Policy, the government is reviewing agricultural support to increasingly tilt payments towards rewarding climate and ecosystem services and encouraging low-emitting production methods (BEIS, 2021[2]). Direct investment in research and development, financial supports for farmers and the provision of advisory services should encourage the development, scaling and application of innovative low carbon farming techniques. These supports should be structured with clear objectives, and coherence between policies, and they should be measured and evaluated against predetermined targets (OECD, 2022[82]).

Direct emission pricing belongs in a policy package to effectively and efficiently reduce emissions from agriculture, but comes with two main challenges. Quantity-based measures like the number of livestock or fertiliser use can be straightforward, but would fail to capture reduced emissions from improved agricultural practices, which are more challenging to measure at the level of individual farms (or companies). Explicit pricing policies are also politically challenging, due to their impact on food prices (Climate Assembly UK, 2020[83]), carbon leakage concerns and strong agricultural lobby groups (Arvanitopoulos, Garsous and Agnolucci, 2021[84]; D'Archangelo et al., 2022[9]). Agriculture may be at risk of carbon leakage, with high emission intensity of imports from some countries and limited scope to pass on increasing production costs to prices. However, this risk could be mitigated by comparable climate policies in the EU, the United

Kingdom's main trading partner in agricultural products, substitution in agricultural production and a considerable scope to increase productivity (HMT, 2021[6]).

A hybrid system, in which quantity-based measures are subject to a carbon price, while improved practices, the provision of nature-based services and green R&D are subsidised, preferably in competitive auction designs, would likely increase policy efficiency and should be explored. If necessary to win political acceptance, such a reform could be fiscally neutral for the sector as a whole. Improved methods and data could help alleviate measurement issues in the longer term. The Government is consulting on measuring and reporting of agricultural emissions from agriculture in its call for evidence on UK ETS reform (UK ETS Authority, 2022[13]). Lessons could be learned from New Zealand, where agricultural greenhouse gas emissions have been mandatory reported since 2012, and will be included in the NZ ETS or a separate pricing system in 2025 (Box 2.4).

Box 2.4. New Zealand's approach to price forestry and agricultural emissions

The New Zealand Emissions Trading Scheme (NZ ETS) is the main tool for achieving the GHG emission targets set under the Zero Carbon Act. The NZ ETS covers all sectors of the economy except agriculture. This sector, accounting for 48% of New Zealand's 79 $MtCO_2$ equivalent gross emissions (2018), was exempt due to concerns that it would undermine competitiveness and lead to carbon leakage. Companies in the agricultural supply chain (e.g. meat processors, dairy processors, nitrogen fertiliser manufacturers and importers) are nonetheless required to monitor and report their agricultural emissions within the framework of the ETS.

The 2019 Climate Change Response (Emissions Trading Reform) Amendment Bill mandates pricing of agricultural emissions from 2025 and mandatory farm-level reporting obligations of livestock emissions as of 2024. The government and the agricultural sector are now working in He Waka Eke Noa (Primary Sector Climate Action Partnership) towards developing a system for farm-level pricing by 2025. In November 2021, the Partnership outlined three agricultural emissions pricing options, including a farm-level levy, a processor-level hybrid levy, and the NZ ETS, which is presented as the counterfactual option retained by the government if commitments by the sector are not met. The independent Climate Change Commission, which has a similar role to the UK Climate Change Committee, will assess progress in 2022.

Land-use change and forestry, which are included in the ETS, increased their carbon stock equivalent to reducing gross national emissions by 30% in 2018. Under the NZ ETS, forests are defined as "post-1989 forest land" or "pre-1990 forest land". Post-1989 forests may be voluntarily registered into the ETS and are eligible to earn emissions units that represent the carbon sequestered by the forest since the start of each "mandatory emissions return period" (MERP, a five-year period defined in legislation, the current is 2018-2025), but are also liable to repay units if there is a reduction in carbon stock. As of June 2018, 50% of post-1989 forest land (approximately 325 000 hectares of 690 000 hectares) had been registered in the NZ ETS. Furthermore, the majority of landowners with exotic forest land defined as "pre-1990 forest land" (approximately 1 440 000 ha) face deforestation liabilities under the NZ ETS. There are no liabilities or entitlements for business as usual forest harvest and replanting.

A simplified accounting approach as of 2021 is expected to increase incentives for participation in the ETS. Furthermore, post-1989 forestry will be registered in the NZ ETS for 50 years, and clear-felling will be prohibited during this period. These changes are estimated to add an extra 45 $MtCO_2$ stored in New Zealand's forests.

Source: Henderson, Frezal and Flynn (2020[85]); Arvanitopoulos, Garsous and Agnolucci (2021[82]); OECD, (2022[80]).

Land use, forestry and engineered emission removals

Some emissions are not possible to eliminate with current technologies, and in a number of cases it is not realistic to assume that technological progress will make it possible and affordable to eliminate them fully by 2050 (Climate Change Committee, 2020[86]). Yet, these activities, notably in food production, air transport, shipping, manufacturing and waste management will remain crucial to UK society and well-being. As countries in the world move towards net zero, residual emissions will increasingly need to be offset by removing greenhouse gases from the atmosphere, be it at home or abroad.

Producing negative emissions involves increasing the carbon stored naturally in forests, soil and wetlands through photosynthesis and engineered solutions to extract carbon from the air, exhaust or industrial and chemical processes and store it long-term or permanently. Solutions like bio-energy with carbon capture and storage and using charcoal produced by pyrolysis of biomass as a soil conditioner (Biochar) combine natural removal through photosynthesis with engineered storage.

Natural removals had a largely neutral effect on UK emissions in 2019. Forestry and woodland reduced emissions by 4% aided by the planting of 123 000 hectares of new woodland since 2010. This was cancelled out by 4% net emissions from peatland degraded by drainage for agricultural use, overgrazing and burning. The England Trees Action Plan (DEFRA, 2021[87]) committed to more than doubling tree planting to 30 000 hectares per year, while the England Peat Action Plan (DEFRA, 2021[88]) sets out to restore 35 000 hectares of peatland by 2025. These efforts are supported by legislative efforts and GBP 750 million funding from the Nature for Climate Fund. The government is also engaging with stakeholders to increase the use of timber for construction. Timber has a low carbon footprint relative to other building materials, and carbon is stored in buildings over their lifetime. For the purpose of domestic climate targets, forestry and land use is counted together with agriculture (BEIS, 2021[2]).

Measuring is complex with actual sequestration depending on a range of natural and local factors and considerable co-benefits if managed correctly. A regime with targeted subsidies within land use providing payments for various ecosystem services is therefore justified. The government is exploring ways to better measure emissions from the sector (BEIS, 2021[2]), strengthen the policy mix with direct pricing of measurable emissions in the future. However, natural sequestration bears the risk of extreme events like floods and fires releasing the stored CO_2 back into the atmosphere. This issue could be overcome, for example by a public or private insurance mechanism. Lessons could be learned from the New Zealand Emissions Trading Scheme, where forestry yearly removes CO_2 equivalent to 30% of national emissions (Box 2.4).

The United Kingdom has an ambition to sequester at least 5 Mt CO_2 per year by means of engineered greenhouse gas removals (GGR), rapidly scaling up until 2050. Prominent technologies include direct air carbon capture and storage (DACCS), bioenergy with carbon capture and storage (BECCS), Biochar, and distributing large amount of CO_2-consuming minerals on land (Enhanced weathering) or at sea (Ocean alkalinity enhancement). Variations of carbon capture and storage (CCS) technologies are technologically proven, but their cost and the lack of infrastructure to transport and permanently store the CO_2 have so far stood in the way of large-scale commercial deployment (Global CCS Institute, 2021[89]). In addition to delivering negative emissions (DACCS and BECCS), CCS has a potentially important role to play in reducing emissions from industrial and chemical processes where waste streams of greenhouse gases are not easily eliminated, from fossil fuel electricity production and in producing low-emission hydrogen from natural gas. Biochar has also been proven as a long-term, relatively low-cost means of storing carbon in soils, with considerable co-benefits in terms of soil fertility and water management, amongst others. Enhanced weathering and ocean alkalinity enhancement has a potential to remove CO_2 from the atmosphere at scale, but also entail considerable risks from the release of mineral dissolution products, calling for further research and gradually increasing the scale of trial projects (BEIS, 2021[2]; Lehmann and Joseph, 2015[90]; Bach et al., 2019[91]).

Policy efforts supporting engineered greenhouse gas removals today focus on research and innovation, as well as the designation of CCS clusters and a GBP 1 billion Carbon Capture and Storage Infrastructure Fund. This support is warranted to kick-start a sector in its infancy. Among a total 14 planned projects in the United Kingdom, two projects connected to the Humber Zero CCS cluster are at advanced stages and planned to go on line by 2028 (Global CCS Institute, 2021[89]).

Carbon capture and storage illustrates the dynamic relationship between explicit pricing and support for research, development and early technology deployment. Separating CO_2 from exhaust gases or directly from the air requires heavy capital investments. In addition comes variable costs of separation, transport, storage and monitoring. Publicly-funded R&D and demonstration projects can help bring these costs down, notably by improving technology and mapping suitable storage sites. Public coordination of the associated infrastructure or even direct investments will also help. However, most potential CCS projects do not carry any energy efficiency gains or additional revenue streams. In the absence of policy intervention, CCS therefore represents a net loss of productivity and profits. Therefore, absent an explicit or implicit price signal at least covering the variable cost, releasing CO_2 into the atmosphere will remain the better commercial decision (Box 2.5).

Box 2.5. Carbon Capture and Storage at the Sleipner West oil field (Norway) was motivated by carbon pricing

The Sleipner gas field is a natural gas field in the North Sea, about 250 kilometres west of Stavanger, Norway. Sleipner was the world's first commercial CO_2 storage project. The natural gas produced from the Sleipner West field contains up to 9% CO_2, but in order to meet export specifications and customer requirements, this has to be reduced to a maximum of 2.5%. Industry practice is to release the separated CO_2 into the atmosphere, but this would have entailed NOK 1 million per day in Norwegian CO_2 taxes. Injection costs about USD 17 per tonne CO_2.

Since 1996, the project has stored approximately one million ton of CO_2 per year into the Utsira Formation, which is a 200-250 meter thick massive sandstone capable of storing 600 billion tons of CO_2. The CO_2 is removed from the natural gas at an offshore platform before being pumped back into the ground, while the hydrocarbons are piped to land. Regular measurement and surveillance shows the storage to be safe and stable.

Source: MIT (2016[92]).

The UK ETS already incentivises carbon capture and storage from covered entities, in which case the CO_2 counts as “not emitted” from its source. The Government recognises the need for additional incentives, and aims to launch a consultation on how to develop markets and incentives for engineered greenhouse gas removals in 2022. It has launched a call for evidence together with devolved administrations exploring the UK ETS as a potential long-term market for removals (UK ETS Authority, 2022[13]). Expanding the UK ETS as widely as technically possible across emission sources while issuing removal activities regardless of sector and technology with ETS-eligible credits under the principle that a tonne is a tonne, complemented by regulations and subsidies as discussed above, would create the necessary steering structure and incentives to reach Net Zero.

Table 2.5. Policy recommendations to reach net zero

Findings (main findings in bold)	Recommendations (key recommendations in bold)
Completing the institutional set-up	
Achieving carbon neutrality will require policy to match ambition. Uncertainty regarding future policy stringency holds back investments.	**Build on the Net Zero Strategy, with further concrete deadlines, policies and priorities in line with legal targets.**
Contrary to some other G7 countries, the United Kingdom is not tracking support measures with potential environmentally harmful impacts.	Systematically track and quantify support measures with potential environmentally harmful impacts and adjust policy accordingly.
Government departments are not always coordinated and policy decisions are not always in line with climate targets.	Ensure that target-consistent carbon values are consistently applied in all cost-benefit analyses across government and systematically considered in decision making.
Implementing efficient mitigation policies across the economy with support in the population	
Private incentives to reduce emissions are inconsistent across sectors and energy sources and too low in a number of sectors, including emission removals.	**Commit to gradually expanding the UK ETS to all emitting sectors and tighten the emissions cap in line with targets.**
Carbon pricing and regulation will in the absence of flanking policies hit low-income households, those in rural areas and those with high heating needs disproportionately at the risk of triggering public resentment.	**Allocate a portion of carbon pricing revenues to schemes compensating low-income and fuel-poor households and supporting their green investments.**
Recycling revenue to support clean technologies and infrastructure increases popular support for direct pricing instruments.	**Allocate a portion of carbon pricing revenue to public investment in green infrastructure, development and deployment of green technologies, including carbon capture and storage.**
Skills could be in short supply, slowing transition and reallocation to green jobs. Flexible markets and active support reduce strain from structural change.	Invest in the skills needed for the green transition, notably within housing energy efficiency and clean heating.
Support for pricing instruments increases if people receive information about their effectiveness.	Engage in education and information campaigns increasing knowledge and awareness on how explicit pricing instruments work.
Competitive "contract for difference" auctions in renewable energy have successfully mobilised private sector investments.	Expand the use of competitive auction designs to maximise value for money of public support policies across sectors of the economy.
Addressing sector-specific context and challenges	
The net zero target and the need to strengthen energy security call for accelerated development of renewable electricity generation. The fourth allocation round of Contract for difference auctions caps allocations to the most competitive technologies.	Accelerate Contract for difference auctions for renewables by lifting caps on solar and onshore wind as well as the 5GW cap on established technologies in the fourth allocation round.
Different biases and constraints prevent households from making climate-friendly investments in heating, energy efficiency and transportation even when they are profitable. Plans for regulatory back-stops exist, but they need to be translated into concrete policies spurring early action.	**Target households' energy use with concrete regulations to phase in higher energy efficiency, clean heating and zero-emission vehicles.**
Liquidity constraints may hold back profitable investments in energy efficiency and clean housing.	**Introduce a large-scale support scheme for residential energy efficiency and clean heating systems with competitive bidding and results-based payments.**
Fossil fuels for heating is untaxed, while electricity charges are high.	Align charges on electricity and fossil fuel for heating to their respective greenhouse gas emissions.
Net zero will erode fossil fuels as a tax base with considerable fiscal consequences.	Replace the fuel duty with a new road pricing regime differentiating charges between fossil fuel and zero emission vehicles.
The low penetration of electric vehicles holds back private sector charging infrastructure investment and vice versa.	Encourage the shift towards low and zero-carbon vehicles, including with financial incentives to invest in recharging stations particularly in remote areas.
Shifting journeys away from private cars on to more sustainable modes of transport can help limit transport sector emissions.	Encourage compact development around transport nodes, and financial incentives to travel by rail, public transport shared mobility and active transport.

Agricultural emissions are in some cases difficult to measure, and political resistance to increasing cost burdens on food production is considerable.	Target agricultural support towards payments for emission reductions and other ecosystem services, supplementing an explicit carbon price on measurable agricultural emissions.
Supporting international collaboration and increasing policy ambition in emission-intensive trade exposed industries	
The United Kingdom is a forerunner in international efforts to green the financial system, but knowledge gaps remain, indicating scope for continuous improvement of regulation and supervision going forward.	Adapt financial sector regulation and supervision as climate-related risks and vulnerabilities are uncovered by stress-tests and related activities.
International cooperation to reduce emissions where it is least costly can increase cost efficiency and contribute to disseminating good practices, but may increase global emissions if the trade partner has low ambitions or fails to implement effective policies.	Engage in cooperative approaches established under the Paris agreement, conditional on credible commitments aligned with net zero in partner countries.
Loss of competitiveness for emissions intensive trade exposed industries is a concern. The risk of carbon leakage is best addressed by international coordination to secure a level playing field.	Engage actively in international efforts to implement and measure pricing and equivalent policies targeting emission intensive trade exposed industries.

References

Albrizio, S., T. Kozluk and V. Zipperer (2017), "Environmental policies and productivity growth: Evidence across industries and firms", *Journal of Environmental Economics and Management*, Vol. 81, pp. 209-226, https://doi.org/10.1016/J.JEEM.2016.06.002. [16]

Arvanitopoulos, T., G. Garsous and P. Agnolucci (2021), "Carbon leakage and agriculture: A literature review on emissions mitigation policies", *OECD Food, Agriculture and Fisheries Papers*, No. 169, OECD Publishing, Paris, https://doi.org/10.1787/9247f1e7-en. [84]

Bach, L. et al. (2019), "CO2 Removal With Enhanced Weathering and Ocean Alkalinity Enhancement: Potential Risks and Co-benefits for Marine Pelagic Ecosystems", *Frontiers in Climate*, Vol. 0, p. 7, https://doi.org/10.3389/FCLIM.2019.00007. [91]

BEIS (2021), *Government conversion factors for company reporting of greenhouse gas emissions*, Department for Business, Energy and Industrial Strategy, https://www.gov.uk (accessed on 11 January 2022). [70]

BEIS (2021), *Heat and buildings strategy*, Department for Business, Energy and Industrial Strategy, https://www.gov.uk (accessed on 11 January 2022). [62]

BEIS (2021), *Net Zero Strategy: Build Back Greener*, Department for Business, Energy & Industrial Strategy, https://www.gov.uk (accessed on 6 January 2022). [2]

BEIS (2021), *UK Hydrogen Strategy*, Department for Business, Energy & Industrial Strategy, https://www.gov.uk (accessed on 13 January 2022). [58]

BEIS (2021), *Valuing greenhouse gas emissions in policy appraisal - GOV.UK*, Department for Business, Energy & Industrial Strategy, https://www.gov.uk (accessed on 4 January 2022). [25]

BEIS (2020), *Powering our Net Zero Future. Energy White Paper*, HM Government Energy Department, https://www.gov.uk (accessed on 13 January 2022). [55]

BEIS and Ofgem (2021), *Transitioning to a net zero energy system: smart systems and flexibility plan 2021*, Department for Business, Energy and Industrial Strategy and Ofgem, https://www.gov.uk (accessed on 13 January 2022). [56]

BEIS, Ofgem and Innovate UK (2021), *Digitalising our energy system for net zero: strategy and action plan*, Department for Business, Energy and Industrial Strategy, Ofgem and Innovate UK, Policy paper, https://www.gov.uk (accessed on 13 January 2022). [57]

BoE (2022), *Results of the 2021 Climate Biennial Exploratory Scenario (CBES)*, https://www.bankofengland.co.uk/stress-testing/2022/results-of-the-2021-climate-biennial-exploratory-scenario (accessed on 24 May 2022). [38]

BoE (2021), *Greening our Corporate Bond Purchase Scheme (CBPS)*, Bank of England, https://www.bankofengland.co.uk (accessed on 5 January 2022). [39]

BoE (2021), *Key elements of the 2021 Biennial Exploratory Scenario: Financial risks from climate change*, Bank of England, https://www.bankofengland.co.uk (accessed on 4 January 2022). [37]

BoE (2021), *Options for greening the Bank of England's Corporate Bond Purchase Scheme*, Bank of England, https://www.bankofengland.co.uk (accessed on 5 January 2022). [27]

BoE (2019), *Enhancing banks' and insurers' approaches to managing the financial risks from climate change*, Bank of England, https://www.bankofengland.co.uk (accessed on 4 January 2022). [33]

BoE (2019), *Insurance Stress Test 2019*, Bank of England, https://www.bankofengland.co.uk (accessed on 4 January 2022). [36]

Bolton, P. (2021), *Petrol and diesel prices*, House of Commons Library. [72]

Burke, J. et al. (2020), *Policy brief: Distributional impacts of a carbon tax in the UK*. [53]

Card, D. et al. (2004), *Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980-2000*, University of Chicago Press. [18]

Caselli, F., A. Ludwig and R. Van Der Ploeg (2021), *No Brainers and Low-Hanging Fruit in National Climate Policy*, http://www.janakreisl.de. [1]

CFRF (2020), "Climate Financial Risk Forum guide 2020 Summary", https://www.fca.org.uk/publication/corporate/climate-financial-risk-forum-guide-2020-summary.pdf (accessed on 4 January 2022). [35]

Climate Action Tracker (2021), *Warming Projections Global Update*, Climate Analytics and New Climate Institute. [43]

Climate Assembly UK (2020), *The Path to Net Zero*, Climate Assembly UK, https://www.climateassembly.uk/recommendations/index.html (accessed on 24 January 2022). [83]

Climate Change Committee (2021), *2021 Progress Report to Parliament*, Climate Change Committee, https://www.theccc.org.uk (accessed on 24 August 2021). [3]

Climate Change Committee (2020), *Reducing UK emissions: 2020 Progress Report to Parliament*, Climate Change Committee, London, https://www.theccc.org.uk. [11]

Climate Change Committee (2020), *The Sixth Carbon Budget*, Climate Change Committee, http://www.theccc.org.uk/publications (accessed on 14 January 2022). [86]

Corlett, A. and J. Marshall (2022), *Shrinking footprints The impacts of the net zero transition on households and consumption*. [67]

D'Archangelo, F. et al. (2022), "A framework to decarbonise the economy", *OECD Economcs Department Working Papers* 31, https://doi.org/10.1787/4e4d973d-en. [9]

Dechezleprêtre, A. et al. (2022), "Understanding public acceptability of climate change mitigation policies across OECD and non-OECD countries (forthcoming)". [10]

Dechezlepretre, A. and M. Cervantes (2022), "Driving low-carbon innovations for climate neutrality". [46]

DEFRA (2021), *England Peat Action Plan*, Department for Environment, Food and Rural Affiars, https://www.gov.uk (accessed on 18 January 2022). [88]

DEFRA (2021), *England Trees Action Plan 2021 to 2024*, Department for Environment, Food and Rural Affiars, https://www.gov.uk (accessed on 18 January 2022). [87]

Department for Transport (2021), *Green Paper on a New Road Vehicle CO 2 Emissions Regulatory Framework for the United Kingdom*, Department for Transport. [74]

Department for Transport (2021), *Greenhouse Gas Emissions by Transport Mode; United Kingdom*, Department for Transport, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984823/env0201.ods (accessed on 18 November 2021). [68]

Department for Transport (2021), *Transitioning to zero emission cars and vans: 2035 delivery plan*, Department for Transport and Office for Zero Emission Vehicles, https://www.gov.uk (accessed on 10 January 2022). [73]

Department for Transport (2021), *Transport decarbonisation plan*, Department for Transport, https://www.gov.uk (accessed on 17 January 2022). [79]

European Commission (2021), *EU-UK Trade and Cooperation Agreement*, Publication office of the EU, https://eur-lex.europa.eu (accessed on 6 January 2022). [23]

European Commission (2021), *Proposal for a regulation of the European Parliament and of the Council establishing a carbon border adjustment mechanism*, Publication office of the EU. [52]

European Commission (2020), *Report from the Commission on the availability of hydrofluorocarbons on the Union market*, European Commission, https://ec.europa.eu (accessed on 10 January 2022). [80]

Gillingham, K., R. Newell and K. Palmer (2009), "Energy Efficiency Economics and Policy", https://doi.org/10.1146/annurev.resource.102308.124234. [64]

Global CCS Institute (2021), *Global status of CCS 2021*, https://www.globalccsinstitute.com (accessed on 19 January 2022). [89]

Guo, J., D. Kubli and P. Saner (2021), *The economics of climate change: no action not an option*, Swiss RE, Zurich. [5]

Henderson, B., C. Frezal and E. Flynn (2020), "A survey of GHG mitigation policies for the agriculture, forestry and other land use sector", *OECD Food, Agriculture and Fisheries Papers*, No. 145, OECD Publishing, Paris, https://doi.org/10.1787/59ff2738-en. [85]

HM Government (2022), *British Energy Security Strategy Secure, clean and affordable British energy for the long term*. [54]

HM Government (2021), *Green Jobs Taskforce - Report to Government, Industry and the Skills sector*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf (accessed on 7 March 2022). [20]

HM Government (2021), *Heat and Buildings Strategy*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1044598/6.7408_BEIS_Clean_Heat_Heat___Buildings_Strategy_Stage_2_v5_WEB.pdf (accessed on 20 January 2022). [65]

HM Government (2020), *The Ten Point Plan for a Green Industrial Revolution - Building back better, supporting green jobs, and accelerating our path to net zero*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf (accessed on 7 March 2022). [21]

HMT (2021), *Net Zero Review : Analysis exploring the key issues.*, HM Treasury, https://www.gov.uk (accessed on 4 January 2022). [6]

HMT (2021), *Recommendations for the Financial Conduct Authority: March 2021*, HM Treasury, https://www.gov.uk (accessed on 4 January 2022). [31]

HMT (2021), *Recommendations for the Prudential Regulation Committee*, HM Treasury, https://www.gov.uk (accessed on 4 January 2022). [30]

HMT (2021), *Remit and recommendations for the Financial Policy Committee – March 2021*, HM Treasury. [29]

HMT (2021), *Remit for the Monetary Policy Committee - March 2021*, HM Treasury. [28]

HMT (2021), *UK Government Green Financing Framework*, HM Treasury, https://www.gov.uk (accessed on 4 January 2022). [32]

HMT (2020), *Green Book Review 2020: Findings and response CP331*, http://www.gov.uk/official-documents. (accessed on 7 March 2022). [24]

HMT (2020), *Net Zero Review: Interim report*, HM Treasury. [48]

HMT (2020), *The Green Book: appraisal and evaluation in central government - GOV.UK*, HM Treasury, https://www.gov.uk (accessed on 4 January 2022). [26]

IEA (2021), *Global EV Outlook 2021*, International Energy Agency, https://www.iea.org/reports/global-ev-outlook-2021. [75]

IEA (2021), *World Energy Outlook 2021, International Energy Agency*, http://www.iea.org/weo (accessed on 10 January 2022). [45]

IEA (2018), *The Future of Petrochemicals Towards more sustainable plastics and fertilisers*, International Energy Agency, http://www.iea.org (accessed on 13 January 2022). [59]

IMF and OECD (2021), *Tax Policy and Climate Change*, OECD Publishing, http://www.oecd.org (accessed on 20 January 2022). [50]

ITF (2021), *Decarbonising Air Transport Acting Now for the Future Decarbonising Transport*, International Transport Forum, http://www.itf-oecd.org (accessed on 18 November 2021). [93]

ITF (2018), *The Social Impacts of Road Pricing*, International Transport Forum, http://www.itf-oecd.org (accessed on 18 November 2021). [71]

LCCC (2021), *Low Carbon Contracts Company (LCCC) Annual Report 2020/21*, Low Carbon Contracts Company, https://www.lowcarboncontracts.uk/index.php/publications/low-carbon-contracts-company-lccc-annual-report-202021 (accessed on 24 January 2022). [47]

Lehmann, J. and S. Joseph (2015), *Biochar for environmental management : science, technology and implementation*, Earthscan from Routledge. [90]

Li, S. et al. (2017), "The Market for Electric Vehicles: Indirect Network Effects and Policy Design", https://doi.org/10.1086/689702. [78]

Lyons, G., A. Curry and C. Rohr (2021), "Decarbonising UK Transport Final report and technology roadmaps". [77]

Masnadi, M. et al. (2018), "Global carbon intensity of crude oil production", *Science*, Vol. 361/6405, pp. 851-853, https://doi.org/10.1126/SCIENCE.AAR6859. [60]

Ministry of Housing Communities and Local Government (2021), *English Housing Survey Energy Report 2019 - 2020*. [66]

MIT (2016), *Sleipner Fact Sheet: Carbon Dioxide Capture and Storage Project*, https://sequestration.mit.edu/tools/projects/sleipner.html (accessed on 25 August 2021). [92]

Nachtigall, D. et al. (2021), "The economic and environmental benefits from international co-ordination on carbon pricing: Insights from economic modelling studies", *OECD Environment Working Papers*, No. 173, OECD Publishing, Paris, https://doi.org/10.1787/d4d3e59e-en. [49]

NAO (2021), *Environmental Tax Measures*, National Audit Office, London, https://www.nao.org.uk/report/environmental-tax-measures/. [22]

NGFS (2021), *NGFS Glasgow Declaration*, Network of Central Banks and Supervisors for greening the Financial System, https://www.ngfs.net (accessed on 4 January 2022). [40]

OBR (2021), *Fiscal risks report – July 2021*, Office for Budget Responsibility, https://obr.uk/frr/fiscal-risks-report-july-2021/ (accessed on 14 December 2021). [7]

OECD (2022), *Agricultural Policy Monitoring and Evaluation (forthcoming)*, OECD Publishing, Paris. [82]

OECD (2022), *OECD Environmental Performance Reviews: United Kingdom 2022 (forthcoming)*, OECD Publishing. [4]

OECD (2021), *Assessing the Economic Impacts of Environmental Policies: Evidence from a Decade of OECD Research*, OECD Publishing, Paris, https://doi.org/10.1787/bf2fb156-en. [14]

OECD (2021), *OECD Economic Surveys Denmark 2021*, OECD Publishing, Paris. [15]

OECD (2021), *OECD Economic Surveys: France 2021*, OECD Publishing, Paris, https://doi.org/10.1787/289a0a17-en. [12]

OECD (2021), *OECD Skills Outlook 2021: Learning for Life*, OECD Publishing, Paris, https://doi.org/10.1787/0ae365b4-en. [19]

OECD (2021), *Transport Strategies for Net-Zero Systems by Design*, OECD Publishing, Paris, https://doi.org/10.1787/0a20f779-en. [69]

OECD (2020), *Climate Policy Leadership in an Interconnected World What Role for Border Carbon Adjustments?*, OECD Publishing. [51]

OECD (2019), *OECD Economic Surveys: Norway 2019*, OECD Publishing, Paris, https://doi.org/10.1787/c217a266-en. [76]

OECD (2019), *Taxing Energy Use 2019: Using Taxes for Climate Action*, OECD Publishing, Paris, https://doi.org/10.1787/058ca239-en. [63]

OECD (2014), *The Governance of Regulators*, OECD Best Practice Principles for Regulatory Policy, OECD Publishing, Paris, https://doi.org/10.1787/9789264209015-en. [44]

Pareliussen, J., A. Saussay and J. Burke (2022), "Macroeconomic and distributional consequences of net zero policies in the United Kingdom", *OECD Economcs Department Working Papers (forthcoming), OECD Publishing, Paris*. [8]

PRA (2021), *Climate-related financial risk management and the role of capital requirements*. [34]

Sánchez-Bastardo, N., R. Schlögl and H. Ruland (2021), "Methane Pyrolysis for Zero-Emission Hydrogen Production: A Potential Bridge Technology from Fossil Fuels to a Renewable and Sustainable Hydrogen Economy", *Industrial & Engineering Chemistry Research*, Vol. 60/32, pp. 11855-11881, https://doi.org/10.1021/ACS.IECR.1C01679. [61]

Stewart, C. et al. (2021), "Trends in UK meat consumption: analysis of data from years 1-11 (2008-09 to 2018-19) of the National Diet and Nutrition Survey rolling programme", https://doi.org/10.1016/S2542-5196(21)00228-X. [81]

ThreeME (2022), *Home | threeme*, https://www.threeme.org/ (accessed on 22 March 2022). [17]

UK ETS Authority (2022), "Developing the UK Emissions Trading Scheme (UK ETS) A joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland", http://gov.uk (accessed on 24 May 2022). [13]

UNFCCC (2021), *Cooperative Implementation*, United Nations Framework Convention on Climate Change, https://unfccc.int/process/the-paris-agreement/cooperative-implementation#eq-1 (accessed on 14 January 2022). [42]

UNFCCC (2015), *Paris Agreement text English*, United Nations Framework Convention on Climate Change. [41]

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UNITED KINGDOM

The UK economy recovered from the COVID-19 shock thanks to emergency support measures protecting jobs and incomes and a rapid vaccine rollout, but is slowing amid persisting supply shortages and rising inflation. Fiscal policy has to balance gradual tightening with providing well-targeted temporary support to households who are vulnerable to rising costs of living, supporting growth and addressing significant investment needs. Accelerating progress towards net zero is fundamental to enhance energy security. The United Kingdom is among world leaders in reducing domestic greenhouse gas emissions, has a strong institutional framework and a broad political consensus supporting the target to reduce net emissions to zero by 2050. Continuing progress towards carbon neutrality requires policy to match ambition. Expanding pricing instruments is an essential building block to reach targets, but can be even more effective if complemented by well-designed sectoral regulation and subsidies, and more acceptable if implemented once energy prices have started to come down from historically high levels. Policy reforms to support economic reallocation, compensation of low-income households and investment in green infrastructure and new technologies can stimulate productivity growth, contribute to reducing disparities across UK regions and increase public support for climate policy.

SPECIAL FEATURE: REACHING NET ZERO

Volume 2022/16
August 2022

PRINT ISBN 978-92-64-72540-9
PDF ISBN 978-92-64-31731-4

ISSN 0376-6438
2022 SUBSCRIPTION
(18 ISSUES)

9 789264 725409