Department of Energy & Climate Change

UK Renewable Energy Roadmap Update 2013

November 2013

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Ministerial Foreword

The last year has been one of the most successful years ever for Britain's renewable energy drive, with big leaps forward in actual deployment, in newly announced projects and in long term policy completion. This Update brings together the story of this rapid progress and sets out our shared high ambitions to go further than many thought possible just a few years ago. As we see record levels of investment and large numbers of new green jobs being created already, we are determined to do more to maximise the green growth potential of Britain's renewable energy drive.

The Government's commitment to cost effective renewable energy as part of a diverse, low-carbon and secure energy mix, is as strong as ever. Alongside gas and low-carbon transport fuels, nuclear power and carbon capture and storage, renewable energy provides energy security, helps us meet our decarbonisation objectives and brings green growth to all parts of the UK.

Since the publication of the last Update in 2012, the UK has made very good progress towards our challenging 2020 renewables target, to deliver 15% of our energy demand from renewable sources. We are fully committed to achieving this target and have seen a significant amount of deployment to date, particularly in the renewable electricity sector. This was demonstrated in 2012 when more than 4% of the UK's energy came from renewable sources – above our interim target. We will continue to monitor our progress towards the target, ensuring that we have measures in place to reach our goal.

We are continuing to make excellent progress in the deployment of renewable electricity across the UK. In Quarter 2 of 2013, renewables accounted for a record 15.5% of all electricity generated. This represents a significant increase in generation since the publication of the last Update. Overall capacity has grown by 38% over the period July 2012 to June 2013 and now stands at 19.5 GW. This, alongside a healthy set of deployment pipelines, demonstrates the progress that is being made to decarbonise our economy and secure our future electricity supply. Actual deployments, will of course, ultimately depend on the sector's ability to drive down costs. We are clear that costs must continue to come down if we are to see the continued deployment of renewables.

Between January 2010 and September this year, DECC recorded announcements worth £31 billion of private sector investment in renewable electricity generation. This investment has the potential to support over 35,000 jobs and we are seeing new capacity coming forward all the time. The Pen y Cymoedd onshore wind project in Wales and the building of the world's largest advanced gasification plant on Teesside are good examples of this. It is great to see the renewable energy sector in the UK showcasing itself as a key driver of green growth. We are determined to ensure that UK-based supply chains are able to make the most of this opportunity. That is why we have launched the Offshore Wind Industrial Strategy. This will provide a long term framework to promote innovation, investment and economic growth.

Renewable heat and transport are likewise important if we are going to achieve our 2020 target. While increasing the deployment of renewable heat remains challenging, we are building new markets in the UK and seeking a step change in consumer and industry behaviour. There has been a 7% increase in energy from renewable heat sources in 2012, and as we put in place enhancements to the financial incentive scheme, we will see a ramping-up in deployment during the second half of the decade. The introduction of the domestic Renewable Heat Incentive (RHI) and the changes to the non-domestic RHI scheme, both due to be introduced in spring 2014, will be key drivers in achieving this.

Transport biofuels continue to offer one of the few routes in the short term to reduce transport sector emissions. Liquid biofuels consumption rose by 7%, from 368 million litres in Quarter 2 of 2012 to 394 million litres in the same period in 2013. It is, however, crucial that the sustainability of biofuels is assured and that they deliver real greenhouse gas reductions when all impacts are taken into account. The Government is actively engaged in negotiations with the European Commission on this matter.

We recognise that some individuals and communities are concerned about the siting of particular renewable energy projects. An important part of this Update concerns our plans for community energy and the work we are doing to strengthen engagement, enhance local benefits, and promote community ownership. We are clear that if renewable energy is to be truly successful it must be truly sustainable, not only economically and environmentally, but also socially. We want to see more and more communities actively involved in small scale renewable projects. It is important that local communities are properly engaged with, and see real benefits from renewable energy developments. The support mechanism and the public register of community benefits in Scotland, which includes over 3 GW of schemes, shows what is possible. We are working towards providing a framework that removes barriers and encourages participation on a wider scale.

2013 has been a very busy year for future policy development, especially around Electricity Market Reform. The Government and Devolved Administrations are working hard to provide the necessary certainty and to create the right conditions to support investment in renewable energy. The Energy Bill is progressing through its final parliamentary stages, and we anticipate that, subject to the will of Parliament, it will receive Royal Assent by the end of the year. There has been significant progress in a number of important policy areas including the programme to reform the electricity market. This will put in place the institutional and market arrangements to maximise the opportunity for economic development and unlock investment in the UK's energy infrastructure.

The UK is unquestionably an attractive place to do business in renewables. The industry continues to enjoy consistently high levels of public support, and we are working tirelessly to encourage further investment. We are committed to ensuring that the nation maximises the opportunity that cost effective renewable energy presents – not just jobs and investment now but providing energy that will underpin our long term economic prosperity.

While recognising that there are different approaches to some matters of energy policy in different parts of the UK, this Update to the Renewable Energy Roadmap has been produced in collaboration with other Governmental Departments and the Devolved Administrations. We will continue to work together as we carry on our journey toward 2020. This will ensure that we are collectively able to realise the opportunities and benefits of a diverse, low-carbon and secure energy mix and to provide the right conditions for continued investment in the UK's energy future.

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Energy and Climate Change

Carwyn Jones AM
First Minister of Wales

Arlene Foster, MLA
Minister of Enterprise,
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Fergus Ewing MSP
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Executive Summary

This is the second Update to the 2011 Renewable Energy Roadmap. It sets out the progress that has been made and the changes that have occurred in the sector over the past year. It also describes our continuing high ambitions and our actions along with the challenges going forward.

Renewable energy is continuing to support economic growth through green jobs and investment. Since 2010, £31 billion worth of private sector investment in renewable electricity has been announced with the potential to support over 35,000 jobs across the UK.

The UK has made very good progress against the 15% target introduced in the 2009 EU Renewable Energy Directive. In 2012, 4.1% of UK energy consumption came from renewable sources, up from 3.8% in 2011.

Building on the strong progress to date, we retain strong ambitions for renewables deployment to 2020 and beyond. The Government is, through Electricity Market Reform (EMR), putting in place the market framework to enable strong continued investment. The Government's draft Delivery Plan for EMR set out the potential ranges for deployment for renewable technologies – with our modelling indicating, for example, up to 16 GW of offshore wind by 2020, and as much as 39GW by 2030.

Overall, renewable electricity capacity grew by 38% to 19.5 GW in Quarter 2 of 2013 with growth being seen across the majority of sectors. Electricity generation from renewable sources for the period July 2012 to June 2013 reached 47.5 TWh, increasing by 24% compared to the same period the year before. Renewables' share of electricity generation was a record 15.5% in Quarter 2 of 2013.

Biomass electricity saw an increase of 1.6 GW between July 2012 and June 2013 with total installed capacity reaching 4.9 GW. Meanwhile generation rose to 17.3 TWh for the year July 2012 to June 2013, increasing by 3.1 TWh compared to the previous period.

Between July 2012 and June 2013 offshore wind increased by 1.0 GW, bringing the total installed capacity to 3.5 GW. Generation rose to 9.7 TWh for the year July 2012 to June 2013, increasing by 3.5 TWh on the year before.

Onshore wind capacity increased by 1.6 GW over the same period, bringing total installed capacity to 7.0 GW by the end of June 2013. Generation rose to 14.2 TWh for the year July 2012 to June 2013, increasing by 2.8 TWh on the year before.

Total solar PV capacity grew by 1.0 GW between July 2012 and June 2013, representing a 70% increase and bringing total installed capacity to 2.4 GW. In the wave and tidal sectors capacity has been unchanged since July 2012, reflecting the developmental status of the industry.

Alongside the strong installed capacity numbers, are a healthy set of deployment pipelines for renewable electricity technologies. The deployment pipelines show that there is

capacity at all stages of development (under construction, awaiting construction and applications being considered) coming through. There has been significant growth in the offshore wind pipeline with total capacity increasing from 10.6 GW to 15.1 GW at the end of June 2013. This has been driven by developments in Scottish Territorial Waters and in the UK's Round 3 zone formally entering the planning consent regime. A number of significant offshore wind projects, with an estimated capacity of around 5 GW have entered the planning system since the end of June 2013.

The Renewables Obligation (RO) and Feed in Tariffs (FITs) scheme continue to play a crucial role in supporting the accelerated deployment of commercial and small scale renewable electricity capacity in the UK. The Government has made significant progress with Electricity Market Reform (EMR) and a number of important milestones have been reached since the last Update including the publication of draft CfD strike prices for renewable technologies.

The Renewable Heat Incentive (RHI) has continued to help stimulate growth in the deployment of renewable heat, with around 16.4 TWh of energy generated from all renewable heat sources in 2012, an increase of 7% on the previous year. Biomass, energy from waste Combined Heat and Power (CHP) and heat pumps remain key renewable heat technologies.

We are building new markets for renewable heat in the UK and seeking a step change in consumer and industry behaviour. Decarbonisation of the heat sector has always been seen as a longer term task, and we expect deployment of renewable heat to increase more steadily during the second part of the decade. Government is taking a number of actions to encourage this growth including the enhancement of the existing RHI support available to certain non-domestic projects and introducing a domestic renewable heat incentive, both currently planned for implementation in spring 2014.

There has been an increase in liquid biofuels with consumption rising by 7%, from 368 million litres in Quarter 2 of 2012 to 394 million litres in the same period in 2013.

The Government's latest projections of energy consumption in 2020 have been revised downwards. The amount of renewable energy (for heat, transport and electricity) estimated to be required to meet the 15% target has also been revised downwards slightly from last year's range of 223-230 TWh to 216-225 TWh.

There has been good progress in unlocking cross cutting and technology specific barriers to deployment. Some of the key activities since the publication of the last Update include:

- The UK is currently the world's biggest offshore wind market with more capacity deployed than any other country. In August 2013, the sector saw the launch of the joint industry and Government Offshore Wind Industrial Strategy, which provides a long-term framework to promote innovation, investment and growth in the UK-based supply chain. Government will continue to work in partnership with industry over the coming months to implement the strategy and provide the tools necessary to support large scale investment, raise awareness of the commercial opportunities, and deliver the innovation and competition needed to bring down costs for consumers. As set out in the draft Delivery Plan for EMR, Government modelling indicates deployment of up to 16 GW by 2020, with much higher levels of deployment in the 2020s as costs fall.

- In relation to onshore wind, support rates were cut by 10% this April, because there was evidence that the costs had fallen. Government also published its response to the 2012 Call for Evidence which provides a clear framework and action plan for ensuring that local communities are better engaged with, and see real benefits from, onshore wind development. Industry has already responded by increasing the recommended community benefit rate in England from £1,000 per MW per year over the lifetime of the wind farm, to £5,000 per MW per year.

- A focus on improving sustainability of biomass with Government support targeted on more resource efficient uses of biomass, as set out in the 2012 Bioenergy Strategy. In August 2013, DECC published the sustainability standards for the use of solid biomass or biogas feedstocks that will be introduced into the RO from 1 April 2014 on a reporting basis. In August, DECC also published details of a non-legislative notification process to allocate spaces for dedicated biomass plant within the previously announced 400 MW cap under the RO.

- 2013 has been an important year for the solar PV sector. Government has started to set out its vision for the strategic direction of this technology in the UK with the publication, in October 2013, of the Solar PV Strategy Roadmap. This provides certainty to investors, developers, as well as the households, communities and businesses affected by solar PV. A full solar PV strategy document will be published in spring 2014.

- The tidal stream sector is moving from individual prototypes to project development of the first arrays. In February 2013, DECC announced SeaGeneration and MeyGen as the successful applicants to its Marine Energy Array Demonstrator (MEAD) programme. DECC is continuing to engage with Low Carbon Innovation Coordination Group (LCICG) members and key sector stakeholders to begin discussions on what else could be done to move the wave sector forward, towards commercialisation. There has been increasing interest in the potential for tidal range deployments with a project to build a 240 MW tidal lagoon in Swansea Bay currently at the pre-application stage in the Planning Act process and private sector plans to construct a tidal barrage across the Severn at very early stages of development.

- Work on renewable heat has focused on setting the right incentives to bring forward deployment. An extension to the Renewable Heat Premium Payment (RHPP) scheme was announced in March 2013. Plans for expanding the non-domestic RHI scheme are expected to be introduced from spring 2014. Revised tariff levels for certain currently supported technologies are also expected to come into force in spring 2014, and are expected to stimulate the market further to counteract low deployment of some technologies. Government is on track to launch the new domestic RHI scheme in spring 2014, subject to Parliamentary and State Aid approval.

- Development of renewable transport policy has continued to focus on ensuring we support the most sustainable biofuels. In addition to contributing to the development of EU wide sustainability criteria, Government is looking to increase the deployment of so called ‘advanced biofuels’ that can be produced using innovative technologies from wastes and residues. DfT announced in August 2013 that it was committing £25 million of capital funding over three years from 2015, to enable the construction of demonstration-scale waste to fuel and other advanced biofuel plants in the UK.

DECC surveys have shown consistently high levels of public support for the use of renewable energy. Government is keen to maximise the potential of decentralised supply and local distributed generation in meeting our renewables target. Government is clear that owning or co-owning renewable energy developments is an important way for communities to have a real stake in, and share the profits of, renewable energy generation in their local area. DECC is exploring what needs to be done to kick start more community energy projects across the UK and will be publishing a Community Energy Strategy later this year.

Finally, we are continuing to look at options for increasing renewable generation. In July 2013, DECC announced, alongside the Scottish Government, that it was committed to taking forward work to consider how to provide additional support for renewable energy in the Scottish islands. Following last year's Call for Evidence on Renewable Energy Trading, Government has announced that it is minded to take up some level of trading so long as it can be made to work and demonstrates benefits for the UK.

Introduction

Background

1. The Government strongly supports renewable energy as part of a diverse, low carbon and secure energy mix. Alongside gas, low-carbon transport fuels, nuclear power and carbon capture and storage, renewable energy offers the UK a wide range of benefits from an economic growth, energy security and climate change perspective.

2. The Coalition has consistently made clear that it is committed to achieving the UK's legally binding target of 15% renewables by 2020 in the most cost effective way, minimising the impact on consumer bills. All parts of the UK are playing a part in delivering this commitment, with the Devolved Administrations setting themselves challenging targets for the level of renewable electricity and heat consumption by 2020[1].

3. In the 2011 Renewable Energy Roadmap[1] DECC presented a framework and set of actions for the delivery of renewable energy deployment. Together with technology specific actions, this set out six key areas where activity was needed to tackle cross cutting barriers:

- Facilitating access to the grid;
- Ensuring long term investment certainty;
- Tackling pre and post consent delays;
- Ensuring sustainable bioenergy feedstock supply;
- Facilitating development of renewables supply chains;
- Encouraging innovation.

4. These barriers continue to present challenges. Whilst good progress has been made, it is recognised that a great deal more needs to be done to unlock potential and to maximise deployment in a cost effective and sustainable way.

Purpose of the 2013 Roadmap Update

5. The first Roadmap Update[2] reported on progress up to the end of 2012 and this second Update provides analysis on further achievements and changes that have taken place in 2013. It includes energy demand and technology cost projections, as well as a 'bottom up' review of projects that could come forward. It updates data on jobs and investments in the renewable energy sector as well as setting out specific information on policy around technology deployment and project pipelines. This year, separate chapters on 'distributed and community energy' and 'increasing options for generation' have been included.

[1] DECC (2011) UK Renewable Energy Roadmap p9: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48128/2167-uk-renewable-energy-roadmap.pdf
[2] DECC (2012) UK Renewable Energy Roadmap: 2012 Update: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80246/11-02-13_UK_Renewable_Energy_Roadmap_Update_FINAL_DRAFT.pdf

6. Alongside this document, DECC is also publishing an Annex providing a more detailed assessment of the status of on-going cross cutting and technology specific actions described in the original 2011 Roadmap and 2012 Update.

Future Renewable Energy Roadmap Updates

7. DECC intends that the next Update to the Renewable Roadmap will be published in late 2015, and biannually thereafter. This will align it with the submission of our progress reports, under the Renewable Energy Directive, to the EU Commission.

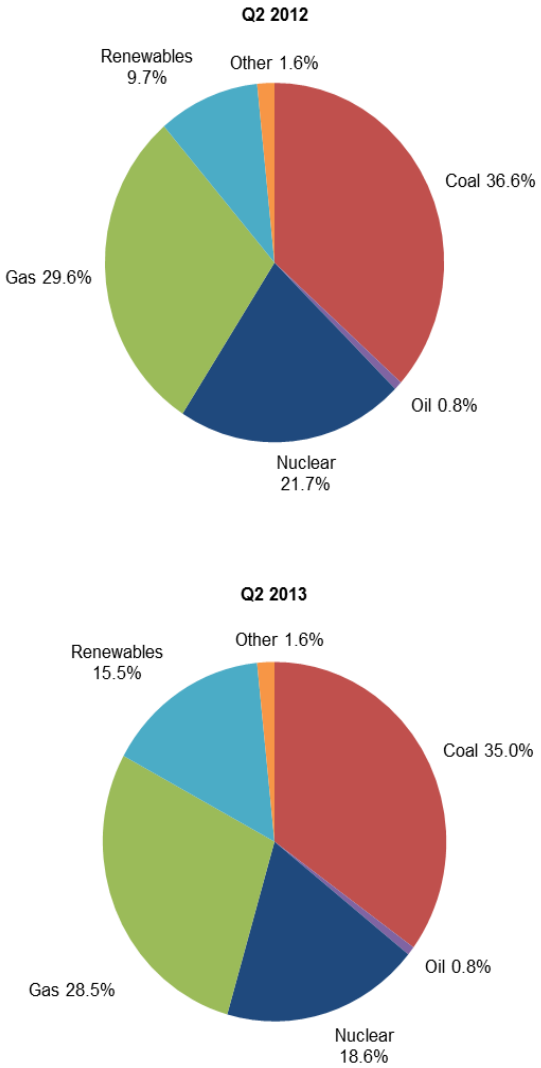
Analysis of Progress and Changes

8. This chapter examines the most recent data on deployment and outlines the changes that have occurred in the past 12 months. It also sets out our analysis of the deployment pipeline for key technologies, identifying where changes have taken place.

Progress in Deployment[3]

9. Renewable electricity generation was 12.8 TWh in Quarter 2 of 2013, an increase of 56% on the 8.2 TWh in Quarter 2 of 2012. Figure 1 shows the share of renewable electricity generation was up from 9.7% in Quarter 2 of 2012, to 15.5% in Quarter 2 of 2013.

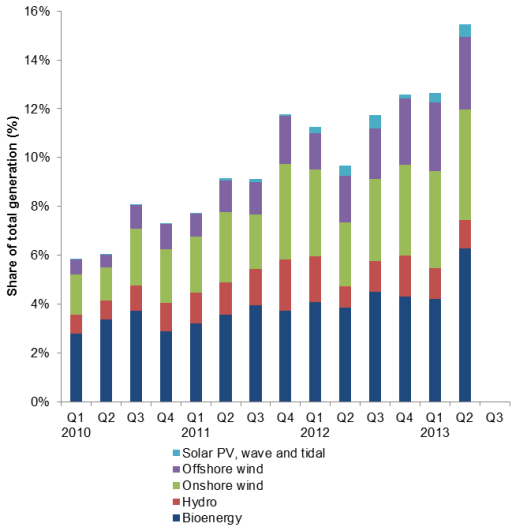
Figure 1: Electricity generation from different fuels in Quarter 2 of 2012 and 2013[4]



[3] All data in this section is from Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013
[4] Energy Trends, September 2013, section 5: https://www.gov.uk/government/publications/energy-trends-september-2013

10. Figure 2 shows how the renewables' share of electricity generation has evolved since 2010 to 15.5% in Quarter 2 of 2013.

Figure 2: Renewable electricity share of total generation[5]



11. Figure 3 shows that the total generation from renewables in Quarter 2 of 2013 was 12.83 TWh. Generation from bioenergy increased by 58%, partly as a result of two new conversions of coal stations to dedicated biomass. Wind generation increased by 62% due to increased onshore and offshore capacity and high wind speeds. Electricity generation from renewable sources for the period July 2012 to June 2013 was 47.5 TWh, increasing by 24% compared to the same period the year before.

Figure 3: Renewable electricity generation - % change on a year earlier

	Generation in Quarter 2, 2013 *TWh*	Percentage change on a year earlier
Renewable electricity generation		
Onshore wind	3.76	+69.9
Offshore wind	2.47	+50.9
Hydro	0.97	+29.0
Solar PV, wave and tidal	0.42	+22.4
Bioenergy (including co-firing)	5.20	+58.3
All renewables	12.83	+55.8

Energy Demand Projections

12. The UK's renewable energy target is expressed as a percentage of total energy use. The Government's latest projections of energy consumption in 2020 have been revised downwards. Figure 4 shows that the amount of renewable energy (for heat,

[5] Energy Trends September 2013, chapter 6 and table ET 6.1: https://www.gov.uk/government/publications/energy-trends-september-2013

transport and electricity) estimated to be required to meet the 15% target has also been revised downwards slightly from last year's range of 223-230 TWh to 216-225 TWh[6].

Figure 4: Estimates of generation required to meet the 2020 target[7]

2011	234 TWh
2012	223 - 230 TWh
2013	216 - 225 TWh

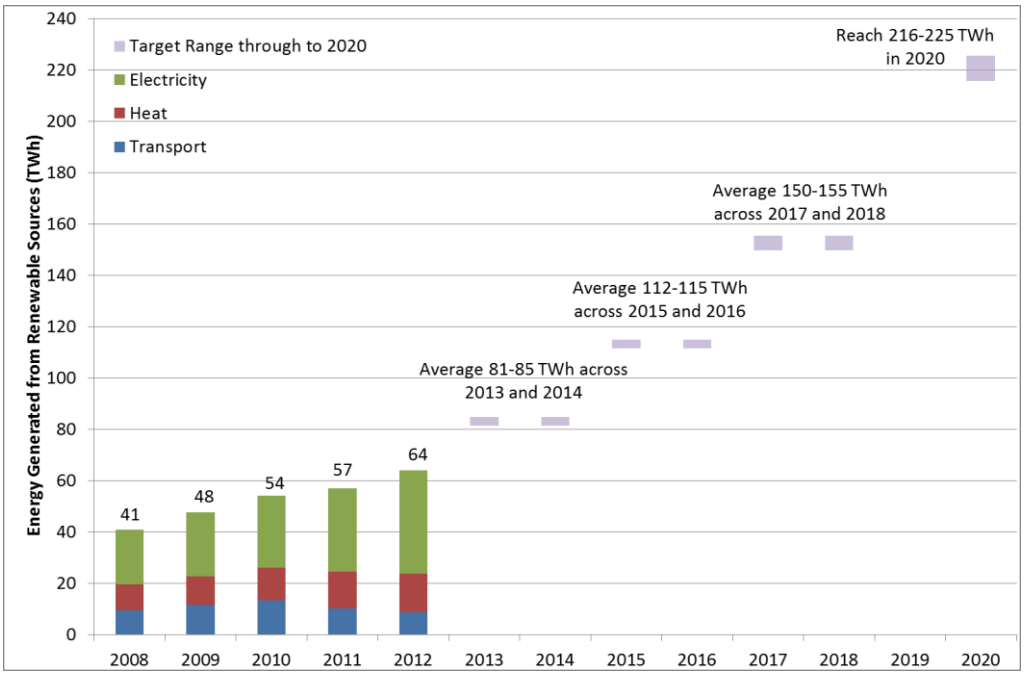
Progress against the EU Renewable Energy Directive

13. The UK has made very good progress against the 15% target introduced in the 2009 EU Renewable Energy Directive.

14. Using the methodology required by the EU Renewable Energy Directive, 4.1% of UK energy consumption in 2012 came from renewable sources. This is up from 3.8% in 2011, an increase of 0.3 percentage points.

15. The 2012 figure is greater than the first interim target of 4.04% as set out in the Directive. Across 2011 and 2012, the UK achieved an average of 3.94%, against the 4.04% target set out in the Directive, the shortfall being within the margin of error around the estimate.

Figure 5: Progress in renewable electricity, heat and transport[8]



[6] Analysis based on Updated Energy and Emissions Projections, 17 September 2013: https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2013

[7] The methodology for estimating generation required to meet the 15% renewable energy target changed between 2011 and 2012, moving away from a single point estimate, to calculation of a range, reflecting uncertainty in estimating future demand levels. Factors that affect our projections of demand include assumptions on economic growth, fossil fuel prices and the impact of government policy such as improving energy efficiency. Changes in the underlying assumptions result in annual revisions to the estimates of final energy consumption in 2020.

[8] DECC (2013), Data from Digest of UK Energy Statistics (DUKES) July 2013, Table 6.7: https://www.gov.uk/government/publications/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes. Analysis based on Updated Energy and Emissions Projections, September 2013: https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2013

16. Figure 5 displays historical levels of renewables generation, and estimates of renewable generation required to meet future interim and 2020 targets. Interim targets are calculated as an average across two calendar years. As such, there is no singular path for deployment in each year to meet these targets. Deployment in one of the interim target years affects what is required in the subsequent year in order to meet an interim target.

17. Renewable energy generation in the Devolved Administrations[9] is important to progress towards the UK target.

Northern Ireland

18. The Northern Ireland Executive's Strategic Energy Framework includes a target of 40% electricity consumption from renewable sources by 2020. The Executive's Programme for Government (PfG) target of 12% by 2012 was met and the current 2011-2015 PfG includes an interim target of 20% by 2015. From July 2012 to June 2013, renewable electricity in Northern Ireland increased from 1.1 TWh to 1.3 TWh – a rise of 16%. Renewable electricity in Northern Ireland accounted for 3% of the total UK renewables output during this period.

Scotland

19. From July 2012 to June 2013, renewable electricity generation in Scotland increased from 14.7 TWh to 15.6 TWh – a rise of 6%. Renewable electricity in Scotland accounted for around 33% of the total UK renewables output during this period. In the context of the Scottish Government's renewable electricity target, renewable generation during 2012 represented approximately 39% of its electricity demand, compared to 36% the year before[10].

Wales

20. From July 2012 to June 2013, renewable electricity generation in Wales increased from 2.3 TWh to 2.4 TWh – a rise of 1%. Renewable electricity in Wales accounted for 5% of the total UK renewables output during this period.

Deployment of Renewable Energy to 2020

21. The Government continues to believe that encouraging a diverse mix of energy sources, including renewables along with improving energy efficiency is the best way to meet our decarbonisation objectives, protect consumers against rising fossil fuel prices and ensure that the lights stay on. In March, the Government published its estimated impacts of energy and climate change policies on energy prices and bills 2013[11]. Today's householders are paying on average £65 or 5% less for their gas and electricity bills as a result of energy and climate change policies compared to if no policies had existed, and in 2020 the net saving against the do-nothing scenario will reach £166 or 11% (all figures real 2012 prices).

[9] Table 6.1 of Energy Trends, September 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244901/et6_1.xls
[10] Renewable Electricity Statistics for Scotland: http://www.scotland.gov.uk/Resource/0043/00434947.pdf
[11] DECC (2013), Estimated impacts of energy and climate change policies on energy prices and bills 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/172923/130326_-_Price_and_Bill_Impacts_Report_Final.pdf

22. In 2012 we agreed a £7.6 billion Levy Control Framework (LCF) cap for 2020/21 for low carbon electricity support schemes, including renewables. In June this year DECC published the annual caps (see Figure 6) alongside the Spending Review as an update to the existing LCF.

Figure 6: Upper limits to electricity policy levies, 2011/12 prices

2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
£4.30bn	£4.90bn	£5.60bn	£6.45bn	£7.00bn	£7.60bn

23. The LCF caps cover all low carbon electricity support policies, including the Renewables Obligation (RO), Feed-in Tariffs (FiTs) scheme and Contracts for Difference (CfD) under the Electricity Market Reform (EMR) proposals. Government intends to support as much investment as is possible without exceeding the limits agreed as part of the LCF.

24. In the 2011 Roadmap, DECC presented evidence on the potential deployment levels and costs of renewable energy technologies to 2020 and considered factors such as technology cost, build rates, and the policy framework. Those variables were modelled to produce illustrative 'central ranges' for expected deployment.

25. The EMR draft Delivery Plan, published in July this year subsequent to the publication of draft CfD strike prices for renewable technologies[12], presented revised deployment scenarios for each of the renewable electricity technologies[13]. The revised deployment projections are indications of how modelled investment and generation decisions might affect how much of each technology might be expected to be deployed in 2020 in a given scenario, with a given CfD strike price. They are not deployment targets. Actual levels of deployment could be very different from these projections.

26. The final EMR Delivery Plan is on track to be published by the end of the year. It will include the final strike prices and deployment scenarios for each technology. It will also include the LCF profile for the period 2014/15 to 2018/19, the Capacity Market Reliability Standard, as well as some further information about managing spend within the LCF. Publication of the Delivery Plan will enable the industry to plan ahead and work towards delivering the renewable electricity needed for the UK to meet its 2020 target.

27. Based on the most recent modelling, we anticipate that the strike prices published in the draft Delivery Plan will bring forward enough deployment of renewable electricity to meet around 32% of the UK's electricity consumption in 2020.

28. Making projections of future rates of deployment is difficult. This Update contains a 'bottom up' review of projects that could come forward. The pipelines do not take into account sensitivities such as the possible impact of policy developments or changes in financial support rates. They are therefore not directly comparable with the deployment scenarios published in the EMR draft Delivery Plan.

[12] DECC (2013), LCF and draft CfD Strike Prices: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209361/Levy_Control_Framework_and_Draft_CfD_Strike_Prices.pdf
[13] DECC (2013), Consultation on draft EMR Delivery plan: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/238867/Consultation_on_the_draft_Delivery_Plan__amended_.pdf

29. With regards to heat, the Renewable Heat Incentive (RHI) and the Renewable Heat Premium Payment (RHPP) scheme are the primary tools for driving the transition to renewable heat. Following the introduction of the non-domestic RHI scheme in 2011, DECC carried out two consultations in September 2012 on the non-domestic scheme: RHI – Expanding the Non-Domestic scheme[14] and Air to Water Heat Pumps and Energy from Waste[15]. In addition, and as a response to lower than projected uptake for some technologies, an early review of the non-domestic tariffs for some technologies was carried out in 2013. The plans for expanding the non-domestic scheme are scheduled for publication alongside the tariff review consultation outcome later this autumn with changes being made to the scheme in spring 2014. In June 2013 the Spending Round confirmed funding of up to £430 million for the RHI in 2015/16[16].

30. In Quarter 2 of 2013, 394 million litres of liquid biofuels were consumed in transport. This is an increase of 7% on the total in Quarter 2 of 2012 (368 million litres), but 13% lower than the record high of 454 million litres in Quarter 4 of 2011[17]. Government has been actively engaged in negotiations around the 2012 European Commission proposal to address Indirect Land Use Change (ILUC) impacts through amendments to the Renewable Energy Directive and the Fuel Quality Directive. Once resolved the Government hopes to pursue deployment of biofuels in a strategic and sustainable way.

Technology Cost Projections

31. This section presents cost estimates for selected renewable technologies in the electricity and heat sectors, with selected non-renewable technologies offered for comparison. Costs in the electricity sector compare costs estimated for 2014, with cost estimates for 2020 (with the exception of biomass conversion, which shows 2014 only) and show a profile of expected cost reductions. Heat cost estimates show estimated costs for 2014/15. It illustrates that the costs of renewable technologies are currently mostly expected to be higher than non-renewable alternatives.

32. These differences in timing, along with other differences, mean comparisons can only be made between technologies in the same sector, and not between different sectors. Both heat and electricity cost estimates display a range of uncertainty. It is important to note that different factors drive the range of uncertainty in each sector.

Electricity Levelised Cost Ranges

33. Figure 7 highlights the levelised cost of electricity generation for selected technologies using technology specific hurdle rates. It shows (where applicable) the levelised costs for plants commissioning in 2014 and 2020.

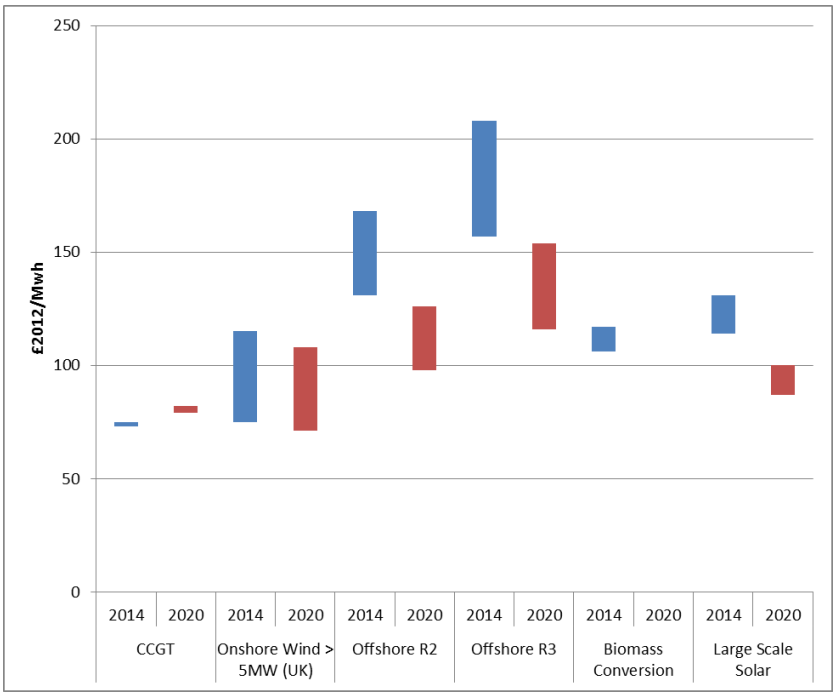
[14] RHI – Expanding the Non-Domestic scheme consultation ran from 20 September – 7 December 2012. We consulted on a range of new tariffs and technologies: air source heat pumps (both air-to-air and air-to-water), biomass direct air heating, a specific CHP tariff (for biomass and bioliquids), medium (200-500kW) and large (>500 kW) biogas combustion and a tariff uplift for deep geothermal heat pumps: https://www.gov.uk/government/consultations/renewable-heat-incentive-expanding-the-non-domestic-scheme

[15] DECC (2012), RHI consultation on air to water heat pumps and energy from waste: https://www.gov.uk/government/consultations/renewable-heat-incentive-air-to-water-heat-pumps-and-energy-from-waste--2

[16] HM Treasury Spending Round 2013, page 26: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209036/spending-round-2013-complete.pdf

[17] Data is taken from Energy Trends – September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013. These figures have been sourced from: HM Revenue and Customs Hydrocarbon Oils Bulletin - https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutyBulletins.aspx

Figure 7: Levelised cost of electricity generation for selected technologies[18,19,20]



34. DECC analysis, based on published electricity generation costs, show that levelised costs will continue to fall across all the key renewable electricity technologies up to 2020[21]. This is leading to a reduction in the level of subsidies for the majority of technologies over the next four years, under the RO and is reflected in the draft strike prices proposed under EMR.

Heat Levelised Cost Ranges

35. Heat costs in Figure 8 shows the levelised cost of heat technologies installed in households in 2014/15[22]. The range reflects the uncertainty and normal variation around costs and performance of technologies. The cross in the range reflects the 50th percentile.

[18] DECC (2013), Electricity Generation costs: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223940/DECC_Electricity_Generation_Costs_for_publication_-_24_07_13.pdf

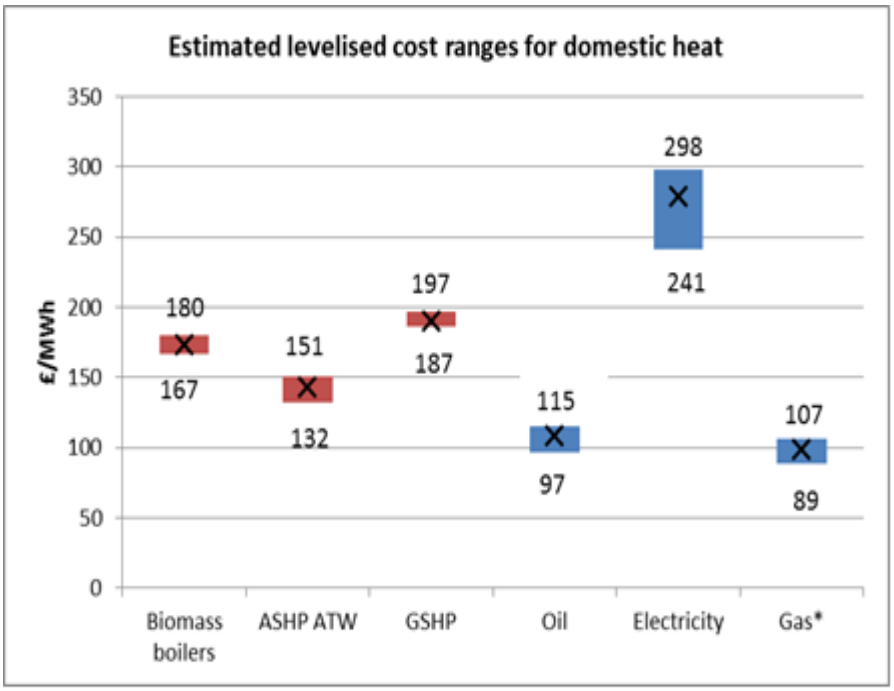
[19] It should be noted that the levelised costs estimates in the heat and power sectors are not comparable due to different methodologies used to calculate cost estimates. As such, comparisons should only be made between technologies within each sector.

[20] It is not possible to compare these levelised costs with those set out in last year's Update as there have been several changes in data and assumptions to selected technologies since previous estimates were published. Further details can be found in this year's publication of Electricity Generation Costs: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223940/DECC_Electricity_Generation_Costs_for_publication_-_24_07_13.pdf

[21] DECC (2013), Electricity Generation costs: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223940/DECC_Electricity_Generation_Costs_for_publication_-_24_07_13.pdf

[22] Figures based on 2014 prices. Levelised costs are gross, based on total heat output produced over 20 years (lifetime of technologies) and include barrier costs. A rate of return of 7.5% on capital expenditure is assumed.

Figure 8: Estimated levelised cost ranges for domestic heat (2014/15)[18, 23]



36. In addition to the technologies highlighted in Figure 8, solar thermal can provide a valuable complementary source of renewable heating for domestic hot water. For particular types of homes solar thermal with RHI support can offer an attractive heating proposition.

37. There have been changes to the levelised cost ranges for heat technologies since the publication of the last Update. The changes are largely due to more up to date evidence on the cost and performance of renewable technologies, which was provided by the Sweett Group through an evidence gathering exercise[24], and use of RHPP scheme data.

38. Unlike in the last Roadmap Update, DECC has not estimated levelised costs for heat technologies in 2020. This has proven difficult given uncertainty around future deployment, the state of the renewable heat market, and the unknown scope for international and domestic cost reductions which will include changes to barrier and financing costs caused by changing consumer attitudes. However, it is expected that the cost gap between renewable and conventional technologies will reduce over time.

39. There are significant uncertainties about the cost and performance of systems and the potential for deployment. In addition the natural variation in the non-domestic building stock means that there is significant variation in the levelised costs.

[23] The levelised costs for oil and gas relate to a more precise definition of who we think will be able to install renewable heating measures. This means that we are looking at a narrower group of people than in previous publications in the range bars. Gas is shown here only for completeness. The target market for the domestic RHI is off-gas grid because it is more cost-effective to install renewable heat in these properties first.

[24] Sweett Group (2013), research on cost and performance: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204275/Research_on_the_costs_and_performance_of_heating_and_cooling_technologies__Sweett_Group_.pdf

Economic Growth

Jobs and Investment

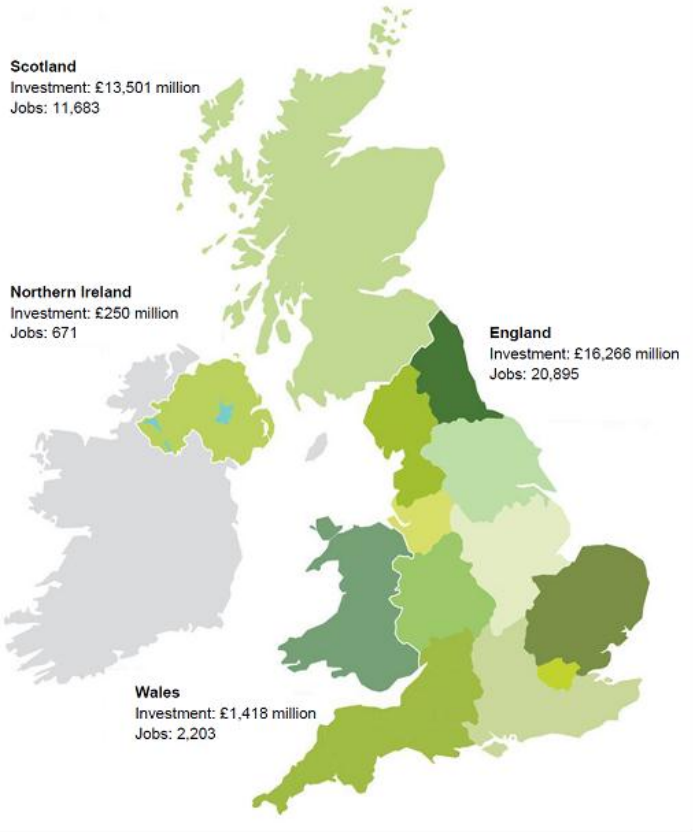
40. DECC analysis suggests that our reforms of the electricity market could help achieve the additional £100-110 billion investment that is required in the electricity sector between now and 2020[25].

41. We expect renewables to play a key part in this growth. Renewable energy continues to be an attractive market for investors and is supporting jobs and investment throughout the supply chain.

42. DECC's research shows that the UK is continuing to enjoy particularly strong levels of investment in renewable electricity generation, which is in turn supporting a wide range of jobs in established and new companies[26].

43. Since 2010, £31 billion worth of private sector investment in renewable electricity has been announced. This has the potential to support over 35,000 jobs across the UK[27].

Figure 9: Recorded investment and jobs by country



[25] DECC (2013), EMR Delivery Plan impact assessment: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225981/emr_delivery_plan_ia.pdf

[26] DECC collates industry announcements of renewable electricity investments to monitor activity in the sector. DECC's research is not a definitive list of the activity in the renewables market but an indication of the continuing realisation of growth and investment opportunities in the UK renewables sector. The information collated relates to projects with a generation capacity of over 20 MW for which public announcements have been made about investment and jobs.

[27] Between April and September 2013, announced investments grew by approximately £2.2 billion overall. This alone has the potential to support over 5,000 jobs.

Headlines on Foreign Direct Investment

44. The UKTI Inward Investment Report 2012/13 published in July 2013 shows that the UK is continuing to strengthen its position as the leading European destination for foreign direct investment[28].

45. The report highlights renewable energy as one of the top performing sectors, with 46 foreign direct investment projects into the UK. These successes (which include both new investments and the expansion of existing investments) are estimated by UKTI to have resulted in the creation of 630 new jobs and the safeguarding of a further 1,884 existing jobs.

46. In the report Adam Bruce, the Global Head of Corporate Affairs at Mainstream Renewable Power, explains why he believes the UK energy sector is offering a 'once in a generation' market opportunity to international companies and investors.

Building Supply Chains

47. In addition to the economic opportunities associated with the development of renewable energy infrastructure, further jobs and investment are created through the development of associated supply chains.

48. In recognition of this, the Government published in October 2013 more information about the requirement for some projects to have an approved supply chain plan to be eligible for the CfD[29]. The EMR consultation proposes that generators with projects over 300 MW will need to demonstrate they have secured Government's approval to their supply chain plan as one of the eligibility criteria within the CfD allocation process. Government will issue a consultation on detailed proposals for supply chain plans in November and this will close on the same date as the EMR consultation.

The Offshore Wind Sector Supply Chain

49. The offshore wind sector in particular, continues to hold significant potential. In August 2013, DECC and BIS launched an Offshore Wind Industrial Strategy[30]. The Strategy, which has been developed in collaboration with industry, provides a long term framework to promote innovation, investment and economic growth in the UK-based offshore wind supply chain.

50. The Offshore Wind Industrial Strategy sets out a vision for the UK offshore wind industry. The vision is of industry and Government working together to build a competitive and innovative UK supply chain that delivers and sustains jobs, exports and economic benefits for the UK, supporting offshore wind as a core and cost-effective part of the UK's long-term electricity mix.

[28] UKTI (2013), Inward Investment report 2012/2013: http://www.ukti.gov.uk/uktihome/aboutukti/item/553980.html
[29] DECC (2013), EMR Consultation on implementation: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249591/EMR_Consultation_on_Implementation_proposals.pdf
[30] Government (2013), Offshore Wind Industrial Strategy: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226456/bis-13-1092-offshore-wind-industrial-strategy.pdf

The vision is to deliver:

- economic growth creating tens of thousands of long term UK jobs;
- a clear and sustainable project pipeline;
- major manufacturing facilities in the UK;
- the development of a competitive UK-based supply chain; and
- a technology cost-competitive with other low carbon technologies.

51. As part of the Strategy, the Government made a number of announcements which will boost levels of inward investment in the UK, build the competitiveness of the supply chain in England and help Small and Medium Enterprises already in the sector looking to increase capacity and those with the capability to enter the offshore wind manufacturing supply chain. These announcements are reviewed in more detail in the offshore wind section. More details of developments specific to Scotland are provided in paragraphs 54 to 56.

52. A number of UK companies have achieved success during 2013, as demonstrated by the achievements of TAG Energy, based in the North East of England.

Case Study 1 – TAG Energy: Building supply chains/manufacturing

TAG Energy Solutions is a manufacturing and project management company with large facilities based in Billingham on the River Tees. TAG has been active in the offshore oil and gas industry for some time and in 2009 they decided to refocus the business to meet the demands of the renewable industry. In June 2013 TAG won a contract worth £20 million to provide 16 monopiles to the Humber Gateway offshore wind farm. This was their first major contract in the sector and the first of its type to be awarded to a UK company.

Danny Alexander with former TAG CEO Alex Dawson and Danny Brennan, Plating Apprentice.

"Offshore wind is a major part of our need to meet our future energy requirements and we need to make sure that British businesses and British workers are getting the benefit from that. Companies like TAG are at the forefront and it's so encouraging to see this business and the work it is doing to ensure we capitalise on what is a huge economic growth area for the country."
Danny Alexander, Chief Secretary to the Treasury

Investment: TAG has invested £30 million in its Haverton Hill site to create a first-class manufacturing and assembly facility to serve the offshore wind renewable energy sector.

Jobs and the wider economic impact: When TAG won the order to construct 16 monopiles, they increased their workforce fourfold to 150. Many of these jobs are highly skilled. TAG's staff are working on projects for the domestic UK and overseas markets. TAG estimates that it supports at least another 100 jobs in its supply chain across the North East of England. This demonstrates the wider economic benefits that renewable energy is delivering across the UK, driving investment, job creation and prosperity.

53. Companies across the UK are winning contracts on a regular basis in the offshore wind sector supply chain. Some of the companies that have won contracts since the last Update include:

In England and Wales:

- 3sun Group, based in Great Yarmouth have been awarded a three year contract for operational services for the Sheringham Shoal offshore wind farm;
- Hughes Sub Surface Engineering with offices in Bootle, Mostyn and Staines, won a £5 million contract for diving and cable installation support services on the Gwynt y Mor wind farm.

In Northern Ireland:

- Harland and Wolff based in Belfast have been awarded the contract for design and fabrication of the Humber Gateway offshore wind farm substation jacket;
- Ridgeway Renewables, also located in Belfast has set up a UK wide supply chain for the provision of sub-sea cable and turbine foundation scour protection;
- The fishing community in Kilkeel have combined their resources and skills to form a new company called Sea Source who have successfully won a range of contracts for radar, benthic, bird and mammal surveys and also the provision of vessels for guard duty in the Irish and North Seas for companies such as Dong Energy, Scottish Power Renewables, Natural Power and Anatec Ltd.

In Scotland:

- FoundOcean, with its offshore service base in West Lothian, has been awarded the contract to provide grouting for 108 monopiles for the West of Duddon Sands offshore wind farm;
- Based in Renfrew, Steel Engineering provided the steel jacket and transition piece for the 7 MW Samsung test turbine.

54. The Offshore Wind Expert Support Programme which helps companies consider and build diversification strategies to enable them to win business in the offshore wind sector has been extended. It is aiming to provide support to 600 companies over a three year period (2012 -2015).

55. Scottish Enterprise, Highlands & Islands Enterprise and Marine Scotland are working to ensure that there is as much local content as possible in Scottish projects. They are working with developers to better understand the procurement processes and to identify companies not yet known to developers.

56. The Scottish enterprise agencies have run a series of supply chain events in collaboration with The Crown Estate, to reach out, and share information with, hundreds of interested supply chain companies.

Wider UK Renewables Supply Chain

57. The UK Government and Devolved Administrations have also been working with stakeholders to support the development of UK supply chains in other renewable industries throughout the UK. For example:

In England and Wales:

- To maximise the economic benefits and job opportunities of onshore wind the Government intends to work with industry to produce guidance for potential supply chain business on how to access the opportunities provided by onshore wind developments. This will be supported by a DECC sponsored supply chain event later in the year;

- The Welsh Government is working with developers to maximise supply chain and economic opportunities in the onshore wind sector including holding events to raise awareness, introduce suppliers to the main contractors for the projects, and host 'Meet the Buyer' sessions where one to one contractual discussions can be brokered and deals secured. The Welsh Government is also providing funding to support apprentice schemes for young people across the renewables sector.

In Northern Ireland:

- Invest NI has developed a marine energy supply chain model with ReGen SW. This has been adopted by RenewableUK for all of the UK;

- Invest NI is also working with companies interested in starting up or transferring their capabilities into the bioenergy sector and is continuing its twin-track approach of exploring market opportunities coupled with Technology Transfer visits;

- RenewableUK will hold its annual Wave and Tidal Conference in Belfast in February 2014.

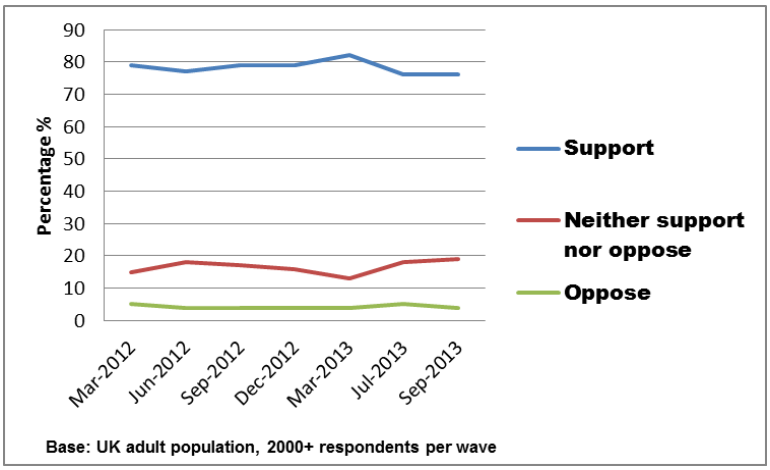
In Scotland:

- Funds such as the Renewable Energy Investment Fund (REIF) are supporting the development of industries in marine energy, community renewables and district heating.

Public Opinion

58. A tracking survey conducted quarterly for DECC by an independent research organisation have shown consistently high levels of public support for the use of renewable energy[31]. Interviews conducted with 2,103 UK adults in September 2013 showed 76% of respondents support the use of renewables to generate the UK's electricity, fuel and heat. Only 4% are opposed. See Figure 10 for survey results since March 2012.

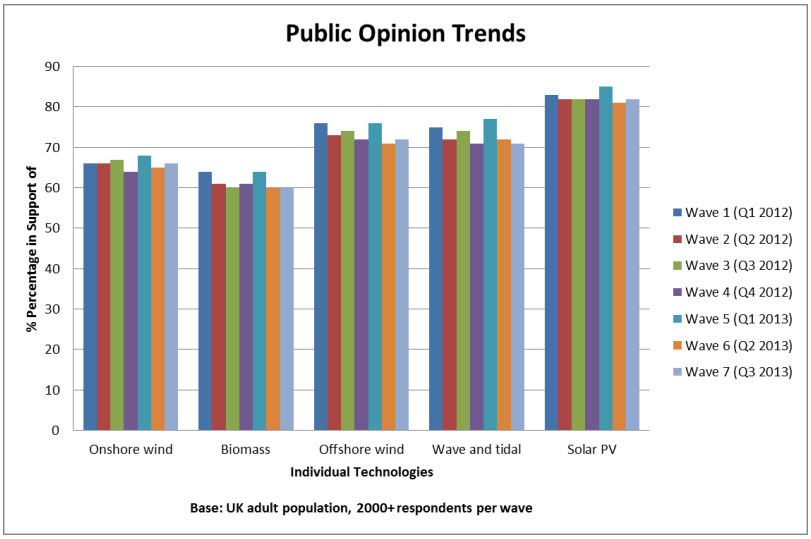
Figure 10: Public support for renewables



59. In order to maintain this level of public support, renewables need to be sited appropriately and Government policies will need to continue to temper the impact on household energy bills of global gas prices and network costs.

60. In the most recent survey 82% supported solar, almost three-quarters supported offshore wind (72%) and wave and tidal (71%), and almost two thirds supported onshore wind (66%) and biomass (60%). See Figure 11 for technology specific survey results since March 2012.

Figure 11: Public support for individual technologies



[31] DECC (2013), Public Attitudes Tracker: https://www.gov.uk/government/organisations/department-of-energy-climate-change/series/public-attitudes-tracking-survey

Distributed and Community Energy

Distributed Energy

61. Government is keen to maximise the potential of decentralised supply and distributed generation. Distributed energy can harness a wide range of smaller-scale renewable and low carbon energy sources and, as it is local, lends itself to community involvement and investment.

62. Many towns, cities and local communities are already investigating ways of developing more integrated local energy systems, involving some combination of locally-generated renewable electricity, local heat networks, storage, and electricity distribution systems. They are supported in this by a number of existing policies such as the FITs scheme, license lite, as well as the newly-established Heat Network Delivery Unit.

63. In addition to these policies, DECC will examine distributed energy and the set of issues around combined, and often area-based, approaches to shifts and reductions in demand for energy (what is currently known as the 'D3 agenda'). DECC's work will consider whether and how we might best develop the evidence base, and its modelling capacity, to enable us to more fully capture the costs and benefits of D3.

Community Ownership

64. Government is clear that owning or co-owning renewable energy developments is an important way for communities to have a real stake in, and share the profits of, renewable energy generation in their local area.

65. Energy generated from small-scale community energy projects is already supported through DECC's financial incentives and there have been a number of actions to enhance this support over the last 12 months. In particular:

- The announcement that DECC is planning to take powers to double the capacity threshold for community power generation projects under the FITs scheme from 5 MW to 10 MW, to enable larger projects to benefit[32]. The Government has laid an amendment to the Energy Bill. DECC will be consulting on using this enabling power, following Royal Assent. There will be no change to the scheme until the consultation has been completed.

- DECC and Defra launched a joint £15 million Rural Community Energy Fund (RCEF) in June 2013 offering grants and loans to help eligible rural communities in England access the money needed to carry out feasibility studies into local renewable energy projects and to fund the costs of applying for planning permission[33]. There is a similar loan fund in Scotland already in operation[34] and loan funding in Wales is available through the Ynni'r Fro community energy programme[35].

[32] DECC (2013), press release: https://www.gov.uk/government/news/more-community-energy-projects-to-get-support-under-feed-in-tariffs
[33] Funding can be used to support rural projects across the renewable and low carbon energy spectrum including wind, solar, biomass, heat pumps, anaerobic digestion, gas CHP and hydro: https://www.gov.uk/government/news/15m-fund-for-rural-energy-projects-opens-to-applications
[34] The Scottish Government's Community and Renewable Energy Scheme delivered by the CARES Consortium: http://www.energysavingtrust.org.uk/scotland/Communities/Community-And-Renewable-Energy-Scheme
[35] Information on the Ynni'r Fro Community Energy Programme can be found at: http://www.energysavingtrust.org.uk/wales/Communities/Finding-funding/Ynni-r-Fro-programme

66. There are already a wide range of successful community ownership and joint industry and community partnership models in place across the UK, particularly in Scotland. These models are supporting a range of different initiatives and technologies, sometimes bringing a number of different renewable technologies together.

Case Study 2: Community ownership of a hydro energy scheme in Oxfordshire

Project name: Osney Lock Hydro (OLH) scheme
Energy: Hydro
Capacity: 49 kW
Investment: £530,000

The OLH scheme is a 49 kW community hydro scheme in West Oxford. In February 2013 OLH received permission from the Environment Agency (EA) to develop the project. By May 2013, OLH had raised over £530,000 in equity shares from local people, allowing the installation to proceed. Plans for the scheme include a number of measures to maximise the environmental benefits and solar panels to be installed on the roof of the building to maximise the generating capacity of the project. It is anticipated that the electricity will be supplied locally to the EA.

Working in partnership: OLH was set up by the successful West Oxford Community Renewables Industrial and Provident Society and has received support from the Low Carbon Hub Community Interest Company under an Intelligent Energy Europe grant programme led by Oxford City Council. The Low Carbon Hub draws together experienced local community energy practitioners to help bring community energy to scale in Oxfordshire.

Community benefits: The scheme is aiming to generate over £2 million during its forty year lifetime. This money will be used to fund energy demand reduction programmes and support biodiversity in West Oxford.

67. DECC is also exploring what needs to be done to kick start more community energy projects across the UK; and following a call for evidence in June 2013[36], will be publishing a Community Energy Strategy later this year. This will consider the benefits of community-owned and community-led energy projects and set out how to address some of the barriers to these projects, such as lack of community capacity, lack of finance and planning and regulatory barriers. It will include a high-level assessment of the potential contribution of community-owned and community-led energy projects to the UK's energy mix under different scenarios.

68. A report by the Energy Saving Trust[37] published at the end of April 2013 shows that Scotland is making excellent progress towards its target of deploying 500 MW of renewable capacity from community and locally-owned projects by 2020. The report shows an increase of 39% on the previous year and suggests that achieving the 500 MW target could be worth up to £2.4 billion to Scottish communities and rural businesses over the lifetime of those projects.

69. Northern Ireland will consider the Community Energy Strategy along with the recommendations in the DECC response to the onshore wind call for evidence and those in the recently completed Northern Ireland study on Communities and Renewable

[36] DECC (2013), Community Energy call for evidence: https://www.gov.uk/government/consultations/community-energy-call-for-evidence
[37] Community and locally owned energy report by EST for Scottish Government: http://www.energysavingtrust.org.uk/scotland/Publications2/Communities/Community-and-locally-owned-renewable-energy-PDF

Energy[38]. A consultation on action to support communities and renewable energy will follow by mid-2014.

70. The Welsh Government has worked with developers and Renewable UK Cymru to agree principles for how community and economic benefits from investment can be maximised. This has led to an industry declaration on the approach and agreement on the creation of an economic and community benefit register.

Strengthening Engagement and Enhancing Local Benefits

71. For renewable energy projects to be successful, local communities must be properly engaged with, and see real benefits from, renewable energy developments in their area. Government has carried out a number of actions since the last Update to help address this, including:

- The publication, in June 2013, of the Government's response to the onshore wind call for evidence[39]. This set out a number of measures aimed at ensuring that communities have a greater say over and stake in onshore wind projects in their areas (see the onshore wind section for further information);

- The publication, in July 2013, of revised planning guidance for renewables[40], including for renewable energy infrastructure in England. The guidance clarifies existing planning policy and helps deliver the balance expected by the National Planning Policy Framework, so that protection of the local environment is properly considered alongside the broader issues of protecting the global environment, when planning for renewables; and

- The provision during 2013/14 of additional support to coastal communities. The Government has increased the Coastal Communities Fund[41] by over £4 million from last year's £23.7 million, to help support the economic development of coastal communities. The Fund is paid for by the Government from income from The Crown Estate's marine assets.

72. In Scotland, draft Scottish Planning Policy (SPP) was issued for consultation in April 2013[42]. This proposed support for further onshore wind development in order to contribute to the 2020 renewable electricity target but balanced this with protecting nationally important 'landscapes', environmental considerations and residential amenity. The consultation closed in July and the Scottish Government is considering over 1,500 responses with a view to publishing a revised SPP alongside the National Planning Framework in June 2014.

[38] DETINI (2013), Communities and Rural Energy report: http://www.detini.gov.uk/communities_and_renewable_energy.pdf
[39] DECC (2013), Onshore Wind Call for Evidence – Government Response to Part A Community Engagement and Benefits and Part B Costs – June 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/205423/onshore_wind_call_for_evidence_response.pdf
[40] DCLG (2013), Planning Practice Guidance for Renewable and Low Carbon Energy – July 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225689/Planning_Practice_Guidance_for_Renewable_and_Low_Carbon_Energy.pdf
[41] Big Lottery Funding: http://www.biglotteryfund.org.uk/global-content/programmes/uk-wide/coastal-communities
[42] For further information see Scottish Government website at: http://www.scotland.gov.uk/Topics/Built-Environment/planning/NPF3-SPP-Review/SPP-Review

Financial Instruments

73. The RO and FITs scheme continue to play a crucial role in supporting the accelerated deployment of commercial and small scale renewable electricity capacity in the UK, and will continue to do so for the foreseeable future (although the RO will close to new capacity on 31 March 2017). CfDs which are being introduced through the EMR will provide future support for low carbon technologies.

The Renewables Obligation

74. A comprehensive review of the RO support rates was concluded by the UK Government and the Devolved Administrations in 2012. Secondary legislation brought the new rates into force in April 2013[43]. This is leading to a reduction in the level of support for the majority of technologies over the next four years. See Figure 12.

Figure 12: Support rates for key technologies between 2009 and 2016/17

Band	2009 banding support (ROC/MWh)	13/14 support (ROC/MWh)	14/15 support (ROC/MWh)	15/16 support (ROC/MWh)	16/17 support (ROC/MWh)
Anaerobic Digestion	2	2	2	1.9	1.8
Advanced gasification/ pyrolysis	2	2	2	1.9	1.8
Standard gasification/pyrolysis	1	2	2	1.9	1.8
Biomass Conversion (station or unit)	New band	1	1	1	1
Dedicated biomass (1)	1.5	1.5	1.5	1.5	1.4
Dedicated biomass with CHP (2)	2	2	2	1.9	1.8
Energy from waste with CHP	1	1	1	1	1
Onshore wind	1	0.9	0.9	0.9	0.9
Offshore wind	2	2	2	1.9	1.8
Solar PV- Building mounted	2	1.7	1.6	1.5	1.4
Solar PV - Ground mounted	2	1.6	1.4	1.3	1.2
Tidal stream(3)	2(4)	5	5	5	5
Wave(5)	2(6)	5	5	5	5
(1) Dedicated biomass subject to a 400 MW cap in England and Wales and 15MW cap in Scotland.					
(2) Includes 0.5 ROC CHP uplift.					
(3) Tidal Stream: 5 ROCs subject to 30 MW cap at each generating station. 2ROCs for any additional capacity added above 30 MW cap.					
(4) Tidal Stream: 3 ROCs in Scotland only.					
(5) Wave: 5 ROCs subject to 30 MW cap at each generating station. 2 ROCs for any additional capacity added above 30 MW cap.					
(6) Wave: 5 ROCs in Scotland only.					

[43] Government (2013), The Renewables Obligation (Amendment) Order 2013 (covering England & Wales): http://www.legislation.gov.uk/ukdsi/2013/9780111534137/contents and the Renewables Obligation (Amendment) Scotland Order 2013: http://www.legislation.gov.uk/sdsi/2013/9780111019542 Scotland) came into force on 1 April 2013. The Renewables Obligation (Amendment) Order (Northern Ireland) 2013: http://www.detini.gov.uk/renewables_obligation__amendment__order__northern_ireland__2013.pdf came into force on 1 May 2013.

Feed in Tariffs Scheme

75. The FITs scheme has been a success since its launch in April 2010, with over 400,000 installations confirmed on the Central Feed-in Tariff Register by the end of June 2013.

76. The FITs Comprehensive Review that concluded in December 2012, sought to improve value for money and reduce tariffs in light of falling costs. The Government continues to monitor performance of the scheme.

77. Following clarification from the European Commission in February 2013, DECC confirmed how FITs and the Green Deal can work together to support consumers wanting to install microgeneration technologies. Customers are able to use Green Deal finance to contribute towards the cost of installing micro CHP, micro wind or solar PV on their property. Only the cost savings on their energy bill as a result of generating their own power can be used in calculating the amount of finance support they can get from the Green Deal. FITs generation and export payments are not currently included, but the customer can benefit from the Green Deal while also separately receiving FITs payments.

78. In Northern Ireland, work is underway to develop and introduce a small-scale FITs scheme similar to that already in operation in Great Britain. The NI FITs scheme is scheduled for introduction before closure of the Northern Ireland Renewables Obligation to new generation in 2017.

Electricity Market Reform

Contracts for Difference

79. The Government has made significant progress with EMR. The first early CfDs could be signed in the form of investment contracts early next year, and the first CfDs under the enduring regime in the second half of 2014, subject to Royal Assent of the Energy Bill and State Aid approval. The Government has reached a number of significant milestones since the publication of the last Update, including the publication of:

June/July	Draft CfD strike prices for renewable technologies[44] and the draft Delivery Plan which sets out the methodology and analysis which provided the basis for the draft CfD strike prices[45].
August	Draft terms for CfDs and details of the allocation process. This provides a comprehensive picture on how CfDs will function once they are introduced[46].
October	A consultation setting out implementation proposals for the key mechanisms for reform: the CfDs and Capacity Mechanism, as well as their associated institutional and transitional arrangements[47].

[44] DECC (2013), LCF and draft CfD Strike Prices: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209361/Levy_Control_Framework_and_Draft_CfD_Strike_Prices.pdf
[45] DECC (2013), EMR Consultation: https://www.gov.uk/government/consultations/consultation-on-the-draft-electricity-market-reform-delivery
[46] DECC (2013), EMR CfD: https://www.gov.uk/government/publications/electricity-market-reform-contracts-for-difference
[47] DECC (2013), Consultation on proposals for implementation of EMR: https://www.gov.uk/government/consultations/proposals-for-implementation-of-electricity-market-reform

80. The final EMR Delivery Plan is on track to be published by the end of the year. It will include the final strike prices, the LCF profile for the period 2014/15 to 2018/19 and the Capacity Market Reliability Standard. Alongside the Delivery Plan we are also intending to publish further updates to the CfD as required. Publication of the Delivery Plan will enable the industry to plan ahead and work towards delivering the renewable electricity needed for the UK to meet its 2020 target.

81. The policy design of EMR will give the Government a number of levers to incentivise deployment – including strike prices and the possible use of minima (floors) or maxima (caps) placing restrictions on allocation of the CfD budget for some technologies or technology groups. These could be used, for example, to promote deployment of less mature technologies or to guard against the risk that some technologies will be deployed too quickly affecting DECC's ability to manage the budget. If used, maxima would entail setting a cap on any allocation to a technology or group of technologies, above which no further allocation would be possible. These would be set at the same time as the CfD budget and would take into account the relevant technology's forecast level of deployment under all elements of the LCF. The LCF profile for the period 2014/15 to 2018/19 will be published in the Delivery Plan, scheduled for the end of the year; it is anticipated that at this point we will also be able to set out further details of how we plan to manage the CfD budget.

Final Investment Decision (FID) Enabling for Renewables

82. Recognising the uncertainty caused by the transition to the enduring CfD regime, the Government has continued to progress with the FID Enabling for Renewables framework.

83. FID Enabling for Renewables will provide real value to eligible developers by offering investment certainty and support in advance of the CfD regime being put in place. The Government launched the process in March 2013[48] and published a further Update in June[49]. We have received 23 applications for 26 investment contracts in Phase 2 of the scheme, from a broad range of renewable technologies, including onshore wind, offshore wind and biomass projects.

84. DECC is now evaluating projects against the criteria set out in the June publication and intends to send Investment Contracts to applicants whose projects meet the minimum threshold evaluation criteria in December 2013. Following that, an affordability assessment against the available budget will take place before investment contracts are signed with successful applicants around March 2014.

RO to CfD Transition

85. Alongside the development of the CfD regime and the FID Enabling for Renewables process, DECC has also continued to clarify the arrangements for the transition from the RO to the CfD regime.

[48] DECC (2013), FID Enabling for Renewables: Invitation to Participate: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/141873/FIDeR_update_doc_Invitation_to_Participate_2013_-_03_-_14_FINAL.pdf

[49] DECC (2013), FID Enabling for Renewables: Investment Contract Allocation: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209367/2013_-_06_-_27_FIDe_Update_2_Master_Draft__2_.pdf

86. On 31 March 2017, the RO will close to new capacity, and will then continue running in support of accredited capacity for a further 20 years, until 31 March 2037. Support will be grandfathered at existing levels on the closure date. The Energy Bill provides for the transition of the RO into a certificate purchase scheme in its final years, in order to reduce volatility in the final years of the scheme.

87. In July we sought views on the policy and processes relevant to the transition period and the choice between the RO and the CfD for new renewable generation[50]. It is our intention to have arrangements in place for the transition that support investment decisions in the sector and prevent investment hiatus.

Renewable Heat and Transport

88. Details of the financial regimes for renewable heat and transport fuels are set out in their respective chapters.

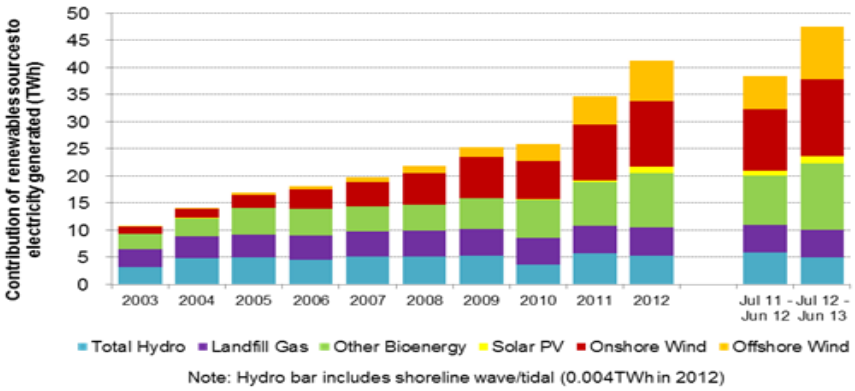
[50] DECC (2013), Transition from RO to CfD Consultation: https://www.gov.uk/government/consultations/transition-from-the-renewables-obligation-to-contracts-for-difference

Renewable Electricity

Generation Statistics

89. Electricity generation[51] from renewable sources for the period July 2012 to June 2013 reached 47.5 TWh, increasing by 24% compared to the same period the year before. Overall capacity grew by 38% to 19.5 GW over the same period. The contribution of all renewables to UK generation was 13.1% for the period July 2012 to June 2013, 2.5 percentage points higher than the same period a year earlier. See Figure 13.

Figure 13: Renewable electricity generation from key technologies between 2003 and 2013[52]



90. This overall trend has been mirrored by the majority of individual renewable electricity technologies:

- Biomass electricity saw an increase of 1.6 GW between July 2012 and June 2013 with a total installed capacity (including the proportion of capacity used in fossil fuel stations for co-firing[53]) reaching 4.9 GW. Meanwhile generation rose to 17.3 TWh for the year July 2012 to June 2013, increasing by 3.1 TWh compared to the previous period;
- Between July 2012 and June 2013, offshore wind increased by 1.0 GW, bringing the total installed capacity to 3.5 GW. Generation rose to 9.7 TWh for the year July 2012 to June 2013, increasing by 3.5 TWh on the year before;
- Onshore wind capacity increased by 1.6 GW over the same period, bringing total installed capacity to 7.0 GW by the end of June 2013. Generation rose to 14.2 TWh for the year July 2012 to June 2013, increasing by 2.8 TWh on the year before;
- The total solar PV capacity grew by 1.0 GW between July 2012 and June 2013, representing a 70% increase. In the wave and tidal sectors capacity has been unchanged since July 2012, reflecting the developmental status of the industry;
- Generation from hydro sources during the period July 2012 to June 2013 decreased by 17% on the same period the previous year due to lower rainfall.

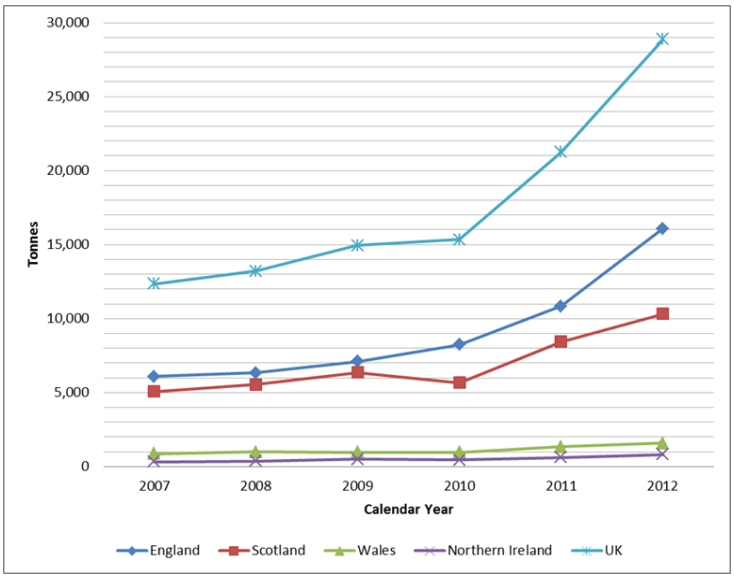
[51] All data in this section derives from DECC Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013
[52] DUKES 2013, table 6.4: https://www.gov.uk/government/publications/renewable-sources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes and Energy Trends September 2013, table ET 6.1: https://www.gov.uk/government/publications/energy-trends-september-2013
[53] Co-firing capacity varies year on year as it is calculated based on the ratio of biomass: fossil fuel use in the co-firing stations.

CO_2 Displaced by Electricity Generated by Renewable Energy Projects

91. Renewable energy helps the UK achieve the challenging decarbonisation targets it has set in an effort to combat increasing climate change. A key benefit of deploying renewable energy technologies is the potential reduction in carbon emissions when compared to fossil fuels.

92. Figure 14 shows that the amount of CO_2 being displaced by electricity generated by renewable energy projects is increasing across the whole of the UK. These numbers show that in 2012 there was a potential 36% increase in CO_2 being displaced across all of the UK during the previous 12 months. Since 2007 there has been a potential 134% increase in CO_2 being displaced.

Figure 14: CO_2 displaced by electricity generated by renewable energy projects (tonnes)



93. These figures were calculated using the total amount of electricity generated by renewable projects[54, 55] multiplied by an estimate of the amount of carbon dioxide emissions per GWh of electricity supplied for a combination of fossil fuels which is based on the known fossil fuel mix for electricity generation in the UK[56].These figures do not take account of lifecycle carbon emissions.

[54] Generation figures from: Renewable electricity in Scotland, Wales, Northern Ireland and the regions of England in 2012 (Table 3), Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013
[55] Historical data is available for download from the following location: https://restats.decc.gov.uk/cms/historic-regional-statistics/
[56] Estimates of CO_2 emissions per unit of electricity supplied from: Table 5C, Chapter 5, Digest of UK Energy Statistics, 2013: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225067/DUKES_2013_published_version.pdf

Grid Network Developments

94. We are continuing to take action to facilitate access to the grid. Some key developments that have taken place in 2013 are set out below:

- The RIIO-T1[57] transmission price control for 2013-21 began on 1 April 2013. Ofgem has agreed with the Transmission Owners a baseline level of expenditure, as well as flexible arrangements to adjust allowed expenditure if additional investment is needed during the price control period. Potentially up to £21.5 billion in total could be invested to expand, replace and maintain the GB electricity transmission network[58, 59]. This will help ensure that the network can accommodate new generation and demand in a cost effective manner;

- In July, Distribution Network Operators (DNOs) submitted their initial Business Plans covering the RIIO-ED1 Price Control period (2015-23) to Ofgem. This amounted to around £26 billion to expand, replace, maintain and operate the distribution network. Ofgem will be publishing its assessment of these Business Plans shortly. RIIO-ED1 contains a number of mechanisms to incentivise network companies to provide an effective connection service to the renewables industry;

- The offshore transmission regime continues to realise savings for consumers, with eight offshore transmission owner licences granted to date including a record £459 million licence for London Array[60]. Ofgem estimates this competitive regime will save the consumer around £290 million in relation to the first £1.1 billion of transmission assets tendered. As evidenced by the reduction in OFTO annual revenue as a percentage of the final transfer value, between Transitional Tender Rounds 1 and 2, further savings are likely to be possible for current and future tender rounds.

95. The enduring ‘Connect and Manage’ grid access regime continues to deliver earlier connections. To date, 163 large generation projects (with a capacity of 36.5 GW) have advanced their connection dates by an average of five years. Of these, 155 projects (31.5 GW) are renewables.

[57] RIIO stands for Revenue = Incentives+Innovation+Outputs
[58] Ofgem (2012), press release: https://www.ofgem.gov.uk/ofgem-publications/76242/20121217-press-release-riio.pdf. This sets out the investment to upgrade the high voltage electricity transmission network in England and Wales.
[59] Ofgem (2013), Factsheet 117 – price control explained, sets out the investment for Scotland’s high voltage network: https://www.ofgem.gov.uk/ofgem-publications/64003/pricecontrolexplainedmarch13web.pdf
[60] Ofgem (2013) press release: https://www.ofgem.gov.uk/press-releases/ofgem-grants-record-%C2%A3459-million-transmission-assets-licence-worlds-largest-offshore-wind-farm

Biomass Electricity

Overview

96. Biomass, when sourced sustainably, can provide a cost-effective, low carbon and controllable source of renewable energy across the electricity, heat and transport sectors.

97. Government support is informed by the sustainability principles set out in the 2012 Bioenergy Strategy[61] and as such is intended to be focused on more resource efficient uses of biomass. These include technologies that generate heat, especially combined heat and power (CHP), or make use of residual wastes. In addition, the conversion of existing coal power stations to biomass is seen as a transitional, low cost means to rapidly reduce the carbon intensity of the electricity grid.

98. DECC announced at the end of 2012 that it intended to introduce a cap of 400 MW on the total new build biomass electricity generating capacity that could expect to be supported through the dedicated biomass band under the RO. Following a public consultation in May and June 2013, DECC implemented in August a non-legislative notification process to allocate spaces within the cap[62].

99. The Scottish Government has announced[63] that under the RO (Scotland) dedicated biomass for electricity will be limited to a maximum of 15 MW. Plants over 15 MW must meet the good quality CHP Quality Assurance (CHPQA) criteria to quality for Scottish Renewables Obligation Certificates (SROCs).

100. Government's decision to constrain deployment of dedicated biomass for electricity has been reflected in the draft strike prices for biomass technologies published in June 2013 as part of the CfD regime being introduced through the EMR[64].

Key Activities

Mandatory Biomass Sustainability Standards

101. In August 2013, DECC published details of the sustainability standards for the use of solid biomass or biogas feedstocks that will be introduced into the RO from 1 April 2014[65] on a reporting basis, with the intention that criteria will become mandatory from 1 April 2015. These controls will help to ensure that biomass used for energy in the UK achieves genuine greenhouse gas savings and is sourced from land that is sustainably managed.

102. To provide long term certainty to industry and investors, Government intends that the first phase of CfDs awarded for bioenergy will include the same sustainability criteria as those set under the RO, and that (as with the RO) these controls will not undergo further unilateral changes before 1 April 2027.

[61] DECC (2012), UK Bioenergy Strategy: https://www.gov.uk/government/publications/uk-bioenergy-strategy
[62] DECC (2013), RO Notification process for new build dedicated biomass projects –Guidance for applying for a place within the 400 MW Cap: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/230442/Biomass_notification_process_-guidance.pdf
[63] Scottish Government (2013), RO Banding Review: http://www.scotland.gov.uk/Resource/0041/00414086.pdf
[64] CfDs do not cover dedicated biomass electricity plant, nor co firing but would continue to support the more cost effective and efficient dedicated biomass CHP, biomass conversion, energy from waste with CHP, anaerobic digestion, landfill and sewage gas and advanced conversion technologies (gasification and pyrolysis).
[65] DECC(2013), Government Response to the consultation on proposals to enhance the sustainability criteria for the use of biomass feedstocks under the RO: https://www.gov.uk/government/consultations/ensuring-biomass-affordability-and-value-for-money-under-the-renewables-obligation

Innovation

103. There has been significant progress over the last year with research and development actions to support deployment, enhance sustainability and deliver innovation in biomass and energy from waste electricity. In particular:

- DECC continues to support innovation in bioenergy technologies via the Wetland Biomass to Bioenergy competition, currently supporting three demonstration projects across the UK, and the European collaborative Bioenergy Sustaining the Future programme;

- The Energy Technologies Institute (ETI) have also supported a number of research and demonstration activities including the Ecosystem Land-Use Modelling (ELUM) trial, Biomass to Power with carbon capture and storage project, Biomass Systems Value Chain Modelling and energy from waste gasification demonstration project. On the latter, three companies have been selected to design the most efficient, economically and commercially viable energy from waste gasification demonstrator plant. The design competition will last ten months with the winning design selected early in 2014; and

- Looking ahead, the International Bioenergy Conference is being held in Manchester in March 2014. This will promote UK bioenergy research internationally as well as bringing the leading international researchers to the UK.

Spotlight on Energy from Waste (EfW)

- Energy recovery through a range of technologies - including combustion, anaerobic digestion (AD) and landfill gas extraction - can be a sustainable option for waste that would otherwise go to landfill and create landfill methane emissions. Where waste cannot be economically or practically reused or recycled, the aim is to get the most value from it via energy recovery using the most efficient technologies;

- Government has taken forward a number of actions over the last year aimed at driving forward this diverse sector and we have seen a number of new plants begin generating electricity such as New Earth's advanced pyrolysis and gasification plant in Avonmouth (see Case Study 3);

- In February 2013, Government issued a guide[66] to the waste management and energy industries, local authorities and other stakeholders providing a starting point for discussions about the role EfW might have in managing waste and providing renewable energy. This includes details of different technologies and infrastructure, financing, support schemes and planning;

- DECC Minister of State Greg Barker and Defra Parliamentary Under Secretary of State Lord de Mauley recently hosted a stakeholder roundtable with senior figures from industry to discuss barriers to getting the most energy out of our residual waste. A similar roundtable for representatives from local government is planned to take place shortly. The outputs from these roundtables, together with the need for any further policy intervention, will be considered;

- The Government is making good progress in implementing the AD Strategy and Action Plan. This is designed to increase EfW through AD. In August, Defra published the second annual report on progress[67], which includes a continued support for innovation and investment, work to develop markets for the bio-fertiliser that AD produces and the publication of an industry-led best practice guide. In September, as part of the Response to the Ecosystem Markets Taskforce, Government announced that it was extending the scope of the AD Loan Fund, currently aimed at food waste AD plants[68]. In October, Defra announced that farmers could apply for up to £400,000 from the AD Loan Fund to help them finance on-site AD technology to turn their waste into energy[69]; and

- Government has continued to make progress with actions to unlock financial barriers to EfW deployment. DECC has completed work with industry and Ofgem, to consider the best way to determine the renewable portion of a mixed waste stream, so that support under the various financial incentives can be calculated more accurately and cost effectively. Ofgem now accept a wider range of biomass sampling methods including Carbon 14 and Bioma, and will consider the suitability of new sampling methods on a case by case basis.

[66] Defra (2013), Energy from waste – a guide to the debate: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221042/pb13892-energy-from-waste.pdf
[67] Defra (2013), AD Strategy and Action Plan: https://www.gov.uk/government/publications/anaerobic-digestion-strategy-and-action-plan-annual-report-2012-to-2013
[68] Defra (2013), Realising nature's value: The Final Report of the Ecosystem Markets Task Force - Government Response: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/236879/pb13963-government-response-emtf-report.pdf
[69] Defra (2013), Press release: https://www.gov.uk/government/news/loan-fund-to-turn-farm-waste-to-energy

Case Study 3: New Earth's advanced pyrolysis and gasification plant

Project name: New Earth's Avonmouth Energy Recovery Facility (ERF)
Energy: Advanced pyrolysis and gasification **Capacity:** 13 MW

The Avonmouth ERF began generating electricity in May 2013, using its patented and highly innovative 'NEAT' staged pyrolysis and gasification Advanced Conversion Technology (ACT).

After 'second-chance' recycling of municipal and commercial waste streams at New Earth's adjacent waste processing facility, the UK's first commercial-scale ERF utilises the remaining refuse derived fuel, that would otherwise be land-filled, incinerated or exported, to generate renewable electricity. The energy generated by the NEAT ERF is used to power the facility itself, the adjacent waste processing facility and the balance is exported to the grid for use by local homes and businesses.

The Avonmouth ERF, Bristol.

"The 13 MW Advanced Thermal Conversion project in Avonmouth delivered by New Earth Solutions is an example of the excellent renewable energy projects being built in the south west of England."
Edward Davey, Secretary of State for Energy and Climate Change

The Deployment Pipeline

104. Total generation from biomass electricity sources in the 12 months to June 2013 was 22% higher than in the previous 12 months. The combined generation from the variety of different bioenergy electricity technologies accounted for 37% of renewable electricity generation, with landfill gas accounting for 30% of the bioenergy electricity generation (and 11% of all renewable electricity generation)[70].

105. Since the publication of the last Update there have been a number of significant developments in the deployment pipeline.

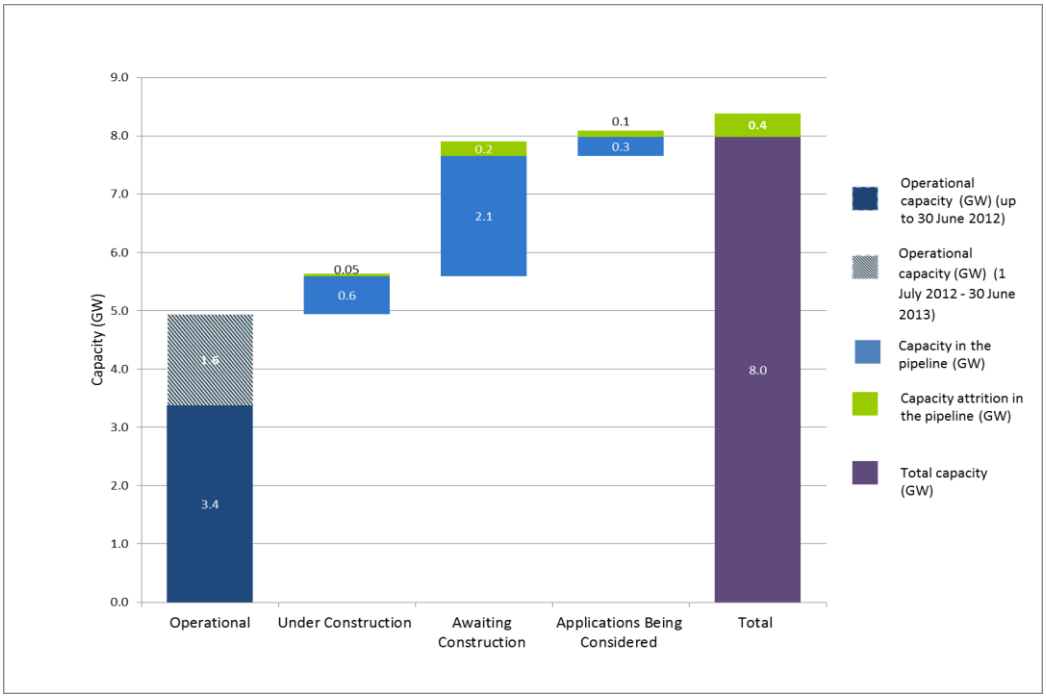
106. The New Earth Advanced Thermal plant in Avonmouth began to produce electricity at commercial scale in May 2013. Air Products is in the process of building the world's largest advanced gasification EfW plant on Teesside. Furthermore, the Government has agreed to purchase the power from a second Air Products facility in the Tees Valley which would be based on the same EfW technology[71].

107. Figure 15 shows the capacity of biomass electricity projects that are operational and in the planning pipeline (as at the end of June 2013). There has been a slight reduction in the biomass electricity pipeline from 8.2 GW to 8.0 GW, when compared to the publication

[70] Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013
[71] Government (2013), press release: https://www.gov.uk/government/news/new-energy-deal-to-save-84m-from-government-bill

of the last Update. This reflects our policy to cap the total capacity of new build dedicated biomass at 400 MW during the RO period 2013 to 2017.

Figure 15: Capacity of biomass electricity projects that are operational and in the planning pipeline[72, 73]



108. A big part of the story this year is the biomass conversion projects. Conversion of coal power or biomass co-firing stations or units to sustainable biomass offers a quick, cost-effective way to rapidly decarbonise electricity generation, in the short to medium term, as well as contributing to security of supply through the extension of the lifetime of generating assets, during our transition to other more sustainable low-carbon generation.

109. Figure 15 shows 4.9 GW of operational capacity[74]. This includes nearly 2.3 GW from the Drax Unit 1 (see Case Study 4), Tilbury and Ironbridge biomass conversion plants. It is, however, important to note that Tilbury has now stopped generating and Ironbridge is running down its hours under the Large Combustion Plant Directive[75]. Ongoing changes will be reflected in future Updates.

110. It is important to note that Figure 15 only includes biomass conversion plant that is operational. It does not include plant that is in the pipeline. This is because some conversion developments do not need planning permission and are not recorded in the planning database. There are a number of biomass conversion projects at various stages

[72] The *operational* figures for capacity (landfill gas, sewage sludge digestion, energy from waste, animal biomass, anaerobic digestion and co-firing) as at Quarter 2 2012 and additional capacity up to Quarter 2 2013 were obtained from Table 6.1 Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013. The *under construction*, *awaiting construction* and *applications being considered* figures for capacity (dedicated biomass, landfill gas, municipal and industrial waste and sewage gas) have been obtained from DECC's Renewable Energy Planning Database (REPD): https://restats.decc.gov.uk/cms/planning-database/ dated 19 July 2013. REPD does not contain co-firing data.

[73] Attrition rates are based on historic consenting rates and on capacity in the pipeline from 2009 to June 2013, taken from REPD. A nominal amount has been included for capacity that has been waiting for approval for more than 5 years and awaiting construction for more than 5 years, as we recognise the majority is unlikely to come forward. The capacity shown in green could potentially be lost from the pipeline.

[74] This comprises 3.376 GW to 30 June 2012 and 1.571 GW from 1 July 2012 to 30 June 2013.

[75] Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants, see: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l_309/l_30920011127en00010021.pdf

of development in the UK. The EMR draft delivery plan projects a biomass conversion capacity range of 1.2 GW to 4.0 GW.

111. While the deployment pipeline in Figure 15 remains healthy, it is unlikely that everything will come forward. Since the last Update the rate of attrition relating to biomass electricity projects has increased from 0.5 GW to 0.9 GW. This capacity has been lost from the pipeline.

112. Figure 15 also includes 1.8 GW of EfW[76] that is operational and a further 1.6 GW of EfW[77] which is either under construction, awaiting construction or waiting to have its planning application considered. Deployment of EfW is in line with the principles of the UK's Bioenergy Strategy[78]. There is also 155 MW of AD in the deployment pipeline that is operational. It is estimated that there is a further 259 MW of AD which is either under construction, awaiting construction or waiting to have their planning application considered. The remaining operational capacity consists predominantly of non-converted biomass plants and animal biomass (non-AD).

113. The deployment pipeline also includes Combined Heat and Power (CHP) plants. While CHP plants are more fuel efficient and hence can provide better greenhouse gas emissions performance, they are harder to commission and finance than electricity only plants. Deployment of CHP is discussed further in the renewable heat chapter of the Update.

[76] This includes capacity for landfill gas, sewage gas and energy from waste as recorded in Energy Trends.
[77] This includes capacity for landfill gas, sewage gas and municipal and industrial waste as set out in REPD.
[78] DECC (2012), Bioenergy Strategy: https://www.gov.uk/government/publications/uk-bioenergy-strategy

Case Study 4: Drax conversion to biomass

Project name: Drax **Energy:** Conversion of three co-fired coal units to 100% biomass
Renewable Capacity: ~1.8 GW **Investment:** £650 - £700 million

Drax Group, the owner and operator of the UK's largest coal-fired power station, has a plan to transform itself into a predominantly biomass-fuelled generator through burning sustainable biomass in place of coal. With the intention to convert three of its six generating units to biomass, the Company successfully converted its first 645 MW unit in April 2013 and hopes to convert the second in the summer of 2014 and the third in or before 2016.

Working in partnership
Shepherd Group, a national construction and engineering company based locally, was awarded the contract to design and build the new biomass receipt, storage and handling, and fuel distribution facilities at Drax Power Station.

The first of the biomass storage domes.

"We are confident we can transform Drax into a predominantly biomass-fuelled generator. Initially we expect to convert three of our six generating units. It will take some time to develop all of the sustainable biomass supply chain to fuel these units, but we believe that Drax could become a predominantly biomass-fuelled plant."
Dorothy Thompson, CEO, Drax

Jobs and community benefits
Drax Group employs almost 1,200 people across its main businesses and supports many other jobs indirectly, including power station contractors, construction contractors and throughout the fuel supply chain, particularly in port and rail operations. The project will also generate wider opportunities for people local to the power station and regionally, in terms of employment and skills training, and will maximise opportunities for local businesses, working closely with supply chain partners throughout the build and beyond.

Wider economic impact and industry benefit
By burning sustainable biomass such as woody materials, agricultural residues and energy crops, to generate electricity in place of coal, Drax will reduce its carbon footprint by around 10 million tonnes compared to today's levels, and deliver low cost and reliable renewable electricity.
This project has resulted in a major programme of work and will have long term benefits to the industry and the local, regional and national economy.

Onshore Wind

Overview

114. Onshore wind, as one of the most cost effective and proven renewable energy technologies, has an important part to play in a responsible and balanced UK energy policy.

115. During 2013 the Government announced that it will continue to provide a stable long term investment framework for the sector under both the RO and CfDs.

116. Government recognises that some people have concerns about onshore wind developments, and it remains committed to ensuring that projects are built in the right places, with the support of local communities and that they deliver real local economic benefits.

Key Activities

117. In April support rates for onshore wind under the RO were cut by 10%, because there was evidence that the costs had fallen.

118. In 2012 and 2013, DECC ran a call for evidence and engaged with a wide range of stakeholders to explore what should be done to ensure that local communities are better engaged with, and see real benefits from, onshore wind development. A Government response to the call for evidence was published in June 2013[79], setting out a package of measures, a number of which have since been implemented.

119. As announced in the response, the Government intends to introduce compulsory pre-application consultation for onshore wind projects, requiring developers to engage with local communities before they submit a planning application.

120. Renewable UK has also announced that it plans to issue its new Community Benefits Protocol later this year, implementing the industry's commitment to increase the standard minimum level of community benefit packages to £5,000 per MW per year[80]. The industry has responded positively; see Case Study 5 on the Tallentire wind farm. This is further demonstrated by SSE's announcement in September 2013 to triple the community benefit package at Keadby wind farm to the same level as the new Renewable UK protocol[81].

[79] DECC (2013), The Government response to the onshore wind call for evidence Part A community engagement and benefits and Part B (costs): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/205423/onshore_wind_call_for_evidence_response.pdf
[80] Renewable UK (2013), press release: http://www.renewableuk.com/en/news/press-releases.cfm/2013-06-06-onshore-wind-industry-responds-to-new-government-guidance-on-local-community-engagement-and-benefit-funds
[81] The overall fund will be worth £8.6 million over the next 25 years, the largest onshore wind community benefit fund in England.

Case Study 5: Tallentire wind farm – community benefits

Project name: Tallentire Wind Farm
Capacity: 12 MW
Energy: Onshore Wind
Investment: Over £2.1 million

Tallentire wind farm, which was completed in June 2013, is made up of six wind turbines located on Tallentire Hill near Cockermouth, Cumbria.

Local commitment: During development and construction Renewable Energy Systems (RES) delivered significant local economic benefits, with over £2.1 million spent locally. During the civil works 25% of the workforce employed on the site came from the local area. Tallentire was also one of the very first operational wind farms to receive RES' Local Electricity Discount Scheme (LEDS).

Construction at Tallentire wind farm.

"I am pleased to see RES pioneering this innovative scheme. Providing local communities with a discount on their energy bills no matter whom their supplier is, is exactly the type of initiative we are keen to encourage as part of a closer relationship between energy generators and local communities."
Edward Davey, Secretary of State for Energy and Climate Change

Community benefits:

- Over the 25 year lifetime of the wind farm, £3.9 million will be paid to the local council in business rates for reinvestment back into the local community.
- RES will provide £3,000 per MW per year for the LEDS. Over 300 properties closest to the wind farm qualify for a £108 discount off their annual electricity bill, without having to switch their energy supplier. This will continue for the lifetime of the wind farm.
- In addition, RES will pay £25,000 per year into a Community Benefit Fund managed by Cumbria Community Foundation to support local groups and initiatives. Other RES Community Benefit Funds have supported local initiatives such as the development of an organic community garden and a residential art trip for local school children. Together with LEDS, this brings RES total community benefit package at Tallentire to £5,000 per MW.
- Throughout the construction period at Tallentire RES supported local events, such as the Taste Cumbria Food Festival and Cockermouth Music Festival.

121. DECC is continuing to work across Government and with industry and other stakeholders between now and early 2014 to deliver the actions set out in the Government response to the onshore wind call for evidence. The focus will be on:

- Developing best practice guidance and a register of community engagement to raise standards, highlight best practice and enable communities and developers to report on engagement practices openly and transparently;
- Providing clear and reliable evidence on the impacts of onshore wind, through an evidence toolkit; and
- Developing best practice guidance and a community benefit register to support communities and developers to negotiate appropriate community benefit packages.

122. The Government will continue to work with the Devolved Administrations to ensure that knowledge is shared and a UK approach is adopted for those actions where this is beneficial.

123. The Scottish Government has already taken a number of positive steps to encourage community 'buy in' to wind energy, including setting up a public register for community benefits[82] and providing support through its Community and Renewable Energy Scheme (CARES) in the form of advice and loans to communities for pre-planning and local ownership. Northern Ireland has recently completed a study on Communities and Renewable Energy and a consultation on proposed action will follow. The Welsh Government is also actively engaged with key industry and community stakeholders.

Other Developments

124. In May 2013, the Institute of Acoustics (IOA) published a Good Practice Guide[83] on wind turbine noise assessment. The document, which has been endorsed by Government[84], provides support on technical issues to all users of the ETSU-R-97 method for rating and assessing wind turbine noise.

125. In Scotland, £725,000 additional funding has been provided during 2013 in support of 17 bids from planning authorities for assistance in dealing with onshore wind applications[85].

126. There has also been significant progress with actions aimed at addressing radar and aviation barriers to onshore and offshore wind development. The DECC chaired Aviation Management Board[86] has provided a collaborative forum for Government and industry to take forward workstreams on Military Air Defence and Air Traffic Control radar, National Air Traffic Services (NATS) en-route radar upgrades and enabling crucial research on the possible impacts of wind turbines on the Eskdalemuir Seismological Array.

[82] Scotland already has a register of community benefits from renewables which, as at September 2013 included information on schemes totalling 3,093 MW: http://www.energysavingtrust.org.uk/scotland/Communities/Community-And-Renewable-Energy-Scheme/Scottish-Government-Register-of-Community-Benefits-from-Renewables

[83] The IOA good practice guidance was jointly funded by DECC and IOA and is available from: http://www.ioa.org.uk/pdf/ioa-gpg-on-wtna-issue-01-05-2013.pdf

[84] DECC (2013), Endorsement of IOA Good Practice Guide: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201013/130520_Institute_of_Acoustics.pdf

[85] Scottish Government Wind Turbine Applications – additional funding: http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/windresources

[86] Aviation Management Board: https://www.gov.uk/government/policy-advisory-groups/aviation-management-board-aviation-advisory-panel-and-fund-management-board

127. With funding support from DECC, the Scottish Government, Marine Scotland, the Crown Estate and the wind industry, the Ministry of Defence (MOD) has completed a technical demonstration programme to assess the technical maturity of Air Traffic Control mitigation systems. MOD will release a report of its findings in December 2013. Dependent on maturity, Government and industry will work together on the next steps to consider how mitigation might be implemented.

128. NATS have made further progress to update three key Raytheon en-route radars. NATS have been working with the wind industry to secure funding by December 2013 and roll out upgrades in 2014.

129. DECC has also been working with the Scottish Government, the MOD and the wind industry to take forward research on measuring the possible impacts of wind turbines on the Eskdalemuir Seismological Array. This research is on track to report by end of December 2013 and will help inform a review of the approach to the management of the Eskdalemuir 'noise budget' management system.

130. In September 2013, the Royal Society for the Protection of Birds (RSPB) announced plans to build a wind turbine at its UK headquarters, to produce the equivalent of up to two-thirds of the RSPB's total UK electricity needs. They have been undertaking the appropriate environmental assessments and have stated that they are confident the turbine will have "no significant impacts on populations of birds, bats and other plants or animals"[87].

The Deployment Pipeline

131. Since the publication of the last Update there has been steady growth in deployment of onshore wind. In the 12 months to June 2013, onshore wind generation increased by 25% on the previous 12 months, with capacity up 30%[88]. More than 14 TWh of renewable electricity was generated from onshore wind during the 12 month period.

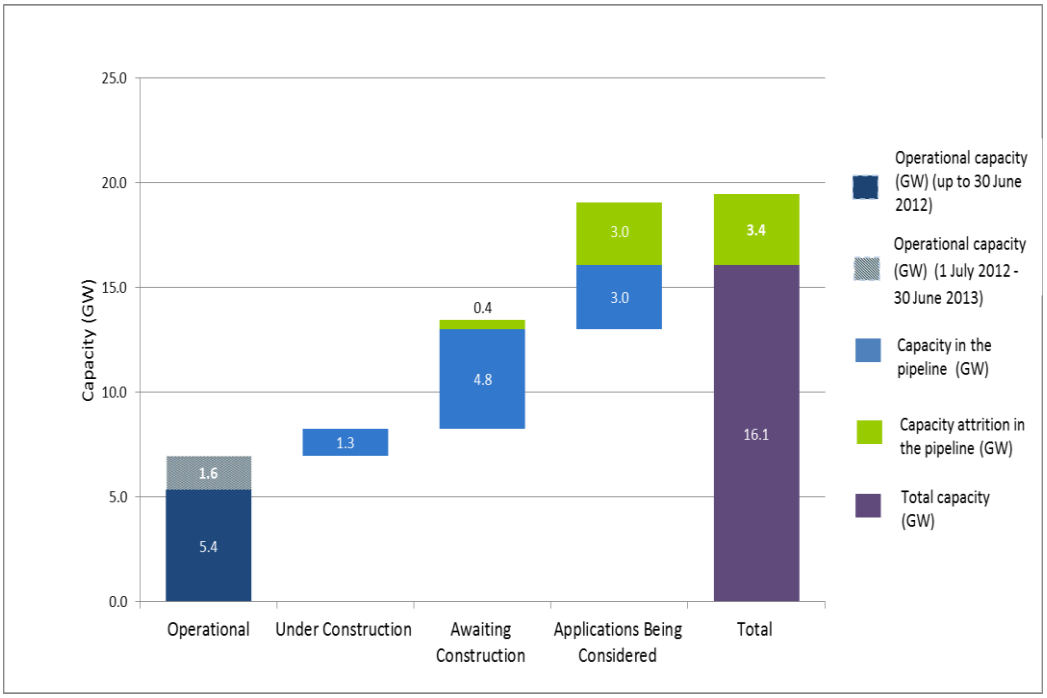
132. Many new projects have become operational in 2013, including Scottish Power Renewables' extension to the UK's largest onshore wind farm at Whitelee, which boosted generating capacity to 539 MW and EDF's 144 MW Fallago Rig (both in Scotland).

133. In addition there a number of developments currently under construction, including the 42 MW Dunbeg project in Northern Ireland, the 68 MW Keadby wind farm in the north-east of England and the 228 MW Pen y Cymoedd project in Wales. In addition the 84 MW Brechfa Forest West project in Wales has recently been consented.

134. Figure 16 shows the capacity of onshore wind projects which are operational and in the planning pipeline (as at the end of June 2013). There has been a slight increase in the overall total since the last Update albeit with a decrease of capacity in the pre-operational stages.

[87] RSPB (2013), press release: http://www.rspb.org.uk/news/352864-rspb-aims-to-reduce-carbon-footprint-with-wind-turbine
[88] Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013

Figure 16: Capacity of onshore wind projects that are operational and in the planning pipeline[89, 90]



135. The attrition assumptions in Figure 16 reflect historic attrition rates and therefore may not accurately reflect attrition rates in the years between now and 2020.

136. In particular, future attrition rates may be affected by the Government response to the onshore wind call for evidence, published in June 2013 and new Planning Practice Guidance published in July. While it is too early to see the impact of these policies on the planning pipeline (which is accurate as at 30 June 2013) it is likely they will affect individual planning decisions in England and may impact on the overall deployment of onshore wind in England and Wales.

137. Since 2011, the amount of onshore wind entering the planning system on a yearly basis has remained relatively steady across the whole of the UK. At the end of June 2013 there were fewer onshore wind applications being considered than at the time of the previous Update – down from 7.0 GW to 6.0 GW. While there has been a small increase in the total capacity of projects awaiting construction from 4.1 GW to 5.2 GW there is less onshore wind capacity under construction than when the last Update was published - 1.3 GW compared to 1.7 GW.

138. The data suggests that a plateauing in the development of new onshore wind projects may be starting to occur. This would be in line with the projections that were presented in the 2011 Renewable Energy Roadmap. These projections suggested

[89] The *operational* figures for capacity as at 30 June 2012 and additional capacity up to 30 June 2013 were obtained from Table 6.1 Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013. The *under construction*, *awaiting construction* and *applications being considered* figures for capacity have been obtained from DECC's Renewable Energy Planning Database (REPD):https://restats.decc.gov.uk/cms/planning-database/ dated 19 July 2013.

[90] Attrition rates are based on historic consenting rates and on capacity in the pipeline from 2009 to June 2013, taken from REPD. A nominal amount has been included for capacity that has been waiting for approval for more than 5 years and awaiting construction for more than 5 years, as we recognise the majority are unlikely to come forward. The capacity shown in green could potentially be lost from the pipeline.

that growth would slow after 2015 due to a limit on the number of sites available, growth of competing technologies and cumulative planning impacts[91].

139. There is considerable variation in the rates of onshore wind deployment and pipeline growth around the UK[92]:

- Of the capacity that has entered the planning system in 2013 – 18% is in England, 8% is in Northern Ireland, 70% is in Scotland and 5% is in Wales. In 2012, 22% was in England, 4% was in Northern Ireland, 69% was in Scotland and 5% was in Wales;

- Consent rates in England and Scotland have fallen significantly in 2013, and are lower in England than elsewhere. In 2013 so far, just 31% of planning decisions in England have been consented, compared to 48% in 2012 and 52% in 2011. This compares to an average of 58% and 72% across the whole of the UK over the same period;

- The increase in the capacity of projects awaiting construction since the publication of the last Update is being driven by capacity in Scotland which has increased from 2.0 GW to 2.9 GW. There has been a decrease in the amount of capacity awaiting construction in England, 0.8 GW compared to 1.1 GW; and

- Of the capacity that has become operational during 2013, 28% has been in England, 4% in Northern Ireland, 58% Scotland and 9% in Wales.

[91] DECC (2011), Renewable Energy Roadmap, page 31, paragraph 3.8: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48128/2167-uk-renewable-energy-roadmap.pdf
[92] DECC analysis from Renewable Energy Planning Database (REPD): https://restats.decc.gov.uk/cms/planning-database/

Offshore Wind

Overview

140. Offshore wind is an ideal technology for the UK where our shallow seas and strong winds make it an important national asset which will play a key role in enabling the UK to meet its legally binding 2020 renewable energy target. In the following decades, the UK has ambitious plans to decarbonise the economy as part of the drive to tackle climate change. As offshore wind becomes a more mature technology and costs fall, it has the potential to play a very significant role in the 2020s and out to 2050 alongside other low carbon technologies. The draft EMR Delivery Plan showed potential deployment of up to 16 GW of offshore wind by 2020, and up to 39 GW by 2030.

141. The offshore wind sector has the potential to become one of significant strategic economic importance to the UK, supporting a competitive and quality UK supply chain and exporting expertise and technology all over the world. The UK is currently the world's biggest offshore wind market with more capacity deployed than any other country. We are very likely to remain the biggest market up to 2020 and potentially beyond.

142. The UK has done more than any other country to support the development of a sustainable and ambitious offshore wind industry. It is the world's most attractive destination for investment in the offshore wind sector[93]. The Government is determined to enable the sector to succeed. We are putting into place the framework needed to maintain the UK's global leadership position through EMR, which will offer industry guaranteed price support lasting into the 2030s and help provide the certainty needed to underpin long term investment in this strategically important sector.

143. During 2013, Government has been working in partnership with industry to develop the UK's offshore wind industry and provide the tools necessary to support large scale investment in the UK supply chain, raise awareness of the commercial opportunities in the UK and overseas and deliver the innovation and competition needed to bring down costs for consumers. The Offshore Wind Developers Forum has now been expanded to become an Offshore Wind Industrial Council (OWIC) including supply chain members. This recognises the fact that the goal now is to drive the development of the industry as well as to tackle barriers to deployment.

Key Activities

144. Bringing down the costs of offshore wind is crucial for the industry to develop and meet its full potential. Over the past year the Offshore Wind Programme Board (OWPB), has been taking forward implementation of the recommendations set out in the industry-led Cost Reduction Task Force report as well as looking to address other barriers to deployment. They report to the OWIC.

145. The Government is determined to secure the huge industrial benefits of offshore wind. In August the Government published the Offshore Wind Industrial Strategy –

[93] Ernst & Young (August 2013), Renewable Energy Country Attractiveness Index: http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices_-_Issue_38/$FILE/RECAI%20Issue%2038_August%202013.pdf

a long term industrial strategy that will strengthen the UK's position in the offshore wind industry[94]. The Strategy set out that the sector could have the potential to unlock £7 billion Gross Value Added in the UK economy by 2020 and support over 30,000 Full Time Equivalent jobs. It includes a programme of actions, to be delivered by Government and industry, which will build a competitive and innovative UK supply chain. The OWIC and the OWPB, together with Government, are working jointly to support the delivery of the Strategy.

146. Key elements of the strategy include:

- £20 million from the Regional Growth Fund for GROW: Offshore wind, a new Manufacturing Advisory Service programme to support the UK supply chain in England to become more competitive by offering tailored support from specialists;
- £46 million funding over five years for the Offshore Renewable Energy Catapult Centre to join up innovation between industry, government and academia and help companies to bring new products to market;
- a new Offshore Wind Investment Organisation, established by UKTI, to attract inward investment to the UK;
- industry-led initiatives to share information with the supply chain about their procurement timelines and contracting decision points;
- a proposal that would require developers of offshore wind farms above a certain size to produce a supply chain plan before they can apply for a CfD – long-term contracts to provide stable revenues for investors in low carbon energy projects – setting out how the project and procurement approaches will encourage a wider, more diverse supply chain and support innovation and skills;
- expansion of the scope of the DECC offshore wind manufacturing funding scheme to support port and coastal infrastructure development in assisted areas of England. Any grants offered will be conditional on sites securing manufacturing investment; and
- the Green Investment Bank (GIB) has an ambition to invest a significant proportion of its £3.8 billion capital in offshore wind, co-investing in projects with commercial parties.

147. In Scotland public sector support has been focused on facilitating infrastructure for offshore wind development, through the National Renewable Infrastructure Plan.

148. The Welsh Government, working alongside the Carbon Trust has identified Offshore Renewables as one of its priority areas and has started working closely with the Welsh European Funding Office to influence the next round of EU funding. There has also been a focus on skills, with EU Skills establishing a Low Carbon Energy and Marine Power Institute through a project funded by the Welsh Government and the European Social

[94] Government (2013), Offshore Wind Industrial Strategy: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226456/bis-13-1092-offshore-wind-industrial-strategy.pdf

Fund. The Department for Education and Skills in Wales is also supporting apprentice programmes.

Innovation

149. The Low Carbon Innovation Coordination Group (LCICG) are providing over £100 million of targeted financial support to develop innovative offshore wind technologies between 2011 and 2015. This has supported:

- DECC and TSB's Offshore Wind Component Technologies Development and Demonstration Scheme aimed at supporting testing and demonstration of devices and innovation in component technologies for all sub-areas of large offshore wind systems. A fourth call of the Scheme was run during 2013; and
- The construction of the structure that will house the ETI commissioned 15 MW capacity wind turbine nacelle test rig was completed at NAREC. The indoor turbine test rig allows the whole offshore wind drive train to be tested onshore before deployment offshore. Samsung Heavy Industries has been confirmed as the first commercial customer for the test rig. Installation of the test rig is taking place during 2013, with commercial operation (post commissioning) expected in early 2014 [95, 96].

150. The Crown Estate has launched a leasing programme to encourage further investment in a range of offshore wind test and demonstration projects. The programme includes a leasing round for floating offshore wind technology and a call for expressions of interest in varying existing projects to test and demonstrate innovative cost reduction measures.

Other Developments

151. In March 2013, the GIB made its first direct equity investment in offshore wind through the acquisition of a 24.95% stake in the 90 MW Rhyl Flats offshore wind farm off the coast of North Wales[97]. In October the GIB announced a £58.6 million investment in London Array[98]. These announcements will allow the release of capital back to the developer which can then be recycled into new wind farm projects.

The Deployment Pipeline

152. In the 12 months to June 2013, offshore wind generation increased by 57% on the previous 12 months, with capacity up 41%. Generation rose to 9.7 TWh for the year July 2012 to June 2013, increasing by 3.5 TWh on the year before[99].

153. Since the publication of the last Update there have been formal openings of London Array, the world's largest offshore wind farm at 630 MW (see Case Study 6); Greater Gabbard, the world's second largest offshore wind farm at 504 MW, the 270 MW Lincs

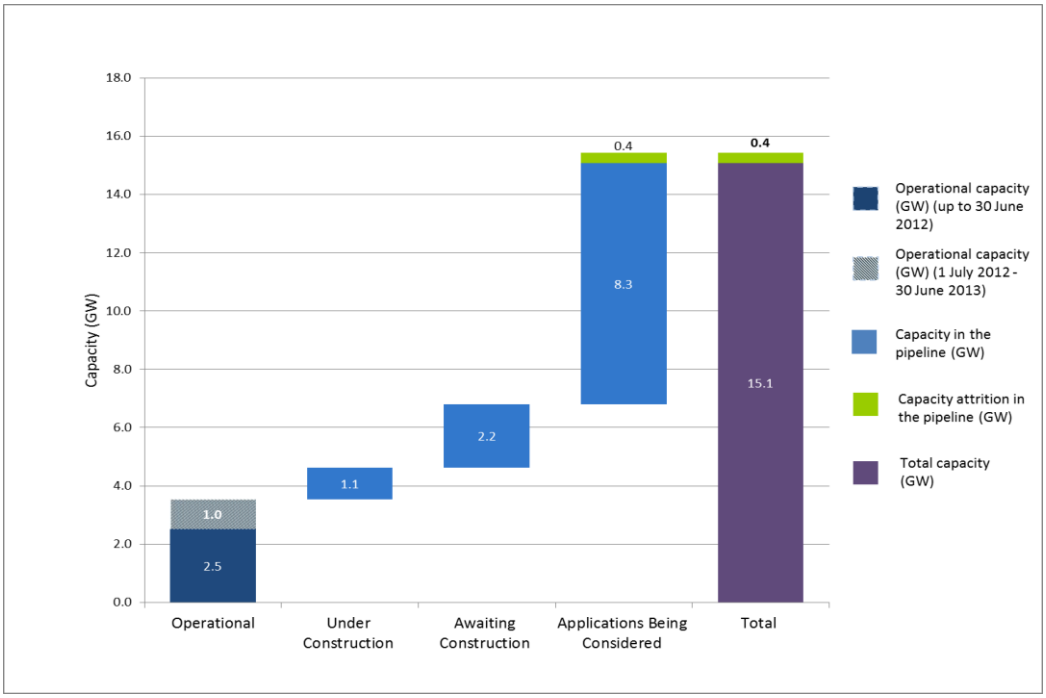
[95] NAREC (2013), press release: http://www.narec.co.uk/news-press/news/Samsung+to+test+7MW+Offshore+Wind+Turbine+at+Narec_10462
[96] ETI (2013), press release: http://www.eti.co.uk/news/article/largest_wind_turbine_components_seen_in_the_uk_arrive_for_testing_at_narec
[97] Green Investment Bank: Case Study Rhyl Flats Wind Farm: http://www.greeninvestmentbank.com/userfiles/files/case-studies/108675-GIB-case-study-Rhyl-Flats-FINAL.pdf
[98] Green Investment Bank (2013), press release: http://www.greeninvestmentbank.com/media-centre/press-releases/uk-green-investment-bank-successfully-refinances-masdar-s-stake-in-london-array.html
[99] Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013

development and the Gunfleet Sands 3 project which is demonstrating the next generation of offshore specific 6 MW turbines.

154. In February 2013 the Government announced it had given the Kentish Flats offshore wind farm, one of the first offshore wind farms built in the UK, the go-ahead for a 17 turbine extension[100]. The decision to extend an existing project reflects the ongoing attractiveness of the UK as a place to do business. In addition, the Government has granted permission for the construction of the 504 MW Galloper wind farm off the coast of Suffolk[101] and has given development consent to the Triton Knoll offshore wind farm[102].

155. Figure 17 shows the capacity of offshore wind projects that are operational and in the planning pipeline (as at the end of June 2013). DECC estimate that the total capacity of the offshore wind pipeline has increased from 10.6 GW in 2012 to 15.1 GW at the end of June 2013. Since the end of June, a number of significant offshore wind projects have subsequently entered the planning system, with an estimated capacity of around 5 GW.

Figure 17: Capacity of offshore wind projects that are operational and in the planning pipeline[103, 104]



156. The 4.5 GW increase in pipeline capacity since the last Update derives mainly from a number of offshore wind developments in Scottish Territorial Waters and in the UK's Round 3 zone formally entering the planning consent regime. While this shows that developers have confidence in the UK market and are willing to take their projects through

[100] DECC (2013), press release: https://www.gov.uk/government/news/kent-offshore-wind-farm-to-be-extended
[101] DECC (2013), press release: https://www.gov.uk/government/news/galloper-offshore-wind-farm-gets-green-light
[102] DECC (2013), press release: https://www.gov.uk/government/news/triton-knoll-offshore-wind-farm-given-development-consent
[103] The operational figures for capacity as at 30 June 2012 and additional capacity up to 30 June 2013 were obtained from Table 6.1 Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013. The *under construction*, *awaiting construction* and *applications being considered* figures for capacity have been obtained from DECC's Renewable Energy Planning Database (REPD): https://restats.decc.gov.uk/cms/planning-database/ dated 19 July 2013.
[104] Attrition rates are based on historic consenting rates and on capacity in the pipeline from 2009 to June 2013, taken from REPD. Historic consenting information shows that capacity which has had its planning application approved ultimately ends up being commissioned. The capacity shown in green could potentially be lost from the pipeline.

the relevant consenting regime, actual rates of deployment will ultimately depend on a range of factors, including the sector's ability to reduce costs. The draft EMR Delivery Plan indicated deployment of up to 16 GW of offshore wind by 2020, and up to 39 GW by 2030.

Case Study 6: The world's largest offshore wind farm was opened in July 2013

Project name: London Array
Energy: Offshore wind
Capacity: 630 MW
Investment: £1.9 billion

DONG Energy, E.ON and Masdar have built London Array, the world's largest offshore wind farm. Work started in July 2009 with the building of the onshore substation. Offshore construction started in March 2011 with the first turbine installed in January 2012, first power achieved in October and the final turbine installed in December 2012. London Array has a 630 MW capacity and produces enough electricity for nearly half a million homes – equivalent to two thirds of the homes in Kent[105]. It was officially opened in July 2013 by the Prime Minister, David Cameron. Its construction demonstrates that delivering our energy objectives can contribute to growth.

Phase one of the London Array.

"This is a great day for Kent and a great day for Britain. London Array has been built by some of the bravest seamen, the most talented engineers and hardest workers. It will bring benefits to Kent for years to come."

Prime Minister, David Cameron

Jobs: During the construction - over 75 organisations helped to build the London Array, with over 6,700 individuals involved. Up to 1,000 people worked on site at the peak of construction, clocking up an average of 300,000 hours a month, and over five million man hours to date. Longer term - London Array will require 90 on-going operational and maintenance jobs, including six new apprenticeships.

Community benefits: The project has widespread good support from the local population. Community benefits for residents near the onshore substation include: an off road car park for the primary school; a £300k community fund; a £200k environmental fund; support for local schools; and a university bursary scheme supporting one person a year for 10 years.

Wider economic impact and industry benefit: Over 120 Kent companies and organisations have been working with London Array, equating to contract values of over £20 million. UK companies involved in building the London Array include: JDR Cables, in Hartlepool, supplying inter-array cables and Ellis, in Malton, North Yorkshire, supplied cable cleats to JDR Cable Systems, for the project; Pipeline Engineering in Richmond won a £7.75 million contract for the supply of the cable protection system, and built a purpose-built manufacturing facility for the project in Catterick, North Yorkshire.

[105] London Array: http://www.londonarray.com/the-project/

Marine

Overview

157. The UK has some of the best wave and tidal resources in the world. This has led to the UK becoming a global focus for the development and early deployment of wave and tidal energy. Marine energy has the potential to make a significant contribution to meeting the UK's future energy needs.

158. Since the last Update we have continued to see good progress being made by the tidal stream sector as it moves from individual prototypes to project development of the first arrays and onto commercialisation. There has also been increasing interest in the potential for tidal range deployments.

159. Wave technology continues to develop, however progress in the wave sector has not been as swift as we or the sector had anticipated and a key priority for Government and industry is to consider further action to help the wave energy sector move to commercialisation.

Key Activities

160. **Tidal stream**: In December 2012, the European Commission announced the recipients of awards under the EU New Entrants Reserve 300 (NER300) competition. Two UK projects were announced under the innovative renewable energy technologies category; an array of Andritz Hydro Hammerfest and TGL devices in the Sound of Islay developed by Scottish Power Renewable and an array of SeaGen-S devices to be deployed by SeaGeneration (Kyle Rhea) in Scotland. The Scottish Government is supporting the two tidal projects to allow them to get upfront financing from the European Commission. Both the UK and Scottish Governments consider that this offers the opportunity for these UK projects to demonstrate the sector's future potential.

161. In February 2013 DECC announced, subject to State Aid clearance and final investment decision, the successful applicants to its Marine Energy Array Demonstrator (MEAD) programme[106]. These are:

- SeaGeneration (Wales) Ltd - An array of MCT Siemens' SeaGen-S tidal devices off the coast of Anglesey; and
- MeyGen's array of Andritz Hydro Hammerfest tidal devices in the Pentland Firth's Inner Sound

162. **Wave**: The Energy Technologies Institute (ETI) launched a £1.4 million project with Pelamis Wave Power to boost the cost effectiveness of large scale wave energy arrays in the UK waters. This will build on the tests currently taking place at the European Marine Energy Centre in Orkney and push Pelamis' design forward to commercial readiness.

163. The failure of any wave energy projects to be successful in securing array demonstration funding from the MEAD, the Scottish Government's Marine Renewables

[106] Government (2013), Marine Energy Demonstrator Scheme: https://www.gov.uk/innovation-funding-for-low-carbon-technologies-opportunities-for-bidders

Commercialisation Fund (MRCF) or the EU NER 300 has highlighted the need for Government to consider further action to assist the wave energy sector to move towards commercialisation. This need has been echoed by discussions across the wave sector. DECC convened a roundtable in July with LCICG members and key sector stakeholders to begin discussions on what else could be done to move the sector forward towards commercialisation.

164. The Scottish Government refocused its £18 million MRCF in May 2013 in line with industry calls. The wave first array support programme, a fund of up to £13 million, is aimed at accelerating wave energy technologies towards commercial readiness alongside their tidal counterparts. The remaining £5 million will be used for an array technology innovation programme, aimed at supporting the enabling technologies needed alongside the first wave and tidal arrays. Pelamis and Aquamarine Power were recently awarded a share of the MRCF's £13 million wave first array support programme.

165. **Tidal range:** a project to build a 240 MW tidal lagoon in Swansea Bay is currently at pre-application stage in the Planning Act process. The company has undertaken a range of public consultation events over the summer and has issued a community share offer to the local community in Wales.

166. The Energy and Climate Change Committee undertook an inquiry into private sector plans to construct a tidal barrage across the Severn, concentrating on the proposals from the Hafren Power Company. The inquiry concluded that the project was still at a relatively early stage of development and would require further work before it could be taken further. The Committee's final report was published in June 2013[107].

Innovation

167. Because of the relatively early stage of development of both the tidal stream and wave sectors, innovation will remain key to overcoming the technological barriers faced by the industry and driving down the costs of devices. Working closely with partners in the LCICG, Government has ensured that innovation funding has been carefully targeted. This Spending Review period will see over £80 million of public funds available for investment in marine energy innovation, including through the MEAD, MRCF and ETI programme mentioned previously.

168. Beyond their on-going SuperGen programme, the Research Councils UK Energy Programme are exploring areas of cooperation and opportunities for joint calls for research on marine energy with China.

169. The recently launched Offshore Renewable Energy Catapult intends to launch a Marine Farm Accelerator programme as one of its pilot programmes, to bring the industry together in solving common challenges in deploying arrays.

Other Developments

170. In February 2013, the UK's two Marine Energy Parks in the South West of England and the Pentland Firth and Orkney Waters, signed a Memorandum of Understanding to

[107] Parliament Select Committee (2013), Severn Barrage: http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee/inquiries/parliament-2010/a-severn-barrage/

help cement cooperation between the different regions. This cooperation agreement will further enhance their ability to bring together manufacturing, expertise and other activities to maximise the UK marine sector's offer, attract investment and build the UK supply chain.

171. In April 2013, Siemens Marine Current Turbines opened the UK's first tidal turbine production plant in the UK, see Case Study 7.

172. In September 2013, The Crown Estate launched a further wave and tidal leasing round to specifically help encourage and accelerate the development and deployment of technology in the sector. Consideration has been given to sites which would facilitate the deployment of demonstration projects by having the necessary infrastructure including ports and grid access. The Crown Estate's leasing round incorporates two new approaches:

- Demonstration zones: to help the industry focus on the best seabed locations, at new zones for test and demonstration activities; and
- Third party management of zones: which, once defined, will be managed by third party organisations who will sublet areas within the zones for test and demonstration activities.

173. Developers have made good progress in securing consent. In May 2013 Aquamarine's secured consent for a 40 MW wave energy project off the coast of Lewis in Scotland. MeyGen have recently announced their consent award for 86 MW of tidal stream energy in the Inner Sound of the Pentland Firth.

174. The Scottish Government recently decided to extend the REIF. The scheme, which provides loans, loan guarantees and equity funding, was due to expire in March 2015 but the £103 million fund will now consider investments until March 2016. This gives the wave and tidal sectors more time to develop projects to the stage where REIF can provide funding.

175. In Northern Ireland, the Centre for Advanced Sustainable Energy is working with lease holders on tidal testing projects.

176. The Welsh Government is continuing to assess marine energy resource potential, while simultaneously facilitating industry access to R&D funding and building supply chain capacity. The Welsh Government is maximising the opportunities for marine energy Wales through its Enterprise Zones, three of which have an energy focus – Haven Waterway in Pembrokeshire, Anglesey and Snowdonia. These Enterprise Zones offer Enhanced Capital Allowances and a Business Rate Scheme aimed at boosting job creation and business growth.

177. SMARTtide, which stemmed from the ETI's Tidal Resource Modelling project, was launched to market and made available to the marine industry under licence from HR Wallingford. It provides a unique model of the UK's Continental Shelf, 100 times more accurate than existing marine data.

The Deployment Pipeline

178. In the 2011 Roadmap we set out a profile of potential deployment by 2020 for wave and tidal stream energy. This suggests a range of between 200 and 300 MW of deployed capacity. However, the delays in progressing to pre-commercial array demonstration and a better understanding of the challenges for both the wave and tidal stream sectors suggests that the actual levels of deployment may be lower than predicted. The eventual deployment to 2020 will be critically dependent on the progress of the initial demonstration array projects and the ability of the sector to raise finance for early commercial deployments on the basis of the results of those demonstrations. DECC will be carrying out a study of the potential deployment pipeline to obtain a clearer estimate of likely deployment to 2020.

Case Study 7: Siemens MCT opened the UK's first tidal turbine production plant

Project name: Marine Current Turbines Ltd, a Siemens business **Energy:** Marine

The UK's first tidal power test and assembly plant opened in April 2013 and is developing leading-edge drive train technology for key tidal array developments in the UK. These include: the 10 MW Skerries tidal array project in Wales and the 8 MW Kyle Rhea project in Scotland. The new plant will support future growth of the tidal business in the UK and other international markets.

The array projects build on the sector leading SeaGen project that was installed in Strangford Lough, Northern Ireland in 2008. SeaGen has now produced 9 GWh of electricity into the grid and operated for more than 12,000 hours[108]. Since installation SeaGen has been subjected to a comprehensive environmental monitoring programme that has demonstrated that the technology has had no significant or adverse impact on the local environment.

The SeaGen tidal turbine at sea.

"Siemens' new testing and assembly facility for tidal turbines in Bristol is a real boost for the South West and for the UK's world leading marine energy industry".

Edward Davey, Secretary of State for Energy and Climate Change

Jobs: The plant will employ around 25 permanent staff at the test facility, as part of Siemens-owned MCT 50 strong workforce in the South West of England, South Gloucestershire.

Community Benefit: As part of its community engagement, Siemens has also delivered a number of educational workshops and exhibitions to hundreds of school children from Bath and Bristol as part of the 'Your Green future' event. Marine Current Turbines has exhibited in DECC's British Energy Challenge in Manchester, Newcastle and Bristol.

[108] Marine Current Turbines: http://www.marineturbines.com/SeaGen-Technology/Performance

Solar PV

Overview

179. In the Roadmap Update 2012, solar PV was included as one of the key renewable energy technologies that can help to create a balanced UK energy mix[109]. There are significant advantages with solar PV; it is versatile and scalable, with deployment possible in a wide range of locations including domestic and commercial buildings and where appropriate on the ground; solar projects can be developed and installed very quickly; and the fuel, solar radiation is free.

180. There has been significant growth in deployment, and costs have reduced significantly in recent years, as a result of technological advances, subsidies to support deployment and increased trade between continents. Government has taken action to align the support mechanisms under the FITs scheme and the RO to reflect the current costs of solar PV installation.

181. The ability to deliver further reductions in the installed costs of solar PV will determine the level of sector growth and the ability for the levelised cost of solar PV to become competitive with other energy sources.

182. The extensive deployment of solar PV across the UK has become increasingly visible to the public at all scales and recently solar received the highest public approval rating of all renewable energy technologies at 85%[110]. We need to ensure that this level of support can be maintained – including by ensuring that solar PV is appropriately sited. We do however expect on-going deployment of the technology to continue at all scales.

Key Activities

183. Fully aware of the potential of solar PV, the Government has started to set out its vision of the strategic direction for this technology in the UK with the publication of a Solar PV Strategy Roadmap[111]. It is designed to show our commitment to solar PV in the UK and provide certainty to investors, developers, and the households and communities and businesses affected by solar PV.

184. The Solar PV Strategy Roadmap is framed by four guiding principles, which form the basis of Government's strategy for solar PV. These principles are making sure that our policies support appropriate deployment in a sustainable, cost effective way.

I. Support for solar PV should allow cost-effective projects to proceed and to make a cost-effective contribution to UK carbon emission objectives in the context of overall energy goals – ensuring that solar PV has a role alongside other energy generation technologies in delivering carbon reductions, energy security and affordability for consumers.

[109] DECC (2012), UK Renewable Energy Roadmap Update: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80246/11-02-13_UK_Renewable_Energy_Roadmap_Update_FINAL_DRAFT.pdf
[110] DECC (2013), Public Attitudes Tracker Wave 5: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/198722/Summary_of_Wave_5_findings_of_Public_Attitudes_Tracker.pdf
[111] DECC (2013), UK Solar PV Strategy Part 1: Roadmap to a Brighter Future: https://www.gov.uk/government/publications/uk-solar-pv-strategy-part-1-roadmap-to-a-brighter-future

II. Support for solar PV should deliver genuine carbon reductions that help meet the UK's target of 15% renewable energy from final consumption by 2020 and in supporting the decarbonisation of our economy in the longer term – ensuring that all the carbon impacts of solar PV deployment are fully understood.

III. Support for solar PV should ensure proposals are appropriately sited, give proper weight to environmental considerations such as landscape and visual impact, heritage and local amenity, and provide opportunities for local communities to influence decisions that affect them.

IV. Support for solar PV should assess and respond to the impacts of deployment on: grid systems balancing; grid connectivity; and financial incentives – ensuring that we address the challenges of deploying high volumes of solar PV.

185. The Solar PV Strategy Roadmap sets out the existing policy framework, the key questions facing the sector and the work which is being undertaken to address them. It forms the first element of a two part strategy process. The second part will be a full solar PV strategy document to be published in spring 2014. Further details are available in the Solar PV Strategy Roadmap[112].

186. Developing engagement with the solar industry has been a priority for the Government since the last Update. The Solar PV Strategy Working Group which was initiated by Government, held its inaugural meeting in March 2013, jointly chaired by DECC and the National Solar Centre (NSC). It includes members from the main trade bodies, manufacturers, financiers, developers and installers. The Group provides a forum for discussion of Government policy and the five Task Forces reporting to the Group are proactively addressing issues and barriers to the sustainable deployment of solar PV in the UK.

187. An ongoing challenge during 2013, especially for the large scale solar sector, has been to ensure that further growth in deployment and land use is managed sustainably and is taken forward in a way which carries the support of the communities among which it is deployed. The Land Use and Sustainable Deployment Task Force chaired by the National Farmers' Union, is looking at how to establish a mechanism which enables the development of solar PV arrays which are acceptable to developers, environmental groups, local communities and planners alike. Further work is being undertaken by the Task Force, DECC and its partners and outputs will include a code of best practice, the development of principles for the establishment of community schemes and consideration of the distribution of potentially suitable deployment sites across domestic, commercial and industrial roofs and large-scale ground mounted sites.

188. The European Trade Commissioner's investigation into whether Chinese manufacturers have been benefiting from unfair trade practices has been affecting solar PV module prices during 2013. The European Commission concluded that there has been dumping and a Regulation was introduced in June[113]. In August, further to negotiations, the Commission adopted a decision to accept the price undertaking offered by Chinese

[112] DECC (2013) UK Solar PV Strategy Part 1: Roadmap to a Brighter Future: https://www.gov.uk/government/publications/uk-solar-pv-strategy-part-1-roadmap-to-a-brighter-future

[113] European Union Commission Regulation: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:152:0005:0047:en:PDF

exporting producers of solar panels[114], as well as a Regulation exempting these participating companies from the payment of provisional anti-dumping duties[115].

189. Final decisions on the anti-dumping and anti-subsidy cases are due to be made by the EC Council no later than 5 December 2013. The UK Government was opposed to the introduction of provisional anti-dumping measures, because of the uncertainty about the possible impact on deployment of solar PV. It is actively involved with the cases and will continue to work to influence the outcomes and track the impact of decisions made.

Other Developments

190. The NSC opened at St. Austell, Cornwall in April 2013. The NSC will play a pivotal role in supporting the solar industry in both the UK and abroad. It will help establish infrastructure for industry growth in developing technical standards, due diligence, best practice planning guides, training facilities and driving innovation through R&D.

Deployment Numbers

191. Solar PV currently accounts for 12% of renewable electricity capacity in the UK and 2.9% of renewable electricity generation[116] with the majority being used in domestic applications. Solar PV can be applied at all levels – domestic roof, industrial and commercial roof and larger ground mounted installations. As of the end of June 2013, there was 2.4 GW installed capacity of which 1.7 GW was small scale (mainly domestic) under the FITs scheme and 0.2 GW (mainly) large-scale under the RO[117].

192. There is also significant potential for further deployment[118]. As set out in the last Update, analysis indicates that there is a potential deployment range of 7-20 GW (equivalent to 6-18 TWh), with 20 GW being our current estimate of the technical maximum level of solar PV deployment by 2020[119].

193. As explained in the last Update, movement towards the 20 GW top limit of deployment (or above 10 GW as National Grid have indicated by their modelling), without generation being frequently constrained off, is likely to require significant technology cost reduction together with developments in tools to help balance the supply and demand of electricity including demand-side response utilising smart meters, energy storage, interconnection and flexible generation.

194. Since the publication of the last Update there have been a number of significant industry developments.

195. In March 2013, the UK's largest rooftop solar PV array was completed at Bentley Motor's factory in Crewe. The 5 MW installation, which consists of a 20,000-module strong array could provide up to 40% of Bentley's energy requirements during peak generation times. In April, the world's largest solar bridge was built across the River Thames in

[114] European Union Commission Decision: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:209:0026:0032:EN:PDF
[115] European Union Commission Regulation: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:209:0001:0011:EN:PDF
[116] Energy Trends (September 2013) Table 6.1: https://www.gov.uk/government/publications/energy-trends-september-2013
[117] Energy Trends (September 2013) Table 6.4: https://www.gov.uk/government/publications/energy-trends-september-2013
[118] DECC (2013), Draft EMR Delivery Plan: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/238867/Consultation_on_the_draft_Delivery_Plan__amended_.pdf
[119] DECC (2012), UK Renewable Energy Roadmap Update paragraphs 2.48 and 2.49: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80246/11-02-13_UK_Renewable_Energy_Roadmap_Update_FINAL_DRAFT.pdf

London (see Case Study 8). Also in April, the UK's largest solar PV farm (34 MW) was commissioned and connected to the grid at the site of a former World War II airfield in Leicestershire. The project consisting of some 130,000 solar panels was built in less than 8 weeks.

Case Study 8: The world's largest solar bridge

Project name: Blackfriars Bridge
Energy: Solar PV
Capacity: 1.1 MW
Investment: £7.3 million

London's new Blackfriars Station, which is built on a bridge spanning the River Thames, is the world's largest solar bridge after work was completed to install more than 4,400 solar photovoltaic panels, covering over 6,000 square metres. The Victorian bridge, built in 1886, is the foundation for the new Blackfriars Station, which has been upgraded by Network Rail to cater for more passengers and an improved train service.

Working in partnership
The company behind the solar engineering and installation is London-based Solarcentury Holdings, who worked with Jacobs Engineering, to incorporate solar PV into the station design.

Installation of the solar panels, the completed Blackfriars Bridge roof.

"The word iconic is used too freely but there is no other way to describe this project in the heart of London. Blackfriars demonstrates just what architectural feats can be achieved with solar PV, not just here but around the world and we look forward to working on further challenging projects in the future".

Frans van den Heuvel, CEO, Solarcentury

Wider economic impact and industry benefit
The solar panels will generate an estimated 900,000 kWh of electricity every year[120], providing 50% of the station's energy and reducing CO_2 emissions by an estimated 500 tonnes a year. In addition to solar panels, other energy saving measures at the new station will include rain harvesting systems and sun pipes for natural lighting.

Paul Byrne, Network Rail's senior programme manager, said that Blackfriars is "a showcase for the potential of solar power – and an important benchmark for Network Rail as we look to make best use of sustainable technology on the rail network".

[120] Solarcentury: http://www.solarcentury.com/uk/case-studies/blackfriars-taking-it-to-the-bridge/

Renewable Heat

Strategic Overview of Low Carbon Heat

196. Decarbonising heat remains a key long term priority for Government. Building on the 2012 publication *The Future of Heating: A Strategic Framework for Low Carbon Heat in the UK*[121], DECC published in March 2013, a paper *The Future of Heating: Meeting the Challenge*[122], setting out specific actions to support the long term transition to low carbon heating, including but not limited to renewable heating systems.

197. Although the scope[123] of this document goes beyond the contribution of heat to the 2020 renewables target, many of the issues raised and commitments made are relevant to renewable heating. In particular:

- Confirming the important role that CHP – including renewable CHP – can play in increasing industrial efficiency and cutting carbon;
- Announcing the establishment of a new Heat Network Delivery Unit, given the crucial importance of low carbon heat networks in urban areas for the future;
- Looking at the scope for additional RHI support for renewable heat which is put into a network, alongside the RHI 2014 review;
- Confirming that for space heating in homes and other buildings, renewable heating systems are most cost effective where no grid gas is available. Hence the domestic RHI tariff is calculated against an oil rather than gas counterfactual, to encourage uptake initially in off grid homes; and
- Announcing a new scheme to support the domestic renewable heat supply chain through the provision of vouchers for training and green apprenticeships for renewable heating engineers.

198. The Government remains committed to delivering a significant contribution to the 2020 target from renewable heat. Since September 2012, the Government has consulted on new tariffs for both domestic and non-domestic heat consumers and committed budget for the renewable heat incentive to 2015/16, the last year of existing Spending Review commitments.

[121] DECC (2012), Heat strategy: The future of heating - a strategic framework for low carbon heat: https://www.gov.uk/government/publications/the-future-of-heating-a-strategic-framework-for-low-carbon-heat

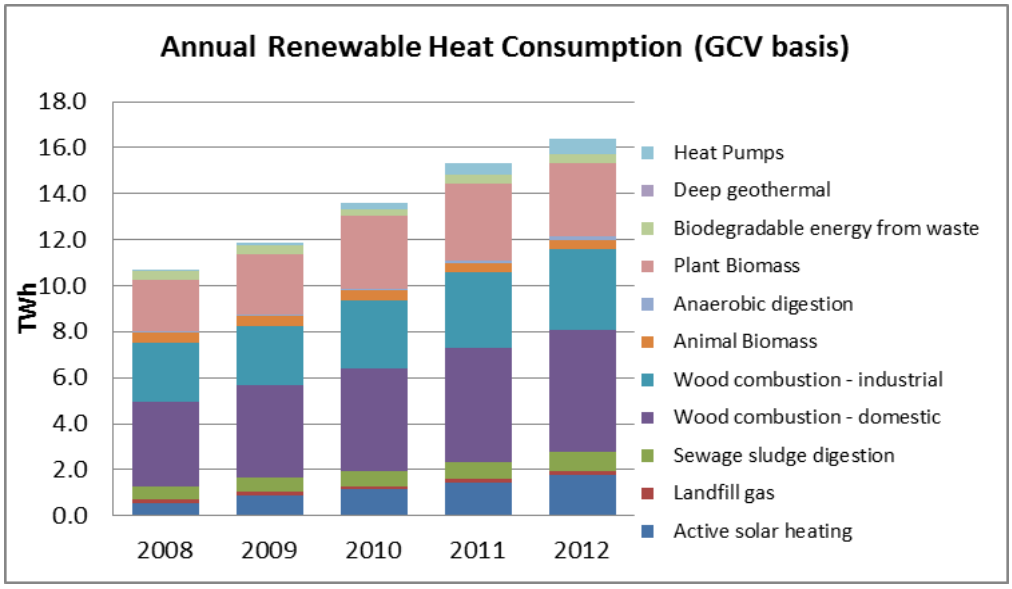
[122] DECC (2013), The Future of Heating – Meeting the Challenge: https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

[123] The publication considers questions such as "how will industry, business and individuals be able to meet their demands for heating in the decades to come, when carbon will be severely constrained? What are the alternatives to fossil fuel heating? Will there still be a role for natural gas as a source of heat out to 2050? What can Government and stakeholders do now to put us on the path to a low carbon heating future? It concludes that renewable heating will have a very important role to play in meeting the longer term decarbonisation challenge.

Heat Consumption Updates

199. In 2012, around 16.4 TWh was generated from all renewable heat sources, an increase of 7% on the previous year. See Figure 18. The sector is continuing to see some growth, following a decline that started more than 10 years ago as a result of tighter emission controls which discouraged on-site burning of biomass, especially wood waste. Since their 'low point' in 2005 bioenergy use has more than doubled to 13.9 TWh; the increase between 2011 and 2012 was 4%.

Figure 18: Annual Renewable Heat Consumption[124]



200. DECC analysis suggests that by 2014/15 the RHI is expected to add a further 3.5 TWh of renewable heat. This is expected to rise more quickly during the latter part of the decade and will continue to play a key part in the UK reaching its 2020 target.

201. We are building new markets for renewable heat in the UK and seeking a step change in consumer and industry behaviour. Decarbonisation of the heat sector has always been seen as a longer term task. Government is taking forward a number of actions and putting in place enhancements to incentivise and increase renewable heat deployment, as well as decarbonising heat, in the run up to 2020.

Incentivising Deployment

Renewable Heat Incentive (RHI)

202. The RHI is the primary tool for driving the transition to renewable heat. It is administered by Ofgem who published their first statutory report on the RHI in July 2013[125].

203. At the end of September 2013 there had been just under 2,400 installations accredited under the non-domestic RHI scheme, over 10,500 vouchers redeemed for

[124] DUKES 2013, table 6.6: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes
[125] Ofgem (2013), RHI – Annual Report: https://www.ofgem.gov.uk/ofgem-publications/76061/rhi-annual-report-web.pdf

domestic systems through the RHPP scheme 1 and 2, and nearly 1,150 vouchers claimed through RHPP scheme 2 Extensions[126].

204. With the introduction of the domestic RHI planned for spring 2014, DECC expects to see double the number of new installations seen under the RHPP in the first year of the RHI scheme and by 2020/21 we expect to support up to 750,000 renewable heating systems in homes[127]. In the non-domestic sector, we are expecting the new tariffs and technologies to be announced shortly to also lead to a significant increase in uptake.

The Domestic RHI

205. In July 2013 the Government published its response to the consultation on the domestic RHI – alongside the policy statement –*'Renewable Heat Incentive: the first step to transforming the way we heat our homes*'.

206. The policy statement outlined the design of the scheme[128], including details of eligible technologies and applicants, tariff payments and other qualifying criteria. The scheme links to DECC's Green Deal and applicants are required to complete a Green Deal Assessment before submitting their application. The tariffs have been set at a level that reflects the net cost of renewable heat generation over 20 years and are designed to compensate households for some of the risks of installing renewable heating systems, which may otherwise act as a barrier[129]. It is intended that the scheme will open for applications in spring 2014 subject to Parliamentary and State Aid approval.

207. DECC anticipates 3.9 TWh of additional renewable heat will be supported through the domestic RHI by 2020/21[130].

The Renewable Heat Premium Payments (RHPP) Scheme

208. An extension to the RHPP scheme was announced in March 2013. This extended the Household Voucher Scheme until 31 March 2014 and launched two new Social Landlords competitions. A further announcement on an increase in grant levels for the Household Voucher Scheme and changes in some of the eligibility rules was made in May 2013[131].

209. The RHPP scheme has already helped to fund well over 12,000 new systems in private and social housing since 2011[132].

[126] DECC (2013), RHI and RHPP deployment data: https://www.gov.uk/government/publications/rhi-and-rhpp-deployment-data-september-2013
[127] DECC (2013), Impact Assessment on Renewable Heat Incentive – Domestic, page 22: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211978/Domestic_RHI_Impact_Assessment.pdf
[128] DECC (2013), RHI Consultation: https://www.gov.uk/government/consultations/renewable-heat-incentive-proposals-for-a-domestic-scheme
[129] The results of a survey on homeowners' preferences and willingness to take up more efficient systems carried out by Ipsos MORI and the Energy Saving Trust for DECC were published in March 2013 alongside the *Future of Heating: Meeting the Challenge* document. A key finding was that whilst financial incentives can encourage take-up of renewable heat, homeowners retain a strong preference for gas due to barriers to take up. Rolling out renewable heating technology to households will therefore be a long term task, with deployment growing steadily over the next few years. See 'Homeowners' willingness to take up more efficient heating systems – Research Report by Ipsos Mori and Energy Saving Trust (March 2013)': https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191541/More_efficient_heating_report_2204.pdf
[130] DECC (2013), Impact Assessment on Renewable Heat Incentive – Domestic, page 22: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211978/Domestic_RHI_Impact_Assessment.pdf
[131] DECC (2013), RHPP Scheme Overview: https://www.gov.uk/renewable-heat-premium-payment-scheme
[132] DECC (2013), RHI and RHPP deployment data: https://www.gov.uk/government/publications/rhi-and-rhpp-deployment-data-september-2013

The Non-Domestic RHI

210. The Government Response to the non-domestic RHI 2012 consultation, *Providing Certainty Improving Performance*, was published in February 2013[133]. DECC has now implemented a number of changes to the non-domestic RHI, which came into force in September and consisted of:

- Simplification of the metering requirements;
- Air quality emission limits, for particulate matter and oxides of nitrogen; and
- Minor regulatory amendments.

211. After completing the parliamentary process we were made aware of an issue with the practical application of the air quality regulations. Government is in the process of amending these regulations with the intention of introducing the amendment as soon as possible.

212. In September 2012 consultations entitled *RHI: Expanding the Non-Domestic scheme*[134] and *Air to Water Heat Pumps and Energy from Waste*[135] sought views, primarily, on plans to extend the non-domestic scheme to include new technologies. The changes to the scheme are scheduled for introduction in spring 2014. As a response to low deployment of some technologies, DECC also ran a consultation entitled *RHI: Non-Domestic scheme Early Tariff Review*[136]. That proposed increases to the tariffs for large biomass >1 MW, ground source heat pumps and solar thermal technologies. The consultation also updated indicative tariffs for some technologies previously consulted on but which are not currently supported in the scheme.

213. These plans for expanding support under the non-domestic scheme and revising tariff levels for currently supported technologies are due to be introduced from spring 2014, subject to Parliamentary and State Aids approval. They are expected to stimulate the market further, to counteract under-deployment of these technologies. Alongside this, there are a number of other important workstreams, these are summarised below:

- The 2014 review of RHI is intended to focus on improving the working of the scheme, but it will also consider a number of new technologies, which may have the potential to go on and receive Government support. Evidence gathering work is starting and is expected to inform the consultation planned for spring 2014;

- Understanding the determinants of heat and wider energy use in non-domestic buildings is important in designing appropriate instruments for promoting renewable heat. A research project is underway (final report in early 2015) to investigate energy usage in these buildings: this is expected to provide a significant improvement in our knowledge;

[133] DECC (2012), Non-domestic RHI consultation – *providing certainty improving performance*: https://www.gov.uk/government/consultations/renewable-heat-incentive-providing-certainty-and-improving-performance

[134] RHI – Expanding the non-domestic scheme consultation ran from 20 September – 7 December 2012. DECC consulted on a range of new tariffs and technologies: air source heat pumps (both air-to-air and air-to-water), biomass direct air heating, a specific CHP tariff (for biomass and bioliquids), medium (200-500kW) and large (>500 kW) biogas combustion and a tariff uplift for deep geothermal heat pumps: https://www.gov.uk/government/consultations/renewable-heat-incentive-expanding-the-non-domestic-scheme

[135] DECC (2012), RHI consultation on air to water heat pumps and energy from waste: https://www.gov.uk/government/consultations/renewable-heat-incentive-air-to-water-heat-pumps-and-energy-from-waste--2

[136] DECC (2013), RHI - Non Domestic Scheme early Tariff Review: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204446/Tariff_Review_Consultation_for_PUBLICATION.pdf

- DECC has started a project to monitor a range of non-domestic RHI heat pumps to determine the variation in performance of different installations and to understand the causes of this variation. The project is expected to complete in autumn 2015 and aims to recommend improvements to the industry guidelines on design and installation.

Biomass Heat and Energy from Waste CHP

214. An additional 23 MW electrical capacity of new biomass and energy from waste CHP came online in 2012, supplying some 18.5 GWh of heat. This brings total operational UK capacity to 200 MW electrical supplying 1,220 GWh of heat per year. In addition, certifications to the CHPQA programme show a further 616 MW biomass and energy from waste CHP in the pipeline, of which 230 MW electrical capacity have proposed initial operation dates in 2013 – although not all of this capacity will necessarily be brought forward. Case Study 9 provides an example of a CHP plant that is beginning to provide waste fuelled heat.

Case Study 9: SELCHP begins to provide waste fuelled heat

Project name: SELCHP Lewisham **Energy:** CHP

South East London Combined Heat & Power (SELCHP) takes residual waste that cannot be recycled and turns it into energy, which up until this year was solely exported as electricity to the National Grid. SELCHP is capable of handling 430,000 tonnes of waste per year and produces enough electricity to power approximately 48,000 local homes[137].

By the end of 2013 it will begin to provide waste fuelled heat via hot water piped to 2,500 properties across five local authority housing estates in South London. This follows the signature of a long-term contract in June 2013 by operator Veolia Environmental Services and one of the three local government participants. Works are currently underway to install a 3.2km piping system from SELCHP to a number of boiler houses which themselves are being modified, to accept the hot water and to adapt the District Heating Hall at SELCHP to draw additional heat and convert steam to feed the new district heating connection.

Installing the district heat pipe system.

"It is fantastic that SELCHP will soon be providing low carbon, low cost heating to homes in South East London through a new heat network, something I am working hard to encourage more of across the capital. Local heat and power supplies not only save Londoners money and reduce carbon emissions but also help to provide London with a more secure, sustainable, cost-effective energy supply."

Boris Johnson, the Mayor of London

[137] SELCHP: http://www.selchp.co.uk/energy-recovery/

215. DECC published its response on revisions to the CHP Quality Assurance requirements for renewable CHP, including energy from waste in July 2013[138]. This set out how requirements are being strengthened for new plant to ensure that the expected energy savings are delivered. The response also helps support the development of renewable heat networks by providing flexibility during the early years of operation of renewable CHP supplying heat networks.

216. In line with the 2012 UK Bioenergy Strategy conclusions that the use of biomass feedstocks for dedicated power generation up to 2050 should be treated with caution[139], the Government's EMR draft Delivery Plan did not propose to provide a CfD for dedicated biomass plant. However, as a more efficient and more cost effective deployment pathway for biomass, the Plan proposes a CfD for dedicated biomass CHP with a £120/MWh strike price. This support would be available in addition to the RHI support on heat output proposed in the September 2012 consultation on expanding the non-domestic RHI. More details were published by DECC in October[140] with further details on the RHI support for CHP to be published later this autumn.

Ground and Air Source Heat Pumps

217. The publication of an updated report by Energy Saving Trust from their field trials on heat pumps shows improvements in performance in situ[141]. DECC has also been collecting data on heat pumps from the RHPP scheme. A key learning is that where systems are metered it allows sub optimal performance to be identified and rectified quickly.

218. This scheme has installed meters at over 700 sites and we are collecting the data on performance. It is early days in terms of collecting, verifying and the analysis of this data. Like the second phase of the EST field trials the RHPP scheme data appears to show that air source heat pumps in particular have improved performance.

219. The domestic RHI scheme has specifically designed elements to promote even better performance from heat pumps as installed – paying for renewable heat incentivises installations designed to operate more efficiently; metering and monitoring service packages enable householders to check how well their systems are working; systems metered for payment will receive larger payments if they perform more efficiently; and there is minimum Seasonal Performance Factor (SPF) criteria that could increase in the future through a change to the regulations.

220. DECC continues to work closely with industry to support growth in both the domestic and non-domestic installations of these key technologies.

[138] DECC (2013), CHPQA Consultation Government response: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211917/D13_813935__CHPQA_Consultation_Government_Response.pdf
[139] DECC (2012), UK Bioenergy Strategy: https://www.gov.uk/government/publications/uk-bioenergy-strategy
[140] DECC (2013), EMR Consultation: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249591/EMR_Consultation_on_Implementation_proposals.pdf
[141] Energy Saving Trust, Heat Pump Field Trials: http://www.energysavingtrust.org.uk/Organisations/Technology/Field-trials-and-monitoring/Field-trial-reports/Heat-pump-field-trials

Renewable Heat in the Devolved Administrations

221. Scotland is continuing to make good progress towards its 11% target for renewable heat – the Scottish Government's report on Renewable Heat in Scotland 2012[142] estimates Scotland generated 2.48 TWh of renewable heat, an increase from 3.8% in 2011 to 4.1% in 2012. In consultation with a wide range of stakeholders, the Scottish Government has proposed an alternative and improved renewable heat measurement methodology to allow more robust annual monitoring and better measurement consistency with other energy targets. The proposed new methodology shows that Scotland will need more renewable heat to achieve the 11% target for 2020.

222. The Scottish Government published an Outline Heat Vision in January 2013[143], with a commitment to produce a Heat Generation Policy Statement (HGPS). The HGPS will set out scenarios for meeting the Scottish Government's vision for a largely decarbonised heat sector by 2050, with significant progress by 2030. It will also look at how to maximise renewable heat in Scotland to meet the increased ambition for renewable heat and take a holistic look at heat across a range of policy areas.

223. Heat networks will be a key part of a decarbonised heat sector. The Scottish Government published its District Heating Action Plan in June 2013[144], setting out its response to recommendations from the Expert Commission on District Heating on accelerating the uptake of district heating in Scotland.

224. Online renewables planning advice on 'Planning and Heat' was launched on 15 May 2013.

225. Given the differences in the Northern Ireland heat market and the rest of the United Kingdom, a separate Northern Ireland RHI was introduced in November 2012[145]. The Northern Ireland RHI is similar in nature to the GB scheme, although it has different tariffs and banding.

226. A domestic premium payment scheme has also been operating in Northern Ireland since May 2012 and over 16 MW new renewable heating capacity has been installed and incentivised since then. This scheme has received over 1,100 applications, over half being for biomass boilers and a high proportion for solar thermal heating. The Department of Enterprise, Trade & Investment (DETI) recently consulted on proposals for a domestic RHI and to introduce new tariffs under the non-domestic scheme[146]. DETI is anticipating publishing a response to the consultation, with final policy proposals, before the end of 2013, dependent on the number and nature of consultation responses. DETI hope to implement a domestic RHI and new tariffs for the non-domestic sector in 2014.

[142] Energy Saving Trust (2012), Renewable Heat in Scotland: http://www.energysavingtrust.org.uk/scotland/Take-action/Get-business-funding/Renewable-Heat-in-Scotland-2012
[143] Scottish Government (2013), Outline for a draft heat vision: http://www.scotland.gov.uk/Resource/0041/00413386.pdf
[144] Scottish Government (2013), District Heating Action Plan: http://www.scotland.gov.uk/Publications/2013/06/7473
[145] DETINI (2013), RHI Tariffs: http://www.detini.gov.uk/deti-energy-index/deti-energy-template-menu-5.htm
[146] DETINI (2013), consultation on phase 2 of the NI RHI: http://www.detini.gov.uk/consultation_on_phase_2_of_the_ni_rhi.pdf – closed October 2013.

Renewable Transport

Introduction

227. Biofuels offer one of the few routes in the short term to reduce transport sector emissions and are needed to help achieve the UK's target under the Renewable Energy Directive (RED) of 10% renewable energy in transport by 2020. However, it is crucial that the sustainability of biofuels is assured and that they deliver true greenhouse gas reductions when all impacts are taken into account.

228. The way in which we power our motor vehicles is changing and in the longer term, fuel efficiency, electric and hybrid vehicles and hydrogen are likely to play a part. These emerging new sectors provide the UK with significant opportunities to grow our economy, reduce our reliance on foreign energy imports, clean the air in our towns and cities as well as reduce carbon emissions from our environment.

Biofuels Consumption[147]

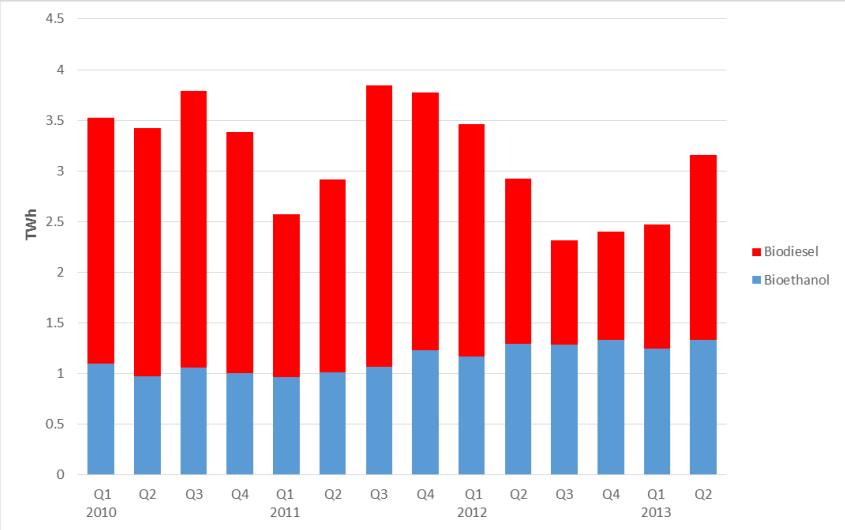
229. In Quarter 2 of 2013, 394 million litres of liquid biofuels were consumed in transport, a rise of 7% on the total in Quarter 2 of 2012 (368 million litres), but a 13% fall on the record high of 454 million litres in Quarter 4 of 2011. In Quarter 2 of 2013, biodiesel accounted for 2.8% of diesel, and bioethanol 4.3% of motor spirit. The combined contribution of the two fuels was 3.4%, 0.2 percentage points higher than Quarter 1's 2012 share.

230. Bioethanol consumption rose by 3%, from 197 million litres to 203 million litres, equalling the record high in Quarter 4 of 2012. Biodiesel consumption rose by 12%, from 171 million litres in Quarter 2 of 2012 to 191 million litres in Quarter 2 of 2013.

231. The composition of biofuels has begun to change over the operation of the Renewable Transport Fuels Obligation (RTFO). After six years of biodiesel contributing the largest share of biofuels consumption, for the fifth successive quarter, in Quarter 2 of 2013 bioethanol had the highest share of total biofuels consumption, with 52%, compared with 48% from biodiesel.

[147] Data is taken from Energy Trends – September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013.These figures have been sourced from: HM Revenue and Customs Hydrocarbon Oils Bulletin - https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutyBulletins.aspx

Figure 19: Biodiesel and Bioethanol fuel consumption between 2010 and Quarter 2 of 2013[148]



Deployment of Ultra Low Emission Vehicles

232. The Government's strategy for ultra-low emission vehicles (ULEVs) 'Driving the Future Today'[149] was published in September 2013 and sets out the unprecedented long-term commitment to speeding the transition to low emission motoring in the UK.

233. The Office for Low Emission Vehicles (OLEV) continues to co-ordinate Government support and plot the practical steps needed to position the UK at the forefront of this global market. The initial provision of £400 million funding to 2015 has been enhanced with a significant funding commitment of over £500 million from 2015 until 2020 to continue Government support for the growing market.

234. At the end of June 2013, over 5,000 claims had been made for the Plug-in Car and Van grants, which help reduce the cost differential between new ULEVs and conventional vehicles. Sales momentum is now building and this is expected to continue as new vehicles enter the market and costs continue to fall, providing a more diverse choice for consumers at different price points.

235. ULEVs are also incentivised through the tax system and Government has committed to involving industry in the process for subsequent development of the tax regime, acknowledging the importance of stability in taxes as the market for these vehicles develops. Fleet sector purchase decisions have a crucial role in helping accelerate sales and OLEV have worked with the Energy Saving Trust to provide independent advice to fleets through the Plugged-in Fleets initiative.

236. The Plugged-in Places (PiP) scheme has accelerated the roll-out of recharging infrastructure in the UK and has now delivered over 5,500 chargepoints in PiP areas to the end of June 2013. A national package of up to £37 million is now supporting the

[148] Derived from Table 6.2 of Energy Trends, September 2013: https://www.gov.uk/government/publications/energy-trends-september-2013
[149] Office for Low Emissions Vehicles (2013), Strategy for ULEVs in the UK: https://www.gov.uk/government/publications/driving-the-future-today-a-strategy-for-ultra-low-emission-vehicles-in-the-uk

installation of chargepoints in homes, residential streets, railway stations and public sector car parks and rapid chargepoints to facilitate longer journeys.

237. Government has continued to work to lower emissions from other types of vehicles. The Green Bus Fund has encouraged bus operators and local authorities to switch to low and ultra-low emission buses. £87 million has delivered more than 1,200 new low carbon buses in England, with nearly 350 in London and 275 in Manchester. Alongside industry, Government participation in the Low Carbon HGV Technology Task Force is building on work already underway through the OLEV co-funded Low Carbon Truck Trial, to demonstrate and showcase low carbon technologies on larger vehicles and to provide confidence in their performance to the freight industry (see Case Study 10).

238. The Government has consistently supported the development of hydrogen fuel cell vehicles alongside the roll-out of plug-in vehicles as part of its technology approach. Both technologies have an important role to play in our future mobility. That is why we are working with companies in the ground-breaking UKH_2Mobility project to develop a business case for the roll-out of hydrogen fuel cell electric vehicles (and the associated hydrogen refuelling infrastructure) in the UK from 2015.

239. As the number of plug-in vehicles on our roads increases, so will the demand for electricity, placing additional pressures on the electricity system. However, ULEVs can be used to help balance demand at peak periods and support the efficient use of energy by consumers. This will be facilitated by the introduction of intelligent power supply networks and the roll-out of electricity smart meters across all domestic properties by 2020.

Case Study 10: Low carbon truck trial

- The Department for Transport (DfT) has commissioned a project to collect and analyse data from a series of trials designed to demonstrate the impacts and benefits of using low carbon trucks across a range of freight operations. The project included the Government providing up to £11.3 million to pump prime the procurement of low emission HGV technologies and their supporting infrastructure.

- The key aim of the project is to provide robust information on the impacts and benefits of using low carbon trucks. A number of the trials will use biomethane produced from waste (including from municipal solid waste) which will be taken into account in considering the carbon performance of the vehicles. The trials will complete at the end of December 2015 and we can expect to see a report on the findings after that.

Other Developments

240. **Biofuel sustainability**: Government has been actively engaged in negotiations around the 2012 European Commission proposal to address Indirect Land Use Change (ILUC) impacts through amendments to the Renewable Energy Directive and the Fuel Quality Directive. Once resolved we hope to pursue deployment of biofuels in a strategic and sustainable way.

241. **Advanced biofuel demonstration**: The Government announced in August 2013 that it was committing £25 million of capital funding over 3 years from 2015, to enable the construction of demonstration-scale waste to fuel and other advanced biofuel plants in the UK. The money will be used to underpin significant private sector investment in one or more demonstration-scale advanced biofuel plants. DfT will be issuing further details in the autumn of 2013. DfT will also be launching a call for evidence later this year. This will seek views on how to address barriers to the commercial viability of advanced biofuels and other emerging low-carbon fuels.

242. **Plug-In Vehicle Infrastructure**: The National Charge point Registry (NCR) is live and available at http://data.gov.uk/, and Government have committed to develop it further and allow greater flexibility and functionality during 2014.

243. **Support for innovation**: £82 million of research and development funding has now been committed to support the new generation of ULEVs and to help build the necessary skills and knowledge base here in the UK. This funding is focussed on identifying and funding emerging technologies that the UK can exploit and lead on globally. This includes innovations in electric machines and power electronics; energy storage and energy management; and lightweight vehicles and powertrains. It specifically targets areas where commercial funding has not been readily available so that we can build value in our supply chain and create opportunities in the UK.

Renewable Transport in the Devolved Administrations

Northern Ireland

244. Since April 2011, a comprehensive network of public charge points has been installed across the country for electric cars. Most people are within 10 miles of one of the 160, 22 kW fast charge posts, or within 30 miles of one of the 14 rapid charge points, representing an investment of more than £2.2 million[150]. Charge posts on each side of the border are fully compatible meaning electric car drivers can travel freely between the two jurisdictions.

245. The number of electric vehicles in Northern Ireland is rising steadily, and a marketing campaign culminating in a 3-day ecar conference at Titanic Belfast saw almost 1,000 visitors come along to hear about the infrastructure and ecar market in Northern Ireland.

Scotland

246. The Scottish Government is committed to the almost complete decarbonisation of road transport by 2050. This commitment has been strengthened by the launch, in September 2013 of 'Switched On Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles'[151], which sets out a vision for Scotland's electric vehicle (EV) future.

247. The Roadmap includes a focus on utilising renewable energy to maximise the carbon reduction benefit of EVs, and the potential to support increased generation from

[150] Department of Regional Development Northern Ireland (DRDNI): ecar website: http://www.ecarni.com/
[151] Transport Scotland (2013), A Roadmap to Widespread Adoption of Plug-in Vehicles: http://www.transportscotland.gov.uk/road/sustainability/low-carbon-vehicles

renewable sources. In particular, coordinating the recharging of plug-in vehicles with the fluctuating levels of generation from renewable sources will help to utilise green electricity that may not otherwise be used.

248. Transport Scotland are a Plugged-in Places partner and work continues to expand the network of home, workplace and en-route EV charge points across the country. Plans include the provision of rapid charging infrastructure at least every 50 miles on Scotland's primary road network.

249. Transport Scotland is now a member of the EU Hydrogen Fuel Cells and Electro-mobility in European Regions (HyER[152]) and the UKH_2Mobility project - ensuring Scotland is well positioned for the commercial roll-out of hydrogen fuel cell electric vehicles.

250. The Scottish Government is also a key funding partner in the Aberdeen Hydrogen Project[153]. This will see a fleet of hydrogen powered buses introduced into the city and the development of an integrated 'whole hydrogen' system which will produce and store hydrogen to fuel the bus fleet, as well as potentially being used to generate electricity at times of peak demand.

251. Through the Scottish Green Bus Fund, Transport Scotland has provided funding of £7.7 million to facilitate the introduction of over 90 low emission buses into the Scottish fleet.

252. In terms of biofuels, Transport Scotland is participating in a Ministerial Taskforce, led by Scottish Enterprise into the economic and environmental potential for production and use of sustainable biofuels in Scotland. Scottish Ministers also provided support for the Scottish Biofuels Programme[154] - a collaboration between some of Scotland's top academic institutions to research advanced biofuels and provide support to industry in the sector.

[152] HyER: http://www.hyer.eu/
[153] Aberdeen City Council, Hydrogen Project: http://www.aberdeencity.gov.uk/business_trade/economic_development/hydrogen_project/hydrogen_project.asp
[154] Scottish Biofuels Programme: http://biofuels-scotland.co.uk/

Increasing Options for Generation

Connecting the Scottish Islands

253. There is considerable potential for renewable energy in the Scottish islands, and independent analysis commissioned by the UK and Scottish Governments[155] suggested that they could make a significant and cost effective contribution to the UK's 2020 renewables targets. We are therefore keen to unlock the potential, where it makes sense to do so, and where it represents value for money for the consumer.

254. The report showed that while there are significant potential benefits to developing renewables on the Scottish islands, there are also considerable costs that need to be overcome. The report's analysis demonstrated that because of the high cost of transmission links to connect to the main GB electricity grid and other factors such as load factors, the economics of developing renewables projects on the Scottish islands is significantly different to that of projects on the mainland.

255. In July 2013, DECC announced alongside the Scottish Government that it was committed to taking forward work to consider how to provide additional support[156]. The Government followed this up by publishing a consultation in September 2013[157] to consider what level of additional support would be appropriate. The consultation highlighted a preference to provide a separate strike price for onshore wind projects located on the Scottish islands, which have clearly distinct characteristics to projects located elsewhere in the UK.

256. We are currently considering responses to the consultation and will take a final decision in time to allow a differential strike price to be set for these projects in the final EMR Delivery Plan.

Non-UK Generation and Renewables Trading

257. The UK can deliver its legal obligation of 15% renewable energy through domestic action alone, and Government remains fully committed to a range of activity in support of that aim. However, Government recognises that connecting to low carbon generation outside the UK could also provide a range of benefits, including:

[155] Baringa (2013), Scottish Islands Renewable Project: www.gov.uk/government/uploads/system/uploads/attachment_data/file/199038/Scottish_Islands_Renewable_Project_Baringa_TNEI_FINAL_Report_Publication_version_14May2013__2_.pdf
[156] DECC (2013), Consultation on Draft EMR delivery plan: www.gov.uk/government/uploads/system/uploads/attachment_data/file/223650/emr_delivery_plan_consultation.pdf
[157] DECC (2013), Consultation on additional support for Scottish island renewables: https://www.gov.uk/government/consultations/additional-support-for-scottish-island-renewables

- Saving money for energy bill payers;
- Reducing technology costs (through economies of scale arising from broadening support to new geographies) while also creating a larger market for UK green goods and services;
- Helping integrate electricity markets across Europe;
- Bringing large new markets into view for exporting our own natural energy sources like wind, wave and tidal – holding the promise of further economic benefits; and
- Reducing dependency on fossil fuels.

258. Work to date has demonstrated potential for clean, new electricity generation to contribute to the UK energy system at a cost effective price. This was highlighted in January, when the UK Government signed a Memorandum of Understanding with the Irish Government[158] committing to a programme of work to jointly evaluate the case, and prepare for, the physical export of renewable electricity from Ireland to the UK.

259. DECC provided an update on this work in June 2013, when it published a response to last year's Call for Evidence on Renewable Energy Trading[159]. This confirmed that we were minded to take up some level of trading so long as it can be made to work and demonstrates benefits for the UK.

260. The idea of cross-border trade in renewables is innovative and untested - not just for the UK, but for each part of the UK and Europe as a whole. There are a number of hard questions to answer and practical problems that would need to be overcome if it were to go ahead. The UK Government is working with the Devolved Administrations, Ireland and other stakeholders to develop an All Islands Approach to assess opportunities for aligning markets between regions and removing barriers to cross border trading of renewable energy. We are also committed to working jointly on energy trading and grid interdependencies with the Devolved Administrations and other Governments in the British Irish Council Grid workstream.

261. Work to address these questions will continue. In June 2013, Ofgem released a consultation[160], which sets out some emerging thinking about questions raised by 'multipurpose projects' (including non-UK generation) in the context of their wider Integrated Transmission Planning and Regulation project – further work on the connection of non-UK generation is planned for later this year.

262. Government plans to announce further details on energy trading in early 2014.

[158] DECC (2013), press release: https://www.gov.uk/government/news/energy-trading-creates-opportunities-for-ireland-uk-davey-rabbitte
[159] DECC (2013), Response to the Call for Evidence on Renewable Energy Trading: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210404/130627_Response_to_Call_for_Evidence_on_Renewable_Energy_Trading_Final.pdf
[160] Ofgem (2013), ITPR Project: Emergent Thinking: http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/itpr/Documents1/ITPR_emerging_thinking_consultation.pdf

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