Economy, Energy and Fair Work Committee

Climate Change Plan

Introduction

1. The Climate Change Plan update (CCPu) was laid in the Scottish Parliament on 16 December 2020.

2. Four parliamentary committees have been scrutinising the effectiveness of the CCPu—
   - Environment, Climate Change and Land Reform Committee
   - Economy, Energy and Fair Work Committee
   - Local Government and Communities Committee
   - Rural Economy and Connectivity Committee

3. A joint call for views was issued on 16 December 2020, the deadline for responses being 12 January 2021.

4. The Economy, Energy and Fair Work Committee (the Committee) received 27 written responses, and we invited witnesses to give evidence at meetings on 19 January, 2 February and 16 February 2021.

5. Our scrutiny has focused on three topics/chapters in the CCPu of—
   - Electricity
   - Industry
   - Negative Emissions Technologies (NETs)

6. Other recent work undertaken by the Committee and relevant to the CCPu includes—
   - Our BiFab, the offshore wind sector and the Scottish supply chain report (22 January 2021)
   - Stage 1 Report on the Heat Networks (Scotland) Bill (17 November 2020)
   - The findings of our energy inquiry (8 July 2020)

Background

7. The Climate Change (Scotland) Act 2009 requires the Scottish Government to produce a plan setting out proposals and policies for meeting future greenhouse gas (GHG) emissions reduction targets. Known as the Climate Change Plan (CCP), it is published every five years and generally covers a 15-year timespan. The most recent CCP was published in 2018, and covers the period out to 2032.

8. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 amends the Climate Change (Scotland) Act 2009 and significantly increases Scotland's GHG emissions reduction target (against a 1990 baseline) to net-zero emissions by 2045, with interim targets for reductions of—

- 56% by 2020
- 75% by 2030
- 90% by 2040

9. Following the adoption of new targets, the Scottish Government undertook to revise the CCP within 6 months of the Act. This was postponed due to the Covid-19 pandemic, and Securing a Green Recovery on a Path to Net Zero: Climate Change Plan 2018–2032 - update (CCPu) was finally published on 16 December 2020.

10. Two SPICe Briefings provide information and analysis of the CCPu and associated issues—
    - Draft Climate Change Plan Update – Background Information and Key Issues
    - Draft Climate Change Plan Update – Key Sectors.

Electricity

Context

11. Scotland is consistently a net exporter of electricity to the rest of the UK – amounting to 28% of all generation in 2018. Figures for 2018 show that electricity accounted for 22% of overall energy consumption in Scotland. Within this, renewables accounted for 55% of electricity generation, nuclear for 28%, and gas for 15%.

12. As energy for transport and for heating decarbonise, the role of renewable electricity becomes increasingly important.

13. The Scottish Government has set a target to generate the equivalent of 100% of domestic electricity demand from renewable sources by 2020. This does not mean that Scotland will be fully dependent on renewables, but that they will be the backbone of a broader electricity mix. In 2019, the equivalent of 90.1% of gross electricity consumption[1] was from renewables, rising from 76.7% in 2018.

14. Another relevant target is to produce the equivalent of 50% of the energy for heat, transport and electricity use to come from renewables by 2030. In 2018 this was 21%, rising from 19% in 2017.

15. In terms of GHG emissions, of the 41.6 MtCO2e[2] emitted in 2018, electricity generation accounted for 2.2 MtCO2e or 5.2% of total emissions – the second lowest after the waste sector (4.1%). This represents an 85% reduction on 1990 levels, but a rise of 7% since 2017 due to an increased use of gas generation at Peterhead. The overall reduction on 1990 levels is due primarily to the closure of both Longannet and Cockenzie coal fired power stations, as well as a reduced reliance on gas.

[1] Gross electricity consumption refers to total electricity generation minus net exports
[2] Million tonnes of carbon dioxide equivalent

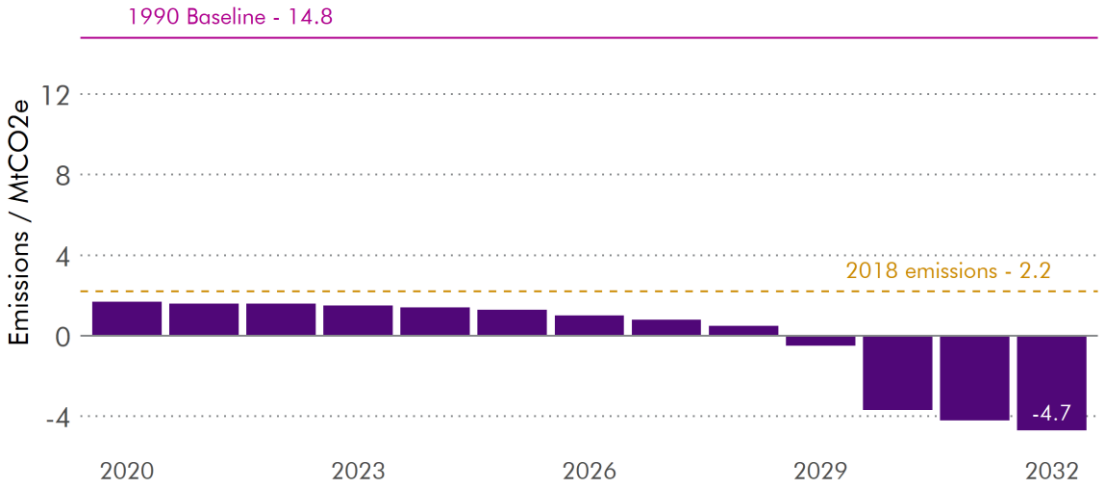
16. Renewable electricity generation capacity in Scotland has more than trebled in the last 10 years; as of June 2019 there being 11.6 GW of installed capacity across the country. Whilst not all projects will be commissioned, there is 13.0 GW of renewable electricity capacity either under construction (1.1GW), awaiting construction, or in planning (10.9GW).

17. Recent progress has led to 6 GW of offshore wind being procured (under the CfD[3] process) at record low prices – of which 740 MW is in Scottish waters. Onshore wind and solar are to be given the chance to bid in the next round of CfD.

18. In 2018, an estimated 697 MW of community and locally owned renewable energy capacity was operational. This is a 6% increase on 2017 figures.

19. The Scottish Government targets 1 GW of community and locally owned energy by 2020 and 2 GW by 2030. The 697 MW estimated above was 70% and 35%, respectively, towards these targets.

20. The draft CCPu anticipates that, via a range of policies and proposals across three key outcomes, and combined with NETs, the following emissions reduction pathway can be achieved—



21. A 376% reduction in emissions out to 2032 is expected (100% excluding NETs), in comparison to a 28% reduction in 2018's CCP.

Evidence

22. We took evidence from a range of electricity sector stakeholders on 19 January.

[3] Contracts for Difference - The UK Government's main mechanism for supporting low-carbon electricity generation which guarantees a fixed price for generation via competitive auction

23. The draft CCPu states that the development of 8–11 GW of offshore wind by 2030 will be supported and that—

"*Renewable generation will increase substantially between now and 2032, and we expect to see the development of between 11 and 16 GW of capacity during this period, helping to decarbonise our transport and heating energy demand."*

24. Witnesses considered the draft CCPu to be credible and adequately ambitious in relation to the electricity sector. Chris Stark from the Climate Change Committee (CCC) thought that the "*growth that is being projected over the next 10 years is achievable, although it is certainly at the upper end of what I think will come through*"[4]; however, key obstacles were highlighted by SSE—

- Planning – on average it takes 11 years for an offshore windfarm to be consented, built and start generating
- Grid connection – need to co-ordinate offshore grids to ensure that they are not just point to point
- Grid charging – Ofgem uses a complicated methodology which is "*heavily skewed towards southern projects and away from Scottish projects, for which the cost in energy terms has a premium of about £3 per megawatt hour*".[5]

25. Capacity was an issue for Scottish Renewables, both at local authority and Scottish Government levels—

"*We have spoken about how renewable energy projects can contribute to a green economic recovery, but that cannot happen if they are stuck on somebody's desk*."[6]

26. It was further suggested that the planning system was not currently able to keep up with the accelerated pace of technological change and "*not just in relation to wind turbines*" but with heat and transport too.[7]

27. The CCC, on the subject of planning, said—

"*I would like to see preparation now for rapid consenting of some of those projects, particularly the ones that we can eyeball…It is easy for me to say that the energy system might need X, but much harder to construct the process for gathering the community's views about the development."*[8]

[4] EEFW Committee, 19 January 2021, Col 28.
[5] EEFW Committee, 19 January 2021, Col 3.
[6] EEFW Committee, 19 January 2021, Cols 17-18.
[7] EEFW Committee, 19 January 2021, Col 18.
[8] EEFW Committee, 19 January 2021, Col 43.

28. Tarmac, in a written submission to the Committee, also saw a barrier in the form of the planning process, both for installation of new technologies and in planning transport and storage infrastructure. The company recommended "*streamlining planning processes*".[9]

29. On grid charging, Scottish Renewables described the system as "*unbelievably complicated*" and urged reform—

"*We are looking to the Scottish Government and the Scottish Parliament to keep up the pressure and say that something needs to change. A solution needs to be found to protect consumers and get the generation that we need*."[10]

30. SSE said—

"*A person's postcode should not determine the particular costs that they pay*."[11]

31. The company sought a "*regulatory regime that allows a lot of consultation of local authorities and of people who know what is happening on the ground*". The company highlighted the importance of the next price-control process for the distribution networks—

"*We need the electricity networks to be in great shape to enable more EV charging and more electrification of heat, which we have been talking about."*[12]

32. Ofgem said charging reform was a key part of its programme and suggested its approach to consultation and engagement made for a "*robust process*"—

"…*the key point is that the two sides are equal and opposite, so it is a zero-sum game—that is, one side pays more, and the other pays less; that is the balance between generators and consumers*."[13]

33. Steve McMahon told us the approach was based on "f*airness and the efficiency of the system overall*"[14] and that it was working with government, industry and others to that end—

"*Increasing the capacity that is required to deliver net zero while meeting our statutory objective of keeping the cost to consumers as low as possible is an on-going process*."[15]

[9] Written submission, Tarmac.
[10] EEFW Committee, 19 January 2021, Col 8.
[11] EEFW Committee, 19 January 2021, Col 8.
[12] EEFW Committee, 19 January 2021, Col 5.
[13] EEFW Committee, 19 January 2021, Col 32.
[14] EEFW Committee, 19 January 2021, Col 32.
[15] EEFW Committee, 19 January 2021, Col 28.

34. The regulator provided supplementary evidence on its Targeted Charging Review (a process which concluded in November 2019), stating—

"*Ofgem will continue to listen carefully to industry's and other stakeholders' views as part of our work on network charging reform. We are also working with BEIS to develop a joint Smart Systems and Flexibility Plan later this year*."

35. The CCC considered the gaps in how delivery of a significant increase in renewable capacity would be achieved were a "*shared issue for the Scottish ministers and ministers in Whitehall*".[16] The new UK Government Energy White Paper (White Paper) included a "*blueprint for a different set of market mechanism*". However—

"The ambition in the climate change plan update is great, but some projects will need to be developed at breakneck speed."[17]

36. National Grid ESO considered achieving 11GW by 2030 *"ambitious*". However, recent price controls had "*given a bit of certainty*" to transmission owners about the availability of investment and "*mechanisms to access the funding*" to enable the future grid to reach the target.[18]

37. Energy UK pointed out that smart use of technologies and storage at various levels of the energy network can also help to increase the amount of renewables actively used at any one time.[19]

38. A net-zero delivery plan to monitor progress, and be updated each year, was proposed by SSE—

"The policy framework is pretty good—we now have to align planning, the grid and charging so that all the elements point in the same direction. At present, that is not quite happening."[20]

39. In relation to achieving net-zero and a just transition, witnesses agreed that there would be costs involved, and that these should be spread fairly across society. Scottish Renewables said—

"*Ofgem was not set up to operate in a net zero world; its remit is clear and is to minimise costs for consumers. We all support that, but now we need to minimise costs for consumers in a net zero context, which is quite different."*[21]

[16] EEFW Committee, 19 January 2021, Col 28.
[17] EEFW Committee, 19 January 2021, Col 35.
[18] EEFW Committee, 19 January 2021, Col 28.
[19] EEFW Committee, 19 January 2021, Col 4.
[20] EEFW Committee, 19 January 2021, Col 6.
[21] EEFW Committee, 19 January 2021, Col 8.

40. SSE said tackling climate change came with a bill and that bill should be "*spread fairly across society*".[22] In terms of public engagement, Energy UK thought the Scottish Government was "*actually doing very well*". However—

"*There is a need to consistently get consumers on side and to get them to understand the purpose and the societal and economic benefits of decarbonisation*."[23]

41. Regarding new renewable capacity, SSE felt that not enough attention was being paid to pumped storage hydro; Sam Peacock highlighting the "*huge potential"* and need for a similar support framework to interconnectors—

"*It does not need a whole bunch of subsidies; it just needs a way of making sure that its revenues are stable, which is basic regulatory practice*."[24]

42. A "*huge potential"* for hydrogen was also noted by witnesses, with Scottish Renewables highlighting the recent publication of the Scottish Hydrogen Assessment—

"*Hydrogen is not an energy in and of itself; it is an energy vector. It is a way of storing and moving energy quite effectively*."[25]

43. Whilst the White Paper contains a plan for supporting hydrogen generation and for carbon capture and storage (CCS), the CCC noted a "*set of industrial challenges"* and that major infrastructure would also be needed:

"*Scotland needs to be thinking now about where that infrastructure will be, how it will be paid for and whether the model that is being worked on in Whitehall will work for the Scottish projects."*[26]

44. The importance of local energy systems was underlined by Scottish Renewables, describing a "*honeycomb of interlinked cells*" that enabled the generation and use of energy to be both "*much more localised*" and also connected to the wider system. Morag Watson referred to the "*ground-breaking project*" in Orkney, visited by members of this Committee in February 2020 as part of our energy inquiry, with generation, use and storage in one integrated system.[27]

45. Asked about energy security in the context of Brexit, Energy UK saw a case for "*further interconnectors alongside other technologies that increase system flexibility*" and offered reassurances about the current picture—

[22] EEFW Committee, 19 January 2021, Col 7.
[23] EEFW Committee, 19 January 2021, Col 21.
[24] EEFW Committee, 19 January 2021, Col 10.
[25] EEFW Committee, 19 January 2021, Col 11.
[26] EEFW Committee, 19 January 2021, Col 37.
[27] EEFW Committee, 19 January 2021, Col 11.

"*However, there absolutely is a case for investing in those technologies now so that, in five or 10 years' time, we can still give you that guarantee of security of supply."*[28]

46. National Grid ESO said "*we keep things constantly under review*" and work on 2025-2030 was underway—

"*That work will be completed towards the end of March this year, and it will give us a clear blueprint about security of supply in 2030*."[29]

47. The system operator noted a "*massive decrease in demand*" since 2008, peak demand this winter have been 44GW, while the capability of the transmission system was 60GW across the UK.[30] The ambition was to be able to operate the Grid at zero carbon by 2025 and Julian Leslie said "*great progress*" was being made with service providers and identifying the technologies that will enable that.[31]

48. On jobs and the supply chain, SSE highlighted the Seagreen project in the Firth of Forth and its Viking wind farm in Shetland, initiatives from which 1,000 jobs would be created this year—

"*Probably 50 per cent of the content of the Seagreen offshore wind farm will come from the UK. We all want to get the final 50 per cent, but to do that we need strategic investment in things such as factories to make the blades and the towers."*[32]

49. More widely, however, there was uncertainty over the number of jobs that may be created, and whether these would be new jobs or reallocated from existing industries. Energy UK said that while it was difficult to calculate with any certainty, there was "*high potential*" in the supply chain for low-carbon heat, with one estimate suggesting—

"…*that the utilities sector as a whole will be looking for something like 270,000 jobs in the next 10 years. A fair proportion of those will be in Scotland, and the way in which those can be taken is based completely on what Scotland's approach will be*."[33]

50. Scottish Renewables referenced a UK study of 18 to 34-year-olds about the desire for jobs in energy-related industries; with 45% seeing the sustainable sectors as the most secure career choice, as compared with 6% who felt the same about working in the fossil fuel industry.[34] Morag Watson spoke about her members working across 72 countries and—

[28] EEFW Committee, 19 January 2021, Col 12.
[29] EEFW Committee, 19 January 2021, Col 29.
[30] EEFW Committee, 19 January 2021, Col 43.
[31] EEFW Committee, 19 January 2021, Col 35.
[32] EEFW Committee, 19 January 2021, Col 13.
[33] EEFW Committee, 19 January 2021, Col 14.
[34] EEFW Committee, 19 January 2021, Col 15.

"*There is a standing joke that, if you go to any foreign project in China, you will always hear a Scottish accent somewhere on the site*."[35]

51. The CCC considered predictions of job numbers to be a "*fool's errand*". Chris Stark elaborated that projected growth in employment was *"entirely feasible*" but that a "*kind of Panglossian approach*" was being taken when—

"…all the evidence from standard economics tells us that the best way to retrain someone and move them from one industry to another industry is to do that while they are still employed, and to begin the planning now". [36]

52. UNISON, in a written submission, urged more than "*warm rhetoric*" on delivering for workers and communities[37], endorsing a comment from the Just Transition Partnership—

"Despite the frequent references to and the welcome aspiration for a just transition in the document, the updated Climate Change Plan does not set out how Ministers intend to support the workforce, employers and communities as part of the shift to a low carbon economy."[38]

53. Friends of the Earth Scotland suggested growing criticism of progress to a just transition, noting "*well-documented job losses at sites of key green industries including Alexander Dennis and BiFab*" plus another *"brutal*" downturn in the oil and gas sector leading to job losses—

"*The experience to date demonstrates that promises of green jobs and positive outcomes are easily broken without the concrete policy action to deliver*."[39]

54. SSE also highlighted the importance of skills and retraining, suggesting "*the most useful thing from a political perspective"* was to address retraining and skills "*in partnership with industry*" and—

"…given the scale of the 11GW, which we talked about earlier, we will run out of people pretty quickly. Having the ability to train people so that we do not end up having to go abroad for skills would be fantastic."[40]

55. According to SCDI—

"*One thing that we have recommended – again, within the broader green skills agenda – is that all universities, colleges, schools and employers that provide training should refocus on carbon literacy*."

[35] EEFW Committee, 19 January 2021, Col 22.
[36] EEFW Committee, 19 January 2021, Col 38.
[37] Written submission, UNISON.
[38] Written submission, Just Transition Partnership.
[39] Written submission, Friends of the Earth Scotland.
[40] EEFW Committee, 19 January 2021, Col 16.

Scottish Government

56. On the question of a detailed assessment of renewable capacity and setting a clear pathway towards 2045, the Minister for Energy, Connectivity and the Islands (the Minister) saw the need to at least double the current installed capacity. More detailed analysis would be forthcoming from the refresh of the energy strategy later post-election. The difficulty in being precise was that—

"*Much will depend on the choices that we make about the decarbonisation of heat, transport and industry and on the degree to which there is technological innovation*."[41]

57. The Minister said the consenting process had a *"key role*" to play in delivering new capacity "*both onshore and offshore*". He described "*steady progress*" in speeding up the consideration of consenting decisions, the average time having been reduced in recent times from 50 weeks to 26 or 29 weeks. However, the process had to be rigorous and "*ensure the right of communities to be engaged*".[42]

58. He stated the "*aspiration*" for half of all planning decisions to be based on a "*shared revenue model or community or local ownership*"; citing the examples of Stòras Uibhist (a project in South Uist to invest in business and harbour facilities, an access road, and social housing) and Berwickshire Housing Association (which has invested in three turbines and generated cash from the feed-in tariff contract for "*up to 500 affordable homes*").[43]

59. Despite the delay in NPF4, the position statement had set out "*key principles*" and was "*explicit about the shift needed to achieve net zero*", the choices that were required, and the support for renewable developments, including existing sites, the extension of existing developments, grid capacity, and CCS.[44]

60. Regarding offshore grid connections being co-ordinated and are not just point to point, the Minister pointed to positive engagement with "*other marine users*" such as the Scottish Fisherman's Federation. However, the current approach required reform and there had been "*some positive discussions*" with the Secretary of State for Business, Energy and Industrial Strategy. There was a need to ensure connections were timely or face the risk of delayed projects due to "*lack of access to grids in the early 2030s*".[45]

61. The fairness of the charging regime in the context of investment decision making was a matter "*regularly discussed*" by the Scottish Offshore Wind Energy Council, the Energy Networks Strategic Leadership Group, and the Scottish Energy Advisory Board. The Minister said SSE and Scottish

[41] EEFW Committee, 16 February 2021, Col 4.
[42] EEFW Committee, 16 February 2021, Cols 4-5.
[43] EEFW Committee, 16 February 2021, Col 6.
[44] EEFW Committee, 16 February 2021, Col 7.
[45] EEFW Committee, 16 February 2021, Col 8.

Renewables had published analysis showing transmission charges in the north of Scotland were "*higher than the rest of GB*" and remained "*volatile and unpredictable*". He told us—

"*…we have in Scotland some of the most efficient wind energy sites anywhere in the world. For many years, we have been pressing for the transmission charging regime to reflect that*."[46]

62. Furthermore—

"*We appear to have a charging system that acts against the renewables development that the [Scottish] Government wants to see much more of. That is also true for the UK Government…"*[47]

63. Asked what changes in governance he would like to see in order to help deliver net zero, Mr Wheelhouse confirmed the Scottish Government had asked UK ministers to amend Ofgem's remit—

"*They are doing what they are set up to do in statutory terms, but we want the statutory terms to change to reflect formally the need to tackle the climate emergency*."[48]

64. He suggested some aspects of the current regime were informed by the "*slightly risk-averse approach that Ofgem has to take in protecting consumers against short-term increases in cost";* the counter argument to which was the danger of "*potentially*" locking in customers to higher costs in the future if investment was delayed. He was pleased the "*UK Government appears to be listening to that kind of logic"* and that the UK Energy White Paper recognised the need to "*shift away*" from a model more reflective of the situation 30 years ago than the targets in place for 2045 and 2050.[49]

65. The refresh of the energy strategy later in the year would "*take on board the climate change plan update and the new pathways such as industrial decarbonisation*" and other policy developments, with hydrogen for example.

"*We will then develop a clear route map for the energy sector's transition to net zero. If changes are needed to the annual energy statement to provide a monitoring tool for that we will make them to reflect the shape of the energy strategy as it then sits*."[50]

66. Jobs-wise, the Minister said the Centre for Energy Policy at the University of Strathclyde estimated between 7,000 and 45,000 UK jobs could come from securing 40% of the carbon storage element of a European CO2 market by

[46] EEFW Committee, 16 February 2021, Col 9.
[47] EEFW Committee, 16 February 2021, Col 10.
[48] EEFW Committee, 16 February 2021, Col 11.
[49] EEFW Committee, 16 February 2021, Col 11.
[50] EEFW Committee, 16 February 2021, Col 12.

2030. He considered that was "*achievable*" and "*could rise to between 22,000 and 105,000 jobs*" by 2050—

"*I know that there is a lot of scepticism about job numbers. However…They show the potential prize that exists*."[51]

67. He broke down "*green jobs"* into three categories: new and emerging jobs relating directly to the transition to net zero, existing jobs needed in greater numbers due to the transition, and jobs for people with other skill sets, such as plumbers and electricians.[52]

Conclusions

68. **Scotland has succeeded in almost halving its greenhouse gas emissions over the last 30 years. What is now required is doing it again in the next 11 years. The word challenge hardly seems sufficient. However, with the targets come opportunities; nowhere more so than in the sectors of Electricity, Industry and Negative Emissions Technologies. We also have a number of comparative advantages in terms of workforce (oil and gas, renewables), natural assets (wind, hydroelectric, wave, tidal) and policy momentum (COP26 taking place in Glasgow later this year). The Minister told us the Climate Change Plan Update set out our ambition whilst recognising the challenges and the need for constant review. The Climate Change Committee described the Scottish Government's ambition as great, certainly in line with what was needed to get to net zero, but still with some significant gaps in how it should be delivered in practice. The CCC viewed this as a shared issue between Scottish and UK Governments.**

69. **When the Committee undertook our energy inquiry in 2020, we began with consideration of the Royal Society of Edinburgh's Scotland's Future Energy Report, the authors of which suggested those developing policy must ask how best to consider the competing issues of the "energy quadrilemma": addressing climate change; ensuring affordability; providing energy security; and developing energy policy which is acceptable to the public, economically sustainable and just. We have sought to view all our work on energy through that lens, a recurring theme being that of public acceptability, engagement and behaviours, and the most germane recommendations – and on which we would recommend the Scottish Government give further reflection – from that recent inquiry being—**

    - ***The Scottish Government to put in place a long-term strategic framework; one covering all aspects of energy, taking a continuous and whole systems approach, and which could include the establishment of an independent expert advisory commission as recommended by RSE.***

[51] EEFW Committee, 16 February 2021, Col 19.
[52] EEFW Committee, 16 February 2021, Col 20.

- ***The Scottish Government – in the context of RSE calling for a clearly articulated position on security of supply – to set out its position on generating capacity, storage and interconnection; addressing the portfolio we have, the one we need, and how we plan to bridge any gap.***
- ***Ofgem to provide an update on their considerations of regulatory reforms that could better support the development of community energy plans and other local energy initiatives.***
- ***The Scottish Government to keep us informed of the actions it plans to pursue from the Climate Change Committee's advice to lead a shift towards positive long-term behaviours – an opportunity to embed new social norms, especially for travel.***
- ***The Scottish and UK Governments to give public engagement greater prominence and priority in other strands of their energy transition and climate change work and set out how they will do so.***

70. **It is a matter of necessity, not to say the utmost urgency, that planning, connection and charging are aligned. Otherwise, we hamper the chances of renewable energy projects contributing to an economic green recovery. That is the key take-away from the evidence we heard during our scrutiny of the Climate Change Plan Update. Three Members of the Committee visited Orkney in February 2020, as part of the energy inquiry, and saw for themselves the ongoing development and deployment of generation, use and storage within one integrated system in the ReFLEX project. We ask the Scottish Government to set out the lessons it has learnt from such an integrated approach, and how it intends to ensure a Scotland-wide alignment of planning, connection and charging.**

71. **On the matter of planning, we note the analysis of SSE and Scottish Renewables showing that charging in the north of Scotland can be volatile and unpredictable. A system that charges more to those who generate energy in a part of the country that produces the most renewable energy – and at a time when both Scottish and UK Governments are seeking an acceleration in the amount of electricity produced from renewable sources – is in need of fundamental reform. This, as we heard from the evidence, is a model more reflective of our energy needs three decades ago than the action now needed if we are to have any chance of hitting Scotland's and the UK's 2045 and 2050 targets. The Committee therefore supports the Scottish Government in its ongoing efforts to address that anomaly. We support too the case for Ofgem to have its statutory remit amended by UK Government ministers in order that the regulator may better contribute to the overriding priority of the climate change emergency.**

72. **The Minister said the consenting process was key to delivering new capacity onshore and offshore. He described steady progress in speeding up consenting decisions while emphasising that the process should retain its rigor and engage with communities. However,**

Scottish Renewables, among others, expressed concerns about the ability of the system to keep up, both at local authority and Scottish Government levels. Decisions, they said, should not end up stuck on somebody's desk. The Committee invites the Scottish Government to set out in more detail how it will ensure sufficient capacity in the planning system.

73. **The aim is that half of planning decisions will be based on either a shared revenue model or community/local ownership. Despite the delay in NPF4, the Scottish Government's position statement sets out that the targets for addressing climate change require a fresh approach, significant investment in infrastructure, and a new understanding of how a zero-carbon Scotland might work. The Committee will include in our legacy report a recommendation that our successor maintains a watching brief on the planning and infrastructure aspects of climate change in the coming parliamentary session.**

74. **It is also the Scottish Government's intention to produce a refresh of its Energy Strategy later this year, one that will incorporate the Climate Change Plan Update and include new pathways such as industrial decarbonisation along with other policy or technological developments. The Minister told us that this refreshed Energy Strategy would encompass the development of a clear route map for the transition of the energy sector to net zero. He also stated that if changes are needed to the Annual Energy Statement to provide a monitoring tool, as was suggested to the Committee during our evidence taking, then these can be made to reflect the shape of the Statement.**

75. **The Committee recommends that the Scottish Government incorporates a monitoring tool within the Annual Energy Statement. Ideally the Statement should be a stand-alone document and one that shows the progress made in a meaningful, prominent and accessible way for policy makers, parliamentarians and the public.**

76. **Visit any energy project in China, we were told, and somewhere on the site you will invariably find a Scottish accent. We have a comparative advantage over other countries based on our workforce and expertise from the oil and gas as well as the renewables sector. However, the Climate Change Committee described the guestimates of the likely number of green jobs as a fool's errand. Chris Stark told us all the evidence showed that the best way to retrain someone and move them from one industry to another industry is to do so while they are still employed and to begin that planning now.**

77. **The Minister said he understood there was a lot of scepticism about job numbers. He was keen nonetheless to flag the potential. He broke green jobs down to three categories: the new and emerging, existing jobs needed in greater number, and those for people with other useful**

if not directly related skill sets. UNISON, the Just Transition Partnership and Friends of the Earth expressed concerns. UNISON wanted to see detail rather than words when it came to creating jobs. The JTP felt the Climate Change Plan failed to say how the workforce would be supported. Friends of the Earth cited recent job losses in green industries such as Alexander Dennis and Bifab, and wished to see concrete policy action.

78. **SSE stressed the importance of skills and retraining, preferably to be approached in partnership with industry, and – given the 11GW target – predicted it would not be long before they faced a shortage of workers. They wished to avoid having to look abroad for those with the necessary skills. Carbon literacy was something underscored by SCDI, suggesting all universities, colleges, schools and employers should put it at the heart of their training.**

79. **We would suggest that the matter of skills and training seems to have fallen between different committees' remits during this parliamentary session. The Committee believes it to be a crucial policy area and one that merits the fullest consideration by our and other committees' successors post-election. We also reiterate a recommendation from our recent BiFab, the offshore wind sector and Scottish supply chain report (published in January 2021)—**

    - ***The Committee notes that in December 2020 the Scottish Government published a Climate Emergency Skills Action Plan to accompany the updated Climate Change Plan. The Committee believes that ensuring that the Scottish workforce has the right skills to enable local economic benefit in the expansion of the renewables sector in Scotland is key. The Skills Action Plan must be translated into well-resourced delivery. The Committee asks to be kept updated on the development of an accompanying Implementation Plan and recommends that delivery of the Skills Action Plan is considered by its successor Committee.***

Industry

Context

80. Industry in the CCP is defined as manufacturing, construction, refining of petroleum products and a range of activities linked to energy supply. (Oil and gas activity taking place offshore is not included). Industry is responsible for almost 30% of Scotland's total GHG emissions, second only to transport.

81. Emissions from the industry sector have fallen by 45% since 1990 (the baseline year). Much of this reduction can be explained by the total disappearance of some major polluting industries, such as steel, coal mining and paper production. However, it is also worth noting that between 2015

and 2018 (the most recent data available) industrial emissions actually increased by 6%.

Grangemouth

82. As highlighted by the CCC in 2019, the largest single geographical source of emissions in Scotland is the cluster of industry in and around Grangemouth, which accounted for over 30% of industrial emissions in Scotland 2017. We also know that natural gas combustion is the biggest source of industrial emissions, followed by the use of internal fuels (i.e. industry by-products generally burned on-site and with limited or no alternative use) within the oil and gas and petrochemical industries.

Draft CCP update and the industry 'envelope'

83. The draft CCP update aims for a 43% reduction in industrial emissions between 2018 and 2032 (52% if NETs are included). This is considerably more ambitious than the 21% reduction set out in the 2018 Climate Change Plan.

84. The Scottish Government outlines four main ways in which industrial processes can be decarbonised—
    - Electrification
    - Switching to hydrogen
    - CCUS (Carbon Capture, Use and Storage)
    - Energy efficiency.

85. Of course, the decarbonisation of some industrial processes will be more difficult than others, especially when they require intense heat or when a particular hydrocarbon feedstock is used in a chemical process

'Deep decarbonisation pathways for Scottish industries' - report by Element Energy

86. Much of the Scottish Government's optimism appears to be based on – or at least affirmed by – the findings of research they commissioned from Element Energy showing that emissions from Scotland's large industrial sites "*could feasibly reduce by 80% or more by 2045, while maintaining output*".

87. For the industries in scope researchers found they may expect to incur additional costs related to decarbonisation of up to £1 billion per year and of just over £11 billion cumulatively, by 2045 (when including capital, operational, and energy-related expenses but excluding the reduction in carbon costs). Furthermore, substantial infrastructure will need to be developed before fuel switching and CCUS can be deployed on a large scale.

88. The Element Energy research – with inputs from INEOS, the Scotch Whisky Association and other big industrial players – finds that a combination of

electrification and hydrogen fuel-switching would be the quickest and most cost-effective pathway to decarbonisation. Energy efficiency advances alone are unlikely to lead to big reductions (although food and drink is identified as a sector where improved efficiency could have a major impact).

89. CCUS is expected to be the main decarbonisation technology for the oil and gas, chemicals, and cement sectors, delivering about 60% of the emissions abatement within these sectors. Fuel-switching and energy efficiency measures are likely to be most impactful for the food and drink sector.

90. Researchers found that their emission trajectories are underpinned by the assumption that four essential conditions are met—
    - Significant economic incentives must be put in place via suitable policies. Without these, no significant investment in deep decarbonisation can be expected;
    - All decarbonisation options must be adopted promptly when they become sufficiently mature from a technical and commercial point of view. This is a process which may also be brought forward with appropriate policy interventions;
    - Enabling energy assets and relevant infrastructure must be deployed in advance, otherwise individual decarbonisation efforts may be delayed;
    - Site managers and investors need to have sufficient confidence in, and understanding of, the relevant technologies and the timescales for their commercialisation;
    - Above all, the decarbonisation of energy intensive industries hinges on the implementation of CCUS and fuel switching at the largest emission sources.

What policy support is required for 'deep decarbonisation'?

91. Industry representatives told the report authors that policy support will be critical "*for establishing a business case for investment in deep decarbonisation",* while at the same time addressing the risk of "*carbon leakage*" i.e. without policy intervention there is a risk that a strongly increasing carbon price could affect industry competitiveness and induce certain industrial sites to shut down or relocate abroad to regions with a lower carbon price.

92. Some policy suggestions to make a stronger business case include—
    - Direct financial support, for instance by subsidising the cost of low-carbon energy through a CfD-type mechanism;
    - Ensuring a level playing field with international competition to avoid "carbon leakage" e.g. ensuring an international agreement concerning the price of carbon, so there would be no incentive to relocate;

- Alternatively, the UK Government could establish a Border Carbon Adjustment Mechanism (BCAM), adjusting the import and export prices of products exposed to different carbon pricing regimes;
- Public authorities could stimulate demand for low-carbon products via demand-side measures like green procurement;
- Another potential barrier to the fast adoption of new technologies is if operators are not looking to replace their fossil fuelled appliances until after 2045, especially if they have recently invested in this equipment. The authors warn that the number of industrial sites finding themselves 'locked-in' with fossil-fuelled technologies until after 2045 could be significant.

93. Policy support is therefore required to help ensure prompt development of the technologies required and deployment of the enabling infrastructure. The Scottish and UK governments should support this by—
    - Supporting the creation of pilot projects and demonstrators which would validate the technical and economic viability of each new technology;
    - Finance feasibility studies for the deep decarbonisation of all subsectors;
    - Ensure that the required infrastructure is developed well ahead of time;
    - More controversially, encouraging or even mandating the early decommissioning of fossil-fuelled appliances where retrofitting is not an option.

Skills, retraining and a just transition

94. The Element Energy report recognises the importance of skills and retraining for the "just transition" to a decarbonised economy. Perhaps mindful of the social and economic traumas arising from the demise of Scotland's coal and steel industries, the authors recommend financial support be made available to individuals and families if industries are to close. In addition, opportunities should be provided for people to retrain *"to ensure that everyone can find work in the new industries"*.

95. The Climate Emergency Skills Action Plan 2020-2025, published just before Christmas, highlighted the employment opportunities presented by a green recovery and stated that skills training was "*critical for successful decarbonisation and will help create new, high-quality green jobs, enhanced regional growth, and improved access to growing 'green markets' across the globe for Scotland's diverse businesses*".

96. The Plan included a number of new or updated policies aimed at developing the future workforce for the transition to net zero. These included—
    - Establishing a Green Jobs Workforce Academy in September 2021;

- The co-design and development of a Construction Retrofit national training programme;
- Supporting the development of leadership and management skills required for a net zero future;
- Access to these green jobs will be supported by recovery skills programmes including the National Transition Training Fund, Young Person's Guarantee, Fair Start Scotland and No One Left Behind;
- Aligning education and training opportunities in schools, colleges and universities to net-zero opportunities and maximising their uptake.

Evidence

97. Witnesses were supportive of the CCPu, with the Chemical Industries Association (CIA) stating "*there is a lot to like*", notably the description of energy-intensive assets as "*strategic*".[53]

98. SCDI told us the building industry, the Scotch whisky sector, salmon producers, and the oil and gas sector had all been proactive in their planning and—

"*There has undoubtedly been a shift in the commitment of businesses to net zero carbon goals*."[54]

99. However, there was broad agreement that achieving a 43% reduction in industrial emissions by 2032 would be exceptionally difficult. In relation to concrete, the Mineral Products Association (MPA) noted that fuel switching could cut emissions by around 30%, but a "*large chunk*" would have to be addressed by technologies like CCS and though "*such steps are possible"*—

"*…the emissions that are left are the challenging ones. Carbon capture is incredibly innovative, but it has not yet been deployed in the cement sector anywhere in the world*."[55]

100. Whilst there is ambition and some government support for building new infrastructure, the MPA suggested CCUS could "*double the cost of cement production"* and—

"*If there was a way of introducing support for those on-going costs, that would help to make Scotland an attractive place to invest in decarbonisation*."[56]

[53] EEFW Committee, 2 February 2021, Cols 4-5.
[54] EEFW Committee, 2 February 2021, Col 28.
[55] EEFW Committee, 2 February 2021, Col 2.
[56] EEFW Committee, 2 February 2021, Col 3.

101. The plan "*lacks a net zero target for consumption emissions"* according to the MPA, something that could address emissions from the products Scotland consumes as well as those we produce—

"It would ensure that we meet the targets through proper decarbonisation and not by exporting the problem to somewhere else."[57]

102. Element Energy made an international comparison and suggested the problem in the UK was the price of electricity versus that of gas—

"*In other countries, where there is not such a good gas network and less of a gas history, those technologies are being taken up and are more economically feasible*".[58]

103. The CIA also commented on the "*higher operational costs*" of decarbonising their sector—

"They would much rather put that money into another country where they could expand operations and make more money. That is just the economics of it."[59]

104. Furthermore—

"*If Scotland can come up with an investable business model, industry will go for it. The future is low carbon and, if you are a fast mover, there are advantages to be had. However, at the moment there are not, because there is no business case for investing*."[60]

105. On the subject of inward investment, SCDI pointed to the "*school of thought"* that better sustainability standards, a decarbonised grid, maximising the advantage of our natural capital resources, and investing in a green and carbon literate workforce would attract investors—

"*There is probably a balance to be struck in setting the right standards to help the industry to reach the level of sustainability that we want, and viewing that as an advantage in attracting investment."*[61]

106. In relation to recognising the carbon emissions relating to consumption, the CIA echoed the CCC's observation that "*the only way for industry finally to move to an economically viable decarbonisation model is by passing the cost of that decarbonisation on to the end consumer*". It also drew attention to the CCC's call for carbon border tariffs and minimum carbon standards—

[57] EEFW Committee, 2 February 2021, Col 3.
[58] EEFW Committee, 2 February 2021, Col 29.
[59] EEFW Committee, 2 February 2021, Col 7.
[60] EEFW Committee, 2 February 2021, Col 14.
[61] EEFW Committee, 2 February 2021, Col 37.

"…we appreciate this Government's call to the UK Government for action in that area and its promise to work on procurement, which will be another important driver of low-carbon markets in the UK."[62]

107. Asked about an increase in greenhouse gas emissions from sectors such as chemicals and petrochemical production between 1990 and 2018, based on analysis of Scottish Government GHG data, the CIA cited other figures showing—

"*…our sector has had an 82 per cent decrease in greenhouse gas emissions between 1990 and 2018*."[63] [64]

108. The proposed timescales for decarbonising the industrial sector were also questioned, with Professor Stuart Haszeldine suggesting "*it takes a while*" to build the facilities for the generation of hydrogen or renewable electricity, and we might not have made the progress necessary by 2032.[65]

109. He said the UK Government had not produced a "*commercial model that does not involve subsidising the first start-ups of the different projects*" and therefore companies like INEOS and Petroineos "*tend to hang back*" in case they are "*put on the spot and made scapegoats*". In the long term—

"*We need things such as carbon border adjustments so that we can ensure that the carbon that is embedded in our imports equates with the carbon that we take out of our manufacturing*."[66]

110. Further key points from Professor Haszeldine, who also provided supplementary written evidence, included—

- One way to decarbonise heating is to produce hydrogen, however *"building enough facilities to produce enough hydrogen by [2032] will be difficult*", and as yet cannot legally be distributed by the gas grid[67]
- More ambition is needed in *"air capture to balance the residual emissions from cement or chemicals plant"*[68]
- The case for a carbon take back obligation (something also supported by the Food and Drink Federation), being an "*entirely different way"* to spread the burden across sectors—

[62] EEFW Committee, 2 February 2021, Col 5.
[63] EEFW Committee, 2 February 2021, Col 6.
[64] Subsequent email from CIA to SPICe: "*Thanks for following up and for sharing your data. What I referenced on Tuesday was UK-level data for the sector, which is sourced from the National Atmospheric Emissions Inventory (NAEI). Unfortunately, we haven't been able to find this data broken down by country before*."
[65] EEFW Committee, 2 February 2021, Col 6.
[66] EEFW Committee, 2 February 2021, Col 9.
[67] EEFW Committee, 2 February 2021, Col 11.
[68] EEFW Committee, 2 February 2021, Col 11.

"*The transport and storage industry sell their CO2 disposal service – it brings in CO2 from industries that are partly or wholly capturing it from air, and charges for that via certificates. Industries all over Scotland buy a certificate to decarbonise, first by 1% p/a, then 5%, 20% and so on. This is supported by most European oil companies, and is being considered in the Netherlands*."[69]

111. On the subject of a carbon take-back mechanism, and other mechanisms for achieving net-zero, Element Energy said that was "*one option*" but with "*relatively limited*" applicability—

"*We need to ensure that the mechanism for decarbonisation is technology neutral so that we achieve the best outcome for each of the different industrial sectors and sites in Scotland*."[70]

112. Also—

"…it is important to decide whether the cost is borne through Government and taxation or consumer pricing. The just transition work on that should be focused on."[71]

113. In its written submission, the Law Society of Scotland encouraged a holistic consideration of "*technological and energy innovation*" so as to avoid moving carbon production around the economy "*or imposing additional costs on certain activities over another".*[72]

114. FDF Scotland said the sector was "*ready and willing to play their part*" but the challenge was—

"…although the food and drink manufacturing industry is Scotland's largest manufacturing sector, our businesses are predominantly small and medium-sized enterprises. Therefore, we are talking about lots of small-scale interventions."[73]

115. Cat Hay provided supplementary written evidence on the sector's progress against its sustainability ambitions and also an update on food waste statistics. She told us—

"*Scotland wants to have a reputation for producing high-quality products with an excellent provenance, and a huge part of that is proving our environmental credentials*."[74]

[69] EEFW Committee, 2 February 2021, Col 16.
[70] EEFW Committee, 2 February 2021, Col 33.
[71] EEFW Committee, 2 February 2021, Col 33.
[72] Written submission, Law Society of Scotland.
[73] EEFW Committee, 2 February 2021, Col 31.
[74] EEFW Committee, 2 February 2021, Cols 31-32.

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116. Asked what work had been carried out to quantify and mitigate emissions from products consumed domestically rather than just those produced here, the Minister said it was important to "*monitor our footprint, including internationally".* He said a research study was underway to "identify policy opportunities" for influencing "*domestic demand from consumers, businesses and the public sector*" for a range of products that "*can demonstrate lower carbon intensity".*[75]

117. In terms of incentivising investment to decarbonise Scotland's energy-intensive industries, he said—

"*A net zero report from the Climate Change Committee in 2019 emphasised the need for the Government to implement an approach that incentivises domestic industries to reduce their emissions in ways that do not adversely affect their competitiveness*."[76]

118. It was "*not an easy thing to do*" but—

"…*we have to put in place mechanisms that, as well as supporting consumers, support businesses to take on the task of investing in retooling for lower carbon production methods*."[77]

119. The Minister said behavioural change had a "*huge part*" to play in achieving the targets in the CCPu—

"*We need to engage consumers, whether those are businesses or individuals, to help us with that task*."[78]

120. He pointed out that the CCC had said industry could be zero carbon by 2045, going beyond the 80% reduction; and policy intervention was needed to overcome key challenges, such as operating costs and the absence of a business case for decarbonisation—

"*It is clear that we need to go further, and we need to go faster if we are going to meet the interim targets by 2032*."[79]

121. Outlining the support available via the £34-million Scottish Industrial Energy Transformation Fund and £26-million Manufacturing Low Carbon Challenge Fund, he stressed the need to work alongside the UK Government (including a ministerial group and new framework for the devolved and UK Governments to discuss net zero matters). Otherwise—

[75] EEFW Committee, 16 February 2021, Col 13.
[76] EEFW Committee, 16 February 2021, Col 13.
[77] EEFW Committee, 16 February 2021, Col 14.
[78] EEFW Committee, 16 February 2021, Col 14.
[79] EEFW Committee, 16 February 2021, Col 15.

"…*there is a significant risk that decarbonising faster than the rest of the UK could lead to carbon leakage*…"[80]

122. There was also the £180-million Emerging Energy Technologies Fund, around £100 million of which was for hydrogen technologies, £80 million to cover other technologies, including CSS; and work to target the latter was ongoing through Neccus, the "*cluster for carbon capture in Scotland".*[81]

123. On the matter of the CCC's proposal for carbon border tariffs and minimum carbon standards, Mr Wheelhouse pointed out the Parliament had implemented the UK Emissions Trading Scheme which—

"…*would include protections for sectors that are at high risk of carbon leakage, to help them maintain their competitiveness with companies outwith the UK that do not face equivalent carbon costs."*[82]

124. He told us—

"*Our approach is a mixture that includes getting carbon pricing correct as well as giving the right support to business to invest early in new technology*."[83]

125. Addressing concerns about the interplay of infrastructure and the CCPu, the Minister stressed the need to align these within the regulatory framework. There was a "*common interest and goal to develop the technology*" with the UK Government. He spoke about Acorn in Scotland, the project at St Fergus and a "*hugely exciting opportunity*" which could be ready by 2024—

"*If we are able to achieve and accelerate the deployment timescale for that, which has the potential to store up to 10 megatonnes of CO2 annually, that would be a huge contribution to decarbonising not only Scotland but potentially the rest of the UK and our European neighbours*."[84]

126. On carbon capture, he said Scotland had a "*potential comparative advantage*" in respect of our skills base and assets, "*such as completed reservoirs*" for the storage of CO2. Also—

"*We have a talented oil and gas sector and a world-class supply chain that wins work around the world. We are aware of the challenges that we have in the offshore wind sector."*[85]

[80] EEFW Committee, 16 February 2021, Col 15.
[81] EEFW Committee, 16 February 2021, Col 16.
[82] EEFW Committee, 16 February 2021, Col 17.
[83] EEFW Committee, 16 February 2021, Col 17.
[84] EEFW Committee, 16 February 2021, Col 18.
[85] EEFW Committee, 16 February 2021, Col 19.

Conclusions

127. **The Minister told us of the importance of and need to monitor our national carbon footprint, including products we consume that come from elsewhere. He said behavioural change had a huge part to play in achieving net zero. We heard the phrase carbon literacy more in the context of skills and training but it can of course also apply to making better informed choices as consumers. A research study is being carried out to consider policy opportunities for influencing consumer, business and public sector demand for lower carbon products. The Committee asks to be kept informed of that work. We also invite the Scottish Government to consider the merits of adopting a net zero target for consumption emissions, one that would enable us to cover what we consume as well as what we produce.**

128. **The Committee expresses its disappointment that INEOS did not wish to speak to us about the decarbonisation agenda. As a key business in its sector and a major player in Scotland's economy, members would have very much valued its input in our scrutiny of the Scottish Government's Climate Change Plan Update.**

129. **We do recognise, however, that the company is in communication with the Scottish Government, UK Government, and the Falkirk Council; and the Committee was able to hear from the Chemicals Industry Association. It was the concern of the Association and of other witnesses that the lack of a business case for industry within the Climate Change Plan Update (and the wider UK policy framework) could give rise to carbon leakage – i.e. jobs and business being lost to Scotland, and the UK, if policy and market conditions were such that it was no longer economically viable for companies working in energy-intensive sectors to remain.**

130. **The Committee wishes to underline those concerns and recommend the Scottish Government seek to prioritise this aspect of policy – around incentive, support and competitiveness for industry – in its dealings and negotiations with the UK Government; and that it continues to work in partnership with industry to develop the business case for decarbonisation and mitigate against the risks to the economy, local communities, and the work-force of carbon leakage.**

131. **The Minister told us the Scottish Government's approach was a combination of getting carbon pricing correct and providing the right support to business to invest early in new technology, front-loading the cost so to speak. This ties in with views we heard from the Climate Change Committee and other witnesses. We wish to highlight the wider issue of industrial decarbonisation as meriting closer scrutiny over the rest of the duration of the current Climate Change Plan (as revised following this process of CCPu scrutiny); and will recommend that our successor Committee picks up the matter in the next**

parliamentary session as a central part of its climate change and energy work.

Negative Emissions Technologies (NETs)

Context

132. NETs can permanently remove carbon from the atmosphere. Plants and trees (known as biomass) naturally remove carbon as they grow, these are then used to generate electricity or other fuels, and the carbon produced is captured and stored. The most viable current technology in relation to this is Bioenergy with Carbon Capture and Storage (BECCS) whereby biomass is used to generate electricity and is coupled with CCS to prevent further emissions. BECCS can also be used in industry for industrial heat or other relevant processes.

133. These technologies are planned to start permanently removing carbon dioxide from the atmosphere by 2029, and significantly ramp up emissions removal in the electricity and industrial sectors from 2030 onwards; equivalent to 23.8% of gross emissions.

134. Whilst these technologies have been proven in test facilities and at small scales, they do not currently exist at scales necessary to remove significant volumes of carbon. Timescales for developing and commissioning are therefore exceptionally tight. Proposals include—

- a feasibility study to identify specific sites, followed by support for commercial partners;
- work with the UK Government;
- investment in research and development, demonstrator projects, and integrating negative emissions technologies with carbon capture and storage infrastructure.

135. A key part of developing NETs will be to understand the implications, scale and pace with which bioenergy resources should be focused.

136. Recent research by the Tyndall Centre for Climate Change Research on the Role of Fossil Fuel Based Carbon Capture and Storage in the Energy System has been cited by Stop Climate Chaos Scotland in evidence to the ECCLR Committee and has noted the following—

- Global operational CCS capacity is currently 39MtCO2 per year, this is about 0.1% of annual global emissions from fossil fuels;
- There is no operational CCS capacity in the UK yet the CCC project CCS capacity of up to 176MtCO2 by 2050. This would mean that the UK would require quadrupling the entire current global CCS capacity;
- G8 committed to launch 20 large scale projects by 2010, IEA committed 100 projects by 2020, only 5 materialised, two £1bn UK competitions have failed to deliver any demonstration projects.

137. This research has itself been criticised by academics, engineers and geologists who have insisted such schemes were "*vital weapons in the battle against global heating*" and warned that failure to trap carbon dioxide would make it "*almost impossible*" to reach net zero by 2050.

138. In written evidence on the CCPu to this Committee, Scottish Carbon Capture and Storage has significant concerns that the Infrastructure Investment Plan (IIP) might not be "*fit for purpose*"; its main contention being the Plan does not consider industrial decarbonisation—

"*We urge the Scottish Parliament to ensure that infrastructure investment in Scotland aligns fully with Scotland's climate change targets. This includes:*

- *Recognising that the size of Scotland's industrial emissions is comparable to the size of its emissions from heat and transport*
- *Recognising that industrial emissions are not just about heat – there are also unavoidable process CO_2 emissions*
- *Ensuring that the Scottish Government's definition of infrastructure explicitly includes infrastructure to enable industrial decarbonisation"*

139. The Infrastructure Investment Plan (IIP) defines infrastructure as—

"The physical and technical facilities, natural and other fundamental systems necessary for the economy to function and to enable, sustain or enhance societal living conditions.

These include the networks, connections and storage relating to the enabling infrastructure of transport, energy, water, telecoms, digital and internet, to permit the ready movement of people, goods and services.

They include the built environment of housing; public infrastructure such as education, health, justice and cultural facilities; safety enhancement such as waste management or flood prevention; natural assets and networks that supply ecosystem services and public services such as emergency services and resilience."

140. The IIP lists decarbonising industry, including manufacturing as a key purpose, and states—

"We will support industry and manufacturing to transform, overcoming private sector investment and transition challenges through:

- *£180 million for an Emerging Energy Technologies Fund to support carbon capture and storage (CCS), negative emissions technologies (NETs) and hydrogen development.*
- *A £34 million Scottish Industrial Energy Transformation Fund for energy efficiency technologies and decarbonisation studies.*
- *A £26 million Low Carbon Manufacturing Challenge Fund for innovation in technology, processes and infrastructure.*

We will support businesses in the energy sectors as they grow and diversify, and help attract private sector investment, including through our £60 million

Energy Transition Fund, focused on the North East, and helping the wider energy sector and supply chain."

141. Other funds which have been announced to support this decarbonisation include—

- Energy Transition Fund for the North East – £62 million funding package available to support Net Zero projects
- The Strategic Innovation Challenge Fund – aims to support investment in R&D. However, it is not clear how much this fund is worth.

Evidence

142. Oral evidence to the ECCLR Committee has highlighted mixed opinions on the need for and desirability of NETs. These technologies are expected to sequester nearly 25% of gross emissions by 2032. However, if they do not materialise, there appears to be no backup plan for Scotland's net-zero ambitions.

143. Energy UK suggested the next 12 to 24 months will be crucial for the development of NETs and it welcomed the energy technologies and carbon capture and utilisation challenge funds—

"*They will be critical in supporting the industry, pushing things forward a little, and getting them past the technology-readiness level at which they can be pushed out at scale*."[86]

144. Also—

"*If we create the right market frameworks and state that carbon capture technologies will be of value in 2029, the industry will meet that...The timescale is ambitious, but we simply do not have any choice*."[87]

145. The CCC saw a "*big challenge*" and noted the current focus of NETs being "*almost entirely*" in the electricity sector. The process of using biomass, growing trees, capturing carbon, storing it in the North Sea, was "*entirely feasible*". However, it would have to be developed at scale and with a Scottish site to be up and running by 2029 to meet the numbers in the CCPu. Chris Stark said—

"*The headline is that the Scottish Government is to achieve that by 2030. That is pretty tasty, to put it mildly – it is ambitious*."[88]

146. SCDI considered NETs to be "*part of the solution*" but with "*long lead times*". It provided some useful context in relation to Scotland's advantage in this sector relative to Teeside—

[86] EEFW Committee, 19 January 2021, Col 20.
[87] EEFW Committee, 19 January 2021, Col 20.
[88] EEFW Committee, 19 January 2021, Col 44.

"*We have the geology, the skills, the people and the infrastructure…all we really need in addition to those are a commitment from the UK Government and a decision from the Scottish Government to invest in that and to support it*."[89]

147. Similarly, SSE saw a "*huge*" comparative advantage if work could begin on capture and storage at Peterhead with pipelines elsewhere for "*other industries to plug in*".[90]

148. Element Energy thought there could be logistical problems with small dispersed sites but saw merit in further investigation.

149. Stuart Haszeldine noted that many small biomass and waste plants did not capture any of their CO2. He thought it possible that a full-scale CO2 transport and storage project could be operating in the UK by early 2025 through a combination of UK Government support and private investment. However, with competition from Teesside, Humberside, Merseyside and south Wales, there was no guarantee this would be in Scotland. If it is built elsewhere—

"…we will have to look at negotiating terms to send any CO2 south into England, either via shipping or a pipeline, to be disposed of using the Teesside or Humberside projects. That would entail a delay of several years, and we will undoubtedly miss our CO2 targets at that point".[91]

150. He suggested the contributions from ""*multiple different actions*" could add up to approximately 10 million tonnes. However—

"*As many people have stated, there are many small and medium contributions, but they all need to add up into a big contribution. I am unsure that, in Scotland, we have made the arithmetic work for us yet*."[92]

151. A key part of the business case for NETs, in Professor Haszeldine's view, was the "*wealth creation*" that would come from keeping "*high-value jobs in the chemical and manufacturing industries—as well as the offshore industry*".[93]

152. The CCC underlined the importance of collaboration between the Scottish Government and Whitehall if proposals were to succeed—

"*The lion's share of bioenergy-with-CCS projects would need to be in Scotland, in what is a very competitive field across the UK*."[94]

[89] EEFW Committee, 2 February 2021, Col 42.
[90] EEFW Committee, 19 January 2021, Col 22
[91] EEFW Committee, 2 February 2021, Col 21.
[92] EEFW Committee, 2 February 2021, Col 13.
[93] EEFW Committee, 2 February 2021, Col 15.
[94] EEFW Committee, 19 January 2021, Col 45

153. In a written submission, Friends of the Earth Scotland was clear in its criticism of the NETs aspect of the CCPu—

"*A plan which clearly states upfront that there is potential to not meet targets is not credible. With carbon budgets increasingly constrained and evidence showing that CCS cannot be relied upon to make any serious contribution to 2030 targets…the Update's reliance on NETs represents a hugely expensive deviation away from renewable energy growth, storage and energy efficiency*."[95]

Scottish Government

154. Questioned about delivery of close to 25% of gross emissions from the 2032 total without a clear industrial road map, the Minister said the process would be "*challenging*" but—

"*We are confident that it will be technically possible to deliver NETs by the late 2020s, including pilot demonstration projects by 2029 and large-scale installations by 2030*."[96]

155. He suggested "*much of the responsibility*" was reserved to the UK Government and work was being undertaken with UKG in areas where it retains responsibility – e.g. the electricity market – and including contracts for difference and other support mechanisms which could "*pick up some of those new technologies*".[97]There are also a £1 billion UK Carbon Capture Utilisation Storage Infrastructure Fund and he would be supporting the sector here to access that fund and encouraging UK ministers to *"look kindly on projects in Scotland*".[98]

156. On the question of how fit for purpose the infrastructure investment plan might was, the contention of Scottish Carbon Capture & Storage being the document does not consider industrial decarbonisation, the Minister was sanguine. He said we needed to get the framework right and the Scottish Government was working alongside the UK Government to do so, "*as we have a common interest and goal to develop the technology*".[99]

157. The timing of the Bioenergy Action Plan was not expected before the end of the current session of Parliament but the Minister said he would "*look to engage with the committee if it would be helpful*".[100]

158. On balancing the risks and rewards between government, industry and consumers, Mr Wheelhouse told us—

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[95] Written submission, Friends of the Earth Scotland.

[96] EEFW Committee, 16 February 2021, Col 20.
[97] EEFW Committee, 16 February 2021, Col 21.
[98] EEFW Committee, 16 February 2021, Col 18.
[99] EEFW Committee, 16 February 2021, Col 18.
[100] EEFW Committee, 16 February 2021, Col 22.

"*We, as a Government, want to deliver the transition in partnership with industry, as well as with individual places – taking a place-based approach – including regions and, at the micro level, communities*."[101]

159. He suggested such a partnership approach was demonstrated via initiatives such as the Grangemouth Future Industry Board, the Scottish Industrial Decarbonisation Partnership and NECCUS – the North East Carbon Capture, Usage and Storage initiative.[102]

160. Deep carbonisation would require "*substantial economic incentives via the appropriate policies*" and relevant sectors faced additional costs of *"approximately £0.8 billion to £1 billion per year by 2045*"—

"*We are trying to help support businesses to avoid those costs in the future, or at least to manage them earlier*."[103]

161. When it came to employment, and referencing in particular the work of the Scottish Offshore Wind Energy Council, he said—

"*Where we are criticised for going too slowly, it is – with most of our policies – because we need to allow the supply chain to respond in order to secure jobs locally in Scotland rather than having to import products from elsewhere*…"[104]

162. Furthermore—

"*We have to get the balance right between the prices that the consumer pays for electricity and gas, and the cost to consumers in terms of their jobs…it is no comfort to people if we manage to keep the price of electricity down but they lose their jobs*."[105]

163. Recalling the legacy of the "*decoaling period*" on communities in Ayrshire, Lanarkshire and the Lothians, he said—

"*We need to do better as we transition other sectors into a net zero future... we want to protect jobs that are already there and allow existing businesses to survive and thrive in a new low-carbon world*"[106]

164. Asked about concerns over intellectual property from small businesses looking to get involved in funding streams, the Minister undertook to raise the issue with cabinet colleagues who "*cover all three enterprise networks*"—

[101] EEFW Committee, 16 February 2021, Col 23.
[102] EEFW Committee, 16 February 2021, Col 23.
[103] EEFW Committee, 16 February 2021, Col 23.
[104] EEFW Committee, 16 February 2021, Col 23.
[105] EEFW Committee, 16 February 2021, Col 24.
[106] EEFW Committee, 16 February 2021, Col 25.

"*If there is a bright potential product for a company…where we know that we need to stimulate the local economy, it is important that we do everything that we can to support it..."*[107]

Conclusions

165. **Expectations of what Negative Emissions Technologies could deliver were, in the view of the Climate Change Committee, ambitious. However, Chris Stark also considered what was set out in the Climate Change Plan Update to be entirely feasible if developments happened at scale and a Scottish site could be established by 2029. SCDI described NETs as part of the solution but with long lead times. Scotland possessed the geology, the skills and the infrastructure, we were told, but the support of the UK Government and investment by the Scottish Government would be crucial. Professor Haszeldine pointed out there would be competition from Teeside, Humberside, Merseyside and South Wales, and therefore no guarantee of a full-scale CO2 transport and storage project being built in Scotland. He suggested the scenario of a site being developed elsewhere could mean delay and missing our own emissions reduction targets. Some of our written evidence expressed concern at the absence of an alternative strategy.**

166. **We asked the Minister what the likelihood of success was in delivering close to a quarter of gross emissions from the 2032 total without a clear industrial road map. He accepted the target was challenging but expressed confidence it would be technically possible to deliver Negative Emissions Technologies by the late 2020s, with pilot demonstration projects up and running by 2029, and large-scale installations ready by 2030.**

167. **In policy terms much of the responsibility is reserved. We heard the Scottish Government was working with the UK Government in areas where the latter has responsibility – the electricity market for instance – and including contracts for difference and other support mechanisms which could bolster some of the new and developing technologies that come under the NETs banner.**

168. **The Minister spoke about balancing the risks and rewards between government, industry and consumers, including regions and, at the micro level, communities i.e. a place-based approach. A number of witnesses made the case that the cost of decarbonisation must be spread fairly across society. Mr Wheelhouse said the Scottish Government wanted to deliver the transition to a decarbonised economy in partnership and such an approach was being taken through initiatives such as the Grangemouth Future Industry Board, the Scottish Industrial Decarbonisation Partnership and the North East Carbon Capture, Usage and Storage initiative (NECCUS).**

[107] EEFW Committee, 16 February 2021, Col 25.

169. **The Committee welcomes the importance placed upon partnership, with buy-in of businesses and communities an integral part of Scotland's plans for decarbonisation. Clearly that ethos must extend to joint government working alongside UK counterparts and we commend the Minister and his officials for their collaborative approach in that respect. Nevertheless, we believe more detail is required on how the 2032 target for gross emissions will be met; and – in the interests of certainty and clarity – the Committee recommends the Scottish Government prepare and publish an industrial road map at the earliest opportunity. As set out earlier (see paragraph 131), we shall include in our own legacy report a recommendation that our successor Committee post-election focuses on industrial decarbonisation as a core part of its climate change/energy work or else in the form of a separate inquiry.**

170. **We also ask for further details to address concerns expressed to us about the approach to the Infrastructure Investment Plan, specifically: how the IIP matches with the ambitions set out in the Climate Change Plan Update; and whether consideration has been given to ensuring the definition of infrastructure in the IIP explicitly includes infrastructure to enable industrial decarbonisation.**

Overall conclusions/recommendations

Electricity

171. **Our recent energy inquiry drew on work undertaken by the RSE suggesting policy makers should seek to balance the competing issues of the "energy quadrilemma" i.e. climate change, affordability, energy security, and public acceptability. That is the lens through which the Committee has sought to view our own energy work; and we would recommend the Scottish Government further reflect on the most relevant findings from our earlier inquiry, those being—**

- ***The Scottish Government to put in place a long-term strategic framework; one covering all aspects of energy, taking a continuous and whole systems approach, and which could include the establishment of an independent expert advisory commission as recommended by RSE.***
- ***The Scottish Government – in the context of RSE calling for a clearly articulated position on security of supply – to set out its position on generating capacity, storage and interconnection; addressing the portfolio we have, the one we need, and how we plan to bridge any gap.***
- ***Ofgem to provide an update on their considerations of regulatory reforms that could better support the development of community energy plans and other local energy initiatives.***
- ***The Scottish Government to keep us informed of the actions it plans to pursue from the Climate Change Committee's advice to***

lead a shift towards positive long-term behaviours – an opportunity to embed new social norms, especially for travel.

- ***The Scottish and UK Governments to give public engagement greater prominence and priority in other strands of their energy transition and climate change work and set out how they will do so.*** **(See paragraph 69)**

172. **Our other recommendations under the Electricity chapter are—**

- **We ask the Scottish Government to set out the lessons it has learnt from an integrated approach – such as members of the Committee saw for themselves when we visited Orkney's ReFLEX project last year – and how it intends to ensure a Scotland-wide alignment of planning, connection and charging. (Paragraph 70)**
- **The Committee supports the Scottish Government in its ongoing efforts to address the anomaly of transmission charging in the north of Scotland. We also support the case for Ofgem to have its statutory remit amended by UK Government ministers so that the regulator may better contribute to the overriding priority of the climate change emergency. (Paragraph 71)**
- **We invite the Scottish Government to set out in more detail how it will ensure sufficient capacity in the planning system. (Paragraph 72)**
- **The Committee will include in our legacy report a recommendation that our successor maintains a watching brief on the planning and infrastructure aspects of climate change in the coming parliamentary session. (Paragraph 73)**
- **We recommend the Scottish Government incorporates a monitoring tool within the Annual Energy Statement; and the Statement ideally be a stand-alone document showing progress made in a meaningful, prominent and accessible way for policy makers, parliamentarians and the public. (Paragraph 75)**
- **The Committee believes skills and training to be a crucial policy area and one that merits the fullest consideration by our and other committees' successors post-election. (Paragraph 79)**
- **We reiterate a recommendation from our recent BiFab, the offshore wind sector and Scottish supply chain report (published in January 2021)—**
    - ***The Committee notes that in December 2020 the Scottish Government published a Climate Emergency Skills Action Plan to accompany the updated Climate Change Plan. The Committee believes that ensuring that the Scottish workforce has the right skills to enable local economic benefit in the expansion of the renewables sector in Scotland is key. The Skills Action Plan must be translated into well-resourced delivery. The Committee asks to be kept updated on the development of an accompanying Implementation Plan and recommends that delivery of the***

Skills Action Plan is considered by its successor Committee. **(Paragraph 79)**

Industry

173. **For the Industry chapter—**

- **The Committee asks to be kept informed of a research study considering policy opportunities for influencing consumer, business and public sector demand for lower carbon products. (Paragraph 127)**
- **We invite the Scottish Government to consider the merits of adopting a net zero target for consumption emissions, one that would enable us to cover what we consume as well as what we produce. (Paragraph 127)**
- **The Committee underlines the concerns expressed to us by the Chemicals Industry Association. We recommend the Scottish Government seeks to prioritise this aspect of policy – around incentive, support and competitiveness for industry – in its work with the UK Government; and continues to work in partnership with industry to develop the business case for decarbonisation and mitigate against the risks of carbon leakage. (Paragraph 130)**
- **We wish to highlight the wider issue of industrial decarbonisation as meriting closer scrutiny and will recommend that our successor Committee picks up the matter in the next parliamentary session as a central part of its climate change and energy work. (Paragraph 131)**

Negative Emissions Technologies

174. **Regarding NETs—**

- **The Committee believes more detail is required on how the 2032 target for gross emissions will be met; and recommends the Scottish Government prepare and publish an industrial road map at the earliest opportunity. (Paragraph 169)**
- **We shall include in our own legacy report a recommendation that our successor Committee focuses on industrial decarbonisation as a core part of its climate change/energy work or else in the form of a separate inquiry. (Paragraphs 131, 169 and 173)**
- **We also ask for further details to address concerns expressed about the approach to the Infrastructure Investment Plan, specifically: how the IIP matches with the ambitions set out in the Climate Change Plan Update; and whether consideration has been given to ensuring the definition of infrastructure in the IIP explicitly includes infrastructure to enable industrial decarbonisation. (Paragraph 170)**