House of Commons

Energy and Climate Change Committee

2020 renewable heat and transport targets

Second Report of Session 2016–17

HC 173

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The Energy and Climate Change Committee

The Energy and Climate Change Committee is appointed by the House of Commons to examine the expenditure, administration, and policy of the Department of Energy and Climate Change and associated public bodies.

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Summary

The UK is legally bound to provide for 15% of its energy needs—including 30% of its electricity, 12% of its heat, and 10% of its transport fuel—from renewable sources by 2020. We expect the Government will surpass the electricity sub-target, but success in this sector may not compensate for underperformance in heat and transport. It is not yet halfway towards 12% in heat and the proportion of renewable energy used in transport actually fell last year. On its current course, the UK will fail to achieve its 2020 renewable energy targets.

The Renewable Heat Incentive (RHI) and Renewable Transport Fuel Obligation (RTFO) are the key policies to meet the 2020 targets in heat and transport. The Government's proposed RHI reforms are not the optimal pathway to the 12% heat sub-target; it should revise them to reflect that heat pumps have proven unsatisfactory, biomass has been successful, and biomethane is crucial to the 2020 target. Moreover, the RHI's consumer engagement has been inadequate: it requires an improved marketing strategy.

In transport, the RTFO has been capped at 4.75% since 2013: this is well below the level needed to meet the 2020 target, and the Government must begin raising it without delay. A roll-out of E10 (a fuel composed of 90% petrol and 10% bioethanol) will also be required; the Government should begin laying the groundwork for its introduction, including a strong public information campaign. Setting a limit on the proportion of transport biofuels from food crops—the 'crop cap'—is a balancing act, but the Government's proposed 1.5% limit may be too low to achieve the 2020 transport target and must be reconsidered.

Beyond 2020, heat and transport will likely depend on some combination of bioenergy and electrification. Over 70% of the UK's renewable energy is bioenergy, which has an important role in the UK's future energy mix, but there are concerns about its carbon footprint. We note the current sustainability criteria for some bioenergy and urge Government to continue to balance its benefits with its harms. Unchecked bioenergy expansion risks substantial CO_2 emissions so electrification is likely to be the preferred option where possible. In heat, it is clear that the Government cannot rely on complete electrification—especially given limits to electricity-network capacity. Central to the Government's plans for transport electrification is an aim for all new cars to be ultra-low emission by 2040 (presently, only 1.1% are). To achieve this ambition, it should reconsider its changes to Vehicle Excise Duty and take the lead on awareness of electric vehicles through greater public procurement.

Our overarching concern is that the UK is at risk of failing to meet the targets not because they are impossible, but because Government departments have not cooperated effectively. Heat and renewable transport incentives are administered through completely separate incentives, with both sectors competing for resources like biomethane and electricity-network capacity. Creating the new Department for Business, Energy and Industrial Strategy may enable more joined-up thinking: the Government should take advantage through deeper analysis of how best to use scarce resources to achieve renewables and decarbonisation targets across different policy areas.

The 2020 targets were set by the EU but adopted by the UK, and still have many merits—even as the UK prepares to leave the EU. If the UK misses, or reneges on its commitment to them, this will undermine confidence in its commitment to future targets, including the 2050 decarbonisation objectives of the Climate Change Act 2008. Whatever the Government's plans, it must commit to and deliver on credible renewables commitments that maintain consistency with its long-term obligations.

1 Introduction

1. The Government has targets for the proportion of energy supplied from renewable sources. By 2020, renewable energy must account for 15% of all electricity, heat and transport fuels in the UK.[1] At least 10% of transport fuels must be renewable;[2] beyond this, the Government has adopted indicative sub-targets of 30% in electricity and 12% in heat.[3] These 2020 aims are an important component of the UK's long-term decarbonisation objectives.[4]

2. In November 2015, we became concerned that progress in heat and transport was inadequate. *The Ecologist* reported on a leaked letter—purportedly from the Rt Hon Amber Rudd MP, then Secretary of State for Energy and Climate Change, to Cabinet colleagues—projecting that only 11.5% of UK energy would be renewable in 2020.[5] We questioned her: the Secretary of State said "we do not have the right policies particularly in transport and heat in order to make those 2020 targets, but we have four to five years" and confirmed that the shortfall anticipated in the letter was an "accurate assessment of where we are if we do not take action, but I am determined to take action so that we exceed that and reach the 15%".[6]

3. We launched our *2020 renewable heat and transport targets* inquiry on 9 March 2016, following the conclusion of our initial inquiries for Parliament 2015–20. We invited responses to the following questions:

- Does the Government have the right policies in place to meet its 2020 renewable energy targets in the heat and transport sectors, and if not where are policies missing or inadequate?
- How could a whole systems approach across the power, heat and transport sectors be utilised to ensure the 2020 targets are met?
- To what extent is electrification of heat and transport a viable approach up to 2020 and beyond?
- What are the challenges (regulatory, technological, behavioural, and others) to decarbonising heat and transport over the longer-term and how might these be overcome?

We received 66 written submissions, and held three oral evidence sessions between June and July. We also held an informal roundtable discussion with academics and Government officials in May. A note of this event can be found at the back of this report. We are grateful to all those who contributed to this inquiry.

4. Two major political developments during this inquiry have changed its context. Firstly, the EU membership referendum on 23 June resulted in a vote to leave. This has implications

1 Directive 2009/28/EC, Appendix I; The Promotion of the Use of Energy from Renewable Sources Regulations 2011 (SI 2011/243), Regulation 3
2 Directive 2009/28/EC, Article 3(4)
3 DECC, National Renewable Energy Action Plan, July 2010, p5
4 DECC, Third progress report on the promotion and use of energy from renewable sources for the United Kingdom, January 2016, p2
5 *"Leaked letter: Rudd admits 25% green energy undershoot, misled Parliament"*, The Ecologist, 9 November 2015
6 Oral evidence taken on 10 November 2015, HC (2015–16) 544, Qq4, 7

for the 2020 targets, set by EU directive then transposed into UK law. Secondly, the new Prime Minister has closed the Department of Energy and Climate Change, transferring its functions to a new Department for Business, Energy and Industrial Strategy.[7] We discuss these at relevant points in the report.

5. Chapter 2 details the 2020 renewables targets and our evidence as to whether the Government will meet them. Chapter 3 examines the major policies for renewable heat and transport—the Renewable Heat Incentive and Renewable Transport Fuel Obligation—and remaining obstacles to their success. In chapter 4, we consider longer-term issues in decarbonising heat and transport, including electric vehicles and the sustainability of bioenergy. Our conclusions are presented in chapter 5.

Box 1: Working towards our goals

At the start of the 2015 Parliament we set out three goals for our scrutiny work:

- Holding the Government to account on achieving a balanced energy policy;
- Setting the agenda on an innovative future energy system; and
- Influencing the long-term approach to climate targets.*

Our work on the 2020 renewable heat and transport targets cuts across our goals to hold the Government to account on achieving a balanced energy policy and influencing the long-term approach to climate targets. A balanced energy policy requires decarbonisation in heat and transport. Moreover, the Government's progress towards its targets raises questions as to the role of bioenergy and electrification in the future. Throughout the course of this Parliament, we welcome feedback on our work towards our goals.

*Energy and Climate Change Committee, First Report of Session 2015–16, Our priorities for Parliament 2015–20, HC 368, para 11

7 HC Deb, 18 July 2016, col 94WS

2 The 2020 targets

Targets and background

6. The UK's targets—to source 15% of all energy and 10% of transport fuels from renewables by 2020—originate in the EU's 2009 Renewable Energy Directive.[8] Each Member State was required to publish a National Renewable Energy Action Plan, adopting sub-targets for electricity, heat and transport.[9] The UK's Plan was published in 2010 and suggests the following breakdown:

- 30% renewable electricity
- 12% renewable heat
- 10% renewable transport[10]

It describes these targets as "purely illustrative".[11] However, the Secretary of State confirmed this as "the UK's plan" in November 2015.[12]

Box 2: Renewable energy

Energy is renewable if it is derived from natural processes and replenished more rapidly than expended. The Renewable Energy Directive lists the following renewable fuels:

- Wind, solar and hydro energy
- Bioenergy (energy from combustion of plant and animal matter)
- Waste energy, such as landfill gas
- Aerothermal, geothermal and hydrothermal energy (heat from the air, ground and water, respectively)

There is major overlap between the categories of renewable and low-carbon energy: both exclude fossil fuels—oil, coal and natural gas—which are finite and emit high levels of carbon dioxide (CO_2) when burned. However, not all renewable energy is low-carbon (and vice-versa). For example, nuclear electricity is low-carbon but not renewable (as its primary fuel, uranium, is a finite resource). Bioenergy is renewable but its carbon footprint is debated: see chapter 4 for further analysis. Renewable energy has benefits beyond decarbonisation: it never runs out, and can replace expensive or unreliable imports.

Sources: Directive 2009/28/EC, Article 2; International Energy Agency, 'Renewables', accessed 1 September 2016

7. The Government has transposed the Renewable Energy Directive into UK law, primarily through The Promotion of the Use of Energy from Renewable Sources

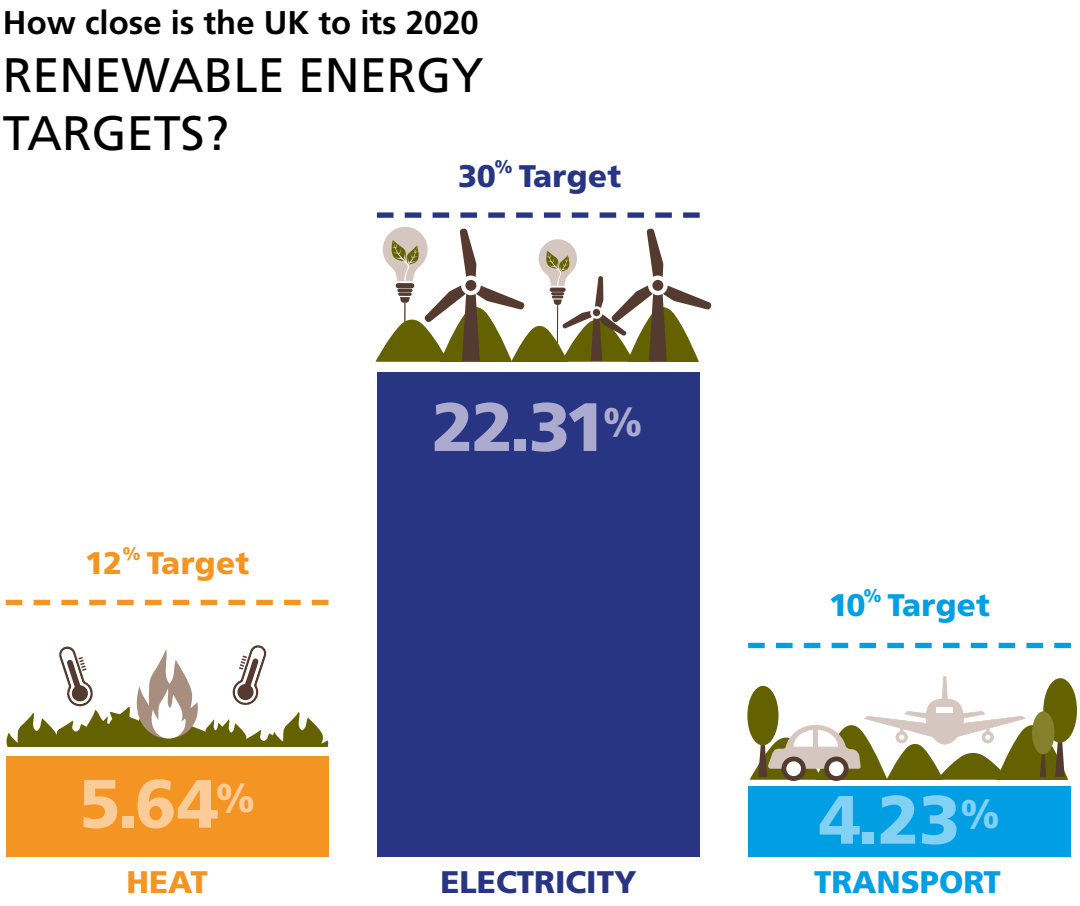
8 Directive 2009/28/EC, Article 3(4) and Appendix I
9 Directive 2009/28/EC, Article 4(1)
10 DECC, National Renewable Energy Action Plan, July 2010, p5
11 DECC, National Renewable Energy Action Plan, July 2010, p6
12 Oral evidence taken on 10 November 2015, HC (2015–16) 544, Q2

Regulations 2011[13] and the Renewable Transport Fuel Obligations (Amendment) Order 2011.[14] While this inquiry has focused on meeting the targets, we also consider (in chapter 5)—in light of the EU referendum result—whether they are worth keeping.

Progress

8. 22.31% of electricity, 5.64% of heat, and 4.23% of transport fuel consumption was met by renewable sources in 2015: this equates to 8.31% of all energy.[15]

Figure 1



Source: BEIS, Digest of UK Energy Statistics 2015

9. The UK is three-quarters of the way towards its 30% electricity sub-target. Indeed, Lord Bourne of Aberystwyth, then Parliamentary Under-Secretary of State for Energy and Climate Change, told us "we are heading on current projections for 35%".[16] National Grid predicts, similarly, that the UK will reach 34% by 2020.[17] However, success in electricity may not compensate for underperformance in heat and transport.

13 The Promotion of the Use of Energy from Renewable Sources Regulations 2011 (SI 2011/243)
14 The Renewable Transport Fuel Obligations (Amendment) Order 2011 (SI 2011/2937)
15 BEIS, Digest of UK Energy Statistics (DUKES) 2015, Renewable sources of energy, Renewable sources data used to indicated progress under the 2009 EU Renewable Energy Directive (measured using net calorific values) (DUKES 6.7), July 2016
16 Q151
17 National Grid, Future Energy Scenarios 2016, July 2016, p134

10. "The biggest challenge is decarbonising the heating sector", National Grid posits.[18] The UK is not yet halfway towards its 12% heat sub-target. Dunelm Energy, a consultancy, predicted only 5% of heat would be renewable in 2020; E.ON (a major supplier), the Institution of Civil Engineers (ICE) and the Renewable Energy Association (REA) all forecast 8–9%.[19] None of the written submissions we received asserted the heat sub-target would be met; approximately 45% claimed it would be missed.

11. The UK's journey towards its 10% transport target reversed between 2014 and 2015, when the proportion of renewable energy fell from 4.93% to 4.23%.[20] Internationally, "the transport sector is where renewable energy has made the least progress in recent years", according to the International Renewable Energy Agency (IRENA).[21] Andrew Jones MP, Parliamentary Under-Secretary of State for Transport, claimed that the Government was "on track to deliver".[22] However, British Sugar and Vivergo (a biofuel producer) contended "reaching the 2020 target will be all but impossible".[23] Projections for 2020 include 4% (Dunelm), 7% (REA) and 8% (ICE).[24] We received no written submission that anticipated the transport target would be met, and approximately 40% explicitly expected it not to be.

12. The Secretary of State's leaked letter suggested that the UK would miss the overall 15% target by 3.5 percentage points.[25] National Grid's best-case scenario has a 3-percentage-point undershoot, with the 15% target not reached until 2022; the worst-case scenario does not see the 2020 target met until 2029.[26] During our inquiry, we conducted a Twitter poll on the question, "Will the UK meet its 2020 targets?"; 91% of 66 voters said "no".[27] Though not necessarily expert opinion, this result suggests that our stakeholders—the wider public and policy community—lack faith in the Government's strategy.

13. The transport sub-target is inflexible—it is a strict minimum level, and none of our witnesses expected it to be surpassed—but electricity could compensate for some shortfall in heat. The UK Energy Research Centre (UKERC) suggested "consideration should … be given to increasing the sub-target for electricity to make up for likely deficits in the other areas".[28] If the UK reaches 10% in transport (with 'double counting')[29] and 9% in heat, renewable electricity will need to rise to 39–40% for the overall target to be met, according to the REA.[30] This is a stretch beyond the Government's hoped-for 35% (see paragraph 10). Renewable electricity's relative success is helpful, but not a panacea.

14. **On its current course, the UK will fail to achieve its 2020 renewable energy targets. This would be an unacceptable outcome given the UK's reputation for climate-change leadership.**

18 National Grid, Future Energy Scenarios 2016, July 2016, p132
19 Dunelm Energy (HAT0007); ICE (HAT0023), para 1.2; REA (HAT0053), para 6; E.ON (HAT0068), para 5
20 BEIS, Digest of UK Energy Statistics (DUKES) 2015, Renewable sources of energy, Renewable sources data used to indicated progress under the 2009 EU Renewable Energy Directive (measured using net calorific values) (DUKES 6.7), July 2016
21 IRENA, The renewable route to sustainable transport, August 2016, p6
22 Q151
23 Vivergo Fuels Ltd (HAT0025), para 7; British Sugar (HAT0043), para 7
24 Dunelm Energy (HAT0007); ICE (HAT0023), para 1.2; REA (HAT0053), para 6
25 The Ecologist, *Leaked letter: Rudd admits 25% green energy undershoot, misled Parliament*, 9 November 2015
26 National Grid, Future Energy Scenarios 2016, July 2016, p132
27 Energy and Climate Change Committee (@CommonsECC), Poll: 2020 renewables targets, Twitter, 12 July 2016
28 UKERC (HAT0041)
29 The energy content of transport biofuels produced from wastes and residues counts is doubled in accounting for the 10% transport sub-target. This 'double counting' does not, however, apply to the overall 15% target.
30 REA (HAT0053), para 6, Figure 1

3 Heat and transport: to 2020

15. The Renewable Heat Incentive and Renewable Transport Fuel Obligation are the principal policies designed to meet the 2020 renewable targets in heat and transport, respectively. We analyse their performance in this chapter, before considering the wider, longer-term policy framework in the next.

The Renewable Heat Incentive

16. The Department described the Renewable Heat Incentive (RHI), a subsidy system, as "the key policy mechanism that DECC has put in place for heat's contribution towards the EU Renewable Energy Directive Target".[31]

Box 3: The Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is a unit subsidy from HM Treasury for producers of renewable heat. It comprises two schemes: the Non-Domestic RHI for industry, businesses and public-sector organisations, and the Domestic RHI for homeowners, landlords and self-builders.

Both schemes support the following technologies:

- biomass boilers
- air- and ground-source heat pumps
- solar thermal

In addition, the Non-Domestic RHI includes biogas, biomethane, water-source heat pumps and geothermal. The Non-Domestic scheme is the larger, accounting for 82% of RHI spending.

Participants in each scheme are paid a tariff per unit of energy produced. Tariffs vary between technologies and are subject to 'degression' mechanisms, whereby they fall (for new applicants) when total spending on that technology reaches a pre-determined level.

Sources: DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016; House of Commons Library, Briefing Paper 6328, *Renewable Heat*, August 2016; Ofgem, Domestic RHI, Essential Guide for Applicants, Version 3.0, March 2016; Ofgem, Non-Domestic RHI, Easy guide to eligibility, March 2016

17. The Government consulted on proposed reforms to the RHI earlier this year.[32] Major changes include:

- An overall spending cap (across both schemes), rising from £430 million in 2015–16 to £1.15 billion in 2020–21[33]
- Spending more on heat pumps and less on biomass[34]
- Focusing on large (rather than small or medium) biomass in the Non-Domestic RHI

31 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, Impact Assessment, March 2016, p7
32 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016
33 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, p3
34 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 2.27

- More support for biomethane[35]
- Tariff guarantees for large projects[36]

The Government has not yet finalised these changes. We discuss their impacts in the context of meeting the 12% renewable heat sub-target, and also wider challenges for the RHI.

A reformed and refocused scheme?

Biomass

18. Biomass dominates the RHI. 92.9% of installations under the Non-Domestic scheme are biomass boilers,[37] which also take 55.6% of Domestic RHI spending.[38] According to Billington Bioenergy, a biomass supplier, "biomass has delivered 93% of the RHI's capacity and 98% of the heat delivered (excluding biomethane) from only 43% of the installations".[39]

Table 1: Non-Domestic RHI: Biomass tariff changes

	Current tier 1 tariff (p/kWh)	Proposed tier 1 tariff (p/kWh)	Current tier 2 tariff (p/kWh)	Proposed tier 2 tariff (p/kWh)
Small biomass	3.76	2.03–2.90	1.00	1.80–2.03
Medium biomass	5.18	2.03–2.90	2.24	1.80–2.03
Large biomass	2.03	2.03–2.90	2.03	1.80–2.03

Source: DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016

19. There are currently three biomass tariffs under the Non-Domestic scheme; the Government has proposed contracting these to a single tariff for all sizes. Boilers receive a 'tier 1' tariff for each unit of heat produced up to an annual threshold, and a 'tier 2' tariff per unit thereafter. As Table 1 shows, the changes shift support from small and medium to large biomass installations.

20. This would reduce small and medium biomass. In its consultation, DECC was concerned that currently "the higher tariffs for small and medium biomass mean these systems offer poorer value for money in subsidy terms compared to large biomass".[40] However, the National Farmers Union (NFU) told us "it is hard to see how the biomass boiler supply chain can adapt at the pace now proposed".[41] Billington Bioenergy claimed the reforms would "completely close down the small and medium non-domestic biomass installation industry".[42] It is unclear that gains in large biomass will compensate: Dr Nina Skorupska, Chief Executive of the REA, warned that "large biomass is a very difficult market to unlock and is not likely to be achieved".[43] British Gas concluded:

35 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 6.17
36 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 11.8
37 Ofgem, Non-Domestic RHI, Public reports and data, accessed 11 August 2016
38 Ofgem, Domestic RHI, Public reports and data, accessed 11 August 2016
39 Billington Bioenergy Ltd (HAT0033)
40 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 8.2
41 NFU (HAT0009)
42 Billington Bioenergy Ltd (HAT0033)
43 Q98

> There is a strong case for biomass support levels to be retained at their current level to support deployment of the most cost effective technologies, else we believe the RHI budget will be underspent and the supply chain will contract.[44]

21. ***If the Government confirms the proposed changes for biomass in the Renewable Heat Incentive, it must consider what support needs to be given to the supply chain for it to adapt at sufficient speed.***

Heat pumps

22. Heat pumps "capture ambient heat from the air or the ground and transfer it inside a building".[45] They can use electricity or gas, though all RHI-supported heat pumps are electric. Good Energy, a supplier, describes them as "the most effective way of using electrical heating".[46] 60.9% of Domestic RHI, but only 4.7% of Non-Domestic RHI, installations are heat pumps.[47]

23. The Government has proposed increasing Domestic RHI tariffs for heat pumps.[48] This contributes, overall, to "proportionately lower spend in biomass, where growth has already been strong compared to the other technology groups, and proportionately higher spend for heat pumps".[49] Lord Bourne told us "there is massive potential for heat pumps".[50]

24. Citizens Advice noted "heat pumps in Great Britain suffer from under-performance in-situ when compared with their design performance".[51] The Government agrees:

> Recent reports on in-situ performance of heat pumps installed in the UK show a continued mixed picture of performance, with some heat pump systems operating at a level such that they are unlikely to be providing significant bill savings to the users and are providing less renewable heat than expected.[52]

DECC argues "we need to support the deployment of heat pumps now to reduce costs and improve performance over time",[53] and is considering new approaches to linking performance and payments.[54]

25. Heat pumps perform best in well-insulated buildings.[55] Their general underperformance may therefore be symptomatic of energy inefficiency. In 2014, the Committee on Climate Change (CCC) estimated that 10 million easy-to-treat lofts could benefit from additional insulation, 7 million solid walls were still without any insulation and 4.5 million cavity

44 British Gas (HAT0028)
45 POST, POSTnote 426, *Residential Heat Pumps*, January 2013, p1
46 Good Energy (HAT0011), para 6
47 Ofgem, Domestic RHI, Public reports and data, accessed 11 August 2016; Ofgem, Non-Domestic RHI, Public reports and data, accessed 11 August 2016
48 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 5.45
49 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 2.27
50 Q190
51 Citizens Advice (HAT0059), para 10
52 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 5.39
53 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 5.37
54 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 5.46
55 British Gas (HAT0028); CPL Industries (HAT0034), para 14; Energy Saving Trust (HAT0054); Q16 [Juliet Davenport]

walls remained un-insulated in the UK.[56] The Energy Research Accelerator, an academic partnership, stated "there are currently over 20 million houses in the UK that require retrofit and therefore this is the most significant area for investment and innovation".[57] Citizens Advice agreed that "delivery of a greater number of energy efficiency measures would support the delivery of renewable heat as well as reduce emissions from existing fossil fuel heating systems".[58] We argued, in our *Home energy efficiency and demand reduction* report, that "driving demand for energy efficiency measures should therefore be one of Government's top priorities"[59] and made detailed recommendations as to how this might be achieved. Energy efficiency is a precondition for heat-pump success: adequate (and adequately-funded) energy-efficiency policy should therefore be prioritised over heat-pump promotion.

26. Heat pumps may be particularly appropriate for off-gas-grid buildings—often in rural areas. SGN, a gas network operator, suggested:

> The electrification of heat may be the most appropriate solution to decarbonise heat in certain areas. This could be for households off the gas grid who currently rely on high carbon fuels such as heating oil or LPG, and have sufficient space for an air or ground source heat pump. In off gas grid areas, the disruption caused by the work that would be required to upgrade the electricity network to meet the large increase in demand, may also be more acceptable to customers.[60]

However, Calor Gas claimed "the average network reinforcement cost per heat pump in rural areas is approximately four times higher than on a GB-wide basis".[61]

Biomethane

27. Our recent *Low carbon network infrastructure* report explained:

> Biomethane is produced by extracting CO_2 and other impurities from biogas, which is a mixture of methane and CO_2 created by anaerobic digestion of organic material. As biomethane is chemically similar to natural gas, it can be used with or instead of natural gas in the gas grid without pipeline modification. However, its CO_2 emissions are approximately 90% lower than natural gas, as the process of anaerobic digestion used to generate it absorbs CO_2 from the atmosphere.[62]

28. Witnesses were enthusiastic about biomethane. Ecotricity, a supplier, claimed "biomethane has the highest potential for providing additional renewable heat in the UK by 2020";[63] the Energy Networks Association added that "biomethane has the potential to

56 CCC, Meeting Carbon Budgets—2014 Progress Report to Parliament, July 2014, pp162–3
57 Energy Research Accelerator (HAT0067), para 1
58 Citizens Advice (HAT0059), para 3
59 Energy and Climate Change Committee, Fourth Report of Session 2015–16, Home energy efficiency and demand reduction, HC 552, para 100
60 SGN (HAT0065), para 22
61 Calor Gas (HAT0016), para 27.2
62 Energy and Climate Change Committee, First Report of Session 2016–17, Low carbon network infrastructure, HC 267, para 44
63 Ecotricity (HAT0047), para 9

meet over 10% of domestic UK heat demand" by 2020.[64] "In 2015, the UK was the fastest growing biomethane to grid market in the world", according to Dr Skorupska.[65] SGN, a gas network company, argued "the RHI has enabled the UK to become the fastest growing and most innovative biomethane market in Europe".[66]

29. The Government is considering resetting the biomethane tariff—which has suffered from successive reductions (called 'degressions')—to its January 2016 level,[67] amidst fears over the subsidy. SGN was "extremely concerned about tariff degressions" and believed that soon, "the biomethane tariff [would] be so low that biomethane projects will be uninvestable".[68] The REA continued "it is likely the biomethane tariff will fall below a commercially viable level by 2017".[69]

30. ***The Government's proposed reforms to the Renewable Heat Incentive (RHI) are not the optimal pathway to the 2020 renewable heat target. Heat pumps have proven unsatisfactory in actual use, yet are being prioritised over biomass—which has been successful. Sudden realignment from small to large biomass will damage the former's supply chain, and the latter is unlikely to be taken up at scale. Above all, biomethane is crucial to meeting the 2020 target and must remain a funding priority. The Government should revise its RHI reforms to reflect these priorities, especially in protecting biomethane support.***

Underlying problems with consumer engagement

31. Households and businesses have their own heat systems, and only they can change them—unlike electricity supply, which suppliers can decarbonise through generation changes with which the public is not directly involved. Therefore, consumer engagement is critical to any success the RHI might have, but it has been poor. Philip Sellwood, Chief Executive of the Energy Saving Trust, explained:

> The level of awareness in the public is so low. This is potentially a programme that we are going to be spending £1 billion on and the latest evidence suggests that there is probably a 5% awareness of [the RHI], and about a 12% awareness of things like ground source heat pumps, so unless we align some form of public awareness campaign between now and 2020, frankly, apart from those who were early adopters and those who really want to get involved, I think the impact will be pretty low because people do not know that it exists now.[70]

Citizens Advice agreed that "information and advice on low-carbon heat that is accessible for all types of consumers seems particularly lacking".[71]

64 Energy Networks Association (HAT0064)
65 Q92
66 SGN (HAT0065)
67 DECC, The Renewable Heat Incentive: A reformed and refocused scheme, March 2016, para 6.17
68 SGN (HAT0065), para 9
69 REA (HAT0053), para 20.4
70 Q8
71 Citizens Advice (HAT0059), para 2

32. Insufficient information means insufficient uptake. Citizens Advice noted:

> When customers are looking to replace their heating system the lack of understanding of new systems can mean people either default to what they are familiar with, meaning fewer low-carbon systems are chosen, or choose inappropriate systems for their needs, which can lead to higher bills.[72]

The Solar Trade Association stated "improved marketing of the RHI by Government would improve the UK's contribution to the renewable heat targets".[73] Our report on *Home energy efficiency and demand reduction* concluded that the benefits of home energy efficiency "have not been clearly communicated to households, which is a principal reason behind the failure of previous schemes to drive demand";[74] it is evident that there are parallel problems in heat.

33. We considered how to improve engagement. Philip Sellwood suggested a focus on system-wide benefits over technical detail:[75] consumers "want to know whether or not if they have this technology it means their house is warmer, their bills are lower, and they have greater comfort and better health outcomes".[76] So far there has been little focus on the environmental benefits of renewable heat: Citizens Advice could see "no overarching narrative for consumers about the need to decarbonise our energy system", meaning "people fail to see the importance of such a policy and are also unable to understand their part in it".[77] Good Energy reported that "around 1.6 million gas boilers are installed in the UK each year".[78] Boiler replacements are often distress purchases,[79] but the churn would be sufficient for progress to be made if information was available to consumers at the point they made decisions on their heat.

34. ***The Renewable Heat Incentive (RHI) cannot succeed without consumer engagement, which has so far been inadequate. An improved marketing strategy, explaining the comfort, health, environmental and financial benefits of RHI installations—rather than technicalities—and targeted at the actual patterns of heat-system replacement, must be made central to RHI reform. Biomethane injection is the only RHI-supported technology that does not require individuals to choose it: this strengthens our case for the RHI to focus on biomethane until consumer engagement is addressed.***

The Renewable Transport Fuel Obligation

35. Transport biofuels include bioethanol (blended into petrol) and biodiesel (blended into diesel). The Department for Transport expects biofuels to provide 90% of the 10% transport sub-target by 2020 (road and rail electrification will contribute the final 10%).[80]

72 Citizens Advice (HAT0059), para 9
73 Solar Trade Association (HAT0060)
74 Energy and Climate Change Committee, Fourth Report of Session 2015–16, Home energy efficiency and demand reduction, HC 552, para 100
75 Q11
76 Q20
77 Citizens Advice (HAT0059), para 2
78 Good Energy (HAT0011), para 7
79 Progressive Energy (HAT0061), para 11(b); Q21 [Paul Blacklock]
80 Q157 [Rob Wakely]

3% of transport fuels are currently biofuels—this will need to "more or less double" to 5–6% by 2020 (double-counting biofuels will bring this to an effective 9%), according to Rob Wakely, Head of Low Carbon Fuels at the DfT.[81]

36. 'E5' (95% petrol, 5% bioethanol) and 'B7' (93% diesel, 7% biodiesel) are currently the biofuel blends in UK transport. A roll-out of E10 (90% petrol, 10% bioethanol) will be needed to meet the 2020 target: Dr Skorupska urged that "we need to see the introduction of E10 as soon as possible".[82] E5 is universally compatible with cars, but E10 is not—approximately 9% of registered petrol cars are incompatible with E10[83] (mostly older vehicles).[84] This should fall to 3% by 2020.[85] Jonathan Murray, Policy and Operations Director at the Low Carbon Vehicle Partnership (LCVP), explained that if E10 were introduced, "there will need to be a public information campaign to explain which vehicles cannot use E10 successfully".[86] Introducing E10 would bring the UK one percentage point closer to the 10% transport target, he estimated.[87] E10 has been rolled out in the USA, Brazil, France, Germany and Finland.[88] The Transport Energy Task Force believes that "achieving the required uptake of E10 in the remaining timeframe would be a significant challenge", anticipating 6–12 months for prerequisite infrastructure and a further 6–12 months for "an effective co-ordinated communication campaign".[89] The LCVP recommended "if the UK decides to introduce E10 … an early roll-out with government support may lead to higher penetration levels and greater chance of success in meeting the targets in 2020".[90] Andrew Jones MP stated "people will see the consultation that we hope to launch very shortly and see that this is about providing some certainty into the marketplace for E10 and all other biofuels".[91]

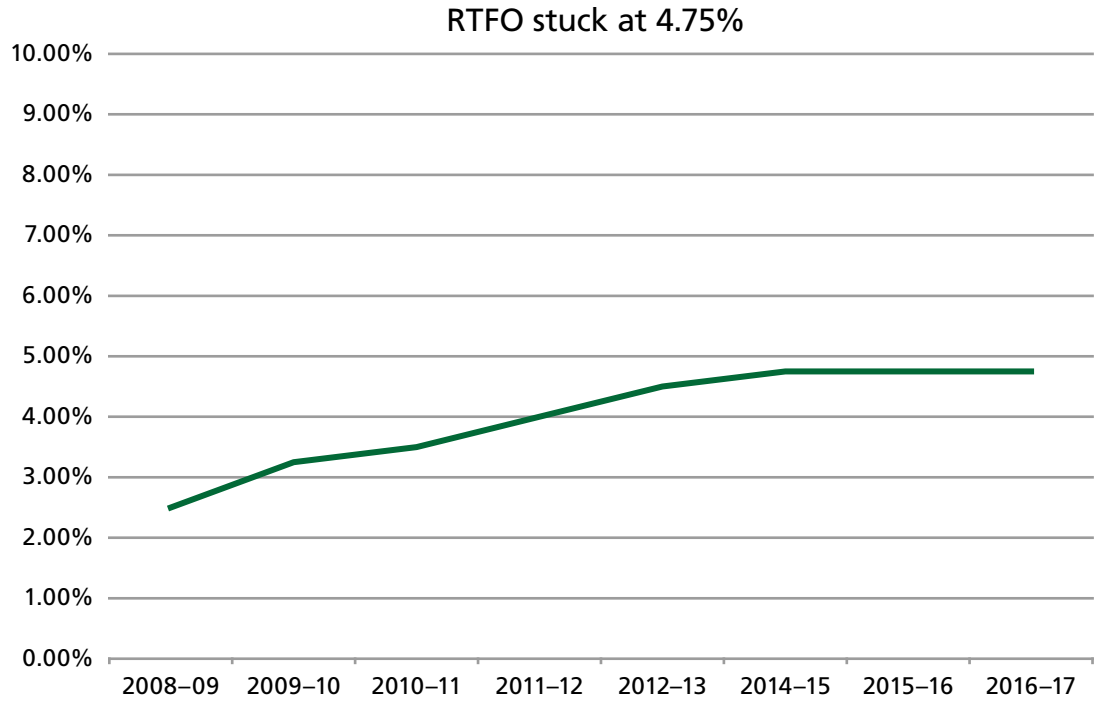
37. It is one thing to introduce E10, and another for it to be used widely. Dr Skorupska noted that fuel duty forms "a large proportion" of pump prices[92] (on average, 64.1%–68.3% is tax):[93] a duty differential between E10 and other fuels might thus stimulate uptake. A similar move, from leaded to unleaded petrol, was fuelled by a duty differential.[94] ePURE, an ethanol trade association, insisted "for E10 introduction, the UK could take inspiration in France where E10 is taxed less than E5".[95] Other stakeholders have also suggested the Government should "offer a fuel duty incentive".[96] On non-financial incentives, the UK Petroleum Industry Association (UKPIA) argued the DfT should, in the event of E10 introduction, "amend the label on dispensers to be reworded to a more positive message (the current one being 'Not suitable for all vehicles: consult vehicle manufacturer before use')" and "lead a consumer information campaign".[97]

81 Q159 [Rob Wakely]
82 Q87
83 Q33 [Jonathan Murray], Q87 [Dr Nina Skorupska]
84 Q41 [Jonathan Murray]
85 Q42 [Jonathan Murray]
86 Q33
87 Q33
88 Vivergo Fuels Ltd (HAT0025), para 10; British Sugar (HAT0043), para 10
89 Transport Energy Task Force, Final Report, March 2015, p34
90 LCVP (HAT0057)
91 Q174
92 Q96
93 AA, Fuel Price Report, July 2016
94 Gasrec (HAT0024); Q96 [Dr Scurlock]
95 ePURE (HAT0052)
96 Vivergo Fuels Ltd (HAT0025), para 7(b), Ensus UK Limited (HAT0036), British Sugar (HAT0043), para 7(b)
97 UKPIA (HAT0022)

38. ***Introducing E10 fuel would help the UK reach its 2020 transport target. The Government must begin laying the groundwork for an E10 introduction as soon as possible, including a strong public information campaign. There is evidence that a duty differential would help, and the Government should produce an Impact Assessment to quantify this claim.***

39. The Renewable Transport Fuel Obligation (RTFO) is the main policy encouraging biofuel use in the UK. It sets a minimum quota (currently 4.75%) for the proportion of biofuels in the sales of major transport-fuel suppliers, who can trade obligations with each other; smaller suppliers are exempted. So far, the RTFO has "achieved greenhouse gas savings from the biofuels supplied of 60%, compared to fossil fuels, and the emissions savings for 2013/14 alone were the equivalent of taking 1.35m average cars off the road".[98]

Figure 2



Source: DfT, Renewable Transport Fuel Obligation statistics: obligation period 7, 2014/15, report 1, November 2014

40. The RTFO has been capped at 4.75% since 2013: this is well below the level needed to meet the 2020 target. The CCC lists the RTFO as "at risk of failing to deliver".[99] Jonathan Murray warned that "unless the RTFO is changed—and there will be a consultation we understand this summer with a view to changing it next year—it will remain at that level and we will miss the target on the transport side".[100] The frozen RTFO has already chilled the biofuel supply chain. Ensus' bioethanol plant on Teeside "has been mothballed for nearly half its life", according to the Financial Times[101]: Ensus told us "we are currently

98 DECC (HAT0063)
99 CCC, The Fifth Carbon Budget: The next step towards a low-carbon economy, November 2015, p53
100 Q32
101 *"UK bioethanol sector struggles to fuel growth"*, Financial Times, 6 July 2015

not operating due to a lack of demand for our bioethanol mainly because the UK has failed to increase [the RTFO]".[102] Vivergo, another bioethanol producer—based in Hull—also expressed concerns:

> The capping of the RTFO target since 2013 has undermined investments, including our own, by suppressing the market. Plans for biofuels production in the UK have been shelved and investors have fled."[103]

41. There are widespread calls to increase the RTFO. The REA recommended "the RTFO target must be raised in 2017 to at least 6.5% and a straight line trajectory set thereafter, if the 8.9% is to be reached by 2020".[104] The NFU went further: "we believe the UK Government must immediately raise the [RTFO] with a clear trajectory to 10% by 2020".[105] Jonathan Murray believed "if the changes are brought in, in the task force that we help DfT lead the consensus was [the 10% target] was achievable even given that timeframe".[106] Andrew Jones MP told us "we have been working up a very comprehensive biofuel policy" and "we are almost ready to go with this", though we are yet to see any proposals for RTFO reform.[107]

42. ***The level of the Renewable Transport Fuel Obligation (RTFO) must be raised to approximately 9% by 2020; the Government must begin doing so without delay. It is clear that the 2020 renewable transport target will not be met without rapid progress on the RTFO.***

102 Ensus UK Limited (HAT0036)
103 Vivergo Fuels Ltd (HAT0025), para 7(a)
104 REA (HAT0053), para 8.1
105 NFU (HAT0009)
106 Q32
107 Q156

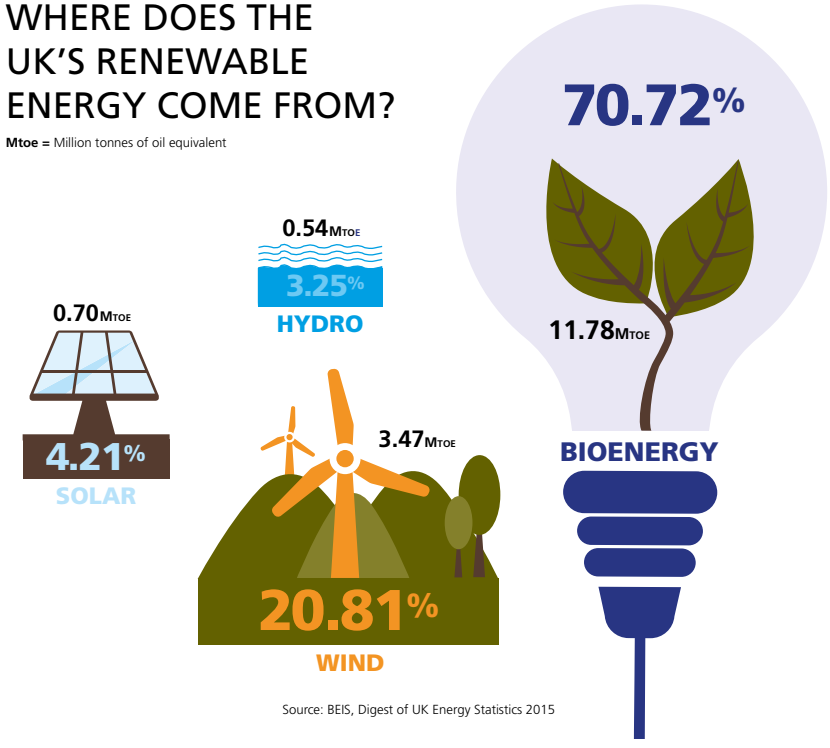
4 Heat and transport: beyond 2020

43. We were asked by stakeholders to look not only at short-term policies to meet the 2020 targets, but also at renewable energy in the longer run—particularly given the Government's present actions will help shape the UK's future options. Without fossil fuels, heat and transport will likely depend on some combination of bioenergy and electrification; we consider each in turn.

Bioenergy

44. Bioenergy is an umbrella term for renewable natural material—such as plant material and animal waste—used for electricity, heat and transport fuel. It is usually called biomass when solid, biofuel when liquid and biogas when gaseous. Biomass—burned for heat and electricity—includes wood, crops and various wastes. Current or 'first-generation' biofuels, such as ethanol and biodiesel, are produced from sugar, starch and plant oils; new biofuels from other sources are under development and termed 'advanced biofuels'. Biogas includes biomethane, obtained through anaerobic digestion of plant matter.[108] These forms of bioenergy together account for 70.72% of the UK's renewable energy across electricity, heat and transport. [109]

Figure 3



45. There are concerns about bioenergy's carbon footprint and a consequent question: Is bioenergy a transitional fuel until heat and transport are electrified, or a permanent component of a low-carbon energy mix? We were advised, at our informal roundtable meeting in May, that bioenergy combustion emits no net carbon, because greenhouse

108 International Energy Agency, Bioenergy, accessed 1 September 2016; POST, POSTnote 410, *Bioenergy*, May 2012

109 BEIS, DUKES 2015, Renewable sources of energy, Renewable sources used to generate electricity and heat and for transport fuels (DUKES 6.6), July 2016

gases released are equal to those that were absorbed in growing the fuel, but that ancillary processes—such as drying and transporting bioenergy—may emit CO_2 (though at low levels compared to fossil fuels). There is evidence linking fertiliser use for biofuel production with nitrous oxide emissions.[110] Most significantly, assigning land to energy (rather than food) production can necessitate agricultural development elsewhere, at a potentially-high carbon cost: this is called 'indirect land-use change' (ILUC). The Government's UK Bioenergy Strategy notes:

> ILUC emissions are inherently uncertain. The vast majority of studies have however concluded that ILUC leads to increased greenhouse gas emissions for biofuels produced from conventional crops. Not all feedstocks have the same ILUC impacts but when ILUC is considered, some biofuels can have greater carbon impacts than fossil fuel alternatives.[111]

The CCC estimates that land-use change, including ILUC, "would lead to a reduction in GHG savings of UK biofuels from 70% to just over 50% in 2014/15".[112]

46. Biofuel sustainability has further issues. Greenpeace claimed "it is now well established that the time lag between emissions from the burning process and sequestration of emissions through growing new biomass can take decades—or, in exceptional circumstances, over a century":[113] this would render biofuels less helpful to climate-change mitigation as time passes. In transport, IRENA argues "liquid biofuels can quickly reach the limits of sustainable production" and thus "the sector must shift to electric-based technologies".[114] UKERC noted "limits on the production of sustainable bioenergy … even more so for indigenous UK bioenergy": as bioenergy can be grown for electricity, heat and transport, "it should be used where it is most cost-effective in assisting decarbonisation".[115]

47. However, there are benefits to biofuels. UKERC noted limiting global temperature rise to 1.5°C "will require, in the long term, the use of negative emissions technologies, of which the best-studied is bioenergy carbon capture and storage (BECCS)".[116] The NFU pointed out "biofuels tend to replace the most marginal and high-carbon liquid fossil fuels".[117] Dr Skorupska contended "developing biomass heat actually incentivises and benefits our forests, bringing in the undermanaged forests".[118] Bioenergy production has animal-feed by-products—Dr Jonathan Scurlock, Chief Advisor on Renewable Energy and Climate Change at the NFU, mentioned "we have a deficit in quality animal feeds".[119]

48. The Government has introduced sustainability criteria for biomass under the RHI and biofuels under the RTFO.[120] Biomass in the RHI must be "an approved sustainable fuel from a supplier listed on the Biomass Suppliers List"[121] and represent 60% lifecycle

110 Leilei Ruan *et al*, "Nitrogen fertilization challenges the climate benefit of cellulosic biofuels", Environmental Research Letters, vol 11(6), June 2016; Professor Keith Smith *et al*, Response to Transport Biofuels Consultation, June 2011, p2
111 HM Government, UK Bioenergy Strategy, April 2012
112 CCC, Meeting Carbon Budgets—2016 Progress Report to Parliament, June 2016, p160
113 Greenpeace UK (HAT0066)
114 IRENA, The renewable route to sustainable transport, August 2016, p6
115 UKERC (HAT0041)
116 UKERC (HAT0041)
117 NFU (HAT0009)
118 Q110
119 Q113
120 Q182 [Sarah Redwood], Q183 [Andrew Jones MP]
121 Ofgem, Factsheet: Biomass sustainability and the Domestic RHI, March 2016

GHG savings against the EU fossil fuel average.[122] Biofuels must achieve 35% GHG savings (rising to 50% in 2017) to qualify under the RTFO.[123] There are rules governing timber sustainability,[124] and other biofuels cannot be grown on land with high biodiversity value or carbon stock.[125] We welcome these standards, and believe that bioenergy compliant with them improves on fossil-fuel alternatives. However, they cannot address the full gamut of environmental issues for bioenergy—particularly ILUC. The Government must continue to balance the benefits and harms of bioenergy.

49. The Government's position is that "alongside electrification, bioenergy has a role to play in the decarbonisation of all sectors".[126] The LCVP stated "because electrification will take time and may not be effective in all transport sectors, the [Transport] Task Force agreed that there will be an opportunity for the foreseeable future for sustainable biofuels to play a role".[127] UKERC agreed that in the long term "the diversity of heat and transport demands renders electricity unlikely to be applicable in all cases, and therefore other energy vectors also merit consideration—these include heat networks, hydrogen and direct use of biofuels".[128]

50. **Bioenergy has an important role in the UK's future energy mix: it can decarbonise sectors and niches that electrification cannot, and delivers substantial carbon reductions under good conditions. Nevertheless, unchecked bioenergy expansion risks substantial CO_2 emissions. This means that electrification is likely to be the preferred option where possible.**

51. ***Clarity on the carbon footprint of bioenergy use and expected future levels of bioenergy is crucial to the UK's long-term decarbonisation. The Government must review its published Bioenergy Strategy in 2017.***

The crop cap

52. The EU's 2015 Indirect Land-Use Change Directive makes significant changes regarding land use. It introduces a 'crop cap': no Member State's share of biofuels from food crops can exceed 7% of transport energy.[129] The LCVP argued "if the government wishes to avoid a significant increase in crop-based biodiesel, it is likely that a crop cap would need to be introduced".[130] Member states must comply with the Directive by September 2017.[131]

53. The Directive has not yet been transposed into UK law, but the Government has proposed a more stringent crop cap, at 1.5%.[132] Andrew Jones MP explained "I am clear that there have been some problems with indirect land use, and I do not want to see this".[133] Conversely, the REA "believes [a 1.5% crop cap] is over cautious and that a cap nearer

122 DECC, New biomass sustainability requirements for the Renewable Heat Incentive, February 2015, p1
123 DfT, RTFO Guidance Part Two: Carbon and Sustainability Guidance, RTO Year 9, April 2016, p8
124 DECC, Timber Standard for Heat and Electricity: Woodfuel used under the Renewable Heat Incentive and Renewables Obligation, Feburary 2014
125 DfT, RTFO Guidance Part Two: Carbon and Sustainability Guidance, RTO Year 9, April 2016, p8
126 DECC (HAT0063)
127 Low Carbon Vehicle Partnership (HAT0057)
128 UKERC (HAT0041)
129 Directive (EU) 2015/1513, Article 2(b)(iv)
130 Low Carbon Vehicle Partnership (HAT0057)
131 Directive (EU) 2015/1513, Article 4(1)
132 Q185 [Andrew Jones MP]
133 Q183

the recommendation in the ILUC Directive should be set".[134] More forthright, British Sugar and Vivergo claimed in event of a 1.5% crop cap "bioethanol would be squeezed out and the UK industry would collapse".[135] Valero Energy, another bioethanol producer, recommended the UK accept the EU's 7% level so as to "not be disadvantaged against other member states".[136]

54. ***Setting the crop cap is a balancing act: 7% may be too high to avoid significant indirect land-use change, but 1.5% may be too low to achieve the 2020 transport target. The Government's reforms to the Renewable Transport Fuel Obligation must find the appropriate compromise.***

Advanced biofuels

55. So-called 'advanced biofuels' avoid indirect land-use change:

> Advanced biofuels, such as those made from wastes and algae, provide high greenhouse gas emission savings with a low risk of causing indirect land-use change, and do not compete directly for agricultural land for the food and feed markets.[137]

The ILUC Directive sets an optional 0.5% target for advanced biofuels in transport.[138] British Sugar and Vivergo wanted this target implemented in the UK.[139] However, UKPIA contended "we do not see any evidence [advanced biofuels] will be available in sufficient commercial quantities across the EU by 2020 to justify setting a target"—there is too little time to create a new incentive for 2020.[140]

56. Advanced biofuels "require huge capital investment if they are to reach commercialisation, and this investment will be stifled if the UK Government does not offer future policy certainty to industry",[141] according to the NFU, whose Dr Scurlock added "we are never going to get to advanced biofuels if we do not have a thriving biofuels industry here in the UK in the first place".[142] The LCVP noted "the [Transport] Task Force agree that the UK should invest in sustainable advanced fuels" and mentioned setting a target—as well as "fiscal and capital support"—in aid of this goal.[143]

57. Andrew Jones MP stated "we see quite a significant role for advanced biofuels",[144] with Rob Wakely confirming the Government is "looking at including a proposal" on the 0.5% target in the promised RTFO consultation.[145] Advanced biofuels could play an important role in long-term decarbonisation, especially if they avoid indirect land use change. We are agnostic about setting a short-term target for advanced biofuels, but believe this is an important area for research and development.

134 REA (HAT0053), para 8.3
135 Vivergo Fuels Ltd (HAT0025), para 7(c); British Sugar (HAT0043), para 7(c)
136 Valero Energy Ltd (HAT0019)
137 Directive (EU) 2015/1513, supra note 7
138 Directive (EU) 2015/1513, art 2(e)
139 Vivergo Fuels Ltd (HAT0025), para 7(d); British Sugar (HAT0043), para 7(d)
140 UKPIA (HAT0022), sect 1(e)
141 NFA (HAT0009)
142 Q110
143 LCVP (HAT0057), sect 2.4
144 Q188
145 Q189

Transport electrification

58. An ultra low emission vehicle (ULEV) emits extremely low levels of CO_2 compared to petrol and diesel equivalents. There are four main types of ULEV:

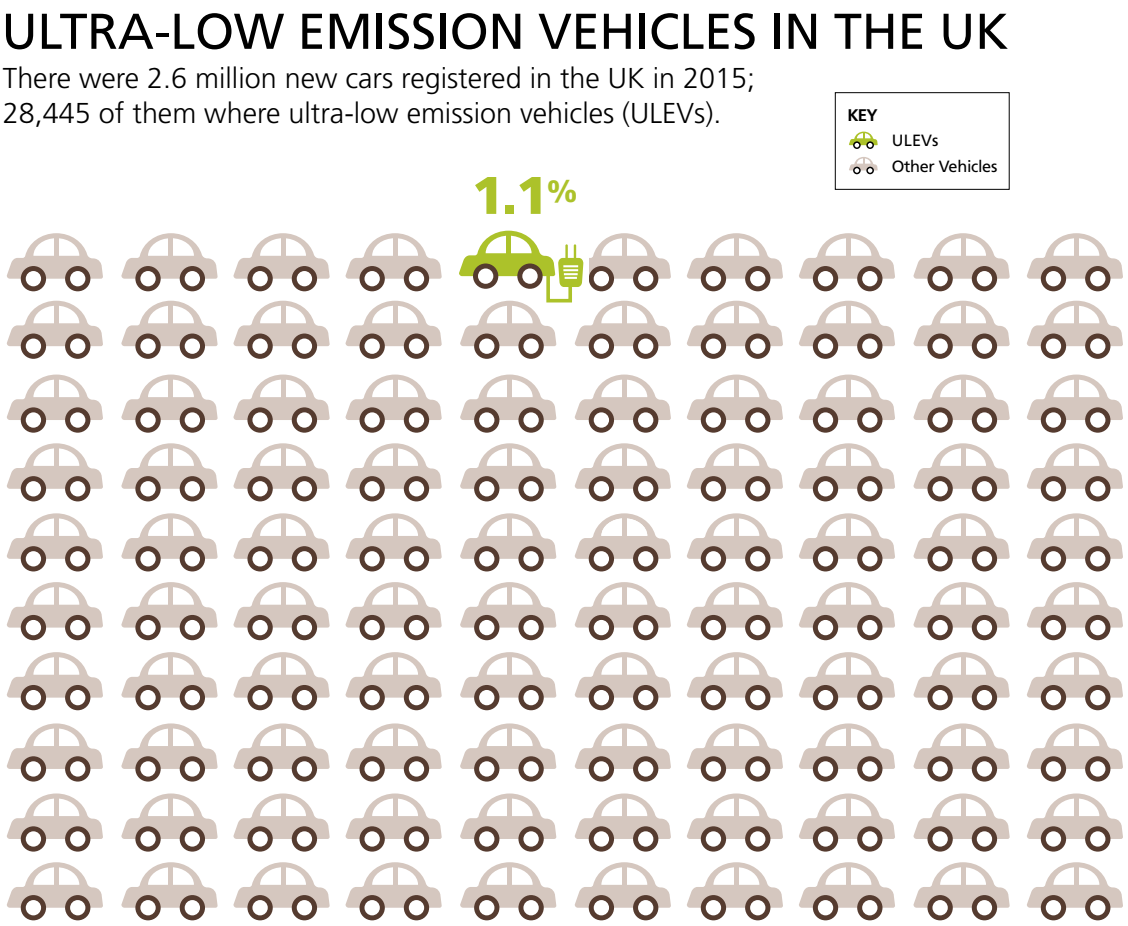
- Battery electric vehicles (BEVs) run only on electricity and are recharged by plugging into the grid.
- Plug-in hybrid electric vehicles (PHEVs) are also recharged by plugging into the grid, but can switch between electricity and fossil fuels.
- Hybrid electric vehicles (HEVs) can also switch between electricity and fossil fuels, but feature smaller batteries that charge while driving.
- Fuel-cell electric vehicles (FCEVs) use non-fossil fuels (such as hydrogen) to power an electric motor.

These all feature electric motors, and so the terms ULEV and electric vehicle (EV) are often used interchangeably.[146]

59. "The electrification of transport is the cornerstone of current policy to reduce carbon emissions from transport energy",[147] according to the LCVP, but EVs "will remain niche in the period to 2020".[148] Fewer than 30,000 of the 2.6 million new cars registered in the UK last year were ULEVs, as are only 0.19% of all cars on the road.[149] Rob Wakely of the DfT expected road and rail electrification to contribute one percentage point towards the 10% target;[150] the UK Energy Research Centre (UKERC) anticipated that only 0.1–0.3% of total transport energy would be electric by 2020.[151]

146 House of Commons Library, Electric vehicles and infrastructure, January 2016; Office for Low Emission Vehicles, Driving the Future Today: A strategy for ultra low emission vehicles in the UK, September 2013; Q57 [Jonathan Murray]
147 LCVP (HAT0057)
148 LCVP (HAT0057)
149 DfT, All vehicles (VEH01): Statistical data set, July 2016
150 Q157
151 UKERC (HAT0041)

Figure 4



Source: DfT, All vehicles (VEH01): Statistical data set, published July 2016

60. DECC told us that "to meet the manifesto commitment for almost all cars and vans to be zero emission by 2050, all new car and van sales will need to be zero emission by 2040 due to fleet turnover times":[152] this will require enormous progress. To this end:

> The Government has committed over £600m across the Spending Review period to tackle the major barriers to ULEV uptake: the high up-front cost of the vehicles; real and perceived concerns about range; the adequacy of charging infrastructure and a lack of knowledge about ULEVs.[153]

E.ON expected EVs' "major breakthrough with customers…to take place in the 2020s".[154]

Cost

61. The Government supports ULEV purchases through the Plug-in Car Grant, which provides consumers with up to £4,500 towards the upfront cost of a BEV or PHEV.[155] The

152 DECC (HAT0063)
153 DECC (HAT0063)
154 E.ON (HAT0068), para 20
155 HM Government, Plug-in car and van grants, accessed 1 September 2016

Energy Research Accelerator suggested "the promotion of financial incentives is likely to be the best way of ensuring adoption of EVs until the cost of EV technology lowers";[156] SSE agreed.[157]

62. However, current incentives do not extend to ongoing costs. Vehicle Excise Duty (VED) was reformed in the 2015 Budget, moving from a many-tiered system where payments scaled with CO_2 emissions to a simplified, three-level approach. From 1 April 2017, new vehicles will pay nothing if (and only if) they emit absolutely no CO_2. Most other vehicles will pay a flat 'Standard Rate' of £140 annually (with a premium of £310, for five years, on cars worth over £40,000). This reform aimed to "make [VED] fairer for motorists and reflect improvements in new car CO_2 emissions".[158] Good Energy told us:

> Whilst the need to maintain the overall amount raised from vehicle road tax was legitimate, the changes are an unnecessary attack on the most efficient vehicles. Gradually decreasing the emissions bands of the current tiered system would have been a fairer way of maintaining this revenue and one that aligns with the government's own desire for 'almost every car and van to be a zero emission vehicle by 2050'.[159]

The Energy Research Accelerator argued that the previous VED system "had a genuine impact through increased sales of low emissions vehicles and improved public awareness of CO_2 production from vehicles".[160] SSE noted "there is no differentiation between a conventional car and a Plug-in Electric Vehicle" under the new system.[161] Philip Sellwood claimed the change "sent a signal not only to the manufacturing community but also to consumers that this is not something to be trusted",[162] and weakened ULEV resale value.[163] Andrew Jones MP replied that "the sales figures don't suggest there is a problem here".[164]

63. ***We regret the Government's changes to Vehicle Excise Duty, which reduced incentives for ultra low emission vehicle (ULEV) uptake and may be interpreted as wavering commitment to road electrification. The Government should reconsider abolishing the tiered system. In the future, fiscal incentives for ULEVs must be maintained with greater consistency.***

64. Fuel duties are a significant component of public revenue, totalling £27.6 billion (approximately 5% of all receipts).[165] Philip Sellwood estimated that road electrification would cost HM Treasury £4 billion in reduced taxes.[166] Ensus asked, "How does the Treasury plan to fill the gap in fuel duty revenue"?[167] Indeed, this loss of revenue may diminish HM Treasury's enthusiasm for ULEVs. Moreover, a looming, unfunded gap in the public finances may raise ULEV producers' and buyers' fears of future tax hikes.

156 Energy Research Accelerator (HAT0067), para 21
157 SSE (HAT0020), para 25
158 HM Treasury, Summer Budget 2015, sect 4.2
159 Good Energy (HAT0011)
160 Energy Research Accelerator (HAT0067), para 9
161 SSE (HAT0020), para 10
162 Q34
163 Q67
164 Q194
165 HM Revenue and Customs, HMRC Tax and NIC Receipts: Monthly and annual historical record, July 2016, p3, 7
166 Q62
167 Ensus UK Limited (HAT0036)

65. ***Road electrification implies a significant reduction in tax revenue in the long term. It is important that this does not deter the Government from rolling out ultra low emission vehicles (ULEVs), for which current financial support must continue. HM Treasury should publish options to address the future fiscal implications of near-universal ULEV uptake: this would improve confidence in Government finances and the future of road electrification.***

Charging infrastructure

66. Drivers with internal combustion engines enjoy a comprehensive network of commercial filling stations, but the charging network for plug-in and hybrid electric vehicles remains limited. The UK has public charging points at over 4,000 locations; rapid chargers are available at approximately 700 of these.[168] We were advised, during our informal roundtable meeting in May, that most BEV and PHEV users charge at home and work. However, SSE observed:

> The ownership of Electric Vehicles (EVs) may be limited by consumer anxiety over the range of EVs and the lack of a national network of charge points that give EV users the confidence to switch from traditional vehicles. The Government should continue to work with the private sector to increase the roll-out of the rapid charging network and encourage the deployment of EV charging infrastructure.[169]

11% of EV drivers live in rural areas (against 18% of the population).[170] The Campaign to Protect Rural England noted this 'range anxiety' "is likely to be higher in rural areas due to the lower density of the charging network, and government subsidies currently support EV ownership and charging points in cities".[171] It advocates "more emphasis on closing the gaps in charging networks in rural areas".[172] The 2050 Climate Group agrees there is "an overly urban-centric strategy for charging infrastructure".[173]

67. **Development of charging infrastructure has generally been promising, and is not the main barrier to ultra low emission vehicle (ULEV) uptake. However, this has not been the case in rural areas.**

Grid impacts

68. Major vehicle electrification will raise pressure on the electricity networks. My Electric Avenue, an Ofgem-funded research project investigating the impact of electric vehicles on local networks, concluded that "local electricity networks in some areas will struggle to cope with the charging of electric cars (with 3.5 kW charging) when 40–70% of properties connected to a substation feeder have EVs".[174] Stewart Reid, Head of Asset Management and Innovation at SSE, explained this 'clustering':

168 Zap-Map, Charging Point Statistics 2016, accessed 1 September 2016
169 SSE (HAT0020), para 26
170 Campaign to Protect Rural England (HAT0058), paras 4, 6
171 Campaign to Protect Rural England (HAT0058), para 6
172 Campaign to Protect Rural England (HAT0058), para 7
173 2050 Climate Group (HAT0048), para 6
174 My Electric Avenue, Project Summary Report, p15

> The clustering effect, by which I mean if you drive through a town now you will see areas where there are lots of solar panels and you will see areas where there are no solar panels. They cluster, and it is sometimes behavioural, sometimes economic. There are different reasons as to why they cluster, and that clustering creates little points of stress on the electrical network. In the project we want to understand what things trigger these clusters and how we can predict where these clusters are going to appear so that we can respond in advance. You could get a scenario where a relatively low uptake of electric vehicles results in a lot of intense clusters, each of which requires investment.[175]

He costed these clusters at "about £1,000 to do the substation work, and a few hundred pounds to do the work on the individual homes".[176]

Public engagement

69. Describing a pathway for major uptake of ULEVs, Jonathan Murray explained:

> If you look at how they deploy new technology in the automotive industry, the way they do it is into high-spec halo vehicles at the top end of the market. So the starting point for this has been Tesla. When James Bond drives an electric Aston Martin, I think that will have quite a big impact. Seeing Formula E in Battersea Park and on the streets of London, it will start to have that impact. That is how technology traditionally has been rolled out for the automotive industry, at the top end of the market, and then it cascades down, rather than bottom up.[177]

70. The 2050 Climate Group suggested "reform of government and public sector transport procurement policies to require that sustainability is an overarching material consideration" and further recommended "a requirement for those in the public sector to publicise utilisation of renewable energy sources in their total heat, power and transport consumption".[178] Philip Sellwood described "leadership of public procurement" of EVs as "lacking".[179]

71. ***The Government should take the lead on awareness of ultra low emission vehicles (ULEVs) through greater public procurement.***

Freight transport

72. Heavy Goods Vehicles (HGVs) are 1.5% of road vehicles[180] but responsible for approximately 20% of the UK's CO_2 emissions[181] and difficult to electrify.[182] BOC, a specialist gas provider, and the Freight Trade Association (FTA) called for "a greater

175 Q128
176 Q133
177 Q58
178 2050 Climate Group (HAT0048), para 13
179 Q15
180 UK Onshore Oil and Gas (HAT0021), para 17
181 BOC (HAT0037), "Key Observations"; NGVN (HAT0039), Energy Networks Association (HAT0064); Q127 [David Manning]
182 Gasrec (HAT0024); NGVN (HAT0039); Progressive Energy (HAT0061), para 11(e); Energy Networks Association (HAT0064); Q93 [Dr Skorupska]

proportion of OLEV funding" in freight,[183] claiming this proportion is currently only 1.7%.[184] Access to biomethane as a transport fuel may be limited due to subsidy mismatch: the FTA argued "Government policies such as the Renewable Heat Incentive provide a much greater incentive for biomethane producers to inject into the grid for electricity and heating, rather than further upgrading the biomethane for use as a transport fuel".[185] Gasrec, a fuel supplier, claimed "one area where the Government's policies are inadequate is in respect of subsidies to promote the use of biomethane as a transport fuel, where the CO_2 reduction benefits are greatest, instead of for heat and power", arguing that "there is no other alternative fuel than methane/biomethane to power HGVs".[186] The FTA calls for "Government to re-prioritise biomethane towards the transport sector".[187] Dr Skorupska told us "there is a strong supply potential of biomethane and bio-SNG … but we are lacking the vehicles at this moment in time".[188] Andrew Jones MP conceded "we will need liquid fuels for HGVs, potentially for decades to come".[189]

73. ***Heavy Goods Vehicles (HGVs) must be decarbonised but electrification, even in the long term, is unlikely. The Government must ensure HGV operators are sufficiently supplied and incentivised to move to biomethane over the medium-to-long term.***

Heat electrification

74. Gas networks provide for 80% of the UK's energy needs at peak.[190] UKERC estimated "complete electrification of existing UK household and space heating … would add 40GW to peak winter demand", and that "large scale electrification of cars alone would add about 7 TWh and 25 TWh to annual electricity demand by 2030 and 2050 respectively".[191] The Energy Networks Association noted "the electrification of some heat and transport demand will present challenges to the UK electricity network, which will need to adapt to accommodate greater seasonal peaks from heat pumps and the simultaneous charging of electric vehicles".[192] The Energy Research Accelerator cautioned that "given the present rate of the decarbonisation of electricity … it is unlikely that there will be sufficient low carbon generation capacity to decarbonise heat".[193] As an alternative to electrification and a new gas grid, we called on the Government to provide "a regulatory investment framework for district heating" in our recent *Low carbon network infrastructure* report.[194] UKERC concluded that "complete electrification of heating would not be a sensible goal, and therefore that policies should also incentivise increasing energy efficiency and possibly biomass and heat networks".[195]

183 FTA (HAT0010), para 7; BOC (HAT0037)
184 FTA (HAT0010), para 7
185 FTA (HAT0010), para 19; BOC (HAT0037)
186 Gasrec Limited (HAT0024)
187 FTA (HAT0010), para 33
188 Q92
189 Q152
190 Energy Networks Association (HAT0064); SGN (HAT0065), para 14
191 UKERC (HAT0041)
192 Energy Networks Association (HAT0064)
193 Energy Research Accelerator (HAT0067), para 17
194 Energy and Climate Change Committee, First Report of Session 2016–17, Low carbon network infrastructure, HC 267, para 51
195 UKERC (HAT0041)

75. **Adding together unsatisfactory heat-pump performance, the seasonality of heat demand, and the limits of the electricity networks—which the Government also intends to use for transport energy in the long term—it is clear that the Government cannot rely on complete heat electrification. Bioenergy, a greener gas grid and district heating all have roles to play in this sector.**

5 Conclusion

A whole-systems approach?

76. The genesis of this inquiry was the fear that the UK was at risk of failing to meet its crucial renewables objectives not because they are impossible, but because Government departments have not cooperated effectively. DECC told us "the Government is committed to a whole systems approach to decarbonisation" and it is "working with colleagues across Government to identify action that will cost-effectively deliver the emission reductions required".[196]

77. However, the Campaign to Protect Rural England criticises "the Government's silo approach taken to the different targets".[197] The UK Hydrogen Fuel Cell Association claims "at present, the Government's heat, power and transport teams appear to be working entirely independently".[198] Giving specific examples, the REA criticises the UK's high imports of Used Cooking Oil for waste fuels "while millions of tonnes of food waste is sent to landfill".[199] ADBA (the Anaerobic Digestion and Bioresources Association) noted "at present, heat and renewable transport incentives are administered through completely separate incentives".[200] Gasrec criticised inefficiency in the Government's allocation of biomethane support between the heat and transport sectors (see paragraph 72). In chapter 3, we suggest that heat pump deployment is proceeding without prerequisite energy-efficiency improvements. Transport and heat electrification are competing for the same, limited, electricity generation and network capacity (see chapter 4). These examples demonstrate how Government could develop renewable energy more quickly and with fewer unintended consequences by adopting a whole-systems approach. It could do this by formally assessing whether the scarce resources employed by a proposed policy—for example biofuels or the electricity networks—could be used more effectively for decarbonisation in another area.

78. Opportunities for more coherent Government policy on low-carbon and renewable energy have arisen through recent Machinery of Government changes. A new Department for Business, Energy and Industrial Strategy (BEIS) has brought together the former DECC with elements of the former Department for Business, Industry and Skills (BIS): at best, this will enable more joined-up thinking on a low-carbon economy and place clean growth at the heart of a more influential Department; at worst, energy and climate-change issues will be buried by conflicting concerns. We note the new Economy and Industrial Strategy Cabinet Committee, a potentially positive move which brings together the Prime Minister, Chancellor of the Exchequer, and Secretaries of State for Business, Energy and Industrial Strategy, Communities and Local Government, the Environment, and Transport (among others).[201] Their leadership will be central to developing renewable and low-carbon energy, which in turn is vital to the UK's economy and industrial strategy.

79. ***Decarbonisation is of critical importance, and the resources to achieve it—primarily bioenergy and the electricity networks—are limited: efficient resource allocation is***

196 DECC (HAT0063)
197 Campaign to Protect Rural England (HAT0058)
198 UK Hydrogen Fuel Cell Association (HAT0030), para 20
199 REA (HAT0053), para 21.1
200 ADBA (HAT0044)
201 Prime Minister's Office, 'New Cabinet committee to tackle top government economic priority', 2 August 2016

therefore key. There is evidence that Government's overall renewables strategy has been hampered by inconsistent approaches. The creation of a new Department for Business, Energy and Industrial Strategy is an opportunity for greater cooperation and consistency. The new Economy and Industrial Strategy Cabinet Committee should place meeting the UK's renewables and decarbonisation targets at the heart of its terms of reference. We moreover recommend that, for any policy that deploys scarce resources to achieve decarbonisation and renewables objectives, the Government compares its costs and benefits against other potential uses of those resources—this process could be included in Impact Assessments.

Leaving the EU

80. The 2020 renewable targets have many merits, even as the UK prepares to leave the EU. Greenpeace stated "the EU renewable energy targets are an essential platform for reducing costs and delivering at scale" in the context of the UK's renewable needs for long-term decarbonisation.[202] E3G, an environmentalist group, argued that "increased investment in renewable energy sources to 2020 is a 'low-regret' pathway", as the UK needs renewable energy to meet its own long-term decarbonisation objective. Moreover, "if the UK were to disregard [the targets] then it would lead to 'moral hazard' whereby other EU countries would be more likely to disregard other obligations in the UK's national interest".[203] Global warming cannot be solved by the UK alone: but the UK's reputation as a climate leader matters. Moreover, Dr Skorupska of the REA identified that "across electricity, heat and transport there are over 117,000 jobs working in renewable energy".[204] David Manning of SGN stated shortly after the EU referendum "what we do today lays the foundation for us to be able to achieve 2050 [emissions targets], so I don't think we can afford to take our foot off the gas based on what might or might not have happened [with regard to the EU referendum]".[205]

81. The UK has not yet left the EU: the exit process could take two or more years. The Treaty on the Functioning of the European Union will cease to be binding on the UK only when withdrawal is agreed, or two years (without agreement) after the UK triggers Article 50: at this point, the Renewable Energy Directive will no longer bind the UK. The 2020 targets have been transposed into UK law through the Promotion of the Use of Energy from Renewable Sources Regulations 2011 and the Renewable Transport Fuel Obligations (Amendment) Order 2011. Both are statutory instruments made under the powers of the European Communities Act 1972 (ECA). To retain the 2020 targets in part or in whole despite repealing the ECA, new legislation would be required. Lord Bourne clarified "as a Department and as a Government, we are still working to the 2020 targets as something that we are seeking to honour".[206]

82. ***If the UK misses, or reneges on its commitment to, the 2020 renewables targets, this will undermine confidence in its commitment to future targets, including the 2050 decarbonisation objectives of the Climate Change Act 2008—both rely on the Government driving policy to change patterns of electricity, heat, and transport consumption and supply; both are Government promises in which stakeholders must be able to trust.***

202 Greenpeace UK (HAT0066)
203 E3G (HAT0070)
204 Q81
205 Q123
206 Q162

Leaving the EU renders the status of the 2020 targets uncertain. The Government must reassess its capacity to meet them and, if able, recommit to them notwithstanding its exit from the EU. If it is not, it must set and commit to replacement targets and explain how these will support the longer-term decarbonisation objectives of the 2008 Act as effectively as the 2020 targets.

Annex: Informal roundtable meeting, Wednesday 4 May

On Wednesday 4 May, the Committee held an informal roundtable meeting with guests from the Government and academia. This was conducted under Chatham House rules (an agreement not to attribute statements made to the individuals making them) to encourage open and creative dialogue at an early stage of the inquiry. The following individuals participated:

Committee Members

Angus Brendan MacNeil MP, Rushanara Ali MP, Mr Alistair Carmichael MP, Glyn Davies MP, James Heappey MP, Matthew Pennycook MP, Antoinette Sandbach MP, and Julian Sturdy MP

Government Officials

Jerome Glass, Deputy Director, Ronan Devaney, Senior Policy Advisor, Strategy Directorate, Sarah Redwood, Deputy Director, Heat in Buildings, and Tim Warham, Senior Policy Advisor, Clean Energy Directorate, Department for Energy and Climate Change, Aaron Berry, Head of Biofuel Strategy, and Rob Wakely, Head of Low Carbon Fuels, Department for Transport, and Richard Bruce, Director, Office for Low Emission Vehicles

Academics

Professor Philip Eames, Professor of Renewable Energy, Loughborough University, Dr Nick Eyre, Co-Director, UK Energy Research Centre, and Dr Grant Wilson, Research Associate, Chemical and Biological Engineering, University of Sheffield

House of Commons Staff

Dr Farrah Bhatti, Clerk, Gavin O'Leary, Second Clerk, and Josh Rhodes, Specialist, Energy and Climate Change Committee, and Dr Aaron Goater, Environment and Energy Advisor, Parliamentary Office of Science and Technology

An unattributed summary of discussions follows. It does not state the position of either the Committee or the Government.

2020 renewables targets and UK progress towards them

The 2020 renewables targets are distinct, if overlapping in purpose to the Climate Change Act 2008 and carbon budgets. Divergences include bioenergy (which contributes more to renewables than decarbonisation targets) and energy efficiency (which contributes more to decarbonisation than renewables targets). However, the Renewable Heat Incentive (RHI) and Renewable Transport Fuel Obligation (RTFO) are two of the Government's most important non-electricity decarbonisation policies. The UK's overall renewable target of 15% is among the most challenging in the EU in absolute terms, but it has met

all interim targets so far and is likely to meet the next, it was argued. According to some, the UK will exceed its 30% electricity sub-target, but heat and transport are more difficult, being consumer rather than Government led.

Heat

Some suggested that progress in heat is a crucial stepping-stone to overall decarbonisation in the long term. Unlike transport, with regular churn in the vehicle stock, heating equipment tends only to be replaced through individual distress purchases, and furthermore, the UK building stock is insufficiently energy-efficient, it was contended. There was an opinion that low-carbon heating systems are quite different from condensing boilers and installers' skill-set may be inadequate. It remains unclear which combination of heat pumps, green gases, hydrogen or other technologies is the best long-term heating solution.

RHI reform, which the Government is consulting on, aims to improve affordability and value for money with cost controls, to support crucial long-term technologies while transitioning away from a near-exclusive focus on biomass, and to move from subsidy-dependent to sustainable markets.

All heat suppliers must notify the National Measurement and Regulation Office if they have an existing heat network. This provides Government with a comprehensive dataset of the location and scale of heat networks in the UK. This data is due to be published by December 2016.

Some had concerns that district heating is uncompetitive, especially given that regulation is presently industry-led. District heating has been successfully installed in social housing with the help of low-cost loans taken by local authorities, it was highlighted. However, the roundtable noted it is harder to sell properties with legacy commitments to district heating, thus such installation is harder in the private sector. District heating only contributes to renewable energy targets if powered by a renewable source.

It was suggested that there be an office for low-carbon heat, with staff from both DECC and the Department for Communities and Local Government (DCLG), similar to the Office for Low Emission Vehicles (OLEV).

Heat electrification is challenging, as full electrification could triple or quadruple winter electricity-demand peaks, according to some. Seasonality in heat demand is inescapable given the UK climate.

Transport

The RTFO is the Government's primary means to decarbonise transport in the short term, it was noted. It will provide, by one estimate, 95% of the 10% renewables target in transport (with road and rail electrification contributing the remaining 5%). There are challenges increasing the level of biofuel in petrol—unlike E5, E10 won't work with all older vehicles. It was argued that transport-fuel plants in Northern England have been harmed by the low current level (4.75%) of the RTFO and the low price of oil.

The Government's ambition to make every new car zero-emission by 2040 is challenging, in the view of some. The UK has the best network of electric vehicle (EV) rapid charging

points in Europe—with 900 such points and 11,000 public charging points in total—and the fastest-growing market for EVs in the EU in 2014. However, it was suggested that correlation between charging infrastructure and EV uptake isn't straightforward: prospective EV users want public charging points, but actual EV users tend to charge at home and work. Still, the approximately 70,000 EVs in the UK are a small proportion of the 2 million new cars every year, and a smaller proportion still of the 20 million cars on the road.

It was estimated that the Government raises £27 billion annually in fuel duty, and that this may fall significantly with wide uptake of EVs. It was suggested that HM Treasury consequently lacks an incentive to encourage EV uptake.

Issues regarding biodiesel and blocked filters were raised; the Government is looking into this matter, but there is no conclusive evidence that biodiesel has caused the damage.

Biofuels

Scientific consensus, including the position of the Intergovernmental Panel on Climate Change, is that burning biomass (or any fuel of recent biological origin) has zero net carbon emissions as greenhouse gases released are equal to those absorbed during production. Biofuel carbon emissions are therefore caused by ancillary processes (such as drying and transport) and land-use change. It was argued that emissions from drying and transport tend to be low compared with fossil-fuel combustion. The Committee on Climate Change's advice on the fifth carbon budget emphasised the long-term importance of negative-emissions technologies, such as biomass with carbon capture and storage. There was uncertainty over the UK's domestic biofuel-production capacity.

Fuels from wastes avoid land-use change, and are 'double-counted' for the transport target. Used Cooking Oil is currently the most prominent waste fuel in the UK. DfT is spending £25m on three waste-fuel projects over three years, looking at fuels from forestry residues, whisky-industry residues and municipal waste.

Hydrogen

It was suggested that the most likely sources of hydrogen until 2050 are hydrolysis using surplus renewable electricity or as a CCS by-product. Hydrogen extracted from fossil fuels without CCS has a high carbon footprint, according to some. Germany sees power-to-gas as a way of using its solar surplus. The UK was one of three markets chosen by Toyota to launch its hydrogen fuel-cell vehicle, and there will be 12 hydrogen filling stations in the UK by the end of 2016. However, there remain concerns about hydrogen's wider commercial viability.

A whole-systems approach

The essence of a whole-systems approach is to envisage the energy systems in 2050, then consider work needed to enable it. There was debate about the role of biofuels: are they a transitional replacement for fossil fuels, or an important component of the 2050 energy system? Government Departments don't always work across silos, it was argued: indeed,

energy legislation tends to divide sharply electricity, gas and heat policies. However, ULEV has staff from DECC, DfT and the Department for Business, Innovation and Skills, also working closely with HM Treasury.

Two observations were made regarding the energy system in the long run. Firstly, decarbonisation will depend significantly on low-carbon electricity—as heat and transport decarbonisation are planned on the basis of electrification. Secondly, the current energy system depends heavily on fossil fuels for storage, and a decarbonised economy needs to find new ways to use surpluses.

The Committee's inquiry

There is no silver bullet for the challenges in meeting renewables targets. It was argued that the Committee may have more influence on longer-term strategy than Government policy towards the 2020 targets, and should prioritise accordingly in its inquiry.

Conclusions and recommendations

The 2020 targets

1. On its current course, the UK will fail to achieve its 2020 renewable energy targets. This would be an unacceptable outcome given the UK's reputation for climate-change leadership. (Paragraph 14)

The Renewable Heat Incentive

2. *If the Government confirms the proposed changes for biomass in the Renewable Heat Incentive, it must consider what support needs to be given to the supply chain for it to adapt at sufficient speed.* (Paragraph 21)

3. *The Government's proposed reforms to the Renewable Heat Incentive (RHI) are not the optimal pathway to the 2020 renewable heat target. Heat pumps have proven unsatisfactory in actual use, yet are being prioritised over biomass—which has been successful. Sudden realignment from small to large biomass will damage the former's supply chain, and the latter is unlikely to be taken up at scale. Above all, biomethane is crucial to meeting the 2020 target and must remain a funding priority. The Government should revise its RHI reforms to reflect these priorities, especially in protecting biomethane support.* (Paragraph 30)

4. *The Renewable Heat Incentive (RHI) cannot succeed without consumer engagement, which has so far been inadequate. An improved marketing strategy, explaining the comfort, health, environmental and financial benefits of RHI installations—rather than technicalities—and targeted at the actual patterns of heat-system replacement, must be made central to RHI reform. Biomethane injection is the only RHI-supported technology that does not require individuals to choose it: this strengthens our case for the RHI to focus on biomethane until consumer engagement is addressed.* (Paragraph 34)

The Renewable Transport Fuel Obligation

5. *Introducing E10 fuel would help the UK reach its 2020 transport target. The Government must begin laying the groundwork for an E10 introduction as soon as possible, including a strong public information campaign. There is evidence that a duty differential would help, and the Government should produce an Impact Assessment to quantify this claim.* (Paragraph 38)

6. *The level of the Renewable Transport Fuel Obligation (RTFO) must be raised to approximately 9% by 2020; the Government must begin doing so without delay. It is clear that the 2020 renewable transport target will not be met without rapid progress on the RTFO.* (Paragraph 42)

Bioenergy

7. Bioenergy has an important role in the UK's future energy mix: it can decarbonise sectors and niches that electrification cannot, and delivers substantial carbon

reductions under good conditions. Nevertheless, unchecked bioenergy expansion risks substantial CO2 emissions. This means that electrification is likely to be the preferred option where possible. (Paragraph 50)

8. *Clarity on the carbon footprint of bioenergy use and expected future levels of bioenergy is crucial to the UK's long-term decarbonisation. The Government must review its published Bioenergy Strategy in 2017.* (Paragraph 51)

9. *Setting the crop cap is a balancing act: 7% may be too high to avoid significant indirect land-use change, but 1.5% may be too low to achieve the 2020 transport target. The Government's reforms to the Renewable Transport Fuel Obligation must find the appropriate compromise.* (Paragraph 54)

Transport electrification

10. *We regret the Government's changes to Vehicle Excise Duty, which reduced incentives for ultra low emission vehicle (ULEV) uptake and may be interpreted as wavering commitment to road electrification. The Government should reconsider abolishing the tiered system. In the future, fiscal incentives for ULEVs must be maintained with greater consistency.* (Paragraph 63)

11. *Road electrification implies a significant reduction in tax revenue in the long term. It is important that this does not deter the Government from rolling out ultra low emission vehicles (ULEVs), for which current financial support must continue. HM Treasury should publish options to address the future fiscal implications of near-universal ULEV uptake: this would improve confidence in Government finances and the future of road electrification.* (Paragraph 65)

12. Development of charging infrastructure has generally been promising, and is not the main barrier to ultra low emission vehicle (ULEV) uptake. However, this has not been the case in rural areas. (Paragraph 67)

13. *The Government should take the lead on awareness of ultra low emission vehicles (ULEVs) through greater public procurement.* (Paragraph 71)

14. *Heavy Goods Vehicles (HGVs) must be decarbonised but electrification, even in the long term, is unlikely. The Government must ensure HGV operators are sufficiently supplied and incentivised to move to biomethane over the medium-to-long term.* (Paragraph 73)

Heat electrification

15. Adding together unsatisfactory heat-pump performance, the seasonality of heat demand, and the limits of the electricity networks—which the Government also intends to use for transport energy in the long term—it is clear that the Government cannot rely on complete heat electrification. Bioenergy, a greener gas grid and district heating all have roles to play in this sector. (Paragraph 75)

A whole-systems approach?

16. *Decarbonisation is of critical importance, and the resources to achieve it—primarily bioenergy and the electricity networks—are limited: efficient resource allocation is therefore key. There is evidence that Government's overall renewables strategy has been hampered by inconsistent approaches. The creation of a new Department for Business, Energy and Industrial Strategy is an opportunity for greater cooperation and consistency. The new Economy and Industrial Strategy Cabinet Committee should place meeting the UK's renewables and decarbonisation targets at the heart of its terms of reference. We moreover recommend that, for any policy that deploys scarce resources to achieve decarbonisation and renewables objectives, the Government compares its costs and benefits against other potential uses of those resources—this process could be included in Impact Assessments.* (Paragraph 79)

Leaving the EU

17. *If the UK misses, or reneges on its commitment to, the 2020 renewables targets, this will undermine confidence in its commitment to future targets, including the 2050 decarbonisation objectives of the Climate Change Act 2008—both rely on the Government driving policy to change patterns of electricity, heat, and transport consumption and supply; both are Government promises in which stakeholders must be able to trust. Leaving the EU renders the status of the 2020 targets uncertain. The Government must reassess its capacity to meet them and, if able, recommit to them notwithstanding its exit from the EU. If it is not, it must set and commit to replacement targets and explain how these will support the longer-term decarbonisation objectives of the 2008 Act as effectively as the 2020 targets.* (Paragraph 82)

Formal Minutes

Tuesday 6 September 2016

Members present:

Angus Brendan MacNeil, in the Chair

Tom Blenkinsop	Matthew Pennycook
Glyn Davies	Dr Poulter
James Heappey	Antoinette Sandbach

Draft Report (*2020 renewable heat and transport targets*), proposed by the Chair, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 82 read and agreed to.

Summary agreed to.

Annex agreed to.

Resolved, That the Report be the Second Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available (Standing Order No. 134).

[Adjourned till Tuesday 11 October at 9.15 am

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

Tuesday 7 June 2016	*Question number*
Philip Sellwood, Chief Executive Officer, Energy Saving Trust, **Paul Blacklock,** Director of Corporate Affairs, Calor Gas, **Juliet Davenport,** Chief Executive Officer, Good Energy, **Christopher Snelling,** Head of National and Regional Policy and Public Affairs, Freight Transport Association, and **Jonathan Murray,** Policy and Operations Director, Low Carbon Vehicles Partnership	Q1–69

Tuesday 28 June 2016	
Dr Jonathan Scurlock, Chief Adviser, Renewable Energy and Climate Change, National Farmers' Union, **Dr Nina Skorupska,** Chief Executive Officer, Renewable Energy Association, and **Hugh Tucker,** Technical Director, UK Petroleum Industry Association	Q70–120
Stewart Reid, Head of Asset Management and Innovation, SSE, and **David Manning**, Director of Stakeholder Relations, SGN	Q121–149

Wednesday 13 July 2016	
Lord Bourne of Aberystwyth, Parliamentary Under-Secretary of State, **Sarah Redwood,** Deputy Director, Heat Team and **Jerome Glass,** Deputy Director, DECC Strategy, Department of Energy and Climate Change, **Andrew Jones MP,** Parliamentary Under-Secretary of State and **Rob Wakely,** Head of Low Carbon Fuels Division, Department for Transport	Q150–213

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

HAT numbers are generated by the evidence processing system and so may not be complete.

1 2050 Climate Group (HAT0048)

2 AECB the association for environment conscious building (HAT0005)

3 AvantiGas (HAT0056)

4 Billington Bioenergy Ltd (HAT0033)

5 BOC (HAT0037)

6 British Gas (HAT0028)

7 British Sugar plc (HAT0043)

8 Calor Gas Ltd (HAT0016)

9 Campaign to Protect Rural England (CPRE) (HAT0058)

10 Citizens Advice (HAT0059)

11 Citizens' Climate Lobby UK (HAT0040)

12 CPL Industries (HAT0034)

13 Department for Energy and Climate Change (HAT0063)

14 Dr Grant Wilson (HAT0026)

15 Dunelm Energy (HAT0007)

16 E.ON UK plc (HAT0068)

17 E3G (HAT0070)

18 Ecotricity (HAT0047)

19 Energy Networks Association (HAT0064)

20 Energy Research Accelerator (HAT0067)

21 Energy Saving Trust (HAT0054)

22 Energy UK (HAT0046)

23 Ensus UK Limited (HAT0036)

24 ePURE (HAT0052)

25 EUA (HAT0038)

26 FTA (HAT0010)

27 Gasrec Limited (HAT0024)

28 Good Energy (HAT0011)

29 Greenpeace UK (HAT0066)

30 Heatrae Sadia (HAT0051)

31 Hydrogen Hub Initiative (HAT0003)

32 Institution of Civil Engineers (HAT0023)

33 Low Carbon Vehicle Partnership (HAT0057)

34 Mineral Products Association (HAT0049)
35 Mr Stephen Browning (HAT0001)
36 National Farmers Union (HAT0009)
37 NGV Network (HAT0039)
38 NIBE Energy Systems UK (HAT0014)
39 Oil Firing Technical Association (OFTEC) (HAT0032)
40 Population Matters (HAT0004)
41 Progressive Energy (HAT0061)
42 Renewable Energy Association (REA) (HAT0053)
43 ROCKWOOL Ltd (HAT0017)
44 Scottish Carbon Capture and Storage (HAT0069)
45 Scottish Renewables (HAT0029)
46 SGN (HAT0065)
47 Solar Trade Association (HAT0060)
48 SSE (HAT0020)
49 The Anaerobic Digestion and Bioresources Association (ADBA) (HAT0044)
50 The Association for Decentralised Energy (HAT0062)
51 The Carbon Capture and Storage Association (HAT0042)
52 The Institution of Gas Engineers and Managers (HAT0050)
53 The Sustainable Energy Association (HAT0045)
54 UK District Energy Association (HAT0015)
55 UK Energy Research Centre (HAT0041)
56 UK Hydrogen and Fuel Cell Association (HAT0030)
57 UK Petroleum Industry Association (HAT0022)
58 UK Petroleum Industry Association (HAT0071)
59 United Kingdom Onshore Oil and Gas (HAT0021)
60 University of Exeter Energy Policy Group (HAT0027)
61 Valero Energy Ltd (HAT0019)
62 Viessmann (HAT0055)
63 Vivergo Fuels Ltd (HAT0025)
64 Wales & West Utilities (HAT0031)
65 Wolseley UK (HAT0018)
66 Wood Panel Industries Federation (HAT0013)

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website.

The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2015–16

First Special Report	Linking emissions trading systems: Government response to the Committee's Fifth Report of Session 2014–15	HC 376
First Report	Our priorities for Parliament 2015–20	HC 368
Second Report	Future of carbon capture and storage in the UK	HC 692
Third Report	Investor confidence in the UK energy sector	HC 542
Fourth Report	Home energy efficiency and demand reduction	HC 552
Fifth Report	Setting the fifth carbon budget	HC 659
Sixth Report	Pre-legislative scrutiny of the Government's draft legislation on energy	HC 776

Session 2016–17

First Report	Low carbon network infrastructure	HC 267
First Special Report	Future of carbon capture and storage in the UK: Government response to the Committee's Second Report of Session 2015–16	HC 497
Second Special Report	Setting the fifth carbon budget: Government response to the Committee's Fifth Report of Session 2015–16	HC 518
Third Special Report	Home energy efficiency and demand reduction: Government Response to the Committee's Fourth Report of Session 2015–16	HC 542
Fourth Special Report	Pre-legislative scrutiny of the Government's draft legislation on energy: Government Response to the Committee's Sixth Report of Session 2015–16	HC 581