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Report on the Draft Climate Change Plan



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Economy, Jobs and Fair Work Committee

Remit: To consider and report on matters falling within the responsibility of the Cabinet Secretary for Economy, Jobs and Fair Work.


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Executive Summary

- The Committee commends the whole-system approach but believes that it should not be at the expense of the detail provided in the earlier RPPs. The TIMES model relies on certain assumptions. However, the Committee does not know exactly what information was incorporated into the model and what weight was given to practical considerations on delivery, costs and disruption. The Committee believes that this approach lacks transparency.

- The Committee believes that additional details on budgets, targets, timelines and policies should be included in the CCP, consistent with that provided in the earlier RPPs, in order to ensure that all those involved in delivering the plan are fully informed and able to do so.

- The Committee joins the other Parliamentary Committees who have scrutinised the CCP in recommending that the Scottish Government reviews the time available for parliamentary scrutiny of future reports on proposals and policies. We ask that it use the opportunity afforded by the forthcoming Climate Change Bill to either remove the fixed period or extend the current 60 day restriction.

- The Committee notes that emission reduction requirements for electricity and the residential sector (discussed below) are particularly ambitious. We do not know what discussions took place to balance practical considerations on delivery, costs and disruption across the sectors. The Committee asks the Scottish Government to provide it with information on how these factors were considered to arrive at the proposed emission reductions across the sectors.

- The Committee is unclear how much electricity capacity would be required if significant electrification of heat and transport takes place (as proposed in the CCP) and how much installed capacity would be required to generate it. Whilst the Committee acknowledges that there are difficulties in knowing what the future path for heat and transport is at the moment, we recommend that further modelling work be undertaken to establish what Scotland's installed electrical capacity requirements would be, should significant electrification of heat and transport take place.

- The Committee welcomes the assurance from the Scottish Government that it is confident that Scotland is on a pathway toward an electricity grid intensity below 50g CO2 per kilowatt hour by 2020.

- The Committee notes that many of the support mechanisms for renewable energy are under the control of the UK Government. This is the case for other technologies which are vital for the CCP (such as CCS, discussed below). The Committee encourages the Scottish Government to do what it can do within its own remit to achieve its policy outcomes, whilst working with the UK Government to maximise support available to the renewable energy industry in Scotland.

- Given the reliance within the CCP on the development and large-scale demonstration of CCS, an as yet unproven technology, the Committee recommends that consideration is given to other available options, alongside CCS.

- Whilst a key milestone of the CCP is that the UK Government will announce a CCS strategy aligned with Scottish energy policies, it will require strong inter-governmental collaboration, and the we seek more information from the Scottish Government on how it plans to take this forward; the Committee believes it is vital to establish how the development of CCS will be supported and funded.

- Demonstration and commercialisation of CCS must be encouraged not only in Scotland but also within the UK, with a UK government system aligned with Scottish energy priorities.

- Despite the divergence of views on the use of CCS in decarbonisation, the Committee believes that it has a role to play and notes the evidence from Professor Haszeldine that it can be applied in diverse ways; for example, it can be used effectively in industrial applications. The Committee believes that there is merit in exploring options for the future use of the existing asset at Peterhead and that CCS represents an opportunity to do so.

- The Committee recommends that the Scottish Government works with the UK Government to consider what investment can be made in Peterhead to secure its long-term future as appropriate.

- The Scottish Government's desire for additional capacity is at odds with the evidence from the National Grid who say this is not required. The Committee questions whether there is a need for additional thermal capacity for the purposes of mitigating climate change. We ask the Scottish Government to provide us with details of the modelling carried out to work out what installed capacity is needed. We will further examine the need for additional thermal capacity in our work on the draft Energy Strategy.

- The Committee notes the evidence on the role of transmission charging in the electricity sector. The Committee will examine this issue in more detail as part of its work on the draft Energy Strategy.

- The Committee notes the proposal to make improvements to the fabric of Scotland's domestic buildings resulting in a 6% reduction in their heat demand by 2032; we note evidence that this target could be viewed as "business as usual" and recommend that the Scottish Government reconsiders the target and whether it could be more ambitious.

- The Committee notes concerns about the pace of change proposed via SEEP and the lack of policy detail at this stage. The Committee looks forward to the planned consultation on minimum energy efficiency standards in the private rented sector but recommends that SEEP now be taken forward with some urgency. We recommend that the Scottish Government produce a detailed plan on how the retro-fitting of

domestic buildings will be carried out and resourced, including owner-occupied and the private rented sectors.

- Given SEEP's importance to achieving the CCP ambitions, the Committee agrees that the Parliament should continue to scrutinise its progress. SEEP is being consulted on as part of the overall energy strategy consultation. The Committee will examine these proposals further as part of its work on the draft Energy Strategy.

- The Committee supports the use of smart meters to allow energy use in homes to allow consumers to monitor their own energy use. The Committee notes the Scottish Government's intention to support Home Energy Scotland (HES) in working with consumers on this. The Committee will seek the views of HES as part of its scrutiny of the draft Energy Strategy to continue its scrutiny of the roll out of smart meters.

- The smart meter is one tool that assists with promoting the behaviour change that is required to reduce heat demand. The Committee notes the support being given to Home Energy Scotland but is surprised by the lack of detail in the CCP on any other actions planned to address the behavioural change required to reduce heat demand. The Committee recommends that the final CCP should include such detail.

- The Committee notes the views of those who gave evidence that appropriate resources are required to deliver the planned changes, and asks the Government for further details on the proposed budget, including incentive-based schemes, grants, and loans.

- The Committee supports the move towards low-carbon heat supply while recognising that transforming our heating supply from predominantly gas to low-carbon sources will require significant change. The Committee notes that the technologies to deliver this change are evolving and this explains, to some extent, the intention to have an intense period of change from 2025-2032. However, the Committee urges the Scottish Government not to delay for so long, on the basis that transforming the housing stock within 7 years strikes us as unrealistic.

- Given the scale of change planned for 2025 onwards, the Committee is of the view that more might be done in the intervening period to front-load some of this work. More details of how the work between 2025 and 2032 will progress are essential in order for those involved to understand how this shift from gas heating to low carbon heating will be achieved.

- The Committee was impressed by the district heating project it visited and supports the benefits that such schemes offer to residents and in supporting the CCP. The Committee notes the potential barriers to developing district heating projects, including housing tenure, persuading people to sign up, the need for sufficient resources for such projects to proceed and the need to ensure that consumers are protected. The Committee asks the Government to report back to us on what steps are being taken to address these issues.

- The Committee notes the potential role of hydrogen in the energy system and as a replacement for gas in heating homes. The Committee will examine this policy in more detail as part of its work on the draft Energy Strategy.

- The Committee notes the concerns expressed in relation to non-domestic rates for district heating and changes to non-domestic rates for renewables. The Committee will examine the issue of non-domestic rates in more detail during its work on the draft Energy Strategy.

- Whilst energy efficiency measures are essential, behaviour change will play a key part in achieving a reduction in heat demand in the services sector. The Committee notes the practical measures planned by the Scottish Government, such as the public sector energy efficiency procurement framework, but believes that behaviour change is also key to achieving the targets. The Committee asks the Scottish Government to report back on how behaviour change considerations were used to inform the selection of policies, proposals and delivery routes in the services sector.

- The Committee is concerned that lesser emissions reductions in transport or agriculture may put particularly ambitious expectations upon the services sector.

- As with the residential sector, the Committee questions whether it is prudent to wait until after 2025 to develop an approach to decarbonisation of heat supply to the services sector and seeks clarification on what work is being carried out at present. As stated above, the 2025-2032 window for transforming the energy supply to mainly low-carbon sources in the services sector will require significant change. The Committee agrees with evidence that this timescale is unrealistic and urges the Scottish Government to consider beginning this process sooner.

- The Committee notes the role of the EU ETS in achieving reductions in emissions levels and notes that the Scottish Government is engaging with the UK Government on its role after the UK leaves the EU.

- The Committee notes the aim in the CCP to demonstrate technologies such as hydrogen and CCS at commercial scale by 2030. As set out above, there is very little detail about many aspects of the CCP, including how this target will be achieved. The Committee recommends that the final CCP should contain more detail on how the policy outcomes for industry will be achieved and implemented.

- The Committee notes the use of the ISM tool and other measures contained in the CCP aimed at encouraging behaviour change. However, the Committee agrees with Scottish Renewables and others that the final CCP must communicate clear messages about the targets and the behaviour changes required to meet them.

Foreword

1. The Climate Change (Scotland) Act 2009 established targets for the reduction of greenhouse gas emissions in Scotland (at least a 42% reduction by 2020 and a minimum 80% reduction by 2050). To demonstrate how this would be achieved, a series of reports on proposals and policies have been laid before the Scottish Parliament—

   - First Report on Proposals and Policies (RPP1), 2011
   - Second Report on Proposals and Policies (RPP2), 2013
   - Draft Climate Change Plan (CCP), 2017. The CCP (the third RPP) is required to set out a clear framework for hitting Scotland's annual emissions reduction targets from 2017 – 2032.

2. The Draft Climate Change Plan was laid before the Scottish Parliament on 20 January 2017. The Parliament has a statutory duty to respond within 60 days.

3. The Scottish Government published its consultation on the draft Energy Strategy on 24 January 2017. The draft Energy Strategy is a "free-standing companion to the draft Climate Change Plan"[1], and the Committee will return to consideration of the strategy in spring 2017.

4. Scrutiny of the CCP has been undertaken by four Committees. The Environment, Climate Change and Land Reform (ECCLR) Committee focused on the overview and development of the Climate Change Plan, climate change governance (including monitoring and evaluation), water, resource use, land use (including peatlands and land use by the public sector), and behaviour change.

5. The Rural Economy and Connectivity Committee focused on rural affairs, agriculture, forestry and transport.

6. The Local Government and Communities Committee considered local government, planning, and housing.

7. This Committee focused its scrutiny on:

   - Electricity generation,
   - Reducing energy demand,
   - Renewable energy (renewable electricity and renewable heat),
   - Interconnection,

[1] Scottish Energy Strategy, p.10

- Grid issues and
- Fuel poverty.

8. The ECCLR Committee also asked that the following issues were considered by all Committees scrutinising the CCP—

   - progress to date in cutting emissions and implementing the proposals and policies set out in the RPP2 and the scale of reductions proposed;
   - the appropriateness and effectiveness of the proposals and policies within the draft CCP for meeting the annual emissions targets and contributing towards the 2020 and 2050 targets;
   - the appropriateness of the timescales over which the proposals and policies with the draft CCP are expected to take effect;
   - the extent to which the proposals and policies reflect considerations about behaviour change and opportunities to secure wider benefits (e.g. environmental, financial and health) from specific interventions in particular sectors.

9. The Committee, along with the other Committees scrutinising the CCP, issued a joint call for written evidence on 19 January and received 41 submissions. Oral evidence sessions were held on 31 January and 7 February, and with the Minister for Business, Innovation and Energy on 21 February. The Committee would like to thank all those who submitted evidence, which has been vital to its scrutiny of the CCP, particularly given the time constraints of the reporting period.

TIMES model and level of detail in the CCP

10. In creating the CCP, the Scottish Government used a whole-system energy modelling approach called the TIMES model[2]. This is different to the approaches taken to produce RPP1 and RPP2, with the intention of showing impacts of actions and reductions across all sectors.

11. This new approach has been both praised and criticised by those submitting evidence. SEPA wrote to—

> express our strong support for the CCP, particularly…use of the TIMES model to help prioritise and make the best strategic choices robustly and transparently [and] the identification of the multiple benefits of climate action not just for the environment, but for improving the health and wellbeing of people.[3]

[2] http://www.gov.scot/Resource/0050/00508928.pdf
[3] Written submission

12. Others were critical. In evidence to the Committee, Dr Mark Winskel of the University of Edinburgh noted that "we have learned that system models provide only a partial insight."[4]

13. The lack of information around "resources, targets and policies"[5] was cited by the witnesses, who suggested there is a need for detailed proposals in the final plan. Existing Homes Alliance Scotland warned—

> we are very concerned that there is a significant credibility gap. It is right to have such ambition, but it cannot be wishful thinking—it must be backed up by credible policies and resources to give us the confidence that the target will be met.[6]

14. WWF-UK agreed, stating—

> On the climate change plan more broadly, we are disappointed by the level of policy detail. It used to be called the report on policies and proposals and it now has a snazzier title, but ultimately it is supposed to give a clear indication of all the policies and proposals that will deliver the targets that are set out from the TIMES model. We do not have confidence that there is enough in there to ensure that the climate envelopes are delivered.[7]

15. The Committee commends the whole-system approach but believes that it should not be at the expense of the detail provided in the earlier RPPs. The TIMES model relies on certain assumptions. However, the Committee does not know exactly what information was incorporated into the model and what weight was given to practical considerations on delivery, costs and disruption. The Committee believes that this approach lacks transparency.

16. The Committee believes that additional details on budgets, targets, timelines and policies should be included in the CCP, consistent with that provided in the earlier RPPs, in order to ensure that all those involved in delivering the plan are fully informed and able to do so.

17. The Committee joins the other Parliamentary Committees who have scrutinised the CCP in recommending that the Scottish Government reviews the time available for parliamentary scrutiny of future reports on proposals and policies. We ask that it use the opportunity afforded by the forthcoming Climate Change Bill to either remove the fixed period or extend the current 60 day restriction.

[4] Official Report, 7 February, col.29
[5] Official Report, 31 January, col.12
[6] Official Report, 31 January, col.3
[7] Official Report, 31 January col.26

Electricity

18. The largest source of greenhouse gas (GHG) emissions in Scotland in 2014 was energy supply. This accounted for 30% of Scotland's total, although it was also a decrease of 39% from 1990 levels. This is credited to a reduction in the use of natural gas and an increase in renewable energy, predominantly electricity.

19. The CCP states that Scotland has consistently been a net exporter of electricity over the past decade, exporting 29% of the electricity generated in 2015 to the rest of the UK – up from 24% in 2014.[8]

20. The CCP proposes a 120% reduction in emissions by 2032 in the electricity sector, which will result in net negative emissions. This represents the most ambitious reduction across all the sectors. The use of carbon capture and storage (CCS) and bioenergy (BECCS) is expected to remove CO_2 from the atmosphere while also powering homes and industry.

21. The CCP states—

> In 2030, Scotland's electricity system will be wholly decarbonised and supply a growing share of Scotland's energy needs. Alongside lighting our buildings and powering household appliances electricity will be increasingly important as a power source for keeping our homes warm and our vehicles on the move.[9]

22. The CCP goes on to show a graph (Figure 5, page 38) for electricity generation carbon envelopes for the next 16 years which assumes that by 2026/27 there will be net negative emissions from electricity generation—

> From the late 2020s, Carbon Capture and Storage (CCS), along with gas from plant material and biomass waste, has the potential to remove CO_2 from the atmosphere (i.e. negative emissions). CCS will be critical in heat, industry and power sectors.[10]

23. RSPB commented in written evidence—

> BECCS is often referred to as a type of negative emission technology…However, the full lifecycle of emissions from bioenergy feedstocks depends upon a number of factors, and the assumption that it is a carbon neutral source of energy is often flawed.[11]

[8] CCP, paragraph 7.1.7
[9] CCP, paragraph 7.2.1
[10] CCP, paragraph 2.2.4
[11] RSPB, written evidence

24. The Committee asked the Scottish Government whether the lesser emissions reductions in other sectors, e.g. transport or agriculture, put particularly ambitious or potentially unreasonable expectations upon the electricity and residential sectors. The Scottish Government responded that the emission reduction pathway is based on the TIMES model and analysis on emerging technologies "together with practical consideration in delivery, costs and disruption".[12] However, as outlined above, the Committee does not know what underlying assumptions have been fed into the TIMES model to inform these emission reductions or exactly how one sector is assessed against another.

Electricity sector - policy outcome 1

25. Policy outcome 1 for the electricity sector is that Scotland's grid intensity is below 50g CO_2 per kilowatt hour by 2020. The specific policies set out in the CCP to achieve this are—

- Support the future development of a wide range of renewable technologies through addressing current and future challenges, including market and wider policy barriers;
- Promoting greater flexibility in the electricity sector, including efficient network management, demand side response and electricity storage.

26. Scotland's climate change targets require the complete decarbonisation of electricity, with modelling for the draft Energy Strategy showing that between 11-17GW of installed renewable capacity will be required by 2030. A range of technologies, including on and offshore wind, hydro, solar, marine, and bioenergy are proposed to lower Scotland's electricity grid intensity to below 50g CO_2 per kilowatt hour by 2020. A wide range of renewable technologies will need to be developed and brought to market, and greater flexibility will be needed in the electricity sector.

Role of UK Government policy

27. Some of the evidence focused on the integration of policies from the Scottish Government, UK Government and the EU. In response to a question on whether the CCP targets were achievable, Jenny Hogan of Scottish Renewables stated—

> whether the target can be achieved relies on UK Government policies and, to some extent, EU policies. We have to be realistic about that and accept that not everything is in the Scottish Government's gift.[13]

28. Scottish Renewables also said—

> Scottish Renewables believes it is critical that the Scottish Government maximises the use of the devolved policy levers it has available - such as

[12] Scottish Government, written evidence
[13] Official Report, 7 February, col.4

> planning, public procurement, building standards, business rates, and innovation and project funding - while continuing to closely engage with the UK Government on market mechanisms, regulation and revenue support.[14]

29. Brookfield Renewable UK Limited spoke of the role of UK Government policy—

> As the Committee will be aware, the exclusion of onshore wind from the second UK Contracts for Difference (CfD) auction and the low wholesale price of electricity has made the economics of wind farm development much more challenging.[15]

30. The Scottish Government told the Committee that clarity and certainty was required in relation to investment in renewables—

> In the immediate future, the renewable energy sector faces investment challenges. Current uncertainties over the support for renewables under UK revenue support schemes – including remote island wind, offshore wind (both floating and fixed) and wave and tidal under the Contracts for Difference scheme – are now jeopardising the future deployment of renewable electricity technologies in Scotland. The Scottish Government calls on the UK Government to provide greater long-term certainty over these support mechanisms – and for greater clarity on the future of the Levy Control Framework, under which the costs of renewables support is currently managed.[16]

31. The Minister stressed the following—

> A key area in which we have had fundamental change in the environment in recent years is onshore wind. There is currently no subsidised route to market for new onshore wind projects that are coming on stream. It is worth putting that in context. More than 11GW of renewables projects have been going through the consenting process in Scotland, so there is a strong interest in investing in Scotland, but there is no route to market—there is no guaranteed price to underpin a long-term investment decision. That is destabilising for the industry.[17]

32. Dr Winskel expressed concern about the future alignment of policies across the two Governments—

> This emerging misalignment between UK and Scottish pathways is a concern because Scotland's rapid progress in decarbonisation to date (especially in the power sector but also in some energy efficiency

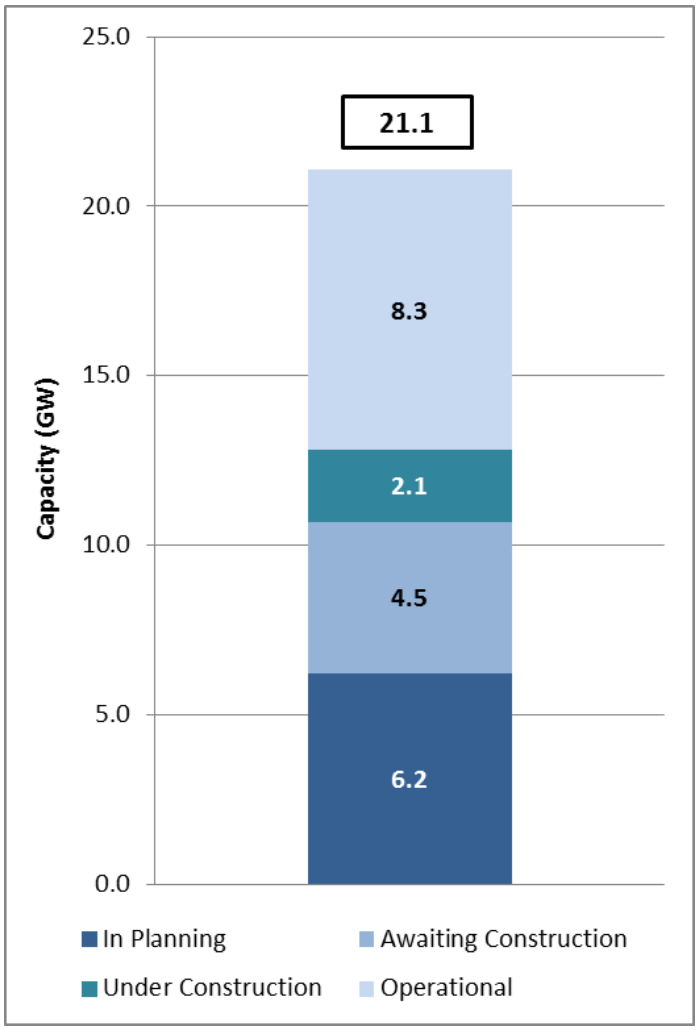
[14] Written submission
[15] Written submission
[16] Written submission
[17] Official Report, 21 February, col.27

programmes) has been enabled by the sharing of renewables subsidies across all GB energy bill payers, and the operational integration within the GB single market and grid.[18]

Renewable capacity

33. Scotland currently has 8.3 GW of installed renewable electricity generation capacity. An additional 6.6 GW is under construction or consented, with the majority coming from wind generation projects (see graph below). Total renewable capacity that is in operation or planned is 21.1 GW (although not all planned projects are likely to be consented to or completed).

34. Renewable capacity in Scotland by Planning Stage, September 2016[19]



35. The Committee asked the Scottish Government whether, if peak demand is currently 5.5MW, it could tell the Committee what it might be if significant electrification of heat and transport takes place (as proposed in the CCP) and how much installed capacity would be required to generate it. In response, the Scottish

[18] Written submission
[19] http://www.gov.scot/Topics/Statistics/Browse/Business/Energy/planningdata

Government said that the level of peak electrical demand will be informed not only by the type of heating and transport technologies deployed, but also the degree of innovation in the operation of the energy system.[20]

36. The Committee asked the Scottish Government how it proposes to ensure that Scotland's electricity grid intensity will be below 50g CO_2 per kilowatt hour by 2020 if a route to market for renewables cannot be put in place. The Scottish Government told the Committee it is confident that Scotland is on a pathway toward an electricity grid intensity below 50g CO_2 per kilowatt hour by 2020.[21]

37. Professor Bell stated—

> There are times when we have a surplus of renewables plus nuclear and there are times when we have a deficit. We depend on being part of the bigger system so that we can balance out that surplus and deficit. In turn, GB depends on being part of a bigger European system.[22]

38. Julian Leslie of National Grid questioned the volume of estimated required capacity—

> Today, we are sat in Scotland with 11.5GW of total generation contracted, but that includes Peterhead[23] and the two nuclear stations. There is another 5GW out there, which is consented, but it is not coming forward at this point because it does not have any form of renewables incentive, and there is another 6GW out there, which has a contract with the National Grid but has yet to go through the consenting process. That represents a pipeline of a further 11GW of generation that we have contact with and have a contract with. As and when the economic environment is in the right place, those projects are willing, able and ready to come forward to connect. If that all came to fruition, it would bring total Scotland generation to about 22GW against a peak demand of 5.4GW for one half hour a year. We are already double the peak demand and there are projects out there that will take us to quadruple the peak demand in terms of installed generation from renewables.[24]

39. Professor Haszeldine, Professor of Carbon Capture and Storage at the University of Edinburgh, however, told the Committee that to achieve the targets in the CCP would require a renewable electricity infrastructure capable of 10GW to 15GW of actual supply, requiring 45GW of renewable capacity. He added—

> we really need to do the arithmetic on the feasibility of delivery of all that. There are conversations about the various policies, strategies, plans and

[20] Written submission
[21] Scottish Government, written evidence
[22] Official Report, 31 January, col.46
[23] Peterhead Power Station is a gas fired power station owned by SSE
[24] Official Report, 7 February, col.31

> so on, but it comes back to this point: if, as a part or region of the UK, we want to decarbonise heat through renewable generation, we need to build an immense amount of renewable electricity generation to do so. The arithmetic on that does not stack up, in my view. I would welcome the challenge, but I would like to see some arithmetic on delivery.[25]

40. The Minister addressed this saying—

> I agree with National Grid that there is enough power in the grid on a day-to-day basis, but as electricity demand grows we need to future proof the supply and provide appropriate back-up.[26]

41. The Committee notes that emission reduction requirements for electricity and the residential sector (discussed below) are particularly ambitious. We do not know what discussions took place to balance practical considerations on delivery, costs and disruption across the sectors. The Committee asks the Scottish Government to provide it with information on how these factors were considered to arrive at the proposed emission reductions across the sectors.

42. The Committee is unclear how much electricity capacity would be required if significant electrification of heat and transport takes place (as proposed in the CCP) and how much installed capacity would be required to generate it. Whilst the Committee acknowledges that there are difficulties in knowing what the future path for heat and transport is at the moment, we recommend that further modelling work be undertaken to establish what Scotland's installed electrical capacity requirements would be, should significant electrification of heat and transport take place.

43. The Committee welcomes the assurance from the Scottish Government that it is confident that Scotland is on a pathway toward an electricity grid intensity below 50g CO_2 per kilowatt hour by 2020.

44. The Committee notes that many of the support mechanisms for renewable energy are under the control of the UK Government. This is the case for other technologies which are vital for the CCP (such as CCS, discussed below). The Committee encourages the Scottish Government to do what it can within its own remit to achieve its policy outcomes, whilst working with the UK Government to maximise support available to the renewable energy industry in Scotland.

[25] Official Report, 7 February, col.25-26
[26] Official Report, 21 February, col. 39

Electricity sector policy outcome 2 - emissions from electricity generation are negative, providing a net reduction in energy system emissions

45. The second policy outcome in the CCP for the electricity sector is that emissions from electricity generation are negative by 2030, providing a net reduction in energy system emissions. The main policy in achieving negative emissions relates to encouraging the demonstration and commercialisation of CCS in Scotland with the aim of a "UK announcement of CCS Strategy aligned with Scottish energy strategies"[27]. This technology is as-yet unproven on a large and commercial scale.

46. CCS, when used in conjunction with BECCS has the potential to deliver negative emissions because the plant material that is used as a feedstock will have absorbed CO_2 during its growth cycle. The UK Government's recently published Industrial Strategy Consultation makes no mention of CCS, and it does not appear to be considered a policy priority at present.

47. The CCP states that the United Nations Inter-Governmental Panel on Climate Change (IPCC), the International Energy Agency and the Committee on Climate Change have all identified CCS as an essential lowest cost climate mitigation technology. The IPCC fifth assessment report states that it would cost 138% more to achieve a 2°C scenario without CCS.[28]

48. The UK Government had been running a £1bn competition to develop CCS projects, with a Peterhead plant proposal from Shell and SSE developing well. However, funding for this was discontinued in 2015.

49. The CCP and the accompanying draft Energy Strategy rely heavily on the development of CCS, BECCS and potentially hydrogen as replacement for natural gas. However, at present none of these options are fully developed or commercially tested.

50. Andrew Mouat of Glasgow City Council raised the issue of the reliance on CCS within the CCP—

> My one point of concern is how heavily reliant it seems to be on carbon capture and storage… Given the resource for renewable energy that we have in Scotland, I am not convinced that we even need to consider carbon capture and storage. Although the funding was taken away, I suggest that, given that there has been so much funding for carbon capture technology over the past 10 years, had there been a viable option, it would have progressed further by now. That is unlike renewable energy, which has increased exponentially over the same period.[29]

51. He added—

[27] CCP, paragraph 7.3
[28] CCP, paragraph 7.2.4
[29] Official Report, 31 January, col.2-3

> I think that the amount of energy, money and resource that would go into establishing the industry could be better directed elsewhere. Renewables are an area that is already delivering results…I feel that carbon capture is a distraction.[30]

52. RSPB also commented in written evidence—

> We are very concerned about the draft Climate Change Plan's apparent reliance on carbon capture and storage (CCS), particularly when combined with bioenergy. Given the UK government's withdrawal of support for this technology and the nascent stage of the industry, we do not see this as a credible approach to ensuring significant reductions in Scotland's greenhouse gas emissions.

53. Gina Hanrahan of WWF-UK concurred, saying she "would question the reliance on CCS for negative emissions from the mid-2020s. That might come to pass, but we should not build it in as our plan A." She elaborated—

> A lot of people view it as an important part of the decarbonisation pathway. We have done a number of pieces of research on it over the past few years. In conjunction with Friends of the Earth Scotland and RSPB Scotland, WWF commissioned work…which examined the Scottish electricity system and renewable energy more generally. It showed that we do not need to have CCS to decarbonise electricity in Scotland and deliver security of supply by 2030—we can maximise our renewable energy resources and in effect have a wholly decarbonised system without CCS. We do not need CCS for electricity here, although it might have an important role to play in decarbonising industry in the long term.[31]

54. Dr Winskel also raised the question of "alternative pathways", saying that within the CCP—

> there is no attempt to look at alternative pathways or to consider systematically, for example, what happens if carbon capture and storage does not appear or if demand can be reduced more rapidly than is assumed in a single climate change plan. That is a problem.[32]

55. Professor Haszeldine made the following key points—

> in the past 10 years, we have been dragged into a conversation about CCS being applied to electricity generation because of the UK Government's obsession with fitting CCS in order to decarbonise coal-generated

[30] Official Report, 31 January, col.7
[31] Official Report, 31 January, col.30
[32] Official Report, 31 January, col.27-28

> electricity. It has been really difficult for it to compete with established low-cost electricity...

> CCS is not a single gadget but a way of reducing carbon emissions in the energy system…It is not just about choosing CCS for electricity; we can choose CCS for heat, transport and industry, because it applies to all those areas. We should get out of the conversation where we think about only one direction for carbon capture and storage.

> …if we think about how we are going to decarbonise our industry emissions … CCS is the key way of doing that, and we need to address that for the future. If we are going to supply low-carbon heating through the means of hydrogen, we have to generate the hydrogen, and CCS is a key part of that delivery…It can happen at small scale, medium scale and large scale, not just at immense power plant scale. [33]

56. He reiterated the importance of developing CCS and BECCS to achieve the targets in the CCP—

> BECCS—biomass energy with carbon capture and storage—does not exist on a commercial scale. There are isolated examples around the world where carbon capture is happening on emissions that are derived from biomass by making alcohol, for example. It is straightforward to capture the carbon dioxide from those sorts of emissions. We could do that in Scotland on our distilling and brewing industries…if we are going to do combined heat and power schemes, we need to work out how we will catch the carbon from the fuel sources in those schemes, whether it is natural gas or biomass. We have not thought that through yet…In Scotland, we face the innovation frontier because we are one of the first countries in the world to get as far as we have got. We now face the cutting-edge challenge of what to do next and how to invent and develop the new technologies that we will need to get down our low-carbon trajectory and the low-carbon technologies that we can then design and sell on to other countries. It is an opportunity to develop something new, not a burden. I repeat that it is not just about renewable electricity but about decarbonising the whole economy. …Carbon capture and storage is always included as an essential part of the whole-system energy model…we need CCS as an essential part of that all-energy system low-carbon delivery.[34]

57. Nicola Pitts of National Grid said—

> As I understand it, the elements that are needed for carbon capture and storage are all proven in themselves. What has not been proven is the end-to-end process, which we should test the viability of. The Energy

[33] Official Report, 7 February, col.13-14
[34] Official Report, 7 February, col.15

> Technologies Institute did research that said that, without carbon capture and storage, £30 billion to £40 billion would be added to the cost of meeting our carbon targets. That crops up in most studies. The question is how we test the viability and scalability of CCS—as a previous panel member mentioned—and at what levels.[35]

58. The Minister responded to concerns about the reliance of the CCP on CCS, and the plans for Peterhead—

> I appreciate that CCS is not universally supported, but we believe that it is potentially a very important technology that would allow Peterhead to continue to provide power to the grid through sequestering carbon emissions from the plant... We need a plant such as Peterhead to provide both power for the network and that black start capability.[36]

59. Chris Stark, Director of Energy and Climate Change (Scottish Government) added—

> We are looking at small-scale demonstration, at least in the interim, but with a clear view that it should grow in the 2020s and 2030s to become something that plays an equal part in the energy system. It is essential that we work with the UK Government on that… We can manage without CCS; it is just that it will cost us more.[37]

60. Oral evidence to the Environment, Climate Change and Land Reform Committee from Scottish Government officials who have modelled the carbon envelopes and costs for the CCP suggested that without CCS "the system cost rises significantly, by around £3.5 billion"[38].

61. The Committee asked the Scottish Government about the implications of relying on CCS/BECCS as the core technology for delivering decarbonisation. The Scottish Government told the Committee that CCS is a system of "common" infrastructure capable of playing a shared and central facilitating role across the decarbonisation strategies of key sectors such as heat, industry and power—

> CCS in this way can become an important part of the energy infrastructure that may allow for negative emissions to be achieved, but we will continue to focus on a reduction in consumption through energy efficiency measures and renewable technologies.[39]

62. The Scottish Government also highlighted that the draft Energy Strategy sets out that to support the future development of bioenergy in Scotland, they will commit

[35] Official Report, 7 February, col.35
[36] Official Report, 21 February, col.40-41
[37] Official Report, 21 February,col.36
[38] ECCLR Committee, Official Report, 24 January, col.15
[39] Written submission

to the development of a whole-system bioenergy action plan, following the publication of the final Climate Change Plan.[40]

63. It was confirmed by the Scottish Government that negative emissions in the electricity sector cannot be achieved without the deployment of CCS in combination with some form of bioenergy. They said that—

> Analysis carried out to assess the impact of having no CCS indicates overall system costs increase, and the result is a greater deployment of renewable electricity, and greater effort required in other sectors.[41]

64. The Scottish Government told the Committee that the UK Government have stated that they continue to view CCS as an important technology for the future and have committed to the development of a new CCS strategy in 2017. The Scottish Government said that it continues "to press the UK Government to deliver a CCS strategy capable of enabling this important technology."[42]

65. Given the reliance within the CCP on the development and large-scale demonstration of CCS, an as yet unproven technology, the Committee recommends that consideration is given to other available options, alongside CCS.

66. Whilst a key milestone of the CCP is that the UK Government will announce a CCS strategy aligned with Scottish energy policies, it will require strong inter-governmental collaboration, and the we seek more information from the Scottish Government on how it plans to take this forward; the Committee believes it is vital to establish how the development of CCS will be supported and funded.

67. Demonstration and commercialisation of CCS must be encouraged not only in Scotland but also within the UK, with a UK government system aligned with Scottish energy priorities.

68. Despite the divergence of views on the use of CCS in decarbonisation, the Committee believes that it has a role to play and notes the evidence from Professor Haszeldine that it can be applied in diverse ways; for example, it can be used effectively in industrial applications. The Committee believes that there is merit in exploring options for the future use of the existing asset at Peterhead and that CCS represents an opportunity to do so.

69. The Committee recommends that the Scottish Government works with the UK Government to consider what investment can be made in Peterhead to secure its long-term future as appropriate.

[40] Written submission
[41] Written submission
[42] Written submission

National Grid

70. The Scottish Government has expressed a desire to see new thermal electricity generating plant in Scotland to provide "base-load capacity and support the resilience of the electricity system".[43] However, evidence to the Committee showed that this investment is unlikely to be forthcoming in the near future due to transmission and infrastructure costs. National Grid stated in evidence to the Committee that—

> In Scotland, you have a 5.5GW demand peak, and that is for one half hour each year. By the time we get to the end of this year, once the western HVDC link is built, you will have a 6GW import capacity. For that one half hour, therefore, we already have a 500MW surplus, plus you will always have some hydro and there will always be a bit of wind blowing somewhere, so there is more than enough margin to meet your future demands in Scotland without any form of generation.

> ...You can export up to 6GW, which you will need to do on a very windy day, because you will not have the demand but you will have all the generation. On a day when the wind stops blowing, you can import energy from England and Wales, in whatever form. With future and growing interconnection with Europe, we will also have access to other renewable sources across Europe, which will then flow into England and meet that national demand.[44]

71. National Grid also stated—

> In relation to meeting network security, Peterhead is an option—it is obviously a location option in Scotland. However, we can meet grid security without that power station, from a network security point of view.[45]

72. In evidence to the Committee, the Minister commented that thermal capacity was important because—

> whether we are talking about pumped hydro storage or thermal capacity, we will see a growth in the requirement for electricity in the Scottish economy as we decarbonise the vehicle fleet and our heating systems. We need to provide reliable, secure sources of electricity. Thermal has a role in that mix. We have never been of the view that we should have a one-technology energy supply, and we have always pushed a range of technologies.[46]

[43] Energy Strategy, paragraph 142
[44] Official Report, 7 February, col.41
[45] Official Report, 7 February, col.30
[46] Official Report, 21 February, col.38

Transmission charges

73. The Committee heard evidence about the impact of transmission charges. Highlands and Islands Enterprise said—

> Despite Ofgem's fundamental review of transmission charging (implemented in April 2016), the locational pricing that remains continues to risk undermining the ability of the region to contribute to national targets.[47]

74. Professor Haszeldine said—

> The problem that we face is that National Grid has developed a UK-wide transmission charging policy and a UK-wide model for delivering electricity at a low cost, but that does not take into account regional generation patterns and security.[48]

75. The National Grid responded that "locational charging is something that we have in the UK. All the generators are equally subject to that".[49] However, the Minister said, "the transmission charges are unhelpful because they do not allow sites in Scotland to compete on a level playing field with sites elsewhere".[50]

76. The Scottish Government's desire for additional capacity is at odds with the evidence from the National Grid who say this is not required. The Committee questions whether there is a need for additional thermal capacity for the purposes of mitigating climate change. We ask the Scottish Government to provide us with details of the modelling carried out to work out what installed capacity is needed. We will further examine the need for additional thermal capacity in our work on the draft Energy Strategy.

77. The Committee notes the evidence on the role of transmission charging in the electricity sector. The Committee will examine this issue in more detail as part of its work on the draft Energy Strategy.

[47] Written submission
[48] Official Report, 7 February, col 7
[49] Official Report, 7 February, col 30
[50] Official Report, 21 February, col 41

Homes and Heating

78. The CCP proposes measures that are expected to lead to a 76% reduction in emissions from the residential sector by 2032. This is the third largest reduction proposed, after electricity generation (120%) and services (96%) sectors.

Policy outcome 1 – heat demand reduction

79. Policy outcome 1 in the residential sector seeks improvements to the fabric of Scotland's domestic buildings resulting in a 6% reduction in their heat demand by 2032. The CCP notes that—

> The residential sector is very diverse varying in tenure, age, primary heat source and level of energy efficiency….23% of Scotland's homes are socially rented, 14% privately rented and 61% owner occupier. It is likely that over 80% of the housing in use today will still be in use in 2050.[51]

80. Key policies in relation to this outcome include the continued delivery of the Energy Companies Obligation (ECO), for which powers over design and delivery are being devolved; the Home Energy Efficiency Programmes for Scotland (HEEPS), which is expected to support the delivery of 14,000 energy efficiency measures by March 2018; the development of Scotland's Energy Efficiency Programme (SEEP) from HEEPS and ECO, for which pilot projects to deliver mechanisms for energy efficiency and low carbon heat are being carried out. SEEP is expected to be formally launched in 2018 and a consultation on SEEP is currently underway.

81. A further policy strand is the smart meter roll out; the UK Government committed to ensuring every home and business in the country is offered a smart meter by 2020, providing an opportunity for a greater understanding of final energy consumption.[52]

82. SEEP is intended to transform housing stock through lofts and wall insulation and efficient heating systems, making homes warmer and easier to heat. Considered to be the cornerstone of the Scottish Government's "whole energy approach", it is expected to deliver a step change in Scotland's approach to energy efficiency and low carbon heat.

83. The CCP does not appear to provide a baseline from which this 6% of heat demand is to be reduced. In addition, some witnesses told the Committee that the proposed rate of change to housing stock is not adequate and that more details are needed in relation to SEEP.

[51] CCP, paragraph 8.1.2
[52] CPP, paragraph 8.3

SEEP and regulations

84. Elizabeth Leighton of Existing Homes Alliance Scotland highlighted that in 2014-15, 87,000 energy efficiency measures were installed, and that the CCP suggests that "the number of measures that would be installed right the way through to 2032 stays static at 90,000", saying—

> That seems a bit like business as usual rather than a national infrastructure priority on energy efficiency that is transformational and moving us towards a housing stock that is truly low carbon. We need to up the number of measures that are going into homes, which will have to be done through a package of measures, including but not wholly reliant on regulation, because it will have to rely on people voluntarily uptaking measures, too.[53]

85. WWF-UK stated—

> The SEEP programme, which is expected to deliver the massive retrofit of all commercial buildings and domestic homes over a 15 to 20 year period, should be designed with a mix of measures. The intention is that there will be a mixture of incentives; there will be regulation for the private rented sector, regulation—in the long term—for the owner-occupied sector, which includes commercial buildings, and a range of different financial incentives such as the capital budget. There will be a mix of different approaches.

> The SEEP programme has been in development for about 18 months and the commitment to a national infrastructure priority was made in 2015. There is not enough detail in the consultation on the Government's preferred scenario for SEEP, on what the balance is between those measures, on how much money will be put up and on exactly when regulation will come in. Seeking clarity from the Government on those issues would be very useful if the plans for emissions reductions in the residential and services sectors are to be fully credible.[54]

86. The Existing Homes Alliance stated that the CCP does not "contain any new policies, nor an increase in budget commitment, to support transformational change in energy efficiency". They made a number of suggestions on how the Scottish Government could set a "transformational pace of change", with all appropriate energy efficiency measures installed by 2025. They suggested that given SEEP's importance to achieving the CCP ambitions, the Parliament should scrutinise its progress.[55]

[53] Official Report, 31 January, col.8
[54] Official Report, 31 January, col.41-42
[55] Written submission

87. Stop Climate Chaos Scotland made a written submission which noted—

> A significant part of the policies and proposals in this section are dependent on SEEP… However…SEEP is only being consulted on now, at the same time as the Draft Plan. Whilst consultations are currently taking place on various aspects of energy policy, including SEEP, it is concerning that so much of the success of the Plan in relation to energy efficiency relies on a programme which does not yet exist and for which no clear scenario has been established for delivery.[56]

88. The Consumer Futures Unit, Citizens Advice Scotland concurred, writing that the CCP relied on SEEP—

> to deliver energy efficiency measures in Scotland. While we have welcomed the Scottish Government designating energy efficiency as a national infrastructure priority, the detail of SEEP, and its central role in realising Scotland's ambitions in relation to climate change, remains to be seen.[57]

89. Witnesses also raised the issue of regulation for the private-rented and owner-occupied sectors. Existing Homes Alliance Scotland said—

> One good thing in the climate change plan is that it says that the Government is going to consult on regulation for the private rented sector on minimum standards of energy performance. That consultation is expected later next month.[58] Regulation is necessary to work on the bottom of the heap—the worst-performing properties that are flatlining and not picking up. The proposals will give a push to get those properties up to a minimum standard of energy performance. At the same time, we need to use incentives, advice and support to pull others higher up the energy performance certificate scale.

> The plan acknowledges that the Government will look at a phased approach to regulation for the rest of the private sector. We think that there should also be regulation of the owner-occupied sector. After all, if we deal only with the rented sector, that will be about a third of the properties, which will leave us with the bulk of properties not really having been addressed. Therefore, we urge the Government to bring forward that measure quickly so that we have a level playing field for all private housing stock. Regulation has worked well in the social housing sector, and private tenants and owners should benefit from the same good energy

[56] Written submission
[57] Written submission
[58] The Scottish Government told the Committee that the consultation on the private rented sector would be in March 2017.

> performance that gives us all the benefits of health and wellbeing as well as saving us money.[59]

90. The Minister recognised the issue, saying—

> In some urban contexts, it might be easy—or easier—to roll out a large-scale programme, working with large-scale landlords such as registered social landlords and councils... However, in the rural context, private rented accommodation is much more dominant... There is a mixture of approaches, and we are considering regulation…However, we have to be mindful of affordability and of the need to give people as much notice as possible.[60]

91. Stop Climate Chaos pointed to delays in carrying out work on the private sector—

> Both RPP1 and RPP2 committed to introducing regulation of energy efficiency in the private sector to make Scotland's homes warmer and significantly reduce fuel poverty. Despite a consultation promised by June 2015 on regulation in both private rented and owner occupied homes, the Scottish Government is now expected to consult on regulating just the private rented sector later in 2017. We are concerned that this delayed and limited consultation will result in further delays in achieving the necessary emissions reductions and realising the positive social, health and economic benefits resulting from improved energy efficiency.

92. Kathie Robertson, Head of Heat, Energy Efficiency and Low Carbon Investment Unit, Scottish Government, confirmed that there are Scottish Government plans to consult on the domestic private rented sector, from March 2017. It is expected that the Scottish Government will produce a timetable for future proposals for owner-occupied properties after that.[61]

93. The Minister recognised the role behaviour change must play in achieving the residential emissions reductions—

> I hope that we can deliver emissions reductions in the residential sector in a way that helps to save people money and makes people less exposed to fuel poverty, through SEEP…and through tackling the energy efficiency of our housing stock. I also hope that we can, beyond the residential sector, help businesses to improve the energy efficiency of their buildings by making them more fuel efficient, which will save them money…We are going to have to be positive in encouraging and helping individual householders to lower their emissions. We recognise that that is a pretty hefty challenge, but we always knew that it would get more difficult as time

[59] Official Report, 31 January, col.5-6
[60] Official Report, 21 February col.33
[61] Official Report, 21 February, col.34

> went by. The importance of achieving the target cannot be overstated, though. If we do not achieve it, the impact on our environment and the global community could be devastating.[62]

Smart Meters and behaviour change

94. Witnesses raised the issues around behaviour changes required, and the support that might be given to users through technological advances. Discussing smart meters, Professor Smith, Director of the Institute for Sustainable Construction and Professor of Construction Innovation, Edinburgh Napier University commented that—

> Most of the smart meters that are coming out now have an in-home display so that users can see and identify how much energy they are using, in terms of heat demand, around their homes. We did a study in which we used real-time displays with good colour graphics to explain easily to people how they use electricity, gas and water, through which we clearly saw a 7 per cent reduction in electricity use. We used the direct comparator of exactly the same income groups in exactly the same sizes of homes, but without the displays. People who used gas for heating reduced their gas consumption by 20 per cent. We have gone back to those properties over the past three years. People are looking less at their in-home displays because they have already started to change their behaviour: they know what they want to change in their houses in terms of radiators, thermometers and so on. People slip back occasionally, but they find it extremely useful to have a display that flashes and tells them that they have used more than a certain amount. If a red light comes on that tells them that they are using much more heat, that allows them to rebenchmark and reset. The reduction of 6 per cent is about improvements to buildings' fabric. That is different from insulation, which is more likely to result in an 8 per cent or 9 per cent reduction.[63]

95. Smart Energy GB highlighted the benefits of smart meters in relation to fuel poverty—

> We believe that vulnerable and fuel poor customers will benefit considerably from smart meters, and we have carried out substantial research to identify and mitigate against potential barriers to this…There are a higher proportion of pre-payment customers in Scotland than in the rest of Great Britain (around 20% of households for electricity, 18% for gas). The smart meter rollout is transforming the customer experience for pre-payment in particular, with a range of more convenient ways to top up credit, such as online and through a mobile phone. Additionally, because

[62] Official Report, 21 February, col.44
[63] Official Report, 31 January col.10-11

> smart meters are able to operate in either credit or prepayment mode, there is increasing parity between the cost of credit and pre-payment tariffs.[64]

96. Existing Homes Alliance added—

> Some of the new technologies are fantastic— using a smart phone to remotely manage heating, for example—but many people do not have a clue how to do such things, or even how to use their home heating controls. Some of the pilot studies for the new energy efficiency programme are looking at what kinds of support works best. We need to identify people's energy use needs and what the solutions are, and then introduce an aftercare programme to make sure that people know how to use the radiator controls and understand about curtains and all the basics.[65]

97. The draft Energy Strategy states the Scottish Government's intention to support Home Energy Scotland to improve consumers' understanding of their consumption patterns and help reduce energy bills, to enhance the consumer experience of Smart Meter roll out.[66] The CCP sets out the details of a workshop held with consumers on energy use which generated ideas and solutions to support behaviour change (such as making controls advice/engagement part of gas safety checks).[67] However, it is unclear from the CCP whether or how these actions may be taken forward.

6% reduction in heat demand

98. In response to a question on the target for residential buildings to reduce their heat demand by 6%, the Minister stated that—

> We still need to invest in the roll-out of energy efficiency measures. Targets in themselves are just a means of measuring progress; we need to back them with investment, which is why Scotland's energy efficiency programme is a national infrastructure project. If the budget is passed this week, more than £0.5 billion will be committed in the period up to 2020 to the roll-out of provisions in the SEEP process.[68]

99. The Minister emphasised the need for a nuanced approach to energy efficiency—

> As you will know, we face a big challenge with the existing building stock, but we have done very well in rolling out energy efficiency measures such as cavity wall insulation as well as more traditional insulation products to more difficult-to-treat properties such as rural properties with solid wall construction. If we were to focus purely on making all the building stock

[64] Written submission
[65] Official Report, 31 January, col.21-22
[66] Energy Strategy, p59
[67] CCP, Annexe, text box 15-2
[68] Official Report, 21 February, col.31-32

> energy efficient to a certain standard, we might eliminate options that could be more attractive or cost effective for particular buildings.[69]

100. The Committee wanted to establish what the current baseline figure for the proposed 6% reduction in heat demand by 2032 is. When asked about this, the Scottish Government responded as follows—

> If conservation measures were not installed, heat and hot water demand in residential in 2030 would be forecast to increase by approximately 15% to reach 123 PJ, from 107 PJ in 2012. Conservation measures satisfy around 6% of all heat demand in 2032, i.e. they serve to reduce heat demand by 6%. In the absence of these conservation measures this demand would have to be met through increased supply.[70]

Fuel Poverty

101. Measures to improve existing residential stock and the roll out of smart meters are two of the key drivers to address fuel poverty. Approximately 60% of homes in Scotland currently have an Energy Performance Certificate (EPC) rating that falls below Band C. In evidence to the Committee, the RSPB wrote—

> We would also support the phased regulation of existing buildings, to accelerate improvements in the energy efficiency of all building stock, and recommend that all homes to be brought up to an EPC C rating by 2025 to make a substantial impact on cutting fuel poverty and reducing emissions.[71]

102. The Royal Scottish Geographical Society agreed, writing, "we would echo calls for all homes to reach at least an EPC band 'C' by 2025, helping to address both climate change and fuel poverty"[72] while Friends of the Earth Scotland stated—

> With others, we have called for all homes to be brought up to an EPC rating of 'C' by 2025 to reduce emissions and help people out of fuel poverty. We are disappointed that there is no action as strong as this in the Plan.[73]

103. Kersti Berge of Ofgem made the point that there must be a balance between environmentally friendly innovations and the cost to the consumer, saying, "it is important that we get a balance between what is cost-effective and might work and achieving the environmental targets."[74]

[69] Official Report, 21 February, col. 31
[70] Written submission
[71] Written submission
[72] Written submission
[73] Written submission
[74] Official Report, 7 February, col.38

104. The Committee was informed that ending fuel poverty could increase energy demand on the basis that as energy became more affordable, it would be used more rather than at the same levels. Dr Keith Baker and Ron Mould wrote that—

> Tackling fuel poverty, particularly amongst the most vulnerable, means accepting that energy demand will increase due to influences including the rebound and prebound effects, and due to fuel poor households engaging in 'self-limiting' and other energy rationing behaviours.

> Conventional policy approaches cannot cope with the problem that human behaviour is highly (possibly infinitely) complex. We can influence single behaviour changes (seatbelts, smoking, etc) using simple measures (taxation, enforcement, etc), but household energy behaviours result from highly complex influences, and this is even more pronounced amongst rural, island and vulnerable households. [75]

105. Scottish Land and Estates wrote and highlighted the need for assistance for those experiencing fuel poverty—

> A new definition of fuel poverty is required and we understand this will be considered later in the year. An improved definition would make it easier to target those most in need and ensure low cost measures are being undertaken before awarding wide-scale public funding. Support in switching suppliers to reduce bills and a better understanding of heating controls would be hugely effective and low cost.[76]

106. Citizens Advice Scotland raised the issue of resource allocation in their written submission—

> if the Scottish Government are convinced about the range of health and economic benefits from energy efficiency and reductions in fuel poverty (all of which we agree with), we would question why the budget remains unchanged from previous years and is entirely taken from housing, rather than drawing on the economic development and health improvement budgets too.[77]

107. Stop Climate Chaos also questioned allocated resources—

> In areas such as energy efficiency, which the Scottish Government has designated a National Infrastructure Priority, bold new policy action is lacking. The Draft Plan moves too slowly with too little funding and does too little to tackle fuel poverty.[78]

[75] Written submission
[76] Written submission
[77] Written submission
[78] Written submission

108. During recent evidence to the Committee on the draft budget, the Scottish Government described £140 million of measures committed to this year was "an uplift on the previous year". They also mentioned ECO, the winter fuel payment, SEEP being developed for 2018, and "wider policy measures" through regulation but not public spend. Officials explained that "in broad terms" the domestic side of fuel poverty was covered by the Cabinet Secretary for Communities, Social Security and Equalities, the non-domestic by the Cabinet Secretary for the Economy, Jobs and Fair Work, but "increasingly" it was the latter's budget being used to develop SEEP, which will cover "all types of building".[79]

109. The Committee notes the proposal to make improvements to the fabric of Scotland's domestic buildings resulting in a 6% reduction in their heat demand by 2032; we note evidence that this target could be viewed as "business as usual" and recommend that the Scottish Government reconsiders the target and whether it could be more ambitious.

110. The Committee notes concerns about the pace of change proposed via SEEP and the lack of policy detail at this stage. The Committee looks forward to the planned consultation on minimum energy efficiency standards in the private rented sector but recommends that SEEP now be taken forward with some urgency. We recommend that the Scottish Government produce a detailed plan on how the retro-fitting of domestic buildings will be carried out and resourced, including owner-occupied and the private rented sectors.

111. Given SEEP's importance to achieving the CCP ambitions, the Committee agrees that the Parliament should continue to scrutinise its progress. SEEP is being consulted on as part of the overall energy strategy consultation. The Committee will examine these proposals further as part of its work on the draft Energy Strategy.

112. The Committee supports the use of smart meters to allow energy use in homes to allow consumers to monitor their own energy use. The Committee notes the Scottish Government's intention to support Home Energy Scotland (HES) in working with consumers on this. The Committee will seek the views of HES as part of its scrutiny of the draft Energy Strategy to continue its scrutiny of the roll out of smart meters.

113. The smart meter is one tool that assists with promoting the behaviour change that is required to reduce heat demand. The Committee notes the support being given to Home Energy Scotland but is surprised by the lack of detail in the CCP on any other actions planned to address the behavioural change required to reduce heat demand. The Committee recommends that the final CCP should include such detail.

[79] 1st Report, 2017 (Session 5): Report on the Draft Budget 2017-18
http://www.parliament.scot/parliamentarybusiness/CurrentCommittees/103256.aspx

114. The Committee notes the views of those who gave evidence that appropriate resources are required to deliver the planned changes, and asks the Government for further details on the proposed budget, including incentive-based schemes, grants and loans.

Policy outcome 2 – low carbon heat supply

115. The CCP proposes that 80% of domestic buildings' heat will be supplied using/from low carbon technologies/sources by 2032, including electrification of heat. Most of this work is planned to commence after 2025. At present, 79% of households are heated with natural gas, 12% with electricity, 7% with oil and the remainder with other fuels. Around 2% of homes are currently heated with low carbon technologies. Furthermore, it is estimated that 80% of current housing will still be in use in 2050.

116. A key policy in relation to this outcome is that the domestic Renewable Heat Incentive (RHI) continues to deliver renewable heat technologies until 2020/21. Uptake will be supported by advice and loan schemes such as the Home Energy Scotland Renewables Loan scheme. This is to help households identify renewable heat technologies and provide the capital to access the regular payments available from the RHI once the technology has been installed.

117. The District Heating Loan Fund (DHLF) and Heat Network Partnership Policy (HNPP) are also important. The DHLF helps address the financial and technical barriers to district heating projects by offering low interest loans to local authorities and registered social landlords etc. The HNPP is a collaboration of agencies focused on the promotion and support of district heating schemes in Scotland.

118. The key proposal on which this policy outcome is predicated is to develop and identify the best approach to long-term decarbonisation of the heat supply, commencing after 2025. The CCP states—

> We intend to include a proposal on how we may realise this potential, in a future Climate Change Plan, taking into account decisions that the UK Government will take on the future of the gas network and the outcomes of the consultation on the draft Energy Strategy.[80]

119. Elevating homes to a new regulated standard will take work. However, little action is planned before 2025, leaving seven years for the policies to be implemented before the 2032 target. Existing Homes Alliance Scotland commented—

> Our concern is that it is expected that, in future, there will suddenly be a huge drop in emissions as we introduce low-carbon heat. However, we feel that much more can be done during the current period. The measures are

[80] CCP, paragraph 8.3.4

> available…We think that, through several steps, about 30 per cent of our housing stock could be brought on to low-carbon heat during the first few years of the programme, so we do not need to wait.[81]

They added that—

> We should not wait till 2025 on low-carbon heat. Only a slight increase is planned for between now and 2020 but much more could be done.[82]

120. Elaine Waterson of Energy Saving Trust discussed the scale of work required to move households onto low-carbon heating in that seven year interval—

> arguably, we are looking at more than 2 million households having to have heating systems retrofitted. If that is expected to happen in that really short time period between 2025 and 2032, what will happen with regard to someone who installs a new gas boiler in 2025? That boiler will have a lifetime of 12 or 15 years, which goes beyond the 2032 timescale. Will we ask people to replace that system before the end of its life? There is a lot of uncertainty in this area, and I am not sure that anyone knows the answers.[83]

121. The Energy Saving Trust noted that it was currently unclear how the heating mix could change from 80% gas to 80% low-carbon in 15 years and that "more work needs to be done to define the issues", adding—

> I am not sure that anyone understands how that will happen. That is part of the problem. It is unclear what the mix will look like up to 2032. Will the majority of people be on air source heat pumps? How many people will be connected to district heating? What proportion of households will be heated by gas, but with hydrogen injected?[84]

122. In setting targets for the residential and services sectors, the TIMEs model was allowed to shift away from the use of natural gas in boilers for heat and hot water provision only after 2025, and then at a maximum rate of 20% per annum. The Scottish Government said—

> This was carried out to reflect practical limitations upon how rapidly alternative technological solutions could be implemented, resulting in more proven approaches, such as conservation measures, being prioritised in earlier years of study period.[85]

[81] Official Report, 31 January, col.4-5
[82] Official Report, 31 January, col.12
[83] Official Report, 31 January, col.18
[84] Official Report, 31 January, col.18
[85] Written submission, TIMES model

123. Kathie Robertson of the Scottish Government explained that much of the work until 2025 is around exploring options and routes, saying "the focus between now and the mid-2020s is on demand reduction and no-regret or low-regret heat solutions" so that consumers do not end up with less ideal energy technologies. She said that—

> We want to be very sure that we understand what will happen across the UK before we push people or businesses into taking up particular technologies, with the possible result that they end up with a stranded asset or regret making that choice… When it comes to a specific focus on district heating, heat pumps and one or two of the other tested technologies, 2025 is as far as we can look at this point in time.[86]

124. The question of resourcing was also raised. Energy Saving Trust said—

> I will just emphasise that there are various ways of softening the blow of regulation such as providing zero interest loans for people and providing grants for the fuel poor so that they are able to bring their homes up to a new regulated standard.[87]

Hydrogen

125. In the draft Energy Strategy, the Scottish Government proposes to explore the role for hydrogen in the energy system in Scotland.[88] Dr Winskel told the Committee—

> In the last two years, the idea of using hydrogen in the gas mains and distribution network has come back into policy interest. I know that the Scottish Government is really looking at that. A modest amount of that is already built into the climate change pathway. The Government is looking at a much greater take-up of hydrogen for heating in the energy strategy to 2050. The problem… is that not much is happening in the climate change plan in terms of deploying such technologies up to 2027, and then there are seven years of very rapid change.[89]

126. Professor Haszeldine commented on the potential use of hydrogen, and said—

> There are big possibilities for co-benefits for hydrogen…if we go down the hydrogen route for heating and make hydrogen available as an energy vector in Scotland…hydrogen technology exists in other countries that is perhaps five or 10 years behind in terms of commercialisation, but we are taking decisions that will set a trajectory for Scotland for maybe 50 or 100 years. We should not be rushing to make decisions without a true analysis of the evidence.

[86] Official Report, 21 February, col.45-46
[87] Official Report, 31 January, col.6
[88] Energy Strategy, paragraph 81
[89] Official Report, 21 February, col 40

> If we want to supply hydrogen at national scale, Scotland is uniquely well positioned to do so, because we can manufacture hydrogen by splitting methane gas—that is a well-established process that can be bought in. If we do that, we need to take away the carbon dioxide and store it. We could do that and create a carbon dioxide storage industry.[90]

127. The Scottish Government told the Committee--

> At point of use hydrogen is a zero emissions fuel, and by 2050 could be a major component of the UK's energy system. The versatility and flexibility of hydrogen gas and hydrogen fuel cells offers the potential to provide a range of services to the energy system and to integrate low carbon solutions across the heat, power and transport sectors.

> As set out in our draft Energy Strategy, the Scottish Government and its agencies will continue to work with the UK government, industry, and the academic sector to build on the findings and recommendations of the Roadmap, and current hydrogen projects to establish the strategic basis for hydrogen in the energy system.[91]

District Heating

128. As outlined above, one of the policies aimed at achieving the decarbonisation of residential heat is district heating. Gillian Hurding, ACCESS Project Manager, Community Energy Scotland, told the Committee that—

> Community energy is driving innovation and is at the forefront of innovation, and it is a real achievement of Scottish communities.[92]

129. Oral evidence to the Committee has suggested that evidence relating to the effectiveness and desirability of district heating schemes is mixed. Dr Winskel noted that—

> evidence on heat is really mixed…We are at the stage where every option for heat has its advantages and disadvantages. District heating is getting a lot of interest within the Scottish Government and in the Scottish energy community. There are dangers there…Some of the scenarios suggest that district heating is an expensive infrastructure commitment, involving a very expensive step-by-step approach to putting in the infrastructure. [93]

130. When giving evidence to the Committee as part of a previous round table on energy, Dr Winskel noted that "the biggest supply chain for domestic gas boilers is in the UK", and in relation to "the Scandinavian model on district heating"—

[90] Official Report, 7 February, col.22
[91] Written submission
[92] Official Report, 31 January, col.32-33
[93] Official Report, 31 January, col. 44

> The question for me is whether that is the best way of delivering UK policy objectives on heat, given that we are starting not from where Denmark was in 1970 or 1975 but from where we are now, with a heavily invested national gas grid. It is not obvious that the Scandinavian model is the one for the UK to follow, partly because the infrastructure cost of getting there would be extremely high and would have to come from public or private funding. It would not be at all straightforward to copy the Scandinavian model.[94]

131. Dr Winskel outlined some concerns about the source of heat for district heating schemes—

> There are also concerns about where the low carbon heat comes from. Heat networks are essentially a heat pipe in the ground that is not connected to anything specifically. At the moment they tend to be used with a gas combined heat and power engine. Let us consider the carbon savings that we get from running that, assuming that we get the electricity decarbonisation. Even by the time we get the electricity decarbonised—electricity being pretty well decarbonised already in Scotland— district heating running on a conventional gas engine does not provide any carbon savings.

> It would be [more efficient than individual boilers] if we were starting by building something from scratch. In the UK we have spent a long time developing an efficient national system of gas transmission and distribution, using domestic-scale boilers. The implications of going from households to a community-scale heat system involve quite a disruptive change for the UK. That needs to be factored into the pathway.[95]

132. Scottish Renewables argued that off gas-grid properties and district heating schemes should be priority action areas. They believed this would help smooth the emissions reduction pathway between now and 2030, while cutting emissions sooner.[96]

133. Committee Members undertook a visit to Dundee City Council (DCC) in January 2017 to view some of the district heating work and external cladding projects to address fuel poverty and energy efficiency. This work was accomplished through the HEEPS area based scheme (ABS). Dundee City Council followed up this visit with written evidence, highlighting some of the difficulties they have faced in what is generally regarded as a highly successful scheme—

> as well as improving the energy efficiency of the flats (thereby helping the Council flats reach [Energy Efficiency Standard for Social Housing]

[94] Official Report, 20 September, col.18
[95] Official Report, 31 January, col.44-45
[96] Written submission

> EESSH), the works have improved comfort levels within homes, saved residents money on fuel bills and transformed the overall appearance of the areas treated. A further benefit is in the provision of local employment opportunities. DCC is very keen to continue with its current approach until all solid-wall and non-traditional flats have been insulated. However, current HEEPS:ABS levels suggest that it will not be able to do so before the EESSH deadline in 2020 as there are simply too many private flats that require HEEPS:ABS funding within the DCC stock. The Council has allowed for sufficient budgets for its own stock in this timescale but external insulation cannot proceed unless all flats are included – without HEEPS:ABS funding it is very unlikely that owners would be prepared to pay even a contribution towards their share of costs. Any diminution of the HEEPS:ABS budget would simply exacerbate this situation so DCC would appeal to the Scottish Government to retain allocations at recent levels as an absolute minimum.[97]

134. They also cited the difficulties faced where single owners within a block of flats have refused to have the work completed. This means that the work for the entire block cannot go ahead, as unanimous approval is needed. They asked for "Any assistance the Scottish Government can give in resolving this Dundee City Council situation so that the majority who want external insulate can get it"[98].

135. Others pointed out areas where district heating can be problematic. Energy UK wrote to the Committee to recommend that, "To support the investment decision in district heating, government should reduce district heating business rates to equalise business rates with gas networks."[99] When asked about non-domestic rates for renewable energy schemes, the Minister said—

> We have been engaging with Scottish Renewables and the industry on that, and we have also been feeding that into Mr Mackay. I know that he is listening carefully to those concerns, and I hope that we will be able to address them in due course.[100]

136. Subsequently, Derek Mackay, Cabinet Secretary for Finance and the Constitution announced a package of non-domestic rate relief for the renewables sector to Parliament—

> For the renewables sector, we will offer a package of reliefs, which will include rolling forward current rates relief up to 100 per cent for qualifying community renewables projects and new-build schemes, lowering the eligibility threshold that is related to community profit share schemes from 1MW to 0.5MW; capping rates bill increases at 12.5 per cent for small-

[97] Written submission
[98] Written submission
[99] Written submission
[100] Official Report, 21 February, col 50

> scale hydro schemes of up to 1MW; and offering a new 50 per cent relief for district heating schemes.[101]

137. Citizens Advice Scotland raised the issue of consumer protection—

> The draft CCP sets out the need for district heating. While we support this technology in appropriate settings, as outlined by the Scottish Government's Strategic Working Group on Fuel Poverty there is currently a lack of statutory protection for consumers using district heating. More generally, district heating schemes are run as supply monopolies, and therefore there is an additional need to protect consumers against overly high prices as there is generally no option to switch supplier or tariff. The risks involved with developing district heating systems, with the capital expenditure spread across a smaller number of people means that the cost of capital for such schemes is high. The Scottish Government Draft should ensure that consumers are not liable for these costs.[102]

138. The Minister told the Committee—

> District heating is a mature technology used in many cities across Europe which is not yet common in the United Kingdom. As an example, the Copenhagen district heating system is one of the world's largest, oldest and most successful, supplying 97% of the city with clean, reliable and affordable heating.

> In the short term, recognising the acceleration of district heating and the increasing number of large scale district heating projects in the pipeline, and that there is still a lack of mainstream investment for early stage district heating projects, as well as considering the regulatory framework, we are exploring innovative financial mechanisms that will allow us to attract private sector funding and bring confidence to the market.[103]

139. The Committee supports the move towards low-carbon heat supply while recognising that transforming our heating supply from predominantly gas to low-carbon sources will require significant change. The Committee notes that the technologies to deliver this change are evolving and this explains, to some extent, the intention to have an intense period of change from 2025-2032. However, the Committee urges the Scottish Government not to delay for so long, on the basis that transforming the housing stock within 7 years strikes us as unrealistic.

[101] Chamber, Official Report, 21 February, col 20
[102] Written submission
[103] Written submission

140. Given the scale of change planned for 2025 onwards, the Committee is of the view that more might be done in the intervening period to front-load some of this work. More details of how the work between 2025 and 2032 will progress are essential in order for those involved to understand how this shift from gas heating to low carbon heating will be achieved.

141. The Committee was impressed by the district heating project it visited and supports the benefits that such schemes offer to residents and in supporting the CCP. The Committee notes the potential barriers to developing district heating projects, including housing tenure, persuading people to sign up, the need for sufficient resources for such projects to proceed and the need to ensure that consumers are protected. The Committee asks the Government to report back to us on what steps are being taken to address these issues.

142. The Committee notes the potential role of hydrogen in the energy system and as a replacement for gas in heating homes. The Committee will examine this policy in more detail as part of its work on the draft Energy Strategy.

143. The Committee notes the concerns expressed in relation to non-domestic rates for district heating and changes to non-domestic rates for renewables. The Committee will examine the issue of non-domestic rates in more detail during its work on the draft Energy Strategy.

Services

144. The services sector is expected to reduce its carbon emissions by 96% by 2032: the second most ambitious reduction in the CCP. The CCP notes that emissions in the services sector have been relatively stable since 1990, albeit with a drop in 7% since 2009. There are, however, difficulties in compiling data on this sector. The CCP states that—

> Historical data on the profile of non-domestic building stock for the services sector, and its energy use, have been limited…The Scottish Government is currently undertaking further analysis to establish a baseline for non-domestic buildings' energy and emissions data, against which progress under the Climate Change Plan can be measured…[104]

Policy Outcome 1 – 10% reduction in heat demand

145. Policy outcome 1 is that improvements to the fabric of Scotland's non-domestic buildings will result in a 10% reduction in their heat demand by 2032. Key policies in relation to this are continued investment support through the Low Carbon Infrastructure Transition Programme, the work of the Public Sector Energy Efficiency Procurement Framework, and various non-domestic energy efficiency finance schemes.

146. Improvements to the fabric of non-domestic buildings are projected to result in a 10% reduction of their heat demand by 2032, with interim targets of 4% (2020) and 6% (2025).[105] However, given a current lack of baseline figures, it is unclear how this will be measured.

147. Proposals include reviews of both the Assessment of Energy Performance of Non-domestic Buildings (Scotland) Regulations 2016 and energy standards within building regulations (as outlined above).[106]

148. Oral evidence from Professor Smith suggested that this reduction was not realistic—

> The biggest gap that we face in going forward with carbon reduction and energy efficiency plans across all building stock is in the non-domestic—by which I mean commercial and public sector—area.

> There are some great projects going on in Scotland to determine more accurate, better solutions. The City of Edinburgh Council is mapping all its current non-residential building stock so that it can look at the various

[104] CCP, paragraph 10.1.2
[105] CCP, table 10-4, page 97
[106] CCP, paragraph 10.3.2

solutions. Other local authorities have also been looking at various aspects of their building stock.

> A huge amount of work is required in the private sector. At least we can take a standardised approach in housing. We have 170,000 four-in-a-block properties and 240,000 tenements in Scotland, so we have a fantastic opportunity to take a standardised approach. As soon as you look at commercial or public buildings, you can see the wide variation in stock across the country, so the remedial treatments—the fabric or energy solutions—that are required to reduce the carbon footprint become more complex and bespoke.[107]

149. The Environmental Association for Universities and Colleges told the Committee that many within the FHE sector would "struggle" to reach the heat demand and decarbonisation targets without "significant investment to improve the fabric of older buildings as well as implement low carbon technologies."[108]

150. Transition Black Isle told the Committee—

> For services, [again] emissions have been steady since 1990, despite improvements in building fabric and improvements in energy efficiency, so again we are concerned that further improvements in these areas may fail to deliver the anticipated emission reductions. Personal experience is of over-heated office buildings and wasteful use of lighting, giving scope for considerable savings from behaviour change.[109]

151. The Minister noted the Scottish Government's desire to "work not just with domestic properties but with non-domestic properties, which can be challenging". He added—

> In new towns…where a lot of buildings have been built at roughly the same time, we know that a huge number of non-domestic properties are in need of investment to make them energy efficient. That is both a problem for local authorities and an opportunity, in that they might be able to roll out a programme with relative efficiency over a larger number of building units. Because the buildings are all of the same type, they might learn a lot from working on the first one and be able to make efficiencies and economies of scale in working on subsequent buildings.[110]

152. As for the residential sector, the Committee asked the Scottish Government what work is being done to model and predict heat demand in the services sector in

[107] Official Report, 31 January, col.20
[108] Written submission
[109] Written submission
[110] Official Report, 21 February, col. 32

2032, and how this policy outcome was calculated if the 2017 baseline figure is not known. The Scottish Government responded that—

> If conservation measures were not installed heat, hot water and cooling demand in services in 2030 would be forecast to reach 65 PJ, increasing from 52 PJ in 2012.

> Conservation measures satisfy around 10% of all heat demand in 2032, i.e. they serve to reduce heat demand by 10%. In the absence of these conservation measures this demand would have to be met through increased supply.[111]

Policy Outcome 2 – 94% of heat supplied by low carbon technology

153. By 2032, it is proposed that 94% of all non-domestic building heat will be supplied by low carbon heat technologies, with interim targets of 64% by 2020, and 65% by 2025. Current estimates are that 50% of non-domestic buildings' heat is supplied by electricity.[112] While electricity is not currently considered to be low carbon, the Committee recognises that if policy outcome 1 is achieved, it will become low carbon.

154. Key policies in relation to this are the continuation of the District Heating Loan Fund, Heat Network Partnership, Low Carbon Infrastructure Transition Programme, and the non-domestic Renewable Heat Incentive and its associated programmes. Proposals relate to developing and identifying the best approach to the long-term decarbonisation of the heat supply, to commence after 2025.[113]

155. WWF-UK stated—

> on heat, there is a stretching policy outcome in…the…services sector for almost complete decarbonisation…94 per cent in the non-domestic sector. However, there is very little detail about how that will actually be delivered and what the technology mix will look like. There is a proposal that backloads effort to the late 2020s, starting from 2025. There is an issue around policy credibility there.[114]

156. In written evidence to the Local Government and Communities Committee, the Sustainable Scotland Network (SSN) commented—

> SSN has concerns about how this 15-year plan relates to the current reality in the public sector. Of particular note is how the 96% reduction in the Services Section (of which the public sector is a part) will be achieved. In the short run of the next four years or so, this will be heavily dependent on

[111] Written submission
[112] CCP, page 92; table 10-8
[113] CCP, paragraph 10.3.4
[114] Official Report, 31 January, col. 27

> ramping up action on energy efficiency; and for the period from 2025 to 2032 this will be reliant on new technologies being available, adopted and implemented and a significant move away from gas heating. While it is too early to make a thorough assessment, we have concerns relating to ability to scale up the pace of action on energy efficiency measures, the availability of appropriate technology, the barriers related to getting projects delivered, and the need to take a system-wide view on how to implement the changes envisaged. SSN would therefore welcome on-going opportunities to work with the Scottish Government to look in detail at how these targets can be met.[115]

157. Whilst energy efficiency measures are essential, behaviour change will play a key part in achieving a reduction in heat demand in the services sector. The Committee notes the practical measures planned by the Scottish Government, such as the public sector energy efficiency procurement framework, but believes that behaviour change is also key to achieving the targets. The Committee asks the Scottish Government to report back on how behaviour change considerations were used to inform the selection of policies, proposals and delivery routes in the services sector.

158. The Committee is concerned that lesser emissions reductions in transport or agriculture may put particularly ambitious expectations upon the services sector.

159. As with the residential sector, the Committee questions whether it is prudent to wait until after 2025 to develop an approach to decarbonisation of heat supply to the services sector and seeks clarification on what work is being carried out at present. As stated above, the 2025-2032 window for transforming the energy supply to mainly low-carbon sources in the services sector will require significant change. The Committee agrees with evidence that this timescale is unrealistic and urges the Scottish Government to consider beginning this process sooner.

[115] Written submission to Local Government and Communities Committee

Industry

160. The industry sector relates to industrial activity and manufacturing in Scotland. The sector includes those energy-intensive industrial sectors that are included in the EU Emissions Trading System (ETS). Between 1990 and 2014 emissions from the industrial sector fell 50.5%. A significant part of this occurred in the period to 2000 as a result of a decline in manufacturing and the iron and steel industry.[116]

Policy Outcome 1 – industrial emissions reduced by 19%

161. Policy outcome 1 is that industrial emissions fall by around 19% between 2014 and 2032, through a combination of fuel diversification, energy efficiency and heat recovery, and participation in EU carbon markets. Key policies which support this include the EU ETS which, by setting emissions caps, is expected to deliver a 43% reduction on 2005 EU emissions levels by 2030; the UK Climate Change Levy (CCL) and Climate Change Agreements (CCAs) which incentivise a shift from gas to alternative fuels, and deliver energy efficiency and emission reduction targets for energy intensive industrial sectors; the non-domestic Renewable Heat Incentive (RHI); and the Manufacturing Action Plan.[117]

162. Dr Winskel told the Committee that by comparison with the residential and services sectors, the carbon envelopes for both industry and transport are relatively modest to 2032. He wrote—

> The CCC [also] recognised the challenges of industry sector abatement, but suggested that out to 2032, upgrades and replacements to existing processes and equipment to improve their energy efficiency, combined with switching away from direct combustion to using biogas and biomass was a more significant source of emission reductions than the use of CCS (although CCS becomes important after 2030 in CCC scenarios).[118]

163. The CCP states that EU ETS and UK carbon taxes and related reliefs ensure continuing access to the level-playing field for industry across the UK and EU and—

> The Committee on Climate Change has already confirmed that it expects that available rules for future phases of the EU ETS will imply a reduction in Scottish net emissions in these sectors of 34% from 2013 to 2030. The ETS cap will therefore make a major contribution to the 19% emissions reduction envelope for industry from 2014 to 2032.[119]

[116] CCP, paragraph 11.1.1
[117] CCP, pages 105-107
[118] Written submission
[119] CCP, paragraph 11.2.3

164. The CCP goes on to explain that—

> The impact of the UK's exit from the European Union on the role of emissions trading is not factored into the draft Plan, since the UK Government has not yet commenced negotiations with the EU, and has not yet taken a position on the UK's future relationship with the EU Emissions Trading System. The EU ETS remains a fundamental part of UK and Scottish climate change legislation. Powers exist under the Climate Change Act 2008, to create emissions trading schemes in the UK.[120]

165. In oral evidence, Professor Haszeldine stated—

> The EU emissions trading scheme has been an overarching umbrella to guide our pathway to emissions reduction for much of what the UK has done in electricity generation and in industry emissions. As a result of leaving Europe, that overarching system will disappear as an obligation. The question is whether we will have a shadow system in the UK that will dictate a trajectory and enforce an overall carbon price across the economy, or whether we will abandon that and take responsibility, either sectorally or as different parts of the UK, for delivering our trajectory on that. To me, that is a major change. In the European trading system, it was very likely that attempts would be made to push up the carbon price from its present €5 per tonne of carbon dioxide up towards €20 or even €40 per tonne of carbon dioxide. Knowing whether we are going to go along a similar or parallel pathway will dictate the economics of the delivery of all that.[121]

166. The Committee notes the role of partners to assist in working towards meeting industry emissions targets and other targets in the CCP. For example, SEPA told the Committee that it is seeking to work with businesses to support behaviour change, innovation and problem solving, aiming to bring about further incentives for businesses to reduce greenhouse gas emissions.[122]

167. The Committee asked the Minister what other options are available to fulfil this policy outcome if Scotland is no longer in the EU ETS and what discussions have been had with the UK Government in relation to this. The Minister responded as follows—

> Participation in the EU ETS is fundamental to our domestic climate change legislation. It is the single most significant contribution to our emissions reduction, covering around 40% of Scottish emissions under the Climate Change Act (Scotland) 2009 (and similarly 40% of UK emissions under the

[120] CCP, paragraph 11.2.3 (footnote)
[121] Official Report, 7 February, col.5
[122] Written submission, paragraph 10

> Climate Change Act 2008). It is also fundamental to the EU's (and therefore the UK's) contribution to the Paris Agreement.

> The particular nature of Brexit will have profound implications for whether the UK (or Scotland) continues to participate in the EU ETS from 2019 (including in phase IV from 2021 which is currently the subject of reform proposals). At this stage, there is no official UK Government position on Brexit with respect to the future of the UK's involvement in the EU ETS.

> Scottish Ministers continue to engage UK Ministers to impress on them Scotland's position; Scottish Government officials are part of the stakeholder led Emissions Trading Group which meets quarterly and engage similarly at official level.[123]

168. The Committee notes the role of the EU ETS in achieving reductions in emissions levels and notes that the Scottish Government is engaging with the UK Government on its role after the UK leaves the EU.

Policy Outcome 2 – demonstration of technologies at commercial scale

169. Policy outcome 2 is that technologies critical to further industrial emissions reduction (such as CCS, carbon capture and utilisation, and production and injection of hydrogen into the gas grid) are demonstrated at commercial scale by 2030. The Manufacturing Action Plan sets out relevant industrial policy for energy efficiency and decarbonisation of the work-stream.

170. Oral evidence from Professor Haszeldine stated—

> There is a lot of wishful thinking about how we can support our industries to avoid carbon leakage, closure or migration to other parts of the world. We should perhaps think about taking an even more positive view and being assertive through the creation of low-carbon industrial zones that act not to preserve the past but to attract future low-carbon industrial manufacture and thereby generate low-carbon industrial exports from Scotland. Powering those…is a very big question indeed.[124]

171. Furthermore—

> if we think about how we are going to decarbonise our industry emissions from, let us say, the east of Scotland and the Grangemouth complex, CCS is the key way of doing that, and we need to address that for the future. If we are going to supply low-carbon heating through the means of hydrogen,

[123] Written submission
[124] Official Report, 7 February, col.8

> we have to generate the hydrogen, and CCS is a key part of that delivery.[125]

172. The Committee has asked the Scottish Government what work it is doing to support industrial CCS, and what the barriers are to it being at a demonstration stage in 8 years. The Scottish Government responded as follows—

> We have set out the importance of the demonstration of CCS technology in Scotland within our climate change plan and our energy strategy. The near-term demonstration of small scale projects leading to the medium and large-scale deployment of Carbon Capture Storage (CCS), along with the development of CO_2 Utilisation (CCU) applications, will be critical for the cost-effective decarbonisation of heat, power and industry.

> We will work with industry to assess opportunities for small scale CCS demonstration and CO_2 Utilisation projects in Scotland across a range of sources including the application of CCS within industrial processes.[126]

173. The Committee notes the aim in the CCP to demonstrate technologies such as hydrogen and CCS at commercial scale by 2030. As set out above, there is very little detail about many aspects of the CCP, including how this target will be achieved. The Committee recommends that the final CCP should contain more detail on how the policy outcomes for industry will be achieved and implemented.

Behaviour change

174. Many of the policy outcomes set out in the CCP require behaviour change across the sectors. The Committee asked the Scottish Government how behaviour change considerations were used to inform the selection of policies, proposals and delivery routes in the electricity, residential, business and public sectors and industry. The Scottish Government told the Committee—

> Influencing behaviours is key to achieving many of the policies in the draft Climate Change Plan. To support work on understanding and influencing behaviours the Individual, Social and Material [ISM] tool was developed and this is assisting policy areas to scrutinise the factors that influence people's behaviours.[127]

175. Scottish Renewables emphasised the role of education and engagement—

[125] Official Report, 7 February, col.13
[126] Written submission
[127] Written submission

> In particular, the targets to supply 80% of domestic and 94% of non-domestic buildings' heat from low-carbon technologies by 2032 will require individuals and business owners as well as the public sector to share the Scottish Government's ambitions. It is unclear as to how this buy-in of support will be gained without clear and concise messages on what the target means and why it's important we all help meet them.[128]

176. Similarly, RSPB said—

> We consider that behaviour change has an important role to play in reducing energy demand, and we would expect to see much more detail on how this will be brought about in order to gain the maximum benefit from the measures proposed.[129]

177. The Energy Savings Trust praised elements of the CCP approach to behaviour change—

> In terms of behaviour change, we note and welcome the attention given to the role of 'behaviours in achieving transformational change' within the draft CCP. It is clearly important that assumed savings from energy efficiency measures are actually delivered in practice and behaviour change will obviously have a key role to play here.[130]

178. However, Transition Black Isle commented—

> We [therefore] think the Plan should include more emphasis on engaging with the public and communities, and demonstrating a consistent government approach to climate change, in order to encourage behaviour change. Although this is discussed in the Draft Plan, there is little detail about specific policies or policy outcomes relating to behaviour change.[131]

179. The Committee notes the use of the ISM tool and other measures contained in the CCP aimed at encouraging behaviour change. However, the Committee agrees with Scottish Renewables and others that the final CCP must communicate clear messages about the targets and the behaviour changes required to meet them.

[128] Written submission
[129] Written submission
[130] Written submission
[131] Written submission

Annexe A

GLOSSARY

Acronyms used in the report—

ABS	Area Based Scheme
BECCS	Bioenergy
CCAs	Climate Change Agreements
CCC	Committee on Climate Change, an independent body that advises the UK and devolved Governments
CCL	UK Climate Change Levy
CCP	Draft Climate Change Plan
CCS	carbon capture and storage
CCU	CO_2 Utilisation
CfD	UK Contracts for Difference
DCC	Dundee City Council
DHLF	District Heating Loan Fund
ECCLR	Environment, Climate Change and Land Reform
ECO	Energy Companies Obligation
EESSH	Energy Efficiency Standard for Social Housing
EPC	Energy Performance Certificate
ETS	EU Emissions Trading System
FHE sector	Further and Higher Education Sector
GHG	Greenhouse Gas
GW	Gigawatts 10^9 watts
HEEPS	Home Energy Efficiency Programmes for Scotland
HNPP	Heat Network Partnership Policy
IPCC	United Nations Inter-Governmental Panel on Climate Change
ISM	Individual, Social and Material
Ofgem	Office of Gas and Electricity Markets
PJ	Petajoule (equal to one quadrillion (10^{15}) joules)
RHI	Renewable Heat Incentive
RPP1	First Report on Proposals and Policies 2011
RPP2	Second Report on Proposals and Policies 2013
SEEP	Scotland's Energy Efficiency Programme
SSN	Sustainable Scotland Network

Annexe B

Extracts from the minutes of the Economy, Jobs and Fair Work Committee and associated written and supplementary evidence.

4th Meeting, Tuesday 31 January 2017
2.Climate Change Plan and Energy Strategy: The Committee took evidence from—
Elizabeth Leighton, Policy Adviser, Existing Homes Alliance Scotland;
Professor Sean Smith, Director of the Institute for Sustainable Construction and Professor of Construction Innovation, Edinburgh Napier University;
Elaine Waterson, Strategy Manager, Energy Saving Trust;
Andrew Mouat, Principal Officer – Carbon Management, Glasgow City Council;
Gina Hanrahan, Climate and Energy Policy Officer, WWF-UK;
Professor Keith Bell, ScottishPower Professor of Smart Grids, co-Director of the UK Energy Research Centre, University of Strathclyde;
Dr Mark Winskel, Research Fellow, University of Edinburgh;
Gillian Hurding, ACCESS Project Manager, Community Energy Scotland.
3.Climate Change Plan and Energy Strategy (in private): The Committee considered evidence heard at today's meeting.

Written Evidence

- Energy Saving Trust
- WWF Scotland
- Dr Mark Winskel
- Institute for Sustainable Construction

5th Meeting, Tuesday 7 February 2017
2.Climate Change Plan and Energy Strategy: The Committee took evidence from—
Christine MacKenzie, Public Affairs Manager for Scotland, SSE;
Jenny Hogan, Director of Policy, Scottish Renewables;
Lindsay McQuade, Policy and Innovation Director, Scottish Power Renewables;
Stuart Haszeldine, Professor of Carbon Capture and Storage, University of Edinburgh;
Julian Leslie, Head of Electricity Network Development, and Nicola Pitts, Head of Commercial Frameworks - Gas, National Grid;
Kersti Berge, Partner, Networks and Head of Ofgem in Scotland, and Andy Burgess, Associate Partner, Energy Systems Integration, Ofgem.
3.Climate Change Plan and Energy Strategy (in private): The Committee considered evidence heard at today's meeting.

Written Evidence

Scottish Renewables

Supplementary Evidence

Professor Stuart Haszeldine

6th Meeting, Tuesday 21 February 2017
5.Climate Change Plan and Energy Strategy: The Committee took evidence from—
Paul Wheelhouse, Minister for Business, Innovation and Energy, The Scottish Government;
Mike King, Economic Adviser, Sue Kearns, Deputy Director, Energy Deployment Division, Kathie Robertson, Head of Heat, Energy Efficiency and Low Carbon Investment Unit, and Chris Stark, Director of Energy and Climate Change, Scottish Government.
6.Climate Change Plan and Energy Strategy (in private): The Committee considered evidence heard at today's meeting.

Supplementary Evidence

Scottish Government
TIMES Model

7th Meeting, Tuesday 28 February 2017
Draft Climate Change Plan (in private): The Committee considered a draft report, various changes were agreed to, and the Committee agreed to consider a revised draft, in private at a future meeting.

8th Meeting, Tuesday 7 March 2017
Draft Climate Change Plan (in private): The Committee considered and agreed a draft report.

List of other Written Evidence

- Scottish Environment Protection Agency
- Scottish Water
- Dr Keith Baker and Ron Mould
- Paths for All
- Historic Environment Scotland
- Peter Batten
- RSPB Scotland
- Royal Scottish Geographical Society
- Environmental Association for Universities and Colleges (EAUC)
- Aberdeenshire Council
- Sustaining Dunbar
- Royal Town Planning Institute Scotland
- Weinberg Next Nuclear
- Calor Scotland.
- Energy UK
- Brookfield Renewable UK Limited
- Smart Energy GB
- Transition Black Isle
- Highlands and Islands Enterprise
- Stop Climate Chaos Scotland
- Mineral Products Association and the Mineral Products Association Scotland
- Modern Masonry Alliance
- Keep Scotland Beautiful
- Consumer Futures Unit at Citizens Advice Scotland
- Scottish Natural Heritage
- NHSScotland-SSG
- Zero Waste Scotland
- Friends of the Earth Scotland
- Just Transition Partnership
- Scottish Land & Estates
- Stirling Council
- Homes for Scotland
- Dundee City Council (Neighbourhood Services Department – Housing Investment Unit)
- 2050 Climate Group

Late Submissions

- Renfrewshire Council
- Scotch Whisky Association

