

Accelerating the Uptake of Anaerobic Digestion in England: an Implementation Plan



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Anaerobic digestion is a well-proven renewable energy and waste management technology. At the same time, it can reduce greenhouse gas emissions by capturing methane from the decomposition of organic materials, such as livestock manures and slurries, sewage sludge and food wastes. Anaerobic digestion produces biogas which can be used to generate heat and power, or as a transport fuel – either locally or injected into the gas grid. The treated material (or digestate) can be used as a fertiliser and soil conditioner.

The Government is committed to encouraging a significant growth in the use of anaerobic digestion, a technology with great potential to contribute to our climate change and wider environmental objectives. We need a much greater uptake by local authorities, businesses and farmers, and have been working with these stakeholders to support the drive for a faster growth in the use of anaerobic digestion in a way that is both cost effective and beneficial to the environment.

In February 2009 we published *Anaerobic Digestion – Shared Goals*¹. Developed jointly with a broad range of organisations, this set our collective ambitions for the use of anaerobic digestion in this country. We also convened the Anaerobic Digestion Task Group to make recommendations for practical actions to achieve our Shared Goals. The Task Group published their report, *Developing an Implementation Plan for Anaerobic Digestion*², in July 2009.

We have carefully considered the recommendations of the Task Group in developing this Implementation Plan. Its purpose is to provide a framework for action by Government and partners in the public and private sector to accelerate the uptake of anaerobic digestion in England. It sets out actions to address opportunities and challenges in each of the following areas:

- **Creating the Economic Framework:** The Government's objective is to ensure that the right long-term economic framework is in place to enable the market to deliver the increase we need in renewable energy. Key actions include: implementing financial incentives (Renewables Obligation Certificates, Feed-In Tariffs, Renewable Heat Incentive and Renewable Transport Fuel Obligation); supporting the separate collection of food waste; and the making effective use of digestate as a product by supporting the new standard BSI PAS110 and developing technical best practice guidance.
- **Creating the Regulatory Framework:** Our objective is to ensure a regulatory framework that strikes an appropriate balance between encouraging cost-effective growth in the use of anaerobic digestion and ensuring protection of the environment and those operating anaerobic digestion facilities. We have therefore worked with the regulatory bodies to identify opportunities for simplifying the routes for operators through the regulatory requirements, without risk to environmental effectiveness. Key actions include: introducing revised exemptions from environmental permitting for small scale on-farm anaerobic digestion; introducing new standard permits; publishing Standard and Quality Protocol for digestate; publishing guidance on the regulatory requirements for injecting biomethane into the gas grid; and, identifying the regulatory requirements for the co-digestion of sewage sludge with other feedstocks.
- **Building Capacity:** We need to ensure the cost effective and environmentally beneficial uptake of anaerobic digestion by increasing awareness and understanding of the use of

¹ <http://www.defra.gov.uk/environment/waste/ad/documents/ad-sharedgoals-090217.pdf>

² <http://www.defra.gov.uk/environment/waste/ad/documents/implementation-plan.pdf>

Executive Summary

the technology and its products. Key actions include: delivery of the Government's £10m Anaerobic Digestion Demonstration Programme; further development of an online anaerobic digestion advice portal; and, the development of training standards for operators of anaerobic digestion plants.

- **Research: Improving Our Understanding:** We need to continue to improve knowledge of the use anaerobic digestion technology and its products in order to make the most of the potential benefits. Key actions include research to: optimise the anaerobic digestion process, including £1M for a new small scale anaerobic digestion development unit; better understand the economics of anaerobic digestion throughout its lifecycle; optimise the use of available feedstocks for anaerobic digestion, including assessing the impacts of energy crop production; and demonstrate the agronomic and economic value of digestate.
- **Sharing Global Experience:** We want to learn from and share experience with other countries, some of whom have much more experience with using anaerobic digestion than the UK. Key networks for sharing experience, and in which the UK takes a leading role, include: the International Energy Agency's (IEA) Bioenergy Task 37, the Methane to Markets Partnership and the China-UK Sustainable Agriculture Innovation Network (SAIN).
- **Assessing Progress:** To identify where actions are working or where changes are needed, we will set up a comprehensive system of monitoring and reporting of progress. This will include a new online geographical information systems (GIS) tool. We will review regularly the need to update or enhance the actions set out in this Implementation Plan, and publish changes to it when necessary.



Purpose of Implementation Plan

1. The purpose of this Implementation Plan is to provide a framework for action by Government and partners in the public and private sector to accelerate the uptake of anaerobic digestion in England. It sets out actions to address opportunities and challenges in each of the following areas:
 - a) Creating the Economic Framework;
 - b) Creating the Regulatory Framework;
 - c) Building Capacity;
 - d) Research: Improving Our Understanding;
 - e) Sharing Global Experience; and
 - f) Assessing Progress.
2. This Implementation Plan relates specifically to England. Nevertheless, the UK Government and Devolved Administrations work together to share best practice on anaerobic digestion and information on issues of common concern.

Why Anaerobic Digestion

3. Anaerobic digestion can make an important contribution to tackling climate change and other environmental challenges, such as diffuse water pollution. Anaerobic digestion produces renewable energy by harnessing the natural process whereby organic matter is broken down by bacteria in the absence of oxygen to produce biogas. This methane-rich gas can be used to generate heat and power, or as a transport fuel – either locally or injected into the gas grid.
4. Anaerobic digestion can be used on farms to process animal slurries and other agricultural residues and so reduce their emissions to the atmosphere. It can process food waste that might otherwise go to landfill. It can be used in the water industry to process sewage sludge. The treated material (or digestate) from anaerobic digestion plants can be used as a fertiliser and soil conditioner. This creates a closed loop, with valuable nutrients from waste being recycled back to land to produce more food.

Our Ambitions for Anaerobic Digestion

5. Anaerobic digestion can be used on farms to process animal slurries and other agricultural residues and so reduce their emissions to the atmosphere. It can process food waste that might otherwise go to landfill. It can be used in the water industry to process sewage sludge. The treated material (or digestate) from anaerobic digestion plants can be used as a fertiliser and soil conditioner. This creates a closed loop, with valuable nutrients from waste being recycled back to land to produce more food.

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Potential of Anaerobic Digestion

6. The potential benefits of anaerobic digestion are significant. The UK produces over 100 million tonnes of organic material each year that could be used to produce biogas³:
 - 12-20 million tonnes of food waste (approximately half of which is municipal waste collected by local authorities, the rest being hotel or food manufacturing waste);
 - 90 million tonnes of agricultural material such as manure and slurry;
 - 1.73 million tonnes of sewage sludge.⁴
7. Biogas can also be produced from energy crops such as maize or grass leys.
8. Some of these organic materials have greater potential to produce biogas than others: source segregated food waste can produce over 2.5 times as much methane as the same weight of cattle slurry⁵. Treating just 5.5 million tonnes of food waste by anaerobic digestion could generate about 1.7 TWh of electricity each year – enough to meet the needs of up to 340,000 households. In addition, the majority of food waste ends up in landfill, where it breaks down to produce methane which is over 20 times more potent than carbon dioxide as a greenhouse gas. Every tonne of food waste digested rather than sent it to landfill could reduce emissions by between 0.5 and 1 tonne of CO₂ equivalent.
9. Biogas to produce renewable energy is just one of the outputs from anaerobic digestion, the other important product is the digestate. The treated material from anaerobic digestion plants can be used to replace inorganic fertilisers. This creates a closed loop, with valuable nutrients from waste being recycled back to land to grow more food. Treating 1 tonne of food waste by anaerobic digestion could produce 0.24 tonnes of bio-fertiliser, which saves about 25kg of CO₂ equivalent from inorganic fertiliser displaced⁶.
10. The Government's initial analysis suggests that the anaerobic digestion of food waste, livestock slurries, sewage sludge and energy crops to produce biogas could contribute at least 10-20 TWh of heat and power by 2020⁷. This represents 3.8 – 7.5% of the renewable energy we estimate will be required by 2020 to meet our obligations under the Renewable Energy Directive (see paragraph 24).

A Partnership between the Public and Private Sectors

11. Partnership between the public and private sectors is central to achieving our ambitions for anaerobic digestion. The Government set out how we would work with stakeholders to drive a faster growth in the use of anaerobic digestion in the UK Biomass Strategy and the

³ DEFRA-DTI-DfT (2007) and Enviro (2008).

⁴ Water UK (2007)

⁵ Methane yield (m³/tonne dry weight). Source: Ulf Nordberg, JTI, Biogas – Nuläge och framtida potential (Biogas – current situation and future potential). Report 993, Värmeforsk, 2007. Quoted by IEA Task 37 FAQs <http://www.sgc.se/biogasfaq/>

⁶ WRAP's estimates 2010.

⁷ DEFRA-DTI-DfT (2007) and Enviro (2008). These numbers are based on estimates calculated for the Biomass Strategy and work done by consultants, Enviro on renewable heat to estimate the potential contribution of any individual technology in 2020, where the higher end of the range can only be achieved if steps are taken to overcome constraints to the maximum deployment of the technology – taking into consideration only non-financial constraints.

Waste Strategy for England, both published in May 2007. An important milestone was a successful workshop that we held in September 2007 on how to facilitate a faster uptake of anaerobic digestion in England. Attendees included representatives of the biogas industry, agriculture, local government, retail, Regional Development Agencies, NGOs and research institutions.

12. To give greater impetus to this work, in July 2008 Defra Ministers convened a meeting of around fifty senior industry and NGO executives to discuss practical ways to achieve a major increase in the use of anaerobic digestion. Delegates included representatives from the agriculture and biogas industries, supermarkets, water and energy companies, the waste and food sectors, NGOs, Regional Development Agencies, local government and regulators.
13. At a follow up meeting in December 2008 participants agreed to work with us to develop a common vision for the future role of anaerobic digestion in this country and a plan of practical actions to achieve this.

Shared Goals

14. This common vision was published in February 2009 under the title *Anaerobic Digestion – Shared Goals*. Its purpose was to catalyse efforts and provide a focus for action, and contained the ambition that:

“By 2020 anaerobic digestion will be an established technology in this country, making a significant and measurable contribution to our climate change and wider environmental objectives. It will produce renewable energy in the form of biogas that will be used locally or injected into the grid for heat and power and for transport fuel. At the same time, it will capture methane emissions from agriculture. It will also divert organic waste, especially food waste, from landfill. The digestate will provide organic fertiliser and soil conditioner for agriculture and land use. Anaerobic digestion and its products will be used in a way that is both beneficial to the environment and cost effective for that particular location.

“This country will be recognised as a world leader in the cost effective, innovative and beneficial use of anaerobic digestion and in anaerobic digestion technology and expertise. We will learn from experience both in this country and worldwide, making use of and building upon best practice, and will share our experience with others.”

Anaerobic Digestion Task Group

15. To build on this partnership approach, the Government appointed the Anaerobic Digestion Task Group in March 2009 to make recommendations for practical measures to achieve the Shared Goals. This was an independent body drawn from a broad range of sectors with an interest in anaerobic digestion and was chaired by Steve Lee, Chief Executive Officer of the Chartered Institution of Wastes Management (CIWM). Members were appointed on a personal basis, and their recommendations do not necessarily represent the views of the organisations by which they were employed.

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16. The Task Group published its report, *Developing an Implementation Plan for Anaerobic Digestion*, on 15 July 2009. They highlighted the following areas for action to address the opportunities and challenges for anaerobic digestion.
 - **Economics and Infrastructure:** The economic framework for anaerobic digestion should encourage each of the potential uses of biogas (used locally or injected into the gas grid) for heat and power, and transport fuel.
 - **Regulation:** The regulatory framework needs to encourage a growth in the use of anaerobic digestion in a way that is both cost effective and beneficial to the environment.
 - **Technology:** Knowledge of anaerobic digestion technology and its use must continue to be improved. Continued research and development should therefore be a priority.
 - **Demonstration and Communication:** Greater awareness and understanding needs to be built of the many benefits of anaerobic digestion among potential developers, investors, customers and those involved in planning decisions.
 - **Measuring Progress:** Effective mechanisms for measuring progress towards the Shared Goals are essential. These will highlight where actions are working well and, importantly, where changes are needed.
17. The Government has carefully considered the recommendations of the Task Group and these have helped to shape this Implementation Plan.

Climate Change

18. Anaerobic digestion has the potential to help this country meet several major challenges. Foremost amongst these is climate change. To drive the transition to becoming a low carbon country, the Government has put in place the world's first ever legally binding target to cut emissions by 80% by 2050 and a set of five-year "carbon budgets" to 2022 to keep the UK on track.
19. The UK Low Carbon Transition Plan, published in July 2009, sets out our strategy for meeting these budgets. It highlights the important contribution anaerobic digestion can make to tackling climate change by reducing greenhouse gases from manure and waste management and by producing renewable energy.
20. The Transition Plan also allocated UK Government Departments their own departmental carbon budgets. Each must produce its own delivery plan to show how it will stay within its budget. DECC's plan will highlight the potential contribution of anaerobic digestion to low-carbon energy generation. Defra's plan will include its role in reducing greenhouse gases from agriculture and waste management.
21. Anaerobic Digestion's role in delivering emissions reductions in the agriculture sector has been highlighted by the farming industry. The Climate Change Task Force⁸ has developed a Greenhouse Gas Action Plan⁹ setting out how the industry can meet the Government's target of a 3 million tonnes a year reduction in greenhouse gas emissions by 2020. This emphasises the importance of a significant increase in the take-up of on-farm anaerobic digestion, with the aim of 20% of manures being used in such plants.

⁸ National Farmers Union; Country Land and Business Association; and Agricultural Industries Confederation.

⁹ <http://www.nfuonline.com/Our-work/Environment/Climate-change/GHG-emissions---reducing-agricultural-emissions/>

Renewable Energy

22. Anaerobic digestion can make an important contribution to the bioeconomy. It produces renewable energy, in the form of biogas from biomass, as well as digestate, which can be used as a fertiliser and soil conditioner. The UK Biomass Strategy 2007¹⁰ initially set out the Government's commitment to anaerobic digestion.
23. To meet the challenge of climate change will require a rapid transition to renewable energy. The EU Renewable Energy Directive requires the UK to source 15% of its energy from renewable sources by 2020. The Renewable Energy Strategy¹¹ published in July 2009, sets out how we will achieve this. It includes the important contribution that anaerobic digestion can make to our renewable energy goals, through biogas production for heat and electricity and biomethane (upgraded biogas) injected directly into the gas grid or used in transport.
24. The Renewable Energy Directive also requires the UK to source 10% of energy used in transport from renewable sources by 2020. Biofuels will need to play a major part in achieving this target by 2020. We are exploring how the potential for using biomethane, from the anaerobic digestion of waste, as a transport fuel could be increased. This offers the opportunity to produce renewable energy to help us reach this target while at the same time contributing to our waste management and wider environmental and sustainability objectives.

Waste

25. If we are to reduce the greenhouse gas impacts of waste management, and meet our obligations under the EU Landfill Directive, it is crucial to deal with the problem of food waste. The EU Landfill Directive requires the UK by 2020 to cut the volume of biodegradable municipal waste sent to landfill to 35% of that produced in 1995. The Waste Strategy for England 2007 sets out the important contribution which anaerobic digestion can make to achieving our waste management goals, with this being a particularly beneficial technology for treating separately collected food waste. Anaerobic digestion is an important technology for producing energy from waste. At the same time, it recovers valuable nutrients for recycling back to land.
26. The Landfill Tax escalator and the Landfill Allowance Trading Scheme have made an important contribution to diverting food waste from landfill to alternative treatment methods, such as anaerobic digestion. On 18 March 2010 we launched a consultation¹² on further restrictions to the landfilling of biodegradable wastes and recyclable materials. This sought views on whether these restrictions would



¹⁰ http://www.decc.gov.uk/media/viewfile.ashx?filepath=publications/white_paper_07/ukbiomassstrategy-0507.pdf&filetype=4

¹¹ http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx

¹² <http://www.defra.gov.uk/corporate/consult/landfill-restrictions/>

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make an effective contribution to reducing greenhouse gas emissions and increasing resource efficiency. Food waste is one of the candidate waste types considered in the consultation. The development of an effective infrastructure of anaerobic digestion plants will be important to successfully diverting food waste from landfill.

27. Energy from waste is integral to our desire to manage waste in the most carbon and environmentally friendly way and to produce renewable energy. However, it raises complex issues. We have therefore set up a cross-government energy from waste project, jointly led by Defra and DECC. This project will provide clarity and guidance to the waste management industry and will create a framework for 'the right energy, from the right technology, for the right waste, in the right place'. This cross-government energy from waste project will facilitate the development of the most environmentally and economically viable energy from waste options, providing further clarity to the important role of anaerobic digestion.
28. In addition, we will publish guidance to local authorities on the various management routes available for the waste streams most commonly found in municipal waste, including food.

Crops

29. Crops such as maize, grass or cereals can also be used as feedstocks for anaerobic digestion. The Renewable Energy Strategy identifies the important contribution that sustainably sourced crops can make to our renewable energy goals. Nevertheless, there is concern that crops used for energy compete for land used for food production, and could therefore potentially raise commodity prices and affect food security. There are also concerns that through indirect land use change, the production of certain crops could theoretically result in a net increase in greenhouse gas emissions or have other adverse environmental impacts.
30. We are determined to ensure that biomass, whether imported or produced in the UK:
 - delivers real and substantive CO₂ savings;
 - uses land responsibly, avoiding damaging land use change; and,
 - does not undermine global food supplies or inflate prices.
31. The 2010 Budget announced our intention to consult over the summer on the introduction of sustainability criteria for use of biomass for both electricity and heat.

Green Jobs

32. There will be a cost from avoiding dangerous climate change – but this will be far lower if we do not delay. Unchecked climate change will cause huge costs to the British economy and destabilise many parts of the world. On the other hand, action on climate change also offers opportunities. The global move to a low carbon and resource efficient economy is creating ever growing demand for more sustainable goods and services. Already 880,000 people in the UK work in the low carbon and environmental sector. By 2020, this could rise to more than a million people if we seize the opportunity to establish the UK as a global centre of low carbon industries and green manufacturing. Meeting our share of the renewable energy target will provide around £100 billion¹³ worth of investment opportunities and up to half a million jobs in the UK renewables sector by 2020.
33. The Government wants the UK to be at the forefront of using renewable energy and other low carbon technologies, but also of building and exporting them, with the jobs and economic opportunities that go along with that. *Anaerobic digestion – Shared Goals* set the ambition that this country will be recognised as a world leader in the cost effective, innovative and beneficial use of anaerobic digestion and in anaerobic digestion technology and expertise.

¹³ Estimated capital investment (undiscounted) required to 2020 under the lead scenario in the renewable heat and electricity sectors.

Creating the Economic Framework

34. The Government's objective is to ensure that the right long-term economic framework is in place to enable the market to deliver the increase we need in renewable energy. The Task Group emphasised that, to achieve this, it was important to establish financial incentives that recognised the different potential uses of biogas. These needed to reflect the fact that biogas could be used locally or injected into the gas grid for heat, power, or used as a transport fuel. The Task Group also highlighted the importance to the economic viability of the anaerobic digestion industry of establishing the necessary infrastructure for feedstocks and products. For example, they argued that support was needed to increase separate collection of food waste and develop markets for digestate.

Capital Grants

35. Anaerobic digestion projects are among the measures eligible for support under various capital grant programmes. The Bio-energy Capital Grants Scheme is currently providing £665,000 funding for three anaerobic digestion projects. The sixth round is open for applications until 31 March 2010. The WRAP Organics Capital Grant Programme is providing £6.4 million funding for five anaerobic digestion projects and further proposals are being considered.
36. The Regional Development Agencies (RDAs) are also funding anaerobic digestion projects under the Rural Development Programme for England 2007-2013 (RDPE). The total amount of RDPE funding available under the socio-economic measures within the RDPE is about £536m, of which £296m has already been spent or committed. Anaerobic digestion is among a range of eligible actions that can be supported. The main way is funding for on-farm anaerobic digestion facilities under the 'Modernising agricultural holdings' measure in Axis 1 of the Programme. The RDPE could also support off-farm anaerobic digestion plants under Axis 3, either as a farm diversification enterprise or as part of a rural micro-business, but at a much lower level of support.
37. The construction of new AD plants is helping to build confidence among potential investors and customers in what, for many, is still an unfamiliar technology. We want to provide a long-term framework to help the widespread deployment of anaerobic digestion and other renewable energy generation technologies, and are therefore providing financial support for this as follows:
- Capital grants to support anaerobic digestion under the RDPE 2007-13, the existing rounds of WRAP's Organics Capital Grant Programme and the Bio-energy Capital Grants Scheme, where these support innovation or provide wider environmental benefit.
 - Renewable Obligation Certificates (ROCs), Feed In Tariffs (FITs) or a future Renewable Heat Incentive (RHI) to provide financial incentives for the electricity and heat outputs from anaerobic digestion.
38. Our intention is that financial incentives should generally replace capital grants. However we recognise that at present both may be needed to secure the growth we want in anaerobic digestion. The rules for State Aid mean that receipt of a grant may affect eligibility for ROCs, FITs or RHI but they do not prevent this, and provided that the relevant State Aid rules are not breached, an anaerobic digestion plant may already receive both grant support and

ROCs. It is our intention to ensure that plants receiving FITs should be able to benefit from grant support on a comparable basis, and we will issue guidance as soon as possible to clarify the precise circumstances in which this can occur.

Case Study: Branston Ltd – Potato Packers and Distributors

Location: Lincoln

Branston Ltd is one of the UK's largest potato buyers, packers and distributors, with around 150,000 tonnes being produced at the Lincoln site. A £568,000 grant from the Rural Development Programme for England (RDPE) has part funded a new anaerobic digestion plant and water recycling facility at the site.

The anaerobic digestion plant uses out of grade potatoes, which are unfit for consumption, to generate 300 kW of electricity for use on site. The solid residue left at the end of the process is used as a soil conditioner or to fuel an existing biomass boiler. The project will save Branston over 40% on electricity and 60% on water at the site, as well as taking one HGV load of waste off the road each day.



Renewables Obligation

39. Our key mechanism for delivering renewable electricity is the Renewables Obligation, which provides financial support to generators of renewable electricity. Electricity from anaerobic digestion is eligible for support under the Renewables Obligation, and on 1 April 2009 we introduced differentiated support levels for different renewables technologies (known as "banding"). Anaerobic digestion is in the top banding at 2 ROCs/MWh (Renewables Obligation Certificates per Megawatt hour).

Creating the Economic Framework

40. With most technologies our policy is not, as a rule, to change the level of support once a generating station has been accredited by Ofgem. (This is known as “grandfathering”.) We set out our policy on grandfathering in December 2008, in the *Government Response to the Statutory Consultation on the Renewables Obligation Order 2009*¹⁴. We decided not to grandfather biomass, including anaerobic digestion, because biomass electricity generation faces ongoing fuel costs which are subject to market fluctuation in an immature market. We recognised the need for flexibility to consider the impact on biomass prices when setting banding levels. As a result, we increased support for all biomass generators, not just new entrants, on the introduction of banding.
41. Industry and investors have recently highlighted that lack of revenue certainty is proving a major constraint on the development of biomass generators, including anaerobic digestion. The 2010 Budget announced that we will consult on changes to the Renewables Obligation Order which offer certainty of support, consumer value and adaptability to biomass price fluctuation. This consultation will include a proposal that existing anaerobic digestion plants are grandfathered at 2 ROCs.

Feed-In Tariffs

42. Although the Renewables Obligation is available for all sizes of installations, it has encouraged mainly centralised renewable electricity generation. On 1 April 2010 the Government will therefore introduce feed-in tariffs for small-scale low-carbon electricity generation. This will provide support for installations up to 5MW.
43. We published our response to the public consultation on the feed-in tariffs on 1 February 2010¹⁵. This confirmed that electricity from anaerobic digestion plants will receive 9.0p/kWh. We also announced that, after considering evidence submitted to the consultation, there will be an additional tariff for farm scale anaerobic digestion, which will provide 11.5p/kWh for plants below 500kW¹⁶.
44. The FITs scheme will be reviewed in 2013. At scheme reviews we will reassess the costs of technologies, electricity price forecasts and whether the target rate of return is still best-suited to encouraging cost-effective take-up of renewable energy potential, and consider revision of tariff levels accordingly. Scheme reviews will also consider technologies not currently supported through FITs and whether or not it is appropriate to allow those technologies to access the scheme and set appropriate generation tariffs.

Renewable Heat Incentive

45. Heating accounts for approximately half of the UK’s carbon dioxide emissions. Currently, only one per cent of our heating currently comes from renewable sources. To encourage the generation of renewable heat, we will therefore introduce a renewable heat incentive from 1 April 2011. This will allow generators of renewable heat to claim financial support for the use of that heat.

¹⁴ <http://webarchive.nationalarchives.gov.uk/20081212102612/http://www.berr.gov.uk/files/file49312.pdf>

¹⁵ http://www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx

¹⁶ Payment of feed-in tariffs must comply with EU law on the provision of State Aid to ensure that government interventions do not distort competition and intra community trade. Eligibility for feed-in tariffs may therefore be affected by the receipt of other public body grants.

46. We launched a public consultation¹⁷ on options for the renewable heat incentive on 1 February 2010. This proposes that producers of biomethane injected into the gas grid receive support from the Renewable Heat Incentive. The proposed tariff for biomethane injection has been calculated on the basis of parity with the proposed feed-in tariffs rather than on the basis of a rate-of-return approach. Generators will have the option of generating electricity from biogas through onsite combustion, or turn the biogas into biomethane and inject it into the grid. In the former case they could receive support for renewable electricity. We want generators to choose between electricity generation and biomethane injection based on what is most appropriate for their circumstances rather than on a comparison between support levels.
47. The consultation also proposes a tariff for biogas combustion for heat up to 200 kW. We currently do not have sufficient data on biogas combustion above 200 kW to propose a tariff. We have therefore invited evidence on this issue.

Renewable Transport Fuel Obligation

48. The Renewable Transport Fuel Obligation (RTFO), which came into effect on 15 April 2008, obligates fossil fuel suppliers (those who supply more than 450,000 litres per year) to produce evidence that a specified percentage of their fuels for road transport in the UK comes from renewable sources, including biomethane. Biofuel suppliers are awarded tradable certificates for the volume of renewable fuels they supply. These can in turn be sold on to any fossil fuel suppliers who have not supplied enough biofuel to meet their obligation for the year, thus enabling them to comply with the RTFO. The current obligation level for 2009/10 is 3.25% by volume and this will be increasing in 2010/11 to 3.5%.
49. Increased use of biomethane can help overcome a number of obstacles in meeting the transport targets in the Renewable Energy Directive. We will therefore be considering the appropriate support for biomethane as a road transport fuel and explore how utilisation may be increased, how deployment barriers can be overcome and how the uptake of technology in this area can be stimulated.

Food Waste Collection

50. Obtaining the right feedstocks is crucial to the economic success of anaerobic digestion plants and food waste will be an important feedstock for many operations. This may come from source segregated municipal collections or commercial sources, such as food processors, food service or the retail sector. Increasing collection rates of food waste from all sources is a priority.
51. WRAP's local authority advisory programme will help local authorities to introduce food waste collection services and improve the performance of existing services.

¹⁷ <http://www.decc.gov.uk/en/content/cms/consultations/rhi/rhi.aspx>

Creating the Economic Framework

52. WRAP's Food Waste Collection Fund will continue to provide funding to local authorities to support the introduction of food waste collection services. The funding is split between 2009/10 (£1M) and 2010/11 (£2.3M). It is expected that this level of funding will support the roll out of services to some 350,000 households and result in more than 35,000 tonnes of food waste being diverted from landfill.

Markets for Digestate

53. The production and use of digestate is an integral part of the operation of a successful anaerobic digestion plant at any scale. The digestate has a real economic value. Digestate can be used as fertiliser and soil conditioner and as such can act as a direct replacement for fossil-fuel derived fertilisers. However farmers and others in the food supply chain are still unfamiliar with digestate and its uses. There is therefore a need to increase awareness of the value of the products and confidence that they can be used safely within agricultural systems.



54. An important step has been the development by the Environment Agency and WRAP, with industry, of a standard and a Quality Protocol for digestate from source-segregated biodegradable waste. These clarify when this material has been fully recovered and waste management controls are no longer required. They also provide users with confidence that the digestate they purchase conforms to an approved standard. The Quality Protocol¹⁸ for the production and use of quality outputs from the anaerobic digestion of source-segregated biodegradable waste was published on 17 September 2009. The standard for digestate BSI PAS110¹⁹ was published on 22 February 2010. REAL (Renewable Energy Association Ltd) have set up an industry certification scheme for BSI PAS110 and the Quality Protocol.
55. WRAP is supporting their development of the market for digestate. They will continue the communications and engagement campaign to increase the number of farmers using quality digestate. Key areas include:
- Technical best practice guidance – development of best practice for digestate and compost use covering application to different crops, including assessment of hazards. This will be followed by targeted advocacy to ensure uptake.

¹⁸ <http://www.environment-agency.gov.uk/business/topics/waste/114395.aspx>

¹⁹ http://www.wrap.org.uk/composting/bsi_pas_110_.html

- Field Trials – demonstration of the agronomic, safety and environmental (carbon storage/soil quality) aspects of anaerobic digestates.
- Standards – continued support for PAS110.
- Research projects – increasing knowledge and understanding of the best use of digestate in UK conditions. (See paragraph 102 for more details.)

Improved Availability of Information

56. Access to data is also important to facilitating the uptake of biogas. Plant operators need to consider the distance travelled for feedstocks and outputs (of both biogas and digestate) to minimise transport costs and emissions, as well as to maximise economic opportunity. The information about the location and scale of existing anaerobic digestion plants can also be actively used by those planning to change their waste management processes and who choose to divert waste to anaerobic digestion in the future. WRAP are therefore developing an online geographical information system (GIS) tool that will record and map key data. (See paragraph 113.)

Creating the Economic Framework

Summary of Actions: Creating the Economic Framework			
Ref	Action	Lead Organisation(s)	Milestones
E1.	The Bio-energy Capital Grants Scheme will support anaerobic digestion projects.	DECC	Runs until 31 March 2011
E2.	The WRAP Organics Capital Grant Programme will support anaerobic digestion projects.	WRAP	Runs until 31 March 2011
E3.	The Rural Development programme for England 2007 – 2013 (RDPE) will support anaerobic digestion projects.	Defra, RDAs	Runs until 31 December 2013
E4.	'Banded' Renewable Obligation Certificates (ROCs) for renewable electricity will be implemented.	DECC	Introduced in April 2009
E5.	Possible changes to the policy for 'grandfathering' ROCs for biomass will be consulted on	DECC	Public consultation in spring 2010
E6.	Feed-in tariffs for small-scale low carbon electricity generation will be implemented.	DECC	Introduction in April 2010
E7.	The Renewable Heat Incentive will be introduced.	DECC	Public consultation from 1 February to 26 April 2010 Introduction in April 2011
E8.	Ways to increase the use of biomethane in transport will be explored.	DfT	Ongoing
E9.	WRAP's local authority advisory programme will support the introduction and improvement of food waste collection.	WRAP	Ongoing
E10.	The Food Waste Collection Fund will support the introduction of food waste collection.	WRAP	Ongoing
E11.	A Quality Protocol for digestate will be drafted.	Environment Agency, WRAP, industry	Published on 17 September 2009
E12.	PAS 110 standard for digestate will be drafted.	WRAP, industry	Published on 23 February 2010
E13.	An industry certification scheme for PAS 110 will be introduced.	REAL, industry	Introduction in spring 2010
E14.	Best practice for digestate use will be developed.	WRAP	Ongoing from spring 2010 to 2014

Creating the Regulatory Framework

57. The regulatory framework needs to strike the right balance between encouraging a growth in the use of anaerobic digestion and the need to ensure protection of the environment and of those operating anaerobic digestion plants. The Task Group highlighted regulatory challenges in the following areas:
- a) environmental permitting;
 - b) planning;
 - c) injection of biomethane into the gas grid; and
 - d) co-digestion of sewage sludge with other feedstocks.

Environmental Permitting

58. We have introduced measures to provide a robust regulatory framework that covers all scales of anaerobic digestion operations from farm scale through to large scale commercial plants. These have been designed to be proportionate to the risks that each scale represents.
59. Defra, the Environment Agency and the Welsh Assembly Government have reviewed exemptions from environmental permitting. Revised exemptions will start to come into force from April 2010. We want to encourage on-farm anaerobic digestion of manures and slurries but need to ensure it is carried out in a way that protects the environment and human health. The revised exemptions therefore include a new exemption for on-farm anaerobic digestion and the burning of the biogas in an appliance with a net rated thermal input of less than 400kW.
60. For anaerobic digestion plants that are not exempt from the need for a permit but are below the level that would make them subject to the Integrated Pollution Prevention and Control (IPPC) Directive, the Environment Agency has developed new standard permits. If an operator wishes to carry out an activity covered by a set of standard rules and can meet those rules, they can apply for a standard permit. Standard rules take considerable time and resources to develop but, once in place, they make applying for a permit comparatively easy and the Environment Agency's work determining them simpler. They cost less than bespoke permits. The new standard permits for anaerobic digestion will be introduced from April 2010.
61. Defra, CLG and the Welsh Assembly Government are also developing an overarching protocol on the interface between the planning and environmental permitting regimes in order to improve the way they work together. This will create a more effective way of working whilst continuing to ensure the protection of the environment and human health. Alongside the protocol, accompanying guidance will be produced, which will suggest how the interface between planning and permitting could work in different circumstances and will include appropriate practical examples. The aim is to secure agreement between planning authorities and the Environment Agency and to publish the protocol and guidance later in 2010.

Creating the Regulatory Framework

62. The Pig Meat Supply Chain Task Force²⁰ has agreed that the pig industry, with support from Government and its Agencies, will review regulatory requirements, including environmental permitting and planning for anaerobic digestion adoption by the pig producers. The review will identify actions for the partners to consider for implementation in order to stimulate and facilitate uptake of on-farm anaerobic digestion.

Planning

63. Research has identified that one of the key barriers to the implementation of the Government's climate change Planning Policy Statement to date is the lack of training and expertise amongst the planners who are expected to deliver it. A need for training for plan makers, development managers and councillors has therefore been identified. The Government will provide support to planners and other local authority staff in England engaged in climate change activities to help increase their skills and knowledge.
64. Reflecting our commitment to a low-carbon future, we have consulted on proposals to make the erection of structures for housing anaerobic digestion systems and associated waste and fuel stores "permitted development", hence removing the need for planning permission. Consultation on this proposal closed on 9 February 2010. It is envisaged that, if they are introduced, permitted development rights for these developments would be subject to conditions and limitations, including that only fuel or waste generated on the farm is used in the anaerobic digester.

Biomethane in the Gas Grid

65. The use of biomethane via direct injection into the grid represents an important additional market for biogas. However this does not yet happen in this country. We have therefore been working with industry to identify the regulatory requirements for grid injection and the actions needed to facilitate compliance.
66. In Great Britain, gas is delivered via a network of pipes owned and operated by National Grid and the Gas Distribution Network Owners. These companies and the flow of gas itself are strictly regulated – to allow the operation of the competitive gas market, and to ensure health and safety. The gas regulatory regime can appear complex to those who do not operate within it. In December 2009, we therefore published guidance on the regulatory requirements for injecting biomethane into the gas grid – "Biomethane into the Gas Network: A Guide for Producers"²¹. The guidance includes the process for seeking flexibility on gas quality requirements under the current statutory arrangements in order to help biomethane injection, without compromising safety.
67. Biomethane produced from the treatment of waste can only be injected into the gas network with the permission of whoever is responsible for the network – for example, the Gas Distribution Network. They may require the gas to be cleaned up and treated to an appropriate agreed standard. There are also regulatory implications arising from the fact that

²⁰ The Pig Meat Supply Chain Task Force was set up by the Government in February 2009 to improve the resilience of pigmeat supply chain through increased collaboration and achieving best practice throughout the chain.

²¹ http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/markets/gas_markets/nonconvention/nonconvention.aspx

this biomethane is produced from waste. Producers are required to demonstrate that they have converted the waste material into a distinct, marketable product, which can be used in exactly the same way as an ordinary fuel, and with no worse environmental effects. The Environment Agency will aim to develop a Regulatory Position Statement setting out when they would consider biomethane produced from waste to be fully recovered and no longer waste. This will help producers of biomethane when they apply to the Environment Agency for confirmation that their gas is fully recovered and that the waste regulatory regime therefore no longer applies.²²

68. Consultation will take place later this year on Gas Transporter's Licence exemptions, some of which would otherwise lapse on 1 March 2011. We recognise that there are good reasons for enabling biomethane plant, connected to the gas grid, to be exempt. Biomethane plant and associated pipeline is therefore likely to be considered for exclusion.

Co-digestion

69. Anaerobic digestion is one of the most important methods for treating sewage sludge and, as mentioned above, two thirds of the country's sewage sludge is treated in this way. At present, properly controlled spreading of sewage sludge to agricultural land offers the best practical environmental option in most circumstances. We are considering the revision of the Sludge Use in Agriculture Regulations, which will help to maintain this vital route for the recovery of sewage sludges.



70. An important area for the potential growth of anaerobic digestion is in the co-digestion of other feedstocks with sewage sludge. The water industry has a well established infrastructure of anaerobic digestion plants and extensive experience of the technology, but sewage sludge and waste are covered by different regulatory regimes. The water industry with support from the waste management sector, the Environment Agency and Defra are now leading work to identify regulatory requirements for the co-digestion of sewage sludge with other feedstocks and actions to facilitate compliance. This work has already successfully resolved how plants operators comply with the Animal By-Products Regulations. Work is continuing on other issues.
71. At the same time, the water industry and Ofwat are working together to develop a regulatory framework for sludge activity in the regulated water industry. They are considering how that framework will enable financial transparency in co-digestion activity, with fair allocation of costs and income between the regulated and non-regulated business areas.

²² For details and a template to apply for end of waste status:
<http://www.environment-agency.gov.uk/business/sectors/109792.asp>

Creating the Regulatory Framework

Summary of Actions: Creating the Regulatory Framework			
Ref	Action	Lead Organisation(s)	Milestones
R1.	Exemptions from environmental permitting will be reviewed.	Defra, Welsh Assembly Government, Environment Agency	Revised exemptions come into force in April 2010
R2.	Standard permits for anaerobic digestion plants will be developed.	Environment Agency	Introduction in April 2010
R3.	An overarching protocol and guidance on the interface between planning and environmental permitting will be developed.	Defra, CLG, Welsh Assembly Government	Publication in 2010
R4.	Regulatory requirements for anaerobic digestion facilities in pig sector will be reviewed.	BPEX, NPA, Pig industry, Defra, Agencies	First meeting in Spring 2010 Completion in late 2010
R5.	The responses will be considered to the consultation on making erection of structures for housing anaerobic digestion systems and associated waste and fuel stores permitted development.	CLG	Decision in 2010
R6.	Guidance will be published on the regulatory requirements for injecting biomethane into gas grid.	DECC	Published in December 2009
R7.	A possible Regulatory Position Statement on biomethane produced from waste will be considered.	Environment Agency	Decision in summer 2010
R8.	Consultation will take place on exemptions from the requirement to hold a Gas Transporter's Licence.	DECC	Public consultation in 2010
R9.	Revision of the Sludge Use in Agriculture Regulations will be considered.	Defra	Decision in 2010
R10.	The regulatory requirements for co-digestion of sewage sludge with other feedstocks will be identified.	Water industry, Environment Agency, Defra	Ongoing
R11.	A regulatory framework for sludge activity in the regulated water industry will be developed.	Water industry, Ofwat	Draft framework in autumn 2010 Revised framework in spring 2011

72. The Task Group highlighted that anaerobic digestion is a relatively unfamiliar technology in this country. The development and planning of new plants can be a long and difficult process. To achieve the successful uptake of anaerobic digestion, it is therefore a priority to build awareness and understanding of its benefits among potential operators, developers, investors and customers of anaerobic digestion. Key actions that the Task Group identified included: demonstration projects to learn from both challenges and successes; and improved sources of advice and training.

Demonstration Programme

73. The Government is providing £10 million for the Anaerobic Digestion Demonstration Programme, over the period April 2009 to March 2011. The Demonstration Programme is managed by Defra and forms part of DECC's National Environmental Transformation Fund. It is being delivered on Defra's behalf by WRAP. Five projects have been awarded funding, and will together demonstrate the following aims:
- maximising the cost effective production of biogas;
 - maximising the environmental benefits from the use of anaerobic digestion and its products;
 - maximising the potential of anaerobic digestion to reduce the carbon footprint of the food supply chain;
 - maximising the opportunity for the injection of biomethane into the gas grid; and
 - maximising the potential of anaerobic digestion to reduce the carbon footprint of water treatment infrastructure.
74. The Programme will facilitate the uptake of anaerobic digestion by demonstrating to potential developers and customers the benefits of anaerobic digestion. A comprehensive monitoring and reporting programme by WRAP will also gain and share experience of the most effective ways to operate anaerobic digestion plants. (For further details see box, Anaerobic Digestion Demonstration Programme: Projects.)

Biomethane for Transport

75. Biomethane is produced by removing the carbon dioxide and other impurities from biogas. This can then be used as a transport fuel or injected into the gas grid. Transport fuel is potentially a very efficient use of biogas, although it is not currently widely used in this country.
76. The 2010 Budget announced funding for a project to demonstrate the potential to use biomethane as a road transport fuel, and encourage greater uptake in the future. Subject to a feasibility study commissioned by the Department for Transport, the project will make available £3.5 million to fund biomethane trials for trucks and heavy goods vehicles in several areas across the UK.

Building Capacity

Anaerobic Digestion Demonstration Programme: Projects

BV Dairy

Processes around 35 million litres of milk per year sourced from 35 farms.

Location: Shaftesbury, Dorset



Project Overview: Dairy waste from the factory will be diverted from the sewer and animal feed into an innovative anaerobic digestion plant (designed specifically for liquid flows) to reduce the carbon footprint of the factory by providing renewable electricity and heat which will be used within the business premises. BV Dairy expects to reduce its carbon footprint by 78% (from 1,840 to 400 tonnes CO₂ per year).

GWE Biogas

Set up to convert up to 50,000 tonnes of organic wastes (from local commercial and industrial businesses) each year to "green" energy

Location: Driffield, North Yorkshire

Project Overview: Main output of the planned anaerobic plant will be biogas to be used on site to generate approximately 2MW of electricity for export to the grid. Long term objective is to upgrade gas to biomethane to supply a private heat and wire network for new housing. Resulting digestate will be used on surrounding farmland to reduce inorganic fertiliser and borehole water requirements. The provisional calculated greenhouse gas saving by the GWE plant running at full capacity is 28,340 tonnes of CO₂ equivalent. This can be expressed as 0.570 tonnes of CO₂ equivalent per tonne of food waste.



Langage Farm



Over 250 head of Jersey and Guernsey Cows and a milk processing plant.

Location: Plymouth, Devon

Project Overview: Waste food from the factory, household food waste and dairy manures will go towards providing renewable energy for the heating and lighting needs of the food manufacturing process. Based on existing consumption the group will save some 4,300 tonnes of CO₂. When heat absorption and further facility expansion is brought into account, the saving in CO₂ increases to some 5,700 tonnes. Digestate will be used to improve the poor quality, sandy soils in the surrounding area.

Staples Vegetables

A large vegetables producer supplying a number of major retailers in the UK.

Location: Boston, Lincolnshire

Project Overview: Out of specification vegetables from the company's packhouses and fields will be used to generate renewable heat and electricity. This renewable energy will be used on site, thereby eliminating the use of 40,500 litres of heating oil and 867,144 kWh of electricity from the grid each year. These are estimated to save 100 and 470 tonnes of CO₂ respectively. Using digestate will reduce use of inorganic fertilisers in primary agricultural production thereby saving approximately 300,000kg CO₂ equivalent.



Building Capacity

United Utilities and National Grid

A joint-venture between United Utilities and National Grid to expand on an existing anaerobic digestion plant.

Location: Davyhulme Waste Water Treatment Works, Manchester

Project Overview: The planned installation is to divert 250 cubic metres per hour of biogas from the existing digesters to an upgrading facility. This biogas will be cleaned and compressed for injection to the national gas grid and to power converted sludge tankers. This installation is also expected to save about 3,000 tonnes of CO₂ per year by reducing the consumption of diesel and natural gas. This project will be the first large scale biomethane gas to grid injection system in the UK.



Regular updates on these projects are available at:

http://www.wrap.org.uk/recycling_industry/information_by_material/organics/etf.html

Anaerobic Digestion Advice Portal

77. There are a wide range of sources for advice on anaerobic digestion. However the information landscape can be confusing for those relatively new to the topic. This is a potential barrier for those interested in developing new anaerobic digestion plants.
78. There is also limited information tailored for the general public or others with a general interest. The Task Group highlighted that a lack of understanding and concerns over new technology might lead to opposition to proposed plants and, ultimately, the refusal of planning permission.
79. NNFCC, supported by Defra and DECC, therefore developed and launched a new web-based anaerobic digestion advice portal on 16 September 2009. This provides a first point of contact for information about anaerobic digestion for local authorities, businesses, farmers and the public. It provides direct links to a wide range of sources of information and advice. Use of the portal to date has been encouraging. By February 2010, the portal had received in total of 68,000 page views, with an average of about 100 visitors per day. 55% of the total traffic is from unique (first-time) visitors.



80. NNFCC are working with stakeholders to further develop the content of the portal, which is kept under continuous review. Priorities include:
- a) Developing links to sources of information and advice on planning applications. This will be supplemented by tailored advice where necessary.
 - b) Further development of the online map of anaerobic digestion plants to co-ordinate input and reporting with the online geographical information system (GIS) tool being developed by WRAP (see paragraph 113).
81. The portal is at: <http://www.biogas-info.co.uk/>

Regional Workshops

82. NNFCC is working in collaboration with the Renewable Energy Association (REA), Country Land and Business Association (CLA), Royal Institution of Chartered Surveyors (RICS), British Institute of Agricultural Consultants (BIAC), WRAP (Waste and Resources Action Programme) and regional development agencies (East of England Development Agency and South East England Development Agency) to run a series of regional anaerobic digestion workshops for local farmers, authorities, waste handlers and waste generators interested in anaerobic digestion.
83. NNFCC has run three such awareness raising events to date; Suffolk (8 December 2009), Bedfordshire (10 December 2009) and Sussex (27 February 2010). Funding and roll out in a wider range of regions is in development.

Public Engagement

84. Business in the Community's (BITC) Mayday Leadership Team has established a new working group to look at waste and resource issues across various business sectors. This is undertaking a programme of activities that will promote the take up of anaerobic digestion at the local level by business and local government. This will include a series of workshops around the country. The programme will produce a report setting out what has been achieved and identifying key practical aspects of ongoing activity. It will also produce a DVD for local authorities which will explain anaerobic digestion as a technology, its benefits and how to solve the issues associated with its take-up from a local government perspective.

Operator Training

85. Operators of most permitted waste facilities are required to demonstrate their technical competence in order to obtain a permit by registering with one of the schemes approved by Defra. Anaerobic digestion is still an emerging technology in the waste and agriculture sectors. WRAP is therefore running training events for anaerobic digestion in these sectors, including events to support the roll out and adoption of the digestate standard BSI PAS110.

Building Capacity

86. A priority now is for the growing anaerobic digestion industry to take over the lead in ensuring the effective development and delivery of training for operators of anaerobic digestion plants in the waste and agriculture sectors. The trade associations for the anaerobic digestion industry, with support from Government, will explore how to achieve this.
87. Similar training already exists in the water industry where anaerobic digestion is an established technology.

Summary of Actions: Building Capacity

Ref	Action	Lead Organisation(s)	Milestones
C1.	The Anaerobic Digestion Demonstration Programme will be delivered.	Defra, DECC, WRAP	Completion of plants by 31 March 2011
C2.	The Anaerobic Digestion Demonstration Programme will be monitored and reported on.	WRAP	Ongoing to 2014
C3.	Project to demonstrate the potential to use biomethane as a transport fuel will be delivered.	DfT	Project will run from 2010 to 2011
C4.	Development of the web-based anaerobic digestion advice portal will continue.	Defra, DECC, NNFFCC	Portal launched on 16 September 2009
C5.	Regional anaerobic digestion awareness raising workshops will be delivered.	NNFFCC, REA, CLA, RICS, BIAC, WRAP, RDAs	Ongoing
C6.	A programme of activities will promote the take up of anaerobic digestion at the local level by business and local government.	BITC	Ongoing from autumn 2010 to winter 2011
C7.	Ways to develop training for operators of anaerobic digestion plants in the waste and agriculture sectors will be explored.	Biogas industry, Defra, WRAP, NNFFCC	Ongoing

88. The Task Group highlighted that, to make the most of the potential benefits of anaerobic digestion, it is important to continue to improve knowledge of the use of the technology and its products. It pointed out that valuable research has already been carried out and is continuing to be done by Government, industry and the research community – both in this country and overseas. It recommended that continued research and development should be a priority.
89. This section summarises key research to improve the technology and best practice in its use at the different phases in the lifecycle of anaerobic digestion:
 - process (eg operation of the anaerobic digestion plant);
 - inputs (eg use of feedstocks); and
 - outputs (eg use of biogas and digestate).

Digestion Process

90. DECC are contributing capital funding of £1M from the Low Carbon Investment Fund (LCIF) for a new Anaerobic Digestion Development Centre. This will involve the Centre for Process Innovation (CPI) working with DECC to build a small scale anaerobic digestion development unit. The unit will be able to process a wide range of organic wastes in single or mixed streams. It will have a range of pre-treatment, digestion and post-treatment technologies that will be rapidly reconfigurable to allow the development of novel and improved anaerobic digestion processes. The unit will be an open access facility for the UK, where companies can come to test and develop novel feedstock and technology combinations. The aim is to provide the UK with a base to advance and develop new processes and intellectual property in the area of anaerobic digestion technology.
91. To help inform measures to encourage the use and improvement of biogas production in the UK, Defra has commissioned a study on *The optimisation and impacts of expanding biogas production (AC0406)*²³. This is being undertaken by North Wyke, Exeter University and AEA Technology. It uses a multidisciplinary approach, drawing on EU expertise. The study is assessing experience of anaerobic digestion in the UK and across the rest of the EU to identify lessons that the UK can learn on, for example, optimising biogas production, reducing capital costs and making best use of digestate.
92. To develop best practice, it is important to understand the environmental impacts of anaerobic digestion throughout its full lifecycle. Defra is therefore commissioning work to: better understand nutrient and carbon flows through anaerobic digestion from feedstock to digestate; and review current best practice in order to determine its environmental impacts. This project will provide a life-cycle analysis of greenhouse gas and ammonia emissions from anaerobic digestion systems, including digestate application to land.
93. There are situations in some anaerobic digestion processes where the inherent stability of the anaerobic digestion process is upset, as a result of conditions within the digester which may be strongly influenced by feedstock characteristics. Defra are currently undertaking

²³ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=14584#RelatedDocuments>

Research: Improving Our Understanding

research to seek solutions to address these issues in order to optimise processes for stable food waste digestion (WR1208)²⁴. An Explanatory Note on emerging findings was published in March 2010.

94. For all waste management facilities, preventing pollution is a priority. The Defra funded project *Emissions from waste management facilities (WR0608)*²⁵ is therefore reviewing data on pollutant emissions across all waste management technologies, including anaerobic digestion.
95. The Research Councils are jointly funding a Rural Economy and Land Use (RELU) project on Energy Production on Farms through Anaerobic Digestion. The project is examining the potential for development of anaerobic digestion on farms, and the contribution that this could make to rural development and diversification of agricultural practice by enhanced land use planning for bioenergy production.
96. To help farmers and others decide whether anaerobic digestion is right for their circumstances, NNFCC have published an anaerobic digestion economics calculator on their website²⁶. This also links through to the anaerobic digestion advice portal (see paragraphs 77-80). A project is under way to update the calculator (NNFCC ref. 10-010).
97. To make the most of the economic and environmental of anaerobic digestion, it is important to consider the full supply from feedstocks through to outputs. Therefore the NNFCC funded project *Anaerobic Digestion supply chain assessment for the UK (ref 10-020)* is carrying out a UK wide assessment of the potential of anaerobic digestion for the treatment of organic waste. The review is considering in depth the supply chain options for the UK; in terms of feedstock, technology and output combinations, for optimum economic and environmental gain.
98. There are few small-scale and on-farm anaerobic digestion plants in this country. To help facilitate the growth of this sector, Defra is therefore commissioning research to examine *European experience with small-scale and on-farm anaerobic digestion (WR1119)*. This will summarise experiences and lessons from the use of small-scale and on-farm anaerobic digestion systems in Europe, with a net rated thermal input of 150kW to 400kW.

Feedstocks

99. An efficient anaerobic digestion process requires a balance of nutrients. The digestion of manures and slurries is accelerated by the addition of carbon sources, such as food waste or crops. While co-digestion of manures and slurries with food waste is a win-win, growing dedicated crops for co-digestion may have a negative environmental footprint and compete for food production. The reductions in greenhouse gas emissions achievable through anaerobic digestion will therefore depend on the spatial distribution of feedstocks for co-digestion. Defra will therefore commission research to assess this spatial distribution and identify:

²⁴ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16690>

²⁵ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=15234#Description>

²⁶ http://www.nnfcc.co.uk/metadot/index.pl?id=7197;isa=DBRow;op=show;dbview_id=2457

- a) areas where there are win-wins for co-digesting food waste with manures/slurries;
- b) areas where additional materials will be needed to co-digest with manures/slurries;
- c) appraisal of the alternative materials, assessment of their impacts on the greenhouse gas and energy balance of the anaerobic digestion process; and
- d) implications for mitigation potential in manures and slurries management.

100. The project will also consider temporal variation in availability of feedstocks and effects of feedstocks on digestate quality.

101. The anaerobic digestion of renewable bioplastics offers businesses a useful option for dealing with food packaging waste. A study by NNFC (National Non-Food Crops Centre) (ref 09-011) is therefore investigating the behaviour of biorenewable plastics in anaerobic digestion conditions. This is due to report in the first quarter of 2010.

Products of Digestion

102. To aid the development of the market for digestate, WRAP is carrying out field trials in its use. This will demonstrate the agronomic value; crop safety; and the business case for digestate use. As a complement to this, Defra will commission research to inform best practice in the use of digestate. This will review the uses for digestate, looking at practices in countries where anaerobic digestion is an established technology.

103. More widely, Defra is looking at the impacts of organic materials applied to land, including digestate. Defra has commissioned *Agronomic and environmental impacts of organic materials applied to agricultural land (WQ0206)*²⁷. This is a review led by WRc plc, with contributions from AEAT and Reading University. It will produce recommendations for best practice in the application of organic materials and identify further evidence needs.



²⁷ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16621#Description>

Research: Improving Our Understanding

104. To help control soil metal loading rates, Defra has commissioned two projects. *Metals in Soil (SP0569)*²⁸ is investigating the impact on the agricultural land bank available for the recycling of organic and inorganic materials of potential changes in limit values. *Assessing the potential for the upstream control of contaminants present in organic materials spread to land (SP0578)*²⁹ is examining the sources of contaminants in organic materials spread to land in order to develop a strategy to reduce the loadings of these contaminants at source.

Summary of Actions: Research: Improving Our Understanding

Ref	Action	Lead Organisation(s)	Milestones
U1.	The Anaerobic Digestion Development Centre will be built and available nationally.	DECC, NNFFCC, CPI	Start of site development of in spring 2010 Facility ready to commission work in autumn 2010
U2.	'The optimisation and impacts of expanding biogas production (AC0406)' will be completed.	Defra	Publication of report in spring 2010
U3.	Work will be commissioned to: better understand nutrient and carbon flows through anaerobic digestion from feedstock to digestate; and review current best practice in order to determine its environmental impacts.	Defra	Commissioning of research in spring 2010
U4.	'Optimising process for the stable operation of food waste digestion (WR1208)' will be completed.	Defra	Publication of report in late 2010
U5.	'Emissions from waste management facilities (WR0608)' will be completed.	Defra	Publication of report in summer 2010
U6.	The potential for development of anaerobic digestion on farms, and its contribution to rural development and diversification will be examined	RELU	Publication of report in autumn 2010
U7.	The anaerobic digestion economics calculator will be updated (10-010).	NNFFCC	Publication of report in spring 2010
U8.	A review of anaerobic digestion technology will be completed (10-020).	NNFFCC	Publication of report in late 2010

²⁸ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=15983>

²⁹ <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=16171>

Summary of Actions: Research: Improving Our Understanding (*continued*)

Ref	Action	Lead Organisation(s)	Milestones
U9.	'European experience with small-scale and on-farm anaerobic digestion (WR1119)' will be completed.	Defra	Publication of report in summer 2010
U10.	The distribution of feedstocks will be assessed and advice produced on: options for co-digestion; the impacts on greenhouse gas emissions; and the energy balance of the anaerobic digestion process.	Defra	Publication of report in spring 2011
U11.	The behaviour of biorenewable plastics in anaerobic digestion conditions will be investigated (09-011).	NNFCC	Publication of report in spring 2010
U12.	Field trials will be carried out into the use of digestate.	WRAP	Field experiments from spring 2010 to 2014
U13.	Research into best practice in the use of digestate will be commissioned.	Defra	Commissioning of research in Spring 2010
U14.	'Agronomic and environmental impacts of organic materials applied to agricultural land (WQ0206)' will be completed.	Defra	Publication of report in spring 2010
U15.	'Metals in Soil (SP0569)' will be completed.	Defra	Publication of report in summer 2010
U16.	'Assessing the potential for the upstream control of contaminants present in organic materials spread to land (SP0578)' will be completed.	Defra	Publication of report in late 2010

105. *Anaerobic Digestion – Shared Goals* set the ambition for this country to be recognised as a world leader in the cost effective, innovative and beneficial use of anaerobic digestion. It said that we will learn from and share experience from both this country and worldwide. The Task Group also highlighted the benefits of international collaboration. We are therefore working to gain and share experience of anaerobic digestion through international networks and bilateral collaboration.
106. A good example of this is the project *The optimisation and impacts of expanding biogas production (AC0406)* referred to above (paragraph 91).

Methane to Markets Partnership

107. One important example is the international Methane to Markets Partnership, established in 2004 and with 30 countries now as members, including the UK, US, China, India and Russia. The UK co-chairs the partnership's Agriculture Sub-Committee. This is an international initiative that advances cost-effective, near-term methane recovery and use as a clean energy source (including by anaerobic digestion). The Partnership supports international collaboration by national governments, private sector entities, development banks, non-governmental organizations, financial and technical experts, and other interested parties to develop methane capture and use projects internationally. A Ministerial meeting of the Partnership is planned for late 2010 in Mexico.
108. Key activities in the Agriculture Sub-Committee's current work programme include:
- a) Supporting member countries in undertaking a resource assessment of the potential for using anaerobic digestion to treat a range of agricultural and agri-food wastes, and in developing international strategies and action plans;
 - b) developing methodologies for measuring fugitive greenhouse gas emissions from anaerobic digestion; and
 - c) developing international guidance for quantifying and reporting the performance of anaerobic digestion systems.

IEA Task 37

109. The International Energy Agency's (IEA) *Bioenergy Task 37 – Energy from Biogas and Landfill Gas* is an international working group of 14 countries which assesses, exchanges and disseminates information and best practice on anaerobic digestion. The UK is represented on this group by Task 37 (UK), a not for profit company limited by guarantee. It is funded by subscriptions from industry, research institutions and other member organisations, together with a grant from the Esmée Fairburn Foundation. Defra and DECC fund Task 37 UK's subscription to IEA Bioenergy Task 37.

110. Key activities in Task 37's work programme for 2010-12 include:

- a) an updated brochure on producing biogas from energy crops which will set out how to avoid any clash with food production;
- b) a study on techniques for monitoring anaerobic digestion plants in order to optimise the process;
- c) a study to evaluate the economics of various sizes of anaerobic digestion plants, including small scale;
- d) a series of success stories on biogas upgrading and grid injection;
- e) the collation of existing standards and quality assurance procedures for digestate; and
- f) a report of the state of the art techniques to monitor methane leakage from anaerobic digestion plants.

UK-China Sustainable Agriculture Innovation Network (SAIN)

111. Under the umbrella of the UK-China Sustainable Development Dialogue, the UK-China Sustainable Agriculture Innovation Network (SAIN) provides a platform for collaboration between the UK and China on environmentally sustainable agriculture. SAIN brings together policy makers, leading academic researchers, farmers and other stakeholders to ensure that policy making is better informed and technical interventions are better targeted. SAIN is considering potential research projects that would draw upon experience and interdisciplinary expertise in the UK and China. Areas of research being considered that are relevant to anaerobic digestion include:

- a) assessing the potential for the sustainable development of bioenergy (including by anaerobic digestion) in China and UK and identifying how to achieve this; and,
- b) identifying the most cost effective and environmentally beneficial way to integrate anaerobic digestion into agriculture.

Sharing Global Experience

Summary of Actions: Sharing Global Experience

Ref	Action	Lead Organisation(s)	Milestones
G1.	Member countries will be supported in assessing the potential of anaerobic digestion to treat agricultural and agri-food wastes.	Methane to Markets Partnership	Ongoing
G2.	Methodologies will be developed for measuring fugitive greenhouse gas emissions from anaerobic digestion.	Methane to Markets Partnership	Ongoing
G3.	International guidance will be developed for quantifying and reporting the performance of anaerobic digestion systems.	Methane to Markets Partnership	Publication of guidance in Spring 2010
G4.	An updated brochure on producing biogas from energy crops will be produced.	Task 37	Publication of brochure in mid-2011
G5.	Techniques for monitoring anaerobic digestion plants in order to optimise process will be studied.	Task 37	Publication of report in late 2011
G6.	The economics of various sizes of anaerobic digestion plants, including small scale, will be studied.	Task 37	Publication of report in early 2012
G7.	A series of success stories on biogas upgrading and grid injection will be produced.	Task 37	Ongoing
G8.	A brochure on existing standards and quality assurance procedures for digestate will be published.	Task 37	Publication of brochure in mid-2012
G9.	A report of state of art techniques to monitor methane leakage from anaerobic digestion plants will be produced.	Task 37	Publication of report in late 2011
G10.	Research to assess the potential for the sustainable development of bioenergy (including by anaerobic digestion) in China and UK and identify how to achieve this will be agreed.	SAIN	Decision reached on research plans in mid-2010
G11.	Research to identify the most cost effective and environmentally beneficial way to integrate anaerobic digestion into agriculture will be agreed.	SAIN	Decision reached on research plans in mid-2010

112. The Task Group emphasised the importance of the effective collection and reporting of data on the use of anaerobic digestion and its products. We consider this a priority because it serves two important purposes. First, it is essential to have effective mechanisms for measuring progress in order to assess the success of the actions in this Implementation Plan. This will enable us to identify where actions are working well and, importantly, where additional actions or changes to existing actions are needed. Second, the availability of data for potential operators, investors and customers of anaerobic digestion can also make an important contribution to facilitating its uptake. (See paragraph 56.)

113. WRAP are therefore developing an online geographical information system (GIS) tool that will record and map:

- a) the number and capacity of new plants;
- b) where the digestate is being used; and
- c) waste arisings.

114. This will link in with the Defra funded ALLOWANCE³⁰ tool. This is a strategic management tool which quantifies and locates, temporally and spatially, the national capacity of agricultural land to accept organic material. ALLOWANCE is currently available at:

http://www.wrap.org.uk/composting/useful_tools.html

115. Working with our delivery bodies, we will monitor progress on the actions set out in this Implementation Plan. We will publish a report in Spring 2011 assessing overall progress towards the commitments to action in this Implementation Plan and the growth in the use of anaerobic digestion in England.

Summary of Actions: Assessing Progress

Ref	Action	Lead Organisation(s)	Milestones
P1.	Develop an online GIS tool to map plant capacity, where digestate is used and waste arisings.	WRAP	Ongoing
P2.	Map land bank availability through the ALLOWANCE project.	Defra, WRAP	Tool published in October 2009
P3.	Publish annual report on progress of Implementation Plan.	Defra	Publication of report in spring 2011

³⁰ Agricultural Land and Organic Waste – A National Capacity Estimator

Annex: Recommendations of Anaerobic Digestion Task Group

List of Acronyms

BIAC	British Institute of Agricultural Consultants
BITC	Business in the Community
CLA	Country Land and Business Association
CLG	Department for Communities and Local Government
CPI	Centre for Process Innovation
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
NNFCC	National Non-Food Crops Centre
NPA	National Pig Association
RICS	Royal Institution of Chartered Surveyors
RDA	Regional Development Agency
REA	Renewable Energy Association
REAL	Renewable Energy Assurance Ltd
SAIN	UK-China Sustainable Agriculture Innovation Network
WRAP	Waste and Resources Action Programme

Annex: Recommendations of Anaerobic Digestion Task Group

	Recommendation	See Paragraphs
	Economics and Infrastructure	
1.	<p>Implement the feed-in tariff for small-scale low-carbon electricity generation and the renewable heat incentive by the dates already announced. In developing these mechanisms, it should:</p> <ul style="list-style-type: none"> ● ensure that the Renewables Obligation, feed-in tariff, renewable heat incentive and Renewable Transport Fuel Obligation complement each other, so as to incentivise the most efficient uses of biogas; ● ensure that the timescales for each are clearly defined and of an appropriate length to ensure that developers can be certain about return on investment; ● ensure that support under the feed-in tariff reflects the relative costs of different scales of plant; ● give an early indication of the level of the renewable heat incentive; and ● give an undertaking that the renewable heat incentive will be applied to all eligible projects completed after 27 November 2008. 	39-49
2.	Continue to support the construction of anaerobic digestion infrastructure of all scales through relevant grant programmes.	35-38
3.	Support the separate collection of food waste by local authorities to provide confidence in feedstock supply to anaerobic digestion plants.	50-52
4.	Provide advice and guidance to local authorities – particularly in two-tier situations with different waste collection and disposal authorities – to ensure that decisions on collection methods are based on an assessment of all the relevant information.	50-52
5.	Provide information and guidance to private sector organic waste producers to raise awareness of the importance and potential cost effectiveness of segregated organic waste collection, including the impact of packaging in providing a suitable feedstock for digestion.	50-52
6.	Map and disseminate information about the availability of feedstocks.	56, 112-114
7.	Map land bank availability through the ALLOWANCE project and disseminate the findings.	56, 112-114

Annex: Recommendations of Anaerobic Digestion Task Group

	Recommendation	See Paragraphs
	Regulation	
8.	Clarify “waste” status of inputs including by-products, sewage sludge and on-farm wastes in guidance documents.	70
9.	Ensure that the current work on regulation of digestate covers digestate from all potential feedstocks.	70
10.	Ensure that the thresholds for permitting anaerobic digestion plants and for burning biogas under the Environmental Permitting Regulations (EPR) and Integrated Pollution Prevention Control (IPPC) are proportionate to risk.	58-60
11.	Clarify the regulations and thresholds that trigger exemptions to standard permits and bespoke permits, for farm, industrial, commercial and municipal wastes and for sewage sludge.	58-60, 70
12.	Change Status of biogas to non-waste via a Quality Protocol. Clarify position when biogas ceases to be waste.	67
13.	Prepare generic guidance on allocation of costs and incomes for co-digestion of sewage sludge with other feedstocks.	71
14.	Clarify and define regulatory arrangements (including Animal By-products Regulations (ABPR) requirements) for the production and use of digestate from co-digestion of sewage sludge with other feedstocks.	70
15.	Amend the Sludge Use in Agriculture Regulations to ensure the maintenance of confidence levels in this vital route for the recovery of sewage sludges and maximise the efficient use of existing infrastructure in the water industry.	69
16.	Review and update PPS 23. Provide clarification regarding differentiation of responsibilities in the planning and permitting process for all anaerobic digestion plants to avoid duplication between planning and environmental permitting.	61
17.	Complete development of guidance on the gas regulatory regime for potential biomethane producers.	66
18.	Develop requirements in respect of calorific value to enable biomethane to be injected without the need for propane enrichment.	66
19.	Review the current metering and monitoring requirements, in liaison with the Health and Safety Executive (HSE) and other relevant parties, to ensure that these are not unnecessarily onerous for small renewable gas installations.	66
20.	Consider the need to set targets for biomethane production and use, to provide an indication of UK Government commitment to the expansion of this renewable technology.	–

Annex: Recommendations of Anaerobic Digestion Task Group

	Recommendation	See Paragraphs
	Technology	
21.	Research into the optimisation of feedstock mixtures, pre-treatment processing, digester design and the digestion process to maximise gas yield and quality for digesters of all scales.	90-91
22.	Develop innovative food waste collection and separation techniques for household and commercial sources of food waste. Determine the best recovery routes for various types of organic materials.	–
23.	Improve the anaerobic digestion of high nitrogen feedstocks, in particular food waste and poultry manure, through targeted research and development.	93
24.	Research best practice in digestate applications in other countries.	102
25.	Research the short-term and long-term benefits of applying digestate to farm land in the context of the UK climate, soils and agricultural crops.	102-104
26.	Develop digestate enhancement technologies and markets for the resulting enhanced products, such as recovered single nutrient fertilisers. Understand fully the impacts of liquors and leachates arising from dewatering of digestates.	–
27.	Research the beneficial use of CO ₂ from biogas.	–
28.	Carry out research and development to improve performance and reduce costs of biomethane upgrading plants.	–
29.	Confirm research already carried out on the safety of biomethane in consumer appliances.	–
	Demonstration and Communication	
30.	Ensure proactive engagement and increase awareness among communities of opportunities offered by anaerobic digestion through a series of workshops, or through a dedicated regional 'anaerobic digestion community champion'.	82-84
31.	Develop tools to raise awareness of the benefits of anaerobic digestion, help address potential concerns and increase participation in separate food waste collection. This should include a leaflet to introduce anaerobic digestion opportunities and facts to communities.	–
32.	Deliver the Anaerobic Digestion Demonstration Programme to demonstrate the cutting edge use of anaerobic digestion to create renewable energy, reduce greenhouse gas emissions and avoid waste being sent to landfill.	73-74

Annex: Recommendations of Anaerobic Digestion Task Group

	Recommendation	See Paragraphs
33.	<p>Regularly review the Anaerobic Digestion Demonstration Programme to identify any further demonstration needs. In doing so, the following should be taken into consideration:</p> <ul style="list-style-type: none"> ● as many different variables should be demonstrated within a single project as possible; ● demonstration plants should be constructed in a variety of locations; and ● public finance packages should include an element of funding specifically for the dissemination of demonstration outputs. 	73-74
34.	Develop and publicise case studies, demonstrating risks and opportunities and projects in a variety of locations and scale.	77-81
35.	Complete development of the new anaerobic digestion web portal to act as a gateway to information on anaerobic digestion technologies for a range of potential stakeholders.	77-81
36.	Improve information resources to demonstrate the viability of anaerobic digestion for investors and developers, through decision support software, awareness of case studies and up to date information on the policy framework, potentially as an anaerobic digestion 'guide for investors'.	77-81
37.	Develop a farmers' guide to digestate use, perhaps accompanied by a series of on farm demonstration events of successful use to improve confidence, and an information campaign in the farming press.	102
38.	Develop a 'local planners guide to anaerobic digestion' to help address public issues with anaerobic digestion throughout the planning process and help successful public communication.	63
39.	Develop systems to disseminate information from Government, industry, the research community and international networks about best practice and new developments in anaerobic digestion technology and its application.	77-81
40.	Increase UK participation in EU and International projects by signposting sources of match funding support, and developing mechanisms to facilitate awareness of opportunities and consortia building.	–

	Recommendation	See Paragraphs
	Measuring Progress	
41.	Develop systems to monitor and report periodically on: <ul style="list-style-type: none"> • biogas production and use; • digestate quality and use; • reductions in greenhouse gas emissions resulting from use of anaerobic digestion; and • methods of feedstock collection. 	112-114
42.	Develop a GIS tool to record and map: <ul style="list-style-type: none"> • number and capacity of new plants; • where the digestate is being used; and • waste arisings. 	112-114
	Delivery	
43.	Set up a central Government team to oversee development and delivery of the actions in an Implementation Plan.	115
44.	Appoint WRAP to monitor and report on progress.	112-115
45.	Appoint an independent advisory group to support the work of the central Government anaerobic digestion team.	–
46.	Share best practice on anaerobic digestion between the UK Government and Devolved Administrations who should work together to address common concerns.	2

Photographs

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