

Powering Ahead:

Decarbonising Scotland's Energy

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About Reform Scotland

Reform Scotland, a charity registered in Scotland, is a public policy institute which works to promote increased economic prosperity, opportunity for all, and more effective public services. Reform Scotland is independent of political parties and any other organisations. It is funded by donations from private individuals, charitable trusts and corporate organisations. Its Director is Chris Deerin and Alison Payne is the Research Director. Both work closely with the Trustee Board, chaired by Lord McConnell, which meets regularly to review the research and policy programme.

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Scotland & Net Zero

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 commits Scotland to achieving net-zero emissions by 2045, five years ahead of the UK government. There are additional interim targets of reducing emissions by 75% by 2030 and 90% by 2040, compared to the 1990 base year.¹

It is not always possible to avoid emissions, so Net-Zero means that the amount of greenhouse gas emissions put into the atmosphere, minus the amount that we are able to take out through carbon capture adds up to zero.

The Scottish Government published Scottish Greenhouse Gas Statistics 2020² in June 2022 to update on progress in meeting the interim target of a 56% reduction by 2020. It reported that there had been a 58.7% reduction and that the target had been achieved. However, while there has been a huge decline in emissions from electricity generation over the period, domestic transport and residential emissions have seen slower declines. The Scottish Government has commented that transport is “*the largest factor slowing the overall reduction*”.³

As the table below illustrates, there were 40million tonnes of carbon dioxide equivalent emissions in Scotland in 2020, with domestic transport being the largest component. Although there was a significant fall in this area in 2020 due to the pandemic, there has been relatively little change in emissions from domestic transport since 2019.

Year	Total Emissions	Domestic Transport	Business	Agriculture	Energy Supply	Residential	International Aviation & Shipping	Waste Management	Public	Industrial Processes	Forestry
2020	39.95	9.53	7.80	7.35	5.33	5.96	0.81	1.35	0.91	0.41	0.50
2019	45.40	12.04	7.80	7.58	6.13	5.88	1.91	1.53	0.92	0.52	1.11
2015	50.85	12.07	7.87	7.62	12.13	6.09	1.73	1.66	0.93	0.43	0.31
2010	63.90	12.91	8.80	7.74	20.92	8.02	1.44	2.45	1.23	0.39	-0.01
2005	70.06	14.36	10.45	8.27	20.82	7.71	1.62	3.89	1.47	0.55	0.91
2000	79.63	14.33	10.94	8.51	26.49	7.85	1.44	5.54	1.65	0.60	2.28
1995	80.30	14.38	10.59	8.75	24.45	7.86	1.46	6.07	1.89	0.58	4.27
1990	81.56	13.59	12.80	8.64	21.46	8.00	1.32	5.84	1.88	1.92	6.12

Source: Scottish Energy Statistics Hub⁴

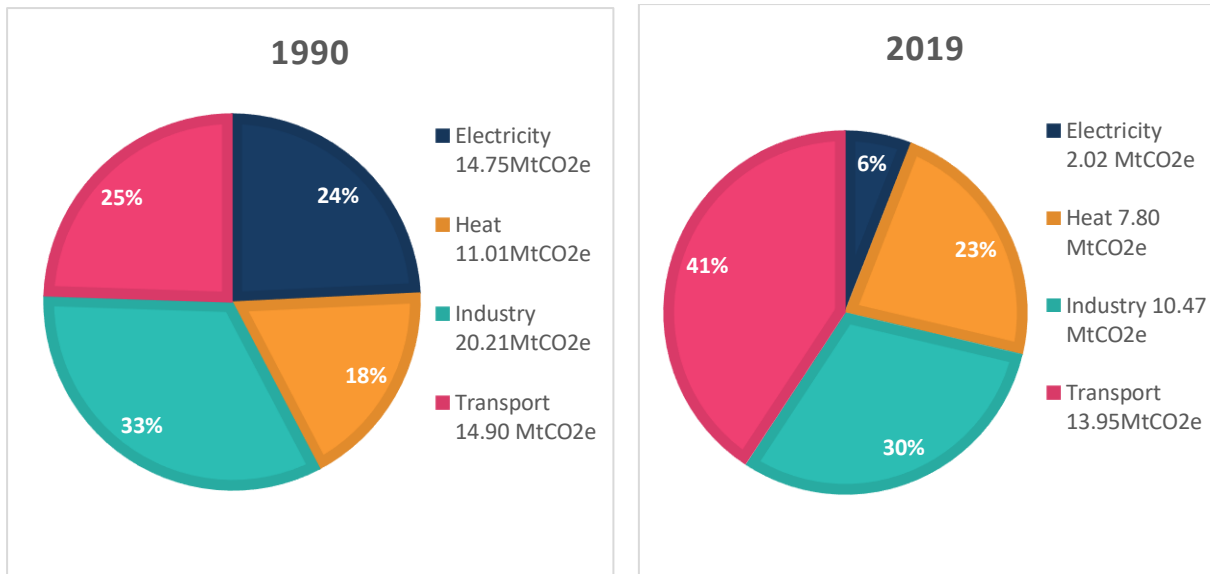
Industry and electricity have seen the biggest declines in their emissions, as illustrated in these pie charts showing the figures for 1990 and 2019 (the last pre-pandemic year), though industry emissions as proportion of the overall total remain roughly the same. In contrast there has been a far smaller reduction in emissions due to heat and very little change from transport.

¹ <https://www.netzeronation.scot/the-importance-of-net-zero>

² <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2022/06/scottish-greenhouse-gas-statistics-2020/documents/scottish-greenhouse-gas-statistics-2020/scottish-greenhouse-gas-statistics-2020/govscot%3Adocument/scottish-greenhouse-gas-statistics-2020.pdf>

³ <https://scotland.shinyapps.io/Energy/?Section=WholeSystem&Chart=GHGEmissions> – Greenhouse gas emissions

⁴ <https://scotland.shinyapps.io/Energy/?Section=WholeSystem&Chart=GHGEmissions>



Source: Scottish Energy Statistics Hub⁵

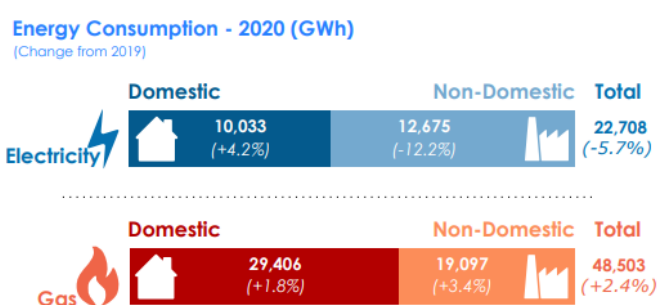
This report focuses on the need to reduce demand and the changes required to the way we heat our homes or travel. Such changes will not all be easy or popular and it is therefore important that the urgency of these changes is clearly understood by the wider public. We consider what the Scottish Government is doing in terms of leading those necessary behavioural changes and what more, if anything, needs to be done.

⁵ <https://scotland.shinyapps.io/Energy/?Section=WholeSystem&Chart=GHEmissions>

Energy use

In 2020 98.6% of all electricity used in Scotland (all generation minus net exports) came from renewable sources, just shy of the 100% by 2020 target, and an increase from 89.8% in 2019.⁶ Of the 51,865 GWh of electricity generated in Scotland, 61.8% came from renewables and 25.7% came from nuclear, with 88.1% of all electricity generated classed as low-carbon.⁷ Although 10.9% came from fossil fuels, this is down from 50.6% in 2004.⁸

However, electricity isn't the only form of energy. Scotland uses a lot more gas than it does electricity, 22,708 GWh of electricity was consumed in 2020 while 48,503 GWh of gas was consumed, as illustrated below.⁹



Source: Annual Energy Statement, Scottish Government, December 2021

Gas is an important energy source for heating and, therefore, has greater seasonal variations in demand than electricity. In 2020/21 the peak daily demand for gas was 385 GWh, whereas the minimum daily demand in the summer was 55 GWh. The variance for electricity demand was much lower with a peak of 99 GWh and a low of 52 GWh.¹⁰

Gas is also the main energy used in domestic settings. In 2019, gas accounted for nearly two-thirds of all domestic energy consumption (65.4%).¹¹

Only 25.4% of our *total energy* consumption came from renewable sources in 2020,¹² so reducing our use of gas is clearly an important part of Scotland's journey to Net Zero. Since the baseline year of 2005, gas consumption overall has fallen by 18.9%.¹³ However, the total amount of gas used in domestic settings and the average gas use per customer has stabilised in recent years, as illustrated in the table below:

⁶ <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf>

⁷ <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf>

⁸ <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---june-2022/energy-statistics-summary---june-2022/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ1%2B2022.pdf>

⁹ <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf>

¹⁰ <https://scotland.shinyapps.io/Energy/?Section=SystemSecurity&Chart=DailyDemand> – Daily demand

¹¹ <https://scotland.shinyapps.io/Energy/?Section=OilGas&Chart=OilGasConsumption> – oil and gas consumption

¹² <https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2018/10/quarterly-energy-statistics-bulletins/documents/energy-statistics-summary---december-2021/energy-statistics-summary---december-2021/govscot%3Adocument/Scotland%2BEnergy%2BStats%2BQ3%2B2021.pdf>

¹³ <https://scotland.shinyapps.io/Energy/?Section=EnergyEfficiency&Subsection=DemandReduction&Chart=GasConsumption> – gas consumption by sector

Year	Domestic gas use (GWh)	Avg gas use per consumer (KWh)
Baseline 2005/07	34714	19361
2008	33342	18043
2009	30730	16300
2010	30330	15919
2011	28959	15064
2012	28802	14812
2013	28073	14287
2014	27700	13992
2015	27528	13818
2016	27882	13709
2017	28573	13873
2018	28421	13645
2019	28896	13742
2020	28896	13899

Source: Scottish Energy Statistics Hub

The Scottish Government's Climate Change Plan includes an aim to reduce domestic heat demand by 15% between 2015 and 2032, alongside a 20% reduction for non-domestic demand. While non-domestic demand has only fallen by 1.8% so far, domestic demand for heat has actually increased by 5.4%.¹⁴

Heat accounts for roughly three quarters of all energy consumption by households. (In 2019 space heating accounted for 76%, cooking for 3%, lights, appliances & renewables for 10% and water heating for 11%).¹⁵

The energy efficiency of housing is linked into achieving Net Zero. Scottish housing stock energy efficiency ratings are monitored, with houses given an Energy Efficiency Rating (EER) from A (most efficient) to G (least efficient).¹⁶ The Scottish Government wants every Scottish home to achieve at least a band C in its Energy Performance Certificate (EPC). As of 2019, 45% of housing were graded C or better. However, very few homes have achieved the A or B rating and the most energy inefficient homes are in the private rented sector¹⁷:

Housing Tenure	A	B	C	D	E	F & G	C or Better
Owner occupied	0.0%	2.5%	38.8%	41.8%	12.2%	4.7%	41.3%
Private rented	0.0%	2.9%	37.5%	39.4%	10.3%	10.3%	40.4%
Social sector	0.0%	6.9%	48.6%	38.8%	4.6%	0.9%	55.5%

Source: Scottish Energy Statistics Hub

Improving the energy efficiency of homes leads to a reduction in energy usage, but it can also, therefore, contribute to a reduction in bills, something that is particularly important during the current energy crisis.

Transport is the largest contributor of emissions and has been slow at reform. There was a greater decline between 2019 and 2020, with a 20.9% reduction, including a

¹⁴ <https://scotland.shinyapps.io/Energy/?Section=EnergyEfficiency&Subsection=DemandReduction&Chart=HeatConsumption> – non electrical heat demand

¹⁵ <https://scotland.shinyapps.io/Energy/?Section=EnergyEfficiency&Subsection=DemandReduction&Chart=HeatConsumption> – household energy consumption

¹⁶ <https://scotland.shinyapps.io/Energy/?Section=EnergyEfficiency&Subsection=EfficiencyMeasures&Chart=DomEPCs> – housing stock

¹⁷ <https://www.heraldsotland.com/politics/19632971.homes-scotland-meet-energy-standards-2025-despite-33bn-costs/>

26.6% reduction in car emissions and 61.5% reduction for domestic aviation. However, this decline was due to COVID restrictions, not permanent changes in behaviour.¹⁸ In 2020 there were 3.04 million vehicles licensed for use on the roads in Scotland, the highest number on record, of which 83% were cars and over 95% of vehicles used petrol or diesel.¹⁹

Vehicles licensed at 31 December in Scotland

<i>thousand</i>	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total vehicles	2,188	2,531	2,685	2,863	2,919	2,962	2,991	3,041	3,042
Cars	1,876	2,139	2,255	2,394	2,433	2,462	2,486	2,524	2,520
Cars as % of total	85.7%	84.5%	84.0%	83.6%	83.4%	83.1%	83.1%	83.0%	82.8%
Vehicles by method of propulsion									
Total	2,188	2,531	2,685	2,863	2,919	2,962	2,991	3,041	3,042
Petrol	1,677	1,771	1,656	1,522	1,509	1,497	1,503	1,533	1,535
Diesel	510	756	1,018	1,321	1,386	1,435	1,450	1,459	1,437
Hybrid Electric	0	0	4	11	14	19	27	35	49
Electricity		0	2	6	7	9	10	12	19
Gas Bi-Fuel		1	2	1	1	1	1	1	1
Gas or petrol/gas	1	2	2	1	1	1	1	1	1
Petrol & Diesel as % of total	100.0%	99.8%	99.6%	99.3%	99.2%	99.0%	98.7%	98.4%	97.7%

Source: Scottish Transport Statistics 2021

The UK Government has banned the sale of new diesel and petrol cars from 2030,²⁰ just eight years away. However, in 2020, 85% of all new vehicles sold ran on petrol and diesel.²¹ There was a 27% drop in the number of new registrations in 2020, which will have been impacted by the pandemic. In 2019, the last year pre-covid, 94% of all new vehicles sold ran on petrol or diesel.²²

Prior to 2020, traffic volumes on major roads in Scotland had been broadly increasing over the past three decades. In 2019, traffic volumes on major roads were 46% higher than in 1995.²³ Cars account for 72% of traffic on roads, with buses representing 1.1% and cycles 1.6%.²⁴

In Scotland around 50 per cent of journeys are under 5 kilometres, while around 30 per cent are under 2 kilometres and 15 per cent are under 1 kilometre.²⁵

The data illustrated highlights that while great progress has been made on the way we generate electricity, there has been little improvement in our use of fossil fuels for heating and transport. Shifting towards electricity as a source of energy, which can be generated from renewable sources, has to be a priority alongside a reduction in demand. However, recent years indicate an increase in car use as well as domestic gas use. This paper will therefore examine policies which can help reduce demand as well as encourage electrification.

¹⁸ <https://www.gov.scot/publications/scottish-greenhouse-gas-statistics-2020/documents/>

¹⁹ <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-38-2019-edition/chapter-1-road-transport-vehicles/>

²⁰ <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>

²¹ Scottish Transport Statistics 2021, Table 1.1

²² Scottish Transport Statistics 2021, Table 1.1

²³ Scottish Transport Statistics 2021, chapter 2

²⁴ Scottish Transport Statistics 2021, chapter 2

²⁵ Scottish Government, 'A route map to achieve a 20 per cent reduction in car kilometres by 2030' - [3. Interventions | Transport Scotland](#)

Government action

As the Scottish Government notes below,²⁶ energy policy remains reserved to Westminster. However, that does not mean that Holyrood is impotent – far from it. Planning, housing and transport are key devolved responsibilities which will need to be utilised to make vital progress on de-carbonisation.

“However, if we are to achieve our net zero greenhouse emissions targets, and to successfully deliver a green economic recovery, there are significant barriers that must be overcome - not least the fact that Scotland does not have all the powers it needs to reach net zero. We continue to call on the UK Government to work with us and to take action in key energy policy areas, which remain reserved including aspects of the decarbonisation of heat, regulatory and financial instruments to accelerate the full deployment of Carbon Capture Utilisation and Storage (CCUS) in Scotland, support for the decarbonisation of Scotland's energy-intensive industries, and the substantial regional security of supply issues that have developed across the UK over the past decade.”

Scottish Government Energy Strategy March 2021

Timeline of targets & commitments

The Scottish Government has announced a number of targets, across a range of strategies and reports, that it wants Scotland to reach over the next 23 years ahead of the 2045 Net Zero deadline. Some are detailed, while others are more vague ambitions.

Our list includes 45 additional government aims. These have been collected from a variety of different strategies and reports. However, there is no single comprehensive and publicly available timeline indicating all of the government's targets, including progress being made. Targets themselves do not guarantee delivery and without transparent and accountable tracking of these goals, there is a danger they become worthless and simply policy by target setting.

For example, the target to reduce heat demand is going in the wrong direction while it has been reported that the target for the majority of buses to be zero emissions will be missed.²⁷

We would urge the Scottish Government to produce its own simplified timeline, which should be continually updated online with tracking.

- **2023**
 - Deadline for all local authorities to produce Local Heat & Energy Efficiency (LHEES)²⁸
 - Bioenergy action plan to be published by Scottish Government²⁹
 - Heat in Buildings Public Engagement Strategy to be published.³⁰
- **2024**
 - From April all new buildings applying for a warrant will be prohibited from using direct emissions heating systems.³¹
 - Majority of new buses purchased should be zero-emission ³²

²⁶ <https://www.gov.scot/publications/scotlands-energy-strategy-position-statement/>

²⁷ <https://www.thetimes.co.uk/article/bc71ec9a-2d56-11ed-b64b-1375cd73757d?shareToken=2f19a5545781e0f15edcb07938611142>

²⁸ <https://www.gov.scot/publications/new-build-heat-standard-consultation-part-ii/>

²⁹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

³⁰ <https://www.gov.scot/publications/new-build-heat-standard-consultation-part-ii/>

³¹ <https://www.gov.scot/publications/new-build-heat-standard-consultation-part-ii/>

³² <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

- The need for any new petrol and diesel light commercial vehicles in public bodies to be phased out.³³
- **2025**
 - Regulations will be introduced to ensure home energy efficiency.³⁴
 - Completion of the next climate change plan.³⁵
 - Reduce food waste by one third, against a 2013 baseline.³⁶
 - End landfilling of biodegradable municipal waste, reduce all waste sent to landfill to 5% and recycle 70% of all waste.³⁷
 - Separate collection of textiles, in line with EU requirements.³⁸
 - Zero direct emissions heating systems (including connections to heat networks) to account for at least 50% of new systems being installed each year.³⁹
 - Reduce emissions to 1.2 megatonnes for the waste and circular economy sectors.⁴⁰
 - First Active Freeways with segregated active travel routes on main travel corridors.⁴¹
 - Development of a new Car Demand Management Framework.⁴²
- **2026**
 - Scotland's fourth Land Use Strategy to be published.⁴³
- **2027**
 - 2.6 Terawatt hours of heat output to be supplied by heat networks.⁴⁴
- **2028**
 - Regulations to be introduced in 2025 should ensure all private rented sector homes now have energy efficiency of EPC C or equivalent.⁴⁵
- **2030**
 - 75% reduction in emissions⁴⁶
 - Sale of new petrol or diesel cars to be banned by UK government⁴⁷
 - Reduce car kilometres by 20% against a 2019 baseline.⁴⁸
 - 2GW of renewable energy being in Local or Community ownership⁴⁹
 - Offshore wind in Scotland expanded to between 8 and 11 GW.⁵⁰
 - Reduce emissions from heat in buildings by 68% from 2020 to 2030.⁵¹
 - Reduce emissions to 0.8 megatonnes for the waste and circular economy sectors.⁵²
 - At least 250,000 hectares of peatland restored.⁵³
 - First delivery-scale Negative Emissions Technologies installations begin operation.⁵⁴
 - Generating 5GW of renewable and low-carbon hydrogen⁵⁵
 - No more than 15% of households should be fuel poor, no more than 5% are in extreme fuel poverty and the fuel poverty gap is no more than £350 (in 2015 prices).⁵⁶
 - 6 Terawatt hours of heat output to be supplied by heat networks.⁵⁷

³³ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/9/>

³⁴ <https://www.heraldsotland.com/politics/19632971.homes-scotland-meet-energy-standards-2025-despite-33bn-costs/>

³⁵ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

³⁶ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

³⁷ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/11/>

³⁸ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/11/>

³⁹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/8/>

⁴⁰ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/11/>

⁴¹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/9/>

⁴² <https://www.transport.gov.scot/publication/a-route-map-to-achieve-a-20-per-cent-reduction-in-car-kilometres-by-2030/3-interventions>

⁴³ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/12/>

⁴⁴ <https://www.gov.scot/publications/heat-networks-delivery-plan/>

⁴⁵ <https://www.heraldsotland.com/politics/19632971.homes-scotland-meet-energy-standards-2025-despite-33bn-costs/>

⁴⁶ <https://www.netzeronation.scot/the-importance-of-net-zero>

⁴⁷ <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>

⁴⁸ <https://www.transport.gov.scot/media/50872/a-route-map-to-achieve-a-20-per-cent-reduction-in-car-kms-by-2030.pdf#:~:text=ln%20response%20to%20the%20global%20climate%20emergency%2C%20scotland%E2%80%99s,up%2038%20per%20of%20those%20transport%20emission>

⁴⁹ <https://www.gov.scot/publications/scotlands-energy-strategy-position-statement/pages/3/>

⁵⁰ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/7/>

⁵¹ <https://www.gov.scot/publications/heat-buildings-strategy-business-regulatory-impact-assessment/pages/3/>

⁵² <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/11/>

⁵³ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/12/>

⁵⁴ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/14/>

⁵⁵ <https://www.gov.scot/publications/draft-hydrogen-action-plan/pages/2/>

⁵⁶ <https://www.gov.scot/publications/tackling-fuel-poverty-scotland-strategic-approach/>

⁵⁷ <https://www.gov.scot/publications/heat-networks-delivery-plan/>

- **2032**
 - Reduce domestic heat demand by 15% from 2015 alongside a 20% reduction for non-domestic demand.⁵⁸
 - Generate at least the equivalent of 50% of our energy across heat, transport and electricity demand from renewable sources.⁵⁹
 - 21% of our land to be covered by forest.⁶⁰
 - 30% of Scottish Government owned ferries will be low emission⁶¹
 - Industry emissions need to decrease by 43% on 2018 levels.⁶²
- **2033**
 - All residential properties should have energy efficiency of EPC C or equivalent.⁶³
- **2035**
 - Scotland's rail services should be decarbonised.⁶⁴
 - Remove the need for new petrol & diesel heavy vehicles.⁶⁵
 - No more than 10% of households are fuel poor, no more than 3% are in extreme fuel poverty and the fuel poverty gap is no more than £300 (in 2015 prices).⁶⁶
- **2038**
 - All publicly owned buildings to meet zero emission heating requirement.⁶⁷
- **2040**
 - 90% reduction in emissions⁶⁸
 - No more than 5% of households should be fuel poor.⁶⁹
 - Decarbonise scheduled flights within Scotland.⁷⁰
 - No more than 5% of households are fuel poor, no more than 1% are in extreme fuel poverty and the fuel poverty gap is no more than £250 (in 2015 prices).⁷¹
- **2045**
 - Generating 25GW of renewable and low-carbon hydrogen⁷²
 - Net Zero⁷³

⁵⁸ <https://scotland.shinvaapps.io/Energy/?Section=EnergyEfficiency&Subsection=DemandReduction&Chart=HeatConsumption> – non electrical heat demand

⁵⁹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

⁶⁰ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

⁶¹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/9/>

⁶² <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/10/>

⁶³ <https://www.gov.scot/policies/energy-efficiency/energy-efficiency-in-homes/>

⁶⁴ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/2/>

⁶⁵ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/9/>

⁶⁶ <https://www.gov.scot/publications/tackling-fuel-poverty-scotland-strategic-approach/>

⁶⁷ [Reducing greenhouse gas emissions – proposals and policies: report – gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/reducing-greenhouse-gas-emissions-proposals-and-policies-report-gov.scot/www.gov.scot/)

⁶⁸ <https://www.netzeronation.scot/the-importance-of-net-zero>

⁶⁹ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/8/>

⁷⁰ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/9/>

⁷¹ <https://www.gov.scot/publications/tackling-fuel-poverty-scotland-strategic-approach/>

⁷² <https://www.gov.scot/publications/draft-hydrogen-action-plan/pages/2/>

⁷³ <https://www.netzeronation.scot/the-importance-of-net-zero>

Changing Behaviour

Scotland has made huge progress towards Net Zero with its efforts to switch electricity production away from fossil fuels and towards renewables. In the decade to 2020 Scotland went from having 48.4% of electricity produced by fossil fuels, to only 10.9%. Renewables went from making up only 19% of production to 61.8%.⁷⁴ This is a huge achievement and is to be welcomed. Indeed, this change has enabled Scotland to meet its interim Net Zero target and greenhouse gasses had been reduced by 58.7% by 2020.⁷⁵

However, the change in electricity production has now happened and to achieve subsequent goals will require changes in heat and transportation. Unfortunately, as the figures earlier demonstrated, in recent years demand for both domestic heat and traffic on our roads has been increasing. These trends need to be reversed and that requires leadership from the Scottish government, with education and awareness programmes to explain the benefits of change along with policy intervention.

Public education & awareness campaign

Reducing demand will be difficult, it will require changes to the way we heat our homes and making wider use of active travel or public transport. People will have to change the way they go about their daily lives. Such changes will not all be popular, and it is therefore important that the urgency of these changes is clearly understood. Focusing on renewable electricity can lead to a sense of complacency and a feeling that little more needs to be done.

The Scottish Government's New Build Heat Standard Consultation Part 2⁷⁶ highlighted that public awareness around the transition to Zero Direct Emissions Heating in buildings was not widespread and that increased consumer awareness and public education were required. The consultation commits the Scottish Government to publishing a 'Heat in Buildings Public Engagement Strategy' in early 2023. However, since 2009 there has been a legislative requirement to publish a public engagement strategy covering climate change overall.⁷⁷ The latest version of that strategy was published in September 2021.

That report noted that while the majority of every age group view climate change as an immediate and urgent problem, it had not been matched by evidence of a comparative increase in people taking action to tackle climate change, with the report suggesting that this means that there needed to be a revised approach.⁷⁸

The scale of the challenge in terms of changing behaviour was also laid bare in private polling that was conducted for the Scottish Government in March and April 2022. It found that only 30% of respondents felt confident in understanding what NetZero was and only 7% knew that the target date for NetZero was 2045.⁷⁹

⁷⁴ <https://scotland.shinvaapps.io/Energy/>

⁷⁵ <https://www.gov.scot/publications/scottish-greenhouse-gas-statistics-2020/>

⁷⁶ <https://www.gov.scot/publications/new-build-heat-standard-consultation-part-ii/>

⁷⁷ <https://www.gov.scot/publications/net-zero-nation-public-engagement-strategy-climate-change/>

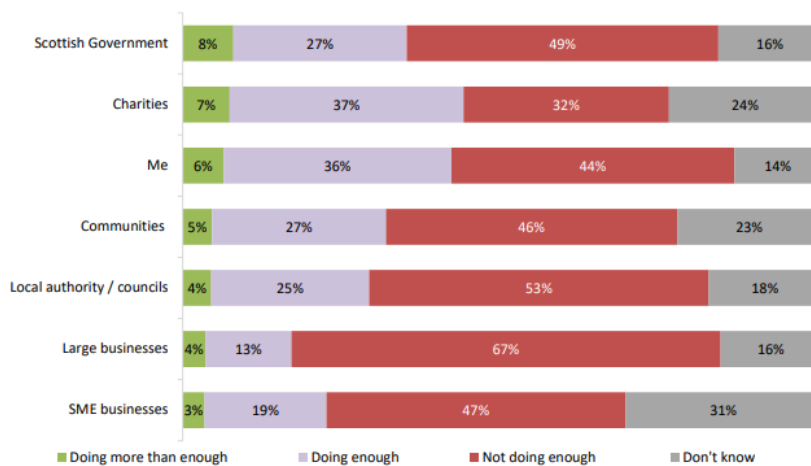
⁷⁸ <https://www.gov.scot/publications/net-zero-nation-public-engagement-strategy-climate-change/pages/2/>

⁷⁹ <https://www.gov.scot/binaries/content/documents/govscot/publications/foi-eir-release/2022/08/foi-202200314193---information-released/foi-202200314193---information-released/govscot%3Adocument/FOI%2B202200314193%2B-%2BInformation%2BReleased.pdf>

The polling went on to note:

- A third (34%) of the Scottish public have at least heard of the website netzeronation.scot, but only 7% say they have used it.
- Across all the policies tested, only a small proportion stated that they know a lot about them. Around one in five (21%) say they know a lot about phasing out of the need for new petrol or diesel cars by 2030, but for other policies, this fell to around one in 10 or fewer.
- Respondents substantially overestimated the greenhouse gas emissions emitted by power stations and waste management, and substantially underestimated the emissions contributions of transport and buildings.
- Respondents didn't think either the Scottish Government, or themselves, (and others) were doing enough to reach Net Zero.

Figure 18: To what extent do you think the following actors are currently doing enough or not doing enough to help Scotland to reach net zero emissions?



Base: Unweighted base (1782), single response question

Source: Scottish Government FOI response⁸⁰

In other words, it seems that, despite having various public engagement strategies, the actual messages have not been reaching the public.

The point made in the polling that respondents were likely to overestimate the emissions caused by power stations and underestimate those caused by transport and buildings is important as it points to a feeling that 'others' are more responsible.

The Scottish Government needs to start a more concerted public awareness and education campaign to increase understanding of exactly what is needed to reach Net Zero and the changes we all must make. Although there is the NetZeroNation.Scot website which has some detailed information, as the pandemic showed, simple repeated messaging is also important. There also needs to be clarity.

⁸⁰ <https://www.gov.scot/binaries/content/documents/govscot/publications/foi-eir-release/2022/08/foi-202200314193/documents/foi-202200314193---information-released/foi-202200314193---information-released/govscot%3Adocument/FOI%2B202200314193%2B-%2BInformation%2BReleased.pdf>

At present there are some confusing messages about what people should be doing to reduce their bills and to contribute towards Net Zero. For example, issues around cavity wall insulation and condensation.

For many replacing their gas boiler with a heat pump is something they cannot afford at present, so a first step may be improving the insulation in their homes as a way to reduce their heat demand. The Home Energy Scotland website is funded by the Scottish Government to help people reduce their bills and their carbon footprint. The website advises that a third of heat can be lost through the walls in an uninsulated home.⁸¹ However, there are also warnings around condensation and damp which can happen after insulating an older building. Homes are all different and a website cannot be expected to give the same detail of advice that a skilled individual examining a home could. However, the potential of risk can have an impact on the decisions people make, particularly when many will not have the time needed to arrange different quotes and look into a range of issues themselves.

For those who can afford to consider alternative heating methods, such as air source heat pumps, they need to have faith that there is a workforce available to fit, service and repair these systems. They need confidence that they are adopting the technology now that, eventually, all buildings will need to convert to. Individuals do not want to spend money on systems which may become the “Betamax” of home heating.

The Scottish Government has said that it plans to create a National Public Energy Agency by 2025 and part of that will launch a national conversation and campaign around transformational change.⁸² The Heat in Buildings Strategy, published in October 2021, stated that the Scottish Government would develop a “bespoke public engagement strategy for heat in buildings”. In a letter to the Local Government Committee in January 2022, Patrick Harvie, the minister for zero carbon buildings, active travel and tenants’ rights, elaborated stating the engagement strategy would have a focus on:

- raising the profile of energy efficiency and zero emissions heating options so that people are aware of the benefits and begin to see them as a positive choice;
- enabling people to actively participate in shaping the development of Scottish Government policy and incentives as well as local level heat and energy efficiency planning; and
- raising awareness of the support and advisory services available in order to maximise uptake of the support available.⁸³

Patrick Harvie’s comments came in response to a December 2021 letter from the committee⁸⁴ where they highlighted concerns about the lack of public awareness and that time was running out:

The Committee is concerned about the lack of public awareness of what is required to be done to housing in order to meet the Scottish Government’s net zero target by 2045. Witnesses suggested to us that COP 26 has raised public awareness of climate change and the need for

⁸¹ <https://www.homeenergyscotland.org/make-my-home-warmer/>

⁸² <https://consult.gov.scot/energy-and-climate-change-directorate/new-build-heat-standard-part-two/>

⁸³ <https://www.parliament.scot/chamber-and-committees/committees/current-and-previous-committees/session-6-local-government-housing-and-planning/correspondence/2022/retrofitting-housing-for-net-zero-january-2022>

⁸⁴ <https://www.parliament.scot/chamber-and-committees/committees/current-and-previous-committees/session-6-local-government-housing-and-planning/correspondence/2021/retrofitting-housing-for-net-zero>

action, but there isn't an understanding yet of what that will mean for people's homes. It would seem to the Committee that this increased public awareness of the need for action afforded by COP 26 provides an ideal opportunity to advance public understanding of this issue.

*The public need to know what will be expected of them, how much it will cost to make changes to their houses and how it will be paid for. The timescales for making these changes are already very tight and people need to have clarity and certainty as soon as possible.*⁸⁵

Nearly a year ago the committee expressed the need for action around public awareness to be taken as soon as possible. There has been a legislative requirement to publish an engagement strategy on climate change overall since 2009. Yet despite these commitments and concerns raised, actual campaigns have yet to materialise and the concerns remain.

While policies focused on ensuring we have the labour force, skills and technology necessary to implement change will take time, there is no reason to delay raising awareness and informing people of the changes that are coming. Raising awareness should also involve work highlighting what the Scottish Government is doing to support the supply side of the transition, such as the Green Jobs Work Academy.

While we welcome the Scottish Government's commitment to implement a public engagement campaign, we would echo the call the local government committee made in 2021 that it has to start "as soon as possible".

Gas in homes

The Scottish Government has stated that in only 8 years it wants around 50% of homes to have converted to a low carbon heating system. This is to enable us to meet the goal of reducing emissions from heat in buildings by 68% between 2020 and 2030.⁸⁶ With the average lifespan of a boiler being 10-15 years, and a well maintained one up to 25 years⁸⁷, it is clear that changes to regulations around the use of gas boilers will need to come into force soon, though will still likely need the replacement of some boilers before they have come to the end of their lifespan. For people making decisions currently about heating their home, when to replace their boiler and what choices they should make, they should be able to have a clear idea from the government about how regulations will change over the next decade. However, there are few details, and even regulations for new buildings don't come into force until 2024.

The Scottish Government has estimated that it would cost about £33 billion to convert our existing building stock to net zero emissions by 2045.⁸⁸ However, transitioning will save money, as well as being better for the environment, in the longer term. A recent study from Oxford University highlighted that transitioning to a decarbonised energy system by around 2050 is expected to save the world at least \$12 trillion, compared to continuing our current levels of fossil fuel use.⁸⁹

⁸⁵ <https://www.parliament.scot/chamber-and-committees/committees/current-and-previous-committees/session-6-local-government-housing-and-planning/correspondence/2021/retrofitting-housing-for-net-zero>

⁸⁶ <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/8/>

⁸⁷ <https://www.plumbingforce.co.uk/how-long-do-boilers-last/>

⁸⁸ <https://www.gov.scot/publications/scotlands-energy-strategy-position-statement/>

⁸⁹ <https://www.ox.ac.uk/news/2022-09-14-decarbonising-energy-system-2050-could-save-trillions-oxford-study>

The New Build Heat Standard Consultation: Part II proposes to prohibit the use of direct emissions heating (DEH) systems in new buildings from 2024 onwards.⁹⁰ The landing page for the consultation suggests that bans will be phased in for existing buildings from 2025 onwards:

“The introduction of the New Build Heat Standard will signal a significant shift away from what has long been considered ‘business as usual’, with an increased deployment in systems which are considered to be ‘zero direct emissions heating’ technologies: paving the way for the introduction of similar requirements in existing buildings from 2025 onwards”⁹¹

Reform Scotland asked the Scottish Government for clarity over the 2025 date and was given the following response:

“For existing homes, this strategy commits to introducing regulations from 2025 onwards (where possible within our legal competence), to ensure that all homes meet at least a standard of an EPC C or equivalent by 2033, and that homes install a Zero Direct Emission heating system by 2045. We are proposing to introduce trigger points (for example at the point of sale), with all remaining homes needing to be upgraded by these backstop dates.”⁹²

Therefore, potentially, from 2025 there may be a ban on selling homes with gas boilers. However, no decision has yet been made public and, as a result, individuals making decisions now about how they heat their homes are doing so without all the facts. People need to be kept informed so that decisions they make now take account of coming changes.

Prior to the publication of the New Build Heat Standard Consultation: Part II, Reform Scotland had submitted Freedom of Information requests to the Scottish Government seeking clarity on when bans on the sale of boilers may be introduced, as well as bans on the sale of gas cookers. We received the following response:

Gas Boilers

The Scottish Government is currently developing regulations which will require all new buildings, for which a building warrant is applied for from 2024, to use zero emissions heating. In existing buildings, we will phase out the need to install new or replacement fossil fuel boilers, in off gas from 2025 and in on gas areas from 2030, subject to technological developments and decisions by the UK Government in reserved areas.

In public buildings, the Net Zero Carbon Public Buildings Standard is being rolled out and applied for new and major refurbished buildings. This includes development and consultation on a series of phased targets starting in 2024 for all publicly-owned buildings to meet zero emission heating requirements, with a backstop of 2038.

Gas Hobs and Cookers

The Scottish Government currently has no plans to ban the use or sale of gas cookers or hobs. The Heat in Building Strategy, however, acknowledges that many buildings use the same fuel for heating and cooking, particularly natural gas. When buildings switch away from using fossil fuel boilers, decisions on cooking appliances may also need to be made. As we accelerate deployment of strategic heating technologies, we will ensure our programmes support households and non-domestic building users to also transition to new cooking appliances, where appropriate.⁹³

⁹⁰ <https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2022/07/new-build-heat-standard-consultation-part-ii/documents/new-build-heat-standard-consultation-part-2/new-build-heat-standard-consultation-part-2/govscot%3Adocument/new-build-heat-standard-consultation-part-2.pdf?forceDownload=true>

⁹¹ <https://consult.gov.scot/energy-and-climate-change-directorate/new-build-heat-standard-part-two/>

⁹² Email response from Scottish Government to Reform Scotland 9/8/22

⁹³ Scottish Government, Freedom of Information response, 16/8/22

The fact that there are targets in place to reduce heat demand and have more low carbon systems in place suggests that the Scottish Government is aware of the urgency and the Freedom of Information response suggests that, internally at least, there are plans to change rules around what is allowed. However, the lack of clarity for the public is unacceptable. The suggestion that the sale of a house may be a trigger point is one that should be made public as soon as possible to help people prepare.

Change will not happen without regulation and bans – as the New Build Heat Standard Consultation: Part II noted, “analysis of the Energy Performance Certificate (EPC) register for all new build homes completed in the 12-month period to end 2020 shows that over 80% of new properties were served by mains gas fired boilers as their main heating system, with a further 3% using heating oil and LPG. Only around 10% were served by non-DEH systems.”⁹⁴

Without early intervention and publicity there is a danger that the chaos around the regulations on interlinked smoke-detectors could be repeated.

Interlinked smoke detectors

In March 2018 the Scottish Government announced its intention to strengthen regulations with regard to smoke alarms in homes.⁹⁵ In February 2019 it was formally announced that interlinked fire and smoke alarms would be required in owner-occupied homes by February 2021.⁹⁶ The requirement was already in place for the private rented sector. In a written answer in August 2020, housing minister Kevin Stewart highlighted the public awareness campaigns that would follow to ensure members of the public made necessary changes:

“This announcement was widely reported in press, television and social media as well as housing and electrical related publications. An informative fact sheet was also made available on our website: <https://www.gov.scot/publications/fire-and-smoke-alarms-in-scottish-homes/>

A joint awareness raising campaign will be taken forward, coordinated across Scottish Fire and Rescue Service, Scottish Government and the Convention of Scottish Local Authorities to ensure consistency in approach in all local authority areas prior to the standard coming into force on 1 February 2021.”

S5W-31126

However, the deadline of February 2021 had to be extended by 12 months to February 2022 due to a lack of awareness, while some, including former MSP Alex Neil and Age Scotland, called for it to be extended further.⁹⁷ When the February 2022 deadline was approaching, there was a rush on stock for interlinked smoke detectors leading to a shortage in supply.⁹⁸ Indeed, the last government building was not made compliant until August 2022.⁹⁹

The Scottish Government estimated that interlinked smoke detectors would cost a two-story household about £220 if they fitted them themselves.¹⁰⁰

From the initial statement of intent in March 2018 there was four years’ notice ahead of the final deadline. Four years to highlight the need to change something which was relatively low cost and easy to do. And yet despite having that length of time, there was still a rush to comply at the end as well as suggestions half of Scots still had not installed the new alarms by that date.¹⁰¹ We cannot afford to repeat these mistakes and it is

⁹⁴ <https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2022/07/new-build-heat-standard-consultation-part-ii/documents/new-build-heat-standard-consultation-part-2/new-build-heat-standard-consultation-part-2/govscot%3Adocument/new-build-heat-standard-consultation-part-2.pdf?forceDownload=true>

⁹⁵ <https://www.gov.scot/news/improving-home-safety/>

⁹⁶ <https://www.gov.scot/news/new-fire-safety-standards-for-scottish-homes/>

⁹⁷ <https://www.dailyrecord.co.uk/news/local-news/change-deadline-law-fire-alarm-23393884>

⁹⁸ <https://www.thecourier.co.uk/fp/politics/scottish-politics/3017865/firefighters-forced-to-ignore-new-law-on-interlinked-alarms-due-to-supply-shortage/>

⁹⁹ <https://news.stv.tv/politics/scottish-government-accused-of-breaking-own-laws-over-smoke-alarm-delay>

¹⁰⁰ <https://www.mygov.scot/home-fire-safety#:~:text=The%20cost%20for%20an%20interlinked,to%20fit%20them%20for%20you.>

¹⁰¹ <https://news.stv.tv/politics/scottish-government-accused-of-breaking-own-laws-over-smoke-alarm-delay>

Account will also need to be taken of the different types of housing. In 2017 there were 2,603,174 dwellings in Scotland, of which 980,290 (37.7%) were flats; 558,911 (21.5%) were detached; 532,963 (20.5%) were terraced; 511,583 (19.7%) were semi-detached; and 19,427 (0.7%) were classed as other.¹⁰⁵ However, the proportion of dwelling that are flats varies considerably across Scotland from less than 10% on the islands, to 67.8% in Edinburgh and 72.6% in Glasgow.¹⁰⁶ The changes necessary to switch the heating system of an old tenement flat will be different to a newer detached house and will need to be reflected in the information from the Scottish Government.

Pay-As-You-Drive Road Pricing

Transport is the largest contributor of emissions in Scotland and has been slow to reform. In 2020 there were 3.04 million vehicles on our roads, the highest number on record, of which 83% were cars and over 95% of vehicles used petrol or diesel.¹⁰⁷

Prior to the pandemic traffic volumes on major roads in Scotland had been broadly increasing over the past three decades. By 2019 traffic on major roads was 46% higher than in 1995.¹⁰⁸ Cars account for 72% of traffic, while buses represent only 1.1% and cycles only 1.6%.¹⁰⁹

About 50 per cent of journeys are under 5 kilometres, while around 30 per cent are under 2 kilometres and 15 per cent are under 1 kilometre.¹¹⁰

If we are to hit NetZero, switching from petrol and diesel to electric cars is not enough. We need to reduce car use altogether, and the Scottish Government's target of a 20% reduction in car kilometres between 2019 and 2030 is welcome and necessary.¹¹¹

Reform Scotland believes that changing the way we tax drivers offers a solution to help change behaviour. The way we currently pay for road space is unfair. It takes no account of the ability to use alternative modes of transport and is unsustainable in the longer term as revenue will decline as more cars switch to electricity and make no tax contribution despite taking up road space.

Although VED takes account of the potential carbon emissions from a car, it punishes infrequent drivers by charging them the same, if not more, than frequent drivers. As a result, someone with an old car who doesn't drive very often can end up paying more than someone who has a newer car but drives all the time. VED also takes no account of where and when people are using the roads – many people living in remote areas or working unsociable hours have no alternative to the car.

It is easier for wealthier individuals to upgrade to more fuel-efficient or electric models on a more regular basis and they are more likely to benefit from tax efficient company

¹⁰⁵ <https://statistics.gov.scot/slice?dataset=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fdwellings-type&http%3A%2F%2Fpurl.org%2Flinked-data%2Fcube%23measureType=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fmeasure-properties%2Fcount&http%3A%2F%2Fpurl.org%2Flinked-data%2Fsdmx%2F2009%2Fdimension%23refPeriod=http%3A%2F%2Freference.data.gov.uk%2Fid%2Fyear%2F2017>

¹⁰⁶ <https://statistics.gov.scot/slice?dataset=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fdwellings-type&http%3A%2F%2Fpurl.org%2Flinked-data%2Fcube%23measureType=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fmeasure-properties%2Fratio&http%3A%2F%2Fpurl.org%2Flinked-data%2Fsdmx%2F2009%2Fdimension%23refPeriod=http%3A%2F%2Freference.data.gov.uk%2Fid%2Fyear%2F2017>

¹⁰⁷ Scottish Transport Statistics [Chapter 01 - Road Transport Vehicles | Transport Scotland](#)

¹⁰⁸ Scottish Transport Statistics 2021, chapter 2

¹⁰⁹ Scottish Transport Statistics 2021, chapter 2

¹¹⁰ Scottish Government, 'A route map to achieve a 20 per cent reduction in car kilometres by 2030' - [3. Interventions | Transport Scotland](#)

¹¹¹ <https://consult.gov.scot/transport-scotland/car-kilometre-reduction-route-map/>

car schemes for purchase of electric cars. Indeed, it is also the case that those who cannot currently afford to buy an electric vehicle, pay fuel duty when they fill up their cars, yet electric car drivers can often charge their cars for free.

ChargePlace Scotland is Scotland's national Electric Vehicle (EV) charging network. It is owned by the Scottish Government and funded in partnership through a public grant from local authorities and other organisations. According to the organisation, members can charge for free at the majority of charge points.¹¹²

It also cannot be justified that in the midst of a cost-of-living crisis and increasing energy prices, owners of electric vehicles can charge their cars for free, while others struggle to pay to keep the lights on.

In addition, in a country as diverse geographically as Scotland, taxing someone simply because they are driving a car is unfair. It doesn't reflect the ability of that individual to choose another easily available mode of transport, takes no account of the congestion they are causing and the necessity of a car in rural areas to access any services.

Reform Scotland believes that a pay-as-you-drive system of road pricing should replace VED and fuel duty. Road pricing is intended to link drivers' choices with the actual costs they impose on the transport system. Pricing can vary to take account of the availability of public transport and the demand on the road space at any time. This can encourage people to use roads more efficiently – including by taking alternative modes of transport.

All of Scotland's roads would be covered by the scheme but the cost of using each road would depend on a number of factors, including the time of day and congestion levels. This means that many quieter roads, particularly in rural areas, would have no charge at all. The type of vehicle used could be taken into account too, with cleaner cars paying less, incentivising drivers towards lower-emitting vehicles, but, unlike currently, ensuring all cars contribute a fair amount for their road use. Local authorities could work with Transport Scotland to consider the charging levels appropriate for the circumstances in their areas.

There has been growing interest in the policy south of the border, with a recent report from the House of Commons Transport Select Committee calling on the UK government to consider a road pricing scheme to replace VED and fuel duty. The report stated:

*“The Government must set out a range of options to replace fuel duty and vehicle excise duty. Those options should be revenue neutral and not cause drivers, as a whole, to pay more than they do currently. One of those options should be a road pricing mechanism that uses telematic technology to charge drivers according to distance driven, factoring in vehicle type and congestion.”*¹¹³

¹¹² <https://chargeplacescotland.org/about-us>

¹¹³ <https://publications.parliament.uk/pa/cm5802/cmselect/cmtrans/789/report.html>

The potential loss of revenue was the main concern for the committee, and it highlighted the problem that if electric vehicle drivers become accustomed to no-tax on their motoring, it could become more difficult politically for that to change in the future. Therefore, it was important to change the tax sooner rather than later. The committee highlighted that the revenue raised by fuel duty across the UK was equivalent to approximately five pence on the rate of income tax.

It therefore recommended that the UK Government start an honest conversation with the public on the funding implications for road development and maintenance and for other essential public services of decreased revenue from VED and fuel duty.

Transport Scotland's route map to achieving the 20% reduction in car kilometres highlighted work from Scotland's Climate Assembly where 63% of the Assembly members supported a recommendation to '*phase in increased road taxes for private car use and use the revenue to subsidise public transport*'. The report goes on to note that these views were consistent with other recent UK research which found that opinions on road pricing had changed since the 2000s, and that in 2021 more people support than oppose road pricing as a concept, with a majority of people agreeing that road pricing would reduce congestion and pollution.¹¹⁴

Glasgow City Council's Draft Policy Framework for its Transport Strategy¹¹⁵ sets out a plan to lobby the Scottish Government to introduce road pricing at a Scottish level, while also considering a regional scheme.

"Policy 7.15: Lobby the Scottish Government and Transport Scotland to introduce road pricing / road user pays proposals at a national level with detailed guidance for regional schemes. [Policy linkage: Connectivity Commission] - Action 7.P: Subject to national support for road user charging, work with SPT and Glasgow City Region local authorities on a potential regional scheme."

In other words, both in Scotland and at Westminster there seems to be a growing sense that some sort of system of road pricing is inevitable, it just requires political will at the top.

Singapore has been using an electronic road pricing (ERP) scheme since 1998. It can charge different prices for the use of different roads and at different times of the day. Cars have an in-vehicle unit with a smart card and when they pass under one of 93 ERP gantries the system deducts the fee. Prior to the introduction of the scheme the government tested prototype systems and gathered feedback to help develop the final policy. Although road taxes are reserved to Westminster, there is an opportunity for the UK and Scottish governments to work together to carry out pilot work in Scotland.

Pilots could also be developed to consider the length of journeys, trying to discourage those from driving for very short distances, though ensuring a sort of 'blue badge' style scheme was in place to support those who cannot use active or public transport for short distances. While short trips may make a smaller contribution to overall car

¹¹⁴ <https://www.transport.gov.scot/media/50872/a-route-map-to-achieve-a-20-per-cent-reduction-in-car-kms-by-2030.pdf>

¹¹⁵ <https://www.glasgow.gov.uk/CHttpHandler.ashx?id=55054&p=0>

kilometres, they can be easier to change and can be an important way to encourage people to start to use their cars less.

Keeping the lights on

Although this report is focused on the demand side of energy, it is worth highlighting that encouraging people to switch to electric cars or heating systems will lead to significant increases on demand for electricity. Therefore, if the necessary behavioural changes are to be successful, the Scottish Government will also need to demonstrate to the public that we have the ability to produce a far greater amount of renewable, or low-carbon, electricity to meet these increased demands.

In 2021 renewable energy accounted for 37.8% of electricity demand,¹¹⁶ with 27.5 TWh of renewable electricity generated. Although this is an increase from 13.9 TWh generated in 2011, it is a fall of 14.3% compared to 2020, with the decrease reportedly due to the milder weather.¹¹⁷

Capacity and output – what do the units mean

Capacity is a measure of the power. For example a 1MW (megawatt) turbine would produce 1MWhr of energy in one hour (if it was generating at 100% efficiency).

The standard scientific unit of energy is a Joule. The unit of power is a Watt which is a Joule per second. A MW is a million Watts (10^6 watts). Therefore a MWhr, is power (MW) multiplied by time (hr) which is energy-per-time unit multiplied by time which gives you energy. So a MWhr is an energy unit.

At the start of 2021 Scotland had 11.9GW of renewable electricity generation capacity. (It is currently 13.3GW). Multiply this by hours in a year, 8,760, would give total energy generated in a year at about 104,244GWhr if the turbines generated at 100% capacity 100% of the time. In fact they only generated 27,530GWh which is an efficiency of roughly 26%, which will be impacted by variable windspeed, technical downtime etc.

Making some very big assumptions, the complete electrification of heat and transport could require additional installed capacity of 100GW (compared with 13.3GW¹¹⁸ already installed). The recent Scotwind award of licences for 25GW of offshore wind generation¹¹⁹ shows the scale of the challenge to generate enough electricity from low-carbon and renewable sources. It would also require huge investments in improving uptime on generation, balancing the grid, improved infrastructure as well as the softer issues every household will need to handle such as how will a heat pump work compared to an existing gas boiler.

The public will rightly have a number of concerns and questions about the path ahead, and the Scottish Government will need to offer reassurance and answer these questions while demonstrating that it is making the necessary investment to ensure we can meet our future energy demands.

¹¹⁶ <https://scotland.shinyapps.io/Energy/?Section=SystemSecurity&Chart=ScotGenDemand>

¹¹⁷ <https://scotland.shinyapps.io/Energy/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecGen>

¹¹⁸ <https://scotland.shinyapps.io/Energy/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecCapacity>

¹¹⁹ <https://www.nsenegybusiness.com/news/crown-estate-scotland-scotwind-auction-results/>

Summary of Policy Recommendations

Public awareness and education campaign

In 2021 the Local Government Committee highlighted concerns about the need for greater public awareness around the transition to Net Zero. It wrote to the Scottish Government stating:

*The public need to know what will be expected of them, how much it will cost to make changes to their houses and how it will be paid for. The timescales for making these changes are already very tight and people need to have clarity and certainty as soon as possible.*¹²⁰

There has also been a legislative requirement to publish a public engagement *strategy* covering climate change overall since 2009.¹²¹

However, despite the commitment for a campaign from the Scottish Government, there remains no sign of action.

Whether it is the target to reduce emissions in homes, or from car use, there will need to be significant changes to the way many of us lead our lives. Behavioural change can take time, particularly when it may mean individuals face upfront costs to retrofit their homes.

The polling that the Scottish Government published as a result of a Freedom of Information request highlighted how individuals underestimated their own contribution to emissions. People need to be better informed. They need to understand how far we still need to go to reach Net Zero. They need to understand the changes they will need to make to their day to day lives. They need to understand that regulations will be coming which will mean that they will have to make changes to how they heat their homes. They need to know how and where to get information and advice. And they need to know that while they are making the necessary changes the Scottish government is doing what it needs to, to ensure we have the necessary skills and technology to implement change.

While we welcome the Scottish Government's commitment to implement a public engagement campaign, nearly a year has passed since this was mentioned in the Heat and Buildings strategy and there is still no campaign. The local government committee used the words "as soon as possible" in its letter of late 2021. They were right. We have little time left. In eight years 50% of homes are supposed to have converted to a low carbon heating system. If we want the public to change, we can't keep delaying telling them.

Clear and concise timeline of targets to net zero with tracking

Our report has listed 45 additional government targets which are to contribute towards NetZero. These have been collected from a variety of different strategies and reports.

¹²⁰ <https://www.parliament.scot/chamber-and-committees/committees/current-and-previous-committees/session-6-local-government-housing-and-planning/correspondence/2021/retrofitting-housing-for-net-zero>

¹²¹ <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/09/net-zero-nation-public-engagement-strategy-climate-change/documents/equality-impact-assessment/equality-impact-assessment/govscot%3Adocument/equality-impact-assessment.pdf>

There is no public timeline indicating all of the government's targets nor the progress we are making towards them. Without transparent and accountable tracking of these goals, there is a danger they become worthless and simply policy by target setting.

The Scottish Government needs to publish a clear and comprehensive timeline of all its targets, along with regular tracking updates.

Clear timeline of regulation for phasing out gas in homes

For people making decisions now about heating their home, when to replace their boiler and what choices they should make, they should be able to have a clear idea from the government about how impending regulations will impact them.

The evidence shows that there is a clear need for building to change the way we heat our homes in order for us to meet Net Zero and it is clear that we will need more buildings to move toward Zero Direct Emissions heating systems. However, that message isn't being conveyed to the public and the key messages about what they will have to do to their homes to make them compliant are not being relayed. That has to change.

Without early warning of impending regulations and trigger points there is a danger that the chaos around the regulations on interlinked smoke-detectors could be repeated.

Such transparency will also need to sit alongside assurances from the government that there will be the necessary skills and technology available to implement these changes. That particularly means people who can install and repair zero direct emissions heat systems.

Immediate ban for gas boilers in new buildings

The Scottish Government has indicated that it will ban gas boilers for new buildings from 2024, but why are we waiting until then? In order to meet the target of reducing emissions from heat in buildings by 68% by 2030, we cannot afford to wait longer. There are undoubtedly problems to overcome with regards to retrofitting existing buildings, but given we know *now* that we need buildings not to be reliant on gas, there is no justification for allowing new buildings to install such systems – systems which would undoubtedly need to be changed before the end of their life in order to achieve NetZero.

Ban on new gas cookers

The use of gas for cooking is small compared to heating, but it is still a source of emissions that needs to be addressed. It is also a very visible signal of change to the public.

Unlike heating, it is relatively easy to change cookers from gas to electricity. Advances in technology also mean that induction hobs are particularly energy efficient, though

there are also ceramic hobs. Solid plates are the older, slower to heat up, style of electric hob. Microwaves, air fryers and slow cookers are also other electricity-based cookers. Although the sale of such items is reserved to Westminster, the Scottish Government could use devolved powers under housing and planning to restrict the products used in homes – just as it intends to do with the changes to the rules about new gas boilers which are currently due to come into force a year before England.

In other words, there are a number of alternatives to gas in the kitchen. Changing from gas to electricity when replacing a cooker doesn't necessarily involve the level of retrofitting required when making a similar switch for heat, but it sends the clear message that these are the sort of decisions people will need to make to get their homes NetZero ready.

Pay-as-you-drive Road pricing

The way we currently charge drivers is bad for the environment, promotes congestion and is unfair on low-mileage motorists and those in more remote areas or with poor access to public transport. Both UK and Scottish governments are committed to phasing out the sale of new petrol and diesel cars and have NetZero targets which require reduction in road transport. It is also unjustifiable that during a cost-of-living crisis with increasing energy prices, owners of expensive electric cars can often charge their cars for free.

Singapore has been using an Electronic Road Pricing (ERP) scheme since 1998. The scheme can charge different prices for the use of different roads and at different times of the day. Cars have an in-vehicle unit with a smart card and when a card passes through one of 93 ERP gantries the system automatically deducts the fee. Prior to the scheme's introduction the government tested prototype systems and gathered feedback to help develop the final policy. Road taxes are reserved to Westminster, but there is an opportunity for the UK and Scottish Governments to work together to trial a pay-as-you-drive road pricing scheme in Scotland.

All of Scotland's roads would be covered by the scheme but the cost of using each road would depend on a number of factors, including the time of day and congestion levels. This means that many quieter roads, particularly in rural areas, would have no charge at all. The type of vehicle used could be taken into account too, with cleaner cars paying less, incentivising drivers towards lower-emitting vehicles, but, unlike currently, ensuring all cars contribute a fair amount for their road use. Local authorities could work with Transport Scotland to consider the charging levels appropriate for the circumstances in their areas.

