



National Audit Office

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COMPTROLLER AND
AUDITOR GENERAL**

**HC 35
SESSION 2010–2011**

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Government funding for developing renewable energy technologies

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National Audit Office

Government funding for developing renewable energy technologies

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Amyas Morse
Comptroller and
Auditor General

National Audit Office

7 June 2010

Renewable sources of energy comprise wind, water, biomass, solar and geothermal and are distinct from non-renewable low carbon sources, such as nuclear power, and coal with carbon capture and storage.

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This report can be found on the
National Audit Office website at
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Summary

Introduction

1 Expanding the supply of renewable energy is central to the Government's aims to tackle climate change and achieve security of energy supplies. Renewable sources of energy comprise wind, water, biomass, solar and geothermal and are distinct from non-renewable low carbon sources, such as nuclear power, and coal with carbon capture and storage. The Department of Energy and Climate Change (the Department) is responsible for the Government's renewable energy policy and targets.

2 The Government's target, originally set in 2000, was to obtain 10 per cent of UK electricity supplies from renewable sources by the end of 2010. The Government's medium-term requirement to meet the legally-binding obligation established under the EU Renewable Energy Directive 2009 is to increase the proportion of all the UK's energy needs, covering electricity, heat and transport, which are supplied from renewable sources to 15 per cent by 2020. This is linked to the national statutory targets to deliver an 18 per cent reduction in UK carbon dioxide emissions, compared to 2008, by 2020 and an 80 per cent reduction in carbon emissions by 2050 supported by further increases in renewable energy generation. There are no specific targets for renewable energy beyond 2020. The government estimated in July 2009 that investment totalling some £100 billion would be required to achieve the 2020 target.

3 The Government has established arrangements that provide financial support for renewable energy technologies, to encourage innovation and deployment:

- **Direct support using public funds to encourage research, development, demonstration and early deployment of renewable energy technology.**

This support has historically tended to take the form of grants, but it also includes loans and equity investments and other support. This support may also contribute to wider government goals for technology innovation, carbon reduction, and economic growth. The value of this type of support in 2008-09 was approximately £76 million.

- **Regulatory and fiscal measures funded by industry and consumers that reward renewable energy generation and penalise carbon-intensive energy.** The main measure is the ‘Renewables Obligation’, which requires all licensed electricity suppliers to source an annually increasing proportion of their electricity from renewable sources. It is designed to help achieve the level of deployment needed to meet the 2020 target by providing renewable electricity generators with additional income, and in 2008-09 provided financial support worth around £1 billion. Other measures include the EU Emissions Trading Scheme and the Climate Change Levy.

4 This report, which follows our earlier 2005 report on renewable energy¹, examines the delivery and performance of direct support using public funds for the development, demonstration and deployment of renewable energy technologies, focusing on electricity and heat generating technologies. This support has been provided by some 20 different schemes and funding streams (the “schemes”) established since 2000 (see Appendix 1). Some individual schemes were set up to reduce carbon emissions, deliver technology innovation, or achieve economic growth, rather than focusing specifically on renewable energy goals. In these cases, we examined spending and impacts relating to renewable energy, but not their performance against wider objectives which in some cases we have previously reported on.² We do not cover public funding for basic research, which aims to broaden scientific knowledge rather than deliver commercial applications that can support deployment targets.

Key findings

On strategic objectives for renewable energy

5 The Department is seeking to accelerate the deployment of renewable energy technologies. The latest available data from 2008 shows that only 2.3 per cent of UK energy was generated from renewable sources, so to meet the 2020 renewable energy target the Department will have to drive a seven-fold increase. The target provides a clear basis for assessing progress overall. The Department has established illustrative scenarios for how individual technologies, such as wind or marine energy, might deliver the target, but it considers the market is better placed than Government to determine the mix of technologies that offers the best value for money for energy consumers. The Department is also seeking to secure innovation that can improve existing renewable technologies, reduce their costs and deliver new technologies, to help meet the statutory longer-term carbon reduction commitment.

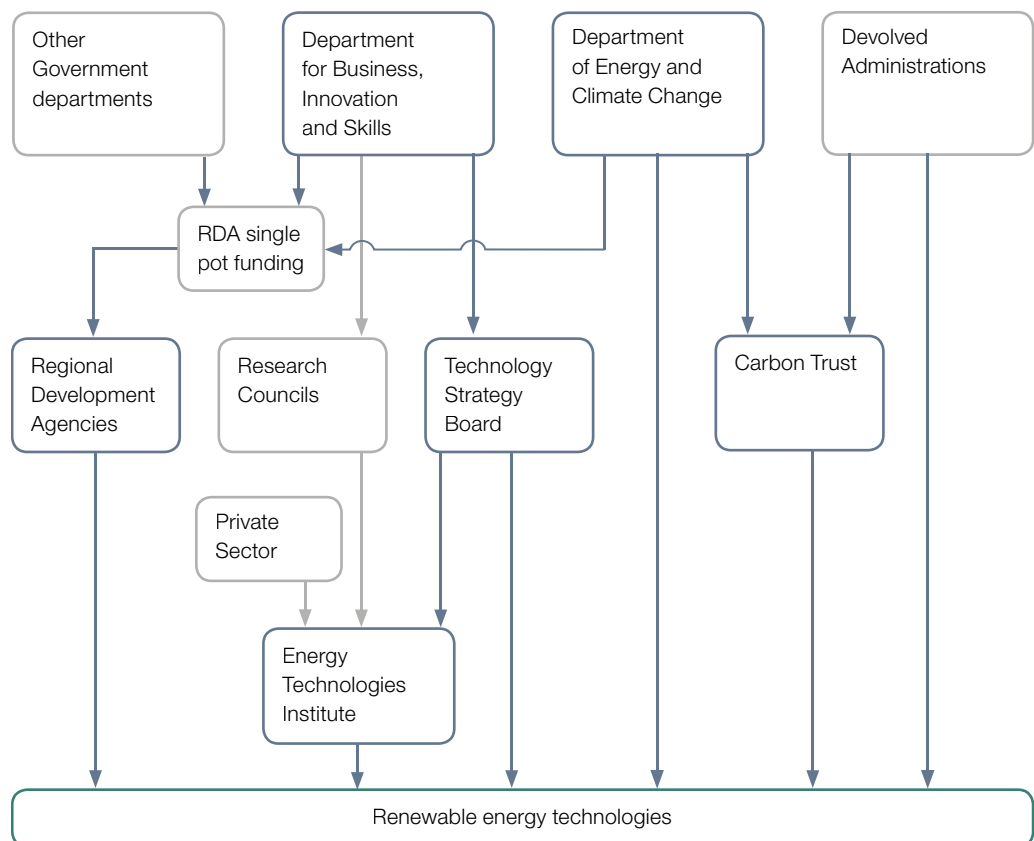
1 C&AG’s report, *Department of Trade and Industry: Renewable Energy*, HC 210, 2004-05.

2 See, for example, C&AG’s report, *The Carbon Trust: accelerating the move to a low carbon economy*, HC 7, 2007-2008.

On identifying funding needs and setting priorities

6 The Department has specific accountability for achieving the Government’s UK renewable energy targets. The Department for Business, Innovation and Skills and other delivery bodies also provide funding for renewable energy technologies (Figure 1). These other organisations provide funding for renewable energy technology in support of their wider policy objectives to reduce carbon emissions (through supporting renewable energy and energy efficiency and other carbon reduction technologies such as carbon capture and storage); support technology innovation; or deliver economic benefits. Each organisation independently carries out its own assessment of renewable energy funding needs, opportunities and priorities in line with its individual objectives and funding allocation. The Department does not have direct control over all public funding provided for renewable energy.

Figure 1
The delivery of direct support for renewable energy technologies



NOTES

- 1 Arrows indicate main funding flows and accountabilities.
- 2 The Energy Technologies Institute is a public-private sector partnership that receives matched funding from the private sector. The Departments, Technology Strategy Board and Carbon Trust part-fund projects that also draw on private-sector funding.
- 3 Research Councils and Devolved Administrations are outside the scope of this report.

7 There is a significant amount of contact between the Department and other organisations that fund renewable energy technologies, including through a cross-Whitehall Climate Change Board that oversees the delivery of PSA 27 to lead the global effort to avoid dangerous climate change. The Department has since February 2010 also been a member of the Low Carbon Innovation Group established by the Carbon Trust, Energy Technologies Institute and Technology Strategy Board in 2008, and whose membership has recently been widened to include the Research Councils. These arrangements have led to improvement in the degree of coordination. For example, the Department's decision to fund a new support scheme for marine technologies, to meet a gap for marine technologies that had existed for several years, was informed by discussions with other organisations including the Carbon Trust.

8 Since its creation in October 2008, the Department has been working to establish a more strategic approach to developing renewable energy and supporting the achievement of the UK target for 2020. It published a renewable energy strategy in July 2009 alongside the low carbon innovation strategy and low carbon transport strategy, and it is developing a supporting renewable energy 2020 delivery plan.

9 The Department is also working with other government departments, delivery bodies and industry to pilot the development of longer-term innovation action plans for key technologies showing potential requirements and priorities. This focus on individual technologies follows the Government's endorsement of a recommendation in the Carbon Trust's report *Focus for success* to tailor support for prioritised technologies.³ The Department published a summary of its first pilot action plan, on marine energy, in March 2010, which recommended targeted public funding to address market failures, although it does not indicate the level of support required. It also recommended building on existing dialogue between delivery bodies by setting up a strategic coordination group to provide a strategic overview of Government funding for marine energy. The Department intends to evaluate the pilot before deciding whether to prepare innovation action plans for other renewable energy technologies.

On the funding allocated to renewable energy technologies

10 Data on the overall level and distribution of public funds to support renewable energy technologies is not routinely collected and published. Information collected by the Department on funding for renewable energy excludes funding provided by Devolved Administrations and Regional Development Agencies, which the Department is not directly responsible for but which are key sources of public funding for renewable energy technologies.

³ Carbon Trust (2009) *Focus for success: A new approach to commercialising low carbon technologies*.

11 Since 2000, the 20 schemes and funding streams we examined provided support totalling some £265 million up to March 2009 for renewable energy technologies, which has reduced to £192 million following repayments of grants to the Department by some recipients. As at March 2009, gross spending through the Department's schemes together with legal commitments to future spend totalled £241 million. This was around two-thirds of the budget the Department and its predecessors had been allocated for renewable energy technologies during the period, and reflected demand for certain schemes being lower than forecast and some funding being reallocated to other objectives.

12 Although new technology mainly contributes to the delivery of medium and long-term goals, direct support for renewable energy development, demonstration and deployment has mostly been short term. Most recently, funding of up to £178 million that has been made available to renewable energy projects from the £405 million low carbon investment funding announced in Budget 2009 must be spent by March 2011. However, developers typically need funding over several years to develop their new technology, and some individual projects have relied on obtaining support from different schemes and sponsors at different stages in their development.

On evaluation and outcomes

13 Reflecting their different remits and objectives, the metrics used to monitor and evaluate the performance of schemes differ between organisations, so it is not possible to establish aggregate performance across the 20 schemes. There is also very little published information on the individual performance of the 20 schemes that allows an overall assessment of their cost-effectiveness specifically in relation to their contribution to the achievement of the Government's renewable energy targets and longer-term renewable energy objectives. Only one of the six case study schemes we examined had been evaluated, while the two newer schemes did not yet have evaluation frameworks in place. We have found a similar need to strengthen evaluation, including setting clear and measurable objectives and baselines, in some previous examinations of other financial support schemes.⁴

14 The schemes have supported projects that would not otherwise have proceeded and contributed to an increase in renewable energy generation, and so progress towards the achievement of the Department's targets. The Offshore Wind Capital Grants Scheme has had the largest identifiable impact on short-term targets, having contributed to an increase in installed renewable electricity generating capacity by nearly 1 gigawatt, equivalent to 14 per cent of total renewable generating capacity in 2008.

⁴ See, for example, C&AG's report, *Venture capital support to small businesses*, HC 23 2009-2010.

15 Support for projects aimed at innovation has contributed to advances in renewable energy technologies, for example by creating new patents. However, the potential impact of patents and other outputs from innovation funding on developing renewable energy can take some years to materialise, and can be difficult to measure directly. This increases the importance of having clear intermediate measures for schemes against which progress towards renewable energy targets and longer-term objectives can be measured. The Department is currently working with the Department for Business, Innovation and Skills on developing Green Book compliant guidance for capturing the innovation impacts of policies.

16 None of the delivery bodies have benchmarked the administrative cost of the support schemes we examined. Where scheme management had been contracted out, we found wide variations in costs as a proportion of financial support provided ranging from less than one per cent for the Offshore Wind Capital Grants Scheme to 18 per cent for the Department's Marine Renewables Deployment Fund.

Conclusion on value for money

17 The scale of the changes needed to meet the UK target for renewable energy and the timescale involved require that direct support is well targeted. It is essential that in progressing its work the Department follows best practice in planning, delivery and evaluation, and involves all the main delivery bodies in this process. Coordination of direct support for renewable energy has historically been limited, with each delivery body developing its own approach in accordance with its own objectives. Individually, supported projects have achieved outputs, but without a coherent delivery framework specifically for delivering the Government's plans for renewable energy or a consistent approach to evaluating and reporting performance across all the main organisations, the overall value for money of direct support for renewable energy technologies cannot be demonstrated.

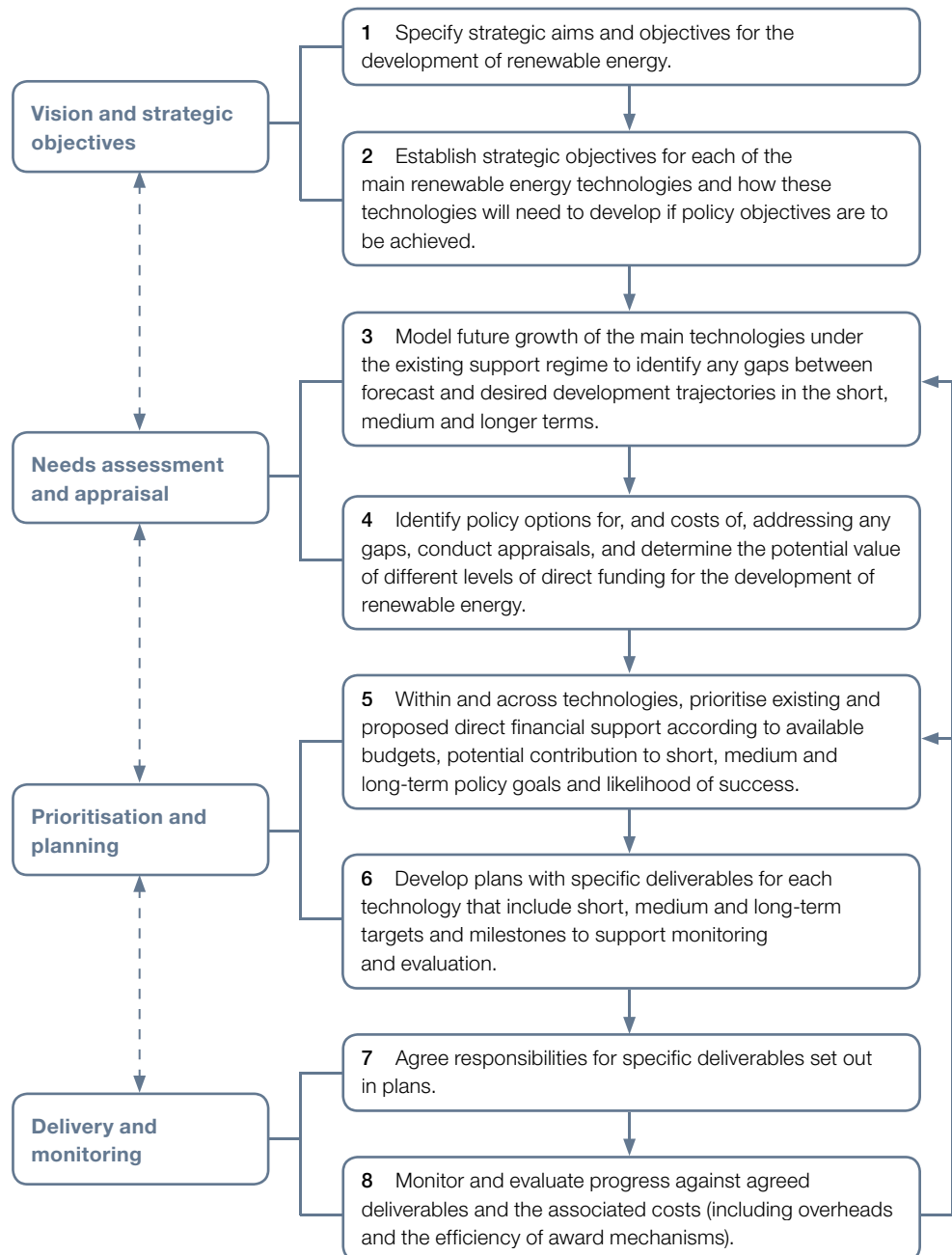
18 Following its creation in October 2008, the Department of Energy and Climate Change has taken steps to improve the legacy it inherited. It has developed a renewable energy strategy and is preparing an overarching 2020 delivery plan. The Department is also piloting the development of a technology-specific, longer-term innovation action plan, for marine energy. To protect value for money, the Department needs as a matter of urgency to demonstrate in its 2020 delivery plan and interrelated innovation plans for all key renewable energy technologies, how it is prioritising public funding; establishing a more coordinated approach to providing such support; and measuring and reporting the contribution of direct support to delivering the 2020 target and longer-term goals.

Recommendations

19 To help the Department build on work it has started, to achieve a more disciplined approach to planning and managing direct support, we have developed a model that draws on approaches used in research and development planning, technology roadmapping and portfolio management (**Figure 2** overleaf). Comparing our key findings against this, we have identified the following recommendations.

Figure 2

The steps required to achieve a disciplined approach to planning and managing direct support for renewable energy technologies



Source: National Audit Office

- a** Having developed its renewable energy strategy, the Department is now preparing a supporting delivery plan for 2020 and is piloting a longer-term technology-specific action plan for the marine sector. In preparing and delivering its plans, the Department, following a disciplined approach as set out in Figure 2, should:
- as a matter of urgency clarify in its delivery plan for 2020 the extent to which direct support will be used to achieve deployment targets, based on a clear assessment of need for and type of support for specific technologies and projects. The Department should review and update its delivery plan at least annually; and
 - prepare associated plans for delivering innovation in key renewable energy sectors to achieve longer-term carbon reduction commitments.
- b** The development of individual renewable energy technologies may need financial support over the long term, but direct support for projects has generally not been guaranteed beyond the three year spending review period. Where the Department identifies a need for direct funding to achieve future targets, it should work with its delivery partners and the Treasury to establish how they can devise schemes that provide sufficient certainty to recipients and private sector co-investors over the long-term development lifecycle for renewable energy technologies.
- c** The Department does not have comprehensive information on direct support for renewable energy technologies. The Department should base its renewable energy strategy delivery plan and associated technology plans on:
- good quality information on the amount and type of current and planned support;
 - clear appraisals of the level of funding needed and lessons from evaluating previous support; and
 - close cooperation with other organisations involved in delivery to draw on their expertise.
- d** Gaps in the coordination of support for renewable energy technologies have occurred partly as a result of the various autonomous delivery bodies having differing remits and objectives, but this is starting to improve. The 2020 delivery plan that the Department is developing is an opportunity to coordinate funding in support of the Government's renewable energy targets. The Department should agree with each of the main delivery bodies how they will contribute to implementing the plan and associated long-term innovation plans, and include them in supporting coordination and reporting arrangements.

e Arrangements are not currently in place to link schemes and their support for individual renewable energy projects to the overarching delivery plan.

In delivering the plan, the Department working with delivery bodies should:

- establish the fit between the objectives of relevant projects and the plan;
- identify risks to achieving targets and interim milestones for development and deployment, and approaches for mitigating them; and
- develop performance reporting to include common metrics across organisations that allows evaluation on a consistent basis across the portfolio, and regular re-appraisal of funding priorities.

f Direct support for renewable energy technologies is not reported in a transparent way in aggregate or in relation to some individual schemes.

The Department should gather information from delivery bodies on their spending on renewable energy and impacts achieved, and publish it annually.

Part One

Background

The Government's aims for renewable energy

1.1 Expanding the supply of renewable energy is a key part of the Government's strategy to reduce carbon emissions and maintain the security of energy supplies. The Government defines renewable energy as energy produced from wind, solar, geothermal, water (wave, tidal or hydropower), and biomass (which includes landfill gas, sewage treatment plant gas, and biogases).

1.2 The immediate renewable energy target, originally set by the Government in 2000, is to obtain 10 per cent of UK electricity supplies from renewable sources by the end of 2010. The medium-term target set under the EU Renewable Energy Directive 2009 is to increase the proportion of all the UK's energy needs for electricity, heat and transport that is obtained from renewable sources to 15 per cent by 2020. This target contributes to achieving the national statutory target of an 18 per cent reduction in UK carbon dioxide emissions, compared to 2008, by 2020 and the long-term statutory target to achieve an 80 per cent reduction in the UK's carbon emissions by 2050, supported by further increases in renewable energy generation.

1.3 The latest figures from 2008 show that only 5.5 per cent of the UK's electricity and 2.3 per cent of all its energy supplies were obtained from renewable sources, and the 2010 target may not therefore be met. Achieving the 2020 EU target will require a seven-fold increase in the proportion of energy supplied from renewable sources over the next decade, with electricity likely to account for the largest share (**Figure 3** overleaf). The Government has estimated that meeting this target will require investment totalling £100 billion.

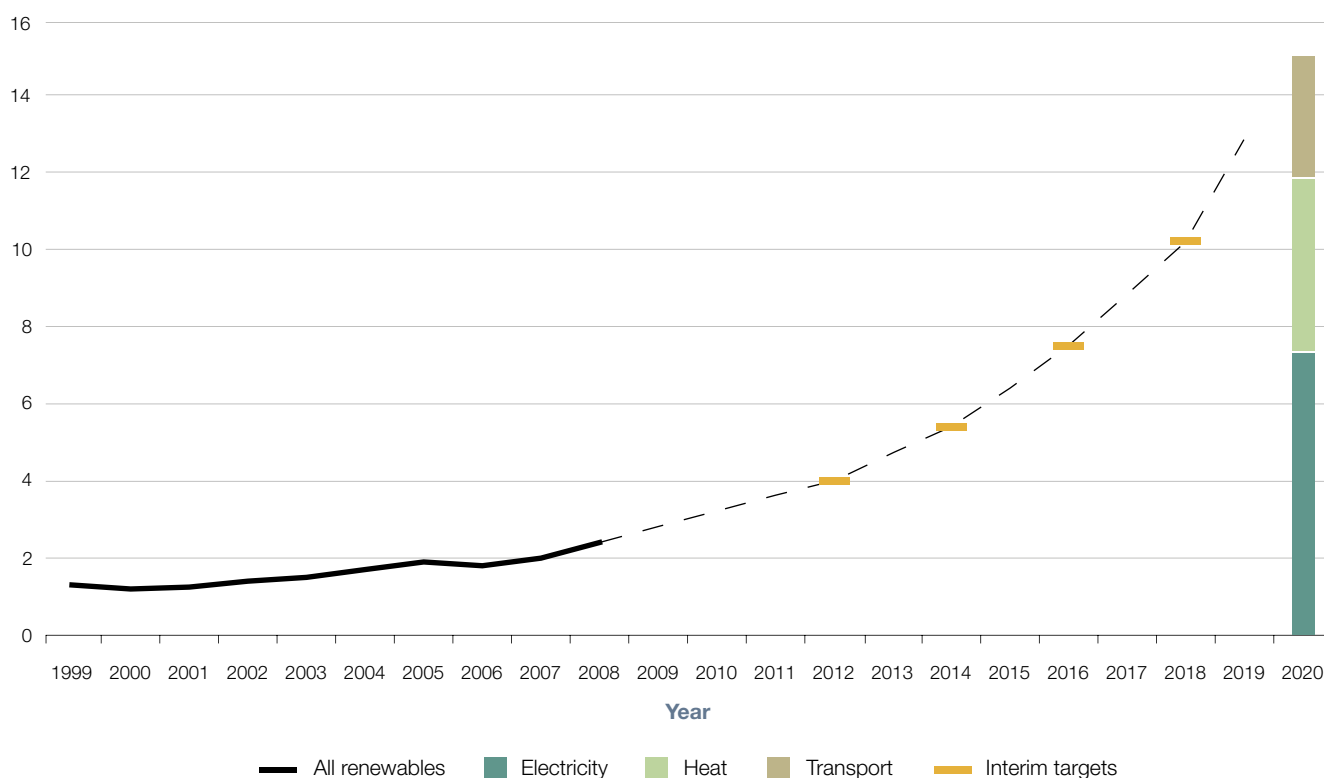
The financial support framework for renewable energy

1.4 The Government provides direct support using public funds to encourage research, development, demonstration and early deployment of renewable energy technologies. This support contributes to the achievement of renewable energy targets and also goals for carbon reduction, technology innovation and economic growth. Since 2000, some 20 schemes and other funding streams that have offered direct support for renewable energy technologies have been launched by government departments and delivery bodies (see Appendix 1). The value of support in 2008-09, including spending by Regional Development Agencies, was £76 million.

Figure 3

The growth in UK renewable energy between 2000 and 2008, and interim targets to 2020

Renewable Energy as a percentage of all energy consumption



NOTE

1 The last column showing the contribution of different types of renewable energy to the 2020 target is an illustrative breakdown prepared by the Department in 2009.

Source: National Audit Office based on information obtained from the Department

1.5 Regulatory and fiscal measures funded by industry and consumers reward renewable energy generation and penalise carbon-intensive energy. The main measure is the ‘Renewables Obligation’, which requires all licensed electricity suppliers to source an annually increasing proportion of their electricity from renewable sources. It is designed to help achieve the deployment needed to meet the 2020 target by providing renewable electricity generators with additional income, and in 2008-09 provided financial support worth around £1 billion. The subsequent introduction of the EU Emissions Trading Scheme and the Climate Change Levy have increased the cost of non-renewable energy and therefore provided further market incentives to invest in renewable energy. Other regulatory measures include feed-in tariffs introduced in April 2010, which offer payments to households and communities generating low carbon electricity, and the renewable fuels transport obligation introduced in 2008 which requires transport fuel suppliers to supply a specified percentage of all road vehicle fuel from sustainable renewable sources by 2010.

1.6 This report examines the delivery and impact of direct support for the development, demonstration and deployment of renewable energy technologies, focusing on electricity and heat generating technologies. **Figure 4** overleaf provides examples of this type of support. We do not cover funding for research, which aims to broaden scientific knowledge rather than deliver commercial applications that can support deployment targets.

Roles and responsibilities for achieving the Government's renewable energy targets

1.7 The Department of Energy and Climate Change (the Department) has overall responsibility for the Government's renewable energy strategy and associated targets. It took over the management of various existing grant schemes for renewable energy technologies when it took responsibility for energy policy from the Department for Business, Enterprise and Regulatory Reform, and climate change policy from the Department for Environment, Food and Rural Affairs.

1.8 Other departments and organisations also fund renewable energy technologies. These include the Department for Business, Innovation and Skills; the Carbon Trust (a publicly-funded not-for-profit private company); the Technology Strategy Board (an executive non-departmental public body); the Energy Technologies Institute (a public-private sector partnership); Regional Development Agencies; and the devolved administrations. Each has its individual reasons for supporting renewable energy technologies in line with its wider objectives (**Figure 5** on page 17). The devolved administrations and Regional Development Agencies fund renewable energy technologies in support of specific targets for renewable energy and other objectives for economic growth.

Study methodology

1.9 We examined financial and performance information for schemes launched since 2000 that have provided direct support for renewable energy technologies up to March 2009. For schemes that support wider objectives, we looked only at the activities and costs relating to renewable energy. For six schemes, we examined in detail the quality of the appraisal of their purpose and approach to evaluating their achievements. We also carried out case studies of 15 renewable energy projects that had received funding. Appendix 1 provides a more detailed description of our methodology.

Figure 4

Examples of direct support for promoting the development, demonstration and deployment of renewable energy technologies

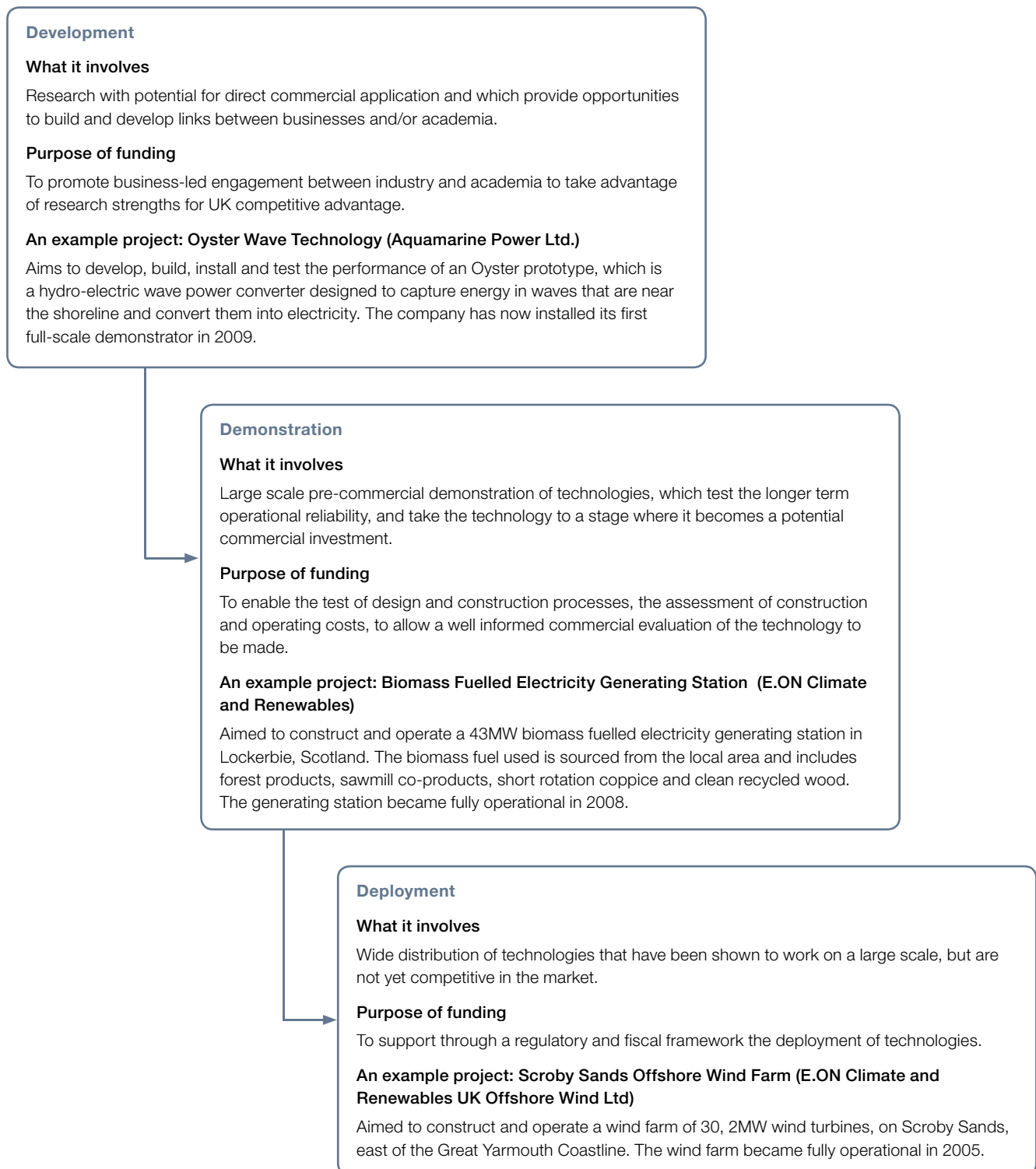


Figure 5

Main sources of UK direct support for renewable energy technologies

Organisation	Overall purpose	Support for renewable energy
Department of Energy and Climate Change	To ensure UK energy is secure, affordable and efficient; and bring about the transition to a low-carbon Britain	The Department funds renewable energy technologies in support of its target to increase renewable energy to 15 per cent of all energy consumption by 2020, and in support of wider carbon emissions targets up to 2050. It manages a portfolio of schemes as the 'Environmental Transformation Fund'
Department for Business, Innovation and Skills	To build a dynamic and competitive UK economy	The Department is funding renewable energy technologies as part of the Low Carbon Industrial Strategy, which aims to equip British businesses and workers to maximise the economic opportunities and minimise the costs of the transition to a low carbon economy
Carbon Trust	To accelerate the move to a low carbon economy	The Carbon Trust supports renewable energy technologies as part of its portfolio of activities aimed at reducing future carbon emissions
Energy Technologies Institute	To develop new low carbon energy technologies and accelerate them towards deployment	The Energy Technologies Institute is funding renewable energy technologies as part of its wider aim
Technology Strategy Board	To stimulate technology-enabled innovation in the areas that offer the greatest scope for boosting UK growth and productivity	The Technology Strategy Board funds renewable energy technologies where it sees opportunities to enable UK businesses to work with one another or with the research community to advance technology for UK business and economic benefit
Regional Development Agencies	To promote economic growth by creating the conditions to grow businesses and by helping to create additional, better quality, higher-paid jobs	Regional Development Agencies fund renewable energy technologies to support regional strategies and targets for renewable energy
Devolved administrations	To take on devolved responsibilities from UK departments	While energy is not a devolved responsibility, the devolved administrations have their own renewable energy targets, strategies and support frameworks

Source: National Audit Office based on information provided by departments and delivery bodies

Part Two

The Government's delivery strategy for direct support

2.1 The involvement of various government departments and delivery bodies in funding renewable energy technologies requires effective planning and coordination to create a shared understanding of funding needs and priorities. This part of the report examines:

- the evidence underpinning the level and type of direct support for renewable energy technologies; and
- how specific priorities have been determined and coordinated.

How the level of direct support has been set

2.2 Direct support for renewable energy technologies should, in line with HM Treasury guidance on appraisal and evaluation, be based on a clear assessment of the market failure and possible options, costs and benefits of addressing it. This should include modelling the impact of providing different levels of direct support to help identify the optimal level, taking into account existing support.

2.3 In this section we examine the evidence underpinning the level and type of direct funding allocated to the achievement of the Government's renewable energy targets, and the timescales over which it has been provided.

a The level of support

2.4 When the Government introduced its first renewable energy target in 2000, it announced it would offer £100 million in grant funding up to 2003 for renewable energy technologies. It subsequently announced further budgets as follows:

- 2001: a support programme for renewables worth £250 million from 2002-03 to 2005-06.
- 2002: £500 million of spending between 2002 and 2008 to help develop low carbon and renewable technologies.
- 2003: additional renewable energy capital grants totalling £60 million.
- 2007: funding of £370 million, which was subsequently increased to £400 million, for low carbon (including renewable energy) projects from 2007-08 to 2011 through a new Environmental Transformation Fund.

- 2009 (Budget): £405 million low carbon investment funding (of which £250 million is part of a wider Strategic Investment Fund), to be spent by March 2011. As at March 2010, £178 million from this Funding had been allocated to renewable energy technologies. The budget for the Low Carbon Buildings Programme was also increased by £45 million.
- 2009 (Pre-Budget): low carbon investment funding was increased by £150 million.

2.5 Some of these budgets are focused exclusively on support for renewable energy, while others, including the funding announced in Budget 2009, have a wider focus on low carbon technologies. The Department was not able to provide us with appraisal evidence showing how its predecessors' budgets for renewable energy technologies were determined. This partly reflects gaps in records and staff continuity resulting from the transfer of policy responsibilities between a number of different departments. Responsibility for renewable energy transferred from the Department of Trade and Industry to the Department for Business, Enterprise and Regulatory Reform in June 2007. Just over a year later, in October 2008, it transferred again to the Department of Energy and Climate Change.

2.6 We found the Government's announcements did not provide a transparent account of the total amount of funding committed to achieving renewable energy objectives. Initial lifetime budgets were subsequently increased, while funding announcements such as the £400 million budget for the Environmental Transformation Fund included £170 million announced in previous budgets. The relationship between budget announcements of overall funding for renewable energy technologies and annual budgets against which departments and delivery bodies monitor in-year expenditure was also not transparent.

2.7 Our analysis of data collected from the departments and delivery bodies covered in this report suggests the total funding committed to the development, demonstration and early deployment of renewable energy generating technologies between 2000 and 2009 was £464 million. This is indicative, as we found some inconsistencies in the data. Our recent report on venture capital funding shows these weaknesses are not unique to schemes that support renewable energy.⁵

b The type of support

2.8 Decisions on the type of direct support should, in line with Treasury guidance, be based on an options appraisal to determine what form of support, and balance between capital and revenue funding, is likely to deliver the most cost-effective outcomes. Grants accounted for 96 per cent of support through the schemes we examined up to the end of March 2009. Alternative forms of support, including creating commercial enterprises and providing venture capital funding to help companies in the renewable energy sector facing difficulties in raising private investment, accounted for 4 per cent of total direct public spending on renewable energy technologies up to March 2009. Securing project finance is a key challenge for more developed technologies such as offshore wind, with some individual projects forecast to cost more than £2 billion.

⁵ C&AG's report, *Venture capital support to small businesses*, HC 23 2009-10.

2.9 Research carried out by Frontier Economics for the Department in 2009 suggested there is little limited empirical evidence on the relative cost-effectiveness of grants, equity funding, loans or other forms of financial support for renewable energy technologies. For offshore wind, the Department has developed its approach following a report it commissioned in 2009 from AEA Technology, which concluded there was not a strong case for continuing capital grants other than for innovation, for example in the design of blades and gearboxes. It will be important to evaluate the cost-effectiveness of the various forms of support being offered.

2.10 The low carbon investment funding includes commitments to provide £38 million venture capital funding up to March 2011 to a new UK Innovation Investment Fund established by the Department for Business, Innovation and Skills in 2009 and to the Carbon Trust's existing venture capital scheme. The largest loan scheme specifically targeting renewable energy technology investment in the UK was launched in November 2009 by the European Investment Bank in conjunction with RBS, Lloyds Banking Group and BNP Paribas Fortis. It is offering onshore wind projects loans totalling £1.4 billion. Onshore wind is a well-established renewable energy technology, and loans to support further deployment of this technology could therefore contribute to the achievement of the Department's 2020 target.

c The timescales over which support is provided

2.11 The Government funds renewable energy technologies in support of short, medium and long term policy goals. Some technologies such as offshore wind contribute to the achievement of the 2020 target. Others, such as marine technologies, may take longer to become commercially viable but could contribute to longer-term targets to reduce carbon emissions. Funding strategies therefore need to extend beyond the three-year horizon of public expenditure decisions.

2.12 The Renewables Obligation is intended to provide a long-term and stable framework to support investment in renewable electricity generating technologies. Direct support, by contrast, has been largely short-term in nature. Many of the schemes we examined had maximum terms of three years, although some, such as the Offshore Wind Capital Grants Scheme and the Low Carbon Buildings Programme and Marine Renewables Deployment Fund had been extended. Funding for individual projects typically covers periods of up to three years. This has resulted in schemes providing funding for a part of a project's lifecycle and individual projects relying on support from different schemes and sponsors at different stages in their development. Some delivery bodies such as the Technology Strategy Board and the Carbon Trust have schemes that extend beyond three years, and in some cases have also funded individual projects for longer than three years, although this has been conditional on the continuation of their own funding.

2.13 The short-term nature of direct support has limited its accessibility to potential applicants. For example, the £178 million allocated to renewable energy projects through the low carbon investment funding was to be spent by March 2011. This has limited the number and type of projects that can be supported through this Fund and potential

applicants have had a limited amount of time to prepare and submit proposals. For example, the Department gave potential applicants only three months to prepare and submit proposals when it launched the first call of a new Offshore Wind Capital Grants scheme in March 2009 to develop and demonstrate components for the next generation of offshore wind turbines. The Department announced a second call on 27 July 2009 with a closing date of 28 August 2009.

2.14 The Department has also had to respond to funding decisions at short notice. For example, it received confirmation that the three-year Low Carbon Buildings Programme would be extended in March 2009, the month that it was due to close to new applications. It had to close the scheme to new applications for four months while it re-tendered management contracts for the Programme.

2.15 The Energy Technologies Institute is in a different position as the Government has entered a long-term commitment to provide up to £500 million to match funds provided by the private sector partners up to 2018. It is therefore able to adopt a different approach, and is running projects over planning horizons of up to ten years. For example, Project Nova, which aims to develop a new vertical wind turbine, covers all stages of development from concept through to the delivery of one gigawatt of generating capacity by 2020.

How specific funding priorities have been determined

2.16 The challenging targets for renewable energy, combined with current fiscal constraints, increases the importance of allocating available budgets to technologies with the potential to deliver the greatest benefits. Funding priorities should also take into account the relative contributions that individual technologies are likely to make to short, medium or long-term goals. In this section we examine the overall coherence of funding priorities across the portfolio of schemes offering direct support for renewable energy technologies, and how these priorities have been coordinated.

a The coherence of funding priorities

2.17 From case studies of six of the 20 schemes, we found that the evidence base inherited by the Department was incomplete or inconclusive, partly due to gaps in documentary evidence caused by changes in the machinery of government. The schemes established by the Carbon Trust, Energy Technologies Institute and Technology Strategy Board had been based on detailed frameworks developed by each organisation to prioritise their funding. For its own schemes, the Department's guidance now requires new support to be of a scale 'commensurate with the challenge within any particular technology'.

2.18 While some delivery bodies have developed detailed frameworks to prioritise funding within their allocations, the combined portfolio of schemes across the departments and delivery bodies has lacked coherence in relation to renewable energy as they are serving different objectives. For example, between 2004 and 2009 the Department and its predecessors had prioritised financial support for marine technologies on demonstrating working prototypes. However, the £50 million budget for funding prototypes remained largely unused as the wider portfolio of funding had not addressed a gap in support for earlier stage development (**Case study**).

2.19 The diversity of the funding landscape offers opportunities to spread the risk of achieving successful outcomes and draw on the skills of the different funding organisations. It also carries risks of reduced efficiency and effectiveness if funding is not prioritised and delivered on a coordinated basis. It is therefore crucial that effective arrangements are in place to coordinate support for renewable energy provided by the various delivery bodies, and provide clear oversight of the total portfolio of direct support for renewable energy technologies.

b Coordinating decisions on funding priorities

2.20 Complex delivery models require clear, shared delivery plans to provide a common understanding of what needs to be achieved, by when and by whom.⁶ The involvement of key stakeholders from the outset, in assessing the possible need for funding, options for providing it and priorities, helps identify how best to achieve effective and efficient delivery. We have previously highlighted the need to maintain central oversight of the complex network of direct support for renewable energy technologies and to clearly define the roles of the various organisations involved.⁷ Against this background, we examined how Departments and delivery bodies coordinate their activities.

Case Study

Previous support for marine technologies has achieved limited progress

The Government announced in 2004 that it would provide £50 million for a Marine Renewables Deployment Fund to address gaps in funding for the commercial demonstration of prototype marine technologies to meet demands from industry for such funding. As at January 2010, no prototype projects had received support from this Fund because the technologies had taken longer to develop than predicted, and the Fund had not bridged the gap between development and demonstration. In January 2008, the Renewables Advisory Board advised the Government that although the Fund was sound, it had been established too early and the Department's research and development programme had failed to supply the technologies the Fund was designed to support. In 2009, the Department agreed to fund a Marine Renewables Proving Fund designed by the Carbon Trust to act as a 'feeder' for the Marine Renewables Deployment Fund. In February 2010, the Carbon Trust announced it had awarded £22 million from the Proving Fund to six wave and tidal energy companies. Marine technologies could potentially make a significant contribution to the Government's 2050 carbon emissions reduction target.

Source: National Audit Office

⁶ See C&AG's report, *Delivering Efficiently: Strengthening the links in public service delivery chains*, HC 940 2005-06.

⁷ C&AG's report, *Department of Trade and Industry: Renewable Energy*, HC 210 2004-05.

2.21 The Department did not inherit active coordination of the funding that delivery bodies provide for renewable energy technologies, and has not established such coordination. The Department, the Carbon Trust, the Technology Strategy Board and the Energy Technologies Institute have developed their own specific priorities based on the policy objectives they are funded to support, and their assessments of funding requirements and energy models to inform investment decisions. There are likely to be benefits from having a range of modelling and analysis, but this has not been brought together in a systematic way to provide a common understanding of the respective priorities of Government and individual delivery bodies in relation to renewable energy.

2.22 The Department and the Department for Business, Innovation and Skills have formal sponsorship and governance arrangements for delivery bodies. Various other arrangements have also been put in place, both formal and informal, to coordinate planning and delivery among delivery bodies:

- The Energy Research Partnership established in 2006, is a high-level forum that aims to improve the coordination of funding by bringing together key funders of energy research and development from industry, Government and academia.
- The Low Carbon Innovation Group established in 2008 by the Carbon Trust, Technology Strategy Board, and Energy Technologies Institute provides a forum for discussing their activities and coordinating funding. The Department of Energy and Climate Change and the Research Councils joined this Group in February 2010.
- The 'Environmental Transformation Fund' programme board established in 2008 oversees the support schemes for low carbon and renewable energy technologies funded by the Department, including some funding provided to the Carbon Trust and projects funded through the Department's low carbon investment funding.
- A joint programme board established by the Department for Business, Innovation and Skills and the Department of Energy and Climate Change in 2009 oversees the management of the jointly-sponsored element of the low carbon investment funding.
- The 'Energy Generation and Supply Knowledge Transfer Network' established in 2009 by the Technology Strategy Board aims to improve transparency and access to funding for stakeholders in energy innovation through measures including conferences, workshops, discussion groups and consultations.
- An energy and climate change working group established by the Regional Development Agencies, with the Northwest Regional Development Agency leading on low carbon energy. Regional Development Agencies also have formal relationships with Research Councils and the Technology Strategy Board that aim to align the financial support they provide across their activities.

2.23 While there is a significant amount of contact between funders through these arrangements, none provides an inclusive framework that brings together all the main funders to coordinate their assessment of needs and priorities in a systematic way. However, as at March 2010, the Department was developing a delivery plan for meeting the 2020 renewable energy target. This plan, which is due to be published in July 2010, could provide a basis for strengthening coordination between delivery bodies. The Department is aiming to publish in Spring 2010 a longer-term roadmap showing how it aims to achieve its 2050 carbon emissions reduction target through measures including further increases in renewable energy. At Budget 2010, the Department published its initial findings from the 2050 road map analysis, which aims to understand the scale and nature of changes required over the long term.⁸

2.24 The Department is also seeking to establish a more strategic approach to supporting individual technologies by working with other departments, delivery bodies and industry to develop action plans for the main renewable energy technologies. Although it has not set specific targets for the deployment of individual technologies, it has identified 'illustrative scenarios' showing how each technology might contribute to its 2020 target. It has also endorsed the conclusions set out in the Carbon Trust's report on *Focus for success* on the need for more technology prioritisation.⁹ The Department published a summary of its first pilot action plan, on marine energy, in March 2010, setting out the development of marine technologies up to 2030. It intends to publish a more detailed plan later this year. The summary plan recommends that the Government ensures that appropriate levels of targeted funding are available to address market failures, but does not indicate the level of support that may be required. It also recommends setting up a new coordination group to provide a strategic overview of Government funding for marine energy. The Department intends to evaluate the pilot plan before deciding whether to prepare plans for other renewable energy technologies. The devolved administrations have their own separate plans for renewable energy technologies.

8 http://webarchive.nationalarchives.gov.uk/+http://www.hm.treasury.gov.uk/budget_2010_energymarket.htm

9 Carbon Trust (2009) *Focus for success: A new approach to commercialising low carbon technologies*.

Part Three

The performance of funding for renewable energy technologies

3.1 Effective delivery of direct support for renewable energy technologies should be underpinned by robust management information. This information should provide feedback on performance against targets and on any barriers encountered to inform strategic objectives and priorities and enable organisations to allocate and manage resources more effectively through an understanding of the relationship between costs and performance. It also provides the basis of accountability to stakeholders for the stewardship and use of public funds.

3.2 In our 2005 report on renewable energy, we concluded that the Department needed to collect better evidence of achievements from its previous research and development grants, and improve processes for learning and disseminating the lessons from that experience. This part of the report examines:

- the adequacy of monitoring and evaluation procedures;
- financial and administrative performance; and
- outcomes achieved.

Monitoring and evaluating performance

3.3 We examined the extent to which the support schemes have:

- specific and measurable objectives, targets and milestones;
- robust systems of reporting; and
- clear frameworks for evaluation.

a Objectives, targets and milestones

3.4 The schemes we examined had a range of different objectives and performance indicators, which reflected variations between the objectives and remits of the organisations that established them. Scheme objectives and targets are linked to one or more of the following interrelated areas:

- **Renewable energy generation and carbon emission reduction.** Most of the schemes established by the Department of Energy and Climate Change and its predecessors were intended to support the achievement of renewable energy and carbon emissions targets, but did not have quantified energy generation or emissions reduction targets. The Carbon Trust had set a target of 500 megawatts deployment for its Partnerships for Renewables scheme, in the context of its aim to achieve carbon emissions reductions over the period up to 2050. The Energy Technologies Institute had set a target for its marine programme to help to achieve 2 gigawatts of deployment by 2020 and up to 30 gigawatts by 2050.
- In relation to **innovation**, which is the primary focus of the Technology Strategy Board, we found a wide range of performance indicators had been used, such as the generation and exploitation of intellectual property, private finance leveraged, and reductions in the generating costs of specific technologies. There is not a common approach used across schemes to measuring innovation, and there are difficulties involved in setting outcome targets for innovation due to the long timescales and degree of uncertainty involved. Interim measures are therefore required to assess performance and progress, and the Department is currently working with the Department for Business, Innovation and Skills on developing Green Book compliant guidance for capturing the innovation impacts of policies.
- **Economic growth and employment** were the primary focus of the low carbon investment funding and are measured using indicators such as the number of jobs created, the level of private sector investment leveraged and the contribution to economic growth. The Energy Technologies Institute's schemes also aim to support economic growth.

3.5 Variations in objectives and performance measures across schemes means they cannot be easily compared, and their impact on the achievement of the Government's renewable energy targets cannot be assessed in a consistent way. The Department is not therefore able to determine the cumulative impact of public funding for renewable energy technologies.

b Information collection and reporting

3.6 The Department does not routinely collect and report information on the total level and impact of direct support for renewable energy across the various delivery bodies. The Department provides research and development funding data annually to the International Energy Agency, but this excludes expenditure by Regional Development Agencies, is not clearly broken down by schemes, and does not report against budgets or targets. The gaps in the information collected by the Department for its planning purposes can be attributed to:

- the complex funding landscape and lack of an overarching arrangement for collating information from departments, regional development agencies, devolved administrations and other delivery bodies;

- discontinuities in the Department's financial and management information systems, and lack of corporate memory, particularly in relation to older schemes, caused largely by machinery of government changes; and
- the low priority placed on scheme and project management skills within the Department and its predecessor in relation to renewable energy, which it is now seeking to address.

3.7 The delivery bodies collect information according to their individual objectives, and each has its own internal performance management systems. As none of them have strategic objectives to increase renewable energy, they do not focus on it in their reporting. Without consistent public reporting individually or across delivery bodies on support for renewable energy, the cost-effectiveness and impact of the total portfolio of direct support specifically in relation to the achievement of the Government's renewable energy targets has not been open to public scrutiny.

c Evaluation

3.8 Evaluation differs from annual reporting insofar as it requires a less frequent but more in-depth assessment of the cost-effectiveness of an individual scheme. For funding for renewable energy technologies where potential benefits may not be realised for many years, regular monitoring and reporting against intermediate milestones is needed to assess progress and reprioritise support as required. We found that delivery bodies were not routinely evaluating the performance of their schemes and had not developed common methodologies. Within the six case study schemes we examined (Appendix 1), one – the Offshore Wind Capital Grant scheme – had been reviewed, although the report did not include a detailed analysis of cost-effectiveness and had not been published. For the newer schemes established by the Carbon Trust and the Energy Technologies Institute, the introduction of programme level evaluation frameworks was planned but not yet in place. We have found a similar need to strengthen evaluation, including setting clear and measurable objectives and baselines, in some previous examinations of other schemes.¹⁰

Financial performance

3.9 In the absence of robust central systems for annual reporting, we conducted our own data collection exercise to establish the level of funding which had been provided and the progress made on schemes and projects. We examined:

- the level of funding for renewable energy technologies;
- how spending compared to budgets;
- how funding has been used;
- administration costs associated with managing schemes; and
- the management and monitoring of individual projects.

¹⁰ See, for example, C&AG's report, *Venture capital support to small businesses*, HC 23 2009-10.

a The level of funding provided

3.10 We found that gross expenditure up to March 2009 on renewable energy technologies across all schemes established since 2000 was £265 million (**Figure 6**). The variable quality of data on historic spending through the Department's schemes means this figure is only indicative, but nevertheless provides a reasonable approximation of the value of direct support provided. Various developers that received funding under the Offshore Wind Capital Grants and Bioenergy Capital Grants schemes repaid their grants in 2009-10 in order to access the increased financial incentives now available from the Renewables Obligation.¹¹ These repayments, including interest, amount to £73 million. The total net level of expenditure is therefore £192 million.

3.11 Schemes managed by the Department and its predecessors accounted for 70 per cent of gross expenditure. Collaborative Research and Development funding now managed by the Technology Strategy Board and the portfolio of schemes managed by the Carbon Trust accounted for 21 per cent and 8 per cent respectively. Twelve of the schemes listed in **Figure 6** incurred expenditure of less than £5 million on renewable energy over this period.

3.12 **Figure 6** does not include expenditure by the Department on renewable energy technologies which is not delivered through support schemes. For example, the Department has allocated £10 million between 2009-10 and 2010-11 to feasibility studies and evaluations of potential Severn tidal power schemes; but it was unable to establish the totality of such expenditure across all renewable energy technologies since 2000. The **Figure** also excludes support provided by Regional Development Agencies for renewable energy technologies, which is not centrally collected. Our own survey of Regional Development Agencies indicated that they provided funding of around £33 million in 2008-09 (**Figure 7** on page 30). This compares with total central Government funding of £43 million in 2008-09, and exceeds the £31 million which the Department spent in that year.

b Comparison of expenditure against budgets

3.13 The alignment of forecast and actual spending is an important measure of the quality of financial planning, and one of the key performance measures used by the Environmental Transformation Fund programme board. Total gross expenditure through the schemes established by the Department and its predecessor since 2000 was £186 million as at March 2009 (£241 million including legal commitments to future spend). Net spend was lower at £113 million (£168 million including legal commitments to future spend), mainly as a result of the repayment of grants by some companies, particularly offshore wind developers, so that they could benefit from the introduction in 2009 of enhanced benefits for certain technologies under the Renewable Obligation. This spending was lower than total planned expenditure during the period through these schemes of £367 million, in part due to expected projects not requiring funding (**Figure 8** on page 31).

¹¹ Changes introduced in 2009 to the Renewables Obligation mean that offshore wind generators can claim up to two Renewable Obligation Certificates for each megawatt of electricity generated instead of only one. However, under state aid rules, they may not do so if they have also benefited from a capital grant.

Figure 6

Direct spending on renewable energy, 2000 to 2009

	2002-03 to 2005-06	2006-07	2007-08	2008-09	Total (gross)	Total (net)
Department of Energy and Climate schemes						
Offshore Wind	38.1	32.4	12.7	2.4	85.6	36.0
Bioenergy Capital Grants scheme	7.8	10.9	6.0	14.2	38.9	15.6
Bioenergy Infrastructure scheme		1.3	0.9	0.5	2.7	2.7
Marine Renewables Deployment Fund		0.9	0.7	0.1	1.7	1.7
Clear Skies	8.2	1.9			10.1	10.1
Major Photovoltaic Demonstration Programme	23.7	2.4			26.1	26.1
Low Carbon Buildings Programme		3.0	6.0	12.4	21.4	21.4
Total Department of Energy and Climate	77.8	52.7	26.3	29.6	186.4	113.5
Carbon Trust Schemes						
Applied research scheme (renewable energy only)	2.0	1.0	0.5	0.5	3.9	3.9
Biomass heat accelerator		0.3	0.8	0.8	1.9	1.9
Incubator (renewable energy only)	0.5	0.2	0.3	0.3	1.3	1.3
Investments (renewable energy only)	3.3	0.0	0.6	0.9	4.8	4.8
Marine Energy Accelerator			0.3	0.9	1.2	1.2
Marine Energy Challenge	2.9	0.1			3.0	3.0
Partnership for Renewables			5.0	1.5	6.5	6.5
PV Research Accelerator			0.1	0.2	0.4	0.4
Carbon Trust total expenditure	8.7	1.7	7.5	5.1	23.0	23.0
Technology Strategy Board Collaborative Research & Development (renewable energy only)						
Energy Generation and Supply (historic portfolio)	32.9	6.4	7.6	7.8	54.7	54.7
Materials for Energy call				0.3	0.3	0.3
Low Carbon Energy Technologies call			0.3		0.3	0.3
Technology Strategy Board (Department of Trade and Industry) Total direct expenditure	32.9	6.4	7.9	8.1	55.3	55.3
Total direct expenditure	119.4	60.8	41.7	42.8	264.7	191.8

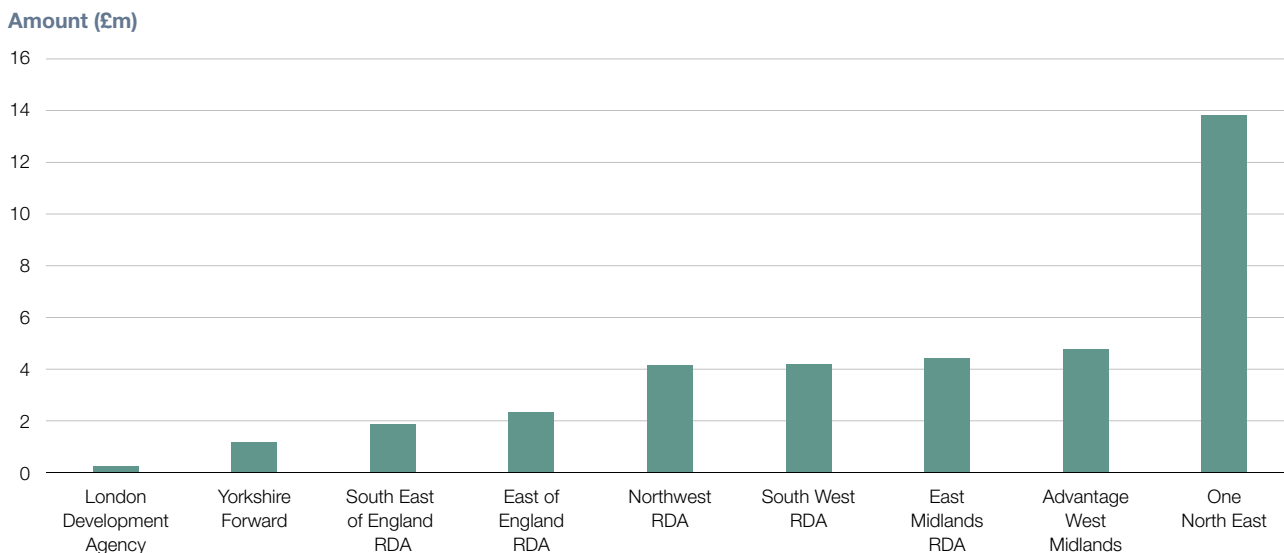
NOTES

- 1 The figures quoted are for actual spend up to 31 March 2009, and exclude any future commitments as at that date. Two support schemes for renewable energy technologies established by the Energy Technologies Institute are not shown as they did not spend any of their budgets until 2009-10.
- 2 In the case of some schemes run by the Departments, a number of recipients repaid their grants in 2009-10 to enable them to apply instead for additional Renewables Obligation Certificates. Grant repayments amounted to £49.6 million in relation to Offshore Wind and £23.3 million in relation to Bioenergy Capital Grants.
- 3 The three schemes funded by the New Opportunities Fund (one offshore wind farm and two large biomass electricity generating plants) are included in the Offshore Wind and Bioenergy Capital Grant scheme figures.
- 4 The Technology Strategy Board Energy Generation and Supply projects were inherited from the Department of Trade and Industry in 2007.
- 5 TSB funding is provided under Collaborative Research and Development funding, which has provided funding for renewable energy technologies through three separate calls which are separately shown.

Source: National Audit Office analysis of data provided by delivery bodies

Figure 7
Expenditure on renewable energy by Regional Development Agencies (RDAs)

Renewable Energy Expenditure per RDA for the financial year 2008-09



NOTE

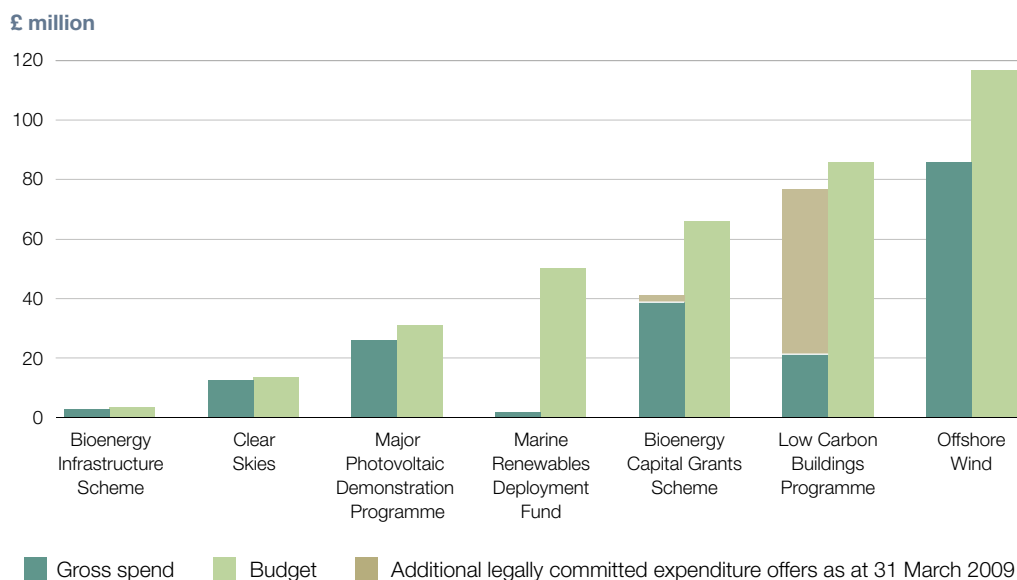
1 The £33.3 million expenditure on renewable energy technologies in 2008-09 reported by Regional Development Agencies includes £12.9 million of grants directly awarded to project developers and £17.6 million allocated to not-for-profit organisations.

Source: National Audit Office analysis of data supplied by Regional Development Agencies

3.14 Where gaps have arisen between planned and actual expenditure, excess budgets have been reallocated in line with the normal Parliamentary supply process with limited transparency around the reasons for gaps between forecast and actual expenditure or impact on progress towards targets. In 2007-08, £28 million from the Department for Business, Enterprise and Regulatory Reform's renewable energy capital grant programme budget for 2007-08 of £42 million was reallocated to other areas including nuclear decommissioning and insolvency services. In February 2009, the Department reallocated funds that had been set aside for the existing offshore wind capital grants scheme, but which had not been spent in part due to the cancellation of a large offshore wind project, to help finance a new offshore wind scheme that provides support for turbine manufacturing component suppliers.

Figure 8

Comparison of budgets allocations with cumulative gross expenditure to March 2009

**NOTES**

- 1 Gross spend includes cumulative spending and future spending commitments as at 31 March 2009.
- 2 Offshore wind and Bioenergy Capital Grant schemes figures are net of grant repayments (paragraph 3.10) and include projects funded from the New Opportunities Fund.

Source: National Audit Office analysis of departmental data

c The use of funding

3.15 The grant schemes, now managed by the Department and which accounted for over 70 per cent of gross expenditure up to March 2009, focused mainly on the deployment of established renewables technologies such as the capital costs of constructing and installing renewable offshore wind farms or biomass energy generating plant, rather than the development of new technologies. The other 30 per cent of gross expenditure over this period (£75 million) was spent in support of the development of new renewable technologies, mainly through Collaborative Research and Development funding provided by the Technology Strategy Board and some of the Carbon Trust's schemes. The Department is refocusing its grants on technology development as it is now aiming to support deployment mainly through the Renewables Obligation and Feed-in Tariffs (para 1.5).

d Administration costs

3.16 Information on the administrative costs of schemes forms an essential part of assessing value for money. As a proportion of grant spending, administrative costs often vary considerably depending on the complexity and structure of the scheme. They can frequently offer the opportunity for efficiency savings as previous NAO reports have shown.¹² We found that delivery bodies:

- could identify expenditure on external scheme management contracts where these were in place, but did not routinely collect and monitor other administration costs, such as staff and research costs for individual schemes (although higher-level information on aggregated administration costs is collected); and
- had not benchmarked the administrative cost of the direct support they had provided, to help identify opportunities for efficiency savings.

3.17 Information we collected on external scheme management contract costs showed large variations in these as a percentage of the financial support provided (including legal commitments to future spend). The percentage ranged from 18 per cent for the Marine Renewables Deployment Fund to less than 1 per cent for Offshore Wind (**Figure 9**). We noted that although the Department inherited several external management contracts, it had not considered the scope for reducing scheme management costs by rationalising the number of these contracts where these involve similar elements of work. The Technology Strategy Board also inherited existing management contracts, but revised them to reduce costs to be in line with the average costs for its other portfolios and to reflect the service required. It expects the cost to be £564,000 in 2010-11. In 2010-11, the Carbon Trust has also restructured the administration of its Applied Research Scheme to reduce the cost by 22 per cent.

e Project management and monitoring

3.18 Our case studies indicate that systems for monitoring individual projects which had received funding were in place and working well. Grant payments were generally conditional on a satisfactory evaluation of progress against project milestones by independent assessors. Funders had withheld or withdrawn funding entirely where monitoring reports had shown that progress was unsatisfactory or the project was unlikely to achieve its aims. However, there were no processes in place for feeding back information from project monitoring, such as specific barriers in the supply chain, that would be of wider relevance to all delivery bodies and could influence future funding priorities.

¹² See, for example, C&AG's report *Making grants efficiently in the culture, media and sport sector* HC 339 2007-2008.

Figure 9
External scheme management costs

Funding body/Scheme	External Scheme Management Costs (£m)	Grant payments (£m)	Grant payments and legal commitments (£m)	Management costs as a percentage of	
				Grant payments (%)	Payments and commitments (%)
Department of Energy and Climate Change					
Low Carbon Buildings Programme	6.4	21.4	73.0	30	9
Offshore Wind	0.5	85.6	85.6	<1	<1
Marine Renewables Deployment Fund	0.3	1.7	1.7	18	18
Bioenergy Capital Grant Scheme	1.4	38.9	42.0	4	3
Bioenergy Infrastructure Scheme	0.2	2.7	2.7	7	7
Carbon Trust					
Applied research scheme (renewables only)	0.7	3.9	4.8	17	14
Technology Strategy Board					
Collaborative research scheme	0.7	7.8	7.8	9	9

NOTES

- 1 The Department's costs are based on total grant expenditure and total scheme expenditure on external management contracts from scheme commencement to March 2009. Technology Strategy Board and Carbon Trust figures are based on 2008-09 data only.
- 2 The management costs for the Low Carbon Buildings Programme include a £5 million grant payment to the Carbon Trust to deliver an advice and support programme until 2011.
- 3 The management costs for the Carbon Trust's Applied Research Scheme includes the cost of monitoring applicants to develop their proposals.

Source: National Audit Office analysis of departmental data

3.19 We found no formal reporting at scheme level on the processing of applications and overruns on projects, though external scheme managers were sometimes required to provide general information such as the numbers of applications made. In the 15 case studies of projects we examined, most grant recipients reported that application processes had been relatively straightforward. However, the time taken to assess grant applications varied considerably, ranging from two months to more than a year. In a number of cases, grant recipients reported that delays in assessing applications had led to delays in starting the project and increased costs. Grant recipients generally considered, however, that claims had been administered satisfactorily.

3.20 Delivery bodies typically issue an initial contract award which specifies the availability of grant funding until a specific date. Eleven of the fifteen projects we reviewed were overrunning against their original timetables by between three months and four years. The reasons included delays in planning permission, changes in the nature of the project, technical problems with the development of new technologies, funding issues and insufficient resources to manage project implementation. For some projects, risks such as barriers or gaps in the UK supply chain delaying or preventing progress, had not been adequately assessed at the application stage. In the case of one project, development had been seriously affected by the non-availability of key components. Where projects have encountered difficulties delivery bodies have frequently granted discretionary extensions to contracts. The Department's ability to extend contracts is limited where it does not have budgetary approval to transfer unused budgets across financial years.

Outcomes achieved

3.21 The absence of a common approach to performance targets and metrics, together with gaps in monitoring information at a scheme level that partly reflects some schemes having wider objectives (para 1.8), mean that it is not possible to measure the overall impact of the entire portfolio of support on renewable energy technologies.

3.22 Some of the major capital grant schemes managed by the Department aimed at the deployment of technologies proven to work at scale which were not yet commercially competitive have contributed directly to increasing renewable energy generating capacity (**Figure 10**). The Offshore Wind Capital Grants scheme has resulted in the construction of 10 wind farms providing nearly 1 gigawatt electricity generating capacity, equivalent to 14 per cent of total installed renewable energy generating capacity in 2008. The Department forecasts that future growth in wind could deliver over 30 per cent of the UK's electricity demand by 2020, much of which would be delivered offshore.

3.23 Schemes aimed at innovation have contributed to technology developments such as the installation and operation in a Northern Ireland sea-lough of a full scale 1.2 megawatt prototype marine generator developed by Seagen. The creation and exploitation of new intellectual property through technology innovation projects can be key to further development of technology and the generation of commercial benefit. Intellectual property rights are not, however, managed in a consistent way. For example, the Department and its predecessors had not routinely required applicants to identify and value intellectual property. In one case it had agreed to pay for intellectual property created through a project it was part-funding. Other delivery bodies have a more clearly-defined approach to managing intellectual property. This is particularly important for the Energy Technologies Institute, as it is a public-private partnership involving several partners with commercial interests in benefiting from intellectual property rights. The importance of intellectual property is illustrated by disagreements about rights management leading to the abandonment of a project that the Energy Technologies Institute had publicly announced in January 2009 it would fund.

Figure 10

Outputs/outcomes of major capital grant schemes as at January 2010

Scheme	Increased Renewable Energy	Other outputs/outcomes		
		Type	Household	Community
Offshore Wind	1 gigawatt	10 wind farms (up to 100 megawatts each) Evaluations also suggest that the scheme may have contributed to job creation and economic growth.		
Major PV demonstration programme	8.7 megawatts	1,661 small scale PV schemes 168 large scale PV schemes		
Low Carbon Buildings Programme	Not known	Type	Household	Community
		Biomass Wood Pellet	46	3
		Ground Source Heat pumps	871	857
		Air Source Heat Pumps	579	0
		Hydro	10	0
		Solar PV	4,529	2,450
		Solar Hot Water	7,130	1,154
		Wind Turbines	827	385
		Wood Boiler Stoves	635	90
		Biomass Combined Heat and Electricity	1	5
Bioenergy Capital Grants Scheme	106 megawatts (heat) 90 megawatts (electricity)	The scheme has supported the construction of seven large scale Combined Heat and Power or electricity generating plants, and 443 small scale installations.		

Source: National Audit Office

3.24 Our findings suggest that most of the 15 case study projects we examined would not have gone ahead without financial support, and that this support had helped to leverage in private sector investment of between 20 to 84 per cent of total project costs. Direct support for renewable energy has also contributed to employment creation. For example, Aquamarine Power Limited estimates that funding provided by the Technology Strategy Board for the development of its Oyster wave technology device has contributed to the creation of 50 jobs. Projects whose objectives and performance measures are focused on economic growth may also have beneficial impacts on renewable energy targets, but as that is not their focus, their impact on these targets has not been routinely reported.

Appendix One

The main elements of our fieldwork, which took place between July and November 2009, were:

Selected method	Purpose
<p>1 File and Document review</p> <p>Our review included documents from the Department, other delivery organisations such as the Carbon Trust, and research reports.</p>	<p>To inform our understanding of the various funding schemes, their objectives and how they are managed.</p>
<p>2 Semi-structured interviews</p> <p>We interviewed key stakeholders, including:</p> <ul style="list-style-type: none"> • Staff within the Department. • Staff within the other delivery organisations including BIS, BIG Lottery Fund, The Carbon Trust, the Technology Strategy Board, and the Energy Technology Institute. • Industry groups such as the British Wind Energy Association (now Renewables UK). 	<p>To gather evidence on scheme set-ups; the application and appraisal processes; monitoring of individual projects and of schemes; the evaluation process for each scheme; and the extent and effectiveness of data sharing across the delivery organisations.</p>
<p>3 Analysis of financial data</p> <p>We analysed and assessed financial data on all schemes which had funded renewable energy technologies across all delivery organisations. The schemes examined were as follows:</p> <p>Department of Energy and Climate Change</p> <p>Bioenergy Capital Grants Scheme Bioenergy Infrastructure Scheme Clear Skies Low Carbon Buildings Programme Major Photovoltaic Demonstration Programme Marine Renewables Deployment Fund Offshore Wind Capital Grant Scheme</p> <p>Carbon Trust</p> <p>Low Carbon Innovation Programme:</p> <ul style="list-style-type: none"> • Applied Research Scheme (Renewable energy projects only) • Biomass heat accelerator • Incubator (Renewable energy projects only) • Investments (Renewable energy projects only) • Marine Energy Accelerator • Marine Energy Challenge • Partnerships for Renewables Limited • PhotoVoltaic Research Accelerator 	<p>To gather evidence on scheme budgets, expenditure, and awards made.</p>

Selected method	Purpose
3 Analysis of financial data continued	
Technology Strategy Board	
Energy Generation and Supply (Renewable energy projects only)	
Materials for Energy call (Renewable energy projects only)	
Low Carbon Energy Technologies call (Renewable energy projects only)	
Energy Technologies Institute	
Offshore wind call	
Marine call	
4 Case studies	
We commissioned Entec to carry out case study interviews with 15 organisations that have received capital grant funding or venture capital investment across all funding organisations and across offshore wind, wave and tidal and biomass technologies.	To assess organisations' experiences after applying and accessing funding, including the application process, the reporting, monitoring and evaluation process and the impacts and risks to delivery of their projects.
5 Economic Analysis	
We commissioned Frontier Economics to examine the economic appraisal and evaluation evidence across six schemes.	
The six schemes we examined were as follows:	To assess the quality of the appraisals carried out, <i>ex ante</i> , for each scheme as well as the quality of the evaluations carried out, <i>ex post</i> , on the impact and cost effectiveness of each scheme.
Department of Energy and Climate Change:	
Collaborative Research and Development:	
<ul style="list-style-type: none"> ● Bioenergy Capital Grants Scheme ● Low Carbon Buildings Programme ● Offshore Wind Capital Grants Scheme 	
Carbon Trust	
Offshore Wind Accelerator	
Technology Strategy Board	
Energy Generation and Supply portfolio	
Energy Technologies Institute	
Marine energy call	



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