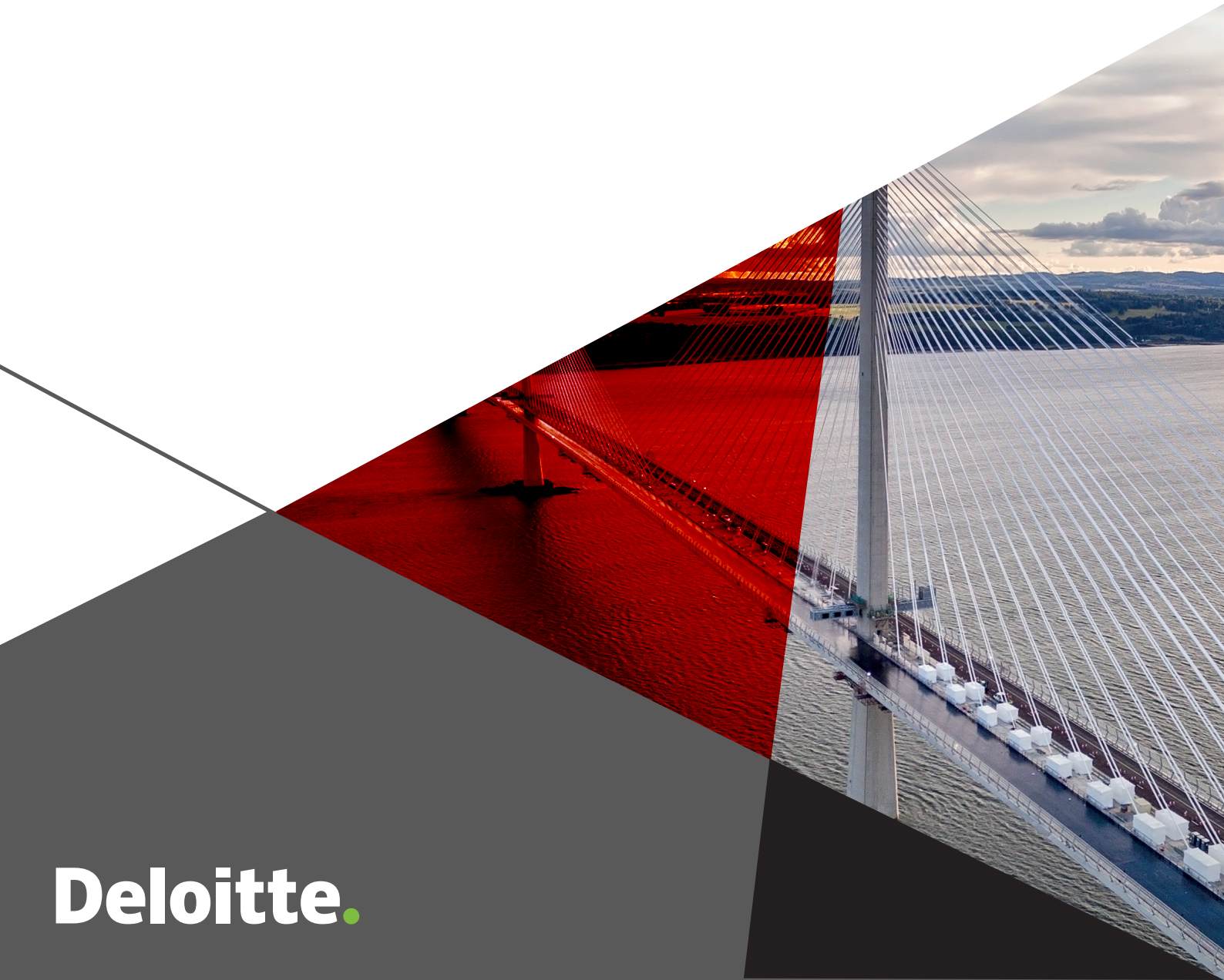


Fraser of Allander Institute

Economic Commentary

Vol 45 No 3



Foreword

The Scottish economy experienced welcomed growth during Q2 with many parts of it returning to a form of normality as restrictions eased. However, while the pace of recovery has surprised many, there are signs momentum is slowing down which is further underlined in the latest Commentary.

This is, in part, due to the continued dominance of the Delta variant, which led to rapidly rising case rates in Scotland as schools returned, as well as supply shortages and recruitment challenges that have hurt many industries as they endeavour to bounce back.

While the impact of the pandemic is by no means over, recovery has certainly moved into a new phase; one marked by slower, more constrained growth and higher inflation. Although there are still risks, particularly as government support winds down, on balance it is likely that global recovery will continue as we move forward¹.

This outlook will be welcomed by many. However, another major crisis, climate change, is already changing behaviours within society as well as the agendas and strategies of business. Widely perceived as the biggest imminent threat facing us all, the pandemic offered a glimpse of the scale of change that would be required to mitigate some of the worst effects of climate change. As the world turned to isolation as a strategy for limiting the spread of the virus, the result was cleaner air and skies, as well as a drop in global emissions by around 7%. These effects, albeit temporary, have put renewed focus on how to build back greener.

For businesses, climate change is no longer a distant threat. This was reflected in our recent research into views on environmental sustainability which found that over 30% of business executives are already feeling the operational impact of climate-related disasters². Against this backdrop, the pandemic has also led to 65% of organisations pushing or cutting back on environmental initiatives in some respect.

Looking to the future, it's essential business leaders reverse this trend as a priority and recognise that climate change is going to be the leading concern for consumers, activists, employees, and shareholders alike. There is increasing expectation on organisations to commit to progressive net zero goals, and inaction could present a serious risk to the bottom line for businesses.

Environmental commitments are also likely to be enforced on businesses from a regulatory perspective with governments seeking to introduce stricter rules and guidelines aimed at contributing towards global climate change targets.

The risks of delay are clear, but it's crucial that businesses also look at the opportunities that responding to climate change can bring to their organisation. Many of the innovative strategies and skills deployed during the pandemic should be considered as a catalyst for helping business leaders and organisations to actively work towards climate change targets. There will also be opportunities for new businesses to grow in this space, as the possibilities offered by the green economy are accelerated.

¹ Where next for the recovery: [A view from London](#).

² [2021 Climate Check: Business' Views on Environmental Sustainability](#).

This will be supported by new ways of living, working and consumption, all of which will be required for the growth of a greener economy. Deloitte recently led a consortium on an international COP26 project “Futures We Want” which saw academics, business, civil society, and citizens across the globe work together to set out their visions for climate resilient, feasible and desirable global net zero futures for nations across the world. A truly collaborative effort, the visions for the UK makes the most of its resources as a coastal nation, embracing solar, wind and tidal energy and it shows how the UK can also champion its role as part of a global net zero community that trades with and learns from other nations.

Ultimately, business leaders will need to take an entrepreneurial approach over the long-term, employing creativity and innovation at a scale and pace not seen since the industrial revolution. This will be underpinned by outcomes from the COP26 summit where world leaders will need to agree very bold targets to reduce global greenhouse gas emissions, and outline how this will be achieved, which in turn, will help give businesses a clearer call to action.

This will require a comprehensive review of all operations to ensure businesses are rewired and prepared for the coming changes. However, by working collectively it is possible to turn net zero commitments into tangible actions and help everyone play their part in progressing to a more sustainable future.

Steve Williams
Senior Partner for Scotland and Northern Ireland
Deloitte
September 2021

Deloitte.

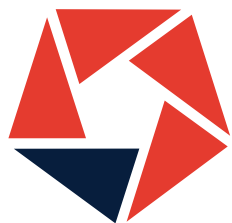
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Summary

Today feels like an important day in the recovery from the pandemic. Today is the last day of the Coronavirus Job Retention Scheme, an essential policy which has protected jobs throughout the pandemic. The removal of this scheme is emblematic of the wider ambition of the Government to get the economy back to more normal ways of operating.

Although the economy contracted in July, growth was significantly faster during Q2 than expected, leading forecasts for 2021 and 2022 to be revised up.

To reflect this, we have brought forward our growth expectations. We are now expecting growth of 6.5% in 2021, followed by 4.8% in 2022, before returning to more normal levels of growth in 2023 of 1.4%. This will mean the economy will return to pre-pandemic levels by April 2022 – two years after the start of the pandemic – but three months earlier than we thought in our commentary in June.

Despite this positivity, there are still a number of risks to the downside for the forecast. It is unknown how many of the currently furloughed workers will become unemployed or unable to secure the type and level of work they want. This uncertainty coincides with the cancellation of the Universal Credit uplift which will bring additional financial hardship to around half a million families in Scotland.

As well as the risk of joblessness, labour shortages are becoming clear in many sectors, threatening goods shortages and adding to wider inflationary risks. Consumer confidence, so important for the improvement in outlook over the last six months, could start to wane as prices across the economy rise.

Earlier this month, the Scottish Government, now in a cooperation agreement with the Greens, set out their Programme for Government, including a focus on Covid recovery, tackling child poverty and of course carbon reduction to meet Scotland's ambitious climate change targets.

In this edition, we focus on what the latest data tells us about the energy use in this country and progress towards these targets, to set the scene for COP 26 taking place this November in Glasgow. Given the IPCC report's dire warnings recently, this is widely seen as the last chance for world leaders to halt warming at 1.5C above pre-industrial levels, to avoid the worst outcome for the planet.

The Scottish Government has selected a number of indicators to monitor the achievement of environmental outcomes for Scotland, measured through the National Performance Framework. Despite the focus on the environment in recent years, many of these measures are showing little improvement, if any at all.

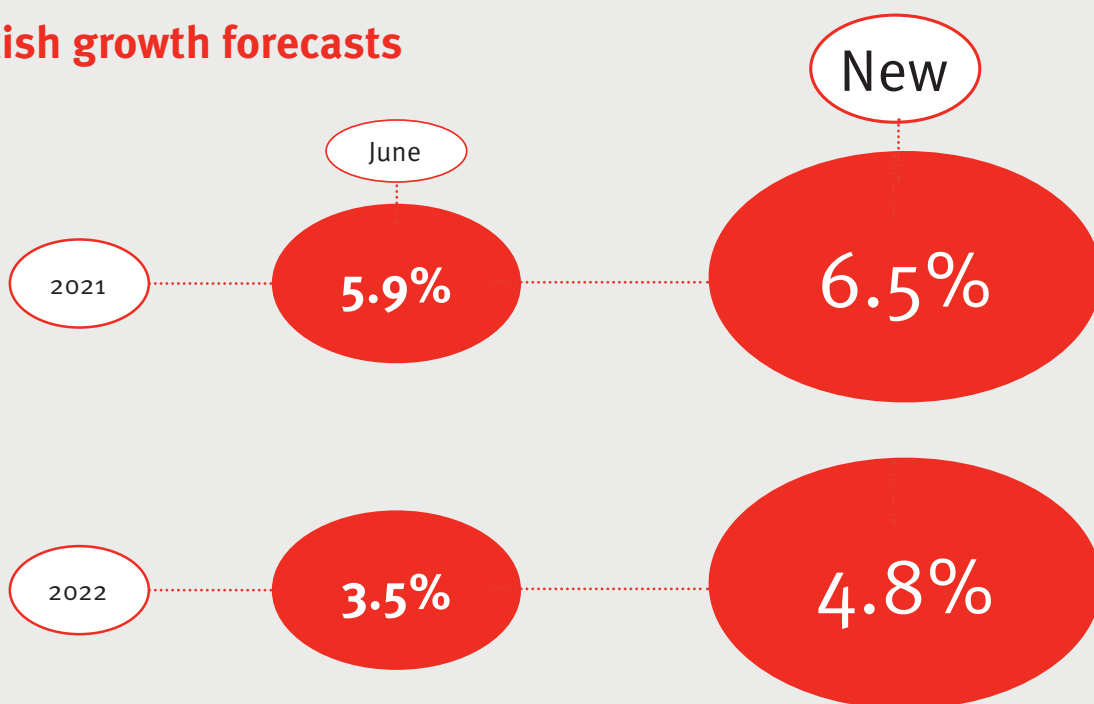
It is clear that there needs to be a real step change in policy making and ambition in order to achieve these world leading targets.

Fraser of Allander Institute
September 2021

State of the economy

Indicator	% of Feb 2020 levels	Rate	Change on previous month / quarter	Performance	Latest data
GDP					
<i>Total</i>	97.6%		-0.2%	▼	July 2021
<i>Production</i>	96.3%		-3.0%	▼	July 2021
<i>Construction</i>	95.9%		-0.4%	▼	July 2021
<i>Services</i>	98.0%		0.4%	▲	July 2021
Labour Market					
<i>Employment rate</i>		74.1%	-1.3 p.p.	▼	May to July 2021
<i>Unemployment rate</i>		4.3%	0.5 p.p.	▲	May to July 2021

Scottish growth forecasts



	Trough	Return to pre-crisis level	Recovery time
<i>June Commentary</i>	<i>Apr-20</i>	<i>July-22</i>	<i>2 years, 3 months</i>
New	Apr-20	Apr-22	2 years

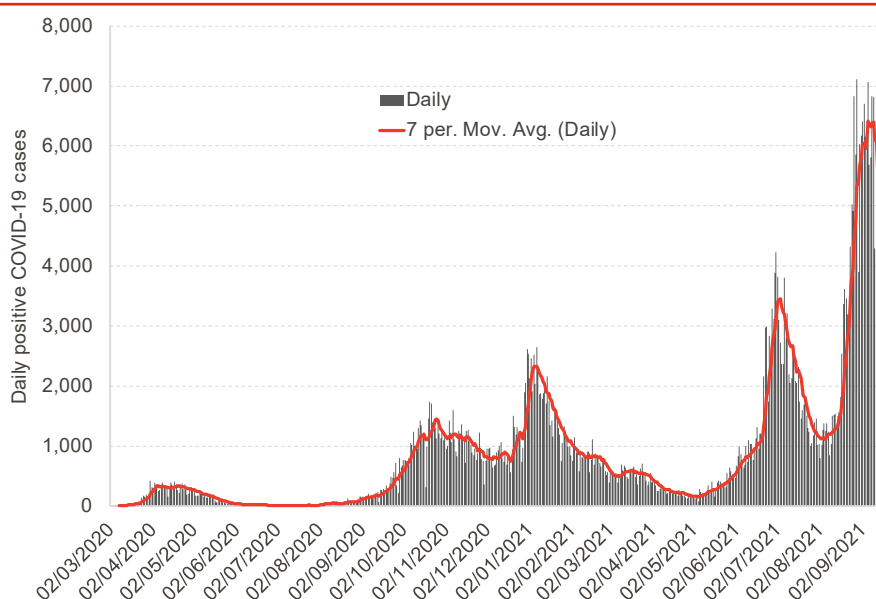
Outlook and Appraisal

Scottish Economy

The Scottish economy moved beyond level 0 on the 9th of August, which saw nightclubs and other entertainment venues open their doors for the first time in over 500 days.

The end of lockdown restrictions, coupled with the return of schools in mid-August has driven a rise in COVID-19 case numbers. See Chart 1.

Chart 1: Number of reported daily new positive cases and 7-day rolling average, Scotland, 2nd March 2020 – 21st September 2021



Source: Scottish Government

Vaccinations have suppressed COVID-19 hospitalisations however, there remains a significant share of young people yet to receive their first dose. See Chart 2.

With the COVID certification scheme due to come into force on the 1st October, nightclubs and large events will see everyone over the age of 18 having to prove that they have had both doses of the COVID-19 vaccination - undoubtedly a challenge facing the hospitality sector come next month.

Despite this, summer has seen the hospitality sector bounce back fairly quickly.

Since May, the accommodation and food services industry has grown by over a fifth, leaving it 15% below pre-pandemic levels in July. See Chart 3.

However, the latest GDP data for Scotland shows that the Scottish economy as a whole contracted by 0.2% in July, leaving the Scottish economy 2.4% below pre-pandemic (February 2020) levels.

Over the same period, the UK economy expanded by 0.1%, meaning the UK economy as a whole is now 2.1% below pre-pandemic levels, and its recovery is slightly ahead of Scotland's.

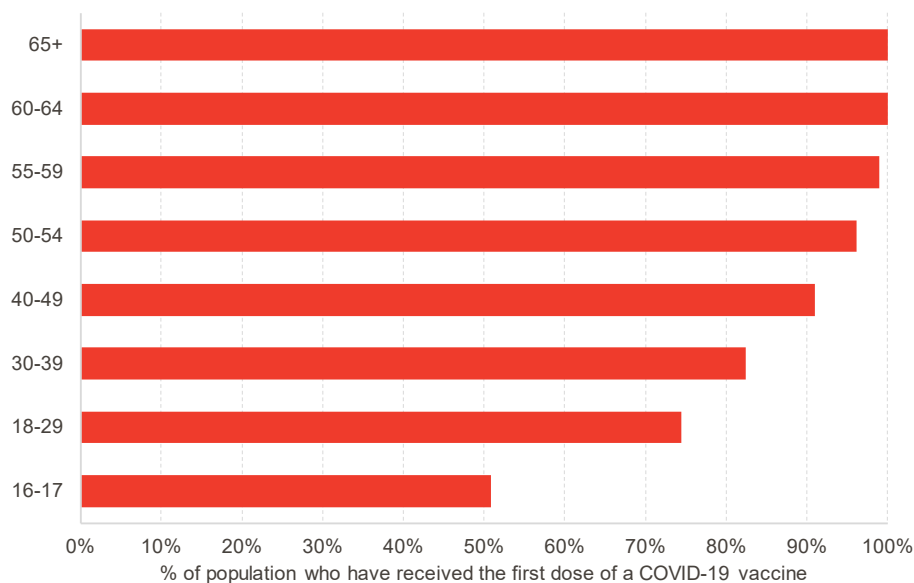
Much of Scotland's contraction in GDP was driven by the production sector - which declined by 3% in July. The electricity and gas supply subsector of production fell by almost 10% in the latest month, caused by low wind and hydro electricity production. The UK's production sector overall increased by 1.2% over the same period, with a contraction in electricity and gas of just 0.9%.

Again, construction contracted in July however, this sector has followed a similar trend to the UK overall this summer.

Both Scotland and the UK's GDP performance in July indicate that the economic recovery from COVID-19 will not be a straight line, and economic growth is not guaranteed even with the easing of restrictions.

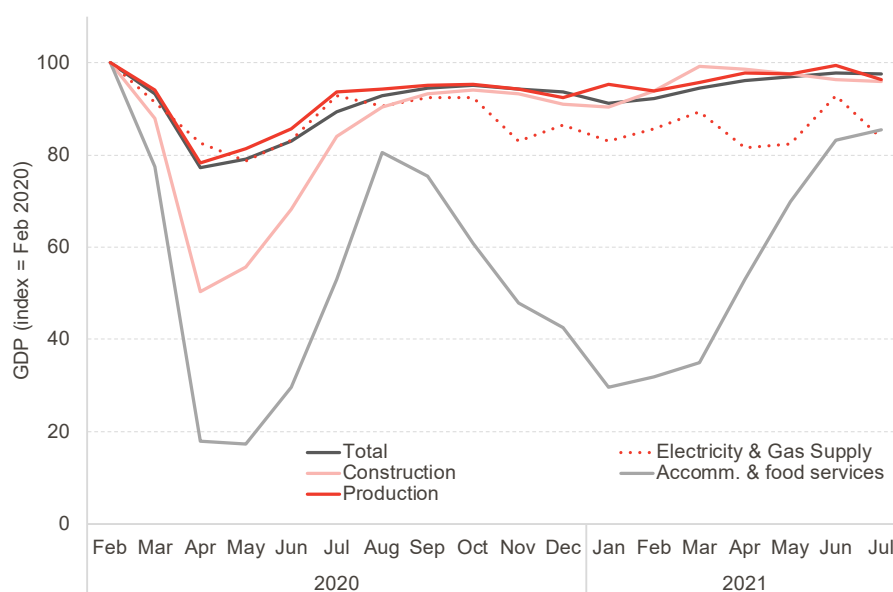
Challenges remain as both economies work towards getting production back up to pre-pandemic levels.

Chart 2: % of population who have received their first dose of a COVID-19 vaccine, Scotland, 31st August 2021



Source: Scottish Government

Chart 3: GDP Index, Scotland, February 2020 - July 2021



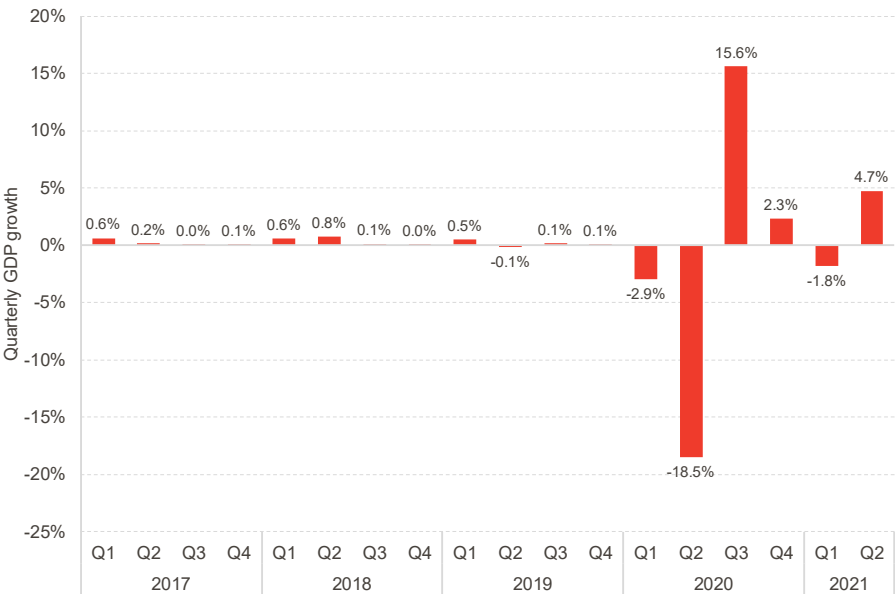
Source: Scottish Government

Overall, in Q2 of this year, GDP expanded by 4.7% - around 0.1-percentage points (p.p.) below the UK's growth for the quarter. See Chart 4.

There was growth across Production, Services and Construction sectors in the latest quarter. Services drove much of the growth in Q2, expanding by 5.2%, with hotels and catering and government services contributing 2.2-p.p. and 1.6-p.p. to Scotland's overall Q2 growth.

On the year, GDP increased by 21.7%. Again, Scotland's growth lagged the UK's slightly, with growth 0.5-p.p. below the UK's.

Chart 4: Quarterly GDP Growth, Scotland, 2017 Q1 - 2021 Q2

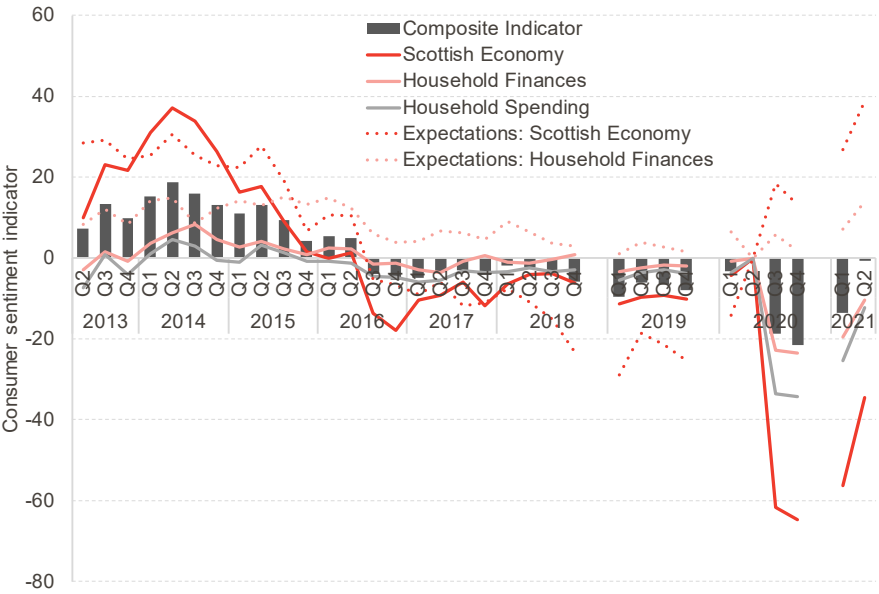


Source: Scottish Government

Consumer sentiment continues to improve across the economy, with the latest indicator at -0.8 – the strongest it has been since the pandemic began. See Chart 5.

Whilst current conditions remain poor – albeit they are continually improving – sentiment around the next 12 months of the Scottish economy and household finances continue to increase.

Chart 5: Consumer Sentiment indicators, Scotland, 2013 Q2 – Q2 2021



Source: Scottish Government

Real time indicators of economic performance

Traditional economic indicators, such as GDP, are often available with a lag. During fast developing crises, such as the COVID-19 pandemic, there is a need to track developments in the economy at a higher frequency.

During the pandemic, the FAI has been tracking several real time indicators which are able to provide a timely picture about the state of the Scottish, and UK, economy.

The real time indicator dashboard shown below summarises recent developments in some key real time indicators. See Diagram 1.

Diagram 1: Real time indicators dashboard

Indicator	Change on pre-pandemic	% change on previous month	Performance	Latest data
GDP	-2.4%	-0.2%	▼	July 2021
Production	-3.7%	-3.0%	▼	July 2021
Construction	-4.1%	-0.4%	▼	July 2021
Services	-2.0%	+0.4%	▲	July 2021
Indicator	Current level/Percentage	% change on previous period	Performance	Latest data
Share of businesses currently trading	98.7%	+0.3 p.p.	▲	23rd Aug - 5th Sep
Share of businesses reporting lower levels of turnover	27.1%	-1.7 p.p.	▼	23rd Aug - 5th Sep
Share of businesses with no or less than 3 months of cash reserves	17.5%	-1.1 p.p.	▼	9th Aug - 22nd Aug
Share of businesses with staff on furlough	31.0%	-4.5 p.p.	▼	23rd Aug - 5th Sep
Share of employees on furlough	3.3%	-1.2 p.p.	▼	23rd Aug - 5th Sep
Claimant Count	5%	- 0.1 p.p.*	▼	July 2021
Average Salaries	£31,567	-0.7%*	▼	July 2021
Number of Vacancies	50,546	+5.6%*	▲	July 2021

* = change on month

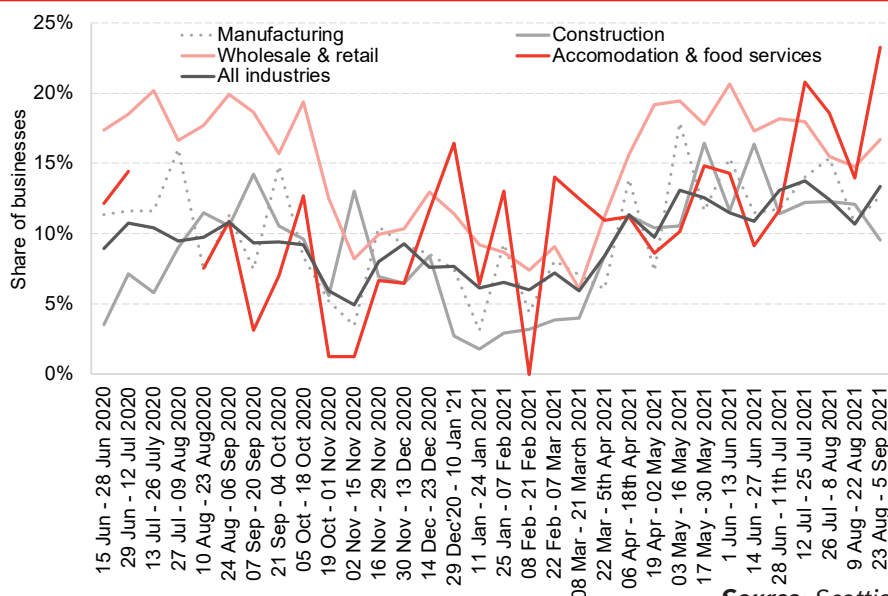
Source: Scottish Government Monthly GDP, Scottish Government BICS, ONS (NOMIS), Adzuna

What does the latest real time data tell us?

Growth of turnover in the accommodation and food services sector has significantly improved since July, when Scotland moved beyond level o.

By early September, almost a quarter of firms in the accommodation and food services sector experienced increased turnover, up from only 10% in June. See Chart 6.

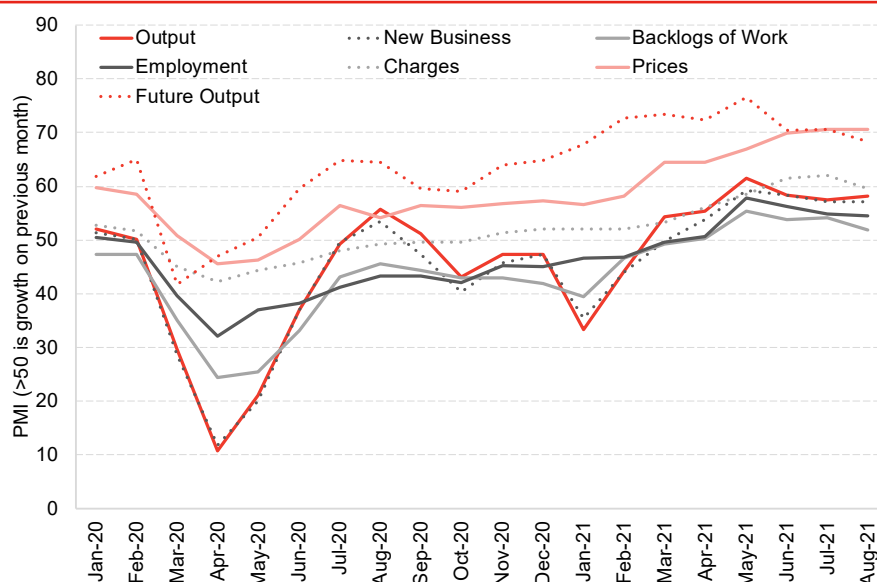
Chart 6: Share of firms with increased turnover compared to what they would normally expect at that time of the year, Scotland, 15th June 2020 – 5th September 2021



Source: Scottish Government, BICS

Additionally, all indicators in the Purchasing Managers Index have typically been growing since April 2021. See Chart 7.

Chart 7: Purchasing Managers Index, Scotland, January 2020 – August 2021



Source: IHS Markit

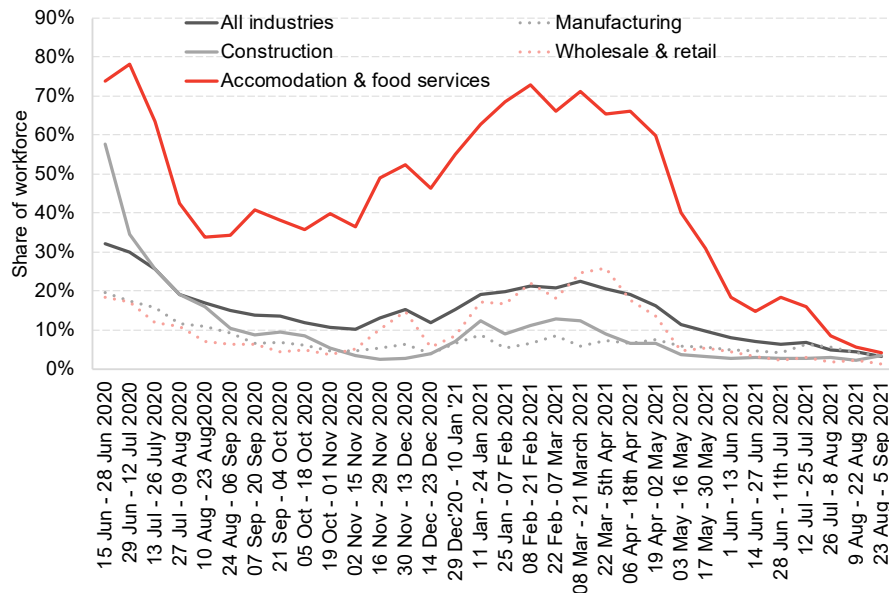
However, higher demand and potential shortages in supply chains have put upward pressure on prices.

The pace of price growth has been consistently increasing month-on-month. Expectations of future output has also been growing, but the pace has slowed down slightly since May.

The increase in demand and higher turnover has allowed firms to bring workers back from furlough.

As of the 5th September, around 3.3% of all workers were on furlough, with the differential between sectors narrowing significantly over the past few months. See Chart 8.

Chart 8: Estimated share of workforce on furlough by industry, Scotland, 15th June 2020 – 5th September 2021

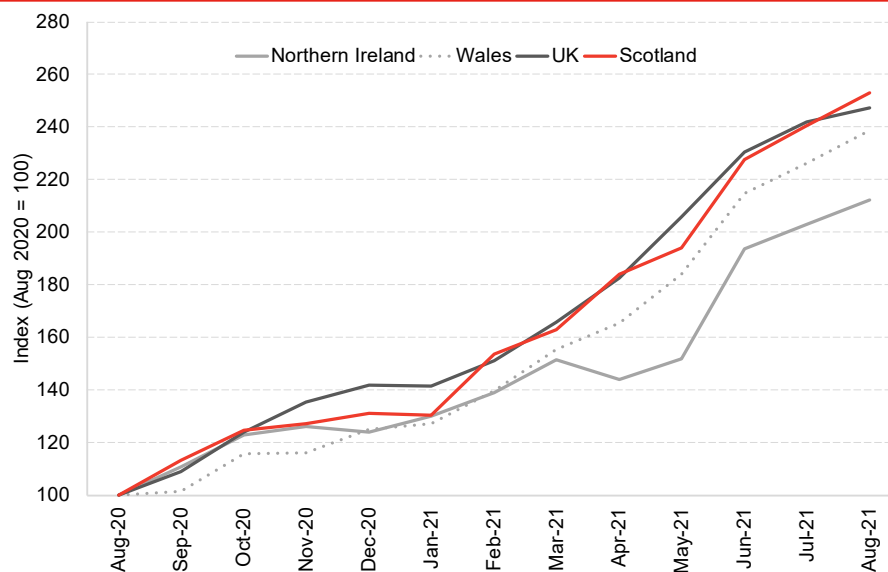


Source: Scottish Government, BICS

With a pickup in economic activity, the demand for labour has increased.

In August, the number of vacancies in Scotland was over twofold greater than last summer – the fastest growing in the UK. See Chart 9.

Chart 9: Number of advertised vacancies, UK and devolved nations, August 2020 – August 2021



Source: Adzuna Labour Market Stats

Although an increase in vacancies is a positive sign of Scotland's recovery, there are growing concerns of a mismatch between the skills demanded for vacancies and the skillsets of those searching for jobs.

This is against the backdrop of an already highly uncertain labour market.

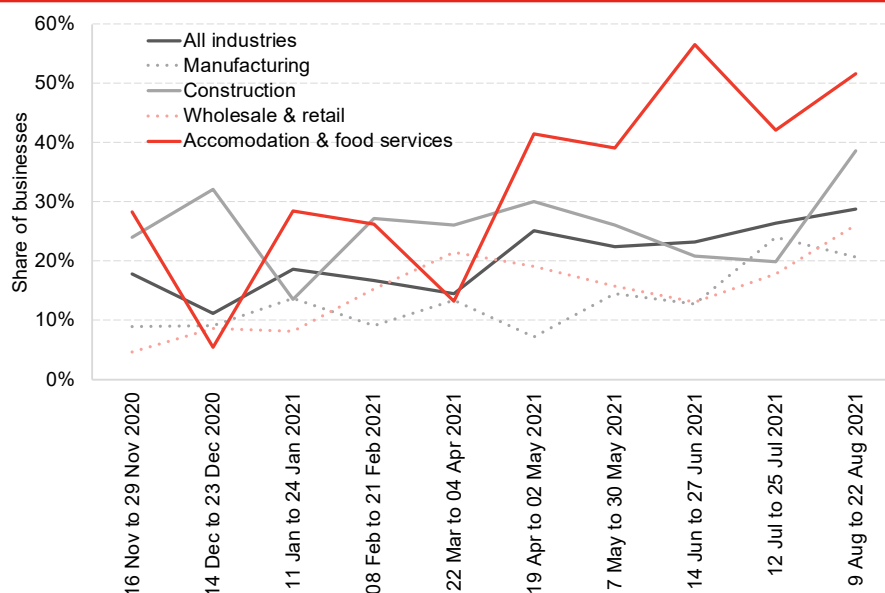
As of the end of June, over 140,000 people in Scotland were on furlough. With the furlough scheme due to close at the end of this month, it remains to be seen the true impact of COVID-19 on employment in Scotland.

The furlough scheme has supported thousands of jobs and businesses throughout the pandemic however, the past year has also saw a large share of businesses taking on debt in order to stay afloat throughout the various lockdowns and levels of restrictions.

During August 2021, the share of businesses with higher debt repayments increased across most industries, with around 29% of businesses having higher than usual debt repayments.

Unsurprisingly, the debt burden was highest in the accommodation and food services sector where over a half of all businesses had higher than normal debt repayments in August. See Chart 10.

Chart 10: Share of businesses with higher than normal debt repayments by industry, Scotland, 16th November 2020 – 22nd August 2021



Source: Scottish Government, BICS

The share of companies which have a low confidence in meeting their debt obligations has been falling over time across the accommodation and food services sector, which saw strong revenue growth over the summer months with the reopening of the economy.

Towards the end of July 3.2% of businesses in the sector had low confidence in meeting their debt obligations. Across other sectors the share has remained more or less constant, at around 2%.

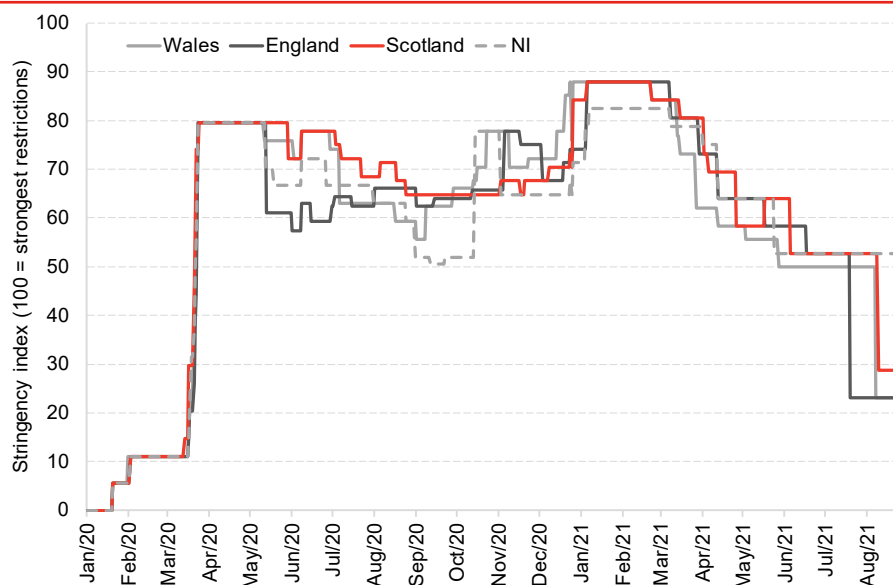
UK Economy

The fast pace of vaccinations has allowed the UK government and the devolved administrations to loosen restrictions and allow a rebound in economic activity.

The Oxford lockdown stringency index shows that the severity of restrictions on activity in August is currently at the lowest level since the beginning of the pandemic.

The stringency index is slightly higher in Scotland compared to England and Wales, but lower than in Northern Ireland. See Chart 11.

Chart 11: Lockdown stringency index, nations of the UK, 1st January 2020 – 27th August 2021



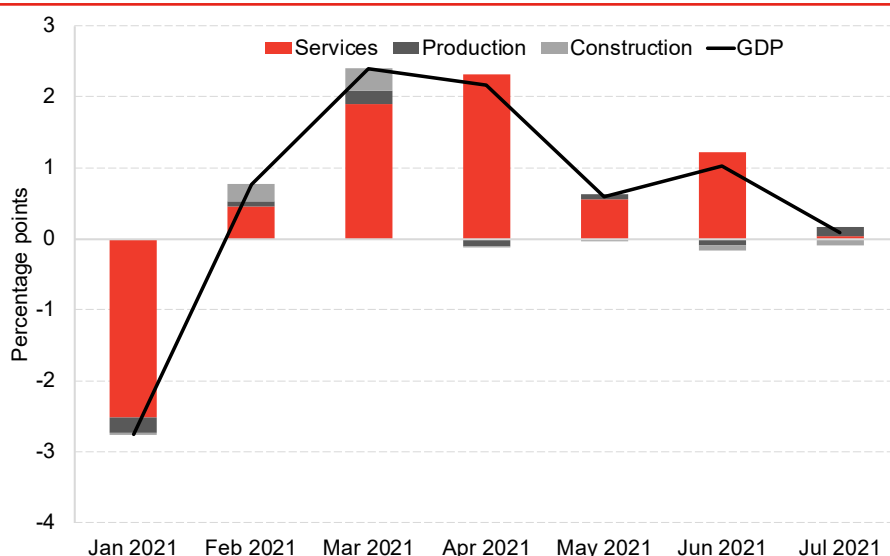
Source: University of Oxford

The latest UK GDP data shows that the UK economy only grew by 0.07% in July a substantial slowdown from the 1.05% monthly growth seen in June. It remains to be seen how the reopening of more of the economy in August impacts GDP figures.

Chart 12 shows that whereas growth has been mainly fuelled by the service sector in previous months, in July services contributed only 0.03 percentage points to the monthly growth rate.

This may be due to labour shortages experienced because of the amount of workers having to self-isolate after being “pinged” as contacts of people with COVID-19.

Chart 12: Contributions to monthly GDP growth, percentage points, January to July 2021, UK



Source: ONS

Climate Change in Scotland

The economy is yet to fully recover from the COVID-19 pandemic and whilst the economic and health crisis should be a priority for policymakers, longer term challenges, like the climate crisis, have not gone away.

The Scottish Government have committed to a 'Green Recovery' from COVID-19. And, with the upcoming COP26 summit in Glasgow, the spotlight will be on the state of the environment and the policy actions needed to tackle the climate crisis.

The Climate Change Act commits the UK to achieving net zero emissions by 2050. However, Scotland aims to be net zero five years earlier, by 2045.

Whilst Scotland, like the rest of the UK, has ambitions to fully switch to renewable and green sources of energy, the current gas crisis highlights how dependent the UK still is on this primary source of energy.

With rising wholesale gas costs and energy providers constrained by the price cap, there are concerns that elements of the current energy market - of which there are currently around 70 suppliers across the UK - will significantly reduce as smaller energy providers are forced to fold.

The slightly longer term implications of having fewer, larger suppliers could be significant for future energy prices.

Before diving into Scotland's emissions, it is important to understand where we are now, how far we have come in switching away from fossil fuels, and how much work still needs to be done.

Scotland energy

Although broad long-term trends are similar, the distribution of energy usage in Scotland is slightly different to the UK.

Like the UK, primary energy usage in Scotland has been falling since the mid-2000s, but rose slightly between 2014 – 2018. See Chart 13.

In 2019, oil formed over three fifths of Scottish energy and natural gas accounted for around a third.

Like many parts of the world, Scotland has been transitioning to using renewable sources of energy. This transition towards renewables in Scotland has been happening at a faster pace compared to the UK.

However, it is worth noting that Scotland started from a higher position given its historic hydro power plants.

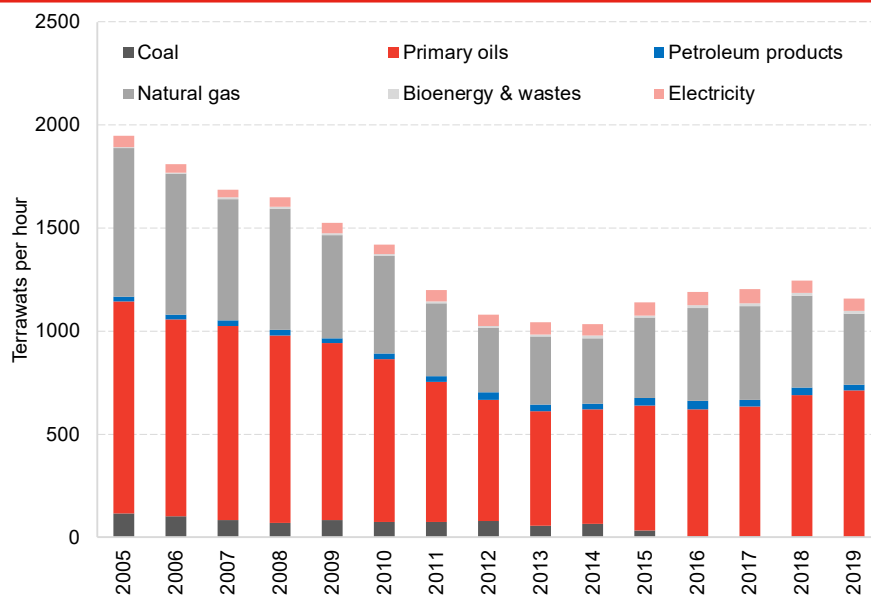
The Scottish Government has a target to generate the equivalent of 100% of Scotland's own electricity demand from renewable sources by 2020.

Scotland's 2020 renewable electricity demand was composed of 59% of onshore wind electricity, 19% of hydro and 10% of onshore electricity.

Overall, the balance of electricity generated from renewable sources has risen from over 10% in 2000 to over 97% in 2020¹, which falls short of the 2020 target. See Chart 14.

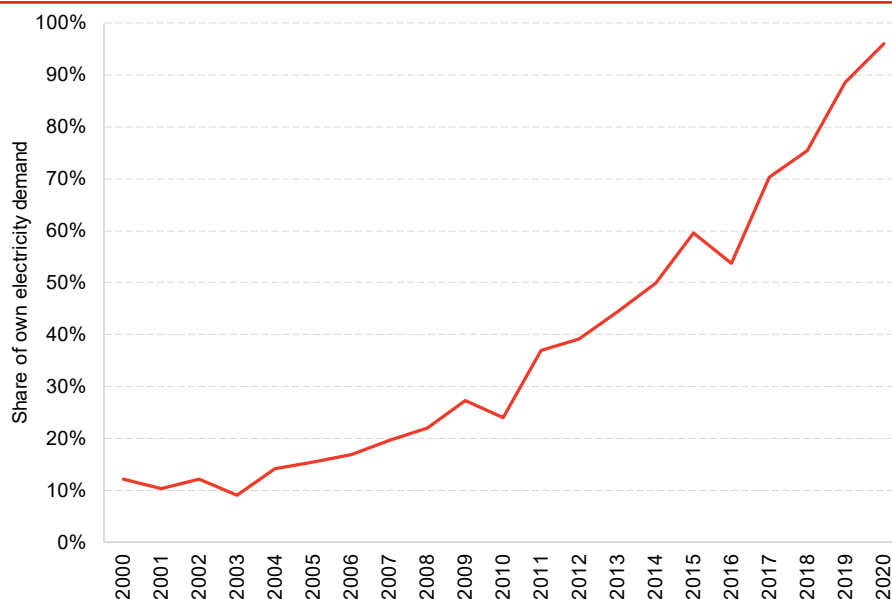
¹ This measure reflects the amount of electricity generated from renewables as a share of Scotland's gross energy consumption.

Chart 13: Distribution of primary energy in Scotland, 2005 - 2019



Source: Scottish Government

Chart 14: Share of Scotland's own electricity demand from renewable sources, 2000 – 2020



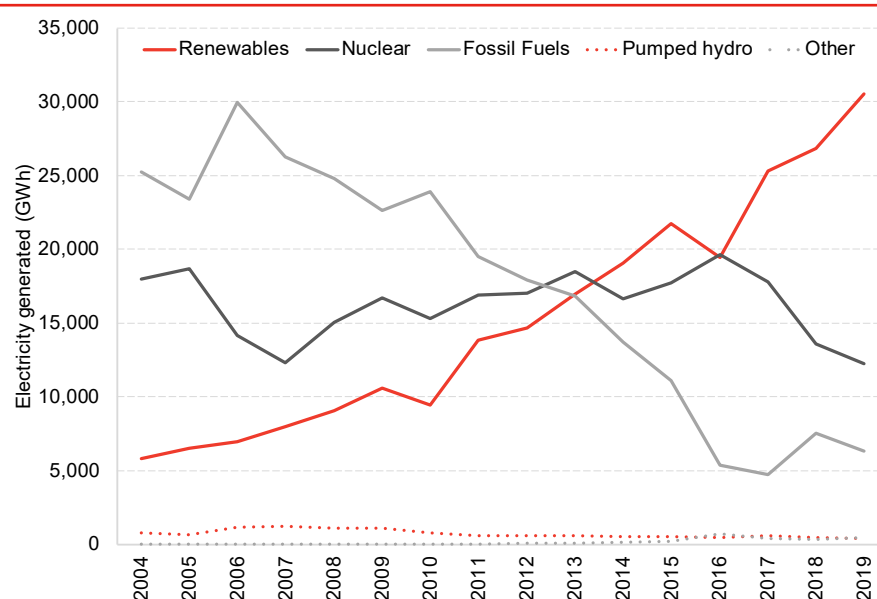
Source: Scottish Government

Fossil fuels have been the main source of Scottish electricity generation in the 2000s, but since 2014 renewables have taken the lead.

In Scotland, the last coal plant, Longannet power station, stopped generating in 2016, leaving gas and diesel as the remaining fossil fuels in production.

Nuclear energy is the second largest source of electricity, but its prominence has been falling in recent years and it too is being replaced by renewables. See Chart 15.

Chart 15: Generation of Electricity by Fuel, Scotland, 2004 to 2019



Source: Scottish Government

Although Scotland missed its renewable electricity target last year, it does appear that we are on track to reach 100% in the not so distant future, and the performance to date of this metric is a success.

However, when it comes to renewable energy, electricity consumption is not the challenge.

Non-electrical heat demand from renewables stood at just 6.5% in 2019, with targets of increasing this to 11% by 2020.

Total Scottish energy consumption coming from renewables stood at 24% in 2019 - a figure that needs to increase by just over twofold by 2030.

Therefore, whilst there has been clear improvements in Scotland's transition to renewables, there is still a while to go before Scotland is no longer reliant on fossil fuels.

Scotland's emissions

Scotland has a net zero emissions target by 2045.

Before tracking Scotland's performance against emission targets, it is important to take stock of Scotland's emissions, shedding some light on the geographical and sectoral drivers of emissions.

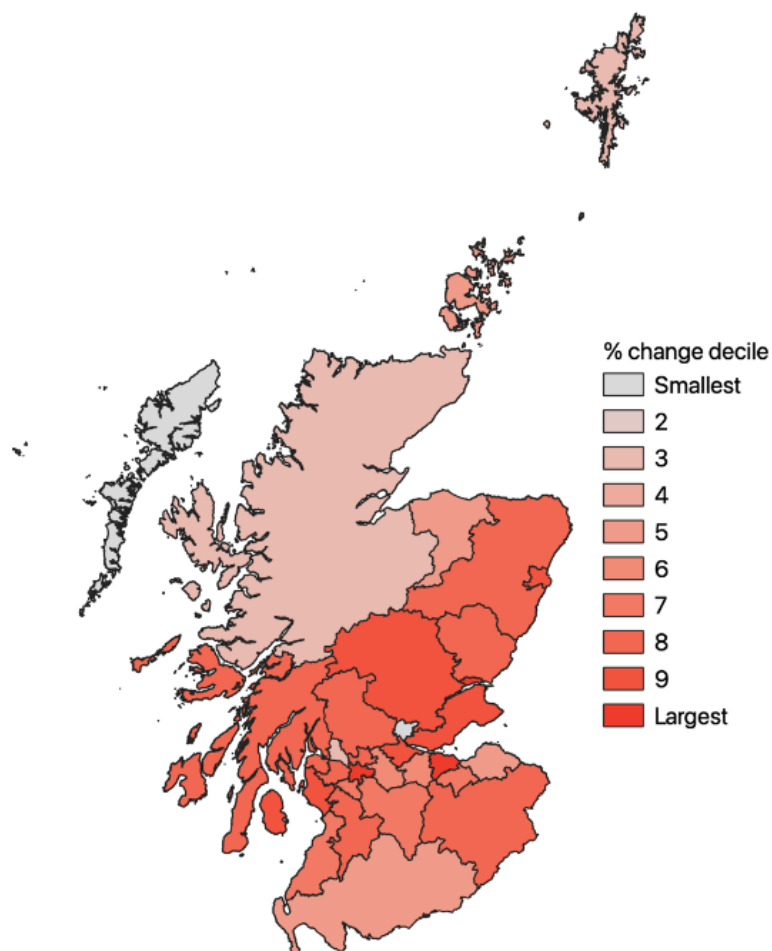
The latest data estimates that per capita emissions are higher in the North of Scotland. See Diagram 2.

Shetland Islands, Eilean Siar and Orkney are 3 of the top 5 local authorities for per capita emissions. These local authorities also had the most emissions per capita in 2005.

Four of Scotland's big cities - Edinburgh, Glasgow, Dundee and Aberdeen - had the largest reduction in emissions per capita between 2005 and 2019.

The reduction in emissions per capita in Eilean Siar was three times less the reduction per capita experienced in Edinburgh between 2005 and 2019, highlighting the work remaining to be done in reducing emissions in the rural areas of Scotland.

Diagram 2: % change in emissions per capita from 2005 to 2019 by local authority



Note: these data are derived from BEIS methodology

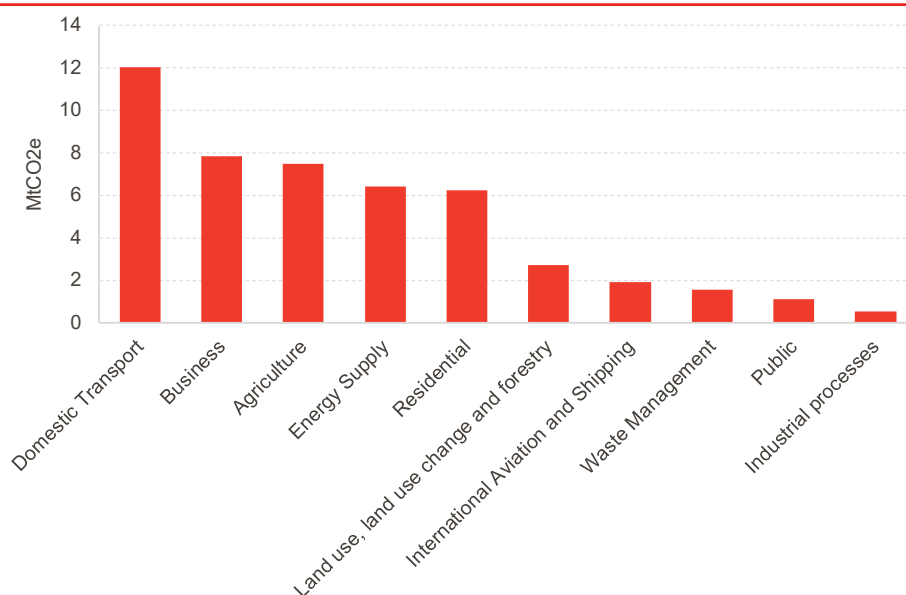
Source: Scottish Government

In terms of sectoral emissions, transport is the main source of emissions in Scotland, followed by business and agriculture². See Chart 16.

Each pound spent on air transport services, electricity transmission and distribution, and agricultural products generates around 2 kilograms of CO₂ emissions. See Chart 17.

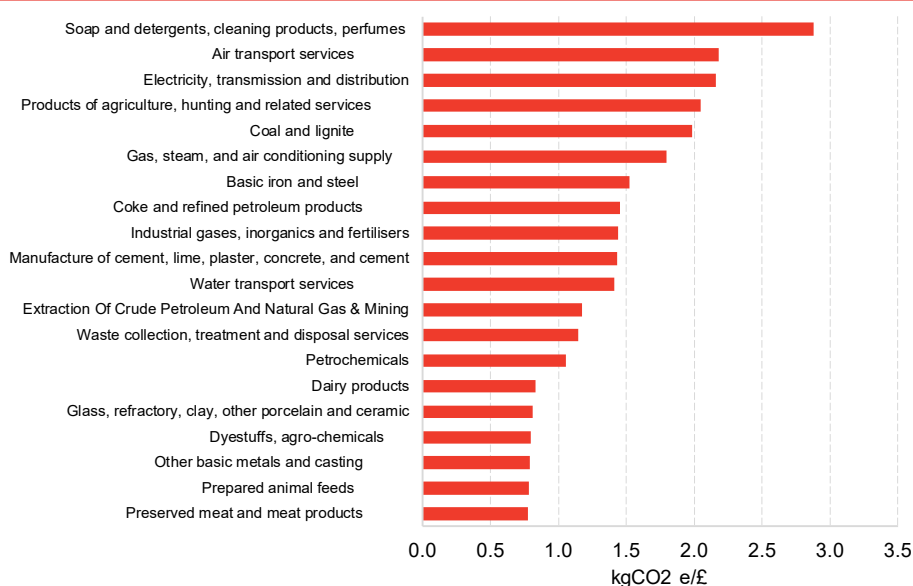
² Farming activities include both Agriculture and a share of Land use, land use change and forestry,

Chart 16: Sources of Scottish Greenhouse Gas Emissions, 2019



Source: Scottish Government

Chart 17: Total impact multipliers for the highest 20 GHG emissions embedded in UK products in 2017 (kgCO₂ e/£)



Source: Scottish Government

Agriculture and land use is a unique source of emissions in Scotland. And with Scotland's large stock of arable land, minimising emissions in the farming sector will be important for Scotland to reach its net zero target by 2045.

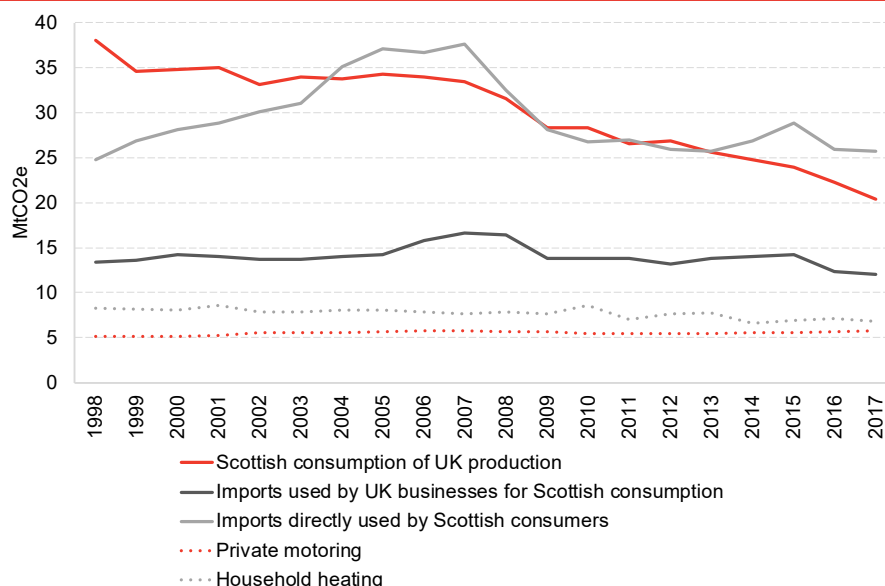
But, as with any green transition, there are acute challenges for this sector, and we will discuss these further in the following section.

Another way of considering Scotland's impact on emissions is to look at imported emissions.

Historically, Scottish consumption of UK products was the largest source of CO₂ emissions. However, this has shifted to imports directly used by Scottish consumers. See Chart 18.

Imports used by UK businesses, motor vehicle emissions and household heating form a smaller share of total emissions.

Chart 18: Breakdown of Scotland's carbon footprint, 1998 – 2017

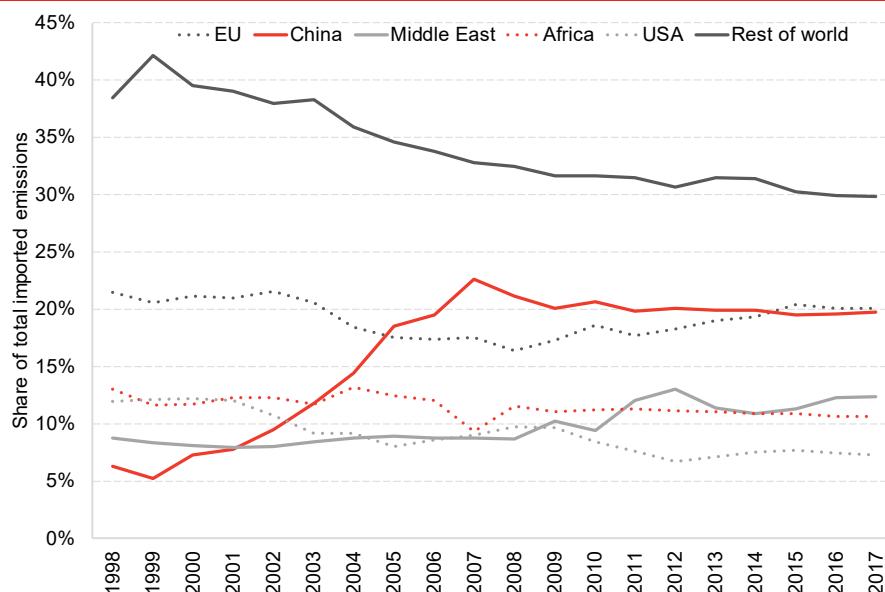


Source: Scottish Government

Around a third of emissions embedded in imports come from the rest of the world. See Chart 19.

Over the past few decades, emissions from Chinese imports rose from 6% to over 20%. The EU accounts for approximately a fifth of all imported emissions.

Chart 19: Breakdown of Scotland's embedded greenhouse gas emissions by region of import, 1998 – 2007



Source: Scottish Government

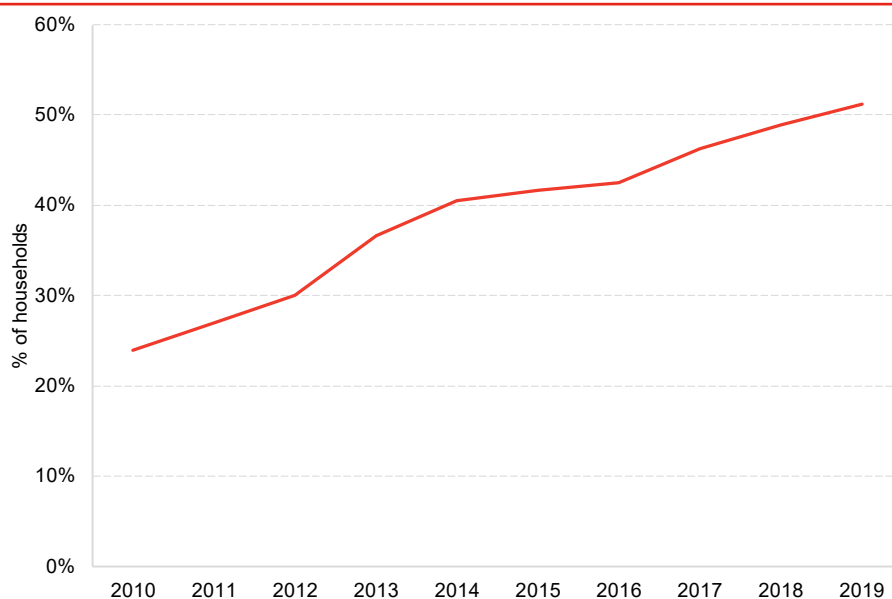
Although household heating does not account for the largest share of Scotland's emissions, improving the energy efficiency of homes will be important for tackling the climate crisis and fuel poverty.

The share of properties with an EPC band of C or above has risen from 34% in 2010 to 51% in 2019. See Chart 20.

However, around a half of all Scottish properties still do not have adequate energy efficiency.

Significant progress will thus need to be made to meet the Scottish Government's target for every Scottish home to achieve at least a band C in its EPC by 2040.

Chart 20: Share of properties rated EPC band C or above, Scotland, 2010 – 2019



Source: Scottish Government

Climate Change and Farming

Farming may be a relatively small part of Scotland's economy when measured by GDP, but it is a relatively big player in terms of green-house gas emissions as both an emitter and a sequester.

Whilst not a large part of the economy itself, farming underpins Scotland's food and drink sector, as well as being crucial employer in rural areas.

Due to natural processes, there will always be emissions associated with farming both from livestock and management of soil. The challenge is to minimise these emissions as much as possible and maximise sequestration opportunities.

This is against the backdrop of a challenging and uncertain financial outlook for farming.

Statistics

What is traditional thought of as farming actually straddles two sectors in terms of emissions reporting: "agriculture" and "land use, land use change & forestry (LULUCF)".

Chart 21: Emissions from Agriculture and LULUCF in context (2019)



Source: Scottish Government

Methane and nitrous oxide are the main greenhouse gases emitted under "agriculture", from livestock and crop management (e.g. fertiliser use) respectively. In addition, carbon emissions from fuel use on farm makes up a small portion.

Agriculture has seen a 1.1 MtCO₂e (12.7 per cent) fall in net emissions between 1990 and 2019. Between 2018 and 2019 there was essentially no change in net emissions of overall greenhouse gases from this sector.

LULUCF had previously been understood as a carbon sink (mainly due to the forestry component), but recent revisions have included the effect of historical draining and rewetting of peatlands, resulting in a large upward revision to estimates of carbon emissions.

Farming is obviously a key player in terms of forestry and land use, including farming on peatlands.

Ensuring good management of peatlands is being increasingly understood as a critical part of sustainable land management. However, even non-peat soils can release carbon from processes such as ploughing.

Policy

There is an acceptance that due to the natural processes involved, there will always be emissions from the sector and hence focus is on efficiency to reduce emissions per output, and to increase sequestration activities.

Livestock farming will have to continue to play a key role in farming if the sector is to continue to produce similar levels of food in the future as the vast majority of land in Scotland is only able to support livestock farming due to geology and terrain.

Many mitigation measures promoted by the Scottish Government are linked to called “good practice”, for example limiting soil erosion by utilising cover crops of fixing nitrogen in the soil using clover to reduce fertiliser use. In some cases, these will deliver net financial benefits to the farmer.

Other measures, such as updating manure stores or installing anaerobic digestion or limiting farming activity on certain soils, will mean upfront costs or potential income foregone.

Translating theory into practice, in relatively small businesses that already deal with massive risks on a yearly basis, is a challenge not to be underestimated. The time required to learn and understand measures and how they work is also a ‘cost’ to farmers.

The Scottish Government’s flagship policy is “Farming for a Better Climate” which provides expert advice through a range of sources that the industry trusts. One aspect is volunteer focus farmers to showcase measures.

The ambitions for the sector are significant.

“By 2032, the agriculture sector in Scotland will have adopted and be competently using all available low emission technologies throughout the whole sector, such as maximising efficiencies, minimising inputs and maximising outputs, precision farming, optimal slurry and manure usage and storage. There will also be increased innovation in areas such as feedstuffs and use of fertilisers, making a significant contribution to meeting our climate change targets as well as wider environmental and biodiversity impacts for the whole of Scotland.” - Scottish Government 2020³

Of course, farming could also be a key beneficiary of efforts to halt climate change. Unpredictable weather and greater intensity of extreme conditions, be it rain, sun or snow heightens the risks already inherent in farming.

The next few years already hold plenty of other challenges for farmers to face, including the move away from EU to domestic subsidies to support the sector. Whilst this will create opportunities for support to be delivered to meet national goals in terms of greenhouse gas emissions, the uncertainty and upheaval it creates may be difficult for farmers to contend with given often precarious financial situations: the average farm business made a loss of £17,100 without support on average in the years 2016 – 20⁴.

The prize in terms of turning farming into a low emissions sector are significant, and necessary, to meet Scotland’s climate change targets. The challenge is to ensure food production can operate at a sufficient scale and quality to make the sector financially, as well as environmentally, sustainable.

³ See: [Scottish Government \(2020\)](#).

⁴ See: Farm Business Income Survey, [Scottish Government \(2021\)](#).

What are Businesses Doing to Support Climate Action?

The Scottish Government cannot tackle climate change on their own, and will rely on the support from Scottish businesses.

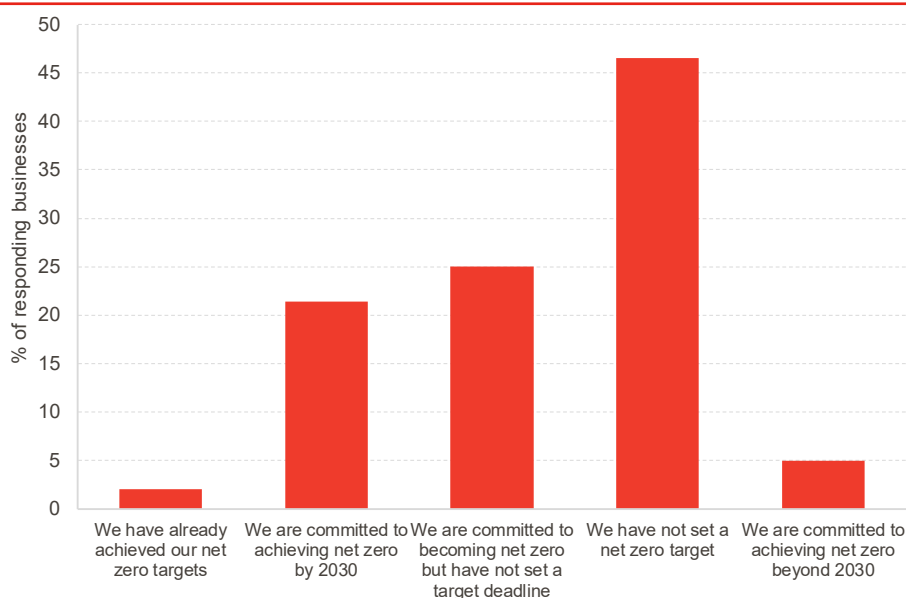
The latest Scottish Business Monitor for Q2 2021 highlights the role and attitudes of businesses in supporting Scotland to achieve net zero by 2045.

SBM - results for Q2 2021

Almost half of all responding businesses (46.5%) reported that they had not set any targets to achieve net zero, with only 2% of businesses reporting that they had achieved their net zero targets. See Chart 22.

Around a quarter of businesses reported that they were committed to achieving by 2030, with another quarter reporting that they were committed but had not yet set any targets.

Chart 22: 'Which statement most accurately describes your businesses targets for achieving a net zero carbon economy?'

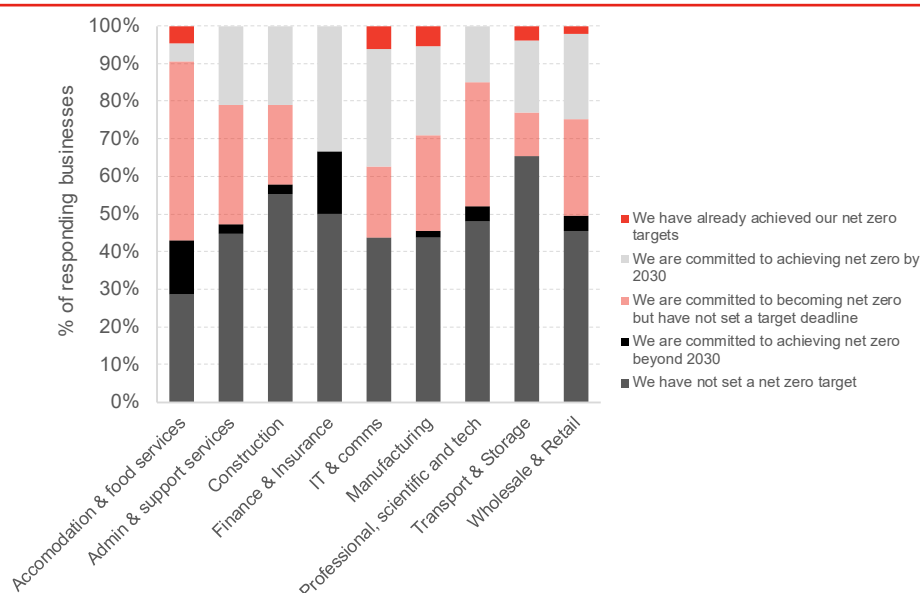


Source: Scottish Business Monitor

The accommodation and food services, and the professional, scientific and technical sectors had the largest share of businesses reporting that they were committed to achieving net zero. See Chart 23.

Surprisingly, the transport and storage sector had the highest share of businesses who had not set a net zero target.

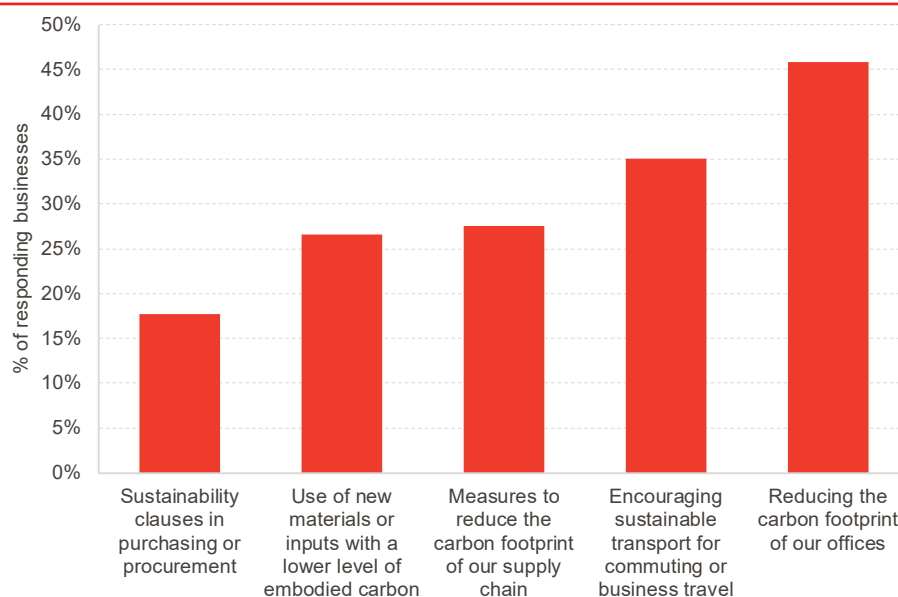
Chart 23: 'Which statement most accurately describes your businesses targets for achieving a net zero carbon economy?' Sectoral analysis



Source: Scottish Business Monitor

Reducing carbon footprint of office spaces was the most popular measure that businesses were currently taking to achieve net zero, followed by encouraging staff to use sustainable transport for commuting or business travel.

Chart 24: 'What measures are you taking to help achieve net zero?'

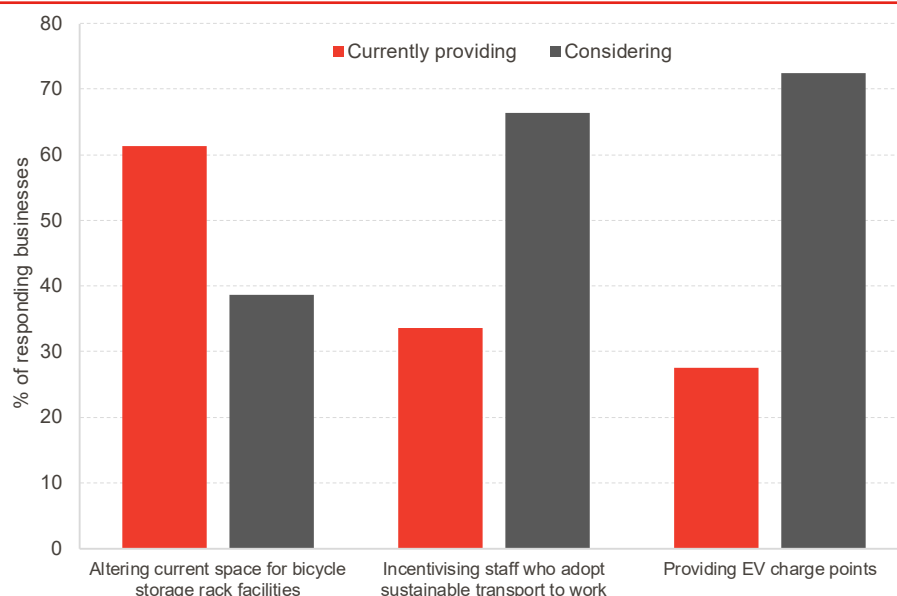


Source: Scottish Business Monitor

Around a third of businesses had encouraged staff to use sustainable transport measures –

- 60% of businesses had altered current space for bicycle storage facilities within their workplace, with a further 38% considering this measure. See Chart 25.
- Over 70% of businesses reported that they were currently considering providing electric charge points for vehicles, with just under 70% considering incentivising staff to adopt sustainable transport to commute to work.

Chart 25: 'Which of these sustainable transport measures are you currently providing or considering for the future?'



Source: Scottish Business Monitor

However, the decision for businesses to invest in sustainable transport depends on how many staff return to a tangible workplace.

More than 70% of businesses do not expect any of their staff to work from home full time, with only 1 in 10 businesses expecting more than half of their staff to work at home full time. See Chart 26.

This suggests that a large share of employees will return to physical workplaces when the rules allow. In fact, two thirds of responding businesses expect more than half of their staff to fully return to the workplace, of which 44% expect almost all of their staff to return to the workplace.

Hybrid work models have also been at the forefront of discussion for businesses of late, with many staff being offered the opportunity to split their work time between the office and their home. 61% of businesses expect some proportion of their staff to work under a hybrid approach.

Chart 26: 'Of staff that only worked in the workplace before the pandemic, what proportion do you expect will work from home full-time, part-time and not at all in the long term?'



Source: Scottish Business Monitor

Scotland's Road to Net Zero - Tracking Scotland's Performance

Scotland is committed to reaching net zero emissions by 2045 however, whilst the volume of greenhouse gas emissions indicate the fate of our planet, they alone do not reflect the state of our environment.

To understand Scotland's path to net zero and the quality of Scotland's environment, this section takes stock of Scotland's performance under the [National Performance Framework](#) (NPF).

The Scottish Government's NPF tracks the performance of Scotland's 11 'National Outcomes' by measuring the progress of 81 national indicators.

The NPF follows the United Nation's [Sustainable Development Goals](#) (SDGs), with the aim of localising the UN's international ambitions.

Of the 11 national outcomes, 3 can be linked to the climate or environment –

- Economy;
- Communities; and,
- Environment

Whilst the economy outcome includes measures surrounding greenhouse gas emissions, carbon footprint and natural capital, the communities outcome includes an indicator linked to environmental wellbeing - access to green or blue space.

Like the green space measure in communities, the environment outcome goes beyond the traditional environmental measurement of emissions and it recognises that Scotland must value, enjoy, protect and enhance the Scottish environment.

The environment outcome has the following indicators -

- Visits to outdoors;
- State of historical sites;
- Condition of protected nature sites;
- Energy from renewable sources;
- Waste generated;
- Sustainability of fish stocks;
- Biodiversity; and,
- Clean seas.

This section will highlight Scotland's performance under these national outcomes, tracing the progress of each indicator under the three outcomes.

Each indicator has a set of criterion that determines the performance of the measure. Based on the criteria, the performance of each indicator is recorded as either: improving, worsening or maintaining.

National Outcome - Economy

GHG emissions (performance: improving)

Scottish greenhouse gas (GHG) emissions stood at 47.8 million tonnes of carbon dioxide equivalent (MtCO₂e) in 2019 – a reduction of 2.3% (1.1 MtCO₂e) on the year and 43.8% since 1990.

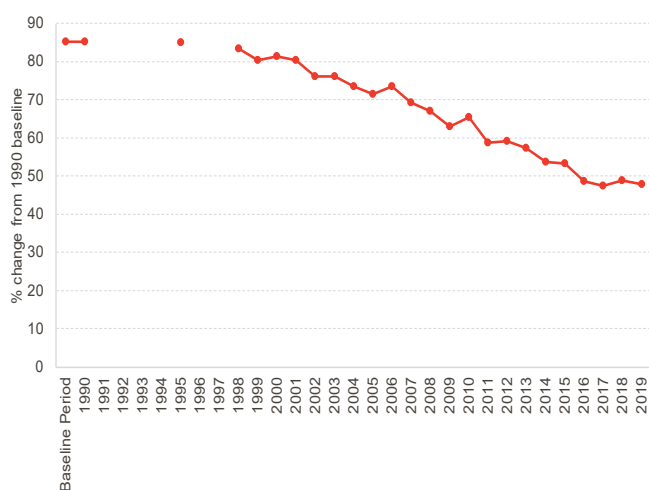
The main drivers of this decline were from business, energy supply and domestic transport.

The Committee for Climate Change (CCC) recommended a new methodology for emission reporting against GHG targets. Under this adjusted method, GHG emissions stand at around 51.5% below the baseline.

The Climate Change (Scotland) Act 2019 outlines that a 55% reduction must be met by 2019. Therefore, Scotland failed to meet its target in 2019.

Despite this, the performance of this indicator is improving as the percentage reduction in emissions exceeded the amount required for that year.

Chart 27: Greenhouse Gas Emissions (Values in MtCO₂e), Scotland, 1990 - 2019



Source: Scottish Government

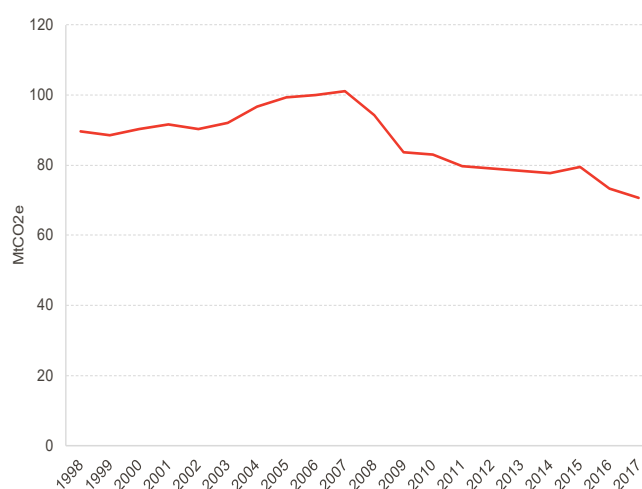
Carbon footprint (performance: improving)

In 2017, Scotland's carbon footprint was over 70 MtCO₂e – a decrease of 3.5% since 2016, and over 30% lower than the peak of 2007 (101 MtCO₂e).

This measure is on a consumption basis. That is, it estimates the emissions associated with the spend of Scottish residents on goods and services – including emissions emitted internationally.

The performance of this measure is improving as the difference exceeds 3%.

Chart 28: MtCO₂e, Scotland, 1998 - 2017



Source: Scottish Government

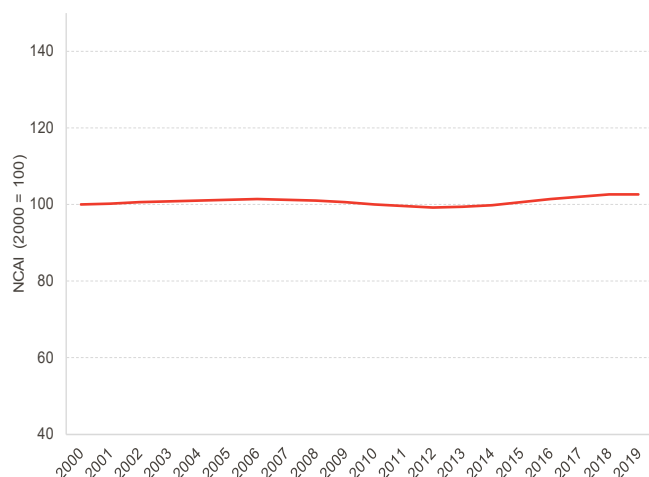
Natural Capital (performance: maintaining)

The Natural Capital Asset Index (NCAI) tracks the quality and quantity of terrestrial habits across Scotland.

In 2019, the NCAI stood at 102.6, 0.1-p.p. above 2018 levels and 2.6% above the 2000 baseline. See Chart 29.

This indicator has remained stable (that is, the annual difference fell within 2-p.p.), meaning the performance of this indicator is maintaining.

Chart 29: NCAI, Scotland, 2000 - 2019



Source: Nature Scot

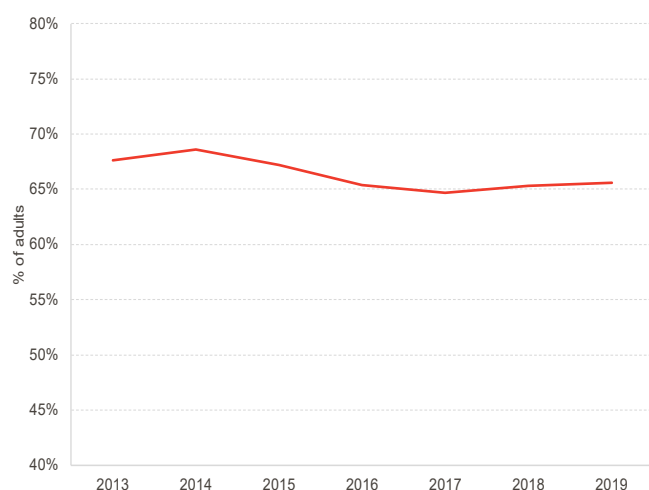
National Outcome - Communities

Access to green and blue space (performance: maintaining)

The share of adults living within a 5 minute walk of green or blue space fell slightly in 2014-2016 and has remained at around 65% since.

In 2019, people living in Scotland's most deprived areas were less likely to live near green/blue space than people in the least deprived.

Chart 30: % of adults who live within a 5 minute walk of a local green or blue space, Scotland, 2013 - 2019



Source: Scottish Government (SHS)

The performance of this indicator is maintaining as the difference on last year falls within 2-p.p.

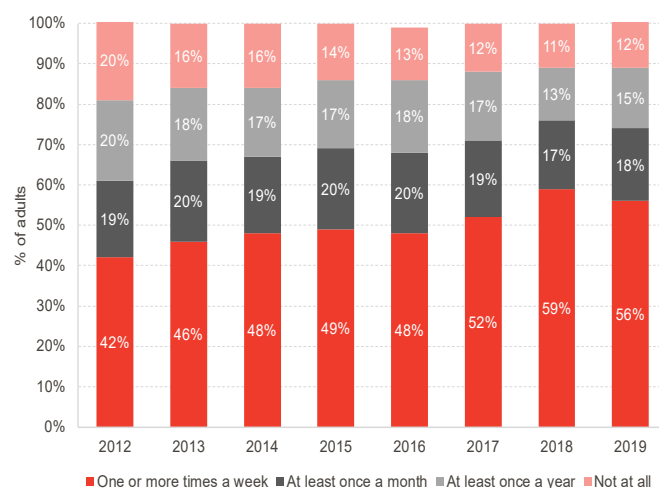
National Outcome - Environment

Visits to the Outdoors (performance: worsening)

The share of adults who made a visit outdoors once or more times a week, on average, in 2019, was 56% - 3-percentage points (p.p.) lower than in 2018.

As the decline in this measure exceeded 2-p.p., the performance of this indicator is worsening.

Chart 31: % of adults who have visited outdoors in the past 12 months by frequency of visit, Scotland, 2012 - 2019



Source: Scottish Government SHS

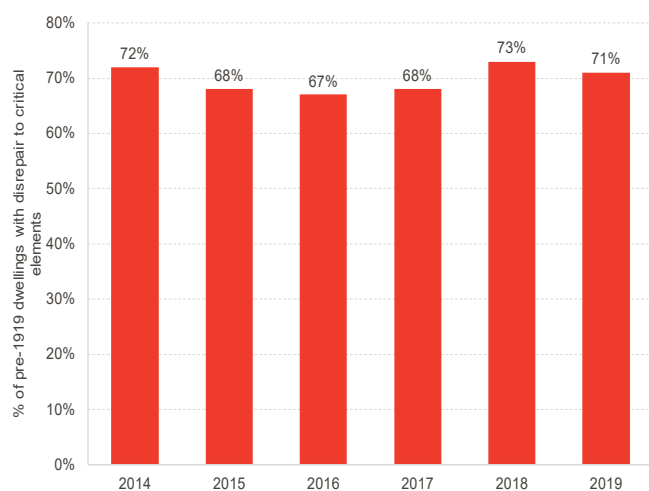
State of historic sites (performance: maintaining)

In 2019, the share of historic sites in a 'poor state'⁵ was down 2-p.p.

This decline was not statistically significant. Therefore, Scotland is maintaining its performance of this measure. See Chart 32.

⁵ For this indicator, poor state is defined as the share of historical dwellings (built pre-1919) that have disrepair to critical elements.

Chart 32: % of pre-1919 dwellings ('historic sites') with disrepair to critical elements, Scotland, 2014 - 2019



Source: Scottish Government (SHCS)

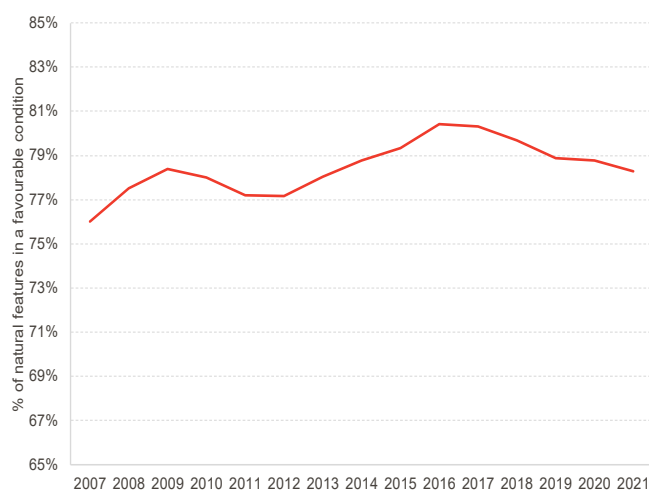
Condition of protected nature sites (performance: maintaining)

In 2021 78.3% of natural features - sites of special scientific interest, Special Protection Areas (SPAs), Special areas of Conservation (SACs) and designated natural features - were assessed as being in a 'favourable condition'⁶, 0.5-p.p. below 2020.

Despite a downwards trajectory since 2018, the long-term trend is positive for this indicator – up 2.3-p.p. since 2007.

There is no significant difference (change greater than 1-p.p.) since last year for this indicator therefore, the performance of this measure is maintaining.

Chart 33: % of natural features in a favourable condition, Scotland, 2007 - 2021

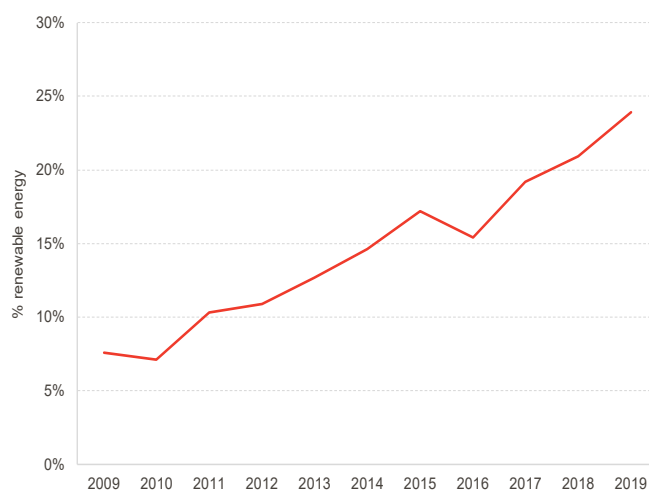


Source: Nature Scot

Energy from renewable sources (performance: improving)

In 2019, renewable energy made up 24% of energy consumption, up 3-p.p. on the year - as the change in this indicator exceeds 0.5-p.p., the performance is improving.

Chart 34: % of energy coming from renewable sources, Scotland, 2009 - 2019



Source: Scottish Government

Over the decade, renewable energy consumption has increased by over 16-p.p., with much of the growth in this indicator being driven by electricity generation.

⁶ Favourable conditions criteria are based on the Joint Nature Conservation Committee's (JNCC) guidelines.

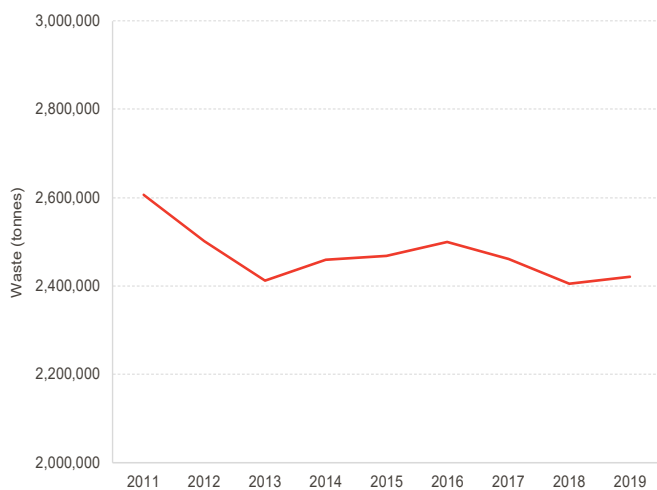
Waste generated (performance: maintaining)

The amount of waste generated by households increased by 0.7% (16,500t) in the latest year.

However, this change was not large enough (greater than 1%) to be considered significant, meaning that Scotland is maintaining its performance of this measure.

Despite the recent increase, the longer-term trend highlights that waste has fallen by 7% (under 200,000t) since 2011 however, most of this decline was felt between 2011-2013, with improvements levelling off since 2014.

Chart 35: tonnes of household waste generated, Scotland, 2011-2019



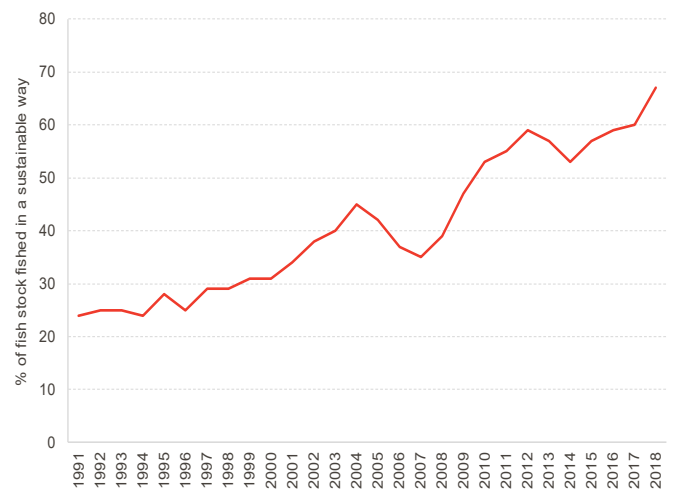
Source: Scottish Environment Protection Agency (SEPA)

Sustainability of fish stocks (performance: improving)

Fish being 'sustainably fished' in Scottish waters has been on an upwards trajectory since the mid-90s.

In the latest year, 67% of stock fished from Scottish waters were fished sustainably⁷, up 7-p.p. on 2017 – a new high for this measure. The performance of this measure is therefore improving as the increase exceeds 3-p.p.

Chart 36: % of fish stock fished in a sustainable way, Scotland, 1991 - 2018

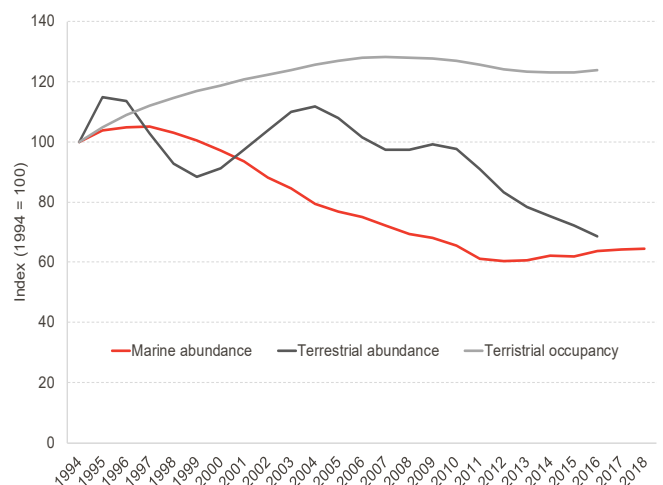


Source: Scottish Government

Biodiversity (performance: maintaining)

Biodiversity in Scotland has been declining over the past few decades.

Chart 37: Index of biodiversity*, Scotland, 1994 – 2018



*the number of marine species is based on seabirds

Source: Nature Scot

The abundance (number of species) of marine and terrestrial (including freshwater species) species has, for the most part, been on a downwards decline since recording began.

⁷ In simplistic terms, sustainable fishing ensures that there is enough fish left to produce replacements.

In 2018, there was 64% of marine species relative to 1994 – a contraction of over a third of marine species. And, in 2016, there was just 69% of terrestrial species compared to the amount found in 1994.

The occupancy trends reflect the sites where species are present and is less likely to change significantly each year.

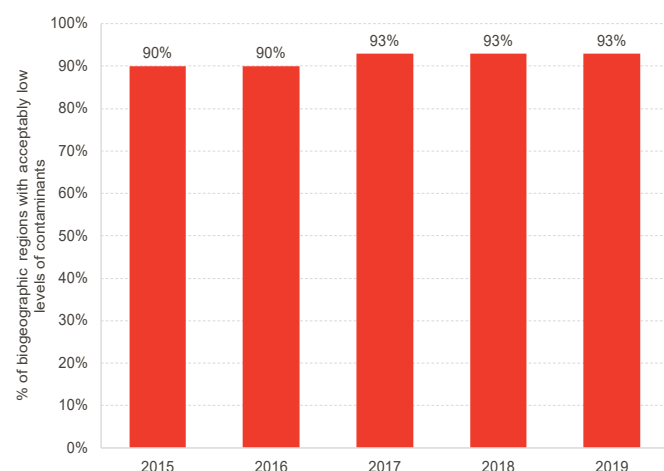
Due to no significant changes, the performance of this indicator is maintaining.

Clean seas (performance: maintaining)

Finally, the share of contaminants in Scottish waters that are unlikely to cause harm to marine species has remained stable for the past few years.

Due to there being no change in this indicator, Scotland is maintaining its performance of this measure.

Chart 38: the percentage of biogeographic regions with acceptably low levels of contaminants, Scotland, 2015 - 2019



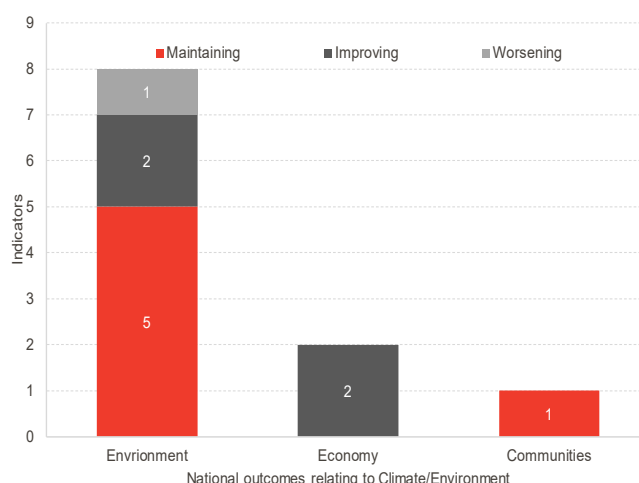
Source: UK (MERMAN); UK (CSEMP)

Overall performance

So, overall, how is Scotland performing against its climate and environmental targets?

Of the 11 measures discussed, Scotland has maintained its performance in over half, and has made improvements on 4 of them, with 1 measure worsening.

Chart 39: Overall performance of Scotland against climate/environment related measures



Source: FAI; NPF

Scotland has ambitious targets to reach net zero by 2045 and, so far, we are falling behind in the cuts to emissions needed to reach these targets.

But, it is not just GHG emissions that we need to be concerned about.

The quality of our seas, biodiversity and environmental wellbeing are all crucial to sustainability.

Whilst Scotland only has one indicator that is worsening, the majority are just maintaining.

More needs to be done to improve our green and blue spaces, and protect the species that depend on these habitats.

Economics and Climate Change Policy

Climate change is the major societal and policy challenge of the next decades - it is a driver of structural change which will affect the way the economy works, and the structure and distribution of economic activity will be fundamental to the extent to which climate change targets are achieved.

Technological progress dating back to the industrial revolution has been a major factor spurring economic growth, but at the same time a driver of emissions through increased industrial production.

However, technological progress also provides an opportunity for policymakers to aid the transition towards net-zero.

So, moving forward, what role does economics play in supporting climate change policy?

Economics offers frameworks and tools which can help with ensuring that economic growth is both inclusive and sustainable by not causing irreversible damage to the natural environment.

This section sets out how economics can support climate change policies, highlighting the range of policies already in place across Scotland, the costs and benefits of various policies, and some challenges, such as distributional impacts, that exist when developing these types of policy measures.

Economics as a tool to support climate change policies

Economists view pollution as a form of a ‘negative externality’, meaning that the true social cost of pollution is not fully incurred by the producer or consumer of polluting goods and services – instead, the cost, i.e. climate change or public funds required to reduce emissions which have to be forgone in other areas, is shared.

Therefore, consumers who want to maximise the enjoyment of their consumption and firms which seek to maximise their profits are likely to over-pollute and are unlikely to consider a socially optimal level of pollution in their consumption/production decisions.

Reducing waste, maximising efficiencies and accurately reflecting environmental costs in prices are just some of the ways in which economics can support the fight against climate change.

Carbon pricing is a prominent lever often promoted by economists. By fully reflecting the price of emissions associated with producing or using a specific good or service, people and firms are forced to ‘internalise the negative externality’ of pollution.

Forcing consumers and producers to pay a higher price for goods and services which are emission-heavy can act to reduce the consumption and production of goods and services that are damaging to the environment and climate; whilst raising funds that can be used to offset carbon emissions.

Revenues can be returned to the economy in a number of ways, such as through targeted payments to lower income groups.

Additionally, this can provide an incentive to innovate lower emissions products.

Another example is investing in home improvements and retrofitting. This would increase the energy efficiency of Scotland's housing stock which is desirable from both an environmental and inequalities standpoint.

The latest Scottish House Condition Survey (2019) estimated that a quarter of Scottish households were in fuel poverty⁸. Therefore, energy efficiency home improvements would tackle inequalities and the climate crisis through reducing energy costs and emissions.

However, energy efficiency improvements can be expensive. Replacing single glazed windows with double or triple glazed windows can cost thousands of pounds – someone living in fuel poverty is unlikely to be in the financial position to afford such improvements.

This is where economics has a role to play.

Balancing the cost of climate change with the cost of government funding for home improvements for those in fuel poverty is a prime example of how economics can support the fight against climate change.

These are just a few examples of the role economics can play to support climate policies.

Scottish Government Policies

The Scottish Government has recently set out several policies in its climate change plan for 2018 – 2032 which aims to reduce emissions by 75% (compared to 1990).

The Scottish Government initially committed £2 billion to the Low Carbon Fund in its first tranche of the programme for investment in several green projects. There are several policies under the programme which are set out using a sector approach in the following 8 areas:

- Electricity;
- Buildings;
- Transport;
- Industry;
- Waste;
- Land use, land use change and forestry;
- Agriculture; and,
- Negative emissions technologies (NETs).

The second tranche set out in December 2020 set aside additional funds for areas such as:

- Electricity: £180 million for an 'Emerging Energy Technologies Fund', supporting the development of hydrogen and providing impetus to the development of 'Negative Emissions Technologies'.
- Transport: £120 million for 'Zero Emission Buses' to decarbonise Scotland's buses.
- Land use, land use change and forestry: £50 million to transform vacant and derelict land, ensuring that land is utilised for maximum environmental and community benefit.
- Transport: £50 million to create 'Active Freeways', providing a sustainable link between towns, cities, and national landmarks.

⁸ A household lives in fuel poverty if fuel costs exceed 10% of the household's adjusted (after housing costs) net income (SHCS, 2019).

From an economic perspective, these policies aim to contribute to a more efficient market solution where demand for things like public transport is satisfied through means which minimise environmental damage (i.e. zero emission buses).

The transformation of land-use (reforestation, peatland restoration, sustainable agricultural practices), electrification of transport and infrastructure (including Electric Vehicles, charging infrastructure, city-level policies on low emissions), and the implementation of emissions reductions strategies (be it carbon taxes, NETs, or behavioural changes) are at the forefront of the Scottish Government's approach towards reaching net-zero.

Most of the policies in the Scottish Government's plan utilise public investment to support means of consumption which are consistent with environmentally friendly outcomes.

At a city-level, there are notable policies which are being introduced in Edinburgh, Glasgow, Dundee, and Aberdeen.

Low Emission Zones (LEZs) aspire to improve public health, by discouraging heavy polluting vehicles from entering an area. If a vehicle entering a LEZ does not meet the minimum exhaust emission standard, then a penalty fine is issued.

Costs and benefits of different policies

An important question surrounding different policy interventions for reducing emissions is their cost-effectiveness.

Gillingham and Stock (2018) compiled a range of estimates for different types of policies from the literature and expressed the estimated cost of reducing carbon dioxide emissions in dollars per tonne for each policy. See Table 1.

Behavioural energy efficiency measures aim to reduce emissions through tools such as the better communication of information on energy use.

For example, people are often susceptible to a 'status-quo bias' where they stick to the default setting on their thermostat or adjust it sporadically. By providing households with a smart meter people see, in real time, how much they spend on energy every day and therefore, may be more inclined to optimise the way they heat their homes.

Behavioural measures appear to be the most cost-efficient since they require little to no investment from the government.

The Scottish Government, in partnership with Zero Waste Scotland, has a 'Food Waste Reduction Action Plan' which aims to reduce a third of food waste by 2025. The approach taken by government focuses on public engagement, with hopes that altering behaviours around food waste will support the public in making better choices.

The literature suggests that such an intervention has the potential to deliver good value for money.

Reforestation also appears to be a cost-efficient measure, suggesting that the Scottish Government's policy aimed at repurposing vacant and derelict land for environmental and community purposes may be a cost-efficient and effective way of supporting the fight against climate change.

On the other hand, this piece of literature suggests that subsidies for electric vehicles is one of the costliest policies for reducing carbon emissions.

The Scottish Government has committed over £80m of funding to date to support the switch to low carbon vehicles, and recently expanded the programme to include electric vehicles.

Findings from the literature suggest that there are many alternative policies which are more cost-efficient.

However, the example of the Norwegian purchase taxation structure based on emissions shows that policy measures aimed at electric vehicle uptake can be both successful and cost efficient.

The purchase tax for all new cars in Norway is calculated by a combination of weight, CO₂ and NO_x emissions. The tax is progressive, making big cars with high emissions very expensive. The purchase tax has been adjusted gradually to have more emphasis on emissions and less on weight. This has resulted in a significant uptake of electric cars – Battery electric vehicles held a 54% market share of sold cars in 2020 (Elbil, 2021).

The UK Government has also announced a policy with a similar objective, albeit through different means. Under its current plan the UK Government aims to ban the sale of all new petrol and diesel vehicles by 2030.

Table 1: Estimated cost of reducing CO₂ emissions, by policy measure

Policy measure	Estimated cost of reducing carbon dioxide emissions (2017 US dollars per tonne)
Behavioural energy efficiency	-190
Corn starch ethanol	-18 - +310
Reforestation	1 – 10
Renewable portfolio standards	0 – 190
Corporate Average Fuel Economy (CAFE) standards	-110 - + 310
Wind energy subsidies	2 – 260
Clean power plants	11
Gasoline taxes	18 – 47
Methane-flaring regulations	20
Reducing federal coal leasing	33-68
Agricultural emission policies	50-65
National clean energy standards	51-110
Soil management	57
Livestock management policies	71
Concentrating solar power expansion	100
Renewable fuel subsidies	100
Low-carbon fuel standards	100 – 2,900
Solar photovoltaic system subsidies	140 – 2,100
Biodiesel	150 – 420
Energy efficiency programs	250 – 300
Cash for clunkers	270 – 420
Weatherization assistance programs	350
Dedicated-battery electric-vehicle subsidies	350-640

Note: The policies in the table are from around the world, but most are from the United States. Costs for greenhouse gases other than carbon dioxide are converted to carbon dioxide equivalents based on the gases' global warming potential. Estimates are based either on individual studies or on a range of estimates from different studies.

Source: Kenneth Gillingham and James H. Stock, "The Cost of Reducing Greenhouse Gas Emissions," *Journal of Economic Perspectives* 32, no. 4 (Fall 2018): 53–72

A policy which appears to be relatively cost-efficient and is currently not featured in the Scottish Government's plan, are gasoline taxes.

This is an area over which the Scottish Government currently has no control as fuel duty is a tax set by the UK Government. However, OECD data suggests that when considering the interplay of VAT and excise duties, the UK already has one of the highest tax burdens on fuel amongst developed economies.

This suggests that marginal gains in emission reductions from increasing the tax burden on fuel could be difficult and affect poorer households - in the absence of any offsetting policy targeted at low income households - with private cars more through price increases, since taxes in this area are already high to begin with.

Further devolution in this area, and potential divergence of Scottish policy away from rUK through higher rates on fuel, could result in suboptimal outcomes.

Challenges – the energy trilemma

Switching to green forms of energy will be crucial for Scotland's net zero targets.

When developing policies surrounding greener energy, it is not just cost efficiency that policymakers must consider. Policies must balance a range of factors to ensure that energy is available, accessible and sustainable.

In energy economics, this is known as the 'Energy Trilemma'.

The energy trilemma represents the trade-off between –

- **Energy security:** measures a nation's ability to meet current and future energy demand. Secure energy must be resilient to shocks with minimal disruption to supplies.
- **Energy equity:** measures the accessibility of energy in the economy. Equitable energy must be affordable for domestic and commercial use.
- **Environmental sustainability:** measures the sustainability of energy. Environmentally sustainable energy must mitigate environmental and climate risks.

Let's take a few of these in turn to highlight the challenges faced when striking the right balance between these three objectives.

Energy security and environmental sustainability

The presence of oil & gas in the North Sea gives Scotland a stable source of energy supply. However, oil & gas account for around a half of all of Scotland's CO₂ emissions.

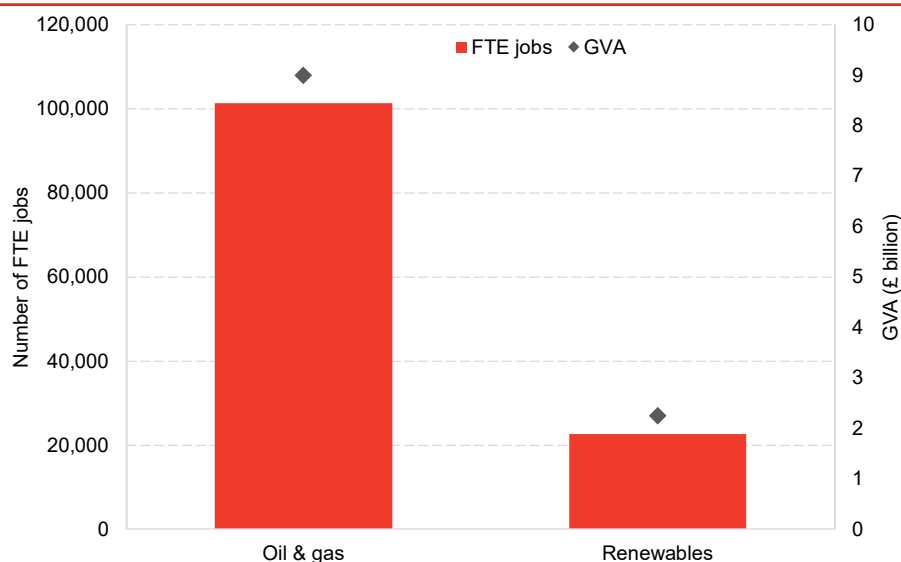
Reducing the reliance on oil & gas is required for environmental sustainability. However, reducing this reliance too quickly could endanger Scotland's energy security and lead to a significant loss of oil and gas jobs.

Recent estimates show that over 100,000 FTE jobs are directly and indirectly supported by the oil and gas sector compared to around 23,000 FTE jobs directly and indirectly supported the renewable energy sector. See Chart 40.

Whilst there are clear job opportunities in the renewables sector, time is needed to ensure the skills of the labour market match with the demand of renewable job vacancies.

So, whilst a switch to renewables is great for environmental sustainability, without a timely transition there would be a lack of labour to support the supply of energy needed to meet demand, resulting in poor energy security.

Chart 40: Number of jobs and GVA supported by oil & gas and renewables, Scotland, 2018/2019



Note: Figure for oil & gas jobs is for 2018, all other figures are for 2019

Source: Scottish Enterprise, FAI

Energy equity and environmental sustainability

A quarter of Scottish households live in fuel poverty and over 12% live in extreme fuel poverty⁹.

Typically, poorer households spend a larger proportion of their disposable income on energy bills. See Chart 41.

If certain policies are targeted at reflecting the true price of carbon emissions in energy consumption, poorer households could thus be affected disproportionately more than better-off households.

So, whilst environmental sustainability would improve, energy equity would worsen.

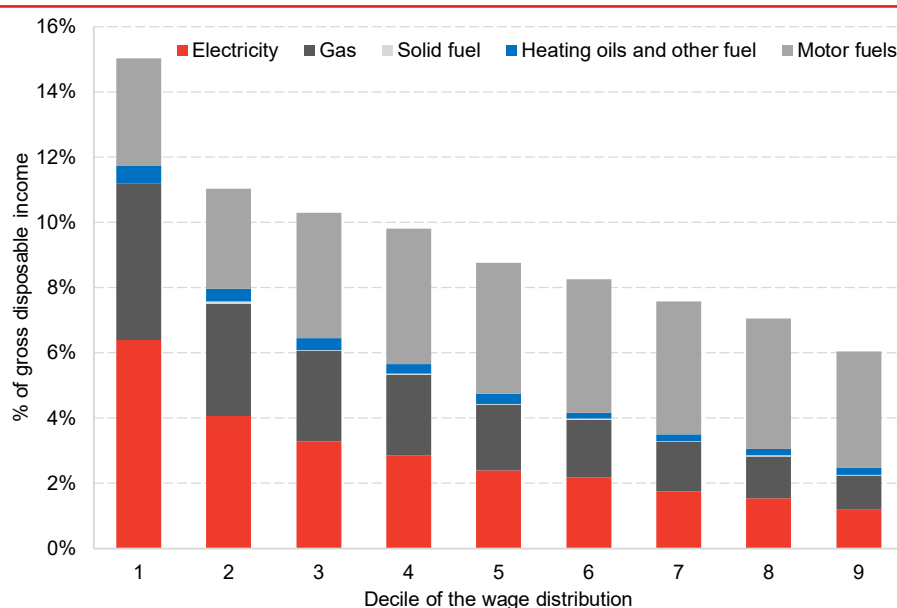
However, revenues from a policy such as a carbon price could be returned to lower income households to avoid this, such as the rebates which are used in Canada.

Most policies in the Scottish Government's climate change plan are investment-based rather than focused on reflecting the social cost of carbon in prices.

For example, the Scottish Government has committed to invest £1.6 billion in heat and energy efficiency over the next Parliament, which has the potential to help poorer households who may currently be in energy-inefficient homes and lack the funds necessary for retrofitting and home efficiency improvements.

⁹ A household lives in extreme fuel poverty if fuel costs exceed 20% of the household's adjusted (after housing costs) net income (SHCS, 2019).

Chart 41: Expenditure on different types of energy by income decile, 2018, UK



Source: ONS Family Expenditure Survey, ONS NOMIS, FAI calculations

Challenges: technological lock-in and infrastructure resilience

Another key challenge for policymakers concerns “technological lock-in”.

Many of the current targets for reaching net zero are towards 2045/2050. However, the lifespan of infrastructure that contributes towards emissions needs to also be considered.

For example, commissioning new, non-renewable generating facilities now would result in them remaining active and part of the emissions accounts up to 2050 – it is actions and policies in the next 10 years or so that will be critical to achieving these high-level goals, ensuring that we are not endowed with infrastructure that would be expensive to decommission before the end of its life cycle.

There is a need to explore the infrastructure that supports our economy and make changes where necessary to improve/secure their lifespan. An example is the water network, and the potential risks from extremes such as drought and floods. Most drainage in Scotland’s cities are from the Victorian era and cannot cope with current runoff rates, so urban flooding and damage could be a crucial challenge moving forward.

Challenges: an inclusive green economy

As outlined in the previous section, policy must strike the right balance between environmental sustainability and energy equity.

Achieving a net zero economy is crucial to the Scottish Government’s long-term strategy however, focussing solely on a future ‘green economy’ could hinder Scotland’s inclusive growth agenda.

The Scottish Government have set up the ‘Just Transition Commission’ which has committed to ensuring Scotland’s road to net zero is inclusive.

The commitments of this commission extend beyond things like fuel poverty, and there is a focus on developing the skillset of the labour market so that the benefits of a more green economy are distributed fairly – i.e. through well paid, secure, green jobs.

This is not an easy challenge.

Scotland has some of the worst inequalities in the UK and the productivity puzzle has highlighted the skills challenge that already exists in our labour market.

Tackling inequalities and combating climate change, all whilst growing the human capital of the economy, will require radical policies – and this is before we have even considered the current crisis that we are facing.

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