Sustainable Scotland Network

Public Bodies Climate Change Reporting 2021/22

Analysis Report

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Executive Summary

Public Sector Leadership Role

Scotland's public sector has a key leadership role in tackling the global climate emergency, in our national endeavour to deliver a just transition to net zero greenhouse gas emissions by 2045, ensuring Scotland is resilient to the changing climate, and securing our environmentally sustainable future.

Public Bodies' Legal Climate Change Duties and Reporting Duties

Since 2011, public bodies in Scotland have had legal duties to contribute to the delivery of Scotland's emissions target, help Scotland adapt to the impacts of climate change, and to act sustainably. Since 2015/16, around 180 listed public bodies[1] have been under a legal requirement to report annually on compliance with their climate change duties.

The Scottish Government strengthened the framework for public bodies' annual climate change reporting in November 2020[2]. The Scottish Government and Sustainable Scotland Network (SSN) co-developed guidance, Public Sector Leadership on the Global Climate Emergency, published in October 2021.

Annual Analysis Reports

This report presents summary analysis and key findings from public sector bodies' annual reports for the seventh mandatory reporting period, 2021/22. Reports were received from 188 public bodies representing 100% compliance.

The main focus of the analysis is on Part 3: Emissions, Targets and Projects and Part 4: Adaptation. New questions, introduced by the 2020 amendment to the original 2015 reporting order, took effect for the first time for the 2021/22 reports. The new questions focus on public bodies reporting their emission reduction targets, the alignment of spend and resources with targets, and on adaptation.

Headline Findings

Scope 1 and Scope 2 emissions were 30.2% lower in 2021/22 compared to 2015/16. This represents a slight upturn in public sector reported emissions in comparison to the 32.6% overall reduction between 2015/16 and 2020/21 recorded last year.

A **3.6% increase** over the previous reporting period is attributable to 2 factors:

- a detectable **rebound in public sector activity** likely due to relaxation of pandemic measures; and
- **expanded reporting** to capture improved emissions data on the use of medical gases and refrigerants.

[1] See Schedule 1 of The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Order 2015 (as amended) see below.

[2] The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Amendment Order 2020

Direct Operational Emissions (Scope 1)

Natural gas for heating continues to be the largest source of public sector emissions (30%) and remained virtually static with the previous reporting period (-0.3%). Expanded reporting of medical gases by 25% of the NHS sector is partially responsible for Scope 1 (direct emissions) being over 5% higher than last year – an example of improvements to reporting rather than an actual increase in emissions.

Emissions from public sector transport fleet increased over 10% from 2020/21, likely due to relaxation of pandemic measures but have reduced by 7.5% since the first reporting period for 2015/16.

Indirect Emissions from Supplied Electricity and Heat (Scope 2)

Indirect emissions from **electricity use and purchased heat and steam (Scope 2) remained stable** compared to 2020/21 (marginal rise of 0.4% within margins of uncertainty). The UK grid emission factor fell by an average 9% but electricity consumption increased by 4.8%, likely due to relaxation of pandemic measures.

Supply Chain and Other Indirect Emissions (Scope 3)

Measurement of other indirect emissions[3] (Scope 3) has expanded considerably this year, almost doubling (95%), but around 75% of this apparent increase is due to **expanded reporting capturing more emissions associated with procurement**. Approximately 10% of bodies have started to include procurement within their reporting boundary. As reporting of procurement emissions gathers pace across the public sector, Scope 3 emissions will become the predominant share of Scotland's public sector footprint. Reporting emissions is a vital step to inform other measures being taken to improve procurement practices in line with circular economy principles, and to engage with suppliers to drive down emissions throughout the supply chain to help deliver a fair and just transition to a net zero Scotland.

Following a sharp reduction during 2020/21 (-64%), **emissions from staff travel increased over 90% but are still 42% less than pre-pandemic level**s (2018/19). This is attributable in large part to on-line meetings reducing the need for business travel and other technologies starting to replace or complement travel for site inspections etc.

Waste emissions increased by just over 15%, attributable to the partial return of staff to workplaces but a reduction of 42% has been achieved since reporting began in 2015/16.

Emissions Reduction Projects

Emission savings from planned projects dropped by 52%. This is due to a number of factors, including disruption to project delivery schedules from pandemic impacts causing delays and uncertainty. However indirect effects on supply chains and contractor capacity have also been compounded by the UK's withdrawal from the European Union. There is potentially also an underlying issue, noted in previous reports whereby the easier, quick win projects have already been delivered. Financial constraints across the public sector are making it harder for investment projects to gain approval, when faced with competition from the delivery of core business and essential services. The need to now demonstrate within reports how budgets and resources align with net zero targets should help bring greater clarity to such issues as this aspect of reporting matures.

[3] See the Public Sector Leadership on the Global Climate Emergency, SG/SSN, October 2021

New Reporting of Emissions Reduction Targets

70% of public bodies reported one or more emission reduction targets. All local authorities and over 70% of the Others sector have at least one target. NHS Scotland, Scotland's Colleges and Scottish Water have targets of achieving net zero emissions by 2040. The total number of targets reported by public bodies has increased by over a third from 374 to 510. However, a range of factors including constraints of the reporting template and inconsistencies of interpretation and application of relevant national targets and policies, present analytical challenges leading to greater uncertainty than any other aspects of the analysis.

New requirements introduced for the 2021/22 reporting period included the reporting of target date(s) for achieving zero direct emissions and targets for indirect emissions, where applicable. **23 bodies were identified as having set a target date(s) for zero direct emissions**. 94 organisations reported a net zero target but there is, again, high variability regarding interpretation of what constitutes net zero, ranging from Scope 1 only to elements of all scopes. Determining progress against targets was challenging for the reasons mentioned above and compounded by a lack of quantitative parameters or other data to determine progress.

Adaptation

Some form of **adaptation risk assessment was completed by 66% of bodies** either during or prior to the 2021/22 reporting period. The level of risk assessment varies with the majority being limited to a single issue, e.g. flooding, rather than assessing risks across a range of potential climate impacts. The NHS is the only sector where the majority of bodies (70%) have conducted a comprehensive or advanced risk assessment.

Adaptation action has been undertaken by 67% of bodies up to and including the 2021/22 reporting period but it is unclear how actions reported by almost half of bodies are addressing specific risks from climate impacts. Some 20% of bodies reference mitigation as part of adaptation risk assessments and action. While there are benefits and constraints in play between adaptation and mitigation, much of these references are solely with respect to emissions. This suggests a **need for adaptation training**, particularly for Educational Institutions and the Others sector. This conclusion is reinforced by 28% of bodies including standalone mitigation measures amongst their top 5 adaptation priorities for the year ahead.

Conclusions

Although good progress has been made over the years, greater action is urgently needed across the public sector to bring steeper cuts in emissions at a much faster pace, and to assess and address climate risks through adaptation planning and action. This requires strong leadership and transparent decision-making that demonstrates alignment of public sector expenditure with pragmatic but transformative pathways to achieving a resilient net zero Scotland in accordance with our national targets.

While not currently part of this summary analysis it is worth noting that the voluntary **recommended section of reports provides an increasingly rich record of public sector climate action** (see "Recommended - Wider Influence" tab of reports). They present an impressive diversity of insights on initiatives that are delivering and promoting a range of benefits that can accrue at different scales and localities. Many are delivered in partnership with communities, local businesses and the third sector. Aims include improving biodiversity, access to nature, enhancing well-being and community regeneration and they are helping to reinforce the positive benefits and alternatives that a net zero, resilient and sustainable Scotland can offer.

Background

Under Section 44 of the Climate Change (Scotland) Act 2009, all public bodies, in exercising their functions, have a duty to:

- contribute to delivery of Scotland's national net zero target (mitigation – reducing greenhouse gas emissions);
- help deliver Scotland's climate change adaptation programme (adaptation – resilience to the impacts of a changing climate); and
- act sustainably (sustainable development as a core value).

The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Order 2015 (as amended by The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Amendment Order 2020) requires public bodies listed in Schedule 1 to report annually by 30th November on compliance with the above duties. The annual report includes information regarding:

- Profile of the body – e.g. budget and staff numbers
- Climate change governance, management and strategy
- Corporate emissions, projects and targets
- Adaptation – including risk assessments and management
- Procurement – how policies and activities contribute to compliance with climate change duties
- Validation of report data and information

Public bodies may also report on their 'wider influence' on climate change and sustainable development. This section of the report is currently voluntary and does not inform the summary analysis.

The 2020 Amendment Order, mentioned above, introduced additional questions with effect from the 2021/22 reporting period. Reports must now include:

- where applicable, the body's target date for achieving zero direct emissions of greenhouse gases, or such other targets that demonstrate how the body is contributing to Scotland achieving its emissions reduction targets;
- where applicable, targets for reducing indirect emissions of greenhouse gases;
- how the body will align its spending plans and use of resources to contribute to reducing emissions and delivering its emissions reduction targets;
- how the body will publish, or otherwise make available, its progress to achieving its emissions reduction targets; and
- where applicable, what contribution the body has made to helping deliver Scotland's Climate Change Adaptation Programme.

Overview

This report provides summary quantitative and qualitative analysis, the latter including analysis of Part 4: Adaptation and, for the first time, qualitative analysis of the new questions related to targets introduced by the 2020 Amendment Order. The analysis of emissions and projects excludes Integrated Joint Board (IJB) reports which currently refer, for the most part, to the corresponding NHS Board and/or Local Authority reports.

Reports were received from all 188 bodies, listed in Schedule 1 of the 2015 Order, as amended by the 2020 Order referenced above. Voluntary reports were received from the following bodies:

- Environmental Standards Scotland
- Healthcare Improvement Scotland
- NHS24
- Architecture and Design Scotland

As these bodies are not currently subject to mandatory reporting the reports do not inform this analysis but are posted on the SSN website alongside the mandatory reports.

The Scottish Land Commission and Crown Estate Scotland commenced mandatory annual compliance reporting for the 2021/22 reporting period. Both bodies are putting governance, management and data monitoring systems in place in order to mature reporting quality and efficacy. For the purposes of this summary analysis, the emissions data provided in their reports do not contribute significantly to total corporate emissions for the public sector.

The reporting period 2021/22 spans 1st January 2021 to 31st August 2022 due to sub-sectors adopting different corporate accounting years (i.e. calendar, financial or academic). Covid-19 pandemic measures were still in place earlier in the reporting period, notably homeworking which has since transitioned into longer-term hybrid working arrangements where appropriate within individual bodies.

As predicted, relaxation of pandemic safety measures has led to increased activity in comparison to the previous 2020/21 reporting period. This is reflected in some aspects of the analysis, specifically emissions data and project savings, although the picture is not necessarily a simple rebound effect. Scope 1 direct emissions increased by 5% in 2021/22, due to a range of factors including over 10% increase in transport fuel use as activity levels recover. However, improved methodologies and expansion of some bodies' reporting boundaries means that previously unreported emissions arising from the use of medical gases and refrigerants are now included. As more bodies expand their operational boundary and methodologies improve it is expected that reported emissions will rise further.

Several factors are influencing project delivery, resulting in a significant drop in emissions savings. In the time available to produce this report, quality assurance checks triggered by apparent data anomalies have not always been able to discern the underlying issues affecting project delivery. Anecdotal evidence, however, particularly in the case of construction (including refurbishment) and energy efficiency projects, suggests that factors such as materials supply chain, skills and capacity gaps, especially amongst contractors, continue to create bottlenecks.

Aside from budget and capacity issues within bodies, which in some cases have been exacerbated by the global pandemic, other drivers such as EU exit, inflation and the energy crisis will continue to have knock-on effects, as evident from impacts being reported on project delivery across Scotland and the UK.

Key facts and figures

Number of reports
188
(100% compliance)

Staff (FTE)
504,782

Emissions (tCO_2e)

Increase in Scope 1 and Scope 2 emissions compared to 2020/21
3.6%

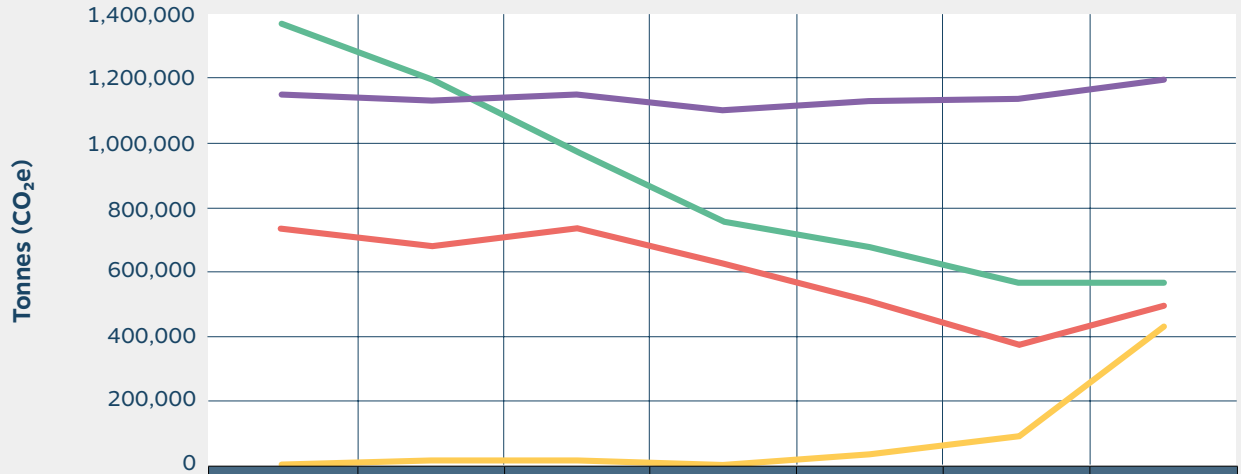
tCO_2e saved due to carbon reduction projects
38,592

Renewable energy generated
362 GWh

Number of reports by sector

Sector	2021/22	
	Number of reports received	Compliance
Local Authorities	32	100%
National Health Service	20	100%
Educational Institutions	45	100%
Transport Partnerships	7	100%
Others	54	100%
Integration Joint Boards	30	100%
Total	188	100%

Trends in reported emission scopes since 2015



	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Scope 1	1,158,400	1,132,344	1,156,837	1,107,785	1,130,112	1,138,573	1,197,089
Scope 2	1,369,236	1,198,287	981,931	765,992	678,082	565,392	567,734
Scope 3 general	740,956	687,254	739,020	631,852	510,059	376,200	476,938
Scope 3 procurement	0	5,000	5,000	0	35,649	94,864	424,857

*91% increase in Scope 3 emissions includes an additional 329,300 tCO_2e due to expanded reporting of procurement emissions by 17 public bodies although over 50% of the procurement emissions were reported by 1 body.

Key findings

1. Direct emissions (Scope 1) arise typically from heating of buildings and the use of fleet vehicles. Refrigerants and some other emissions associated with sector specific processes are also included.
   - Emissions from natural gas were largely the same as previously. The 0.3% reduction is within margins of error/uncertainty but 2021/22 was warmer than 2020/21.
   - Scope 1 emissions increased by 5% over 2021/22 due to a range of factors including over 10% increase in transport fuel use as activity levels recover. However, improved methodologies and expansion of some bodies reporting boundaries means that previously unreported emissions arising from the use of medical gases and refrigerants are now included. As more bodies expand their operational boundary and methodologies improve it is expected that these reported emissions will rise further.
2. Indirect emissions (Scope 2) from UK grid electricity consumption rose 0.4% from 2020/21. Electricity consumption increased by almost 5% from the previous period following relaxation of pandemic measures, but is >5% lower than 2018/19 pre-pandemic levels, the last complete pre-pandemic reporting period. The UK grid has decarbonised by over 50% since 2015/16 meaning emissions savings due to energy efficiency and other active measures have achieved savings of around 10% since 2015/16.

3. Other indirect emissions (Scope 3) increased by 91% compared to 2020/21. Three quarters of this increase is due to 17 bodies, mainly in Education, improving reporting of procurement emissions, i.e. the **increase reflects better accuracy and expanded reporting boundaries rather than an actual increase or new source of emissions**. The emissions were estimated based on spend categories and therefore have potentially large margins of uncertainty but enable targeting of more focused action. This trend will accelerate as more bodies include procurement emissions in their reporting. Activity levels recovered to some extent as pandemic measures relaxed throughout the period, for example travel emissions returned to about 58% of pre-pandemic levels.

4. 70% of public bodies reported one or more emission reduction targets (5% more bodies than 2020/21). New requirements introduced for the 2021/22 reporting period included the reporting of target date(s) for achieving zero direct emissions and targets for indirect emissions, where applicable. 23 bodies were identified as having set a target date(s) for zero direct emissions.

5. Analysis of the adaptation section of reports for the second consecutive year indicates that while most bodies have completed some form of risk assessment these need to become more comprehensive i.e. to look at all potential risks and vulnerabilities. Policies and plans are needed to better address specific risks and measure progress. Better understanding of the differences between adaptation and mitigation, in particular mutual constraints and benefits, is critical to ensuring maladaptation is avoided.

Analysis within the context of change: The scale and scope of emissions data has increased since reporting began which introduces some challenges in terms of detecting trends. The main changes are:

- The number of public bodies subject to mandatory reporting has increased by >25%, from 150 in 2015/16 to 188 and may increase further.
- More recently established bodies, specifically new Executive Agencies, became subject to mandatory reporting immediately on being established, and are not necessarily at full operational/staff complement. As more measures are put in place to ensure appropriate governance and management of climate action, compliance reporting will improve and respective emissions footprints will better reflect actual emissions.
- As data capture has matured over the years and with the introduction of more policies on targets and measures, the range of emission sources has grown and improved although gaps remain. The largest gap is in the area of the challenges around measurement of emissions related to procurement activity. The Sustainable Procurement Duty is helping to drive knowledge and adoption of good practice but substantial effort is needed by public bodies to assess and target action that will drive down emissions throughout supply chains and services. Assessments to date indicate that procurement could be contributing some 70-80% of a body's actual footprint[4]. This does not mean that the public sector's overall footprint is increasing but rather that the ability to monitor and report supply chain emissions is improving over time.

[4] See for example: East Renfrewshire Council's latest report and webpage

Corporate Emissions

Most sectors reported increased emissions compared to 2020/21 reflecting activity returning partially towards pre-pandemic levels

Public bodies report their corporate greenhouse gas (GHG) emissions[5] which typically include emissions from estate operation, owned assets and service delivery. A public body determines what to include in its reporting boundary, however, there are moves to improve consistency, especially within subsectors. This is generally based on what is readily within control, typically heating, electricity, fleet, waste, water and business travel plus increasingly the procurement of goods and services. In some instances, particularly for smaller bodies based within a larger public sector estate, it is not always feasible to pro-rata emissions based on percentage occupancy or floor area. Similar issues can arise in respect of shared services such as water and waste. As more activities come under consideration e.g., procurement, boundaries will expand resulting in more complete reporting of overall footprints[6].

- Local Authorities contribute the largest share of public sector total reported emissions. The sector's emissions increased by 4.6% since 2020/21.
- Following the breakthrough in methodologies for emissions accounting related to the use of medical gases, some 25% of NHS bodies have now broadened their operational boundary to report on these emissions under Scope 1. This improved accuracy of reporting contributes 20% to the total NHS emissions footprint reported last year. In addition, one NHS body reported emissions attributed to staff commuting for the first time, which accounts for 27% of the NHS sector's total Scope 3 emissions.
- The Education sector has made marked inroads on starting to estimate emissions due to the procurement of goods and services. This expansion of the reporting boundary by a third of the sector explains the sector's total footprint seeming to more than double after steady declines since reporting began. This level of change is expected to continue as other bodies and sectors expand their boundaries to capture this largely unreported area of emissions associated with c£14.5Bn public sector annual spend on procurement. It is worth noting that current methodologies for assessing procurement-related emissions generally rely on expenditure as an emissions proxy but this can introduce potentially large uncertainty as a realistic indicator of carbon intensity/emissions. Basing emission reduction measures solely on spend also risks compromising delivery of broader sustainable procurement outcomes and ensuring a just transition to a net zero Scotland.
- Remaining sectors demonstrate steady declines in annual emissions but with smaller year-on-year reductions than previously.

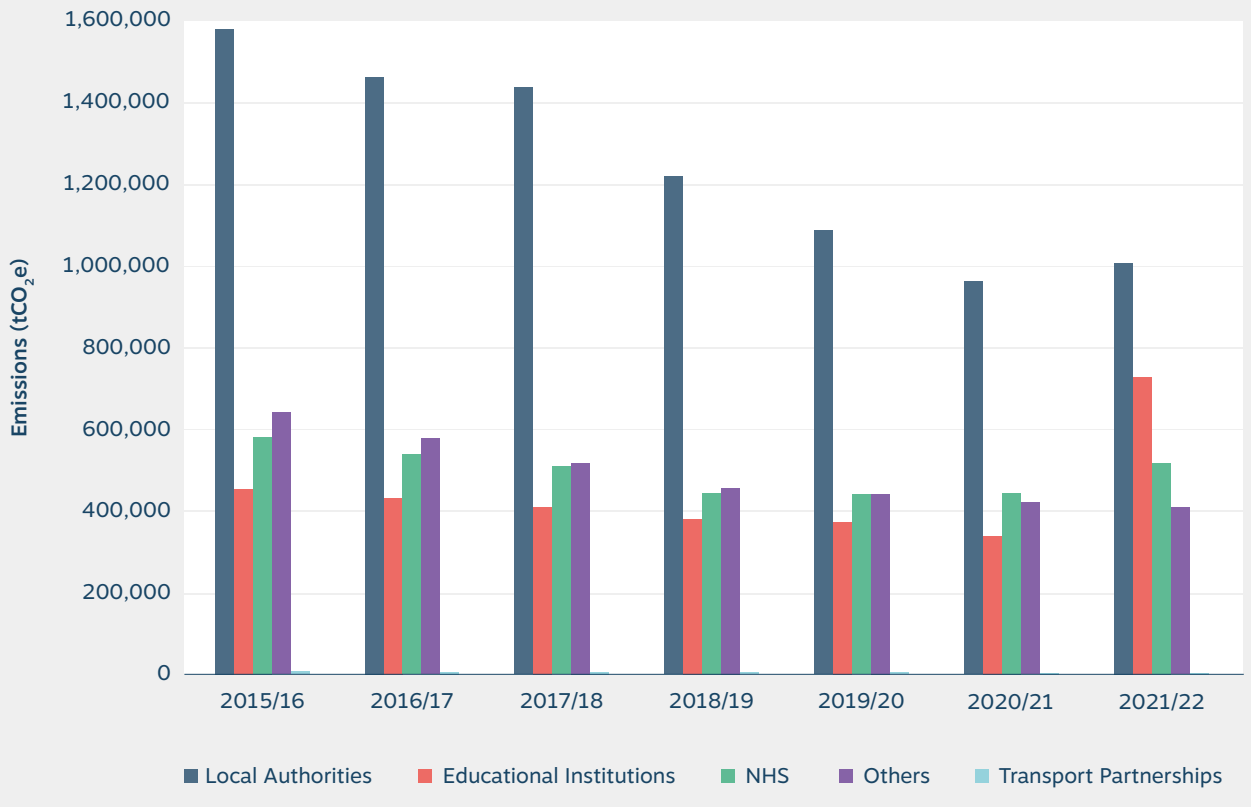
[5] Reported as tonnes of carbon dioxide equivalent, tCO_2e.

[6] Public sector leadership on the global climate emergency: guidance, 2021

i. Total emissions by sector

Sector	Total emissions (tCO_2e)							Change since 2020/21
	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	
Local Authorities	1,580,335	1,463,298	1,436,627	1,218,438	1,087,513	963,554	1,008,191	4.6%
NHS	583,252	541,381	509,551	444,052	442,735	446,586	514,902	15.3%
Educational Institutions	453,632	432,079	410,138	381,801	375,635	338,825	729,677	115.4%
Others	642,482	578,780	519,902	455,801	442,982	421,766	409,784	-5.4%
Transport Partnerships	8,892	7,345	6,571	5,537	5,036	4,297	4,065	-5.6%
Total	3,268,592	3,022,885	2,882,788	2,505,629	2,353,902	2,175,029	2,666,618	22.6%

Sector emissions (tCO_2e) per reporting period since 2015/16



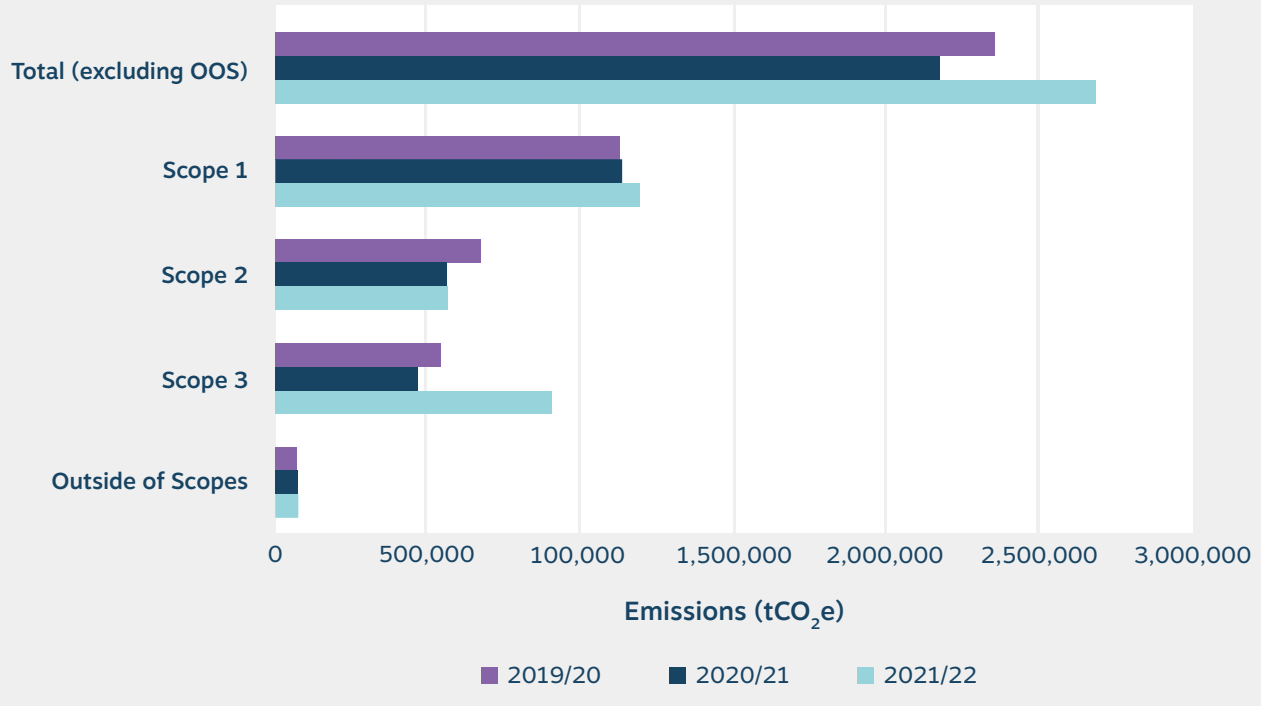
ii. Total emissions by scope[7]

Most bodies include emissions from gas, fuel use and electricity consumption (Scopes 1 & 2), where relevant. Emissions reporting associated with water use, waste, non-fleet business travel and procurement (Scope 3) is more variable. As mentioned above, where building services such as waste and water provision are shared, data is not always readily available to provide *pro-rata* emissions. With successive reporting periods and as data systems and processes mature, bodies are starting to include other Scope 3 emissions such as staff commuting, home/hybrid working and, of greatest longer-term significance – emissions due to the procurement of goods and services.

Emissions by scope

Scope	Emissions (tCO_2e)			% change from 2020/21
	2019/20	2020/21	2021/22	
Scope 1 general	1,127,338	1,137,263	1,160,207	2%
Scope 1 medical gases	2,774	1,310	36,882	2715%
Total Scope 1	**1,130,112**	**1,138,573**	**1,197,089**	**5%**
Total Scope 2	**678,082**	**565,474**	**567,734**	**<1%**
Scope 3 general	510,059	376,200	476,938	27%
Scope 3 procurement	35,649	94,864	424,857	348%
Total Scope 3	**545,708**	**471,064**	**901,795**	**91%**
Outside of Scopes (OOS)	78,393	77,742	79,315	2%
Total Emissions (excluding OOS)	2,353,902	2,175,029	2,666,618	23%

Total emissions by scope over last 3 years



[7] For more information on emission scopes, see Chapter 4 of the GHG Protocol Corporate Standard.

Scope 1

A number of factors have contributed to changes in total reported direct emissions since 2020/21. Relaxation of pandemic measures is responsible for >10% increase in emissions from fleet and transport fuel use as activity levels partially recovered. However, improved methodologies and expansion of some bodies' reporting boundaries means that previously unreported emissions arising from the use of medical gases and refrigerants are now included by more bodies. As other bodies, particularly within key sectors such as the NHS and Educational Institutions, expand their operational boundary and adopt improved accounting methodologies it is expected that reported emissions will rise further. However, accounting for degree days, natural gas consumption is essentially on a par with previous years.

Percentage of sectors reporting Scope 1 emissions

Sector	Natural gas	Other heating fuel	Transport Fuel	Refrigerants	Renewables	Process gases[8]
Local Authorities	91%	94%	81%	0%	84%	0%
National Health Service	70%	70%	45%	35%	40%	30%
Educational Institutions	89%	44%	40%	33%	24%	4%
Others	81%	41%	33%	13%	20%	6%
Transport Partnerships[9]	29%	0%	0%	0%	0%	0%
Average	82%	54%	45%	18%	36%	7%

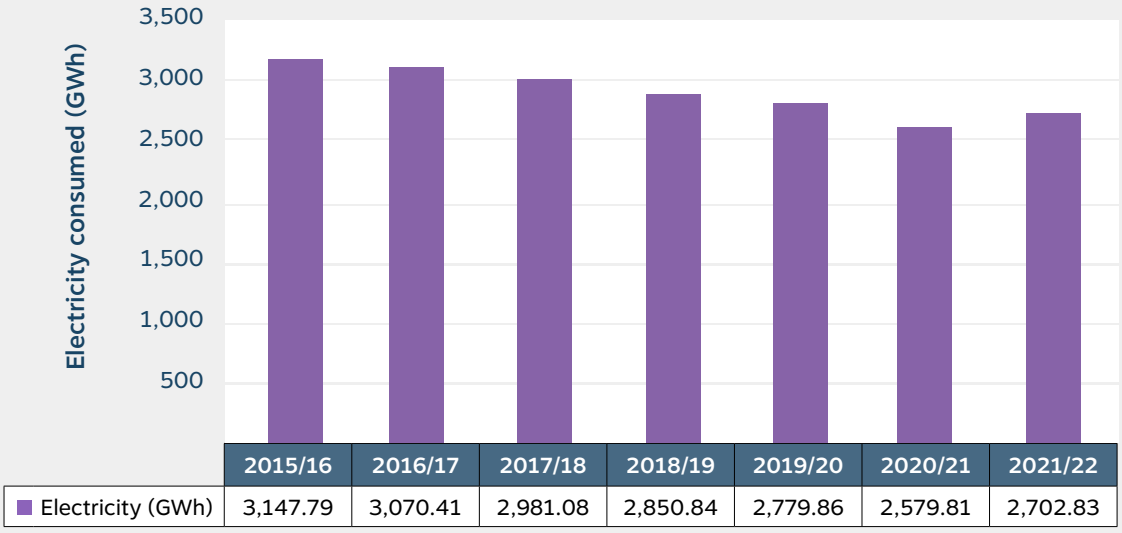
[8] Mainly from sewage sludge treatment and from the use of medical gases in the NHS and university hospitals.

[9] Majority are based within local authority offices so emissions are accounted for in another PB report.

Scope 2

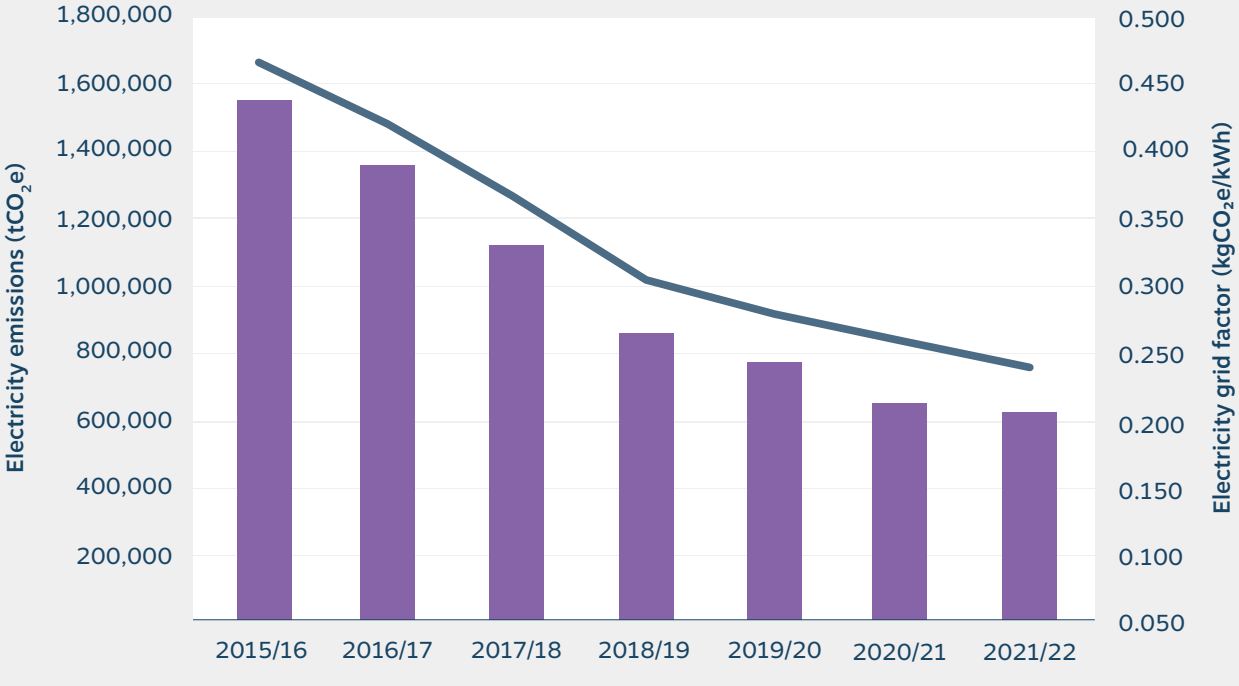
Indirect emissions from electricity use and purchased heat and steam remained stable compared to 2020/21 (0.4% increase is within margins of uncertainty). The UK grid emission factor fell by an average 9% but was counterbalanced by electricity consumption increasing by 4.8% due to relaxation of pandemic measures.

Grid electricity (GWh) consumed since 2015



	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Electricity (GWh)	3,147.79	3,070.41	2,981.08	2,850.84	2,779.86	2,579.81	2,702.83

Grid electricity emissions (tCO_2e) since 2015



Percentage of sectors reporting Scope 2 emissions

Sector	Electricity
Local Authorities	100%
National Health Service	95%
Educational Institutions	100%
Others	93%
Transport Partnerships	57%
Average	95%

The majority of bodies report Scope 2 emissions but, as mentioned elsewhere, most Transport Partnerships and some of the smaller "Other" bodies are co-located with larger public bodies which accounts for gaps in Scope 2 reporting.

SPOTLIGHT: NHS Lothian

Nitrous Oxide Cracking Machine Trial

Nitrous oxide (N_2O) mixed with oxygen in the form of Entonox is a commonly used analgesic agent during labour and delivery. Within NHS Lothian, over 70% of patients use it at some point during childbirth. Unfortunately it is exhaled completely unchanged and is released both into the delivery room and eventually, earth's atmosphere. It exposes staff and birthing partners to possible increased risks of potentially harmful long-term effects and is a significant greenhouse gas (GHG) with a lifespan of approximately 110 years. By absorbing and re-emitting infrared radiation it contributes to the GHG effect, with a Global Warming Potential over 100 years (GWP100) of 265 compared to the reference gas carbon dioxide (CO_2).

Given its effectiveness, ease of use, safety and low side effect profile, in addition to the lack of suitable equivalents, Entonox use in Maternity Units is here to stay for the foreseeable future. However, novel technology now exists that can catalytically 'crack' exhaled N_2O into its harmless individual components nitrogen and oxygen, at the point of use. In September 2021, St John's Hospital in NHS Lothian was the first hospital in Scotland to use such an innovative technological solution to this problem. A Mobile Destruction Unit (MDU) can be moved from room to room when requested and has a footprint of about 1 square metre but is not too intrusive when in use. St John's Hospital has been able to share its experience of using the MDU with colleagues within other maternity units in NHS Lothian, but also across Scotland and the UK, as only a handful of sites currently have access to such a device.

Further research is taking place to address the fugitive emissions through system loss which is as high as 60% for piped analgesic nitrous oxide (Entonox) and only mitigates the gas the patient successfully exhales into the scavenging system. Two new innovative projects at UCL and Heriot Watt University are under development to mitigate medical nitrous oxide emissions and develop a novel system which can be built into the ventilation already in place.

Full technical update: Anaesthetic nitrous oxide system loss mitigation and management [PDF]

Scope 3

The impact on Scope 3 emissions of more bodies adopting good practice by expanding their reporting boundaries to start including emissions associated with the procurement of goods and services has already been mentioned above. Taken at face value it may seem that Scope 3 emissions have almost doubled, however, this is not an increase in real terms, as discussed in further detail below.

Waste tonnage to landfill has increased 7% generating >15% increase in waste emissions, due to returning increased occupancy and activity across the public sector estate following relaxation of pandemic measures. However, waste emissions remain lower than 2019/20 and continue to show a downward trend with increased recycling rates reported by 66 bodies compared with 33 bodies for the previous period.

Travel emissions increased >90% since 2020/21 representing c58% of pre-pandemic levels. Full rebound is unlikely due to continued practices favouring on-line over in-person meetings, where feasible. Commuting shows a similar pattern, dipping during 2020/21 then recovering but, as more bodies include commuting year-on-year, reported emissions are expected to rise longer-term. Commuting was only reported by a handful of bodies pre-pandemic, but 16 bodies reported commuting representing 15% of total FTEs.

Percentage of each sector reporting the most common Scope 3 emissions

Sector	Travel	Waste	Water	Homeworking	Commuting
Local Authorities	97%	91%	84%	72%	3%
National Health Service	80%	85%	75%	55%	5%
Educational Institutions	93%	93%	93%	89%	18%
Others	89%	76%	80%	93%	9%
Transport Partnerships	86%	43%	43%	71%	14%
Average	**91%**	**84%**	**82%**	**82%**	**10%**

iii. Total Emissions by source

The table below shows percentage changes in emissions by source since the first reporting period (2015/16) and since the previous reporting period (2020/21). Procurement, homeworking and hotel stays were not reported initially so comparison of relative changes is not available. Improvements in the quality and number of sources reported since 2015/16 have resulted in more Scope 1 process emissions being reported (mainly due to better reporting of medical gases) and also refrigerants. Better reporting of Scope 3 emissions associated with staff commuting, is illustrated in the dramatic difference in percentage changes between the first and last reporting periods shown in the table below. However, in combination, these Scope 1 and Scope 3 sources still contribute less than 9% of total emissions. Emissions from waste, travel and water have reduced substantially since 2015/16 but activity rebound from relaxation of pandemic measures saw an increase for waste and travel emissions over 2020/21, with travel emissions almost doubling.

Total emissions by source and percentage changes since first and previous reporting periods

Source	Emissions (tCO_2e)			Percentage change since	
	2015/16	2020/21	2021/22	First RP*	Last RP
Natural gas	843,615	826,506	824,281	-2.3%	-0.3%
Electricity	1,550,894	648,441	623,147	-59.8%-	-3.9%
Procurement	NR*	94,864	424,857	NA	347.9%
Transport fuel	207,559	173,313	191,903	-7.5%	10.7%
Waste	314,744	159,162	183,434	-41.7%	15.3%
Processes	47,772	81,059	130,127	172.4%	60.5%
Other heating fuels	133,536	100,342	89,348	-33.1%	-11.0%
Commuting	18,193	5,522	66,975	268.1%	1112.9%
Travel	136,532	39,713	75,667	-44.6%	90.5%
Homeworking	NR	32,400	30,449	NA	-6.0%
Refrigerants	620	5,251	21,289	3332.9%	305.4%
Water	13,655	4,493	4,478	-67.2	-0.3%
Hotel stays	NR	174	1,222	NA	603.4%
Other	640	1,690	645	0.8%	-61.8%
Renewables[10]	832	2,098	1,204	44.7%	-42.6%

Number of bodies reporting specific emissions sources since first and previous reporting periods

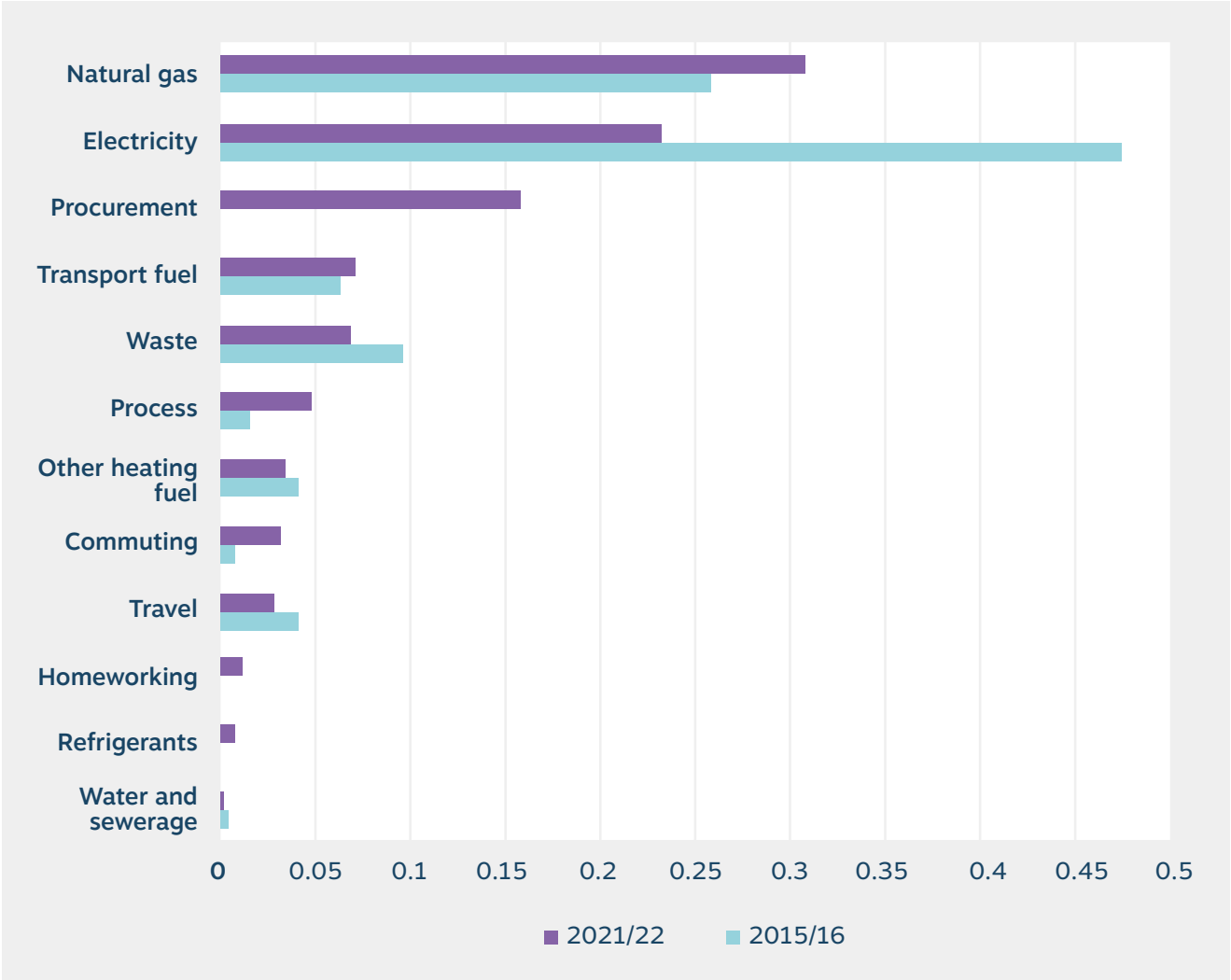
Emissions Source	2015/16	2020/21	2021/22
Procurement	1	5	17
Processes	1	9	11
Commuting	3	7	16 (15% of total FTEs)
Homeworking	0	104	129 (68% of total FTEs)
Refrigerants	5	22	24

[10] Scottish Water reported significant emissions reductions from biogas.

*NR – not reported; RP – reporting period

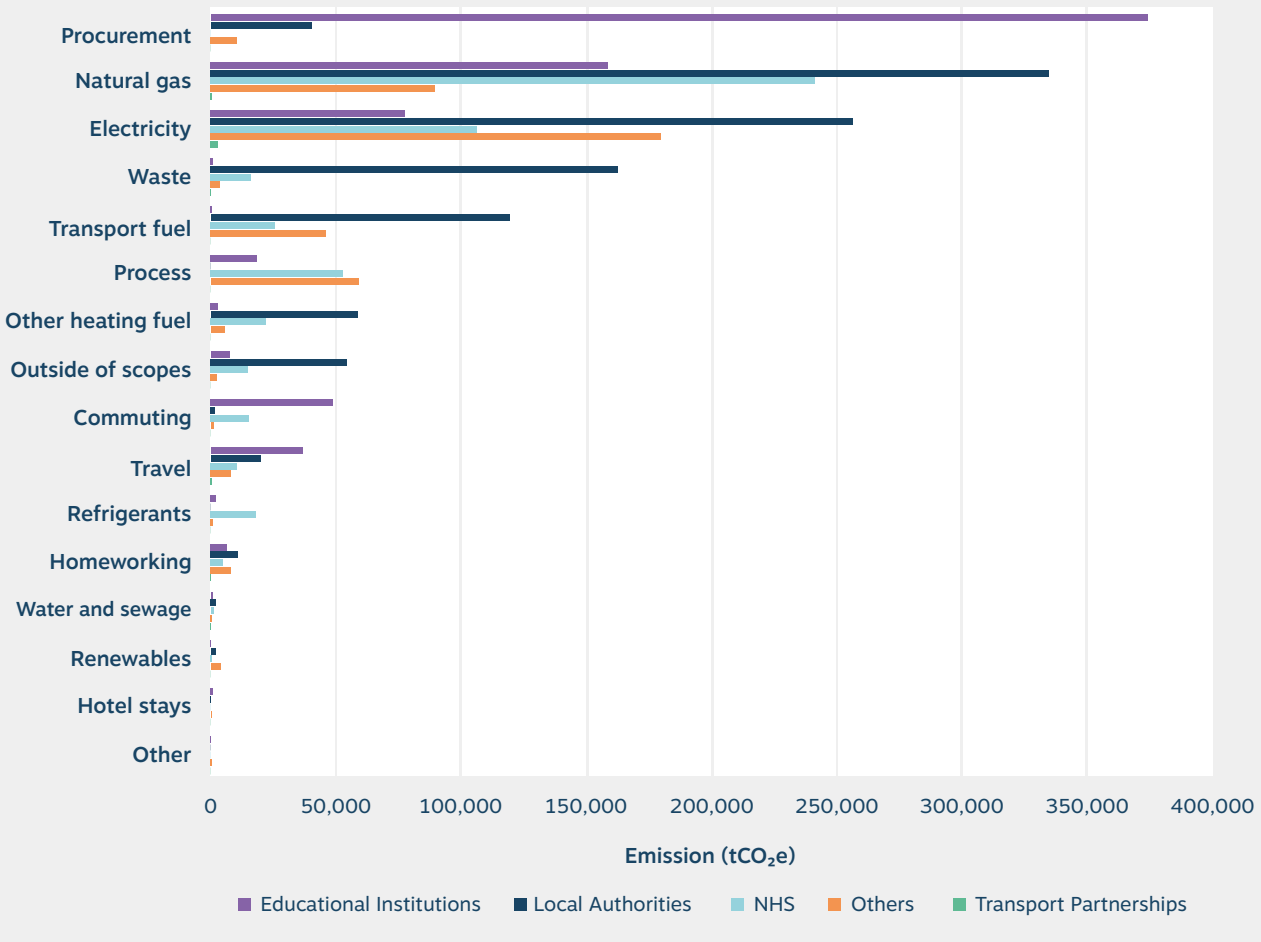
The graph below shows the composition of total annual reported emission by source for the first and latest reporting periods. As detailed elsewhere in the report, electricity emissions have seen the greatest change, falling from nearly 50% of the 2015/16 total footprint to less than a quarter of 2021/22 total emissions footprint. Procurement, which was not reported at the outset of reporting, now represents >15% of the total reported emissions footprint for 2021/22 and, as good practice evolves across the public sector on accounting for procurement emissions, further substantive change is expected over future reporting periods.

Emission sources as fraction of total reported emissions for first and latest reporting periods



Emissions sources by sector 2021/22

Source	Emissions (tCO_2e)				
	Local Authorities	Educational Institutions	National Health Service	Others	Transport Partnerships
Procurement	40,278	374,027	-	10,552	-
Natural gas	334,588	158,624	241,167	89,463	438
Electricity	256,381	77,657	106,397	179,787	2,925
Waste	162,604	1,031	16,013	3,783	3
Transport fuel	119,334	601	25,821	46,147	-
Processes	-	18,373	52,770	58,985	-
Other heating fuels	58,578	3,021	22,209	5,540	-
Outside of scopes	54,553	7,526	14,825	2,410	-
Commuting	1,612	48,922	15,327	1,113	-
Travel	19,880	36,688	10,433	8,039	626
Refrigerants	-	2,243	18,059	987	-
Homeworking	10,840	6,475	5,019	8,046	68
Water and sewage	2,146	750	1,099	479	4
Renewables	1,947	237	587	3,975	-
Hotel stays	2	901	-	319	-
Other	-	127	-	518	-
Total	1,062,744	737,203	529,727	412,194	4,065



SPOTLIGHT: Argyll and Bute IJB

Innovation

The Argyll and Bute Integrated Joint Board (IJB) has taken a lead in progressing several projects, including:

- Electrification of the Argyll and Bute IJB fleet. Currently 36 vehicles are electric with orders placed for a further 56. This will take the total to 28% of the fleet being electric within the next year and £118k of additional budget has been allocated for the cost of this.
- Direct funding secured for increasing electric vehicle charging points by 30 during 2023/24.
- Supporting increased use of remote/home working for staff and expanding the use of 'Near Me' Video Appointments for patients and clients when clinically appropriate.
- Business case submitted to implement a biomass generator at the Campbeltown Community Hospital.
- Working with partners to consider feasibility of direct energy generation in Lochgilphead.
- Running an innovative project to pilot the use of drones in remote and island areas.
- Argyll and Bute IJB is also building internally by recruiting a Senior Estates Development and Sustainability Manager to provide additional capacity and expertise to work with partners on estates development and sustainability.

Using drones to improve delivery and diagnostic services in remote areas

The Argyll and Bute IJB is running an innovative project to pilot the use of drones in remote and island areas. The drone will operate along the West of Argyll between Oban, Lochgilphead, Isle of Mull and Easdale; with vision to expand to the Kintyre peninsula and Islay, Jura and Colonsay.

The project is the first in the UK and is currently in phase two of a drone beta service for clinical logistics, focusing on blood specimen transportation. This would improve the speed of diagnostic testing for GPs and hospitals and cut carbon emissions by reducing the need for multiple forms of transportation, including car, ferry, and air. The drone can carry 5kg and will be remotely piloted from a control centre in Aylsebury, England with the drone maintenance operating crew based in Argyll.

Procurement emissions

In order to help meet Scotland's ambitious climate change targets, public bodies will need to understand, measure and reduce their full climate impact, including the indirect impact of their operations. Typically, Scope 3 indirect emissions can contribute 70-80% of a body's carbon footprint, see for example East Renfrewshire Council's report. For most public bodies, their greatest climate impact will therefore lie within influencing Scope 3 emission sources, beyond their direct operational control.

To date, the majority of public bodies have reported on selected Scope 3 emissions related to their operations but beyond their direct control including waste, water and wastewater treatment, business travel and home working.

As public bodies set and progress towards net zero targets, they will undertake assessments of their wider value chain. Measuring and reporting emissions is a vital first step to allow targeted action to address procurement behaviour, engage with suppliers and to drive down emissions throughout the supply chain.

Including these wider value chain emissions in their reporting for the first time can make it appear as if the body's carbon emissions have increased. However, the actual emissions **have not increased; rather the reporting boundary has expanded to include these additional existing sources**.

Data from a Scope 3 assessment will typically allow bodies to identify carbon 'hot spots' in their supply chain from particular products, activities or suppliers. Efforts to reduce emissions can then be focused on these areas where the highest carbon reduction impacts can be achieved.

Procurement emissions reported by sector

Sector	No. of Bodies Reporting Procurement Emissions	2020/21 Reported Procurement Emissions (tCO_2e)	2021/22 Reported Procurement Emissions (tCO_2e)
Educational Institutions	15	44,727	374,027
Local Government	1	40,278	40,478
Other	1	9,859	10,552
Total	17	94,864	424,857

Homeworking emissions

82% of bodies reported emissions due to home/hybrid working arrangements, accounting for 68% of total FTEs and 1.1% of total emissions. Estimates from individual bodies of the percentage FTEs working from home ranged from single figures up to 100% in some cases. Two of the transport partnerships report staff numbers under the corresponding local authority.

Homeworking emissions as percentages of sector and FTEs in 2021/22

Sector	No. of Bodies Reporting Homeworking Emissions	As a % of Sector	As a % of FTE Staff
Local Authorities	23	72%	67%
National Health Service	11	55%	55%
Educational Institutions	40	89%	75%
Others	50	93%	99%
Transport Partnerships	5	71%	100%
Total	129	82%	68%

Key findings

- Waste tonnage to landfill increased by 7% following a 12% dip during the previous period. This resulted in a 15% increase in waste emissions compared to 2020/21. Despite this increase, attributed to relaxation of pandemic measures, waste emissions remain below pre-pandemic levels and continue to show a downward trend due to increased recycling.
- Travel and water emissions have partially rebounded mainly due to relaxation of pandemic measures.
- Procurement emissions contributed >15% of total reported emissions (330,000 tCO_2e). This is based on only c. 10% of bodies reporting procurement activity and is expected to increase substantially in future years as more bodies include supply chain activity within their reporting boundaries. Fifteen of these bodies are in the education sector which uses a sector-designed tool that takes a spend-based approach rather than a more nuanced carbon-intensity assessment but can be useful as a first-stage assessment.
- Commuting emissions were reported by 16 bodies representing 15% of total FTEs.

Emission Reduction Projects

Emissions savings from planned projects dropped by 52%, saving 38,592 tCO_2e

Emission reduction projects are planned activities intended to reduce emissions within the annual reporting period. Projects include measures to reduce energy demand (for example, energy efficiency projects) and to reduce emissions from the supply of energy (for example, renewable energy projects). Examples of emission reduction projects reported in 2021/22 are listed below.

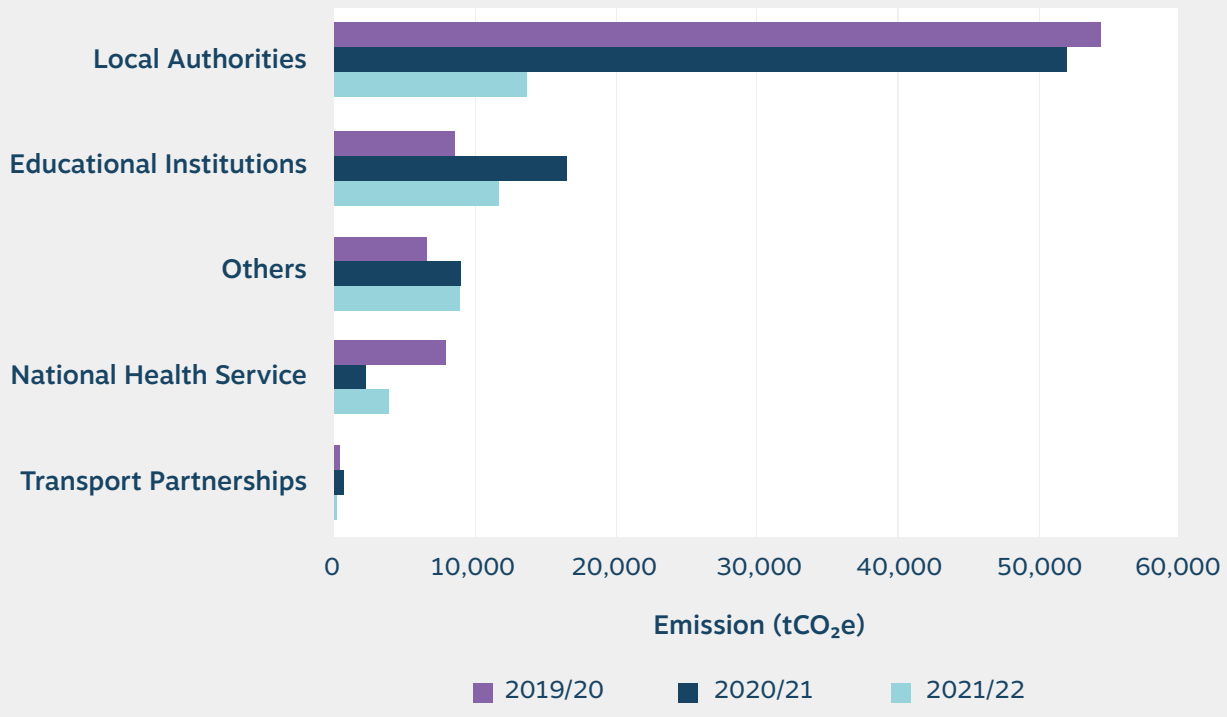
Emission Source	Examples	
 **Electricity**	• Chiller replacements • Energy efficiency measures • IT infrastructure upgrades • LED lighting upgrades	• Lighting – internal, external and street lighting • Photovoltaic (PV) panels • Switch off schemes to reduce consumption
 **Heating**	• Biomass boiler installations • Boiler upgrade or replacement • Building Management Systems (BMS) upgrades • District heating network expansion	• Draught proofing • Improved energy management during lockdowns • Insulation improvements • Replacement of thermostatic heating valves
 **Fleet transport**	• Expansion of electric vehicle (EV) charging infrastructure • Fleet replacement, including hydrogen and electric vehicle	• Route optimisation projects
 **Business travel**	• Sustainable business travel policies to reduce emissions • Remote annual conferences and board meetings	• Promoting active travel
 **Waste**	• Landfill diversion • Waste compactor • Energy to waste schemes • Reuse/repurpose – circular economy projects • Electronic filing to reduce paper	• Improved bin signage / comms around waste • Reducing use of office consumables • Waste education programmes • Waste tracking systems being implemented
 **Water**	• Leakage reduction • Water air temperature cooling system upgrades • Waterless urinals	• Efficiency measures • Sensor Tap installations • Installation of compostable WCs
Other	• General improved carbon/ sustainability governance • Hybrid working policies	• Estate rationalisation • Staff carbon literacy training

i. Project savings by sector

Reported savings from projects reduced markedly due to a range of external factors such as ripple effects from the pandemic including disruption to supply chains, especially the global shortage of construction materials, and also labour shortages as a result of EU exit. There is also an element of under-reporting, especially for multi-year projects for which the current reporting template is not ideally suited. Uncertainty for many bodies over long-term estate needs due to the move to hybrid working (and other factors) is also delaying project investment.

Project savings by sector since 2019/20

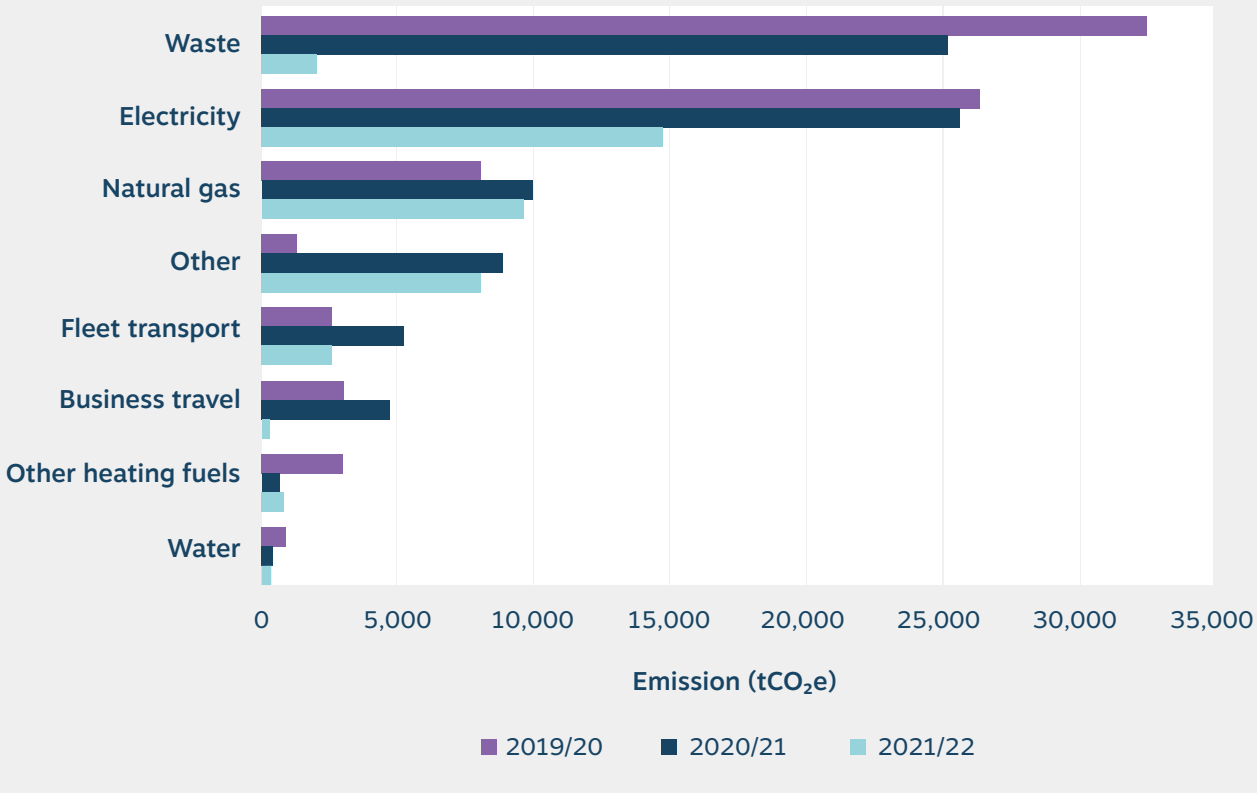
Sector	2019/20		2020/21		2021/22	
	Emissions saved (tCO_2e)	% of subsector emissions	Emissions saved (tCO_2e)	% of subsector emissions	Emissions saved (tCO_2e)	% of subsector emissions
Local Authorities	54,083	4.97%	52,036	5.40%	13,664	1.36%
Educational Institutions	8,612	2.29%	16,551	4.88%	11,820	1.62%
Others	6,625	1.49%	9,003	2.13%	8,977	2.19%
National Health Service	7,986	1.80%	2,287	0.52%	3,921	0.73%
Transport Partnerships	472	9.36%	719	16.72%	210	5.17%
Total	77,778		80,596		38,592	



ii. Project savings by source

Project savings by source since 2019/20

Emissions Source	Emissions saved (tCO_2e)		
	2019/20	2020/21	2021/22
Waste	32,619	25,248	2,061
Electricity	26,441	25,689	14,771
Natural gas	8,075	9,925	9,619
Other	1,235	8,793	8,123
Fleet transport	2,543	5,211	2,598
Business travel	3,018	4,726	266
Other heating fuels	2,958	620	801
Water	889	384	353
Total	77,778	80,596	38,592



Key findings

- Emission reduction projects saved 38,592 tCO_2e which is 52% less than savings achieved in 2020/21. Waste projects savings were 90% less than the last reported period, followed by travel projects with 70% less savings and electricity projects having 42% less savings.
- Electricity and gas projects saved around 25,000 tCO_2e which accounts for over 60% of total savings achieved.
- Local Authorities reported less savings from projects this year particularly in waste and electricity.

SPOTLIGHT: Aberdeen City Council

Staff Car Club Project

Aberdeen City Council has 848 members of staff registered to use Car Club with access to 10 low carbon vehicles (4 EVs and 6 Hydrogen) and 16 new charge sockets for work purposes. Vehicles can be refuelled at 2 Hydrogen filling stations in Aberdeen. The 10 exclusive-use low carbon cars for staff were purchased by the Council and are managed and administered by Car Club. Staff also receive free personal membership and access to 40 publicly available vehicles across the city, providing an alternative to car ownership.

25,472 km were covered using Battery Electric Vehicles (BEV) and 24,958.4 km using Fuel Cell Electric Vehicles (FCEV). The Car Club helps to reduce non-essential travel and grey fleet miles. The Car Club contract was retendered in November 2021.

The Benefits:

- **Reduce congestion and parking pressures:** On-street and city centre, staff are less car dependent for commuting.
- **Reduced management burden:** The new partnership replaced a manually managed pool car system of 9 cars. Club Cars are booked online, accessed via Smart card or app with the keys inside.
- **Alternative to grey fleet dependency:** Reducing personal car use for business purposes and claiming back mileage.
- **Reduced corporate emissions:** Co-wheels use lowest emitting cars and replaced vehicles before they were 5 years old, resulting in emissions reduction in journeys through Car Club over private car use.

To build understanding around the introduction of the new technology, training sessions, online videos and instructive emails were created to cover aspects such as operating, refuelling cars, designated parking locations and reporting faults.

Dual Fuel

As part of Aberdeen City Council's transition towards de-carbonising its in-house fleet, in March 2022 three waste collection vehicles (12 tonne, 18 tonne and 26 tonne), were adapted to dual fuel hydrogen – diesel hybrids (H2ICEd). This technology injects hydrogen into the diesel engine and burns with the diesel, lowering emissions by about 30%. Over the past 10 months the vehicles have saved over 2000kg of CO_2.

Whilst electric does have its place within the fleet for mainly cars and vans, hydrogen is emerging as the preferred technology for replacing diesel within the council's large vehicle fleet. Aberdeen has two publicly accessible hydrogen refuelling stations located in the centre and south of Aberdeen City. Both stations produce, store and dispense green hydrogen (generated from green tariff electricity), providing 350 bar and 700 bar refuelling for a council fleet as well as a fleet of buses, cars, HGVs, and vans from various organisations, such as Siemens, and Royal Mail. The hydrogen is stored at low temperatures in high pressure tanks that allow the gas to move at pressure through to the refuelling dispenser when refuelling is required. This means buses can refuel to a full tank within 10 minutes, trucks within 8 minutes and cars within 3 minutes. However, there are a limited variety of fuel cell electric vehicles (FCEVs, 100% H2) on the market at present.

Pure hydrogen fuel cell electric vehicles are expensive compared to their diesel equivalents as economies of scale, skills and parts haven't yet had time to mature. Hydrogen – diesel hybrids, H2ICEd, offer an alternative "bridging" technology that reduces CO_2 emissions compared to diesel equivalents. In 2023, the council plans to retrofit 15 further H2ICEd vehicles and upskill staff to undertake the retrofitting and ongoing maintenance.

Video tour of Aberdeen City Hydrogen Energy Storage station (ACHES)

SPOTLIGHT: NHS Forth Valley

Cycling Initiatives

NHS Forth Valley aims to encourage and support more staff, patients, visitors and the local population to be more physically active. One of the key ways they achieve this is through a series of cycle initiatives that help staff and patients get started:

- NHS Forth Valley promotes free, safe and credible Essential Cycling Skills training, provided by Cycling Scotland trained volunteers. People can take part in a course on their own or with friends, family and colleagues.
- NHS Forth Valley applied for an Energy Savings Trust Loan to buy twenty ebikes that are delivered to any interested permanent member of staff on a three month free loan. Free e-bike support, route planning and cycle training is offered to the staff member with support from Forth Environment Link. Since April 21, a total of 89 people benefited from the 90 day trial.
- As some may worry about a puncture or breakdown, NHS Forth Valley has a free taxi bike recovery service for staff.
- Dr Bike FREE 'triage' service: fixing minor repairs and checking to make sure bikes are safe and road worthy.

NHS Forth Valley attributes the success to the partnerships in place between NHS Forth Valley staff in different services and partners such as Forth Environment Link, Cycling Scotland, Energy Savings Trust, Paths for All Smarter Choices Smarter Places fund and Recyke a Bike.

SPOTLIGHT: Glasgow City Council

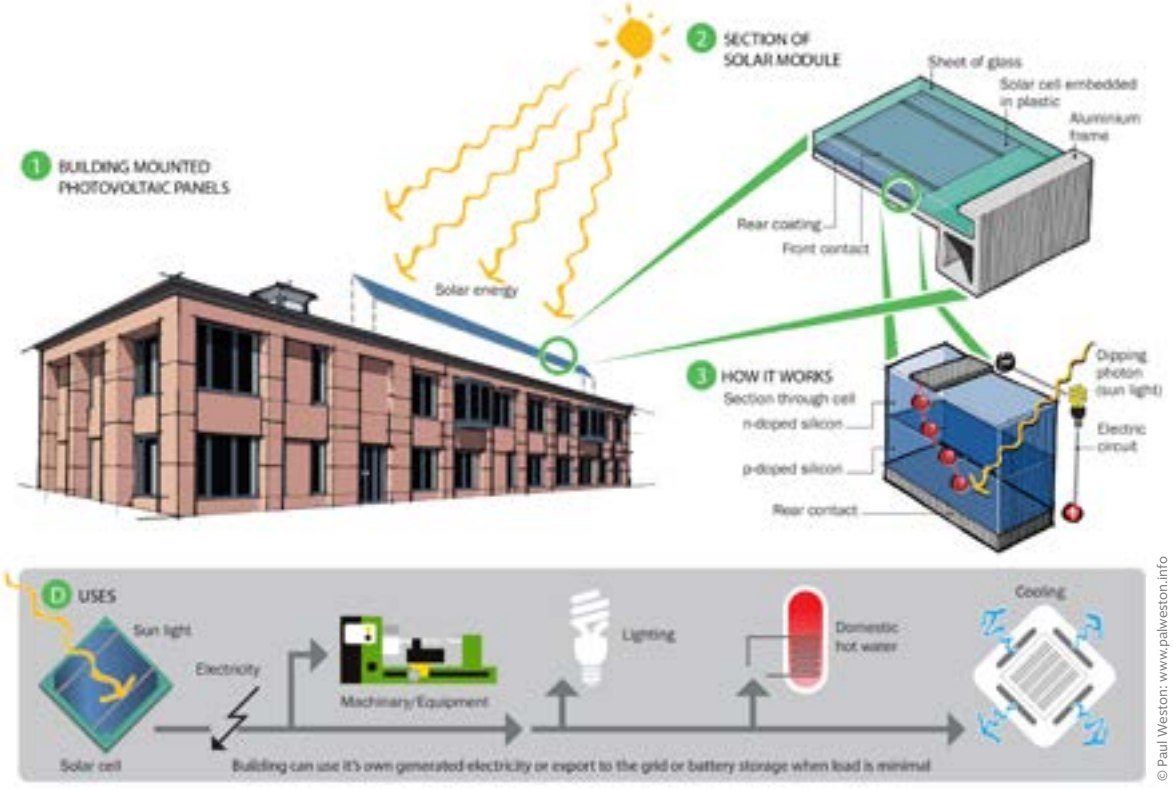
The Burrell Collection Renovation in Pollok Country Park

The Burrell Collection is housed in a purpose-built museum situated in Glasgow's Pollok Country Park. Following extensive refurbishment, improvements have been introduced to prioritise renewable energy generation, sustainable and active travel, and to ensure a high-quality park visitor experience following the Burrell Collection's re-opening in March 2022.

Visitors to the museum expressed the value that nature has to them and how much importance they place in protecting the natural environment. Sustainability was a key element to consider, with the renovation project seeking to reduce the building's carbon footprint and enhance its climate resilience. The design incorporates the installation of energy efficiency measures to improve thermal efficiency such as specialist glass, significantly improved roof insulation, and improved air permeability ensuring that heat loss is greatly reduced.

The building is currently warmed through a combination of gas boilers and heat reclaim chillers; however, the building has been enabled for full decarbonisation in the future, with all heating networks designed to allow for low flow and return temperatures, which are commensurate with heat pump technology and district heat networks. Low energy lighting was installed, as was renewable energy through the installation of solar PV panels. The main reason for choosing solar PV was due to the size of roof, as a large array could be easily installed without having any visual impact. The estimated PV generation per year is 119MWh and the building's overall electrical consumption is 2500MWh per year. All electricity is anticipated to be used on site. As it was not possible to have a 'fixed' system installed on the roof, a ballast type footing was required, with the panels mounted at a 12° angle.

The project also focussed on improving visitor journeys to and within the park by improving paths and roads, installing benches, new wayfinding, barriers to prevent unnecessary vehicular circulation, providing EV (Electric Vehicle) chargers, bus shelters, bike racks, NextBike hub and an Electric Shuttlebus to link facilities to the public transport network.



Glasgow Recycling and Renewable Energy Centre (GRREC)

The Glasgow Recycling & Renewable Energy Centre (GRREC) is a state-of-the-art residual waste treatment facility designed, built and operated in partnership for Glasgow City Council by Viridor. The GRREC has transformed how Glasgow manages its residual waste, using advanced technology to capture high-quality recyclates and generating energy from material destined for landfill. The three-step residual waste treatment process is:

- **Step 1:** Smart-Materials Recycling Facility – using mechanical and manual processes to separate out recyclable materials from residual waste, based on the physical characteristics of the material. These recyclates are cleaned and refined within a further GRREC process to ultimately replace virgin material in manufacturing processes.
- **Step 2:** Anaerobic Digestion – converting food and organic waste into renewable electricity through a process of anaerobic digestion. This is as part of a combined heat & power (CHP) system whereby waste heat from the gas engines helps dry digestate from the digester tanks. This digestate is then passed for thermal treatment in the Advanced Conversion Facility.
- **Step 3:** Advanced Conversion Facility – Advanced thermal treatment technology generates electricity from residual material. Advanced thermal treatment technology is different to conventional energy from waste technologies and uses gasification as part of a two-stage thermal treatment process. The first stage involves using heat to synthesise a gas, the second stage combusts the gas to generate heat, to raise steam, and drive a turbine that generates renewable electricity to feed-in to the grid. This is generally considered to be a more efficient thermal treatment process which produces less harmful gases than conventional thermal treatment technologies.

This blend of three treatment technologies is an innovative and bespoke solution for Glasgow, tailored to meet the sustainability ambitions of the city. The facility achieved full service in January 2019 and the partnership has already delivered major achievements for Glasgow, including:

- A landfill diversion rate of up to 90% for material processed at GRREC.
- Extraction of up to 18% high-quality recyclable material.
- Capability to generate power for the equivalent of 26,496 homes.
- Approximately 70% of household residual waste is processed at GRREC, with the remaining 30% landfilled.
- Contributes towards the city's carbon reduction commitments.
- Provided over 250 high quality jobs and development opportunities and stimulated millions of pounds worth of investment in the local economy.
- Sponsored the Industrial Cadets STE(A)M programme and construction of a dedicated visitor centre.
- Raised the education and awareness of effective resource management and the contribution towards a circular economy.

The council is currently implementing a Resource & Recycling Strategy 2020-30 and is working towards meeting the landfill ban on organic waste which comes into effect on 1st January 2025. This ambition will be facilitated by the GRREC which has capacity to increase throughputs beyond current levels.

Renewable Energy Initiatives

Emissions savings from renewable energy generation increased by 15% from 2020/2021

Renewable energy initiatives are an effective means of reducing emissions. Over half of public sector bodies (53%) reported renewables generation, broadly comparable with last year. Nearly all Local Authorities have at least one renewable energy source as do two thirds of NHS Boards and over half of educational institutions.

Solar panels and biomass boilers are the most widely reported renewable technologies being adopted, in keeping with the past four years. Other common technologies include heat pumps, solar thermal and wind.

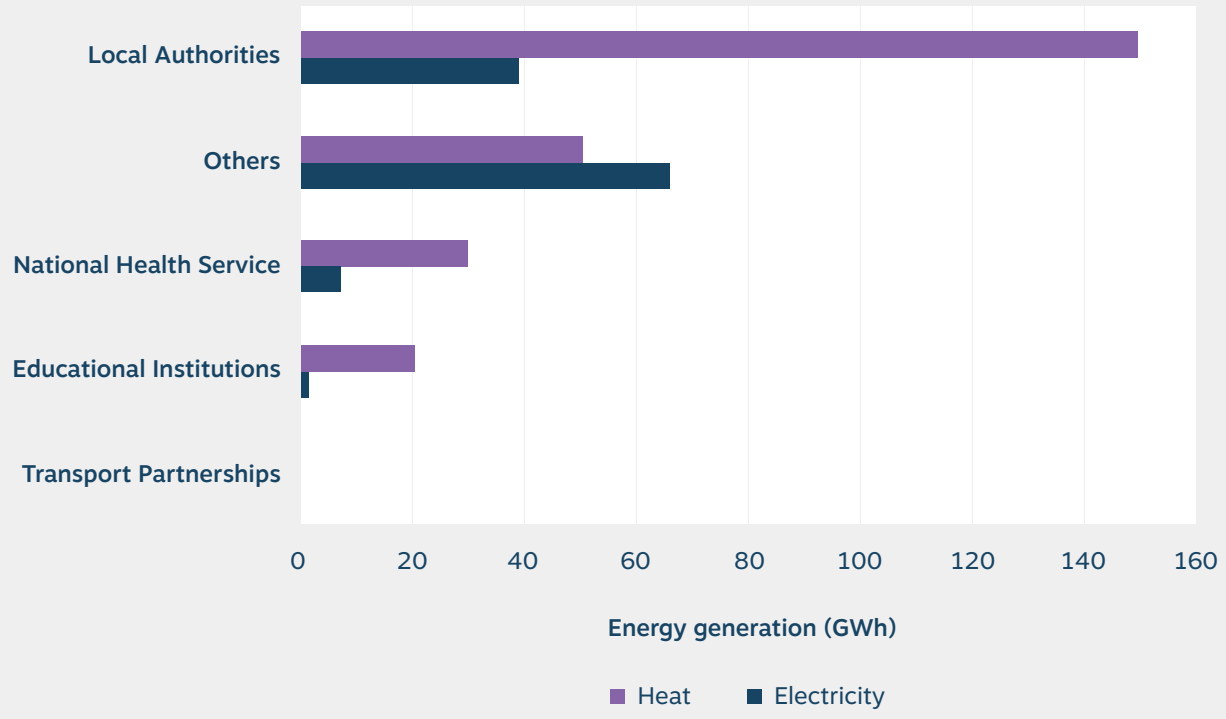
i. Renewable energy generation (GWh) by sector

Renewable energy generation (GWh) by sector over the 3 previous years

Sector	2019/20		2020/21		2021/22	
	Electricity (GWh)	Heat (GWh)	Electricity (GWh)	Heat (GWh)	Electricity (GWh)	Heat (GWh)
Local Authorities	35.48	127.43	25.11	133.89	38.79	149.15
Others	62.79	13.44	68.28	7.24	65.72	50.22
National Health Service	0.46	36.93	0.86	26.64	6.78	29.73
Educational Institutions	4.26	33.45	0.90	29.57	1.45	20.46
Transport Partnerships	0.02	-	0.01	-	0.01	-
Total	102.99	211.25	95.16	197.12	112.75	249.56

88% of renewable heat generation within the Others sector is due to a new Scottish Water biogas combined heat and power plant. More than 50% of the drop in renewable heat generation by the Education sector is due to maintenance issues requiring temporary shutdown of a biomass plant.

Renewable energy generation by sector in 2021/22

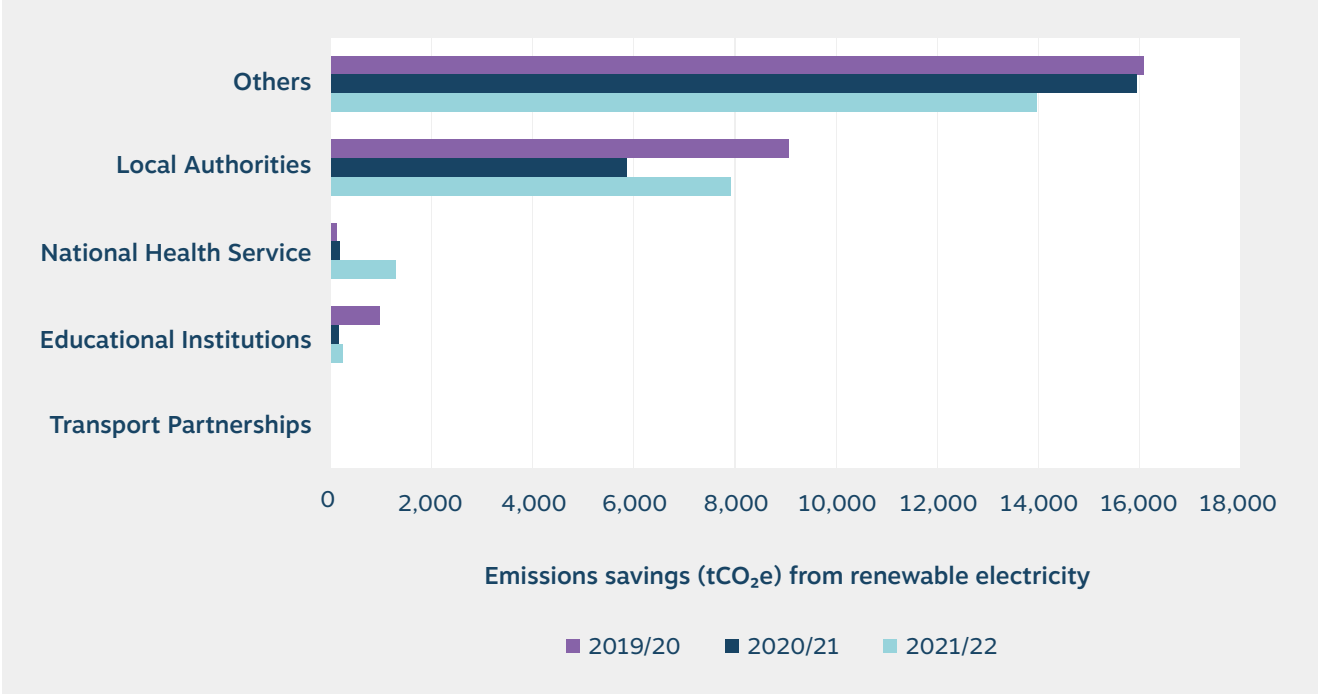


ii. Annual emission savings from renewables

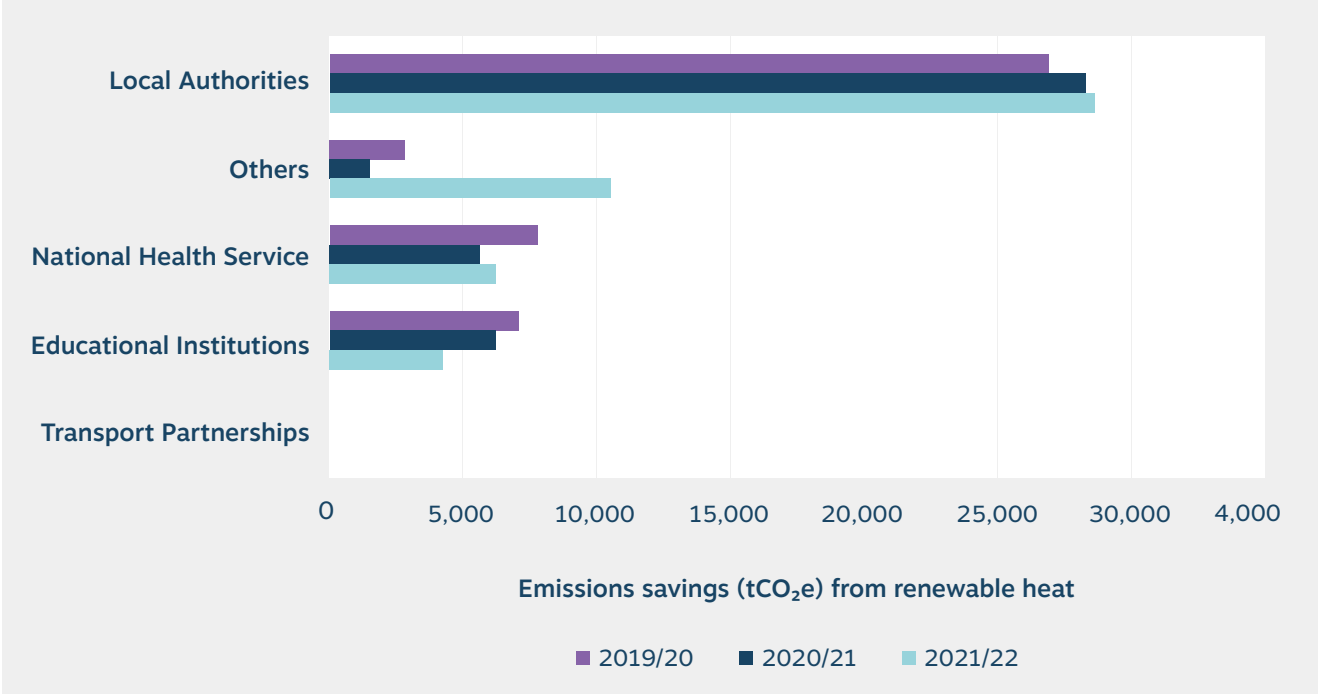
Annual carbon savings (tCO_2e) based on energy generation by sector over the 3 previous years

Sector	Estimated annual carbon savings (tCO_2e)					
	2019/20		2020/21		2021/22	
	Electricity (GWh)	Heat (GWh)	Electricity (GWh)	Heat (GWh)	Electricity (GWh)	Heat (GWh)
Others	16,040	2,841	15,918	1,531	13,954	10,577
Local Authorities	9,068	26,943	5,854	28,311	7,931	28,692
National Health Service	117	7,808	200	5,632	1,322	6,255
Educational Institutions	980	7,072	191	6,228	271	4,239
Transport Partnerships	4	-	3	-	3	-
Total	26,210	44,664	22,167	41,702	23,481	49,764

Annual emissions savings (tCO_2e) per sector from renewable electricity generated since 2019/20



Annual emissions savings (tCO_2e) per sector from renewable heat generated since 2019/20



Key findings

- 113 GWh of renewable electricity and 250 GWh of renewable heat were reported, equivalent to the displacement of c.73,000 tCO_2e. This is an increase of 24% since 2020/21 for total renewables generation.
- Reported emissions savings from all renewable energy generation has increased by 15% from 2020/21. This is due to a combination of a 24% increase in the renewable energy generated by bodies and the lower electricity grid factor.
- 32% of savings are from renewable electricity and 68% from renewable heat generation.
- Local Authorities are responsible for 52% of the reported renewable energy generation during 2021/22.
- Renewable heat is more prevalent than renewable electricity amongst Local Authorities, National Health Service and Educational Institutions.
- Some of the largest generators include Scottish Water's hydropower stations, their biogas CHP plants and biomass boilers installed at NHS Grampian, Highland Council, Fife Council and NHS Ayrshire and Arran. Glasgow City Council reported significant savings for the first time due to the 3MW wind turbine installed on Cathkin Braes.

SPOTLIGHT: Ayrshire College

Nethermills Hydro Project

The River Ayr historically had 26 mills working along its length. In the heart of Ayr, around 60 years after the corn mill on the lower, or 'nether', weirs was shut down, Energy Agency Renewables Limited began a project to bring them back into productive use. The resulting hydro power scheme now provides clean, green electricity for Ayrshire College. The engineers created a design that minimised its ecological footprint and improved the habitat for migratory fish, opting for a fish-friendly Archimedean screw turbine with a 4-metre diameter, capable of generating up to 90 kilowatts.

Work began in April 2021, installing a temporary dam to provide a safe and dry area for constructing the powerhouse to contain the screw and generating equipment. Contending with twice-daily high tides, unpredictable weather bringing high river flows, and other unexpected set-backs, the reinforced concrete structure was completed by midsummer. Next, the Archimedes screw with its covers, gearbox, generator and hydraulic by-wash gate was crane-lifted in place. The curved roof was then fitted and covered in a blanket of hardy sedum plants that provide insect nectar and help blend the structure within the landscape. After several years of planning and construction that employed 30 local businesses, the Nethermills Hydro Scheme was declared open in February 2022 and began transmitting power to Ayrshire College. By July 2022 82 MWh of renewable electricity had already been supplied to the college's Riverside Building. The college used 86% (70 MWh) with the remaining 14% (12 MWh) exported to the grid. A fish counter and camera provide important data for Ayrshire Rivers Trust and Ayrshire College students designed a mural and interpretive display panel for the site.

4 minute video of planning and construction

SPOTLIGHT: Scottish Prison Service

HMP Dumfries Solar PV Installation

The Scottish Prison Service (SPS) looked at a range of options for the use of renewable energy at HMP Dumfries, one of the oldest operational prisons in Scotland. The preferred option was to install solar PV, a 100kWp system (approx. 488.2m², consisting of 250 panels), located in an underused area of grounds and gardens within the establishment. The installation will be a ground mounted array surrounded by wildflower meadows. Benefits are expected to include:

- Up to 12% of the annual electrical power consumption of the prison from a zero carbon, renewable source.
- Contribute to the SPS's greenhouse gas emissions reduction targets.
- Support and contribute to the wider Scottish Government target to reduce Scotland's greenhouse gas emissions to net zero by 2045.
- Produce lifetime cost benefits of up to £316k.
- Achieve a return on capital investment of approximately 9 years and reduce CO_2e emissions by up to 19 tonnes annually.

Return on investment is likely to be significantly better than projected due to the recent increase in utility tariffs.

SPOTLIGHT: Historic Environment Scotland

Installation of Solar Panels at Edinburgh Castle

Solar panels at Edinburgh Castle are one of the latest actions to reduce carbon emissions across the Historic Environment Scotland (HES) estate under their Climate Action Plan which commits to net zero by 2045. Schemes such as this, help demonstrate that historic buildings are part of the solution to reducing emissions and helping Scotland reach net zero.

The building's elevated and open location at the summit of Castle Rock, as well as its high roof parapet, allowed for solar panels to be installed to ensure that they're not visible from any other vantage point within the site, city, or surrounding areas. The installation was designed to consider both the cultural significance of the monument and its historic fabric. One of the challenges was to minimise the impact on the historic building fabric, so the panels have been installed with a ballast system to remove the need to fix to the roof or penetrate the roof structure and existing cable and flue ways in the building were used for cable runs.

Other technical challenges were adapting the design to consider the high wind speeds experienced at this height, ensuring the ballast load was spread evenly over the surface and that the installation didn't impede maintenance access on the roof. The renewable energy generated by these new solar panels will more than offset the electrical consumption of the War Memorial building with any additional energy generated being used elsewhere within the Castle.

Targets

70% of bodies have one or more targets. Over a third of the 510 reported targets are based on all emissions reported by the body

Since mandatory annual reporting was introduced in 2015/16, the reporting template has asked public bodies to list all targets of relevance to their climate change duties. Targets may be overall emission reduction targets (percentage or absolute) and/or policy specific targets relating to particular emission sources or business activities.

As detailed in the Background section, the legislative framework was strengthened by the Scottish Government in 2020. Public bodies must now include the following in reports:

- where applicable, the body's target date for achieving zero direct emissions
- where applicable, the body's targets for reducing indirect emissions
- how spending plans and resource use contribute to reducing emissions and delivering reduction targets; and
- how progress on achieving emissions reduction targets is publicised

Analyses of responses to these new questions are provided later in this section.

Prior to this year's reporting round, there was already information available on the net zero targets of the four highest emitting groups of public bodies. Audit Scotland's report, Scotland's councils' approach to addressing climate change, published in September 2022, highlighted that 28 councils had declared or recognised the climate emergency, 81% of councils had targets for the council's own emissions, and 53% of councils had targets for council area-wide emissions. The report showed that councils' net zero target dates were mostly either 2030 or 2045. NHS Scotland, Scotland's colleges and some universities, and Scottish Water all aim for net zero by 2040.

This year's analysis shows that, although some improvements are evident in the quality of reporting of targets, the sheer diversity of target types and lack of standard definitions still proves challenging to analyse and present a meaningful assessment, especially with respect to progress and trends.

N.B. IJB responses have been included in the analysis of this section for the first time.

Targets by sector

Almost 70% of bodies have now set one or more targets increasing the total number of reported targets by over a third since last year (374). A further 10 bodies have at least one target compared to last year (121). All Local Authorities reported one or more targets and over 70% of each sector, apart from IJBs, now has at least one target.

Total reported targets per sector

Sector	Bodies with at least one target	Percentage of sector	Total number of targets
Local Authorities	32	100%	125
National Health Service	17	85%	62
Others	42	78%	177
Educational Institutions	33	73%	135
Transport Partnerships	5	71%	9
IJBs	2	7%	2
Total	131	Average 69%	510

Target types

The sector totals above are broken down further in the table below into a series of target types representing the range of targets being set. “All emissions” is the most prevalent target type, approaching one third of all targets. “Energy use in buildings” comes a distant second, representing <16% of total targets and half that of “All emissions” targets.

Number of reported target types per sector

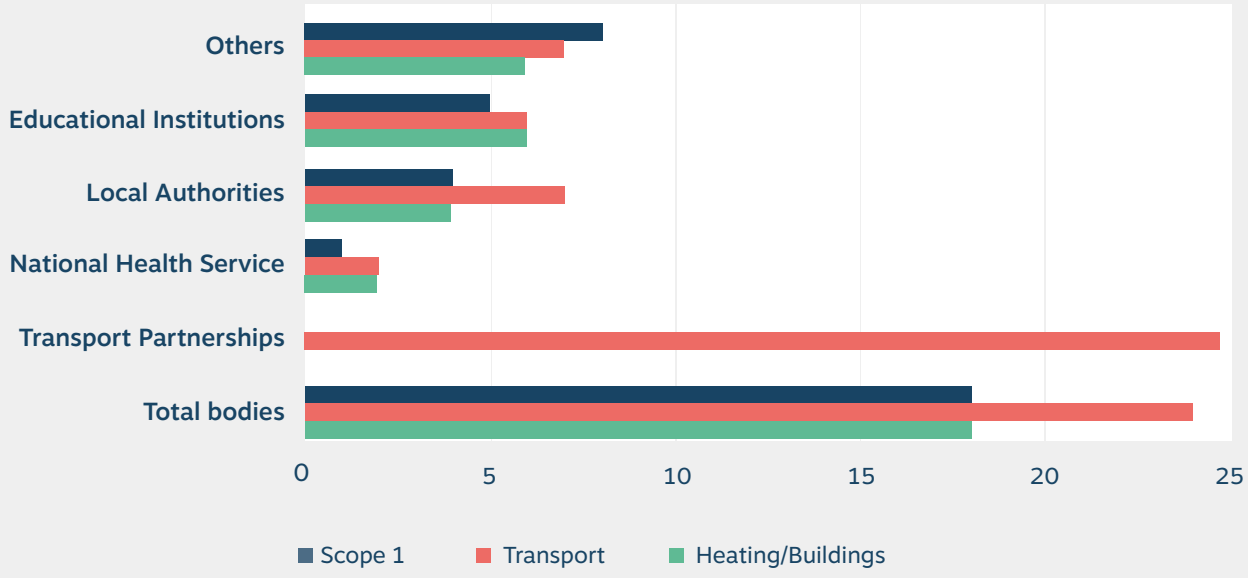
Target type	Others	Educational Institutions	Local Authorities	National Health Service	Transport Partnerships	IJBs	Total
All emissions	50	41	49	18	5	-	163
Energy use in buildings	25	19	20	16	-	1	81
Waste	18	20	21	12	-	-	71
Transport	11	11	10	7	4	-	43
Other[11]	18	8	3	4	-	-	33
Scope 3	23	6	4	-	-	-	33
Staff travel	10	12	3	3	-	-	28
Scope 1	11	5	8	1	-	-	25
Water and sewage	5	6	1	-	-	-	12
Scope 2	5	2	3	1	-	-	11
Scopes 1 & 2	1	5	3	-	-	1	10
Total	177	135	125	62	9	2	510

[11] Other targets adopted include limits on paper use and increasing woodland areas.

The table below shows how many bodies per sector reported having one or more zero direct emissions targets that stipulate a date.

Number of bodies per sector reporting target date(s) for zero direct emissions

Direct emission type and target date	Total no. of bodies per sector (some bodies have >1 target per type)						Total no. of bodies per target type
	Others	Educational Institutions	Local Authorities	National Health Service	Transport Partnerships	IJBs	
Scope 1 Net Zero by 2045	8	5	4	1[12]	-	1	18
Transport Fleet **Zero tailpipe emissions by 2030**[13]	7	6	7	2	2	-	24
Heating/Buildings[14] **Zero emissions no later than 2038**	6	6	4	2	-	1	18
20% reduction in car kms by 2030[15]	5	3	1	0	1	-	10



[12] NHS Scope 1 includes emissions from the use of medical gases for which there are currently no alternatives and is therefore potential reason for low representation within the sector.

[13] Some exceptions apply for specialised, including emergency, vehicles.

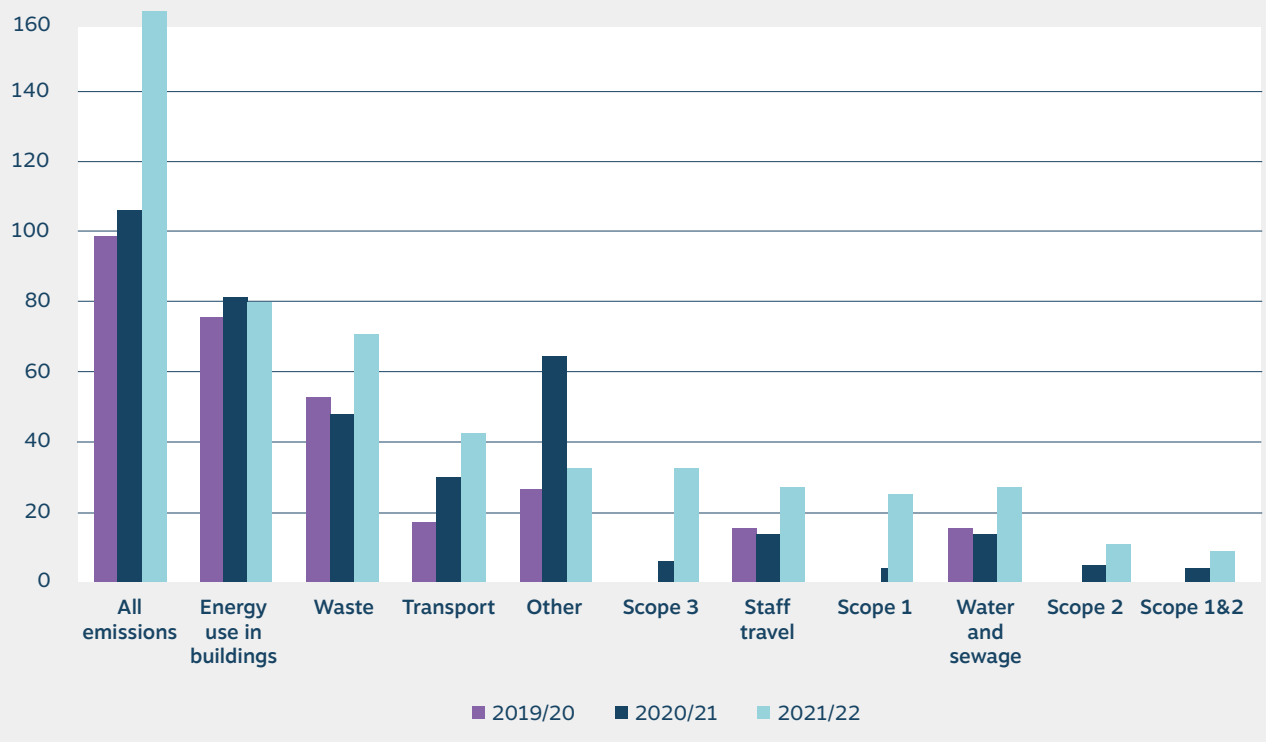
[14] Some bodies include Scope 2 electricity use and other indirect emission sources as part of overall building target.

[15] From 2020 baseline, see Transport Scotland routemap. This covers a mix of direct and indirect emissions.

Target totals per type for each of the three most recent reporting periods are provided in the table below. The greatest increase since the previous reporting period is 525% for Scope 1 emissions, followed by 450% for Scope 3 emissions but both still rank low in terms of overall numbers.

Number of target types reported since 2019/20

Target type	2019/20	2020/21	2021/22	Percentage change since 2021/22
All emissions	99	106	163	54%
Energy use in buildings	76	81	80	-1%
Waste	53	48	71	48%
Transport	17	30	43	43%
Other	26	65	33	-49%
Scope 3	-	6	33	450%
Staff travel	15	14	28	100%
Scope 1	-	4	25	525%
Water and sewage	14	11	12	9%
Scope 2	-	5	11	120%
Scope 1&2	-	4	9	125%
Total	300	374	508	36%



Net Zero targets

Ninety four organisations included a net zero target, however, the emissions that organisations include within a net zero target is highly variable, ranging from e.g. solely Scope 1 emissions to all emissions falling within the current reporting boundary. More than 64% of these net zero targets have a target date ahead of the national deadline of 2045. If fully achieved this would represent c.80% of the current public sector footprint. However, it is unclear how many are supported by a realistic target pathway therefore feasibility of achieving this level of reduction overall must not be over-estimated.

Number of net zero targets per sector by type/scope

Sector	Net zero target reported	% of sector	Target ahead of 2045
Local Authorities	24	75%	11
Educational Institutions	28	62%	23
National Health Service	11	55%	11
Others	26	48%	17
Transport Partnerships	3	43%	1
IJBs	2	7%	2
Total	94	Average 48%	65

Progress against targets

Not all reported targets are quantitative i.e. specifying an absolute or percentage reduction by an end date or over a specified time period. Of the 510 reported targets only some 24% included sufficient information to assess progress. The majority of these set a target date of 2025 or later and include those reported as “Net Zero Targets”, discussed above.

The table below shows progress towards these long-term targets where a baseline year, target date and percentage or absolute reduction is provided.

Progress to date	Emissions	Waste	Energy	Transport	Streetlights	Paper	Total
Ahead	44	2	1	1	0	1	49
On-track	19	2	1	0	0	0	22
Behind	37	9	3	1	1	0	51
Total	**100**	**13**	**5**	**2**	**1**	**1**	**122**

Over 40% of these long-term targets are ahead of scheduled delivery, 18% are on track and c.42% are behind. However the later the target date, especially where there are no intermediate milestones, the greater the risk of assuming it is on track. In addition, progress towards a target can falter, e.g. the reduced levels of project activity witnessed as a result of a range of factors including the pandemic and also EU exit impacts. Inflation and increased energy prices are and may continue to have impacts, particularly on construction projects and supply chains. As decarbonisation of the UK grid potentially starts to plateau, at least compared with the sharp decline witnessed since 2015/16, this must also be kept in mind.

New questions

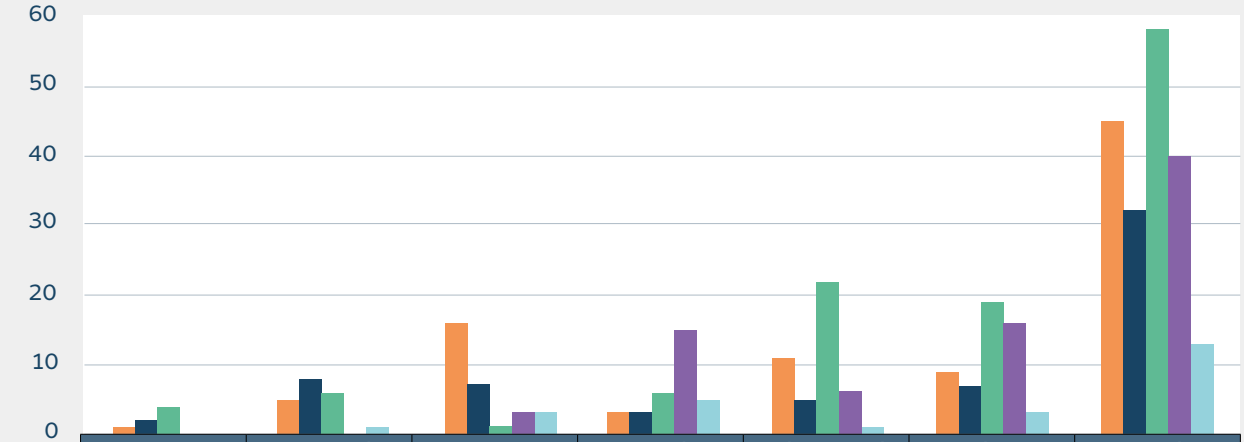
It is vital that public bodies understand the potential, including whole-life, impacts of budgetary and resource planning and decision-making processes on achieving emission reduction targets. They must take account of this in helping Scotland deliver a just and sustainable transition towards a net zero Scotland by 2045. Public bodies must also be transparent about progress being made towards targets. Two additional questions included for the first time in the reporting template are intended to help demonstrate these important aspects. Findings from a high level assessment of the information provided are presented below.

1. How will the body align its spending plans and use of resources to contribute to reducing emissions and delivering its emissions reduction targets?

The Scottish Government hoped that some exemplar approaches to this new question would be demonstrated in this year's reports. Responses to this question were split across five categories demonstrating the range and quality of information provided: from no response or not applicable to indicating a clear understanding of the intention and implications of the question. In the highest category (4) this is demonstrated by evidence of corporate systems already being in place to track and correlate budgetary plans and expenditure against a net zero pathway, or other quantitative assessment of emissions reduction targets and milestones.

The majority of organisations rank midway i.e. any system for assessing emissions implications of budgets and resource use is narrowly focused e.g. on estate only or fleet rather than looking across all budgets and relevant decision-making processes and broader governance.

Alignment of spend and resource use with emissions targets



	Transport Partnerships	National Health Service	IJBs	Local Authorities	Educational Institutions	Others	Total
0	1	5	16	3	11	9	45
1	2	8	7	3	5	7	32
2	4	6	1	6	22	19	58
3	0	0	3	15	6	16	40
4	0	1	3	5	1	3	13

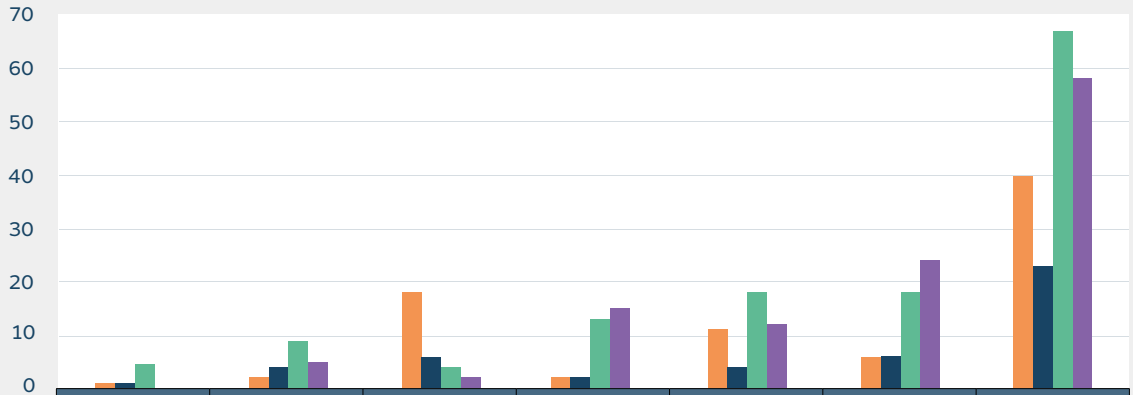
Key to categories

0	No response or not applicable entered.
1	No mention of meaningful plans to enable assessment of proposed spend/resource planning needs in tandem with potential implications for emissions and delivery of targets. Tendency to repeat emission reduction projects mentioned elsewhere with no supporting information on correlation with budget planning etc. IJBs referred to one or more partners' report/targets.
2	Some evidence that emission targets are informing budgets and resource planning but limited to specific operational areas e.g. fleet decarbonisation by 2030.
3	Evidence that a corporate/strategic approach is planned or in embryonic stages, i.e. good understanding of what is being asked and what is needed.
4	Well-established strategic approach that considers all relevant budgets and resource needs with respect to an established net zero pathway or emissions budget.

2. How the body will publish, or otherwise make available, its progress to achieving its emissions reduction targets

All public bodies' annual climate change reports are published on the SSN website, however the Scottish Government believes that public bodies should also publicise their progress on climate change through other corporate reporting routes. Again, responses were split into categories according to the quality of information provided. Only four categories were applied ranging from the lowest (0) where no answer was provided or claimed not applicable up to the highest category (3) meaning evidence was provided whereby progress on emissions reduction targets is reported in statutory documents such as annual accounts.

Transparency of reporting progress towards emission reduction targets



	Transport Partnerships	National Health Service	IJBs	Local Authorities	Educational Institutions	Others	Total
0	1	2	18	2	11	6	40
1	1	4	6	2	4	6	23
2	5	9	4	13	18	18	67
3	0	5	2	15	12	24	58

Key to categories

0	No response or claimed not applicable.
1	Considering how to make information on progress towards emission reduction targets available. IJBs referred to one or more partners' report or approach.
2	No evidence of targets being mentioned in corporate reports/financial accounts etc., but softer measures in place e.g. published on website or in general communications.
3	Targets are included in annual corporate accounts or as part of other key accountability trackers available in the public domain.

Key findings

- There are 36% more targets in total compared with the last reporting period.
- Almost 70% of bodies reported at least one target.
- 94 bodies have some form of net zero emission targets which is >300% increase on 28 bodies that reported a net zero emission target in 2020/21. These targets account for almost 80% of reported emissions.
- Over 69% of bodies with a net zero target have set it in advance of the national policy deadline of 2045.
- 59 bodies have set a net zero target across all emission scopes which will be extremely challenging to meet.
- Other targets represent a mix of scopes or are based on a source type such as Energy Use in Buildings or Transport.
- 23 bodies have set a target date for achieving zero direct emissions on or ahead of 2045.
- New questions on alignment of spend with targets and publishing progress towards targets present a mixed picture but the majority of bodies fall midway in demonstrating understanding and effective action in addressing these important areas. Guidance and examples on how bodies can improve action and reporting on these issues will be provided in due course.

SPOTLIGHT: National Galleries Scotland

Environmental Response Plan

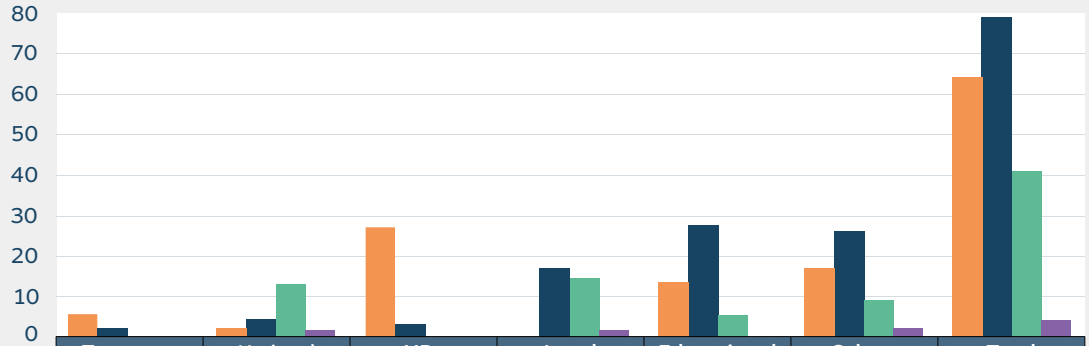
National Galleries Scotland (NGS) has been working with a consultant to map out a pathway to net zero. This substantial piece of work is to realign all estates work and investment requirements for the next 5 years, and potentially further. The key area of focus is buildings' emissions, which are the biggest contributors to NGS' carbon footprint. From the baseline year of 2008/09 to the current reporting year 2021/22, NGS has managed to reduce carbon emissions by 60% through interventions such as: introducing recycling, changing over to LED lighting, improving insulation, and closely monitoring and managing the energy use of the buildings. NGS has created a new Environmental Response Plan for 2022-2025 to outline the next steps for the organisation to address the Climate Emergency and push forward to achieving net-zero before 2045.

NGS is also looking to improve Scope 3 emissions reporting as part of its new Environmental Response Plan. A further Scope 3 target will be created to support emission reductions. An area for improvement is the emissions associated with the external transportation of art for exhibitions, tours, and acquisitions. These are expected to increase as more data is added to this reporting section, particularly in terms of procurement data and art transportation data.

Adaptation

1. Climate Adaptation Risk Assessment

Level of risk assessment across the public sector



	Transport Partnerships	National Health Service	IJBs	Local Authorities	Educational Institutions	Others	Total
0 - No assessment	5	2	27	0	13	17	64
1 - Limited assessment	2	4	3	17	27	26	79
2 - comprehensive	0	13	0	14	5	9	41
3 - advanced	0	1	0	1	0	2	4

Key to categories

0 – no assessment	PB reports that a climate risk assessment has not been completed. PB provides no evidence/links to any kind of climate risk assessment.
1 – limited assessment	PB reports risk assessment is in progress but is focused on a single issue (e.g. flooding) or is relation to a (corporate) risk register or business continuity plan only (i.e. no in-depth risk assessment that addresses a range of climate hazards or risks has been completed).
2 – comprehensive	PB provides evidence of risk assessment that addresses a range of climate hazards or risks but without evidence of the use of various climate and/or socioeconomic scenarios or involving stakeholders.
3 – advanced	PB addresses a range of climate hazards and risks, involves stakeholders and considers a range of future climate (socioeconomic) scenarios.

Based on returns, 66% of all bodies have completed some form of risk assessment during or prior to the 2021/22 reporting period while 34% of bodies have not completed any form of risk assessment. 42% of bodies have carried out a limited assessment which does not provide an in-depth risk assessment addressing a range of climate hazards or risks. 26% of bodies have carried out a comprehensive risk assessment and only 2% have completed an advanced risk assessment involving stakeholders and considering a range of climate or socioeconomic scenarios.

The majority of Educational Institutions (60%) have carried out a limited risk assessment, 11% a comprehensive risk assessment and 29% have not completed any kind of risk assessment.

Local Authorities is the only sector in which all bodies have completed some form of risk assessment. There is a fairly even split between bodies that have completed a limited assessment (53%) and a comprehensive assessment (44%).

IJBs have the highest percentage of bodies that have not undertaken any form of risk assessment (90%) as most bodies state that they refer to another body for adaptation risk assessment.

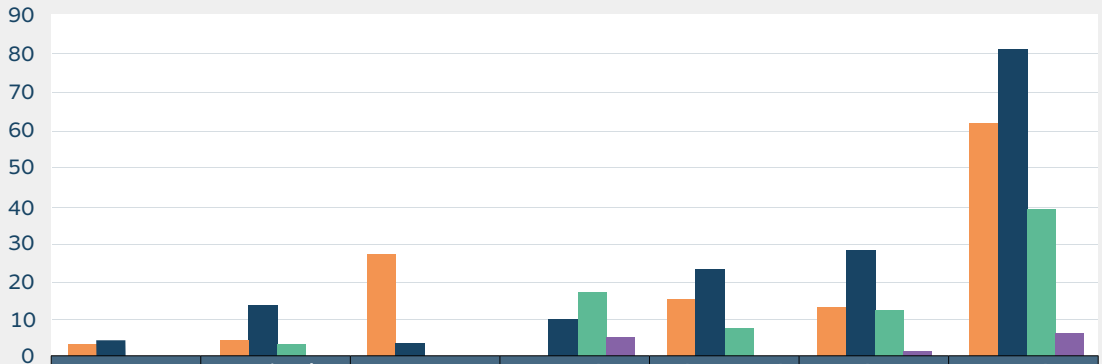
71% of Transport Partnerships have not undertaken any form of risk assessment, followed by 31% of Other bodies. 48% of Others have completed a limited assessment, 17% a comprehensive assessment and 4% an advanced risk assessment reflecting the diverse range of organisations within this sub-sector.

The NHS sector has the greatest percentage of bodies that have completed a comprehensive risk assessment at 65% although 10% have no risk assessment in place.

The fact that 90% of NHS bodies have completed some form of risk assessment could be in part due to the sector specific tools available including the NHS CCRA Adaptation & Planning Tool, commissioned by Health Facilities Scotland.

2. Climate Adaptation Action

Level of adaptation action taken across the public sector



	Transport Partnerships	National Health Service	IJBs	Local Authorities	Educational Institutions	Others	Total
0 - none	3	4	27	0	15	13	62
1 - some action	4	13	3	10	23	28	81
2 - good action	0	3	0	17	7	12	39
3 - advanced action	0	0	0	5	0	1	6

Key to categories

0 – none	PB has not identified any adaptation actions
1 – some action	PB lists a range of actions/policy but does not link the actions to climate risks and there is no sense as to how actions are contributing to addressing the risks that they have identified.
2 – good action	PB has a policy/plan/strategy in place that commits to a range of actions to addressing a range of specific risks (beyond flood risk). Whilst PB links actions to risks it does not have targets and/or identifies the extent to which committed actions will manage the risks identified. PB is taking significant sector-specific adaptation actions.
3 – advanced action	PB has a comprehensive set of actions in place to address climate risks. PB has targets in place to measure progress against management of risks and has identified the adaptation shortfall – the extent to which actions will manage the risks – and has identified options to address the shortfall.

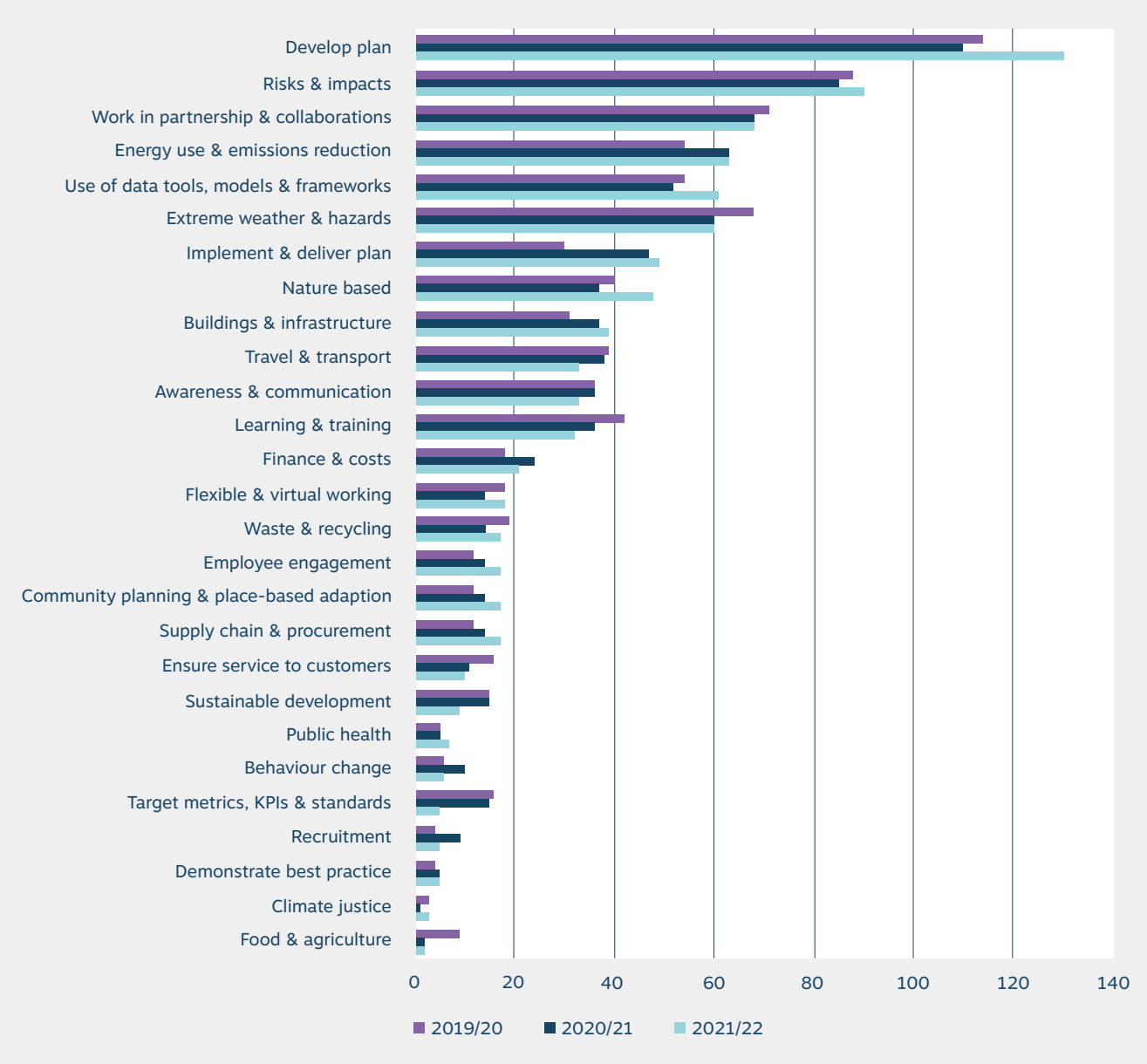
67% of all bodies have taken adaptation action prior to or within the 2021/22 reporting period. 43% of bodies have taken some action where a range of actions or policies exist but it is unclear how the actions are contributing to addressing specific climate risks or hazards. 21% of all bodies are taking good action, meaning the bodies are taking action to reduce specific risks and/or taking significant sector-specific adaptation actions. 3% of bodies are taking advanced action where a comprehensive set of actions are in place to address specific climate risks and plans are in place to measure progress against the management of these risks.

The majority of Educational Institutions are taking some adaptation action (51%), however 33% have not reported any adaptation action. 43% of Transport Partnerships are taking no adaptation action. 90% of IJBs have not taken adaptation action although most refer to actions by partners.

Local Authorities is the only sector where each body is taking some form of adaptation action. 53% of the sector is taking good action and 16% is taking advanced action. Five of the six bodies taking advanced adaptation action are Local Authorities.

3. Adaptation priorities across the public sector

Adaptation priorities across the public sector – trend over reporting years 2019/20 to 2021/22



Key themes emerging from the question, *"What are the body's top 5 priorities for the year ahead in relation to climate change adaptation?"* have been analysed over the last three reporting years to understand what the key priority areas are across the public sector and to understand how they are changing through time.

The most frequently referenced themes by the majority of sectors across the last three reporting years are "Develop Plan" followed by "Risks & Impacts" and "Work in Partnerships & Collaborations". This suggests that bodies have a focus on developing adaptation plans, understanding the risks and potential impacts they may face while working with other organisations or as part of initiatives. There are however themes discussed frequently within the adaptation section of the report that are generally considered to be mitigation actions including "Energy Use & Emission Reduction" and "Reduce waste & Recycling" for example.

There is little change in the themes and number of references within each theme from reporting year 2019/20 to 2021/22.

These findings suggest that little progress is made on adaptation priorities year to year. This could be due to the fact that bodies have multi-year priorities or could indicate the need for more resourcing or prominence given to the adaptation agenda in order to see progress made.

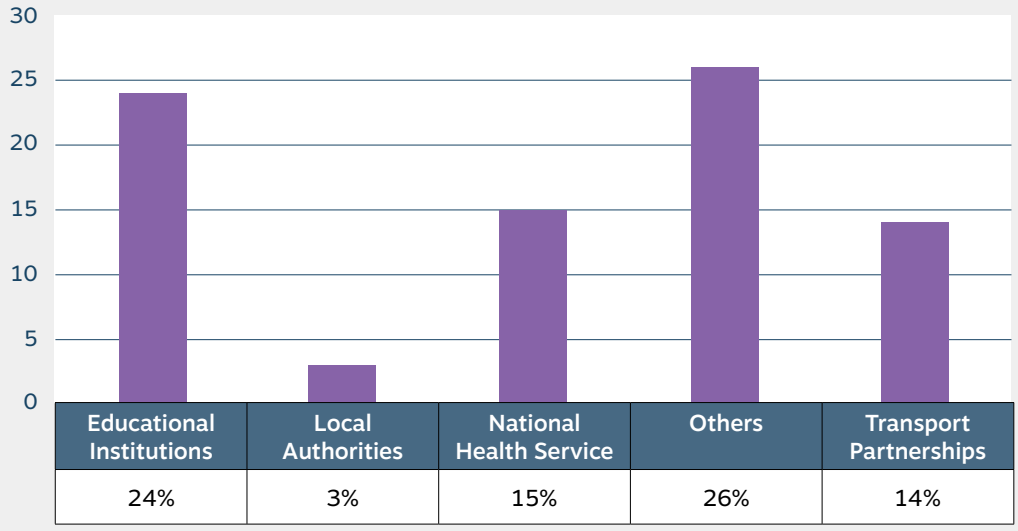
4. Progressing towards Advanced Risk Assessments and Action

4.1 Mitigation

Around one fifth of all bodies made reference to mitigation in responses to questions regarding risk assessments and adaptation actions. While it can be beneficial to progress on mitigation and adaptation simultaneously, realising co-benefits between them, the majority of bodies who mention mitigation in the adaptation section of the report did this at the expense of discussion adaptation actions. In other words, mitigation alone was discussed and not how it relates to adaptation or how co-benefits could be realised. This leaves bodies at risk to climate hazards if for example a full risk assessment has not been completed or if any potential trade-offs between adaptation and mitigation actions have not been fully explored. By analysing risk fully and exploring both potential adaptation and mitigation actions, bodies could draw on synergies between them and manage any potential trade-offs.

Mitigation	Actions that reduce the greenhouse gas emissions that contribute to climate change
Adaptation	Actions that reduce or manage the impacts of climate change

Percentage of bodies per sector providing responses with a mitigation-heavy focus in the adaptation section of the report



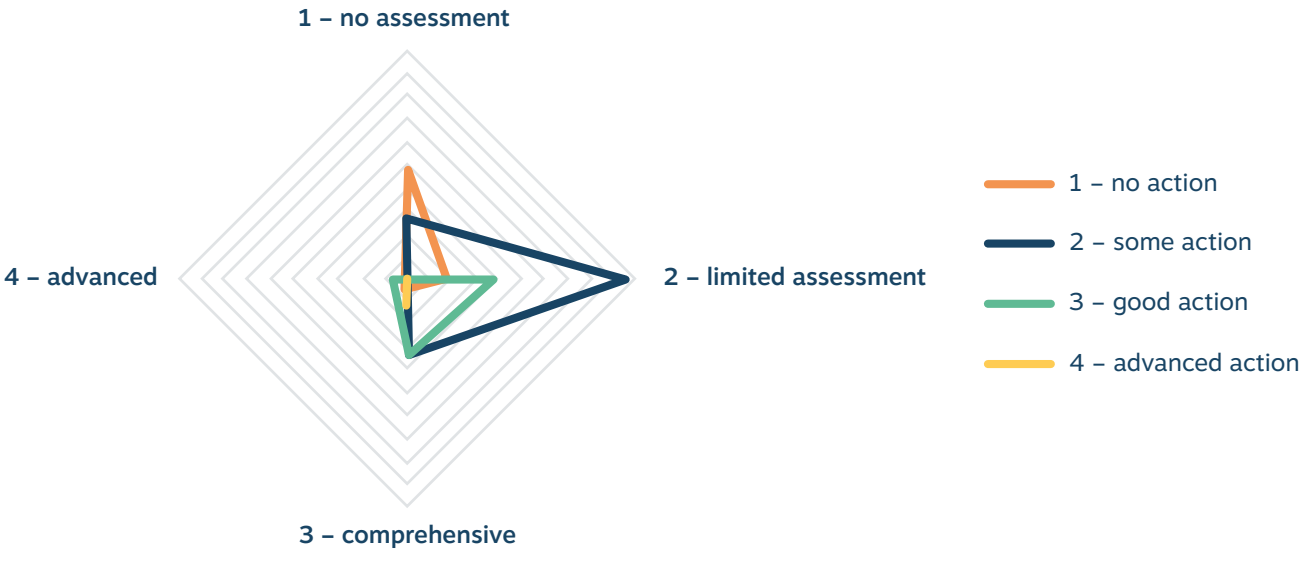
Educational Institutions	Local Authorities	National Health Service	Others	Transport Partnerships
24%	3%	15%	26%	14%

The table above shows the percentage of bodies within each sector that made reference to mitigation actions within the adaptation section of the report in response to questions around risk assessments and adaptation action taking. 26% of Other bodies and 24% of Educational Institutions made reference to mitigation. This is also demonstrated in the responses to the question on top priorities for the year ahead where 28% of bodies made reference to a mitigation action when discussing their adaptation priorities without discussion of any inter-relationships between adaptation and mitigation.

These findings suggest that mitigation may still be prioritised over adaptation within these sectors specifically or that the differences between adaptation and mitigation are less clearly defined.

4.2 Monitoring & Evaluation

Comparison of assessment level and action level across the public sector – action level represented by colours and assessment level on plot



30% of bodies have completed a limited assessment and taken some action. 15% have not completed a risk assessment or taken any action. All the bodies taking advanced action have completed a comprehensive risk assessment.

51% of bodies are taking some or good action but with a limited risk assessment or none at all. 39% are taking some action with limited or no risk assessment, this includes bodies that are taking a general approach to risk reduction such as learning and training or raising awareness without targeting specific risks. However, 12% of bodies are taking good action with just a limited risk assessment.

Few bodies made reference to how adaptation actions should be monitored and evaluated within their responses relating to climate risk assessment and action taken. However, within the priorities questions, 28% of Local Authorities, 13% of Educational Institutions and 4% of Other bodies made reference to use of the Adaptation Scotland Benchmarking tool or being part of the Benchmarking Working Group.

These findings could mean that actions taken are not part of a strategic approach to the management of risks and while the bodies may be taking some action to reduce risks, a full assessment of potential risks and opportunities has not been completed and certain potential future risks may be missed.

In addition, actions taken without a comprehensive risk assessment being conducted could make it difficult to monitor and evaluate progress made in minimising climate risks.

5. Spotlight – successful collaborations

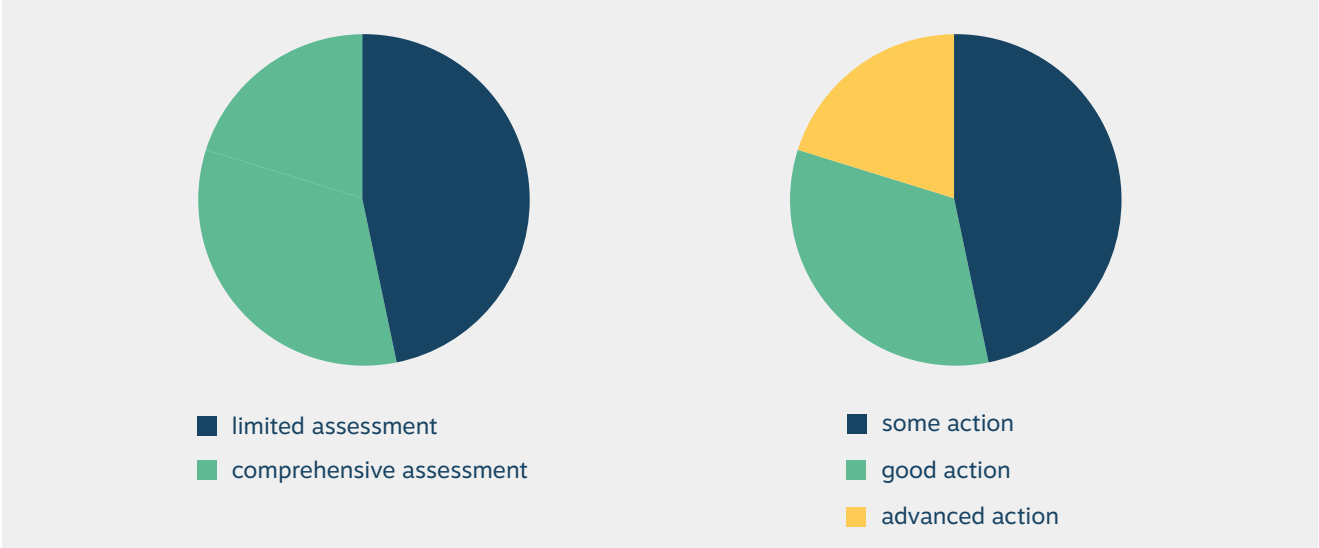
Working in partnership and collaboration was a key theme in relation to adaptation priorities highlighted by bodies with reference to section 3. Two examples of successful collaborative initiatives include Climate Ready Clyde and Highland Adapts.

Climate Ready Clyde

Climate Ready Clyde is a cross-sector initiative aiming to create a shared vision, strategy and action plan for the Glasgow City Region. The initiative is built on the principle of strategic collaboration to meet economic, social and environmental aims regionally. The initiative has created an Adaptation Strategy and Action Plan for the region as well as a climate risk and opportunity assessment.

All fifteen of the bodies associated with Climate Ready Clyde are taking at least some action and have completed at least a limited risk assessment. In addition, three of the fifteen bodies are taking advanced action.

Percentage of Climate Ready Clyde bodies at each risk assessment (a) and action (b) level



Renfrewshire Council

As well as being part of Climate Ready Clyde, Renfrewshire council is a member or contributor to a number of organisations demonstrating the potential for collaboration on adaptation and biodiversity.

Renfrewshire Council is one of eight councils within the Glasgow City Region who have worked together to prepare, maintain and monitor an up to date Strategic Development Plan (Clydeplan) for the Glasgow city region. Climate change adaptation is incorporated throughout Clydeplan and it sets the framework which supports the region to build resilience and adapt.

In addition, the Council has an action within the Plan for Net Zero that involves undertaking a climate risk register of all public assets including infrastructure and historic buildings ensuring they are resilient to climate change impacts including impacts on services, statutory responsibilities and health and well-being of employees.

The Council is a member of the Clyde & Loch Lomond Flood Risk Management Local Plan District. This partnership involves Scottish Water, SEPA, Scottish Forestry and Forestry and Land Scotland, the National Parks Authority for Loch Lomond and the Trossachs Park and 10 local authorities. A Flood Risk Management Plan was published in December 2021 which identifies potentially vulnerable areas of flooding in the region.

Glasgow City Council

Glasgow City Council has undertaken a Climate Risk Assessment for the city and developed a Climate Adaptation Plan to address key risks. It focuses on local impacts of climate change and what they mean for the city of Glasgow as well as plans to address them including 52 actions. The Council has also developed a set of indicators that will be used to assess progress annually.

The Council has established a corporate climate liaison group which meets monthly to support knowledge exchange around climate, enabling collaborative actions.

The Council is also the lead Local Authority for the Clyde and Loch Lomond (CaLL) Local Plan District, and led on engagement with SEPA for the publication of the CaLL Flood Risk Management Plan in January 2022.

Highland Adapts

The Highland Adapts initiative aims to facilitate transformational action towards a prosperous, climate ready Highland. The objectives of the initiative include developing an evidence base around risks and opportunities affecting the region, sharing information and developing a shared adaptation strategy. The initiative is cross-sector involving communities, the public sector, businesses and land managers.

The Highland Council is currently an active partner in the Highland Adapts initiative and its partnership approach to building a climate-ready Highland. The Highland Council currently chairs the Programme Board of the initiative.

In addition, the Council has a Resilience Team that conducts regular risk assessments at a variety of geographic scales across Highland, in collaboration with partner agencies including the NHS, SEPA, Police and Fire Services and other local authorities in the region. The resilience team also helps communities to prepare local community resilience plans which focus on steps communities can take to prepare for extreme weather events, as well as providing for vulnerable members of the community, or those who will become vulnerable in the event of prolonged power cuts or disruptions to water supply or essential transport links. Approximately 55 communities have engaged in community resilience planning.

SPOTLIGHT: University of Aberdeen

Grey Water Harvesting

The University of Aberdeen set a target of reducing freshwater consumption levels on campus by 2% each year to minimise the environmental impact associated with water use. As a solution, the university had grey water harvesting systems installed in four new buildings across its campuses. For all four buildings, the aim of reducing freshwater usage was incorporated into the design process from the very beginning and grey-water harvesting was identified as a way of reducing freshwater consumption and satisfying over-arching Building Research Establishment's Environmental Assessment Method (BREAAM) targets. The university was targeting BREEAM "Excellent" certification as a minimum, which aligned with the university's water conservation ambitions and therefore, grey water harvesting systems to feed the toilet systems were included. To further aid with water conservation, 43 nine litre toilets were replaced with Propelair toilets in February 2017. The Propelair toilets require just 1.5 litres of water to operate and have resulted in an average decrease of 72% in toilet water consumption. The systems have successfully reduced the volume of freshwater consumed by 49% to 64%.

Retrofitting at a later stage is more of a challenge than implementing it in the design process from day 1. Once installed, ensuring regular maintenance is carried out is essential to prevent the filters from becoming blocked and damaged. The university continues to target the inclusion of grey water systems as well as metering capabilities in each system to ensure their impact can be properly monitored.

SPOTLIGHT: Transport Scotland

Broadleaved woodland above A83 Rest and be Thankful

Transport Scotland, working in partnership with Forestry and Land Scotland, is in the process of delivering a native woodland on the steep slopes above the A83 trunk road through Glen Croe, below the Rest and be Thankful, to mitigate the impact of landslides. This nature-based solution will assist by:

- Canopy interception of rainfall plus subsequent evaporation.
- Increased root water uptake of the water that does infiltrate into the soil, and subsequent transportation via the leaf cover.
- Root reinforcement to bind the soil substrate.

In addition, the woodland will significantly increase local biodiversity and improve habitat connectivity throughout the glen, whilst sequestering a considerable amount of carbon. This is a challenging location for planting operations due to the steepness and instability of the ground, and the prevalence of heavy precipitation. Phase 1 of the planting started in 2021 and Phase 2 is due to be completed by early 2024.

Increasing species-rich grassland and reducing grass maintenance

As part of the dualling the A9 trunk road between Perth and Inverness, Transport Scotland has been investigating how the area of species-rich grassland normally associated with road infrastructure projects can be increased, whilst reducing grass maintenance. The investigation aimed to demonstrate that it is possible to develop a species-rich sward right up to the carriageway edge, and within the central reservations, thereby improving biodiversity, increasing carbon sequestration, and reducing maintenance without impacting driver visibility. The intention is to reduce the verge and central reservation cutting to a maximum of 2 cuts per year. Currently verge maintenance ranges from 3 - 14 cuts per year. A reduced need in maintenance will ensure the vegetation does not impinge on driver safety, whilst creating the optimum conditions for improved establishment and sward development.

The trial project examined four different species mixes, sown in controlled settings by the side of the trunk road at three different elevations (60, 160 & 400 AOD). Monitoring over a 3-year period demonstrated that Heath/ Upland mix and Lowland/Strath mix performed the best, and the results have been used to prepare a new species mix that is now being included as part of the next phase of the A9 proposals. The mixes were designed to support the use of more diverse ground cover vegetation in areas which previously had limited diversity, or where gravel was used. The mixes were not specifically designed to support insects and invertebrates, but this is an anticipated, desirable outcome.

Additional Spotlights

Edinburgh Council

Granton Waterfront

Granton Waterfront is the largest regeneration project of its kind in Scotland and one of seven strategic sites within the South-East Scotland City Region Deal. Scotland's ambitions to tackle climate change and transition to a net zero-carbon economy are fundamental to the Granton Waterfront vision.

In line with National Planning Framework (NPF) 4 strategic objectives, Granton Waterfront will pioneer a new era of low carbon urban living by delivering around 3,500 net zero homes, a primary school, medical centre, coastal park, commercial, retail, and leisure space over the next 10-15 years. The primary school is expected to be built to PassivHaus building standards which are optimised for net zero. While the council does not have jurisdiction over the construction of the medical centre in terms of energy, planning requirements will ensure that sustainability and energy efficiency are taken into account. Commercial, retail and leisure space operators will be responsible for addressing net zero in their build. There will however be no gas supply to the new development at Granton. With over 200 ha of green space and being situated just 3 miles from Edinburgh's city centre, sustainable transport connections will include around 10km of new and improved active travel network, enhanced city linkages with the wider network and two new mobility hubs helping to provide attractive, convenient, safe and sustainable choices for everyday travel. The mobility hubs will be placed in well-lit, highly connected areas and will co-locate public transport stops/interchanges with shared transport services (car club & bike hire), and other amenities such as: long and short stay bicycle parking, waiting spaces, EV charging, parcel lockers, taxi ranks, and real time information.

Granton Waterfront will also take a finer grained approach to placemaking, incorporating networks of natural spaces and blue and green infrastructure. The project will adapt to the future impacts of climate change through natural resilience to flooding and tackling biodiversity loss by creating a coastal park. The council currently has over 500 net zero homes under construction, including the Edinburgh Homes Demonstrator which will deliver 75 homes to test a new business model for building affordable, net zero homes. Much of the construction is off-site in a factory setting, reducing the overall build time. The zero emissions heating aims to reduce the risk of fuel poverty for residents and support the region's net-zero targets. The council is embarking on the pre-development stage in partnership with Cruden, to provide around 800 net zero homes, active travel infrastructure, mobility hub, services, culture and commercial opportunity. The council is also committed to investing in a low carbon heat network (a wastewater source heat pump using heat from sewers) which in tandem with a fabric first approach will help reduce energy demand and help meet Scotland's targets for emissions reduction.

Dundee and Angus College

EV Training School

The education sector must keep up with the rapid change in skills required in the automotive industry due to the growing number of EVs on the road. To remain at the forefront of the transition, Dundee and Angus College has partnered with Robert Lawson and Sons Auto Electricians to create a state-of-the-art Electric Vehicle and Hybrid Training Centre. The centre and the courses are designed to ensure Scotland has vehicle technicians trained to the highest standard, ensuring we have a skilled workforce in place as a more sustainable transportation sector is created.

The Training Centre offers a suite of EV courses which cater to a range of professionals, from car salespeople through to advanced motor technicians and emergency services. These short courses bolster the skills of those already in industry as well as giving college students the opportunity to practice these skills either full-time or as part of an apprenticeship. This initiative not only addresses the current skills gaps but also futureproofs the sector by creating a highly skilled next generation workforce.

A further addition to the training school is the newly formed Emergency Services Partnership; Dundee and Angus College has partnered with Scotland's three key emergency services; Police, Fire and Ambulance and are currently rolling out training for their technicians across Scotland. In the first year alone, they will train 100 technicians. This unique partnership has allowed them to transport the classroom to the workshop, ensuring they can train technicians in a life-like working environment, something which they believe is behind their impressive 100% pass rate.

Scotland's Rural College (SRUC)

Dairy Farms

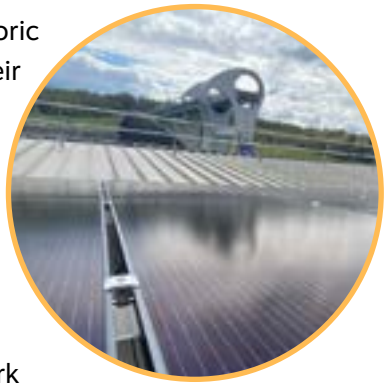
Scotland's Rural College (SRUC) has been making changes in order to make the practice of dairy farming more ethical and sustainable. The first of such changes was to look at cow feed, which usually consists of home-grown feeds and purchased concentrate. Increasingly, these mixes need to show carbon credentials and ethical/traceable sourcing; however, the mixes often contain elements that are out of the farmer's purchasing control. SRUC determined that purchased soya was something that could be managed out of the dairy diet, replacing it with UK grown proteins in the form of rapeseed meal and distillery by-products. The results were positive and there were no adverse impacts on the cows. By removing imported soya, concerns over origin and possible association with rainforest deforestation have been taken out of the equation entirely.

In order to grow feeds on the dairy farm, waste from the cows is used alongside chemical fertiliser. However, by investing in N2 Applied technology, there is the potential to further reduce and even eliminate the need for purchased chemical fertiliser on the dairy. The technology adds nitrogen from the air into slurry through plasma treatment, this treatment process comprises of two steps: plasma and then absorption. In the plasma step, nitrogen is fixed from the air using electricity, splitting nitrogen (N_2) and oxygen (O_2) molecules into N and O atoms which form nitrogen oxides. In the absorption step, the nitrogen oxides are then absorbed into livestock slurry, increasing its nitrogen

content. The reaction prevents the loss of ammonia and eliminates methane emissions. This technology reduces the smell from manure management, and reduces overall air pollution from the farm. The business case has been built on straight financial modelling and once fully installed and operating, SRUC will be able to evaluate the carbon savings delivered as a part of the business operation.

Scottish Canals

Solar PV on The Falkirk Wheel



Scottish Canals, responsible for the operation and management of the historic canal network of Scotland, has developed renewable energy projects at their premier, and highest energy consuming, tourist destination: The Falkirk Wheel (TFW) and an exemplar customer facility building at Auchinstarry on the Forth & Clyde Canal, near Kilsyth.

Consultants undertook the design work in 2021/22 for the replacement of a gas boiler with air source heat pumps at TFW and the installation of roof mounted photovoltaic (PV) panels at both TFW and Auchinstarry. A new submetering system, to provide live electricity use data for the Falkirk Wheel site, was a key element of the project to allow site managers to have oversight of daily and seasonal energy demands, renewable generation, and to assess the impact of the project. The main challenge was retrofitting larger central heating radiators and associated pipework to work effectively with the heat pump system. The work at TFW was part funded through the Scottish Government's Tourism Recovery Plan and was completed in summer 2022.

Canal Sediment Pilot Projects

Scottish Canals is undertaking work to reduce the dependency on primary resources and to adopt a circular economy approach to the management of canal sediments which are produced as part of our maintenance regime. Scottish Canals worked in partnership with University of Strathclyde between 2017/22, on the Interreg NWE EU-funded transnational Circular Economy Demonstrator project, Sediment Uses as Resources in Circular and Terrestrial Economies (SURICATES). The project aimed to investigate sustainable opportunities and develop solutions for the re-use of canal sediments in erosion protection and flood mitigation.

Three pilot site trials were undertaken repurposing dredged sediments from the canal network at Falkirk on the Union Canal, Laggan on the Caledonian Canal and Bowling on the Forth & Clyde Canal. At Laggan the sediment was separated into cobbles for embankment grading on the proposed A82 road re-alignment in 2024. Fine silts with organic fractions have been used to improve the arability of the adjacent field. Sand and gravel from the dredged sediment have been used to make 2tonne concrete blocks which are being tested to determine their suitability for erosion control and flood defences. Resultant nature-based solutions are intended to provide lower carbon products for a range of sectors.

Concluding remarks

Scotland's public bodies achieved 100% compliance this year with all 188 listed bodies submitting an annual compliance report. Voluntary reports were also received from four public bodies not currently subject to mandatory reporting.

The uptick in emissions over the 2021/22 reporting period is due to a range of factors. While activity returning to pre-pandemic levels plays a role, the main reason is due to **improvements in the range, quality and methodologies for emissions accounting**. Improvements in emissions accounting related to previously unreported procurement activity and the use of medical gases are of most significance but **do not represent an increase in actual emissions**.

The £14.5 billion annual **public sector procurement budget will become the major accountable source of emissions** in future years, effectively dwarfing reported emissions to date. It is immensely important, therefore, that actions to reduce the carbon intensity of public expenditure are well-informed, targeted to best effect, and that decisions are transparent, support a circular economy and are in accordance with the Sustainable Procurement Duty and the principles of a just transition to net zero. Proposed new Statutory Guidance and sharing of good practice on monitoring and influencing emissions within supply chains will help ensure a balanced approach that does not stifle action at the expense of chasing increasing data accuracy. The specification of goods and services, improved contract management and the development of consistent accounting principles and practices will be key to success.

The principal influence with respect to emissions reductions since reporting began is due to **decarbonisation of the UK electricity grid**. Aside from longer-term uncertainty surrounding the continued pace of grid decarbonisation, the ongoing energy crisis and measures being taken by the UK Government to improve security of supply will have implications near-term for the carbon intensity of electricity provided by the UK grid. The escalation of energy costs may counter-balance such impacts but the overall message remains that **the public sector must seek means to reduce demand while also, accelerating and innovating ways of pushing fossil fuels out of those activities which they have direct control over**.

While energy efficiency measures, renewable energy generation and other projects have all realised reductions in fossil fuel consumption, **the rate of decarbonisation of the public sector estate and assets, including fleet, needs to increase dramatically** to achieve the reductions that are needed and contribute to Scotland meeting national net zero targets.

As public bodies plan pathways to achieving net zero targets it is apparent that options to **offset** what are presently "unavoidable" direct emissions, due to technological limitations or other constraints, will be necessary. Such measures, whether through insetting emissions on the public sector estate or offsetting through purchased credits from high integrity verified schemes can and should bring multiple benefits to Scotland's communities and biodiversity. Recent guidance on nature-based carbon reduction projects (insetting and offsetting) and annual public bodies duties reporting (Scottish Government, February 2023) will help inform and foster good practice and sound investments by the public sector on projects to help sequester emissions and retain carbon in our soils and natural habitats.

A focus on climate action is vital, so more attention is needed on project reporting, the setting of targets and the alignment of resources to meet targets. **Emissions savings from projects are down this year, while savings from renewables have increased**. Effective reporting of projects, especially more complex multi-year projects, and improved clarity, transparency and consistency of reporting on progress

against targets remain challenging. Additionally, there are clearly issues to be addressed to **improve the reporting of resource alignment**. SSN will support public bodies with these complex areas of reporting going forward.

Analysis of **adaptation data shows a mixed picture**, both on the clarity of reporting and the maturity of work across the public sector. In some reports there is an apparent lack of understanding of the distinction between adaptation and mitigation. The overall picture of progress on risk assessment, adaptation planning and adaptation action is concerning. Progress made by the NHS, e.g. in conducting more comprehensive risk assessments, may offer lessons to other sectors in developing and adopting more bespoke approaches to adaptation. There is a significant opportunity to better align mitigation and adaption, especially through convergence with the multiple benefits offered by and for actions to address the nature emergency that can simultaneously sequester carbon, reduce emissions and improve resilience to climate impacts.

While not currently part of this summary analysis it is worth noting that the voluntary **recommended section of reports provides an increasingly rich record of public sector climate action**. They present an impressive diversity of insights on initiatives that are delivering and promoting a range of benefits that can accrue at different scales and localities in partnership with communities, the private and third sector to improve biodiversity, access to nature, enhance well-being, regeneration and thereby reinforce the positive benefits and alternatives that a net zero, resilient and sustainable Scotland can offer.

The public sector is commended for expanding its scope of reporting and must be encouraged and supported to go not just faster but smarter in delivering targets and **achieving emission reductions in tandem with improving resilience** to climate impacts and vulnerabilities. It is vital to **close the gap between reporting, action and decision-making** and to do more to realise the potential of mandatory climate change reporting. With growing and welcome scrutiny of public bodies duties and compliance reporting from independent external organisations including Audit Scotland, the Scottish Parliament, the Climate Change Committee and Environmental Standards Scotland, and public sector climate leadership becoming more visible, reporting stands at a watershed moment.

Further information

All reports submitted since 2015/16 and corresponding SSN Analysis Reports are published on the SSN website and are available to download at:

https://sustainablescotlandnetwork.org/reports

More detailed information and background on the analysis is available from SSN.
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SSN would like to thank everyone involved in completing and submitting 2021/22 reports.

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About the Sustainable Scotland Network

The Sustainable Scotland Network (SSN) is Scotland's public sector climate change and sustainability network. SSN builds public sector capacity to accelerate action on climate change, in line with the duties placed on public bodies by Scotland's climate change legislation.

SSN shares knowledge, builds capacity, and enables the public sector to collaborate effectively to achieve Scotland's climate change and sustainability commitments.

SSN is supported by the Scottish Government, NHS Scotland, Scotland's Local Authorities, and other public sector bodies. The SSN Secretariat is part of the Edinburgh Climate Change Institute (ECCI) at the University of Edinburgh.

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