Taking forward the deployment of renewable energy

A final report to Lancashire County Council

July 2011

CLASP. Climate Change Local Area Support Programme

NWIEP north west improvement and efficiency partnership

maslen environmental part of the JBA Group

SQW

Contents

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1: Introduction

1.1 SQW and Maslen Environmental were commissioned by Lancashire County Council in March 2011 to identify the potential for the development of sustainable energy resources across Lancashire on an area basis and to provide analysis and advice to support the increased deployment in the future.

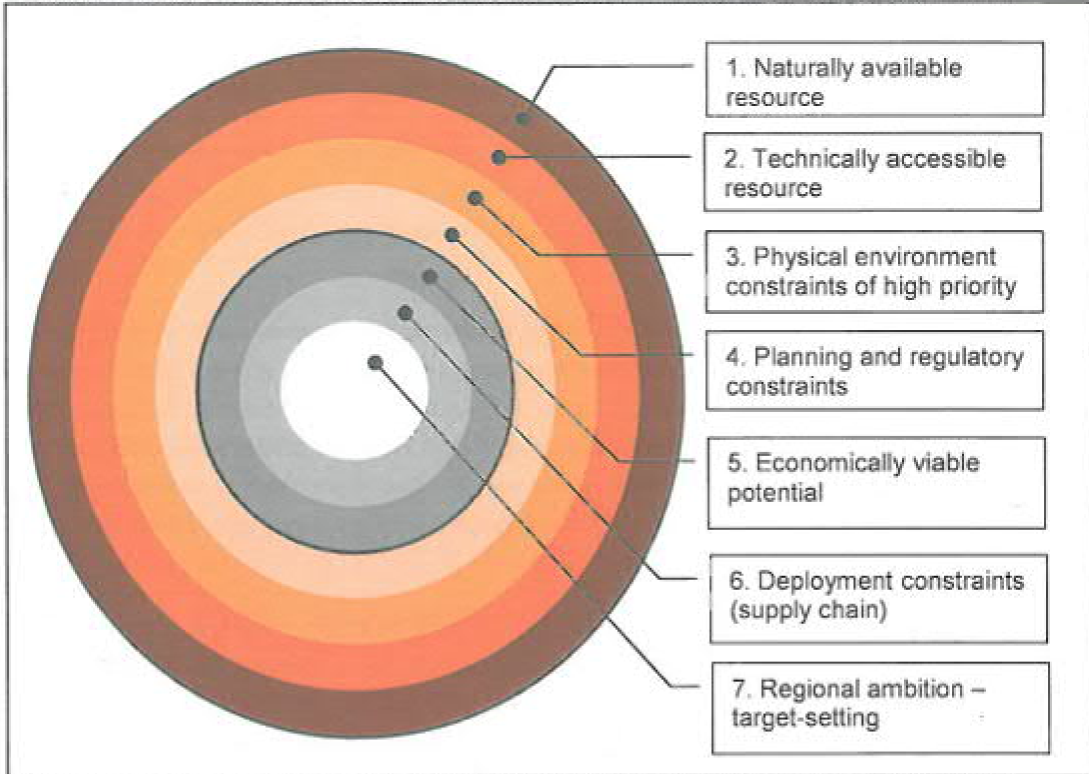
1.2 Lancashire is committed to becoming a low carbon economy and in order to progress its contribution towards the national goal of generating 15% of the UK's energy needs from renewables by 2020[1], the need for a consistent evidence base across its local authorities was recognised. This drive towards increasing the deployment of renewable energy is as important for the achievement of economic and social imperatives, such as fuel security, job creation and addressing fuel poverty, as it is for environmental reasons associated with fostering a low carbon future for communities.

1.3 With the intended revocation of Regional Spatial Strategies, and with them regional (and sub-regional) targets for renewable energy generation, it is important that local areas are proactive in looking to maximise their future renewable energy deployment. The current approach, reflected in the 2011 Memorandum of Understanding between DECC and the Local Government Group[2], is to "encourage all councils to take firm action – underpinned by locally ambitious targets and indicators".

1.4 The first stage of this study involved providing Lancashire's local authorities with resource assessments of the technical renewable energy capacity at 2020 using the nationally endorsed DECC and CLG methodology: *Renewable and Low Carbon Capacity Assessment Methodology for the English Regions (2010)* – hereafter referred to as 'the DECC methodology'. The overarching framework of the DECC methodology is depicted in Figure 1-1.

[1] *UK Renewable Energy Strategy, 2009*
[2] http://www.decc.gov.uk/assets/decc/What%20we%20do/lc_uk/loc_reg_dev/1380-mou-lggroup-decc.pdf

Figure 1-1: Stages for developing a comprehensive evidence base for renewable energy potential



Source: DECC, Renewable and Low Carbon Energy Capacity Methodology: Methodology for the English Regions, 2010

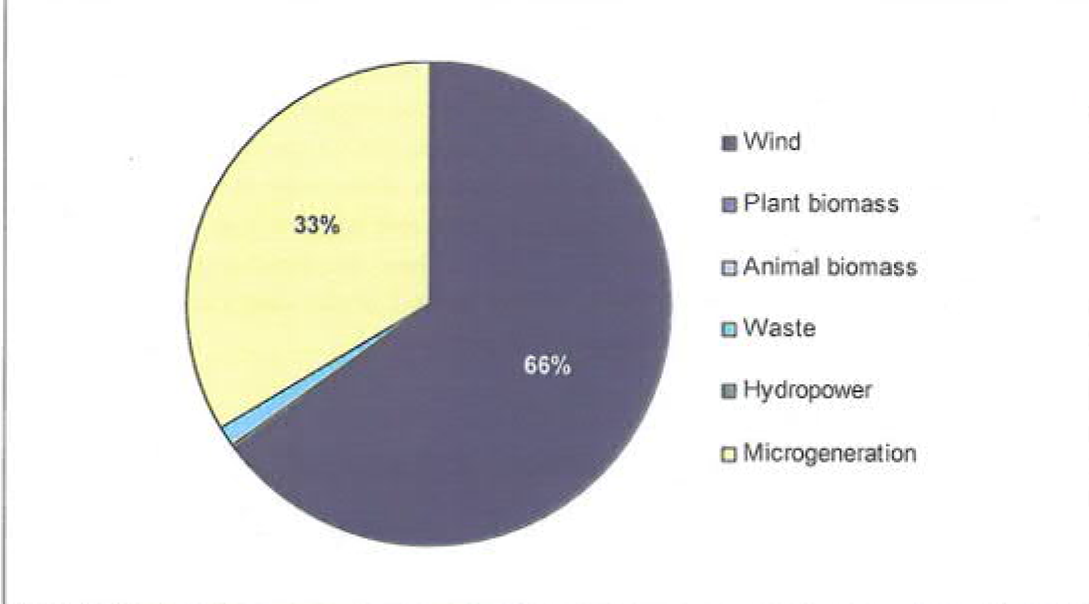
1.5 This methodology was used by SQW in 2010 to undertake a renewable energy capacity and deployment study for the North West, on behalf of the North West Development Agency. Lancashire County Council required the results for Lancashire from the North West study to be further interrogated and disaggregated to the local authority (LA) level. This assessment of technical resource capacity represents stages 1-4 as shown in Figure 1-1. The results from that first phase of work, together with an analysis of grid transmission constraints, are provided in an overarching technical report and fourteen individual resource assessment reports - one for each local authority. All of the reports are available from www.lancashire.gov.uk. These reports are supported by GIS maps provided at the local authority level, which can also be accessed from Lancashire's website.

Recap of technical resource assessment results

1.6 The resource assessment results from Stage 1 identified an overall technical resource of 10,612MW[3]. The distribution of this potential energy by technology type and LA contribution is depicted in Figure 1-2 and Figure 1-3.

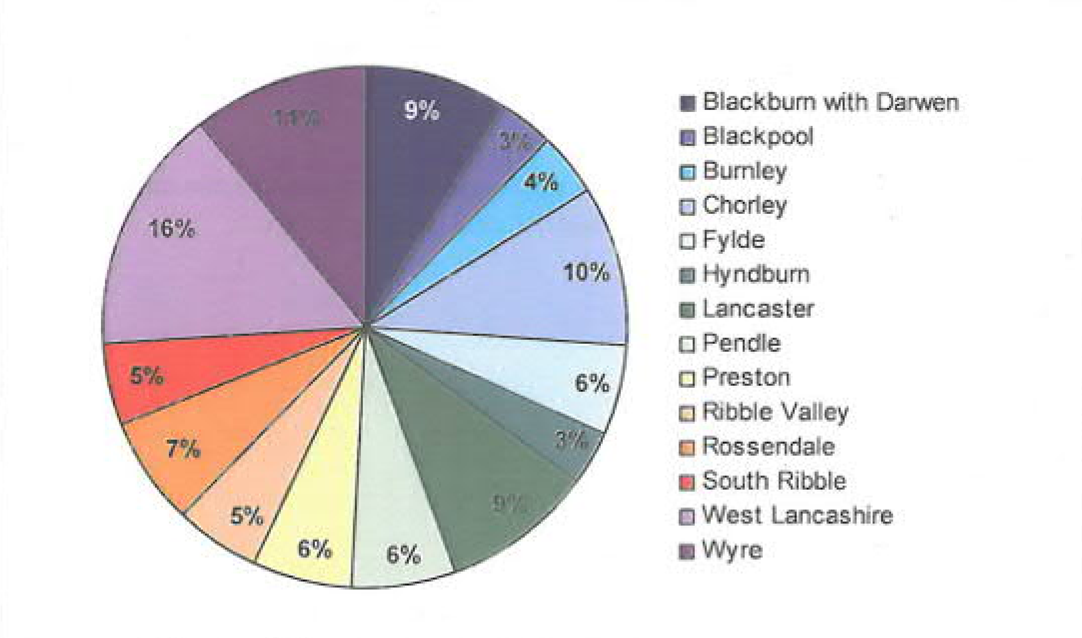
[3] This total excludes the potential capacity for managed woodland (electricity), energy crops (electricity) and waste wood (heat) as these technologies provide both electricity and heat potential which are mutually exclusive.

Figure 1-2: Potential accessible energy resource by technology



Source: SQW and Maslen Environmental

Figure 1-3 Potential accessible energy resource by LA



Source: SQW and Maslen Environmental

1.7 Annex A provides the detailed results for each technology for each local authority across the Lancashire sub-region, and the heat and electricity potential of each local authority.

Translating technical capacity to deployable capacity

1.8 The resource assessment results provide a view of the overall ***potential technical*** capacity for renewable energy generation across Lancashire to 2020. They do not provide an indication of ***what could or should be deployed.*** Following the completion of this first phase, discussions were held with the Lancashire County Council (LCC) client team to explore options for further support. It was agreed that the remainder of the study should focus on translating this technical capacity to a more realisable deployable capacity and providing support to LAs concerning the application of this evidence base to planning policy development. The deployment analysis and scenario testing (Phase 2 of this study) addresses stages 5 and 6 of the DECC methodology as depicted in Figure 1-1.

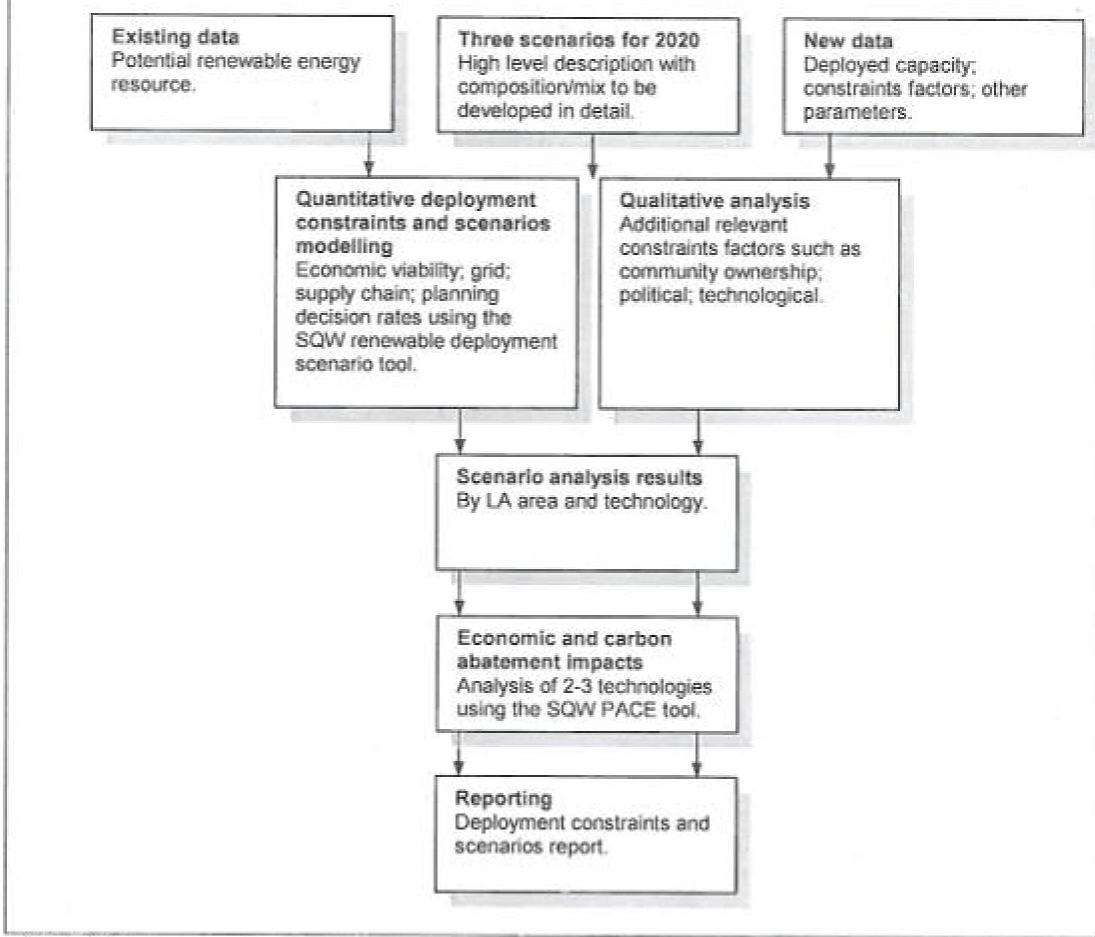
1.9 The key elements of Phase 2 have involved:

- analysis of deployment constraints and scenario testing (the subject of this report)
- provision of planning advice to help support the increased deployment of renewable energy through the production of a planning guide (the latter is the subject of an accompanying report)
- three area based workshops, run in June and July 2011, which engaged LA officers in the findings from the study and considered how the evidence base could best be used to inform planning policy development.

1.10 This report provides the results of the deployment analysis and scenario testing including an assessment of the implications for LAs and recommendations for increasing potential developments in the future.

1.11 Figure 1-4 provides an overview of the methodology used for the deployment analysis and scenario testing which is explained in further detail in Section 3.

Figure 1-4 Methodology overview



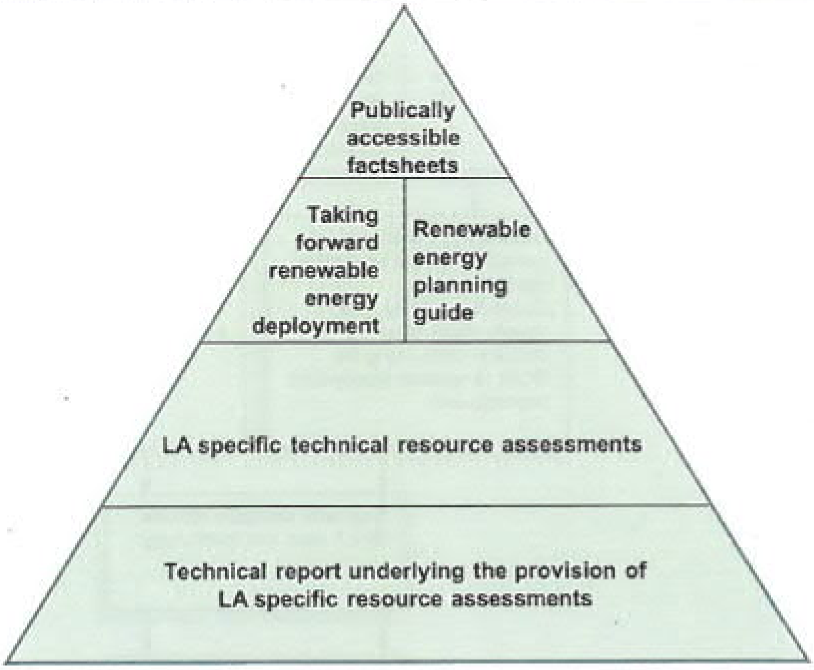
Source: SQW

Hierarchy of outputs from this study

1.12 As previously stated, this report is one of a suite of outputs provided to Lancashire Council. It builds directly on the fourteen individual LA technical resource assessment reports and the accompanying technical report that were issued in April 2011. This report is accompanied by a planning guide to assist LA officers with the development of renewable energy planning policy and guidance. The results of this report have also been used to inform publicly accessible factsheets that have been produced for each LA in Plain English bite-sized fashion suitable for informing elected members, developers and local communities of the key findings of the study and implications for each specific LA.

1.13 Figure 1-5 provides an overview of the relationship between each of the study outputs.

Figure 1-5: Relationship between outputs



Source: SQW

Structure of the report

1.14 The remainder of the report is structured as follows:

- Section 2 provides the overarching policy context for the deployment of renewable energy with regards to both energy and planning policy and an introduction to each of the renewable resource methodologies considered within the study.
- Section 3 sets out the methodology utilised to undertake the deployment constraints analysis and scenario testing and provides the full results of this analysis.
- Section 4 uses the results from section 3 to identify the implications for Lancashire as a whole, its district authorities and the unitary authorities of Blackburn with Darwen and Blackpool.
- Section 5 provides our concluding statements and recommendations for the future deployment of renewable energy across Lancashire.

1.15 In addition there are four annexes which provide:

- technical resource assessment results by technology and local authority
- status of development plans in each of the Lancashire local authorities and identification of current renewable energy policies
- current installed renewable energy capacity by technology and LA
- deployment constraints and scenario modeling results by LA.

2: Wider policy context for renewable energy deployment in Lancashire

2.1 This section provides a brief overview of the national and local energy and planning policy context for the deployment of renewable energy, as summarised in Table 2-1. The section also provides a brief explanation of each of the onshore renewable energy technologies with which the study is concerned.

Table 2-1: Summary of policy context

Energy Policy

- Policy on renewable energy capacity is fast moving and changing to take into account emerging technologies and targets at the national and global level.
- Coalition Government is committed to furthering deployment of renewable energy.
- Key current policy: UK Renewable Strategy, 2009 (source 15% of energy needs from renewable sources by 2020).
- Key financial incentives:
  - The Renewables Obligation which is the main mechanism for supporting large-scale generation of renewable electricity.
  - Renewable Heat Initiative announcement in March 2011 – phase 1 non-domestic from June 2011, phase 2 domestic from autumn 2012.
  - Premium Payment scheme for domestic renewable heating systems targeted at off gas grid properties starting 1 August 2011.
  - Feed in Tariffs support renewable energy generators with capacity less than 5 MW – currently under review to make efficiency savings due to be complete by end 2011. In June 2011 fast track decisions were announced on changes to the tariffs for anaerobic digestion plants and larger solar projects >50kW.
- Energy Bill 2010 – 3 key measures: The Green Deal, measures to enable low carbon technologies, further provisions including support to the private sector, the Energy Company Obligation and measures to support energy efficiency.
- Electricity Market Review White Paper, 2011, identifies key challenge of meeting electricity demand as 25% of current capacity is removed over the next 10 years due to plant closures and introduces specific measures to attract investment, reduce the impact on consumer bills and create a secure mix of electricity sources including gas, new nuclear, renewables and carbon capture and storage.
- UK Renewable Energy Roadmap, 2011, sets out shared approaches (across England, Wales, Scotland and Northern Ireland) to unlock renewable energy potential by building on existing actions and introducing new measures to promote greater deployment of eight key technologies.
- Emerging legislation: potential revision of Climate change levy; more support to LAs & communities re: ownership of renewable assets.

Planning policy

- National planning policy: Planning Policy Statement 22 Planning for Renewable Energy and Supplement to PPS1: Planning and Climate Change; national planning system review imminent, Localism Bill intending to shift power from central government back into the hands of individuals, communities and local authorities.
- Regional Spatial Strategies revoked so have no status in terms of material considerations and targets are no longer valid.
- Lancashire LAs at different stages in LDF development process – accompanying planning guide will assist with developing sound planning policies for renewable energy.

Source: SQW

Energy policy

Overview

2.2 Policy on renewable energy capacity is fast moving and changing to take into account emerging technologies and targets at the national and global level. During the five years from the end of 2004 through to 2009, worldwide renewable energy capacity grew at rates of 10–60 percent annually for many technologies. For wind power and many other renewable technologies, growth accelerated in 2009 relative to the previous four years.[4] Currently, UK policy is in a state of flux with new Coalition Government policy emerging through 2011. The 2010 Comprehensive Spending Review confirmed the current Government's commitment to investing in this area and to pressing ahead with the UK's competitive advantage in the green economy. The Department for Energy and Climate Change (DECC) is the only department that will see its Capital Budget rise over the Spend Review Period; a 59% increase is planned by 2014-2015.

2.3 The UK's current policy stance is to dramatically increase its use of renewable energy (including renewable electricity generation, renewable heat and renewable energy/fuels for transport). Underpinned by an EU-wide commitment to increase the use of renewable energy, the UK has committed to sourcing 15% of its energy from renewable sources by 2020.

2.4 Renewables will help the UK to recover some of its energy self-sufficiency, while ensuring that more imported energy comes from reliable sources. Globally, there is an ongoing transition to a new, low-carbon future, and the UK can make the most of economic opportunities in this sector by getting ahead on the renewables agenda as quickly as possible.

Renewable Energy Strategy

2.5 The current Renewable Energy Strategy for the UK was put in place by the former Government to promote the security of the national energy supply by reducing overall fossil fuel demand by around 10% and gas imports by 20 - 30% against what they would have been in 2020 and to help tackle climate change, by reducing the UK's emission of carbon dioxide by over 750 million tonnes between now and 2030. The strategy also has the aim of creating up to half a million more jobs in the UK renewable energy sector resulting from around £100 billion of new investment. Alongside energy saving, nuclear and carbon capture and storage; the strategy is a key element of an overall transition plan for the UK to achieve a low-carbon, sustainable future.

Government priorities and key incentives for renewable and low carbon energy

2.6 Last year's Spending Review revealed the Government's plans on renewables and how it intended to take forward the low carbon agenda. Although the Renewable Energy Strategy is still in place, the Spending Review, plus the Business Plan for DECC published in November 2010, set out Government thinking and proposed action on the topic with reform priorities as summarised in Table 2-2 below:

[4] REN21 Global Status Report http://www.ren21.net/globalstatusreport/REN21_GSR_2010_full.pdf

Table 2-2: DECC's priorities for 2011-15

- Save energy with the Green Deal and support vulnerable consumers.
- Reduce energy use by households, businesses and the public sector, and help to protect the fuel poor
- Deliver secure energy on the way to a low carbon energy future.
- Reform the energy market to ensure that the UK has a diverse, safe, secure and affordable energy system and incentivise low carbon investment and deployment
- Drive ambitious action on climate change at home and abroad.
- Work for international action to tackle climate change, and work with other government departments to ensure that we meet UK carbon budgets efficiently and effectively
- Manage our energy legacy responsibly and cost-effectively
- Ensure public safety and value for money in the way we manage our nuclear, coal and other energy liabilities

Source: DECC Business Plan 2011-2015

2.7 The current Government has retained the commitment to obtain 15% of energy from renewables by 2020 by supporting the roll out of large and small scale technologies and will aim for a 34% reduction in greenhouse gas emissions by 2020 compared to 1990 levels.

2.8 As a result of the Spending Review, DECC will no longer fund technologies unless it is confident that they are the most critical to meeting long-term de-carbonisation and energy security objectives. Nor will it contribute to funding the establishment of the National Nuclear Centre of Excellence or provide the same scale of funding to deal with the overseas nuclear legacy once current commitments are met. The Government's key needs for technical advice and related support on nuclear non-proliferation issues will instead be met by new cross-government arrangements that were announced in the Strategic Defence and Security Review. There will be an end to voluntary contributions to international energy and climate organizations; instead contribution to international low carbon technology efforts will be channeled through the Official Development Assistance Budget. There will also no longer be funding for any of the economic development activities previously funded by the Regional Development Agencies.[5]

Renewable Heat Incentive

2.9 On 10 March 2011, the Government announced the details of the Renewable Heat Incentive[6] (RHI) policy to change the way heat is generated and used in buildings and homes. The RHI will provide support for a range of technologies and fuel uses including solid and gaseous biomass, solar thermal, ground and water source heat-pumps, on-site biogas, deep geothermal, energy from waste and injection of biomethane into the grid.

2.10 The RHI is the first financial support scheme for renewable heat of its kind in the world. The RHI will represent over £850m investment over the spending review period, driving a more-than-tenfold increase of renewable heat over the coming decade and moving renewable heat into the mainstream, whilst achieving efficiency savings of 20 per cent or £105million a year by 2013-15.

2.11 The scheme will be introduced in two phases. In the first phase, long-term tariff support will be targeted in the non-domestic sectors, at the big heat users - the industrial, business and

[5] DECC Business Plan 2011-2015 http://www.decc.gov.uk/assets/decc/About%20us/decc-business-plan-2011-2015.pdf

[6] http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/incentive/incentive.aspx

public sector – which contribute 38% of the UK's carbon emissions. Under this phase there will also be support of around £15 million for households through the Renewable Heat Premium Payment. This is due to come into force in September 2011.

2.12 The second phase of the RHI scheme will see households moved to the same form of long-term tariff support offered to the non-domestic sector in the first phase. This transition will be timed to align with the Green Deal which is intended to be introduced in October 2012. In the meantime a Premium Payment scheme for domestic renewable heating systems targeted at off gas grid properties has been launched. This phase will start in October 2012.

Feed-in Tariffs

2.13 Feed-in-Tariffs (FITs)[7] are a financial incentive for renewable generators with an installed capacity below 5MW. The initiative was developed by DECC designed to encourage individuals and businesses in the UK to generate renewable energy. FITs aim to make renewable generation more financially viable by guaranteeing generators a long term fixed price for the renewable energy they produce. This will help the UK reach its 2020 target of generating 15% of the UK's energy from renewable sources. They are particularly designed for 'first time' generators and will consist of two tariffs: a Generation Tariff and an Export Tariff:

- **Generation Tariff** – a fixed rate that a generator will receive for every kilowatt of renewable energy generated regardless of where the energy is used. To measure the generation there must be an Ofgem approved total generation meter connected to the installation.
- **Export Tariff** – a fixed 3p/kWh rate for the surplus amount of energy which is sent back to the electricity grid. This is measured by an export meter onsite and will initially be estimated for smaller installations. Generators will receive the export tariff in addition to the generation tariff.

2.14 On 7 February 2011, the Energy Minister, Chris Huhne announced the start of the first review[8] of the FITs scheme to be completed by the end of 2011. As confirmed at the Spending Review, the review will determine how the efficiency of FITs will be improved to deliver £40 million of savings, around 10%, in 2014/15. The review will be completed by the end of 2011, with tariffs remaining unchanged until April 2012 – unless the review reveals a need for greater urgency. Changes proposed include the following:

- indexation of all tariffs by Retail Price Index (RPI) in future years
- support for electricity generation from biomass (other than anaerobic digestion) will not be provided by FITs, but will be continued to be supported through Renewable Obligation Certificates instead

7 http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/feedin_tariff/implementation/implementation.aspx

8 http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/feedin_tariff/fits_review/fits_review.aspx

- a pilot programme for support of domestic scale microCHP through FITs
- changes to the banding structure for AD, hydro and wind
- deferral of the start of degression of tariffs by one year with a steeper profile thereafter.

2.15 As part of the FIT scheme review, a fast-track review was initiated by DECC in relation to the tariffs for large-scale and stand-alone solar photovoltaic (PV) projects (over 50kW); for example, so called solar farms, and farm-scale anaerobic digestion of up to 500 kilowatts. A consultation on the fast-track review was held between March and May 2011. The outcome of this fast-track review was announced on 9 June 2011. This confirmed the Government's proposed tariff reductions for solar PV larger than 50 kilowatts and all stand-alone PV installations, and increases for farm-scale anaerobic digestion (up to and including 500 kilowatts).

Green Investment Bank and Finance for Overseas Development

2.16 The Spending Review also included a commitment of providing £1 billion of funding to capitalise a UK-wide Green Investment Bank (GIB). Subject to final design, this will aim to provide financial interventions to unlock significant new private investment in green infrastructure projects. Government ministers have said they want to '*create an enduring institution which can re-invest the proceeds from its investments*' and expect the GIB to support risk that the market currently cannot afford. On 29 June 2011 the GIB Commission published its recommendations for the initial design and focus of the Bank in its report *Unlocking investment to deliver Britain's low carbon future*[9].

2.17 Spending on overseas development assistance (ODA) was also protected, providing £2.9 billion of international climate finance to help developing countries.

Carbon Capture and Storage

2.18 On carbon capture and storage, the Spending Review revealed that there will be up to £1 billion of investment to create one of the world's first commercial scale carbon capture and storage (CCS) demonstration plants and there is an additional commitment to providing public funding for four CCS demonstration plants in coming years.

Carbon Reduction

2.19 The CRC Energy Efficiency scheme (formerly known as the Carbon Reduction Commitment) will be maintained but reformed with the first allowance sales for 2011-12 emissions now taking place in 2012 rather than 2011. The scheme is a mandatory scheme aimed at improving energy efficiency and cutting emissions in large public and private sector organisations. These organisations are responsible for around 10% of the UK's emissions. The scheme is designed to tackle CO_2 emissions not already covered by Climate Change Agreements (CCAs) and the

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[9] http://www.climatechangecapital.com/media/108890/unlocking%20investment%20to%20deliver%20britain%27s%20low%20carbon%20future%20-%20green%20investment%20bank%20commission%20report%20-%20final%20-%20june%202010.pdf

EU Emissions Trading Scheme. Following the Spending Review, revenues from allowance sales in the scheme, totalling £1 billion a year by 2014-15 will be used to support the public finances, including spending on the environment, rather than recycled to participants.

Energy Legacy

2.20 The legacy of UK energy will be managed responsibly in a way that protects public safety. The Department will continue to manage capital funding for the Nuclear Decommissioning Authority (NDA) and spending on the highest hazards at sites such as Sellafield are protected.

Energy Bill (December 2010)

2.21 The Energy Bill has been designed to provide for a step change in the provision of energy efficiency measures to homes and businesses, and make improvements to our framework to enable and secure, low carbon energy supplies and fair competition in the energy markets. The Bill seeks to provide for some of the key elements of the Coalition's Programme for Government and its first Annual Energy Statement. It is a first step in our legislative programme and further legislation will be sought to implement, for example, the findings of the Electricity Market Reform Programme.

2.22 The Energy Bill has three principal objectives: tackling barriers to investment in energy efficiency; enhancing energy security; and enabling investment in low carbon energy supplies. In summary, the Bill seeks provisions for:

- The Green Deal
- Measures to enable low carbon technologies
- Further provisions including support to the private sector, the Energy Company Obligation and measures to support energy efficiency.

The Green Deal

2.23 The Green Deal[10] is the Coalition Government's initiative to support the implementation of energy efficiency measures to households and businesses without needing to meet any upfront costs. The programme will be backed with a totally new finance mechanism designed around the needs of people and business. The Queen's Speech in May 2010 set out a provisional timetable to put in place the legal framework needed for Green Deal. It is an anticipated that the Green Deal will be launched in autumn 2012.

2.24 The Green Deal has provision:

- To create a new financing framework to enable the provision of fixed improvements to the energy efficiency of households and non-domestic properties, funded by a charge on energy bills that avoids the need for consumers to pay upfront costs. This framework will include:

[10] http://www.decc.gov.uk/en/content/cms/tackling/green_deal/green_deal.aspx

- powers to set parameters around the use of this facility to ensure consumer protection for both the originator of the work and subsequent occupiers
- powers to limit access to the financial mechanism in the framework to the installation of measures that are expected to deliver savings exceeding the level of the charge
- an obligation on energy companies to administer the charges and pass monies to the appropriate party.

- To exempt energy suppliers from the Consumer Credit Act requirement to gain a credit licence when they collect Green Deal payments, and exempt Green Deal Providers from the requirement to hold a consumer credit licence in respect of Green Deal Finance offered to smaller businesses, to avoid segmenting the non-domestic market.

2.25 In November 2010, DECC announced that the Energy Bill would create powers to allow any tenants asking for 'reasonable energy efficiency improvements' to receive them from 2015 onwards.[11] It was also announced that local authorities would be given powers to insist that landlords improve the worst performing homes. Local authority action would focus on homes with an Energy Performance Certificate Rating (EPC) of F and G.

Measures to enable low carbon technologies

2.26 These measures will firstly involve extending existing Secretary of State powers in the Energy Act 2004 (that expire on 18 December 2010) and also extend existing Ofgem powers in the Electricity Act 1989 to enable the implementation of an enduring offshore electricity transmission regime beyond 2010. Secondly, they will require amending existing powers in the Energy Act 2008 that enable the Secretary of State to modify a nuclear operator's Funded Decommissioning Programme; to ensure that there is an appropriate balance between the Secretary of State's powers to protect the taxpayer and the operator's need for clarity over how those powers will be exercised.

Other provisions in the Energy Bill

2.27 Other provisions in the Energy Bill include:

- **Private Rented Sector:** establishing powers for the Secretary of State, which would, in the event of continued poor energy efficiency performance in the Private Rented Sector, prevent private residential landlords from refusing a tenants' reasonable request for energy efficiency improvements to be undertaken in their properties, where a finance package is available. It would also require private landlords in the domestic and non-domestic sector to improve some of the least energy efficient properties where finance is available. The earliest date regulations could be made is April 2015.

[11] DECC Press Release 'Huhne heralds green homes revolution', November 2010

- **Energy Company Obligation:** amend existing powers in the Gas Act 1986, Electricity Act 1989 and the Utilities Act 2000 to enable the Secretary of State to create a new Energy Company Obligation to take over from the existing obligations to reduce carbon emissions (the Carbon Emissions Reduction Target (CERT) and Community Energy Saving Programme (CESP)), which expire at the end of 2012). Also, to work alongside the Green Deal finance offer by targeting appropriate measures at those households which are likely to need additional support, in particular those containing vulnerable people on low incomes and those in hard to treat housing.
- Further measures to improve energy efficiency including:
  - amending the smart meters powers in Energy Act 2008 to allow Government to direct the approach to the roll-out of Smart Meters until 2018 and to enable the Secretary of State to make changes to transmission licences to ensure the effective introduction of the new central communications arrangements to support all Smart Meters
  - amending the Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007, to enable the removal of unnecessary restrictions on access to data
- a series of measures to improve energy security
- a measure extending the role of the Coal Authority
- Repeal of Home Energy Conservation Act 1995 (HECA) in England, Scotland and Wales.

Electricity Market Reform and Renewables Roadmap July 2011

2.28 In December 2010, DECC and HM Treasury together launched consultations on fundamental reforms to the electricity market to ensure the UK can meet its climate goals and have a secure, affordable supply of electricity in the long term. The key proposals included:

- four reforms to provide long-term certainty for electricity investors
- a new market to have a built-in level playing field for low carbon
- rules for existing investments protected
- long term impact on household electricity bills lower than under the current market.

2.29 Following the consultations, the Electricity Market Reform (EMR) White Paper *'Planning our electric future: a White Paper for secure, affordable and low-carbon electricity'*[12] was published on 12 July 2011. This paper sets out the Government's commitment to transform the UK's electricity system to ensure that future electricity supply is secure, low carbon and affordable. It identifies the key challenges as security of supply as existing plans close with around a quarter (around 20 GW) of existing generation likely to be lost over the next 10

[12] http://www.decc.gov.uk/en/content/cms/news/pn11_061/pn11_061.aspx

years as older or more polluting plants are closed, which if not replaced could result in increasing, expensive blackouts. Other challenges identified are the need to decarbonise electricity generation to meet the 2020 target of meeting 15% of energy needs from renewable energy, a projected increase in demand for electricity despite improvements in energy efficiency and an increase in electricity costs.

2.30 The White Paper sets out key measures to attract investment, reduce the impact on consumer bills and create a secure mix of electricity sources including gas, new nuclear, renewables and carbon capture and storage. Key elements include:

- A Carbon Price Floor to reduce investor uncertainty, putting a fair price on carbon and providing a stronger incentive to invest in low-carbon generation.
- The introduction of new long-term contracts (Feed-in Tariff with Contracts for Difference) to provide stable financial incentives to invest in all forms of low-carbon electricity generation. A contract for difference approach has been chosen over a less cost-effective premium feed-in tariff.
- An Emissions Performance Standard set at 450_g CO_2/kWh to reinforce the requirement that no new coal-fired power stations are built without carbon capture and storage, but also to ensure that necessary short-term investment in gas can take place.
- A Capacity Mechanism, including demand response as well as generation, which is needed to ensure future security of electricity supply. Further views will be sought on the type of mechanism required.

2.31 The White Paper was accompanied by the publication of the UK Renewables Roadmap[13]. The Roadmap is intended to set out a comprehensive action plan to accelerate the UK's deployment and use of renewable energy, in order to achieve the 2020 target, while driving down the cost of renewable energy over time.

2.32 This study has strong resonance with the Roadmap and its precursor, the North West Renewable Energy Capacity and Deployment Study, is highlighted within the document as an example of how to take forward capacity assessments.

2.33 The UK Renewables Roadmap identifies the eight technologies that have either the greatest potential to help the UK meet the 2020 target in a cost-effective and sustainable way, or offer great potential for the decades that follow. These are: onshore wind, offshore wind, marine energy, biomass electricity, biomass heat, ground source heat pumps, air source heat pumps and renewable transport.

2.34 Energy from wind, biomass and heat pumps are identified as the leading contributors, including offshore wind - where the UK has abundant natural resource and is already the world's largest market. The remaining energy necessary to meet the 2020 target is expected to come from technologies such as hydropower, solar PV, and deep geothermal heat and power.

[13] http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/re_roadmap/re_roadmap.aspx

Emerging energy legislation and policy

2.35 Consultation on the reform of the Climate Change Levy[14] to provide support to the carbon price was undertaken in spring 2011 with plans to publish on the consultation by November. The Government will decide whether to introduce a levy on electricity supplies for CCS or to fund future demonstrations from general public spending from this consultation.

2.36 There are also particular implications for local authorities and communities from the Government's commitment to maximising renewable energy generation. In August 2010, the ban on local authorities selling renewable energy generated from their own estates was overturned. According to a letter from Chris Huhne to all local authorities, they *'should assume their rightful place leading a local power revolution'*. This will open new sources of income including the full benefit of the FIT and it is estimated could generate up to £100 million a year in income for local authorities across England and Wales.

2.37 In addition more support is to be given to community ownership of renewable assets. The Coalition's Programme for Government[15] stated that it would *'...encourage community-owned renewable energy schemes where local people benefit from the power produced. We will also allow communities that host renewable energy projects to keep the additional business rates they generate'*. Further details of how this will operate in England are expected in the coming months and DECC has also established "Community Energy Online"[16] to support local authorities and community groups on renewable energy.

2.38 Overall, there are still important national policy decisions being made in this area which will impact on the Lancashire authorities' approaches to renewable energy. It is important that local authorities and regional agencies keep abreast of unfolding policy developments to ensure that their policies and practices align with national policy and legislation.

Planning policy for sustainable energy

National

2.39 The Government has announced a programme of radical reforms to the planning system as part of its agenda for devolving greater powers to councils and neighbourhoods. The approach to reforming the planning system is set out in the *Open Source Planning* Green Paper[17], which sets out a wide range of proposals for a new 'open source' planning system. Central to these reforms is a 'simple and consolidated' national planning framework, the details of which are still awaited. The implications of a new national planning framework on specific areas of planning policy, including renewable energy, are currently unknown.

2.40 In the meantime, current national policy and guidance set out in planning policy statements (PPS) and planning policy guidance (PPG) will continue to apply, and will be a material consideration when determining planning applications for renewable energy developments.

[14] http://www.hmrc.gov.uk/budget2011/tiin6125.pdf
[15] HM Government 2010 – The Coalition's Programme for Government.
[16] http://ceo.decc.gov.uk/
[17] http://www.conservatives.com/~/media/Files/Green%20Papers/planning-green-paper.ashx

2.41 Planning Policy Statement 22: Renewable Energy (PPS22) and its Companion Guide, both published in 2004 (ODPM), set out the Government's national policies and key principles for planning for renewable energy in England. It states that increased development of renewable energy resources is vital in facilitating the delivery of the Government's commitments on both climate change and renewable energy. The Supplement to PPS1: Planning and Climate Change (ODPM, 2007) also states that local planning authorities should provide a framework that promotes and encourages renewable and low carbon energy generation.

2.42 In March 2010, the former Government commenced consultation on a revised draft PPS: Planning for a Low Carbon Future in a Changing Climate, which was intended to replace the PPS1 supplement and PPS22. The emphasis of this draft statement was that planning should actively support and help drive the delivery of renewables and low carbon energy, with particular importance placed on the role of regional strategies in setting ambitious targets for renewable energy and a clear strategy to support their delivery. It also stated that targets should be based on an assessment of the region's renewable energy resource, following guidance on assessing potential for renewables in the English regions published by the Department of Energy and Climate Change (DECC). In the light of the change in Government, the future of this revised PPS is still uncertain but is likely to be changed.

2.43 This year's Budget and Growth Review announced on 24 March 2011 set out proposals aiming to ensure that the planning system better supports economic growth and sustainable development. These measures are intended to complement wider reforms to the planning system including the removal of central targets and encouraging local councils to bring forward more homes through incentives to share in the benefits of growth. The Budget proposals include:

- **A new presumption in favour of sustainable development** - fundamentally a presumption in favour of development except where this would clearly compromise the key sustainable development principles in national planning policy, including protecting the Green Belt and Areas of Outstanding Natural Beauty. The presumption is intended to give developers, communities and investors greater certainty about the types of applications that are likely to be approved, and will help to speed up the planning process and encourage growth.
  - ➢ The proposed wording was published on 16 June 2011 and will be consulted on as part of the consultation on the draft National Planning Policy Framework which is due to be published imminently.
  - ➢ The presumption states that LAs should:
    - o prepare local plans on the basis that objectively assessed development needs should be met, and with sufficient flexibility to respond to rapid shifts in demand or other economic changes
    - o approve development proposals that accord with statutory plans without delay
    - o grant permission where the plan is absent, silent, indeterminate or where relevant policies are out of date.

- **A pro-growth national policy planning policy framework** - the Government intends to combine all national planning policies into one document called the National Planning Policy Framework. This will contain the Government's key economic, social and environmental objectives and planning policies to deliver them. The framework will be published for consultation imminently, with the aim of finalising it by the end of 2011, if possible.

- **Changes to permitted development rights** - removing the requirement for planning permission for change of use to convert vacant and derelict offices into new homes. The Government will consult on this shortly and also launch an urgent review of the Use Classes Order, which determines how a building can be used, for example as a shop or office. The review will examine the role the Use Classes system can play in supporting growth.

- **Prioritising growth and jobs** - local authorities should prioritise growth in the decisions that they take locally. Councils should ensure they are not imposing any unnecessary burdens in the way of development; where development has stalled, councils should be open to reviewing section 106 agreements at the request of developers, and look at making possible amendments to get growth underway.

- **Piloting elements of the land auctions model** - the Government is interested in testing the potential of land auctions to bring forward land for development, improve competition and provide greater certainty for developers. The approach will be piloted with public sector land through auctioning parcels of land with planning permission. The outcomes of the pilot will inform next steps for looking at land auctions more widely.

- **Extending neighbourhood planning to businesses** – businesses now have the right to initiate Neighbourhood Plans and Neighbourhood Development Orders. This is intended to encourage growth by reducing the need to apply for planning approval in order to develop. Businesses will need to work closely with and win the approval of local communities in order to establish a neighbourhood plan or order.

- **Removal of central targets** - the Government will, through the National Planning Policy Framework, remove the Whitehall target specifying the levels of housing development that should take place on previously developed land as concerns over 'garden grabbing' have led to the definition of previously developed land becoming discredited. However, strong policy protection will be maintained for the environment, including maintaining the Green Belt, National Parks, Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty and other environmental protections.

- **Removing bureaucracy from planning applications** - simplifying and speeding up the planning application process will include a 12-month guarantee for the processing of all planning applications, including appeals which have been made in a timely fashion. The Government will consult on proposals to make outline and other applications simpler, and on other streamlining measures.

- **New duty for councils to co-operate on planning issues** – the Localism Bill will place a new Duty to Co-operate on councils to work together to address planning issues that impact beyond local boundaries, such as on transport, housing, or infrastructure. Councils are already operating in natural economic areas that stretch beyond traditional boundaries through 31 local enterprise partnerships.

- **Fast track, democratic system for major infrastructure applications** - the new Major Infrastructure Unit will maintain the stability and speed of the current fast track system for applications, but decisions will be made by Ministers rather than unelected officials.

Localism Bill

2.44 The Government's Localism Bill was introduced to Parliament on 13 December 2010. The intention of the Bill is to shift power from central government back into the hands of individuals, communities and local authorities. It is intended that increasingly community groups and local institutions should be given the power to deliver local services and includes a number of important elements:

- decentralisation and strengthening local democracy
- Non-Domestic Rates
- community empowerment
- a radical re-boot of the planning system including neighbourhood planning
- changes to social housing policies
- Devolving Powers to the Mayor and London Boroughs.

2.45 Whilst proponents of the Bill consider that it should accelerate rather than put a break on development, concerns have been voiced that it could lead to increased NIMBYism which can be a significant barrier to the consent of renewable energy developments.

Regional

2.46 In June 2010, the Coalition Government announced the revocation of Regional Spatial Strategies (RSS) with immediate effect with new ways for local planning authorities to address strategic planning and infrastructure issues to be introduced in the Decentralisation and Localism Bill. However, in November 2010, Cala Homes (South) Ltd won a case against the Secretary of State for Communities and Local Government, with the outcome being that the latter was not entitled to use the discretionary power to revoke regional strategies contained in s 79(6) of the Local Democracy, Economic Development and Construction Act 2009. As a result, RSS remains a material consideration although its revocation is still intended.

2.47 The North West RSS promotes the deployment of renewable energy with overall objectives to:

- reduce energy demand and break the link between energy demand and economic growth
- promote and exploit low carbon and renewable energy technologies and increase the amount of electricity and energy for heating from renewable sources supplied and consumed within the North West.

2.48 In addition, it has specific renewable energy policies based on the North West Sustainable Energy Strategy, which include Policy EM 17 Renewable Energy and Policy EM 18 Decentralised Energy Supply, aiming to ensure that by 2020 at least 20% of the electricity which is supplied within the North West should be provided from renewable energy sources. In order to achieve this overall target, targets have been set by technology and sub-region – these targets for Lancashire are replicated in Table 2-3

Table 2-3 North West Regional Spatial Strategy Renewable Energy Targets, 2020

Renewable energy type/scale	Number of schemes	Capacity (MW)
Onshore wind farms & clusters	13 – 20	232.5
Single large wind turbines	11	16.5
Small stand-alone wind turbines	15	0.45
Building mounted micro-turbines	4,100	4.1
Biomass fuelled CHP/electricity schemes	3	19
Anaerobic digestion of farm biogas	5	10
Hydro power	2	0.1
Solar photovoltaics[18]	10,250	20.5
Landfill gas	0	0
Sewage gas	4	1.2
Thermal treatment of municipal/industrial waste	1	40
Total[19]	54-61	344.4

Source: The North West of England Plan: Regional Spatial Strategy to 2021, GONW

2.49 Less attention is currently paid to these targets due to the likely revocation of RSS which could lead to a substantial policy void at the regional/local level. However, in a letter to chief planning officers (dated 6th June 2010) the Secretary of State stated the following with regards to regional policies on renewable and low carbon energy:

'Through their local plans, authorities should contribute to the move to a low carbon economy, cut greenhouse gas emissions, help secure more renewable and low carbon energy to meet national targets, and to adapt to the impacts arising from climate change. In doing so, planning authorities may find it useful to draw on data that was collected by the Regional

[18] This category is assumed to consist of a variety of different scales of domestic, commercial and 'motorway' schemes. With domestic PV encouraged by building Regulations, the number of domestic installations was projected to increase greatly

[19] All totals are exclusive of micro wind and photovoltaics installations

Local Authority Leaders' Boards (which will be made available) and more recent work, including assessments of the potential for renewable and low carbon energy.'

Local

2.50 Each of the Lancashire LAs is at a different stage in their LDF preparation and therefore in the development and adoption of renewable energy policies. Annex B provides a brief review of the status of each Local Development Plan (LDP) and identifies existing renewable energy policies. The supporting Planning Guide will be useful for all LAs, regardless of the stage of their current LDP as the importance of a supportive and transparent planning environment is crucial for the increased deployment of renewable energy across the county. In the absence of regional targets, advice and support; LAs should ensure that they keep themselves abreast of ongoing national energy and planning policy developments to ensure that these are reflected in their own policy decisions as far as possible as greater emphasis is likely to be placed on the need for local authorities to encourage the development of renewable and low carbon energy through local policies.

Overview of renewable resource technologies

2.51 This study has focused on the following onshore resource technologies, for which full individual technical resource capacity assessments are set out in the previously published LA-specific reports:

- onshore wind – commercial and small scale
- biomass – from plant and animal sources, including waste (municipal and industrial, plus landfill and sewage gas)
- hydropower – small scale
- microgeneration – solar photovoltaics, solar heating, ground source and air source heat pumps
- combined heat and power.

2.52 Table 2-4 provides a brief review of each of these technologies:

Table 2-4 Renewable energy technologies

Technology	Description	Scale	Example	Type of energy generated
Commercial scale wind	• The natural energy of the wind can be harnessed to drive a generator that produces electricity. • Commercial scale wind refers to on-shore wind farm developments for commercial energy generation and supply. The majority of these developments are connected to the national grid, however private-wire schemes are also an option and some already exist. Configurations of groups of wind turbines or individual turbines are used.	Most large scale wind turbines produce energy on the 1 – 3 MW range. The number of turbines per site can range from individual turbines to groups of turbines (classed wind farms) which can generate substantial amounts of energy. Turbines are usually in excess of 100m high and required wind speeds of over 5m/s at 45m above ground level (agl)	Scout Moor Wind Farm, Lancashire	Electricity
Small scale wind	• Small scale wind energy developments can be installed on site and supply the on site demand before excess energy is discharged to the grid. • Tend to be located in or next to built up areas so their potential is a function of the number of available sites rather than the density of sites that could be installed as with commercial wind developments	Small scale wind refers to turbines which have a capacity of less than 100Kw. Lower hub/tip heights of about 15m agl and are viable at lower wind speeds (4.5m/s at 10m agl)	Various	Electricity
Biomass	• Biomass is material of recent biological origin derived from plant or animal sources. • Biomass is widely used to feed heating systems. Modern biomass heating technology is well developed and can be used to provide heat to buildings of all sizes either through individual boilers or via district heating systems. • Biomass is increasingly being used to fuel electricity plants or combined heat and power plants due to the low carbon emissions associated with their use. • Key biomass sources include: managed woodland, energy crops, waste wood, agricultural arisings, poultry litter, wet organic waste, municipal solid waste, commercial and industrial waste, landfill and sewage gas • Three conversion processes are used to convert	Scale can range from very small individual boilers to large scale energy from waste plants producing hundreds of megawatts of heat and/or electricity	Carr Farm AD plant, Warton Lancashire	Electricity and heat

Technology	Description	Scale	Example	Type of energy generated
	biomass to energy: direct combustion of solid biomass, pyrolysis and gasification of solid biomass, anaerobic digestion of solid or liquid biomass.			
Hydropower	• Hydro power involves harnessing the power of flowing or falling water (from rivers, or stored in reservoirs) through a turbine in order to produce electricity. • The parameters determining the amount of electricity produced include the turbine generating capacity, the turbine discharge flow (the volume of water passing through the turbine at any given time, which will change depending on the time of year) and available head (the vertical distance between the point where the water is highest and the turbine). The larger the head, the more gravitational energy can be converted to electrical energy. • Hydropower can also be combined with storage (pumped storage), by pumping water from a low elevation to a high elevation at times of plentiful supply of electricity for release when needed.	Small scale hydropower schemes are defined as having capacity of up to 50 KW. The Environment Agency considers it unlikely that any large scale hydropower schemes will be installed in Lancashire	Worsthorne Hydro, Burnley	Electricity
Microgeneration	**Solar photovoltaics (PV)** • Solar photovoltaics (PVs) harness energy from the sun to produce electricity. PV cells are formed into a panel that can be attached to the roof or walls of a building. Each cell is made from one or two layers of semiconducting material, usually silicon. **Solar water heating** • Solar thermal heating systems use solar panels, called collectors, fitted to a roof. These collect heat from the sun and use it to warm water which is stored in a hot water cylinder. Liquid inside the solar panels absorbs solar radiation and heats up. This heat is transferred to a hot water cylinder by pipes. Your boiler tops up this stored heat to reach the temperature set on your cylinder thermostat.	Microgeneration describes the generation of low, zero or renewable energy at a 'micro' scale. It covers energy generation resource that is decentralised, not centralised. Microgeneration is defined under the Energy Act 2004 as referring to installations <45kWs (micro-heat) and <50kWs (micro-electricity). Microgeneration can therefore refer to community scale energy which may fall within these capacities. Microgeneration needs to be installed in considerable numbers to make a significant overall contribution to energy generation.	Various	Electricity and heat

Technology	Description	Scale	Example	Type of energy generated
	Ground source heat pumps • Ground Source Heating (GSH) systems use the natural steady temperature of the ground to heat radiators, underfloor heating systems and hot water. Beneath the surface the ground stays at a fairly constant temperature, even in the middle of winter, so a GSH pump can be used throughout the year. **Air source heat pumps** • Air Source Heating (ASH) uses the temperature of the outside air to produce usable heat for space heating purposes. Acting like a fridge in reverse, the heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. Most systems are capable of extracting heat from outside temperatures as low as -15℃. Heat pumps are not self-sufficient as they require electricity to run, but the heat they extract from the air is renewed naturally. There are two main types of ASH pump systems.			
Combined heat and power	• Combined heat and power (CHP) sometimes known as Co-generation (or together with cooling – trigeneration) is the use of a single piece of plant to generate both heat and electricity. In conventional power generation large quantities of energy in the form of heat are wasted. By using this technique, the total energy conversion efficiency can reach 90%. • Combining this with sustainable fuels such as biomass and domestic energy saving measures, community heating schemes can provide low cost heating that has a minimal carbon footprint.	CHP plants are available in all capacities from large CHP plants where the electricity output feeds into the national network and the heat is used locally; through building or community sized CHP plants to Micro CHP that effectively replace the boiler of a single home.	Various	Electricity and heat

Source: SQW and Maslen Environmental

3: Deployment constraints and scenarios to 2020 – methodology and results

Introduction

3.1 This section explains the methodology utilised to analyse and apply deployment constraints to assess a realistic level of renewable energy that could be deployed by 2020. It then presents the results of that analysis alongside two further scenarios of different technology mixes that could be adopted in order to reach this level of renewable generation over the next 9-10 years.

3.2 The results of the constraints modelling and the different technology mix scenarios are provided for each of the Lancashire LAs. Further insight and analysis of the implications of the deployment and scenario analysis for the individual local authorities is set out in Section 4. Section 4 also provides analysis of economic, carbon and other socio-economic and environmental factors which may impact on and be impacted by future deployment patterns.

Constraints and deployment scenarios methodology

3.3 The purpose of the constraints and scenario analysis is to investigate the most significant areas of constraint on the growth rates of different renewable energy technologies and apply these constraints to provide quantitative forecasts of possible deployment pathways to 2020. The focus of the analysis is upon constraints that are likely to have a material impact on the potential deployment of renewable energy sources at 2020 rather than minor constraints that might have temporary and/or localised effects but little overall impact. The constraints and scenario analysis has been carried out using the SQW *RE:Deploy* tool that has been designed for local authority scale analysis and customised for the Lancashire study.

3.4 The analysis is based around four types of constraint as indicated below. These are similar to the constraints that were investigated in the North West Renewable Energy Capacity and Deployment Study.

- economic viability
- transmission constraints
- supply chain constraints
- planning constraints.

Economic viability

3.5 Given that many renewable energy technologies are relatively new and still undergoing significant innovation, economic viability varies between them and is of key importance. The economic viability of each technology has a significant effect on the probability of its deployment and we have utilised the findings from a number of recent studies to inform our analysis[20]. These include:

- Committee on Climate Change (2011). *Achieving deployment of renewable heat*, undertaken by Element Energy and NERA Economic Consulting
- Committee in Climate Change (2011). *Cost of low carbon generation technologies*, undertake by Mott Macdonald
- Element Energy (2008). *The growth potential for Microgeneration in England, Wales and Scotland.*

Transmission constraints

3.6 The electricity transmission system can constrain the deployment of large scale (transmission connected) new renewable energy capacity. This is most likely to occur if a proposed site for a renewable energy project is a long distance from the existing electricity transmission grid or if the grid is already at or near full capacity. In these situations, access to the grid will be granted and in the context of the period 2010-2020, time delays to provide the connection can be seen as temporary. However, significant investment may also be required to provide connection to the grid. Under the agreed charging schemes[21] these up front investments can render particular renewable energy projects as uneconomic.

3.7 During the first stage of the study, we undertook a detailed analysis of grid transmission constraints for gas and electricity which involved consultation with the electricity supply industry. The individual LA resource assessments reported on the key issues for each LA; largely constraints are minimal other than in designated areas such as Areas of Outstanding Natural Beauty and therefore should not have a major impact on the deployment of renewable energy across Lancashire. Further into the future, the major upgrade planned in Cumbria to support the development of developments such as at Sellafield, will boost transmission and distribution in Lancashire from 2020.

Supply chain constraints

3.8 Given that many renewable energy technologies are relatively new and still undergoing significant innovation, supply chains for producing and installing some technologies may be constrained. As supply chains for some of the renewable technologies are global, consideration is needed of what is happening outside of the UK as well as any likely regional variations. Clearly the picture will also change over time with new supply chains established in response to committed demand and as regional, national and international support initiatives help to tackle initial bottlenecks. The investigation of supply chain constraints has utilised the findings from a number of recent studies conducted in this area, in particular a study on *Supply Chain Constraints on the Deployment of Renewable Electricity Technologies (BERR, 2008).*

[20] The analysis was undertaken prior to the publication of the Arup study on study on projected costs and deployment potential for different renewable electricity technologies up to 2030 for DECC (June 2011).
[21] http://www.nationalgrid.com/uk/Electricity/Charges/

Planning constraints

3.9 The planning system can have a major influence on the deployment rate of new renewable energy projects where planning consent is required. The key parameters are the approval rate for planning applications and the duration and delays to planning decisions for different technologies and types of project. Recent historic data has been used as the starting point for the analysis of planning constraints, largely drawing upon a study of planning approvals for renewable energy projects in the North West region between 2004 and 2009 (Envirolink Northwest, 2010) and also publicly available data from RESTATS.

3.10 The Lancashire LAs were consulted to obtain their views on the key constraints and potential deployment scenarios via an email survey in May 2011 to ensure that their local experiences, knowledge and insight into the progress of renewable energy across Lancashire were incorporated.

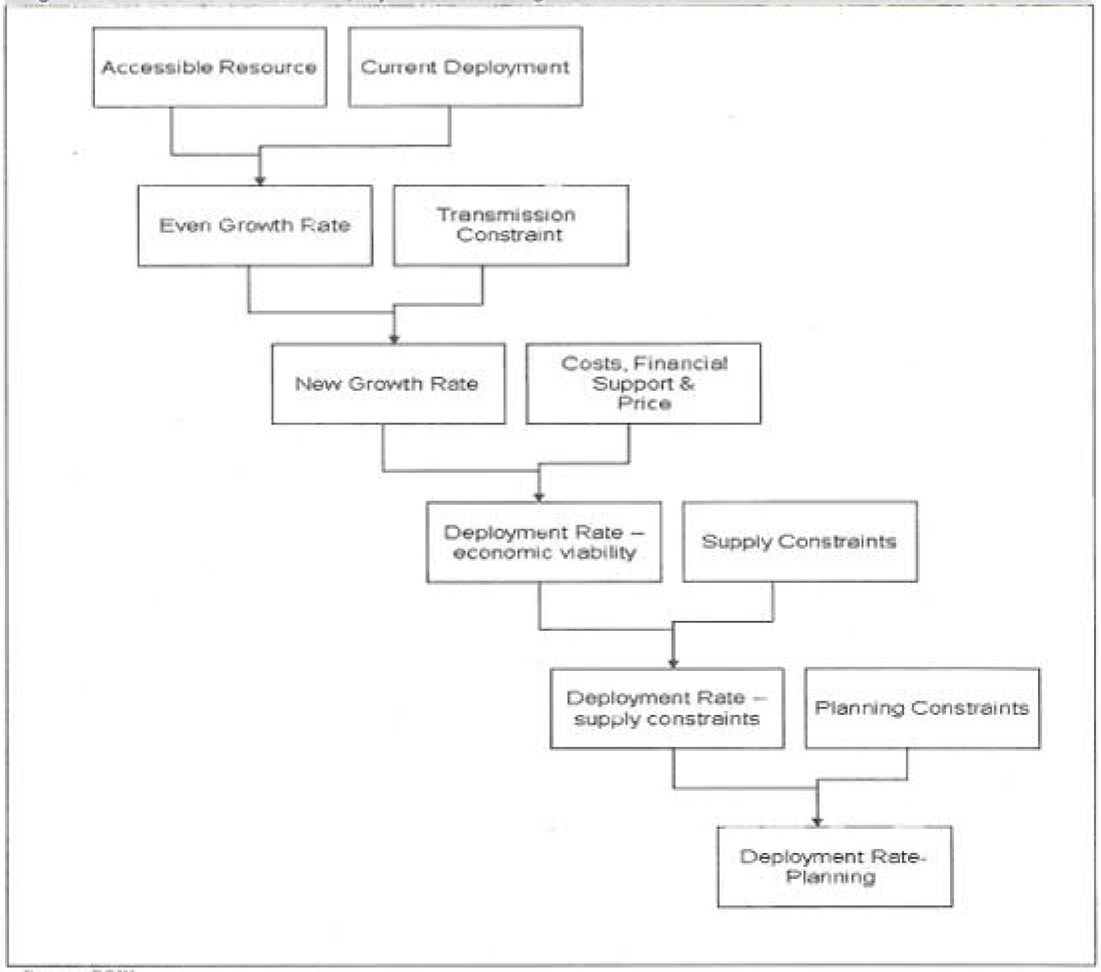
Deployment modelling tool

3.11 The deployment modelling was supported by SQW's *RE:Deploy* tool for local authority scale analysis, which was developed in Microsoft Excel. A schematic of design of the tool is provided in Figure 3-1 showing how the four constraints (economic viability, transmission, supply chain and planning) were applied to illustrate different assumptions and scenarios for the deployment/growth of each renewable energy technology. Further information regarding the characteristics of the two scenarios is presented in the following sections.

3.12 The overall process for identifying the potential deployable capacity by 2020 involved the following steps:

- Identification of current installed capacity and potential capacity with planning consent (Annex C includes the full list of sites which are operational, under construction, have consent or awaiting planning consideration).
- Calculation of the difference between the current installed and consented capacity, and the technical available resource identified earlier in the study on an LA basis.
- Identification of LA specific growth rates to reach the technical capacity constrained by economic factors (using national benchmarks), transmission constraints (using the grid analysis undertaken earlier in the study), supply chain constraints (using national benchmarks) and planning acceptance rates (using the evidence from the Envirolink study and RESTATS data).
- Projecting forward from the current installed capacity (or 5% of the technical capacity if there were no current installations) using the constrained growth rate over the next 10 years on an individual LA basis.
- Aggregation of the LA results to provide a deployable capacity figure for Lancashire as a whole.

Figure 3-1: Schematic for the deployment modelling tool



Source: SQW

Renewable energy scenarios to 2020

3.13 Three scenarios were agreed following consultation with the 14 Lancashire local authorities and in discussion with the client team at Lancashire County Council. The main features of the scenarios and the differences between them are described below:

3.14 ***Scenario 1: 'RE: Deploy results'*** provides the results of the constraints and deployment modelling taking account of the current installed capacity. It generates a bespoke technology mix and level of renewable energy deployment to 2020 within Lancashire. The other scenarios (2 and 3) then provide different technology mixes and pathways for meeting the same level of deployment by 2020 as results from the *RE:Deploy* modelling.

3.15 ***Scenario 2: 'Balanced mix'***, which reflects the indicative national technology proportions identified within the UK Renewable Energy Strategy 2009 to obtain 15% of the UK's energy needs from renewables by 2020. This provides overall proportions of:

- 35% commercial scale wind
- 2% small scale wind

- 20% plant biomass (energy crops, managed woodland, waste wood, agricultural arisings)
- 18% energy from waste (wet organic waste, poultry waste, municipal solid waste, commercial and industrial waste, landfill gas and sewage gas)
- 3% small scale hydropower
- 22% microgeneration (solar photovoltaics, solar water heating, ground source and air source heat pumps).

3.16 *Scenario 3: 'Balanced growth'* or business as usual projecting forward the current installed capacity mix within each of the Lancashire LAs (the mix differs between LAs according to characteristics of current installed capacity).

3.17 Another scenario reflecting a significant increase in large scale commercial wind was suggested for inclusion in the analysis. This suggestion was explored, but in practice the *RE:Deploy* modelled results (scenario 1) were found to reflect this situation, based on the fact that this is the largest proportion of technical available resource in Lancashire.

Deployment constraints and scenarios modelling results

3.18 From the *RE:Deploy* modelling (Scenario 1), the results for Lancashire and for each LA are shown in Table 3-1 alongside the current installed capacity and total technical capacity figures.

3.19 Overall the results suggest that **786 MW of renewable energy** could be generated by 2020. Under this scenario West Lancashire would deploy the most renewable energy capacity - based on its technical capacity being greater than all other LAs. However, it is noticeable that this is from a low start (just 5MW electricity is currently generated in West Lancashire) so a major step change, particularly in the deployment of commercial wind, would be required over the next nine years to reach this.

Table 3-1: Deployment projections to 2020 by LA

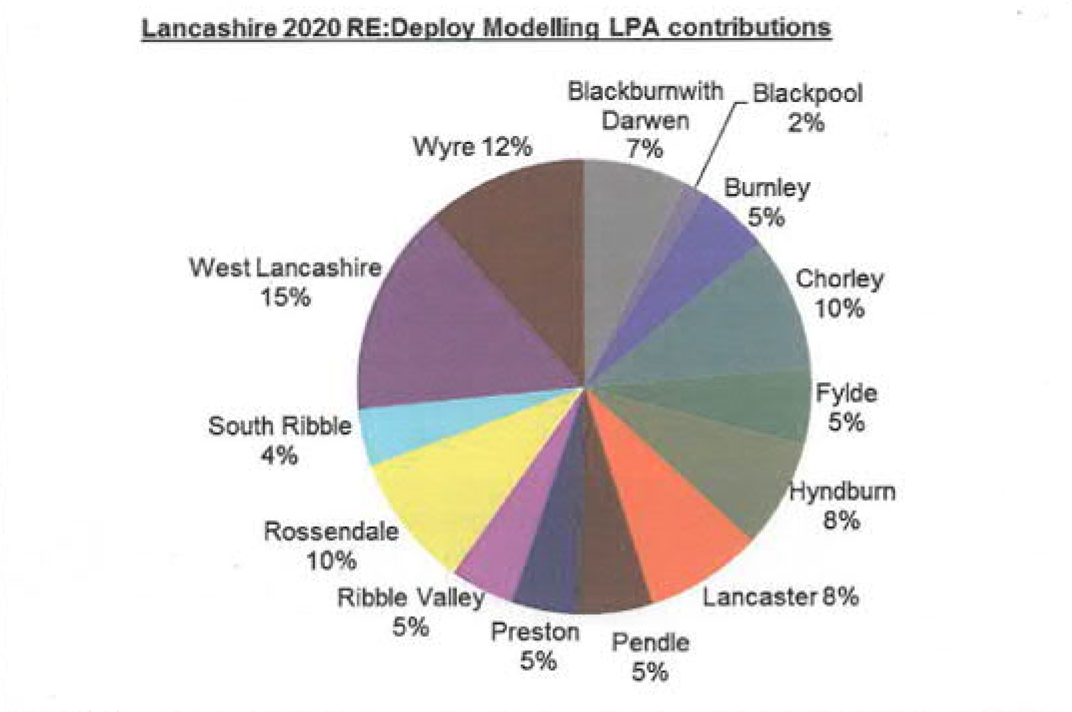
Local Authority	Current Installed Capacity 2011 (MW)	Additional projected deployment to 2020 (MW)	Total deployment 2020 (MW)	Total technical capacity (MW)
Blackburn with Darwen	7	51	**58**	933
Blackpool	0	13	**13**	362
Burnley	21	19	**40**	408
Chorley	10	66	**76**	1057
Fylde	6	37	**43**	604
Hyndburn	26	35	**61**	362
Lancaster	21	45	**66**	1004
Pendle	0	42	**42**	661

Local Authority	Current Installed Capacity 2011 (MW)	Additional projected deployment to 2020 (MW)	Total deployment 2020 (MW)	Total technical capacity (MW)
Preston	0	37	37	660
Ribble Valley	0	36	36	557
Rossendale	33	43	76	691
South Ribble	1	31	32	529
West Lancashire	5	113	118	1630
Wyre	22	69	91	1155
Lancashire total	**152**	**634**	**786**	**10,612**

Source: SQW

3.20 This proportion is split between the LAs as shown in Figure 3-2.

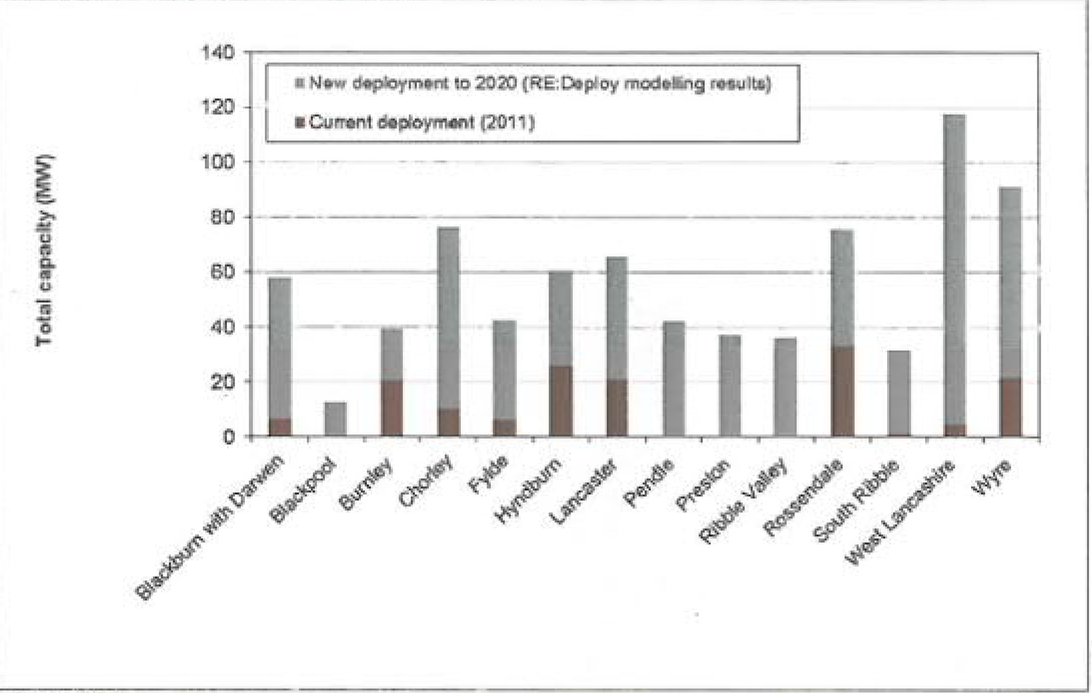
Figure 3-2: RE Deploy modelling results by LA



Source: SQW

3.21 The additional amount that each LA is expected to deploy is shown in Figure 3-3:

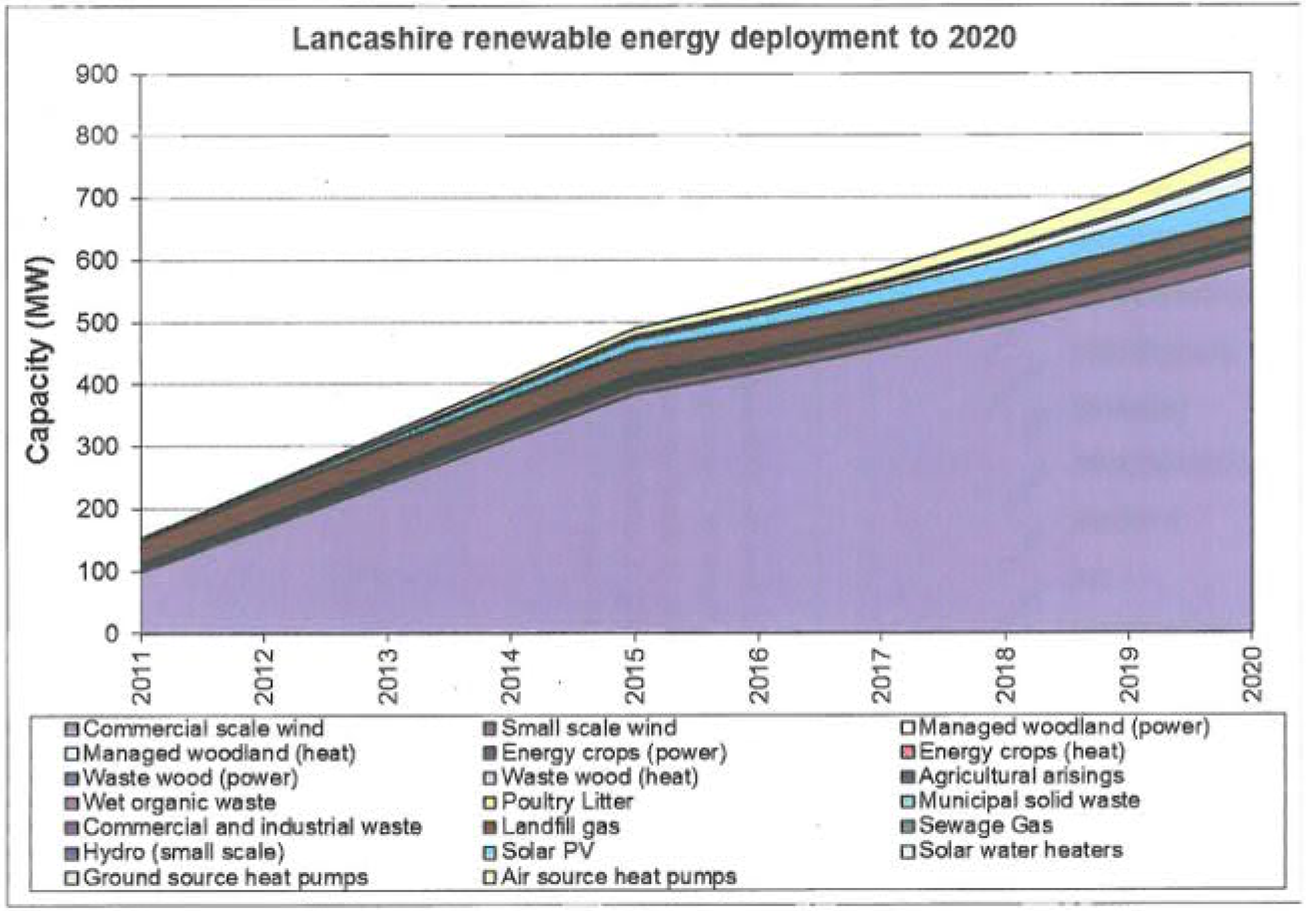
Figure 3-3: Current and projected additional deployment by LA



Source: SQW

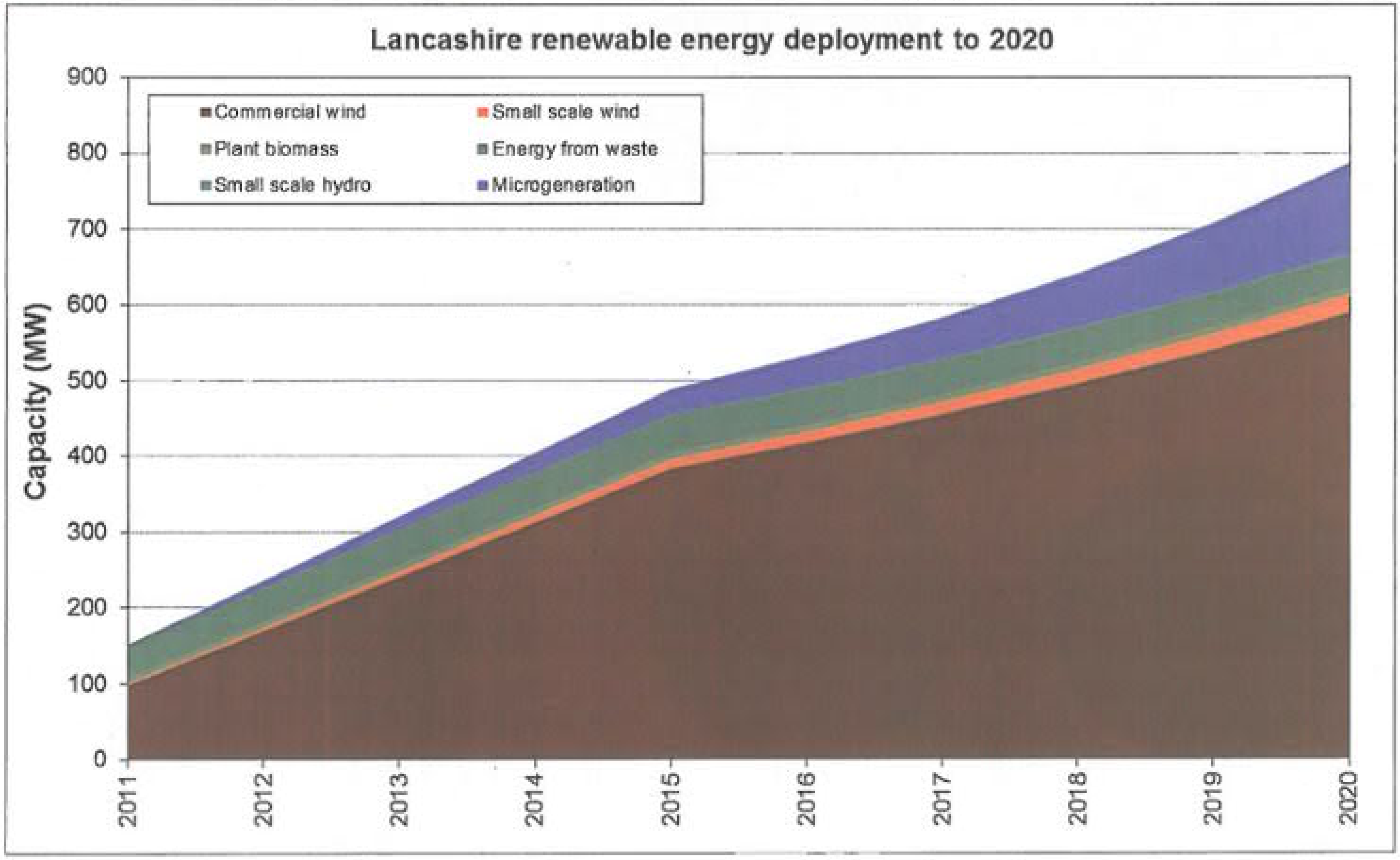
3.22 Figure 3-4 and Figure 3-5 show the deployment curves (i.e. the "build rates") for the onshore renewable energy technologies for Lancashire as a whole. These reveal that commercial scale wind will continue to play an important part of the sub-region's technology mix with plant biomass also representing a considerable proportion of the overall mix. The largest proportional increase is envisaged to be in microgeneration which is starting from a very low base.

Figure 3-4: Lancashire renewable energy deployment curve to 2020



Source: SQW

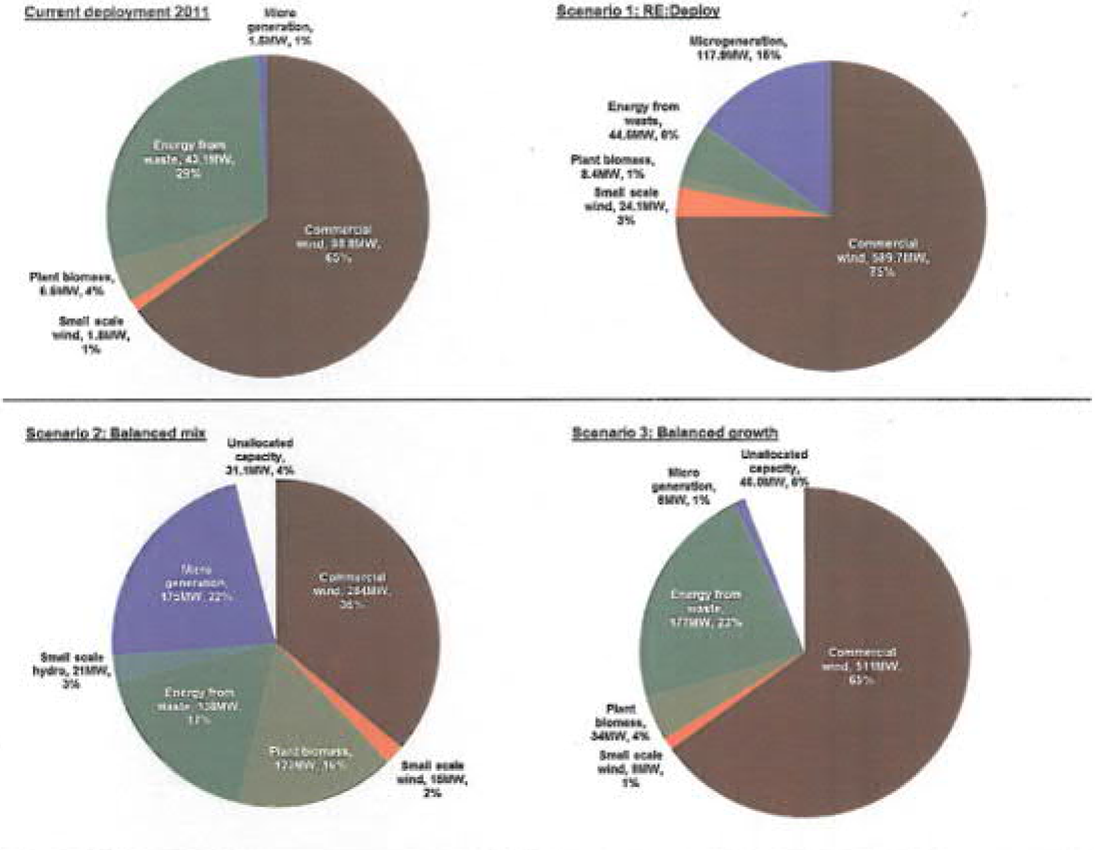
Figure 3-5: Simplified Lancashire renewable energy deployment curve to 2020



Source: SQW

3.23 Table 3-2 provides an overview of the scenario results for the whole of Lancashire.

Table 3-2 Scenario results for Lancashire (NB all future scenarios relate to total deployment of 786 MW)



Source: SQW

3.24 The current deployment pie chart in the top left hand corner shows the overwhelming prevalence of commercial wind (99 MW out of a total of 152 MW); unsurprising as this is also the largest proportion of the available technical capacity. Energy from waste also provides a substantial resource, which is largely comprised of landfill gas. At 4% of the total, plant biomass provides just 7 MW, whilst small scale wind and microgeneration both comprise just 1% of total capacity each. Currently, just 0.1 MW is generated from small scale hydro schemes in Lancashire.

3.25 The *RE:Deploy* modelling results show an even greater proportion of capacity from commercial scale wind – at 75% of the total, with a substantial increase in microgeneration from the current 1.5 MW to just under 118 MW. The proportion of energy from waste is projected to reduce although the actual amount will remain approximately the same (43 MW compared with the current 45 MW), which is due to the resources available for landfill gas production reducing (due to European legislation concerning future limits on landfill) whilst other sources are projected to increase, but remain at around the same proportions as the installed capacity. Small wind is expected to increase from 1% of the total (1.8 MW) to 3% of the total (24 MW) whilst small scale hydro schemes are expected to show a modest increase from 0.1 to 1.8 MW; however, this does not show up on the relevant pie charts due to the very small relative amounts (less than 1% of the total).

3.26 The *Balanced Mix* scenario reflects the projected share of technologies required nationally to reach the Renewable Energy Strategy targets. In this scenario, there is a shortfall in capacity (depicted by the 'empty wedge' in the pie chart) which is due to the technical capacity for plant biomass being reached in Lancashire. In other words, for 786MW of renewable energy to be deployed by 2020, this shortfall would need to be made up through increased deployment of other technologies.

3.27 The large proportion of microgeneration (23 % of the total, 173 MW) would require a very substantial increase in the deployment of schemes across the county, which would only really be feasible with continued or increased financial incentives. It is important to note that the high level constraints analysis in the model did not include an appreciation of local building stock. This is particularly relevant for building integrated technologies such as solar PV, which may not be appropriate in many of the older terraced properties in East Lancashire, for example.

3.28 This scenario also requires a substantial uplift in deployment from hydropower, to the technical available capacity. This could be stretching as the initial assessment from a report produced by the Environment Agency[22] included a number of very environmentally sensitive schemes; however, a current study of the hydropower opportunities within the Forest of Bowland Area of Outstanding National Beauty[23], has revealed that there is possibly more potential than identified within the Environment Agency study but much of this will be extremely small scale and need measures introduced to address environmental constraints e.g. fish passes. There would also need to be a similar uplift in plant biomass deployment, which is financially viable and has relatively lower impacts on the environment so should be achievable. Small scale wind is expected to increase by a similar proportion and amount as with the *RE:Deploy* (significant increase in commercial wind) scenario.

3.29 The *Balanced Growth* scenario reflects business as usual; that is continuing to deploy greater amounts of renewable energy but in the same proportions as the pattern of current deployment. However, the maximum technical capacity for energy from waste is exceeded showing that it would not be possible to continue increasing renewable energy deployment into the future on a linear trajectory reflecting the current technology mix. This leaves a 6% capacity shortfall which would need to be made up from other sources to meet the 786 MW deployment level.

3.30 Annex D provides the full deployment and scenario modelling results for each local authority and Section 4 provides further analysis of the findings and identifies the implications of the results for individual LAs and Lancashire as a whole.

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[22] Opportunities and environmental sensitivity mapping for hydropower in England and Wales, 2010 http://publications.environment-agency.gov.uk/PDF/GEHO0310BRYF-E-E.pdf

[23] http://www.forestofbowland.com/climatechnage#hydro

4: Implications for LAs including economic and carbon abatement impacts

4.1 This section provides our interpretations of the results and analysis for Lancashire and its constituent authorities with regards to increasing renewable energy deployment, in general, and specifically considering different scenarios (i.e. different technology mixes) through which the uplift can be achieved.

4.2 The section then goes on to consider the more qualitative elements that will impact on renewable energy development, such as environmental issues, political and planning factors and the potential for community deployment to identify which key factors will impact on the deliverability of each of the defined scenarios.

4.3 The final part of this section describes the findings of analysis using the *PACE* tool[24] regarding the economic and carbon abatement impacts associated with three of the technologies that are likely to be of crucial importance in Lancashire's future renewable energy technology mix: commercial scale wind, energy from waste and microgeneration.

Scenario implications at the LA level

Table 4-1 Results and implications of the scenarios for each LA

LA	RE:Deploy modelled results	Balanced mix	Balanced growth
Blackburn with Darwen Deployment at 2020 = 58 MW Additional deployment to 2020[25] = 51 MW	Substantial growth in commercial wind & microgeneration, but commercial wind with a less dominant share than currently (79% compared with 98%). Growth in microgeneration considerable with 10.5 MW projected for 2020. Would require continued financial incentives & retrofit that may prove challenging on older terraced housing.	Capacity shortfall of 18% as the technical capacity for plant biomass would be exceeded to reach the expected national share. Balanced mix also suggests 22% of the share would be microgeneration which is a substantial uplift to 13 MW and would have the same implications as for *RE:Deploy*.	Continuing the current mix would mean a continued dependence on commercial wind to provide almost all of the district's renewable energy provision. There is more than sufficient capacity, but continued take up will depend on availability of sites, financial incentives and political will. Cumulative impacts would also need to be taken into account.
Blackpool Deployment at 2020 = 13 MW Additional deployment to 2020 = 13 MW	Blackpool is starting from a very low base with some very small scale microgeneration. Microgeneration is projected to become the main renewable energy source making up 95% of future deployable capacity. As with Blackburn a substantial increase in building integrated renewables may prove challenging in older	Capacity shortfall of 54% due to Blackpool's limited potential resources overall – only microgeneration and energy from waste likely to generate more than 1 MW in future.	Continuing with the current mix (NB: current installed capacity totals less than 1 MW) would lead to a capacity shortfall of 53% due to the fact that current capacity is small scale wind and hydro which have very limited technical capacity.

[24] The PACE (Prioritisation of Actions for a low Carbon Economy) tool was developed by SQW for Cornwall Council as part of the EU INTERREG Regions for Sustainable Change programme.
[25] This represents the difference between current installed capacity and projected deployment at 2020

LA	RE:Deploy modelled results	Balanced mix	Balanced growth
	housing areas.		
Burnley Deployment at 2020 = 40 MW Additional deployment to 2020 = 19 MW	Commercial wind (67%), microgeneration (16%) and energy waste (15%) comprise the main elements of modelled results. As with Blackburn, the substantial increase in microgeneration may prove challenging re: older housing.	Capacity shortfall of 18% due to the limited technical capacity for small scale wind and plant biomass.	If the business as usual scenario were followed there would be a 19% capacity shortfall largely due to EU legislation re: future landfill use. Also currently landfill gas is above technical capacity due to waste being imported and so this is treated as a 'windfall'.
Chorley Deployment at 2020 = 76 MW Additional deployment to 2020 = 66 MW	The *RE:Deploy* results show a very different pattern from the current reliance on energy from waste with a substantial uplift in the deployment of commercial scale wind (from 2 – 58 MW) reflecting the substantial technical capacity. This is achievable but would depend on financial incentives and a supportive planning policy environment.	Capacity shortfall of 20% due to the technical capacity for plant biomass, energy from waste and small scale hydro being exceeded.	If the business as usual scenario were followed there would be a 60% capacity shortfall largely due to the EU legislation re: future landfill use. Also currently landfill gas is above technical capacity due to waste being imported and so this is treated as a 'windfall'.
Fylde Deployment at 2020 = 43 MW Additional deployment to 2020 = 37 MW	Due to its large untapped technical capacity for commercial scale wind, Fylde's *RE:Deploy* results show a substantial increase in deployment of this technology from 0 to 28.5 MW. Microgeneration also increases from 0.1 to 7 MW requiring greater deployment of building integrated technologies.	Capacity shortfall of 15% due to the technical capacity for plant biomass and small scale hydro (0 MW resource capacity) being exceeded.	Capacity shortfall of 60% largely due to the technical capacities for plant biomass and energy from waste being exceeded. This shows a requirement to alter the existing pattern of deployment utilising more of the potential wind and microgeneration resources to meet future renewable energy requirements.
Hyndburn Deployment at 2020 = 61 MW Additional deployment to 2020 = 35 MW	*RE:Deploy* results largely reflect the current pattern of deployment with a reliance on commercial scale wind (installed capacity 95%, *RE:Deploy* result 88%) with the main change being an increase in the deployment of microgeneration from 0.1 to 6 MW.	Capacity shortfall of 25% due to the technical capacities for small scale wind, plant biomass, energy from waste and small scale hydro being exceeded. Technical capacity is very much focused on commercial wind and microgeneration.	If the business as usual scenario were followed, the main deployment source would continue to be commercial scale wind requiring an increase in deployment from the current 22 MW to 58 MW which is slightly higher than the *RE:Deploy* results which project 53 MW deployable capacity at 2020.
Lancaster Deployment at 2020 = 66 MW Additional deployment to 2020 = 45 MW	The *RE:Deploy* results suggest a slightly lower reliance on commercial scale wind, a decrease in the proportion of energy from waste and an increase in microgeneration and small scale wind providing a more balanced portfolio overall.	Capacity shortfall of 15% due to the technical capacity for plant biomass being exceeded.	Business as usual suggests a continued reliance on commercial wind and energy from waste even though the latter is projected to decrease slightly in absolute terms due to landfill legislation.

LA	RE:Deploy modelled results	Balanced mix	Balanced growth
Pendle Deployment at 2020 = 42 MW Additional deployment to 2020 = 42 MW	Pendle is starting from a very low base with installed capacity at less than 1 MW generated through solar PV and small scale wind. Its large technical capacity for commercial wind means deployment of this technology is projected to grow the most from 0 to 34 MW which is achievable but may require additional financial incentives to those that currently exist to take forward marginal sites as well as a supportive planning policy environment	Capacity shortfall of 19% due to the technical capacities for plant biomass and small scale hydropower being exceeded.	The current mix is comprised of microgeneration and small scale wind, but the very small absolute figures must be taken into account. It is unlikely that a sufficient amount of either source could be deployed to meet the 42 MW deployment for Pendle that has been projected through the modelling.
Preston Deployment at 2020 = 37 MW Additional deployment to 2020 = 37 MW	Preston is starting from a very low base with installed capacity at just 0.1 MW generated through solar PV. It has a reasonable technical capacity for commercial wind meaning deployment of this technology is projected to grow from 0 – 22 MW. Microgeneration capacity also has the potential to grow from the current low 0.1 MW to over 11 MW. Again both of these could be achieved within the next decade, but will require financial incentives and a supportive planning policy environment.	Capacity shortfall of 19% due to the technical capacities for plant biomass and small scale hydropower being exceeded.	If the current mix was projected forward, the overall mix would be dominated by microgeneration (78% or 29 MW capacity) and there would be a capacity shortfall of 6 MW.
Ribble Valley Deployment at 2020 = 36 MW Additional deployment to 2020 = 36 MW	Ribble Valley is starting at a very low base with less than 1 MW installed capacity from microgeneration, small scale wind and small scale hydro. Due to its large technical capacity for commercial scale wind, this is the technology for which deployable capacity is projected to grow the most – from 0 to 28 MW which is achievable but may require additional financial incentives to those that currently exist to take forward marginal sites as well as a supportive planning policy environment.	Capacity shortfall of 10% due to the technical capacity for plant biomass being exceeded.	The current mix is comprised of microgeneration, small scale wind and small scale hydropower, but the very small absolute figures must be taken into account. It is unlikely that a sufficient amount from any of these sources could be deployed to meet the 36 MW deployment for Ribble Valley that has been projected through the modelling.
Rossendale Deployment at 2020 = 76 MW Additional deployment to 2020 = 43 MW	Rossendale has a large technical capacity for commercial scale wind and already has 32 MW installed capacity from this source. The *RE:Deploy* results project continued	Capacity shortfall of 30% is identified due to the technical capacities for small scale wind, plant biomass and energy from waste being exceeded.	The balanced growth scenario provides very similar results to *RE:Deploy* albeit with an increased projection for commercial scale wind (72 MW compared with 68 for

LA	RE:Deploy modelled results	Balanced mix	Balanced growth
	reliance on commercial scale wind with deployment at 2020 identified as 68 MW. Microgeneration also shows an increase from 0.1 to 6 MW		*RE:Deploy*). It also only identifies very minimal deployment of microgeneration.
South Ribble Deployment at 2020 = 32 MW Additional deployment to 2020 = 31 MW	South Ribble is starting from a very low base in terms of installed capacity with just over 1 MW generated from sewage gas, microgeneration and small scale wind. Due to its technical capacity for commercial wind, this is the technology for which deployable capacity is projected to grow the most – from 0 to 20 MW which is achievable but may need financial incentives in addition to those in place currently to support marginal sites as well as a supportive planning policy environment.	Capacity shortfall of 17%is identified due to the technical capacity for plant biomass being exceeded.	If the current pattern of deployment was continued into the future, but with larger amount of energy generated, a capacity shortfall of 46% would be created due to the technical capacity for energy from waste being exceeded. Whilst the very small absolute figures must be taken into account, this shows how the pattern of deployment needs to be amended with a particular uplift in the deployment of commercial scale wind.
West Lancashire Deployment at 2020 = 118 MW Additional deployment to 2020 = 113 MW	West Lancashire's current installed capacity is very modest (at just under 5 MW) particularly as it has the largest technical capacity of any Lancashire LA. This explains why the *RE:Deploy* results have identified such a step change in deployable capacity from 5 MW to 118 MW over the next 9 years. This is largely comprised of commercial scale wind with an increase from 0 to 99 MW. This is substantial but could be achieved through the development of a small number of wind farms over the period.	Capacity shortfall of 23% due to the technical capacities for plant biomass, energy from waste and small scale hydropower being exceeded.	If future deployment was to follow the current technology mix, only 11% of the potential 118 MW could be deployed due to the technical capacity limit of energy from waste which provides 97% of the current installed capacity. If West Lancashire is to play its part in contributing to future UK renewable energy targets, this can only be achieved through the deployment of commercial scale wind.
Wyre Deployment at 2020 = 91 MW Additional deployment to 2020 = 69 MW	Wyre's current technology mix has a large proportion of deployment from energy from waste followed by commercial wind and plant biomass. The *RE:Deploy* results suggest a changed pattern of deployment with greater deployment of commercial scale wind (from 6 to 63 MW) and also an increase in microgeneration from 0.1 to 9 MW. The increase in commercial wind is substantial, but achievable although it may require continued financial incentives as well as a supportive planning environment.	Capacity shortfall of 17% due to the technical capacities for plant biomass and small scale hydropower being exceeded.	If business as usual scenario followed, there would be a 43% capacity shortfall due to the technical capacities for energy from waste and plant biomass being exceeded. The main energy from waste source for the current installed capacity is landfill gas which will be restricted in future due to EU regulations. In order to meet future renewable energy requirements Wyre will have to diversify its technology mix with increased deployment of commercial scale wind and microgeneration.

Source: SQW

4.4 The above analysis highlights a number of important issues for the Lancashire LAs that need to be given serious consideration regarding the future deployment of renewable energy. Central to the above findings are the following key points:

- There is substantial technical capacity for commercial scale wind; however, some of the local authorities with the largest capacity currently have nil installed capacity. Whilst there are a number of constraints to the deployment of commercial wind and the technical capacity was strongly caveated; the *RE:Deploy* model results suggest that a total of 590 MW of commercial scale wind could be deployed by 2020 and this is just under 9% of the identified technical capacity. In order to significantly increase the deployment of commercial wind, a supportive planning environment will be essential as well as the continuation of financial incentives particularly with regards to more marginal sites (for example, those less favourable to developers than ones in other locations, such as Cumbria, due to low wind speeds).

- The *Balanced Mix* scenario, which reflects the indicative nationally projected technology mix is not relevant in many cases due to the low technical capacity of plant biomass and small scale hydropower, in particular. This means that other technologies would have to deploy a larger share in order to make up this shortfall to meet a level of around 786MW.

- For several local authorities, and across Lancashire as a whole, energy from waste provides a significant proportion of installed capacity. Looking into this in more detail, landfill gas provides 36 MW of installed capacity, which is almost 24% of the total installed capacity of 152 MW. This will be a declining resource in the future due to EU restrictions on landfill, which means that Lancashire not only needs to increase its total deployment figure, but also 'backfill' for the amount that will be lost from this source.

- The current installed capacity from microgeneration is minimal (1.5 MW) yet according to the *RE:Deploy* results, could increase to around 118 MW, with the largest increases in the more populous and urban areas. This is challenging, particularly taking into account the amount of older terraced housing stock across the county. However, there is considerable Registered Social Landlord (RSL) and local authority housing stock which provides larger opportunities for retrofit programmes providing financial support can be obtained. More widely, financial incentives such as FITs would need to be sustained or possibly increased in order to support the larger increase in deployment of microgeneration that is envisaged.

- The balanced growth scenario, in which LAs continue to deploy renewable energy with the same technology mix, is unlikely to be the most appropriate approach into the future due to the overall limits on certain resources such as energy from waste. This is a particular issue for specific authorities such as Burnley, Chorley, Fylde, South Ribble and West Lancashire. Essentially, Lancashire is only likely to be able to substantially increase its renewable energy deployment between now and 2020 by deploying more commercial scale wind – the uplift required is unlikely to be met through other sources.

Comparison with North West Regional Spatial Strategy renewable energy targets

4.5 The overall identified deployable renewable energy capacity is at 786 MW in 2020 - more than double the target capacity identified in the North West RSS (344.4 MW).

4.6 The below table compares the RSS targets with current installed capacity and the potential deployable capacity at 2020.

Table 4-2 RSS targets compared with installed capacity and RE Deploy results

Renewable energy technology	RSS capacity target at 2020	Current installed capacity	RE:Deploy results at 2020
Commercial wind	249	98.8	589.7
Small scale wind	4.55	1.8	24.1
Plant biomass	19	6.6	8.4
Energy from waste	50.85	43.1	44.5
Hydropower	0.1	0.1	1.8
Microgeneration	20.5	1.5	117.9
Total	344[26]	152	786

Source: SQW

4.7 It can be seen from the above table that the *RE:Deploy* results far exceed the RSS targets overall and for each individual technology other than Energy from Waste and plant biomass (for which the RSS targets exceed the *RE:Deploy* results). The hydropower installed capacity already meets the RSS target. The largest absolute difference between the RSS target and the *RE:Deploy* result is for commercial wind - *RE:Deploy* being some 331 MW higher than RSS - with the largest relative increase being for microgeneration which *RE:Deploy* suggests could be almost six times higher than the RSS target.

4.8 It must be noted that the RSS targets are based on the North West Sustainable Energy Strategy[27] which was produced almost a decade ago when many technologies were in their infancy and some, such as heat pumps, are not included. Also the methodology behind the North West Sustainable Energy Strategy was a top down assessment aiming to achieve 20% of the North West's energy demand by 2020 (exceeding national targets that were in place at the time), followed by an allocation to each sub-region. In this way it was a demand rather than supply led model. In reality, if each region were to assess its contribution to the UK target based on the supply opportunity (i.e. the resource capacity), it is likely that the North West, and possibly Lancashire, would identify the potential to contribute a greater proportion of renewables in relation to its energy use or population due to its naturally occurring resources.

[26] Total excludes building mounted micro-turbines and solar photovoltaics

[27] http://www.4nw.org.uk/downloads/documents/aug_06/nwra_1156410934_North_West_Sustainable_Energy_.pdf

Other issues related to increasing renewable energy deployment – qualitative analysis

4.9 There are a number of issues that will impact on the increased deployment of renewable energy across Lancashire, particularly associated with economic viability, supply chain, technology developments, planning and political factors, the potential for community ownership and environmental impacts. These issues have been analysed from the intelligence gained during the course of the study, including consultation with all of the Lancashire LAs and feedback from the CLASP supported planning events run by Quantum.

4.10 Indicators have been identified for each of the factors and an assessment undertaken of downside risks and upside opportunities in relation to how these indicators may impact on deployment. These are summarised in Table 4-3 and then explored further in the text below.

Table 4-3 Qualitative analysis matrix

Factor	**Indicator** i.e. the particular aspect of this factor that will have a bearing on whether the scenario can be achieved	**Downside Risk** i.e. how this could jeopardise deployment	**Upside Opportunity** i.e. how the scenario/target level could be exceeded
1. Economic viability	Continuation of existing financial incentives such as RHI and FITs	A reduction in such schemes or difficulties with their application would impact on achieving the uplift in microgeneration envisaged in the *RE:Deploy* modelling	Increased financial incentives could lead to greater deployment of microgeneration as identified in the *RE:Deploy* and *Balanced Mix* scenarios
2. Supply chain	Limited access to specialised skills for the installation of renewable technologies, but very skilled workforce in advanced manufacturing – what is being done to marry the two?	Supply chain operates as a global market although local installers are an advantage. Biggest downside likely to be regarding local employment although could also impact on achievement of all three scenarios	Greater utilisation of local skills would provide a greater impetus to meeting the scenarios and would have local employment benefits
3. Planning and political	Planning policies requiring renewable energy % in large scale developments	Without these policies, the opportunity to tie developers into providing renewable energy is lost and could lead to scenario targets not being reached	Positive planning policies including Merton type requirements (which several of the Lancashire LAs already have) could lead to a significant increase in deployment of all sources allowing scenarios could be achieved/exceeded
	Importance of communication – with other agencies e.g. MOD, with developers through pre-app discussions, with elected members and communities re: national and local policy requirements	Breakdown in communication could lead to greater misunderstanding between agencies and distrust from communities and elected members, which combined with Localist approach could lead to greater NIMBYism and reduced deployment of renewable energy	Improved communication through discussion with agencies, pre-app discussions and provision of information to elected members and communities should lead to greater deployment of renewable energy
	Differential requirements between local authorities for small scale applications	Continuation of this situation is likely to result in continued low deployment of renewable energy as the process to obtain permission is not clear	Consistent advice, potentially in the form of a Lancashire wide SPD could address this issue and provide greater clarity to applicants thus leading to increased overall deployment of renewable energy

Factor	**Indicator** i.e. the particular aspect of this factor that will have a bearing on whether the scenario can be achieved.	**Downside Risk** i.e. how this could jeopardise deployment	**Upside Opportunity** i.e. how the scenario/target level could be exceeded
4. Technology	Elected members' understanding of renewable energy technologies	Some elected members may not have had the direct experience of the technical aspects of renewable energy e.g. to provide an appreciation of the size of different installations and understand the conversion factors e.g. how much electricity is generated from a 25m high turbine. Lack of understanding could lead to permission being rejected	Taking elected members on site visits and providing information around installed size, capacity and conversion factors can lead to a turnaround in planning acceptance rates and therefore greater deployment of renewable energy
	Exploitation of CHP potential	Big opportunity to provide onsite energy demands from renewable sources could be missed if this opportunity is not promoted and supported through the planning process	Greater promotion and support through the planning process should maximise deployment. Small scale plants could be provided in schools, public buildings, district heating schemes, businesses etc subject to steady fuel and other feasibility parameters. Whittingham Hospital site which is being redeveloped for housing has planning permission for a district level CHP scheme – the first in Preston.
	Heat pump technology and roll out	Unless heat pump technology is improved, particularly with regards to carbon usage, it is unlikely that the *RE:Deploy* scenario in terms of microgeneration results could be reached	Nationally more research and development is needed to improve the technological basis for heat pumps in order to meet the anticipated increased deployment of microgeneration
	Installation of building integrated technologies on older housing stock	Older, terraced housing stock may not be suitable for building integrated technologies which could lead to the microgeneration deployment proportion not being reached under the *RE:Deploy* scenario	Potential for local authority owned stock and RSL owned stock to be subject to major retrofit schemes also meeting fuel poverty requirements as well as renewable energy targets
5. Community ownership	Interest, finance, knowledge	Lack of interest, awareness, knowledge and finances will prevent take up on any significant scheme	Provides the potential to increase the acceptability /demand amongst the public for renewables as well as individual schemes contributing to overall deployment. Awareness raising and the development of a standard framework to organise such schemes would be beneficial to encourage greater take up
6. Environmental impacts	Consideration of environmental impacts	Lack of consideration not only damaging to environment, but will also impact on public opinion and lead to reduction in renewable energy deployment	Environmental impacts need to be taken into account; the accompanying planning guidance provides advice with regards to environmental impacts of all technologies. Proper consideration of these issues will protect the reputation of renewable energy deployment and encourage greater take up in the future

4.11 From the above, the following key recommendations can be identified:

- Economic viability
  - Financial incentives need to be sustained to support a large uplift in renewable energy deployment, particularly commercial wind and microgeneration.
- Supply chain
  - Due to some anecdotal evidence of a lack of specialised installers, and a labour force with advanced manufacturing skills, it is important that re-skilling and training is a priority. This should be promoted through the Lancashire LEP.
- Planning and political
  - Improve communications, provide better information for elected members, developers and communities and develop policy guidance that requires developers to generate a certain proportion of energy from renewable sources. Addressing these elements could be supported through the development of a county-wide SPD setting out the requirements for applications for small energy installations.
- Technology development
  - CHP and heat pumps are two technologies for which there is significant untapped technical capacity. National technological developments are needed for deployment to be fully maximised, and locally there may be opportunities to support firms involved in the associated supply chains (manufacture and installation).
  - The large uplift in microgeneration suggested by the *RE:Deploy* scenario results may be challenging in some areas due to the prevalence of older, terraced housing, but this could be addressed through major RSL or LA run retrofit schemes.
- Community ownership
  - Awareness raising and potentially the development of a standardised framework for initiating and running such schemes is needed to increase current uptake which is minimal.
  - Disseminating information about, and potentially visiting successful community schemes elsewhere could also foster interest. For example, the Baywind Energy Cooperative in South Cumbria has enabled the local community to invest in local wind turbines with 35% of its shareholders living either in Cumbria or Lancaster and a larger number from the North West. Also in June 2011, it was announced that the first anniversary of the

Dewlay Cheese turbine in Wyre was to be celebrated through the establishment of a 'Go Green' fund which will distribute funding to smaller scale eco-friendly projects in the local area.

Figure 4-1: Dewlay Cheese Wind Turbine, Garstang, Wyre

Source: The Garstang Courier, 1 June 2011, Photo:Ian Robinson Installation of the wind turbine at Dewlay cheese maker near Garstang Nick and Richard Kenyon

Analysis of carbon and economic impacts

PACE tool: purpose and approach

4.12 The SQW PACE tool[28] is a transferrable model which robustly and consistently compares the impact of various mechanisms required to move towards a low carbon economy. The tool compares the **cost effectiveness** of these mechanisms, the **carbon impacts** (the carbon savings, taking into consideration the production emissions associated with delivering the measure as well as the savings it will ultimately achieve) and the **job creation impact** (the extent to which the measure will create jobs and therefore could contribute to an area's economic objectives).

4.13 All three of these impacts can be considered at a local level, i.e. only the jobs created within Lancashire, or at a total level, i.e. all jobs created "globally". Note that when considering costs, the 'local' costs are those that are borne by the local authorities in that area.

4.14 For the purposes of this analysis, the cost, carbon and job impacts refer to the *net* impacts of deploying the various renewable technologies. This means the costs, carbon emissions and

[28] The PACE (Prioritisation of Actions for a low Carbon Economy) tool was developed by SQW for Cornwall Council as part of the EU INTERREG Regions for Sustainable Change programme.

jobs associated with renewable energy deployment minus the costs, carbon emissions and jobs which would have occurred anyway (i.e. the reference case) if the energy was generated using more conventional power generation.

Selection of technologies for impact analysis

4.15 In line with the results of the *RE:Deploy* modelling, we selected three key renewable technologies for the impact analysis. These technologies were chosen because of the significant deployable potential that they have in Lancashire to 2020.

- **Commercial-scale onshore wind** – the additional deployment of 491 MW of onshore wind in Lancashire by 2020.
- **Energy from waste (focusing specifically on anaerobic digestion)** – the additional deployment of 11 MW capacity energy from waste plants in Lancashire by 2020 (in this case, landfill gas was excluded as this is a declining resource with no additional deployment)[29].
- **Microgeneration focusing specifically on domestic solar photovoltaics)** – the additional deployment of 116 MW[30] via solar PV in Lancashire by 2020.

Overall results

Net impacts

4.16 Table 4-4 and Table 4-5 show the total net impact and the local net impact respectively of deploying the three selected types of renewable energy. These have been derived from the deployment figures for each of the three technologies (491 MW commercial wind, 11 MW energy from waste and 116 MW solar photovoltaics).

Table 4-4 Total cost, carbon and employment impacts

Renewable technology	Net cost – NPV (£m)	Carbon savings (tCO_2)	Cost of carbon ($£/tCO_2$)	Jobs created (FTE)	Cost per job (£/FTE)
Commercial wind	£66	8,458	£8	5,768	£11,387
Energy from waste	£79	326	£242	1,019	£77,484
Microgeneration	£748	445	£1,680	17,905	£41,761

Source: SQW

[29] NB: the aggregate increase in energy from waste is just under 2 MW, but this is partially accounted for by a reduction in landfill gas of 10 MW which will be deployed from other sources

[30] The 116 MW of microgeneration equates to 41,429 individual PV installations (assuming 2.8 kW per installation, which according to the Ofgem Feed-in Tariff data (April 2010 to March 2011) is the current average for the North West region).

Table 4-5: Local cost, carbon and employment impacts

Renewable technology	Net cost – NPV (£m)	Carbon savings (tCO_2)	Cost of carbon ($£/tCO_2$)	Jobs created (FTE)	Cost per job (£/FTE)
Commercial wind	£0	-105	£0	4,539	£0
Energy from waste	£0	-25	£0	901	£0
Microgeneration	£0	-39	£0	14,797	£0

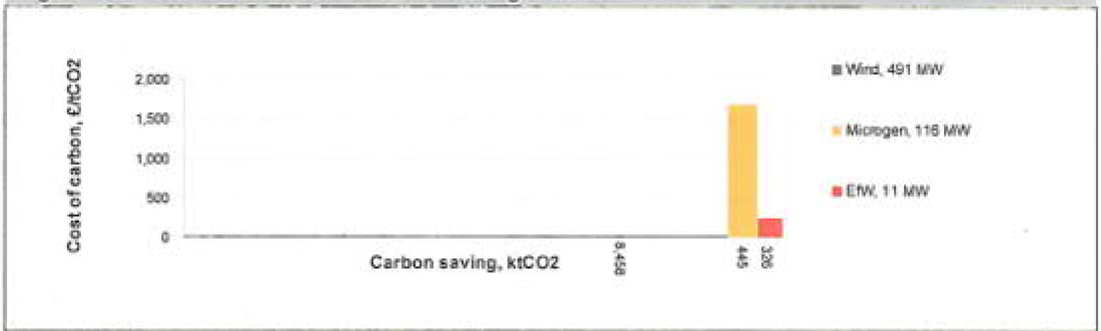
Source: SQW

Comparing total impacts

4.17 Of all three technologies, the deployment of 491 MW of onshore wind leads to the most significant carbon savings, due to the fact that the capacity, and thus the amount of traditional generation that this displaces is much higher, than both the deployable capacity for energy from waste and microgeneration.

4.18 Wind is the cheapest of the renewable energies selected in that it is the most economical in terms of the cost of achieving those carbon savings. The PACE tool analysis estimates that it would cost £8 per tonne CO_2 saved. The same tCO_2 saving would cost £242 and £1,680 if deploying energy from waste and microgeneration respectively. Figure 4-2 shows the cost of carbon savings. Tall and thin bars (e.g. microgeneration), show the deployment of technologies with low carbon savings and relatively high costs for each tonne of carbon saved. Wide and short bars (e.g. commercial wind) save larger amounts of carbon and at a smaller cost per tonne of carbon saved. NB on this chart, the wind bar does not show up due to the very low cost per tonne.

Figure 4-2: Total abatement cost v carbon saving to 2060



Source: SQW

4.19 In terms of total jobs created, wind is also more cost effective, with the costs per job considerably lower than for energy from waste and microgeneration. Nevertheless, the installation of 116 MW of microgeneration would lead to a significantly higher number of jobs compared to onshore wind and energy from waste deployment (17,905 compared to 5,768 and 1,019). Figure 4-3 shows the cost of job creation. Tall and thin bars show the deployment of technologies with low job creation and relatively high cost for each net job created. Wide and short bars create larger amounts of jobs and at a smaller cost per net job created.

Figure 4-3: Total cost per job v jobs created to 2060

Source: SQW

4.20 Energy from waste is the least attractive technology in terms of the overall carbon savings and jobs created, although this is partly because a far lower deployment rate was analysed. In terms of carbon savings, while not as economical as wind, it is more cost effective than microgeneration. It fairs worse than both other technologies, however, when comparing the cost per job created.

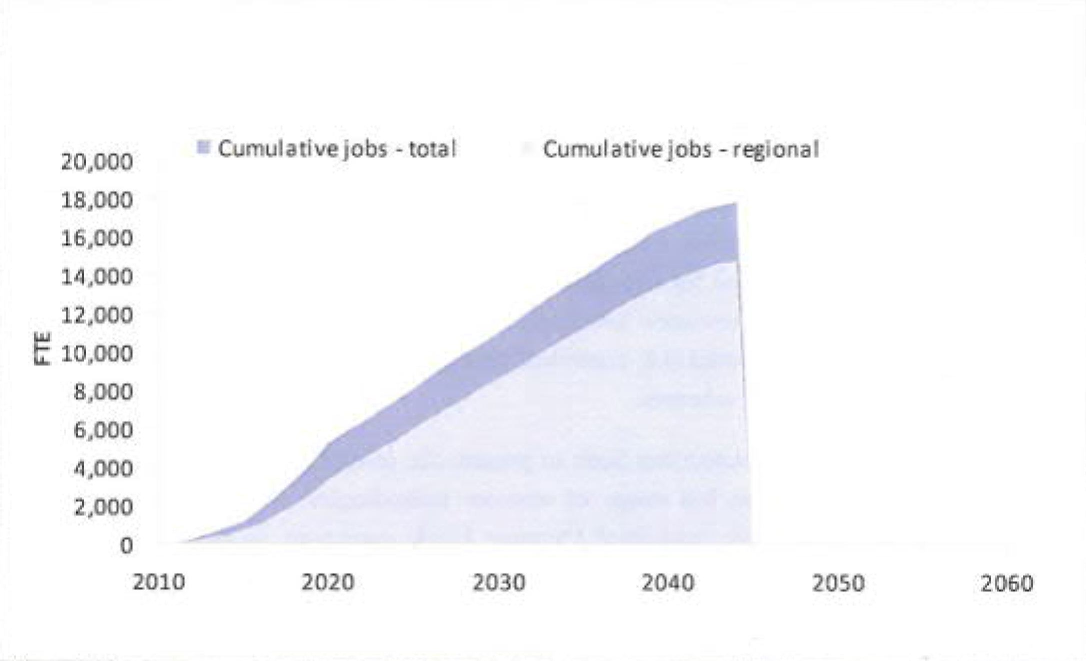
Comparing impacts within Lancashire

4.21 The sub-regional cost relates to the cost borne by the Lancashire local authorities, which in all cases is assumed to be zero. This means that the cost to Lancashire authorities of carbon savings and job creation is also zero for all technologies.

4.22 The sub-regional carbon savings are negative (i.e. local carbon emissions would rise) because the emissions that would be displaced by wind, energy from waste or microgeneration (i.e. the reference case emissions) are modelled using a combined-cycle gas power plant and are assumed to occur outside of Lancashire, as there are no such plants in the area. Conversely the life-cycle carbon emissions for the wind, energy from waste or microgeneration technologies (e.g. emissions arising from installation of the technologies) would occur in Lancashire, thus increasing local carbon emissions. We are aware that planning permission has been granted for a new gas fired power station in Wyre with a capacity of 875 MW. However, the power station has not yet been constructed and therefore has not been taken into account in these calculations.

4.23 The sub-regional jobs created (the jobs created from wind, energy from waste or microgeneration minus the jobs that would have occurred in the reference case from conventional generation) are those that occur within Lancashire as opposed to total worldwide jobs created as a result of deployment. Figure 4-4 shows that for microgeneration, the majority of the total jobs created – around 15,000 of the total 18,000 - can be captured in Lancashire (through installation and maintenance). The PACE analysis shows a similar profile for onshore wind and energy from waste.

Figure 4-4: Microgeneration jobs (using solar PV as a proxy): total versus Lancashire (116 MW)



Source: SQW

5: Conclusions and recommendations

Overview

5.1 This study has produced a comprehensive assessment of the potential accessible renewable energy resources across Local Authorities in Lancashire and explored the constraints and deployment scenarios for significantly growing their contribution to 2020. The LA specific renewable energy resource assessments have also provided an initial assessment of low carbon energy potential (i.e. combined heat and power or tri-generation (to include cooling), and district heating schemes.

5.2 The focus of the project has been to present the results at the Lancashire and individual LA scales covering the full range of onshore technologies. The project's evidence base, in conjunction with the associated Planning Guide document, is highly relevant for use at the local scale in planning policy development. The evidence and Guide can be used to assist LAs in considering the potential contribution of renewable energy and low carbon initiatives (i.e. opportunities for climate change mitigation) noting that energy consumption is a material planning consideration. The evidence base from this project has the specific advantages of being disaggregated down from the sub-regional scale to individual LAs taking their specific opportunities and challenges into account, and has been updated with more current data sources, where relevant.

5.3 The key implications arising from the different parts of the analysis in this study are summarised in Table 5-1. The overall conclusions and recommendations for LAs in Lancashire follow.

Table 5-1: Summary of key implications

Scenario implications for LAs

- Substantial technical capacity for commercial scale wind, but some of the local authorities with the largest capacity have nil installed capacity. *Redeploy* model results suggest that a total of 590 MW of commercial scale wind could realistically be deployed by 2020 which is just under 9% of the identified technical capacity.
- The *Balanced Mix* scenario, which reflects the nationally projected technology mix is not relevant in many cases due to the low technical resource availability in Lancashire for plant biomass and small scale hydropower, in particular.
- For several local authorities, and across Lancashire as a whole, energy from waste provides a significant proportion of installed capacity. The use of this source will need to change in the future due to EU restrictions on landfill (and the associated energy production).
- The current installed capacity from microgeneration is minimal (1.5 MW) yet according to the *RE:Deploy* results, could increase to around 118 MW, with the largest increase in the more populous and urban areas. Continued financial incentives will be required to realise this.
- The *Balanced Growth* scenario in which LAs continue to deploy renewable energy with the same technology mix is not viable into the future due to the overall limits on the local technical resource availability.
- For most technologies, the identified capacity via the RE:Deploy modelling exceeds the targets for 2020 within RSS. However, the evidence base for this was developed some time ago prior to considerable technological development and the introduction of financial incentives for the deployment of renewable energy. It was also firmly based on a top down assessment of demand, rather than a bottom up assessment of capacity.

Further recommendations from the analysis of other risks and opportunities

- Economic viability – importance of financial incentives, particularly for marginal commercial wind locations
- Supply chain – local labour force skills in advanced manufacturing should be promoted by the Lancashire LEP to meet requirements for skilled renewable energy installers
- Planning and political - need to improve communications, provide better information for elected members, developers and communities and develop policy guidance that requires developers to generate a certain proportion of energy from renewable sources.
- Technology development - CHP and heat pumps are two technologies for which there is significant untapped technical capacity. National technological developments are needed for deployment to be fully maximised, and locally there may be opportunities/ to support firms involved in the associated supply chains
- The large uplift in microgeneration in the *RE:Deploy* results may be challenging in some areas due to the prevalence of older, terraced housing, but this could be addressed through major RSL or LA run retrofit schemes.
- Community ownership - Awareness raising and potentially the development of a standardised framework for initiating and running such schemes is needed to increase uptake which is currently minimal.

Carbon and economic impacts from key technologies

- From analysis of three technologies: commercial wind, energy from waste and microgeneration, key findings were that onshore wind is the cheapest (in unit cost terms) technology to deploy and will achieve the highest carbon savings.
- Wind is also most cost-effective in terms of job creation (i.e. cost per job), but microgeneration would create more jobs (17,905 compared with 5,768 for commercial scale wind and 1,019 for energy from waste)

Source: SQW

Overall conclusions

5.4 The main conclusions arising from the project are that:

- **Lancashire has substantial potential deployable renewable energy resources of 786 MW. When converted into energy generation (GWh) and taking into account load factors for the various technologies, the potential electricity generation element of this is 2,000 GWh by 2020.** This compares with current electricity consumption of around 6,098 GWh[31] based on 2008 figures. The UK Renewable Energy Strategy, 2009 suggests that 15% of total future energy needs should come from renewable sources by 2020 which translates to approximately 30% of electricity production. It is noted that the national 30% indicative target includes electricity generated from offshore sources and energy consumption is projected to forecast to reduce slightly over the next 10 years. The potential deployable electricity generation figure for Lancashire of 2,000 MW by 2020 is 33% of the 2008 consumption figure, demonstrating the significant opportunity for Lancashire, even from onshore renewable electricity sources alone.
- **The successful deployment of commercial scale onshore wind is critical to the overall growth in renewable capacity accounting for approximately 75% of the full renewable energy capacity at 2020 under the deployment scenarios presented.** It is unlikely that Lancashire can make a significant contribution to meeting its potential for renewable energy by 2020 without increasing the deployment of this resource due to the scalability and/or limited capacity of other naturally occurring resources such as plant biomass, small scale wind, small scale hydropower and energy from waste. A supportive planning environment will be

[31] DECC sub-national domestic and non-domestic electricity consumption statistics, 2008

essential to achieve this along with continued financial incentives particularly for sites, which are marginal; for example, where wind speeds are at the lower ends of acceptability. Wind also provides the cheapest option as identified through the carbon and economic impact analysis and will achieve the highest carbon saving.

- **Microgeneration is also expected to provide a substantial contribution of future renewable energy deployment at 15% of the total and is starting from a low base – just 1.5 MW currently deployed.** In addition, microgeneration offers the best job creation potential as identified through the carbon and economic impact analysis. Some of the microgeneration technologies included, specifically heat pumps, are still in their infancy as regards wide-scale roll out, but continued support via Feed in Tariffs, or other financial incentives in the future, plus a supportive local policy environment should help maximise take up. Potential funding sources for wider scale roll-out for retrofit and new housing include European funding, section 106 and the Community Infrastructure Levy. Supportive planning policies are also important particularly those that require more than the standard Code for Sustainable Homes level and Merton type policies where it is specified that a certain proportion of energy should be generated on site, although we are aware that many developers are tending to focus on energy efficiency rather than renewable energy measures.

- Whilst Lancashire has substantial potential for the deployment of renewable energy; there is anecdotal evidence of a **lack of developer interest**, in specific local authorities, particularly for the deployment of commercial wind. This may be due to a number of marginal sites as a result of low wind speed (above the 5m/s at 45m agl that DECC considers sufficient, but less than the 6m/s generally favoured by developers), which may come forward once more 'desirable' sites in windier parts of the North West and the country as a whole have been exhausted. Related to this, it is acknowledged that **even where consent has been given, not all proposed developments are realised**. For example, in Fylde domestic size turbines have been approved, but these have never been developed and now permission has expired. A final point relates to the need for a reality check on the *RE:Deploy* results.

- Whilst it is **technically and, we believe, practically possible to increase deployment of renewable energy** across Lancashire to 786 MW by 2020, any delays in the planning consent or construction process, future changes to financial incentives, lack of developer interest, policy changes or technological developments in other technologies, e.g. nuclear will affect this. In addition, a substantial, sustained and widespread increase in the adoption and **implementation of energy efficiency measures may mean that a lower level of renewable energy** needs to be deployed.

Recommendations

5.5 The final stage of this study involved dissemination and discussion of the study results and launch of the planning guide with Lancashire LA officers via three area-based workshops. Wider dissemination within LAs, including with elected members, and with developers and local communities will also be essential to start to build momentum around appropriate technologies and opportunities for increasing renewable energy deployment locally.

5.6 Individual LAs may also identify the need for further refinement of the results at the local level (e.g. to test particular technology mixes/levels of ambition). Serious consideration will be required concerning the evidence base, results and their implications for individual LAs. The Planning Guide provides further information on the opportunities and options. The identification of targets is one area that LAs, individually or collectively, may wish to pursue. In so doing, it will be important that capacity plays a larger role than demand. The current policy direction is not for the UK target simply to be disaggregated down to the LA level. In other words LAs should not limit their ambition to providing 15% of their own energy needs from renewables, but should take account of the local opportunities associated with renewable energy deployment in line with the location of naturally occurring resources.

5.7 To maximise the potential of specific Lancashire's renewable energy resources, further detailed consideration is required with regard to the supporting mechanisms/environment for commercial wind and microgeneration in particular:

- Increasing the deployment of commercial wind will require supportive planning policies and it may be appropriate to consider the development of a Lancashire wide Wind SPD as has been developed in Cumbria. This would provide a more transparent environment for planners, developers and local communities and also a level playing field across the Lancashire district authorities, Blackburn with Darwen and Blackpool. We are aware that there has been a lack of interest from developers in some areas that have a substantial technical wind resource; this may be due to economic return i.e. wind speeds are sufficient for the deployment of commercial scale wind, but are not as high as some other areas suggesting a slightly lower return on investment. However it is also likely that the scarcity of new/untested sites in locations with absolutely optimum windspeeds, combined with continued gradual technological improvement (e.g. in terms of turbine efficiency), will shift the areas of search over time.

- The increased deployment of microgeneration will require supportive planning policies, particularly the promotion of Code for Sustainable Homes and Merton type policies to ensure that new build properties maximise the deployment of microgeneration measures. In addition, it is recommended that funding solutions are sought over and above the current incentives available via Feed in Tariffs, particularly for large scale retro-fit schemes. European funding provides one example - Cumbria has recently secured £3.5m from ERDF to support a major microgeneration retrofit programme working with local RSLs, Cumbria University and Envirolink Northwest.

- Community renewable energy schemes provide an opportunity to meet local needs, raise income via Feed in Tariffs and increase the acceptability of renewable energy deployment more widely. Awareness, skills and knowledge, and available finance have been identified as potential obstacles. Therefore it is recommended that a programme of awareness raising with community groups is considered – based around information on available finance and using good practice from elsewhere to publicise what can be achieved[32].

- Finally the potential job creation impacts from a significant uplift in renewable energy deployment are considerable, particularly for microgeneration. The LA officer survey revealed a lack of local skilled installers yet highlighted the advanced manufacturing skilled workforce within the area. It is recommended that the Lancashire LEP investigates this issue further to explore the transferability of existing local skills (e.g. advanced manufacturing skills) to renewable energy/microgeneration technologies (R&D, production, maintenance and installation)[33].

[32] See for example the Community Energy Online website from DECC: http://ceo.decc.gov.uk/

[33] The forthcoming UKCES offshore skills report may also provide useful information regarding skills transferability.

Annex A: Technical capacity resource assessment results by local authority

A.1 The following tables present the detailed results for each technology for each local authority across the Lancashire sub-region and the heat and electricity potential of each local authority and the proportion of the sub-regional total.

Table A-1 Potential accessible renewable energy resource (MW) by local authority area

	Wind		Biomass			Hydro power	Micro-generation		
	Commercial scale	Small scale	Plant biomass	Animal biomass	Waste	Small scale	Solar	Heat pumps	Total[34]
Blackburn with Darwen	592	11	2	1	12	2	57	255	**933**
Blackpool	1	0	0	0	9	0	65	287	**362**
Burnley	200	1	1	1	7	2	35	162	**408**
Chorley	755	33	3	4	9	1	47	205	**1,057**
Fylde	371	8	2	4	9	0	40	170	**604**
Hyndburn	171	0	1	1	7	1	33	149	**362**
Lancaster	598	36	6	11	12	4	62	275	**1,004**
Pendle	446	4	1	2	5	1	36	165	**661**
Preston	285	27	2	5	12	1	62	268	**661**
Ribble Valley	361	12	6	9	4	5	31	129	**557**
Rossendale	516	0	1	1	5	3	31	135	**691**
South Ribble	257	11	3	3	9	1	44	200	**529**
West Lancashire	1,292	44	14	2	7	1	50	220	**1,630**
Wyre	828	29	3	8	11	1	51	225	**1,155**
Lancashire total[35]	**6,674**	**215**	**46**	**52**	**117**	**21**	**642**	**2,844**	**10,612**

Source: SQW and Maslen Environmental

[34] Figures may not total due to rounding
[35] Figures may not total due to rounding

Table A-2: Potential resource capacity split by electricity and heat generation

	Electricity (MW)	Heat (MW)	Total (MW)[36]	Proportion of Lancashire total (%)
Blackburn with Darwen	647	286	933	9
Blackpool	42	320	362	3
Burnley	228	180	408	4
Chorley	825	232	1,057	10
Fylde	412	192	604	6
Hyndburn	196	166	362	3
Lancaster	694	312	1,004	9
Pendle	477	184	661	6
Preston	361	301	661	6
Ribble Valley	407	151	557	5
Rossendale	540	151	691	7
South Ribble	305	225	529	5
West Lancashire	1,375	257	1,630	15
Wyre	902	253	1,155	11
Lancashire total[37]	**7,414**	**3,210**	**10,612**	**100**

Source: SQW

[36] Total does not equal the sum of electricity and heat capacity as they are mutually exclusive for some technologies.
[37] Some totals are inaccurate by 1MW due to rounding

Annex B: Current status of Lancashire LA's Local Development Plans

Table B-1: Development Plan status and renewable energy policies

	Status of Development Plan	Renewable energy policies
All	N/A	The Lancashire Core Strategy for Minerals and Waste was adopted by Blackburn with Darwen, Blackpool and Lancashire County Councils in February 2010. Lancashire Climate Change Strategy 2009 Rubbish to resources: Waste Management Strategy for Lancashire 2008-2020
Blackburn with Darwen Borough Council	The Core Strategy Development Plan was adopted in January 2011	Policy CS13 environmental strategy includes a presumption in favour of renewable energy
Blackpool Borough Council	The Blackpool Local Plan was adopted in 2006 and is to be replaced by the Local Development Framework of which the Blackpool Core Strategy is part. The Core Strategy Preferred Option was approved for public consultation in March 2010	The Core Strategy Preferred Option includes three proposed policies of relevance (criteria and location based and targets) • Policy G9: Energy requirements of new development • Policy G10 Sustainable design, layout and construction • Policy G11 Strategic site energy requirements. Blackpool has no renewable energy strategy however a *climate change and renewable energy study* was undertaken in February 2010 to inform the Core Strategy. Local Plan includes *Policy LQ8 Energy and Resource Conservation* which states that developments should be designed in a way that minimises their overall demand for resources.
Burnley Borough Council	Consultation on Burnley's draft Core Strategy took place in Autumn 2009 no further update on its progress is provided	No detail of any renewable energy policies
Chorley Borough Council	The draft Core Strategy (produced alongside Preston and South Ribble for Central Lancashire) was put out for public consultation in January 2011 and submitted to the Secretary of State in March 2011	In the Draft Core Strategy Policies 19 and 20 are concerned with climate change and low and zero carbon sources of energy and wind energy. It also includes strategic objective SO22 Encourage generation and use of energy from renewable and low carbon sources and Policy 28: Renewable and low carbon schemes An environmental appraisal is in progress as part of the Local Development Framework Chorley Council Climate Change Strategy 2008/11
Fylde Borough Council	Public consultation concerning Issues underway	No detail concerning renewable energy policies
Hyndburn Borough Council	The Core Strategy document has been submitted to the Planning Inspectorate in May 2011.	Policy Env 5 Renewable energy – criteria based but no targets

	Status of Development Plan	Renewable energy policies
Lancaster City Council	Lancaster District Core Strategy was adopted on 23rd July 2008.	The Core Strategy contains a dedicated Renewable Energy Policy(ER7) to maximise the proportion of energy generated from renewable sources where compatible with other sustainability objectives
Pendle Borough Council	The Issues and Options consultation on the Core Strategy and Land Use Allocations (site search) closed on the 18th August 2008. Core Strategy; preferred options consultation due autumn 2011 with expected adoption 2012.	Existing Local Plan includes Policy 5 Renewable Energy Sources which encourages appropriate renewable energy proposals. Burnley and Pendle Home Energy Strategy 2008-2011 Pendle Municipal Waste Strategy 2002
Preston Borough Council	The draft Core Strategy (produced alongside Chorley and South Ribble for Central Lancashire) was put out for public consultation in January 2011 and submitted the Secretary of State in March 2011	In the Draft Core Strategy Policies 19 and 20 are concerned with climate change and low and zero carbon sources of energy and wind energy. It also includes strategic objective SO22 Encourage generation and use of energy from renewable and low carbon sources and Policy 28: Renewable and low carbon schemes An environmental appraisal is in progress as part of the Local Development Framework No Preston specific renewable energy or waste strategies
Ribble Valley Borough Council	The draft Core Strategy is expected to be put out for consultation in Autumn 2011. Submission to the Secretary of State is anticipated to be in Spring 2012	No detail concerning policies as yet Draft Waste Awareness and Education Strategy 2009
Rossendale Borough Council	The draft Core Strategy was submitted to the Secretary of State in December 2010, proposed changed were expected in May 2011 followed by further consultation until June 2011. Adoption is expected in late summer 2011.	Draft Environmental Strategy for Rossendale 2006 Policy 19 Climate and low and zero carbon sources of energy Policy 20 Wind energy
South Ribble Borough Council	The draft Core Strategy (produced alongside Preston and Chorley for Central Lancashire) was put out for public consultation in January 2011 and submitted the Secretary of State in March 2011	In the Draft Core Strategy Policies 19 and 20 are concerned with climate change and low and zero carbon sources of energy and wind energy. It also includes strategic objective SO22 Encourage generation and use of energy from renewable and low carbon sources and Policy 28: Renewable and low carbon schemes An environmental appraisal is in progress as part of the Local Development Framework
West Lancashire District Council	The Core Strategy Preferred Option is out for consultation until June 2011, adoption is expected by the end of 2012.	Chapter 9 of the draft Core Strategy focuses on Low Carbon and Development and energy infrastructure policy. Specific policies include: Policy CS15 Renewable energy development No specific renewable energy or waste strategies
Wyre Borough Council	Issues and options consultation	No policies specified No specific renewable energy or waste strategies

Source: SQW

Annex C: Installed capacity

List of renewable installations

Tables C-1 – C-9 provide a summary of existing and consented renewable energy deployment categorised by technology type.

Table C-1 Commercial wind (onshore)

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Darwen Moor Wind Farm	6.41	Lords Hall, Duckshaw Road, Darwen, Lancashire	Blackburn with Darwen	Operational	Non-Fossil Purchasing Agency (NFPA)
New Barn Farm	4.50	Billington Road, Burnley, BB11 5QQ	Burnley	Operational	REPD
Caton Moor Repowering	16.00	Crossgill, Lancashire	Lancaster	Operational	The Wind Power – Wind turbines and windfarms database
Dewlay Cheese	2.00	Garstang Bypass Road, Garstang, Preston	Wyre	Operational	RenewableUK
Scout Moor Windfarm (9 out of total 26 turbines in Rossendale)	22.50	Scout Moor off Edenfield Road Rochdale	Rossendale	Operational	REPD
Hameldon Hill extension	7.50	Hameldon Hill, Accrington Road, Burnley, Lancashire	Burnley	Awaiting Construction	REPD
Mawdesley Moss	2.25	Cliff Farm, Mawdesley Moss, Chorley, Lancashire	Chorley	Awaiting Construction	REPD
Hyndburn Wind Farm	24.60	Oswaldtwistle Moor	Hyndburn	Awaiting Construction	RenewableUK
Reaps Moss Wind Farm	9.00	Reaps Moss, Bacup, East Lancashire	Rossendale	Awaiting Construction	REPD
Orchard End (Resubmission)	4.00	Orchard End, near Pilling, Eagland Hill, Preston	Wyre	Awaiting Construction	REPD

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Coal Clough Wind Farm Repowering	20.00	Coal Clough Wind Farm, The Long Causeway, Burnley	Burnley	Application Submitted	REPD
Fanny House Farm	2.50	Oxcliffe Road, Heaton With Oxcliffe, Morecambe, Lancashire, LA3 3EF	Lancaster	Application Submitted	REPD
Claughton Moor Community Windfarm	39.00	Claughton and Whit Moor	Lancaster	Application Submitted	RenewableUK
Lancaster University	2.50	Lancaster	Lancaster	Application Submitted	RenewableUK

Source: SQW

Table C-2 Small scale wind

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Blackpool Promenade	0.04	Blackpool Promenade, Lytham Road, Blackpool, FY4 1EW	Blackpool	Operational	REPD
Black Scout Wind Farm	0.85	The Long Causeway, Burnley Way, Burnley	Burnley	Operational	Non-Fossil Purchasing Agency (NFPA)
Stockabank Farm	Erection of 15m turbine	Littledale Road, Quernmore	Lancaster	Application submitted	Lancaster CC
Moss House Farm	Erection of two 22m wind turbines	Gulf Lane, Cockerham	Lancaster	Application submitted	Lancaster CC
Land South of Burton Service Area	Erection of a 50m single 330kW turbine	Land South Of Burton Service Area, Tarn Lane, Yealand Redmayne	Lancaster	Application submitted	Lancaster CC
Hale Hall Farm	Single 55 kW turbine	Hale Hall Farm, Salwick Road, Treales Roseacre and Wharles	Fylde	Application submitted	Fylde BC
Todderstaffe Hall Farm	Single 50 kW	Todderstaffe Hall Farm, Off Fairfield	Fylde	Application submitted	Fylde BC

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
	turbine	Road, Staining			
Swarbrick Hall Farm	Single 50 kW turbine	Swarbrick Hall Farm, Singleton Road, Weeton with Preese, PR4 3JJ	Fylde	Application submitted (NB; earlier application was approved in 2009, but not built, New application proposes alterations to siting and design)	Fylde BC
Land rear of Queensland	0.006	Land rear of Queensland, Carr Lane, Hambleton	Wyre	Consented	Wyre BC
Out Rawcliffe Village Hall	0.015	Out Rawcliffe Village Hall, Crook Gate Lane, Out Rawcliffe	Wyre	Consented	Wyre BC
20A Church Road	0.001	20A Church Road, Thornton	Wyre	Consented	Wyre BC
2 Wordsworth Avenue	0.001	2 Wordsworth Avenue, Thornton-Cleveleys	Wyre	Consented	Wyre BC
Brick House Farm	0.006	Brick House Farm, Brick House, Hambleton	Wyre	Consented	Wyre BC
Bleasdale Parish Hall	0.015	Land north of Bleasdale Parish Hall, School Lane, Bleasdale	Wyre	Consented	Wyre BC
Wyresdale Cottage	0.005	Wyresdale Cottage, Titherbarn Lane, Forton	Wyre	Consented	Wyre BC
Moor Head Farm	0.001	Moor Head Farm, Ratcliffe Wharf Lane, Forton	Wyre	Consented	Wyre BC
Nat West Bank	0.0006	Nat West Bank, The Esplanade, Knott End-on-Sea	Wyre	Consented	Wyre BC
Carr Gate	0.030	Carr Gate Jct to Kingsway Jct,	Wyre	Consented	Wyre BC

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
		Promenade North, Thornton-Cleveleys			
Brook House	0.0018	Brook House, Hall Lane, Great Eccleston, PR3 0XN	Wyre	Consented	Wyre BC
Pilling St Johns C of E School	0.00125	Pilling St Johns C of E School, Fluke Hall Lane, Pilling	Wyre	Consented	Wyre BC
47B Hardhon Road	0.0125	47B Hardhorn Road, Poulton-le-Fylde, FY6 7SR	Wyre	Consented	Wyre BC
Bonds House	0.006	Bonds House, Duck Street, Pilling, PR3 6HN	Wyre	Consented	Wyre BC
Pilling Memorial Hall	0.006	Pilling Memorial Hall, Taylors Lane, Pilling PR3 6AP	Wyre	Consented	Wyre BC
Preesall Park Ford	0.006	Preesall Park Ford, Hall Gate Lane, Preesall, FY6 0PJ	Wyre	Consented	Wyre BC
Proctors Farm	0.05	Proctors Farm, 154a Pilling Land, Preesall	Wyre	Consented	Wyre BC
Riverside Industrial Park	0.06	Riverside Industrial Park, Catterall	Wyre	Consented	Wyre BC
Primrose Hill Farm	0.05	Primrose Hill Farm, Catterall	Wyre	Consented	Wyre BC
Wyre Side Farm	0.01	Wyre Side Farm Rawcliffe Road, St Michaels	Wyre	Consented	Wyre BC
Wyre Side Farm	0.011	Wyre Side Farm, Rawcliffe Road, St Michaels	Wyre	Consented	Wyre BC
Thostles Nest Farm	0.015	Thostles Nest Farm, Head Dyke Lane, Pilling	Wyre	Consented	Wyre BC
Helmsdeep	0.225	Helmsdeep, Long Lane, Barnacre	Wyre	Consented	Wyre BC

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Kurloon	0.02	Kurloon, Horse Park Lane, Pilling	Wyre	Consented	Wyre BC

Source: SQW

Table C-3: Biomass

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Lancashire Waste Technology Park	9.00	Thornton Cleveleys, Lancashire	Wyre	Operational	REPD
Elswick	1.00	Gorst Farm Lodge Lane Elswick Preston	Fylde	Awaiting Construction	REDP

Source: SQW

Table C-4: Anaerobic digestion

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Carr Farm (Resubmission)	1.00	Lodge Lane, Bryning with Warton, Lytham St Anne's, FY8 5RP	Fylde	Under Construction	REDP
Stanley Villa Farm	0.5	Back Lane, Weeton with Preese, PR4 3 HN	Fylde	Consented	Fylde BC

Source: SQW

Table C-5: Landfill Gas

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Deerplay Landfill Site	2.00	Bacup Road, Burnley, Lancashire	Burnley	Operational	REPD
Rowley	1.85	Rowley, Burnley	Burnley	Operational	REPD

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Queen's Park Road Energy	1.77	Rowley Landfill, Queen Park Road, Burnley, Lancashire	Burnley	Operational	REPD
Queens Park Energy	1.90	Burnley, Lancashire	Burnley	Operational	REPD
Ulnes Walton Energy	1.34	Ridley Lane, Croston, Preston, Lancashire	Chorley	Operational	REPD
Withnell LFS	2.25	Bolton Rd, Withnell, Chorley, Lancashire PR6 8BP	Chorley	Operational	REPD
Clayton Hall Landfill Site	1.10	Dawson Lane, Whittle-le-Woods, Near Chorley, PR6 7DT	Chorley	Operational	Ofgem Renewables and CHP Register
Clifton Marsh Energy	3.30	Newton With Clifton, Freckleton, Preston, Lancashire	Fylde	Operational	REPD
Whinney Hill Waste Disposal Site	1.20	Whinney Hill Waste Disposal Site, Hyndburn Whinney Hill Road, Clayton-le-Moors, Lancashire	Hyndburn	Operational	REPD
Lune Power	3.12	Ovangle Road, White Lund, Lancaster	Lancaster	Operational	Ofgem Renewables and CHP Register
Salt Ayre Power	1.14	Ovangle Road, White Lund, LA15 5JR	Lancaster	Operational	Ofgem Renewables and CHP Register
Rossendale Power	1.63	Horncliffe Quarry, Rossendale, BB4 6EZ	Rossendale	Operational	REPD
West Quarry	4.50	West Lancashire	West Lancashire	Operational	REPD
Jameson Road (A & E)	4.26	Jameson Road Landfill Site, Jameson Road, Fleetwood, Lancashire	Wyre	Operational	REPD
Jameson Road (additional)	1.63	Jameson Road Landfill Site, Jameson Road, Fleetwood, Lancashire	Wyre	Operational	Ofgem Renewables and CHP Register

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Rigby Landfill	3.00	Rigby Houghton House Quarry Landfill Site, Adlington, Chorley	Chorley	Awaiting Construction	REPD

Source: SQW

Table C-6: Sewage Gas

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Burnley Sewage Treatment Works	0.16	Burnley Sewage Treatment Works, Woodend Road, Burnley, BB12 9DS	Burnley	Operational	REPD
Lancaster CHP at Lancaster WWTW - A,C,D	0.58	Ashton with Stodday, Lancaster, LA2 0AG	Lancaster	Operational	Ofgem Renewables and CHP Register
Blackburn CHP WTWW - A, D	1.15	Cuerdale, Lane Salmesbury, Preston, Lancashire, PR5 0UY	South Ribble	Operational	Ofgem Renewables and CHP Register
Leyland CHP at LL WWTW - A, D	0.09	Emnie Lane, Leyland, Lancashire, PR26 8LH	South Ribble	Operational	Ofgem Renewables and CHP Register

Source: SQW

Table C-7: Small-scale hydro

Name	Capacity (MW)	Location	Local Planning Authority	Status	Source
Worsthorne Hydro	0.09	Worsthorne Water Treatment Works, Brownside Road, Worsthorne, Burnley, BB10 3LP	Burnley	Operational	REPD
Blackburn Hydro at Blackburn WWTW	0.02	Cuerdale Lane, Salmesbury, Preston, PR5 0UY	Preston	Operational	Ofgem Renewables and CHP Register
Hodder Water Treatment Works	0.01	Slaidburn, Neat Clitheroe, Lancashire, BB7 3AQ	Ribble Valley	Operational	British Hydropower Association

Source: SQW

Microgeneration Capacity

Table C-8 shows the number of installations and the installed capacity of small scale generation (less than 5MW) receiving the feed-in tariff (FIT) up to May 2011, according to the Ofgem Renewable and CHP register[38]. The data on domestic, commercial and community installations are shown separately; in Lancashire, there are no industrial installations which are registered for the FIT. Data on individual installations are currently unavailable so there is likely to be some overlap between the above individual installation data and the microgeneration capacity provided below. In Lancashire, only micro CHP, solar PV and wind installations have benefitted from FITs, with no registered hydro or anaerobic digestion plants.

Table C-8: Renewable generation under 5MW

Technology	Domestic Installations	Domestic Installations Installed Capacity (MW)	Commercial Installations	Commercial Installations Installed Capacity (MW)	Community Installations	Community Installations Installed Capacity (MW)	Total Installations	Total Installed Capacity (MW)
Blackburn with Darwen								
Solar PV	27	0.094	1	0.004	2	0.012	30	0.110
Small/micro wind	4	0.021	0	0.000	0	0.000	4	0.021
Blackpool								
Solar PV	14	0.033	1	0.002	0	0.000	15	0.035
Burnley								
Micro CHP	1	0.001	0	0.000	0	0.000	1	0.001
Solar PV	40	0.096	0	0.000	0	0.000	40	0.096
Small/micro wind	4	0.024	0	0.000	0	0.000	4	0.024
Chorley								
Solar PV	46	0.128	0	0.000	0	0.000	46	0.128

[38] Disaggregated data for each LA can be accessed from http://www.aeat.com/microgenerationindex/

Technology	Domestic Installations	Domestic Installations Installed Capacity (MW)	Commercial Installations	Commercial Installations Installed Capacity (MW)	Community Installations	Community Installations Installed Capacity (MW)	Total Installations	Total Installed Capacity (MW)
Small/micro wind	1	0.011	0	0.000	0	0.000	1	0.011
Fylde								
Solar PV[39]	41	0.104	0	0.000	1	0.023	42	0.127
Hyndburn								
Solar PV	30	0.067	2	0.027	0	0.000	32	0.095
Lancaster								
Solar PV	62	0.160	0	0.000	0	0.000	62	0.160
Small/micro wind	2	0.030	1	0.005	1	0.005	4	0.040
Pendle								
Micro CHP	1	0.001	0	0.000	0	0.000	1	0.001
Solar PV	34	0.094	0	0.000	0	0.000	34	0.094
Small/micro wind	3	0.016	0	0.000	0	0.000	3	0.016
Preston								
Solar PV	32	0.088	0	0.000	0	0.000	32	0.088
Small/micro wind	1	0.005	0	0.000	0	0.000	1	0.005
Ribble								
Micro CHP	1	0.001	0	0.000	0	0.000	1	0.001
Solar PV	44	0.131	0	0.000	0	0.000	44	0.131

[39] In addition, a planning application for 99 x 180 KWp panels on the school roof of St Bedes RC High School, Talbot Road, Lytham St Annes was approved in 2010

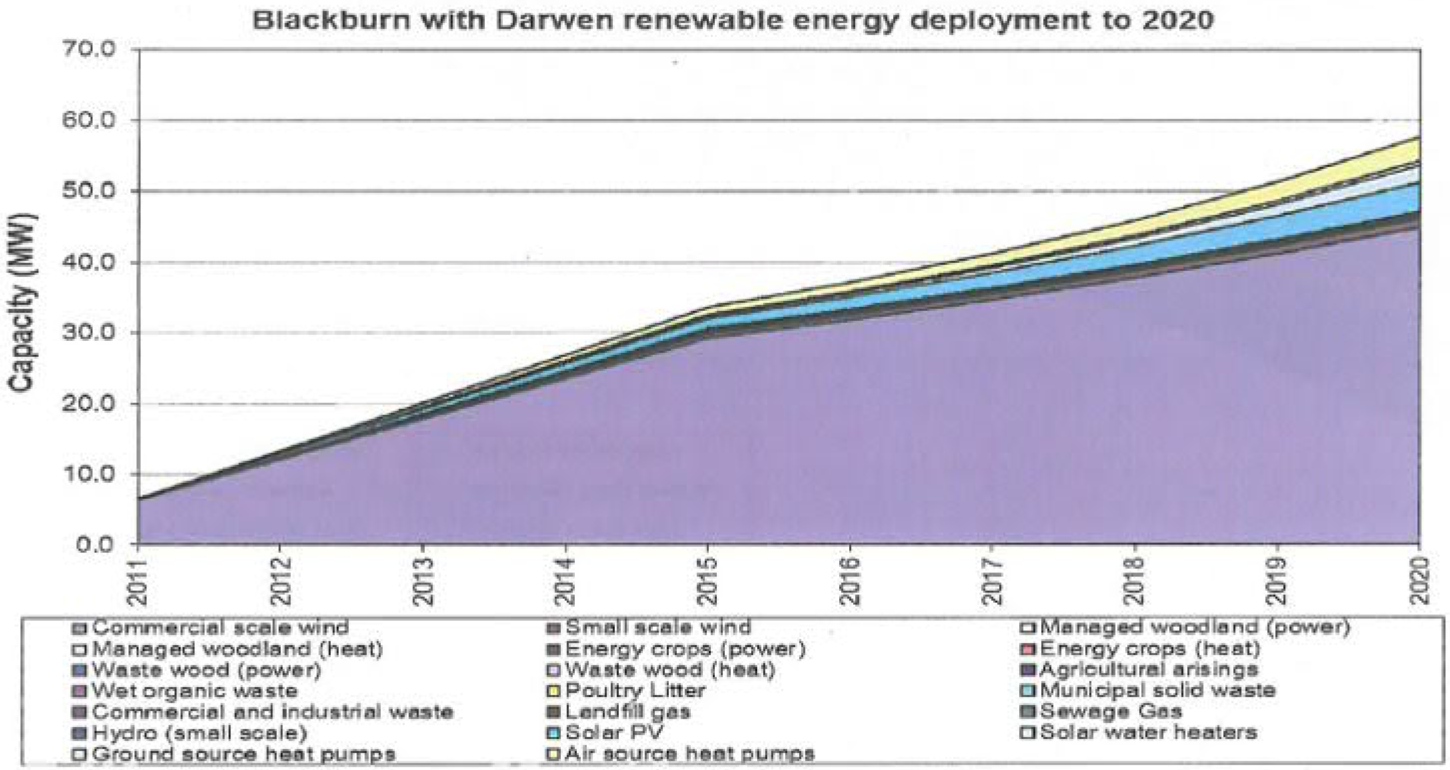
Technology	Domestic Installations	Domestic Installations Installed Capacity (MW)	Commercial Installations	Commercial Installations Installed Capacity (MW)	Community Installations	Community Installations Installed Capacity (MW)	Total Installations	Total Installed Capacity (MW)
Small/micro wind	3	0.023	2	0.021	0	0.000	5	0.044
Rossendale								
Solar PV	2	0.072	0	0.000	0	0.000	27	0.068
Small/micro wind	17	0.135	0	0.000	0	0.000	12	0.079
South Ribble								
Solar PV	34	0.114	2	0.014	0	0.000	36	0.128
Small/micro wind	2	0.017	0	0.000	0	0.000	2	0.017
West Lancashire								
Solar PV	36	0.101	0	0.000	0	0.000	36	0.101
Small/micro wind	6	0.026	0	0.000	0	0.000	6	0.026
Wyre								
Solar PV	50	0.132	0	0.000	1	0.004	51	0.136
Small/micro wind	5	0.024	0	0.000	2	0.011	7	0.035

Source: Ofgem Renewable and CHP register

Annex D: Deployment modelling and scenario results by Local Authority

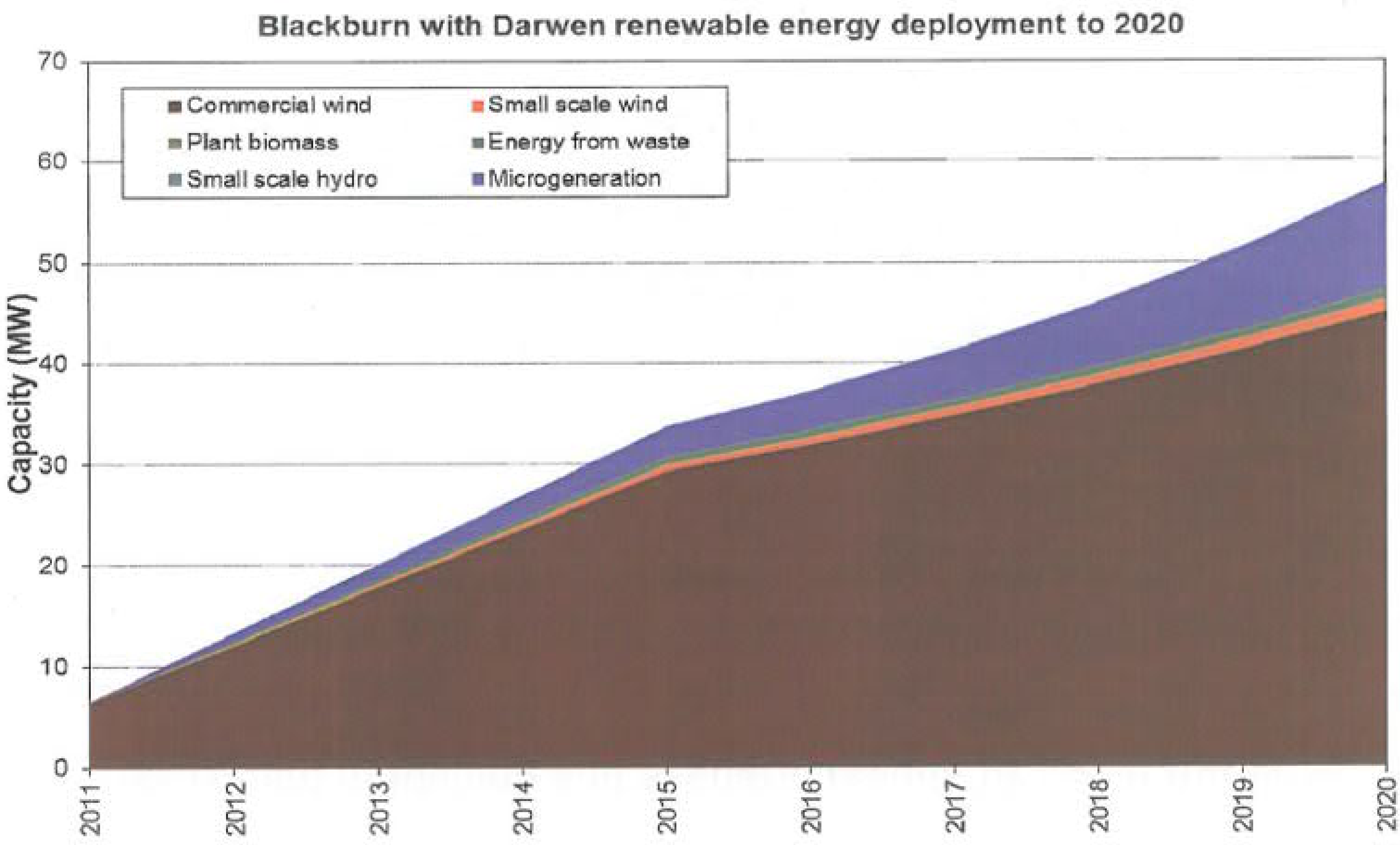
Blackburn with Darwen

Figure D-1: Detailed deployment curve to 2020 for Blackburn with Darwen



Source: SQW

Figure D-2: Simplified renewable energy deployment curve to 2020 for Blackburn with Darwen



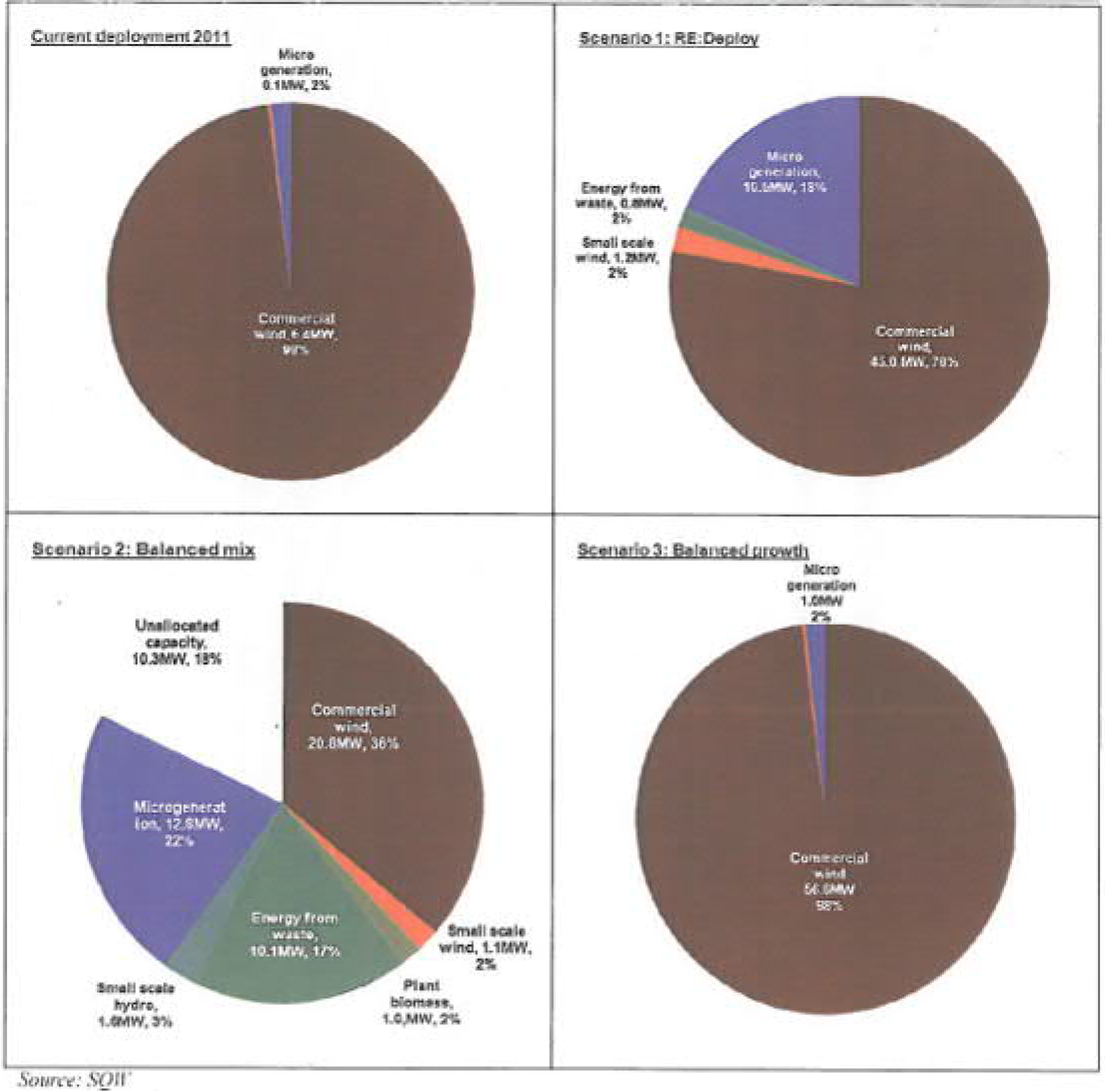
Source: SQW

Table D-1: Blackburn with Darwen renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	6.4	38.6	45.0
Small scale wind	0	1.2	1.2
Plant biomass	0	0.1	0.1
Energy from waste	0	0.8	0.8
Small scale hydro	0	0.2	0.2
Microgeneration	0.1	10.4	10.5
Total	**7**	**51**	**58**

Source: SQW

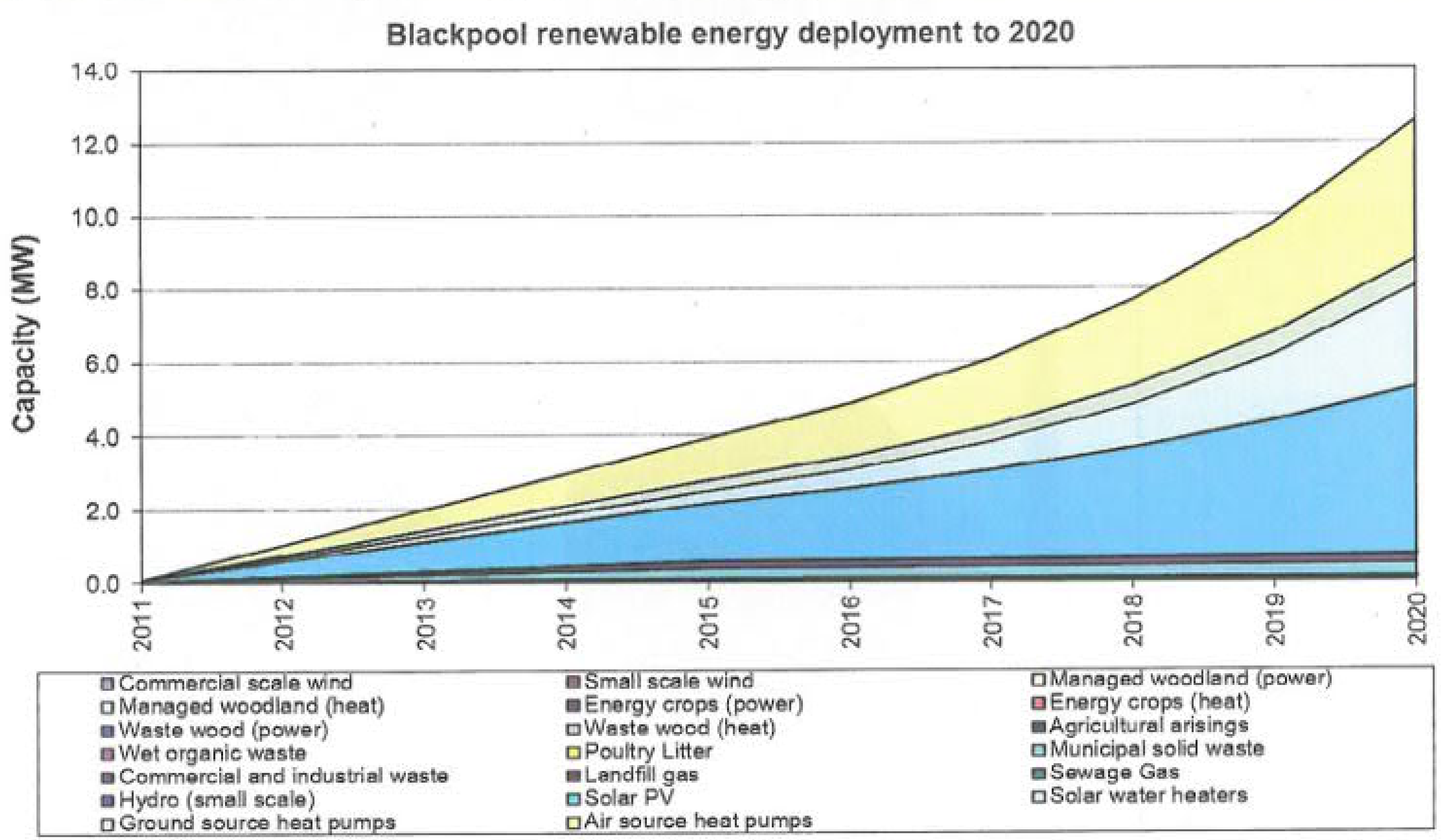
Table D-2 Scenario results for Blackburn with Darwen (Total deployment = 58 MW)



Source: SQW

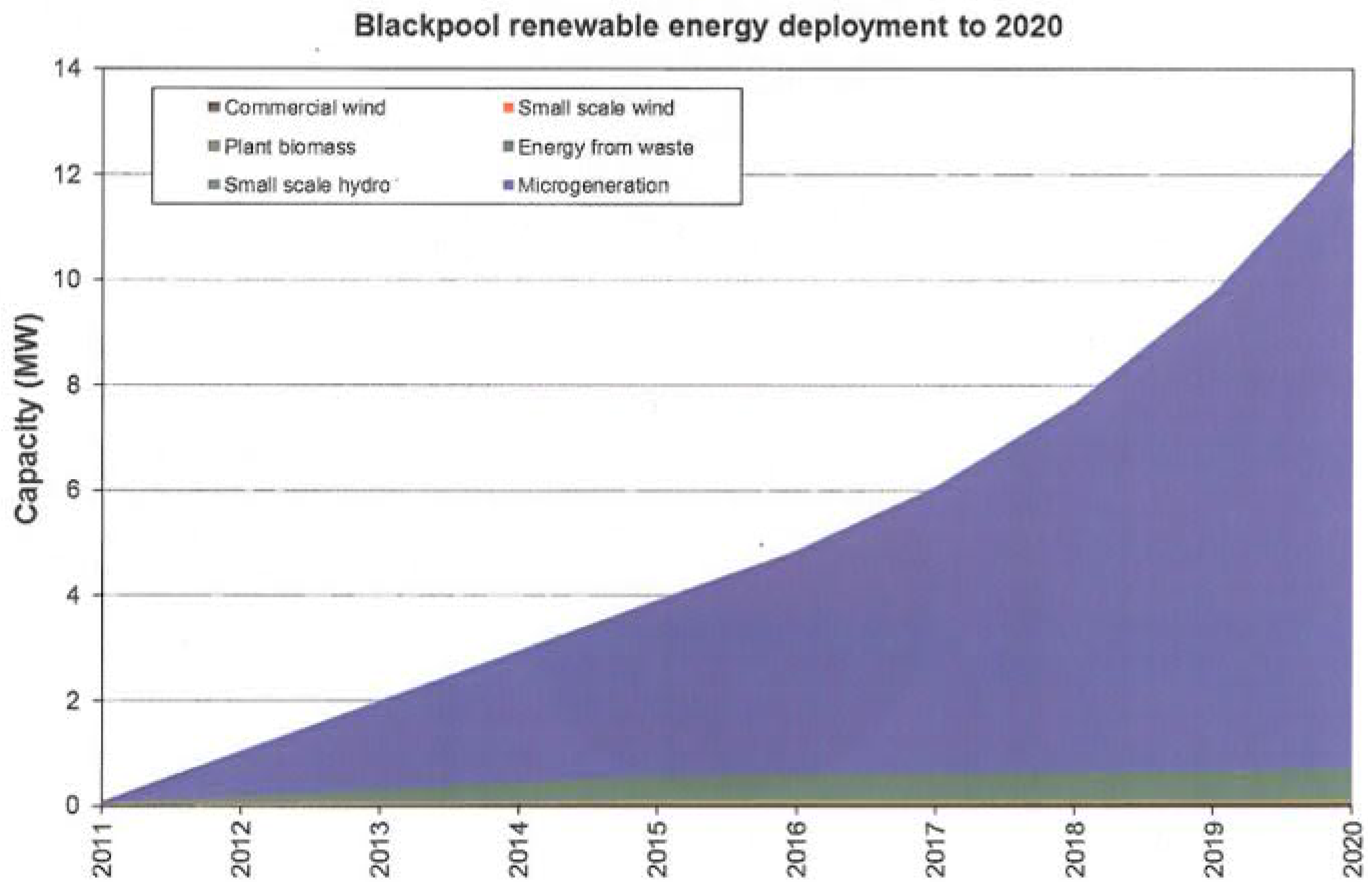
Blackpool

Figure D-3 Detailed renewable energy deployment curve for Blackpool to 2020



Source: SQW

Figure D-4: Simplified renewable energy curve for Blackpool to 2020



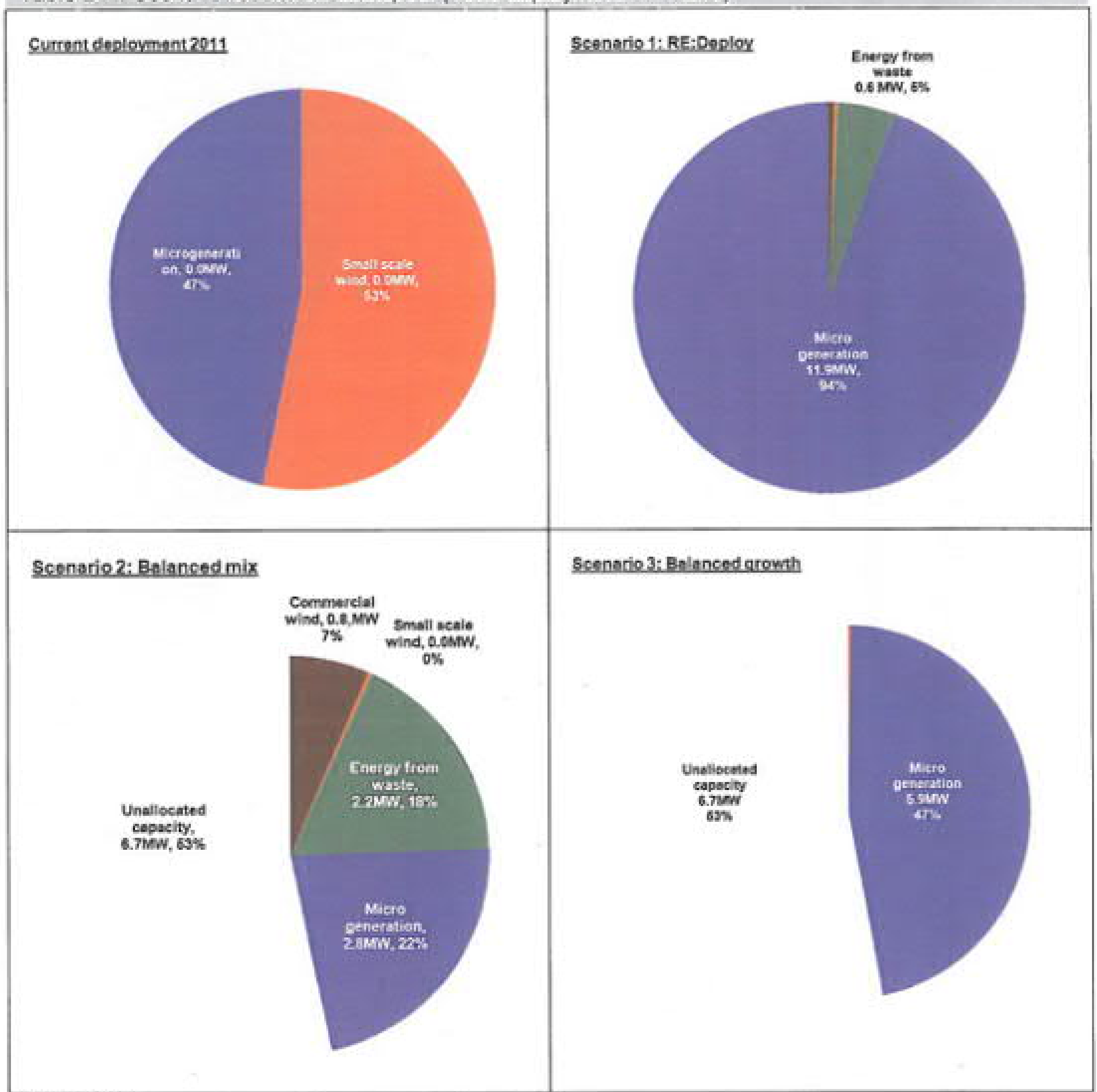
Source: SQW

Table D-3 Blackpool renewable energy deployment projections 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	0.1	0.1
Small scale wind	0.0	0.0	0.0
Plant biomass	0.0	0.0	0.0
Energy from waste	0.0	0.6	0.6
Small scale hydro	0.0	0.0	0.0
Microgeneration	0.0	11.9	11.9
Total	**0**	**13**	**13**

Source: SQW

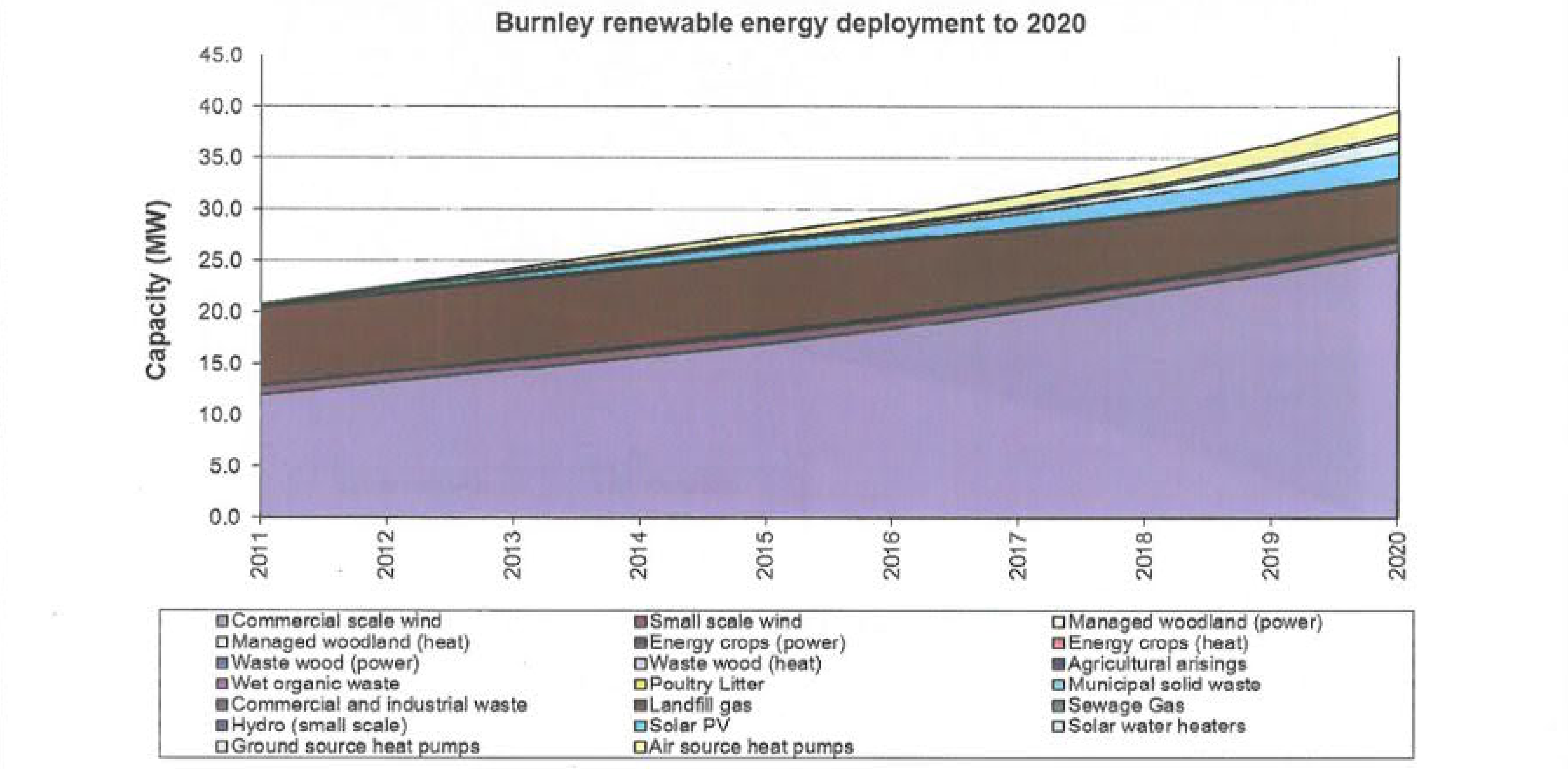
Table D-4: Scenario results for Blackpool (Total deployment = 13 MW)



Source: SQW

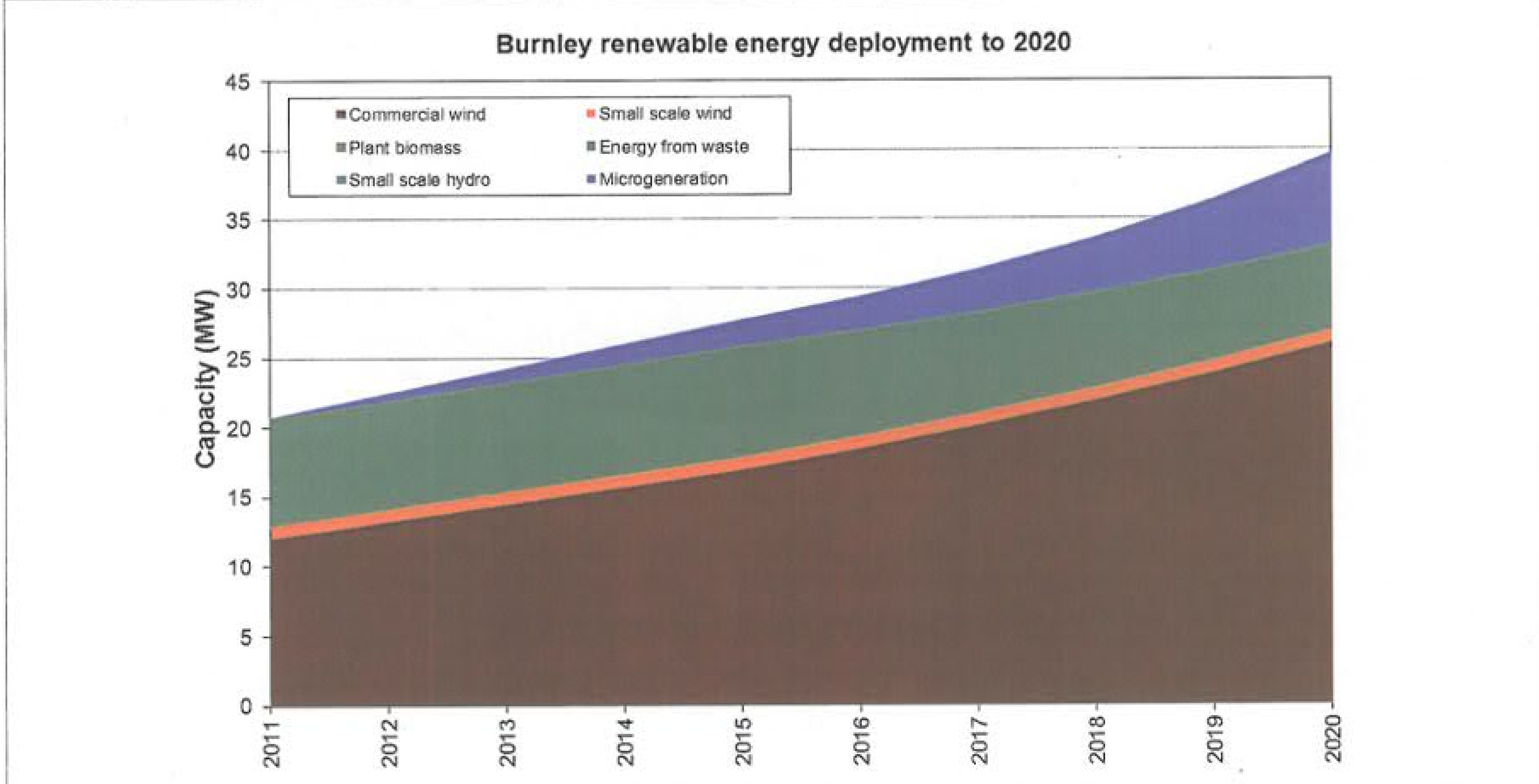
Burnley

Figure D-5 Detailed renewable energy deployment curve for Burnley to 2020



Source: SQW

Figure D-6: Simplified renewable energy deployment curve for Burnley to 2020



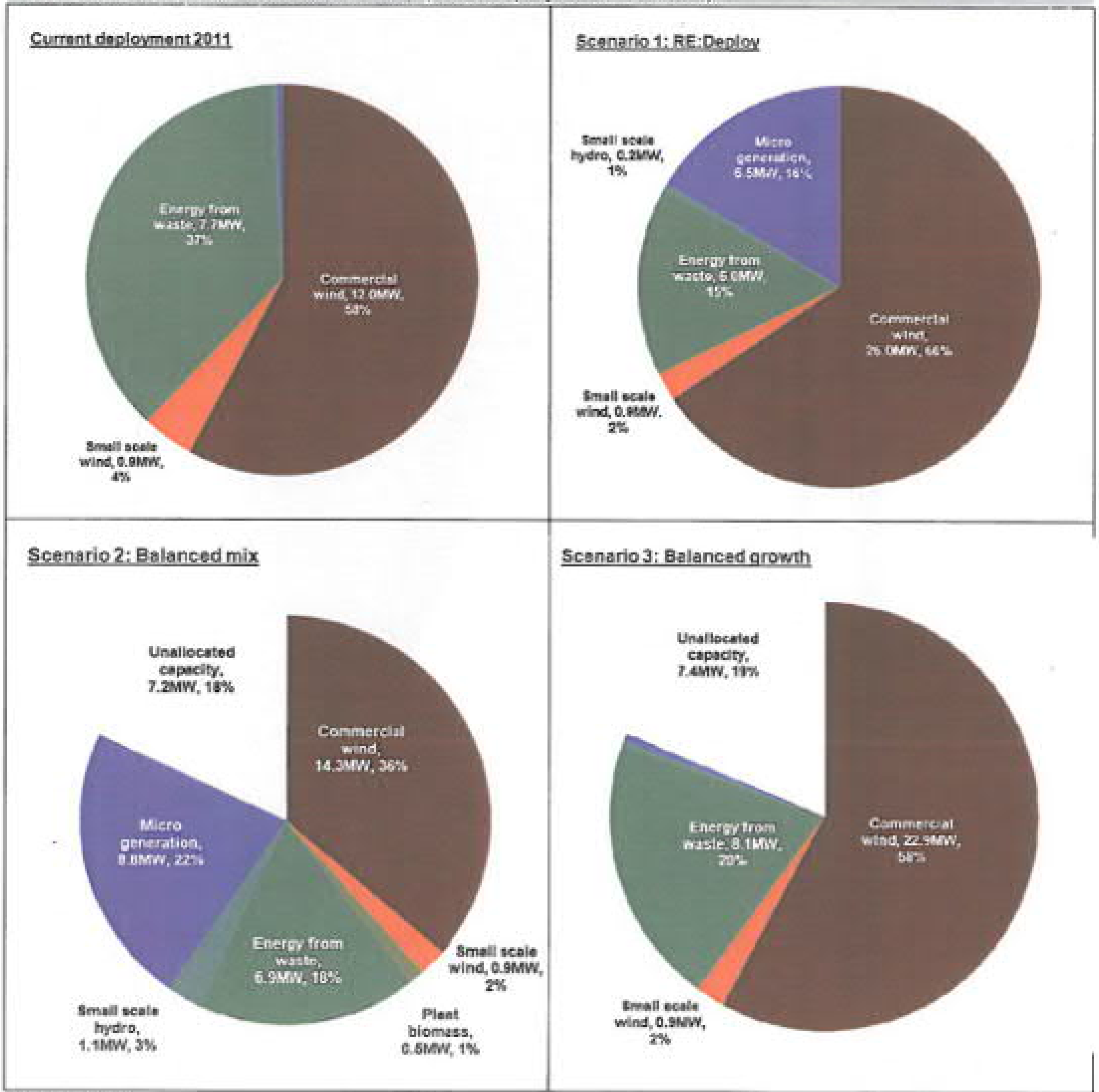
Source: SQW

Table D-5: Burnley renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	12.0	14.0	26.0
Small scale wind	0.9	0.0	0.9
Plant biomass	0.0	0.0	0.0
Energy from waste	7.7	-1.6	6.0
Small scale hydro	0.1	0.1	0.2
Microgeneration	0.1	6.4	6.5
Total	**21**	**19**	**40**

Source: SQW

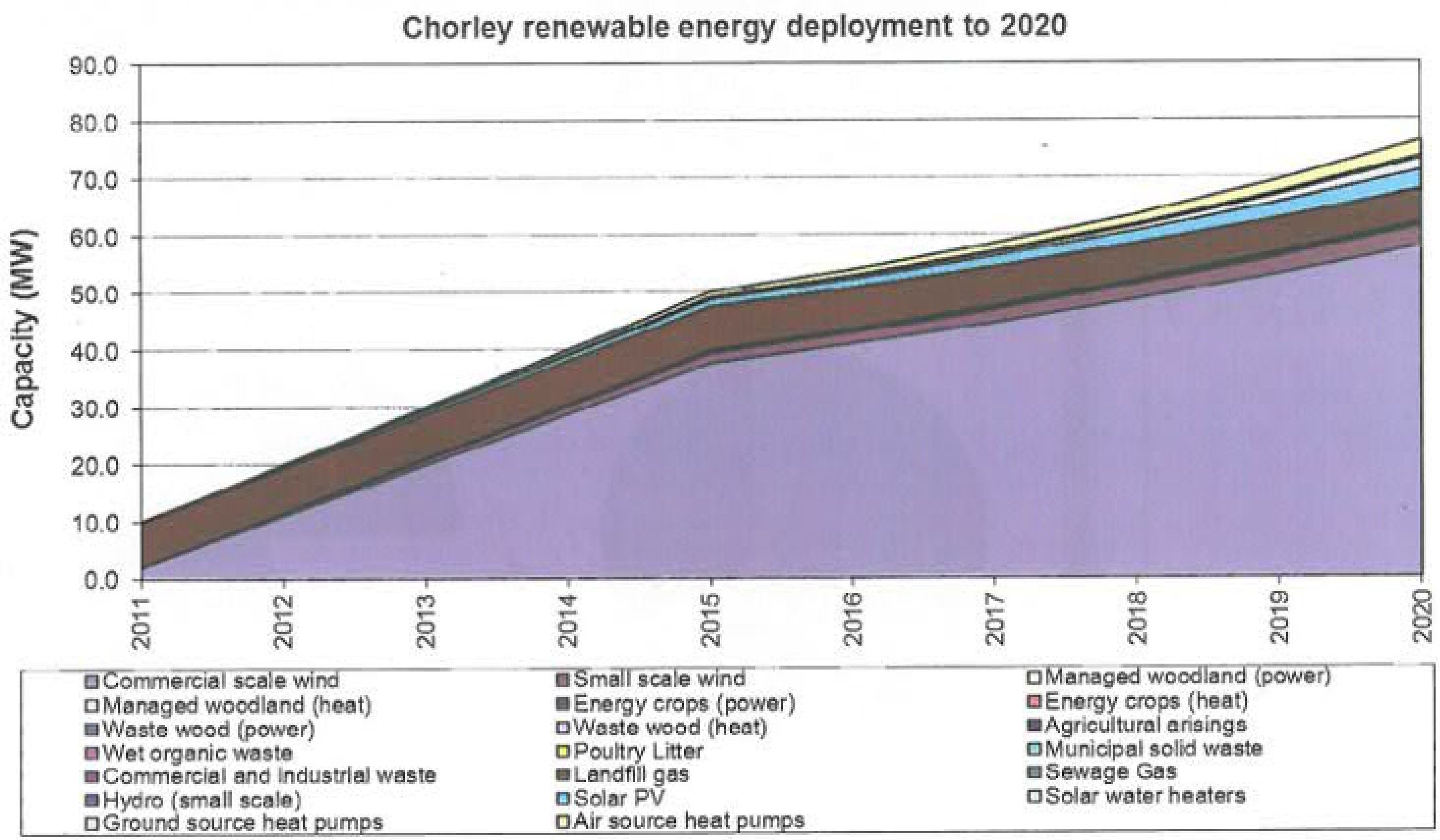
Table D-6: Scenario results for Burnley (Total deployment = 40 MW)



Source: SQW

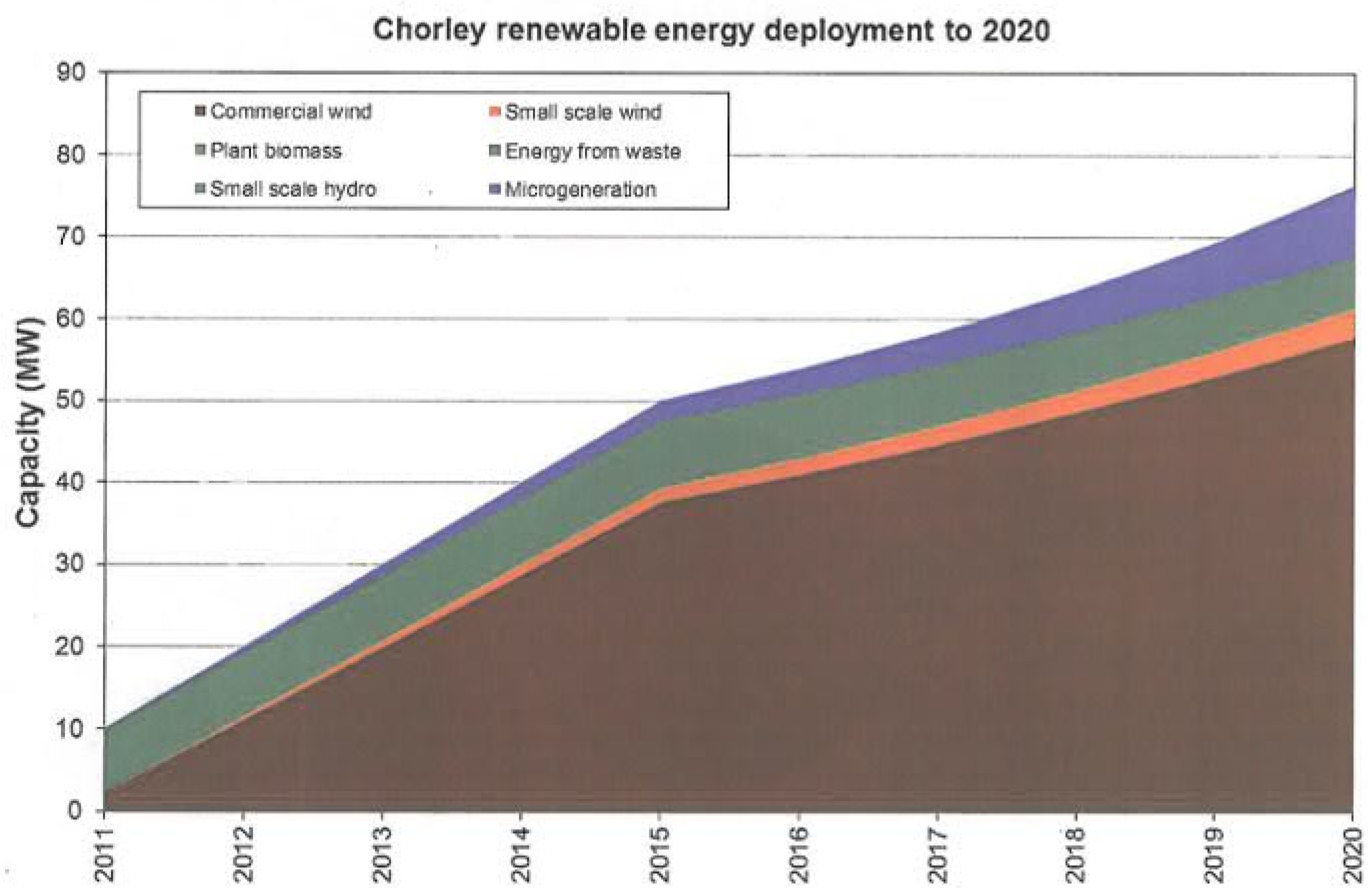
Chorley

Figure D-7: Detailed renewable energy deployment curve for Chorley to 2020



Source: SQW

Figure D-8 Simplified renewable energy deployment curve for Chorley to 2020



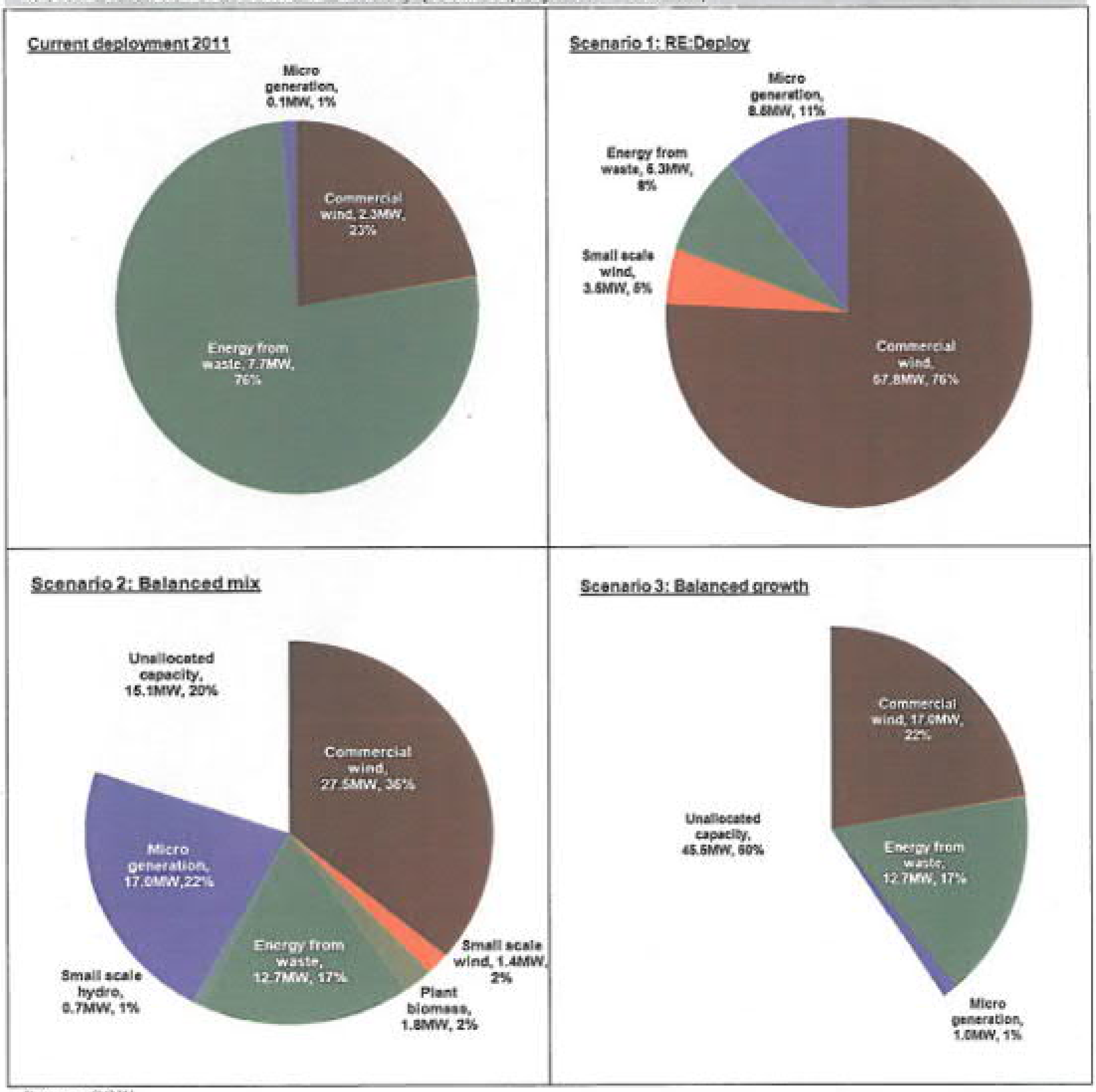
Source: SQW

Table D-7: Chorley renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	2.3	55.6	57.8
Small scale wind	0.0	3.5	3.5
Plant biomass	0.0	0.1	0.1
Energy from waste	7.7	-1.4	6.3
Small scale hydro	0.0	0.1	0.1
Microgeneration	0.1	8.4	8.5
Total	**10**	**66**	**76**

Source: SQW

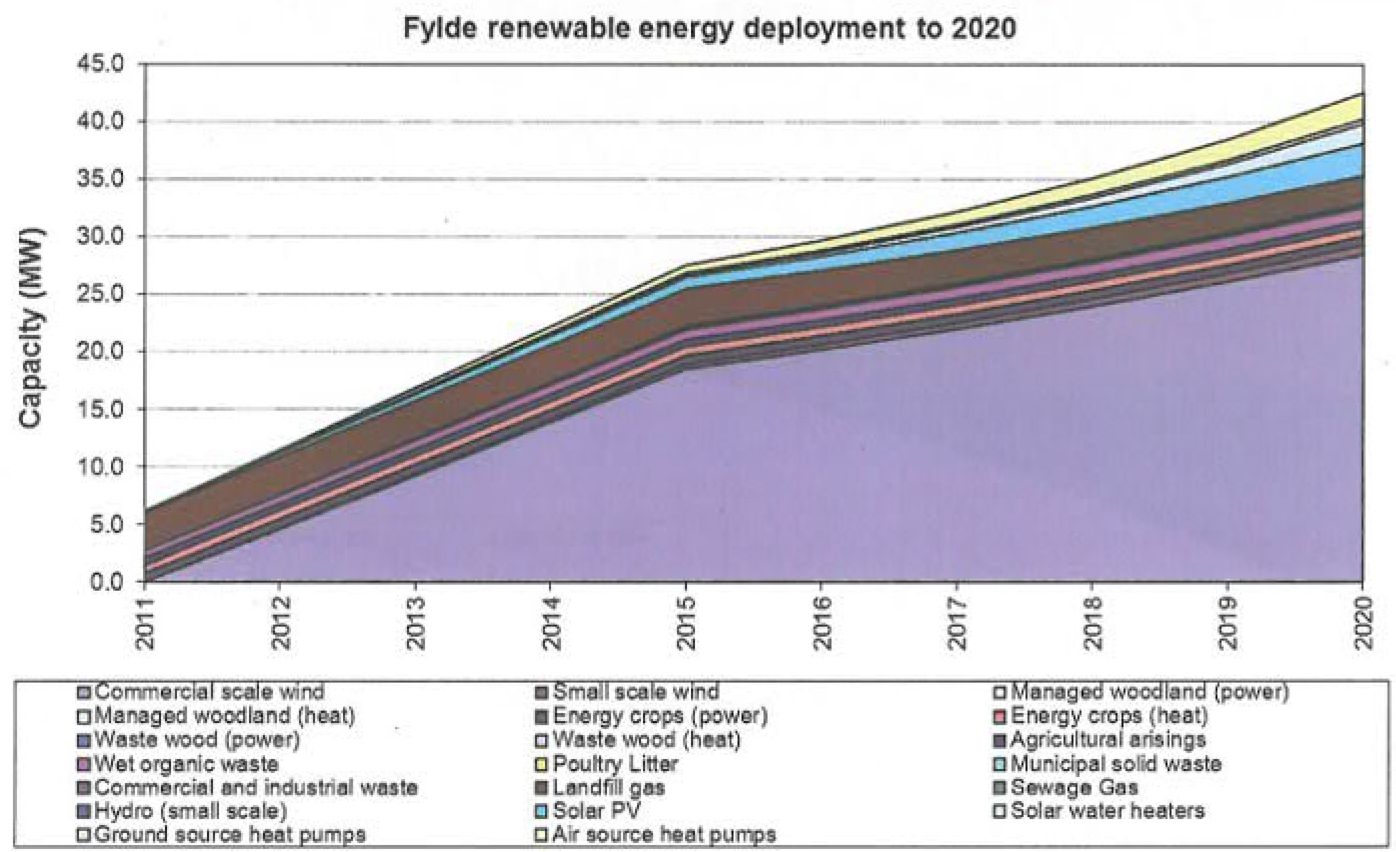
Table D-8: Scenario results for Chorley (Total deployment = 76 MW)



Source: SQW

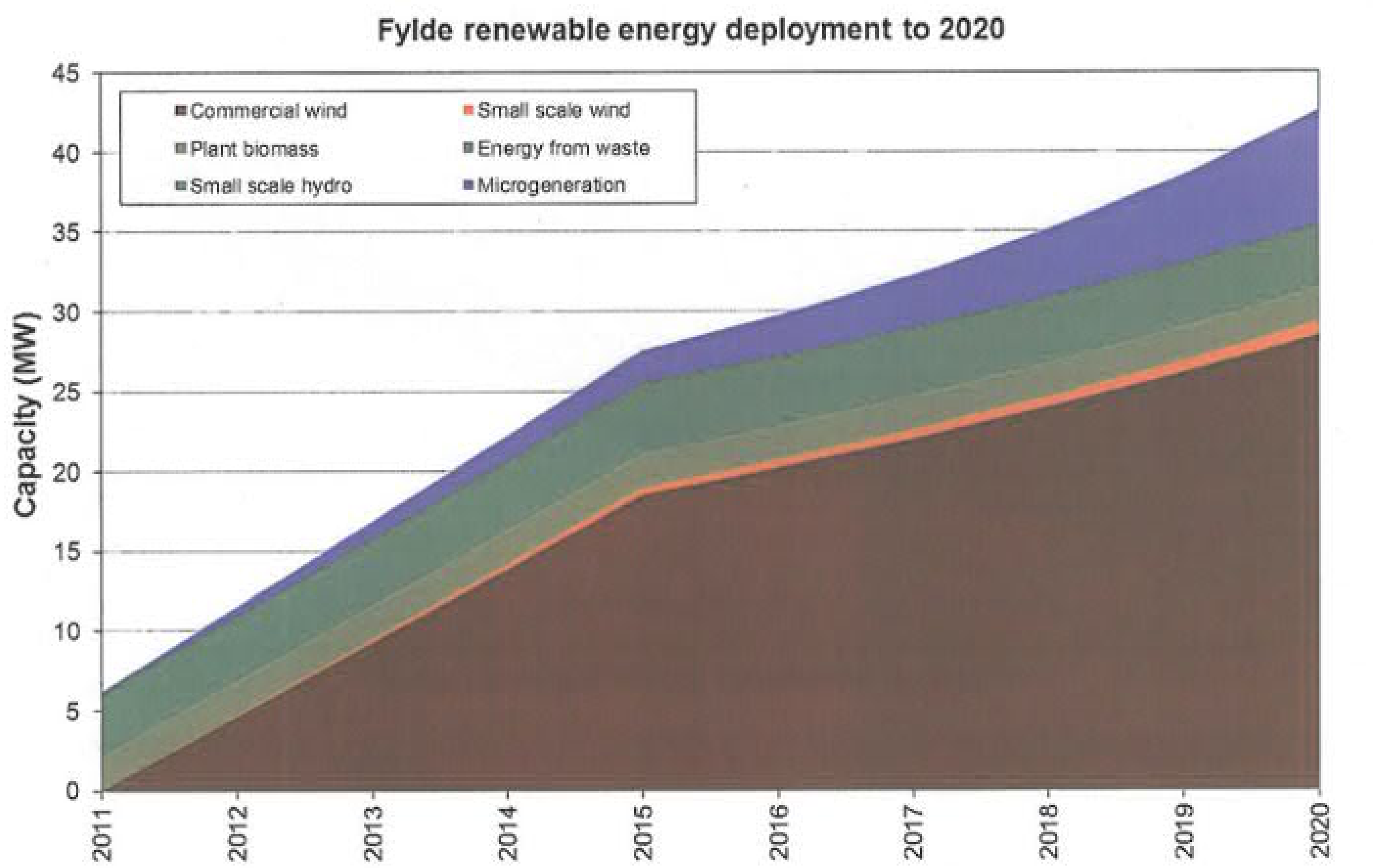
Fylde

Figure D-9: Detailed renewable energy deployment curve for Fylde to 2020



Source: SQW

Figure D-10 Simplified renewable energy deployment curve for Fylde to 2020



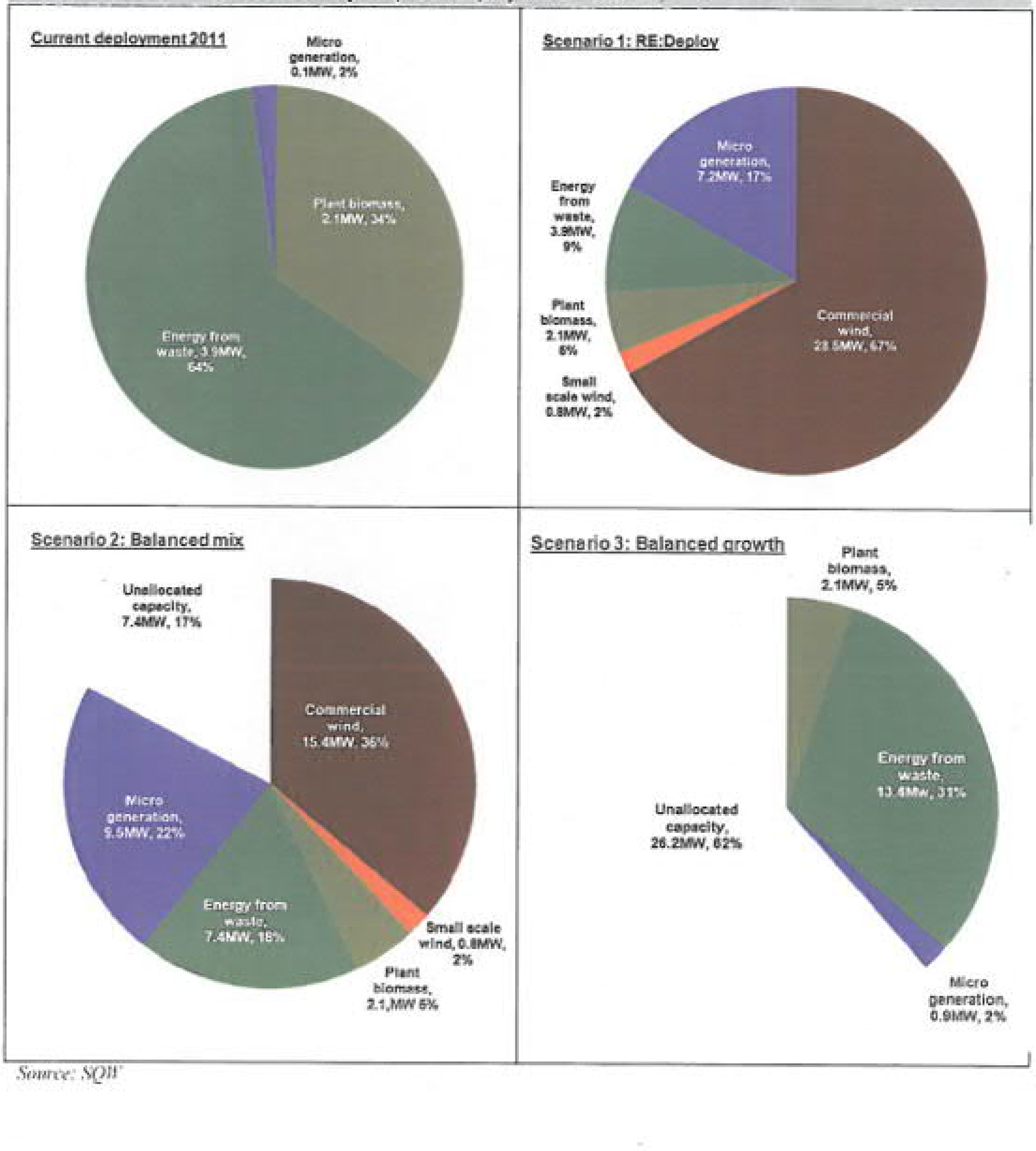
Source: SQW

Table D-9: Fylde renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	28.5	28.5
Small scale wind	0.0	0.8	0.8
Plant biomass	2.1	0.0	2.1
Energy from waste	3.9	0.0	3.9
Small scale hydro	0.0	0.0	0.0
Microgeneration	0.1	7.0	7.2
Total	**6**	**37**	**43**

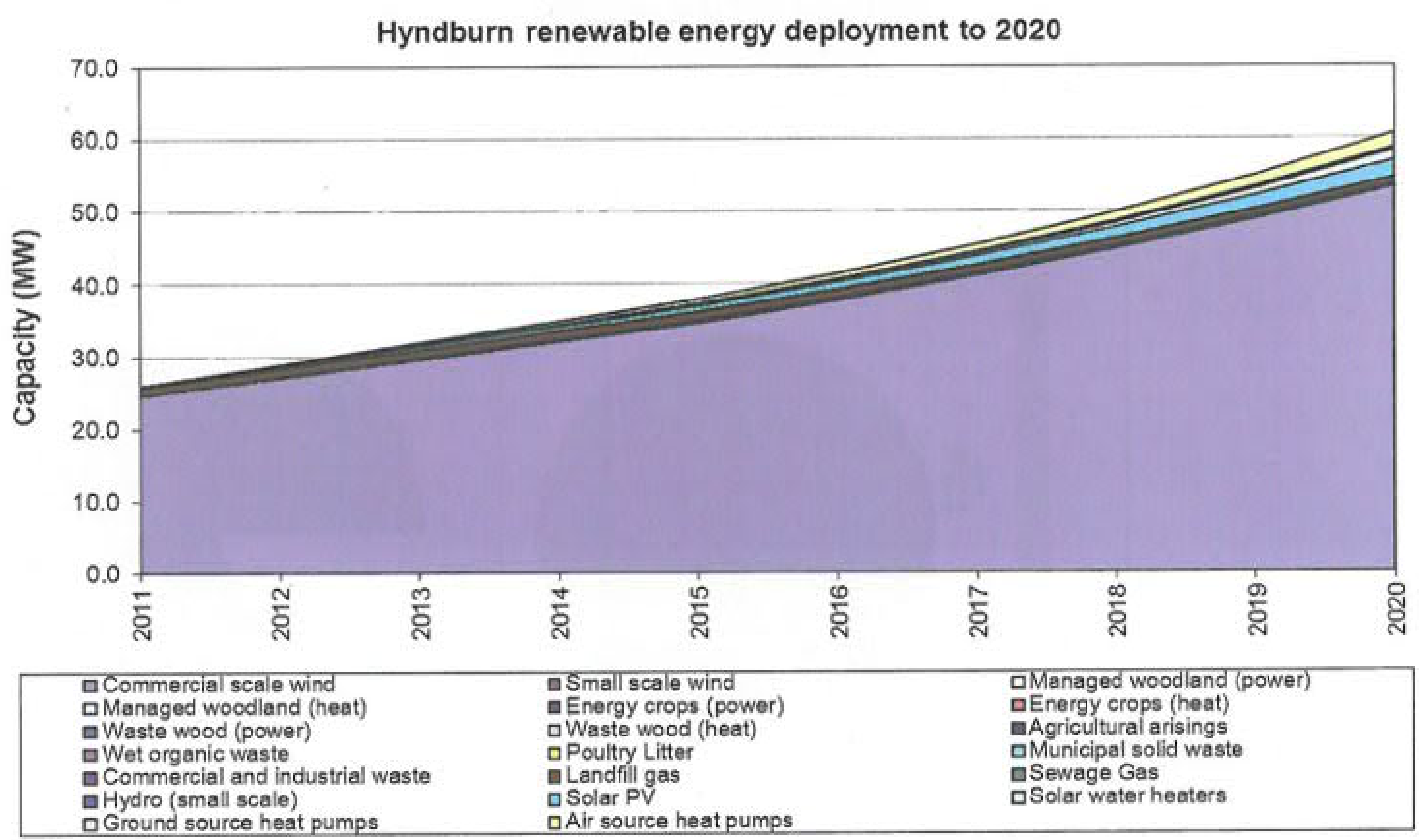
Source: SQW

Table D-10: Scenario results for Fylde (Total deployment = 43 MW)



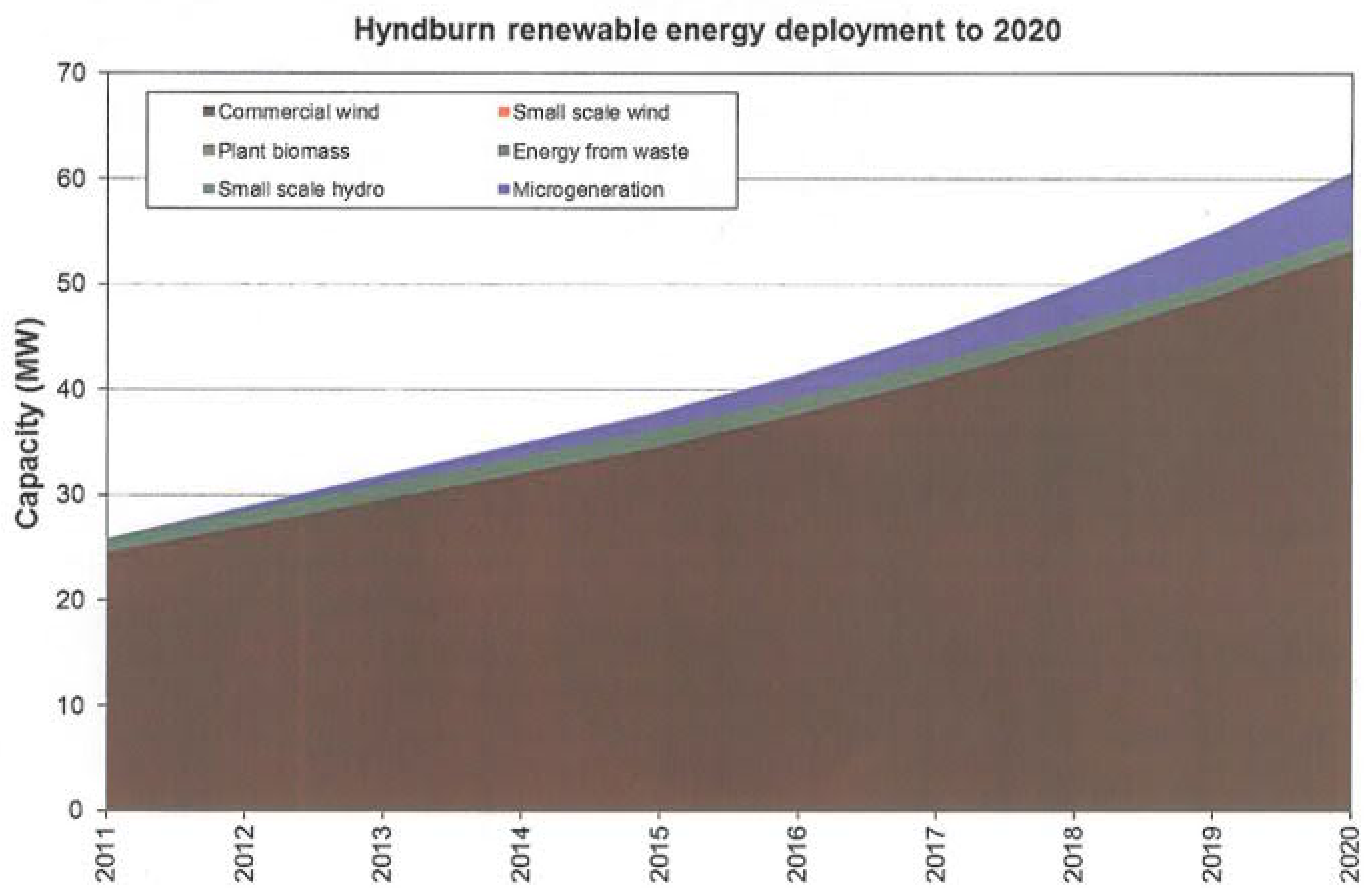
Source: SQW

Figure D-11: Detailed renewable energy deployment curve for Hyndburn to 2020



Source: SQW

Figure D-12: Simplified renewable energy deployment curve for Hyndburn to 2020



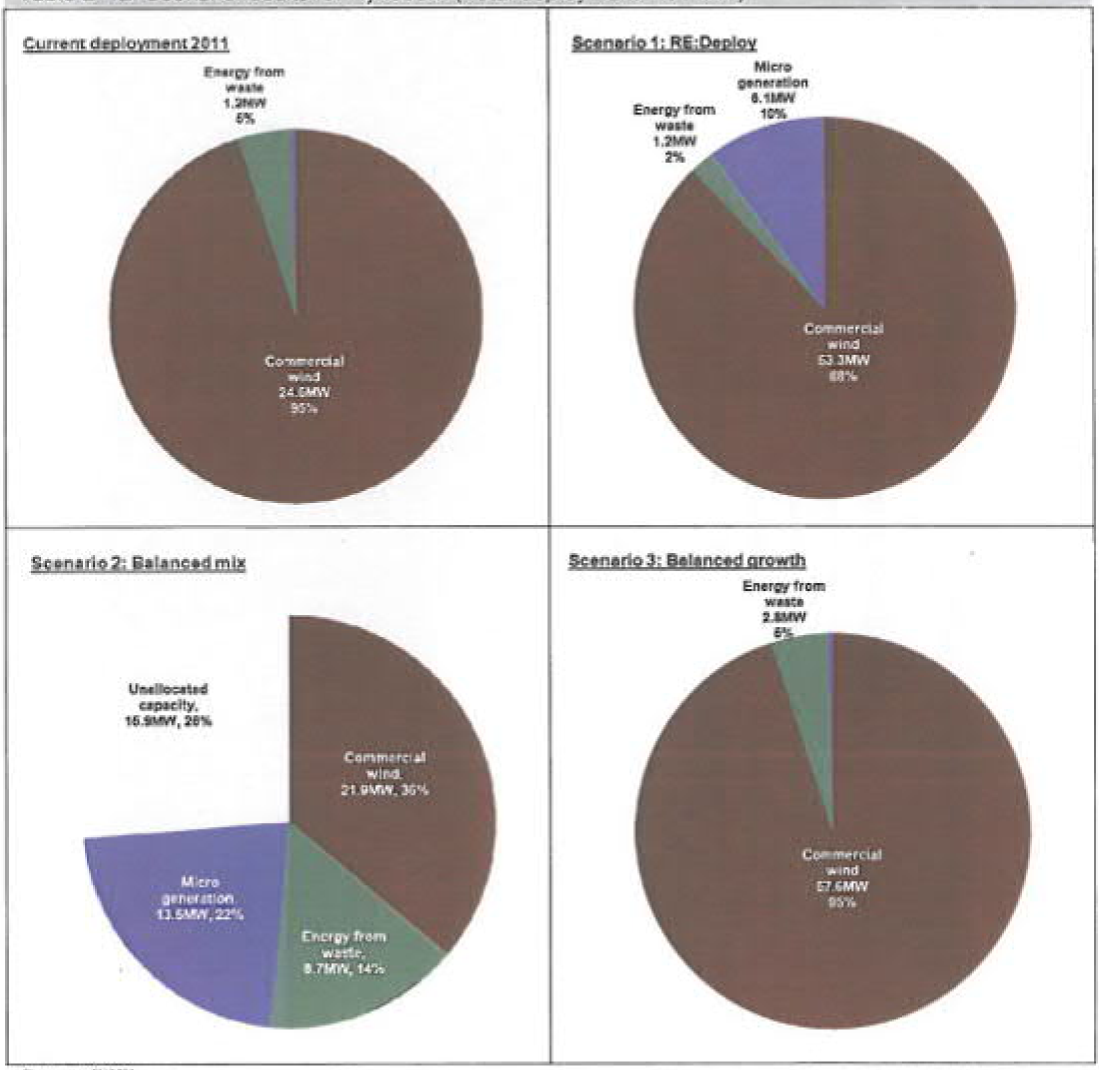
Source: SQW

Table D-11: Hyndburn renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	24.6	28.7	53.3
Small scale wind	0.0	0.0	0.0
Plant biomass	0.0	0.0	0.0
Energy from waste	1.2	0.0	1.2
Small scale hydro	0.0	0.0	0.0
Microgeneration eration	0.1	6.0	6.1
Total	**26**	**35**	**61**

Source: SQW

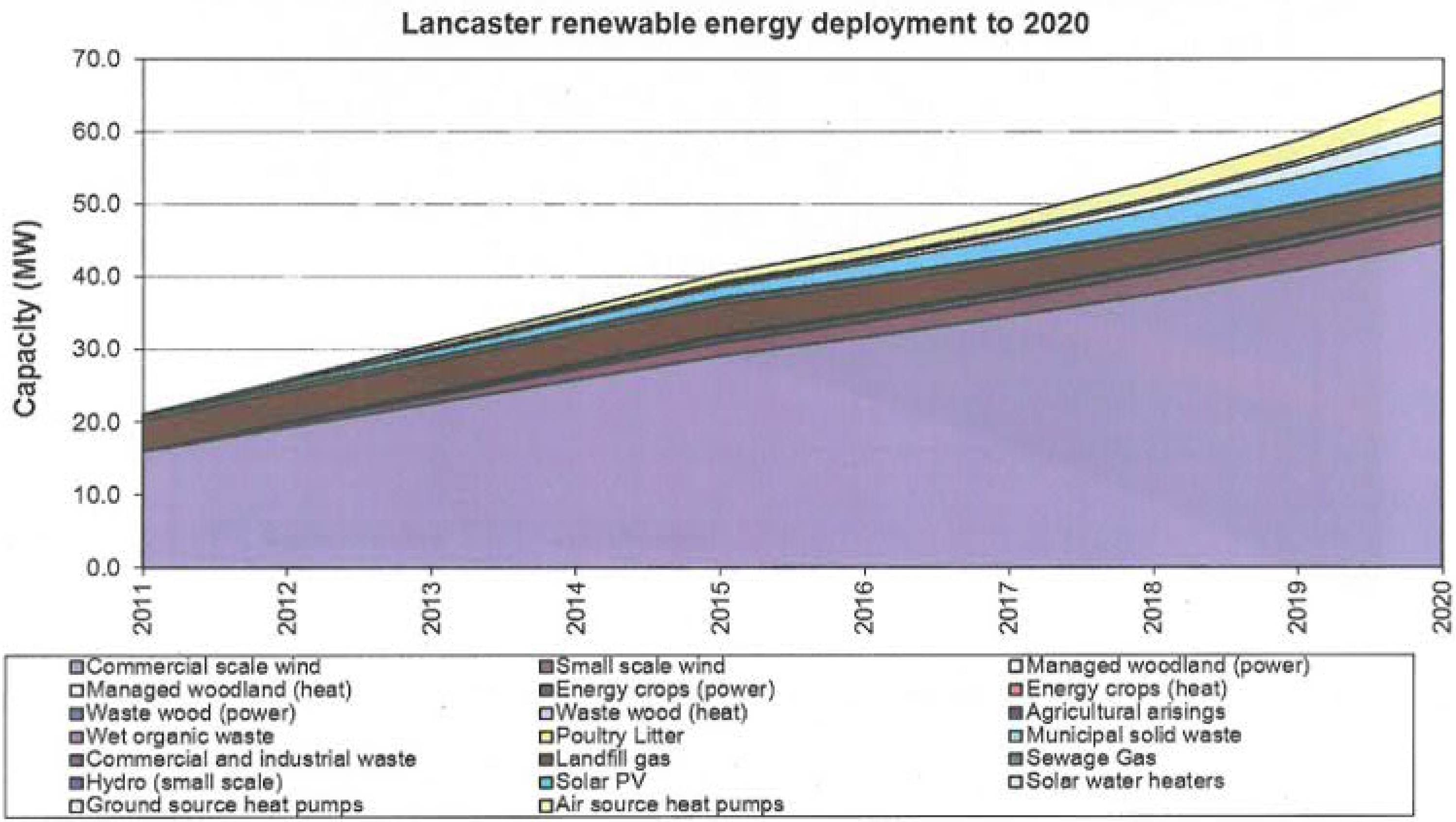
Table D-12: Scenario results for Hyndburn (Total deployment = 61 MW)



Source: SQW

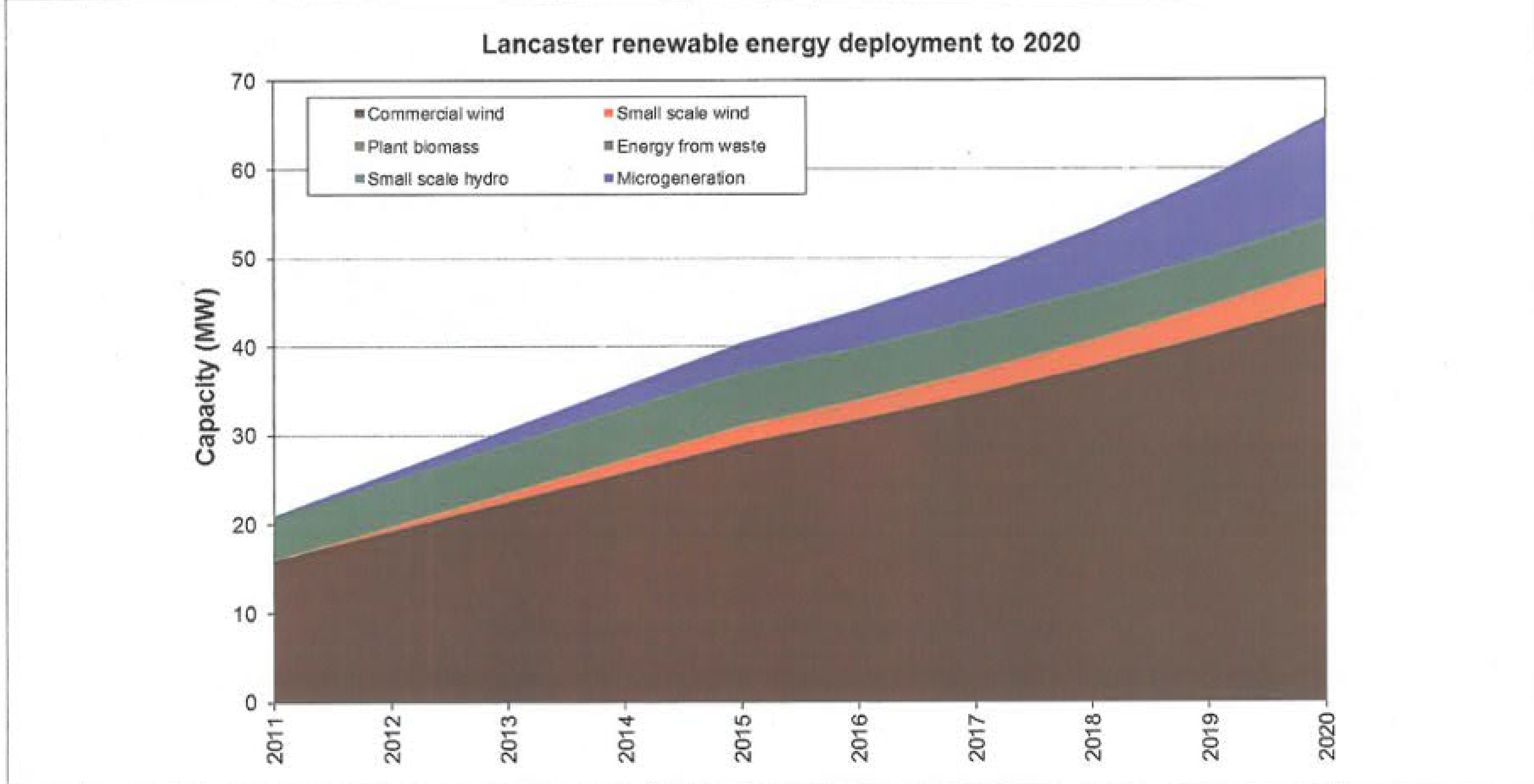
Lancaster

Figure D-13: Detailed renewable energy deployment curve for Lancaster to 2020



Source: SQW

Figure D-14 Simplified renewable energy deployment curve for Lancaster to 2020



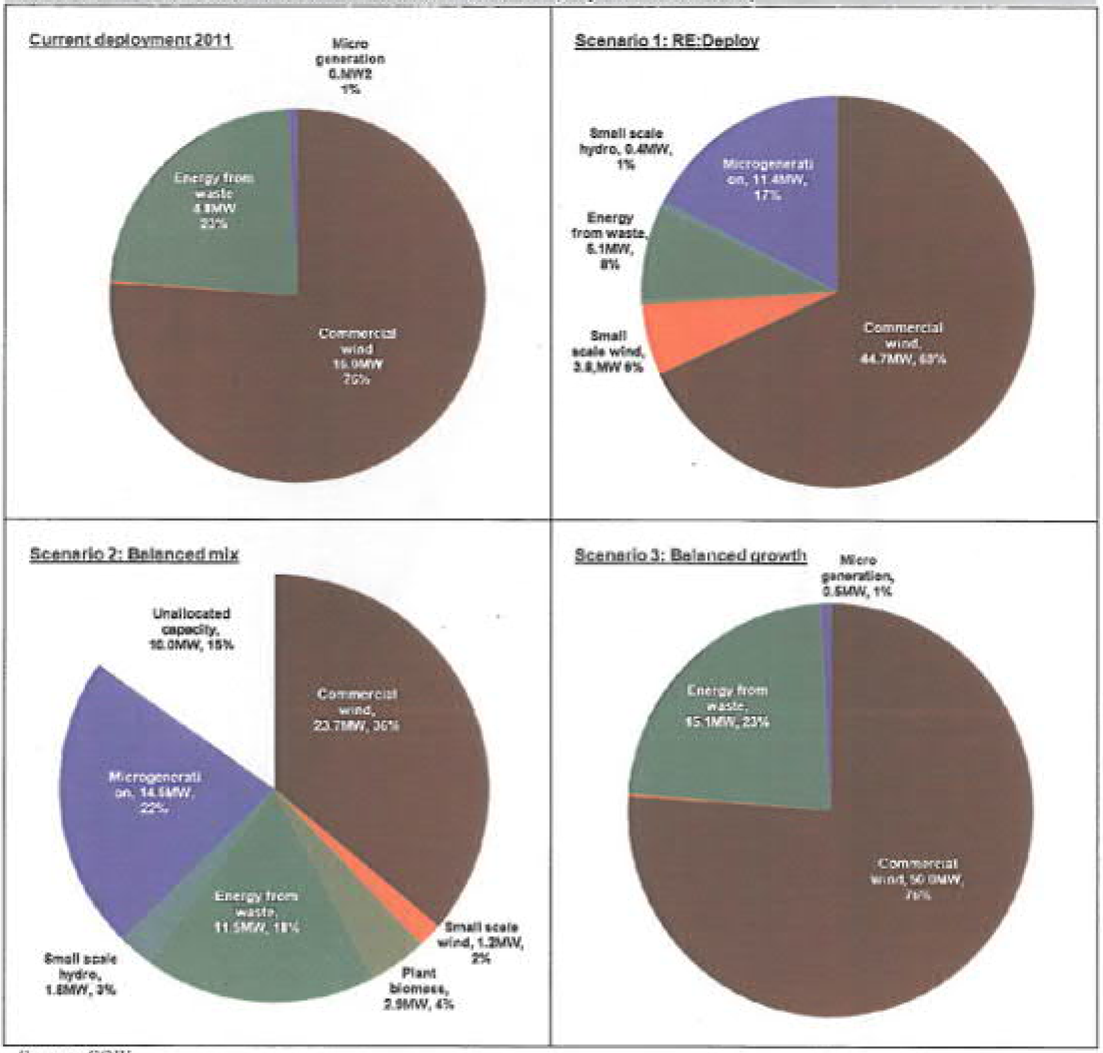
Source: SQW

Table D-13: Lancaster energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	16.0	28.7	44.7
Small scale wind	0.0	3.8	3.8
Plant biomass	0.0	0.3	0.3
Energy from waste	4.8	0.3	5.1
Small scale hydro	0.0	0.4	0.4
Microgeneration eration	0.2	11.2	11.4
Total	**21**	**45**	**66**

Source: SQW

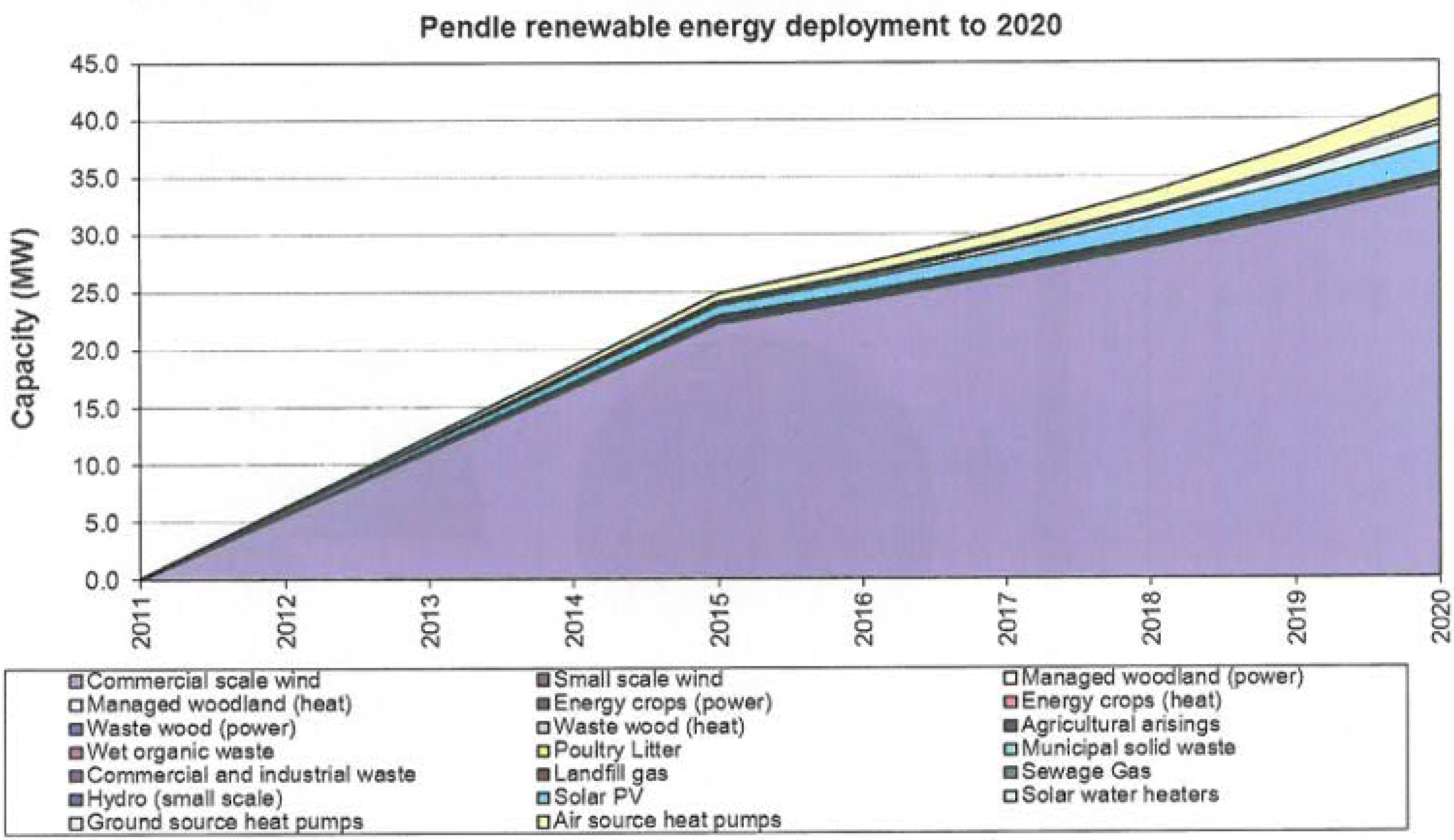
Table D-14 Scenario results for Lancaster (Total deployment = 66 MW)



Source: SQW

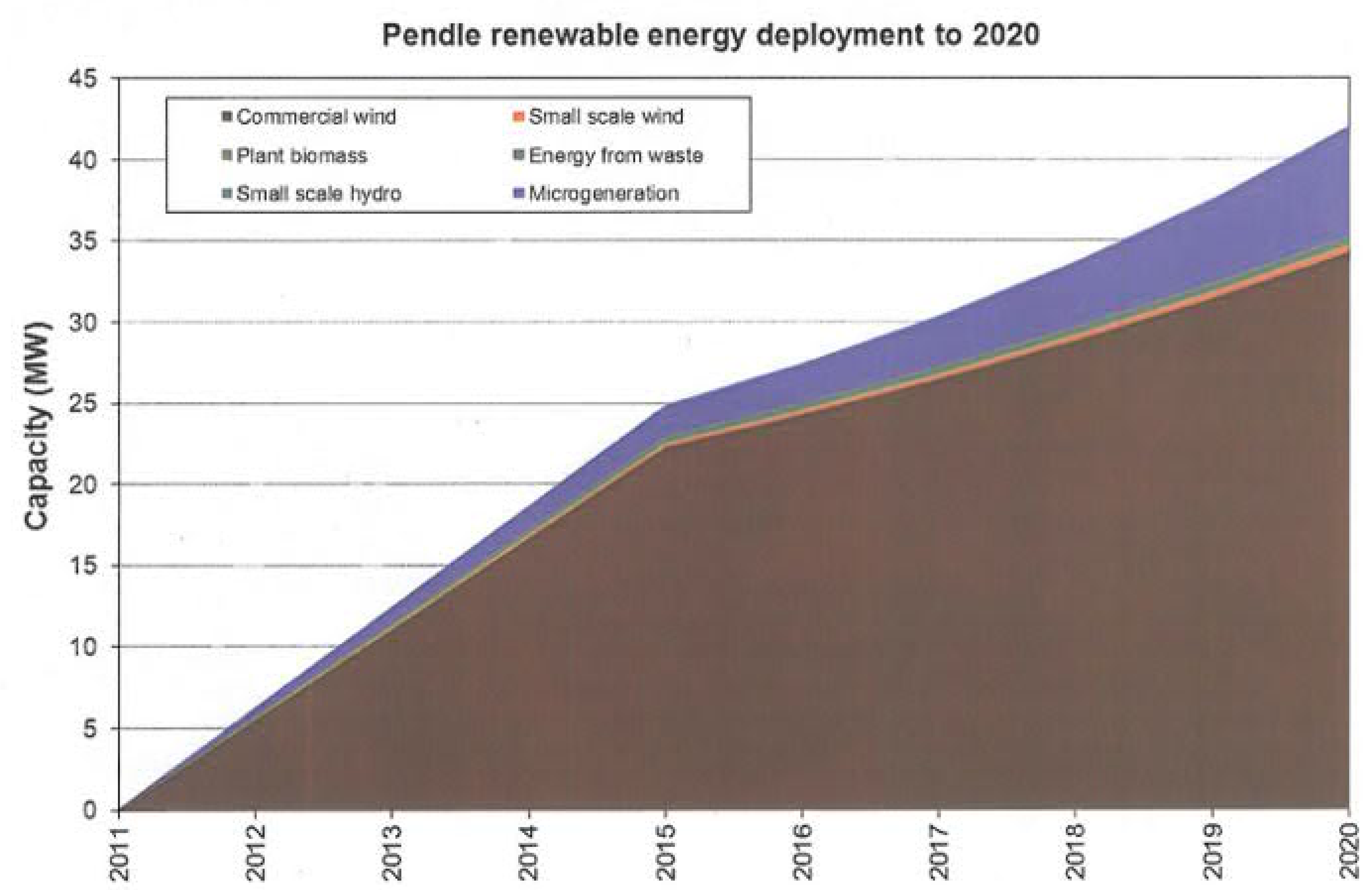
Pendle

Figure D-15. Detailed renewable energy deployment curve for Pendle to 2020



Source: SQW

Figure D-16 Simplified renewable energy deployment curve for Pendle to 2020



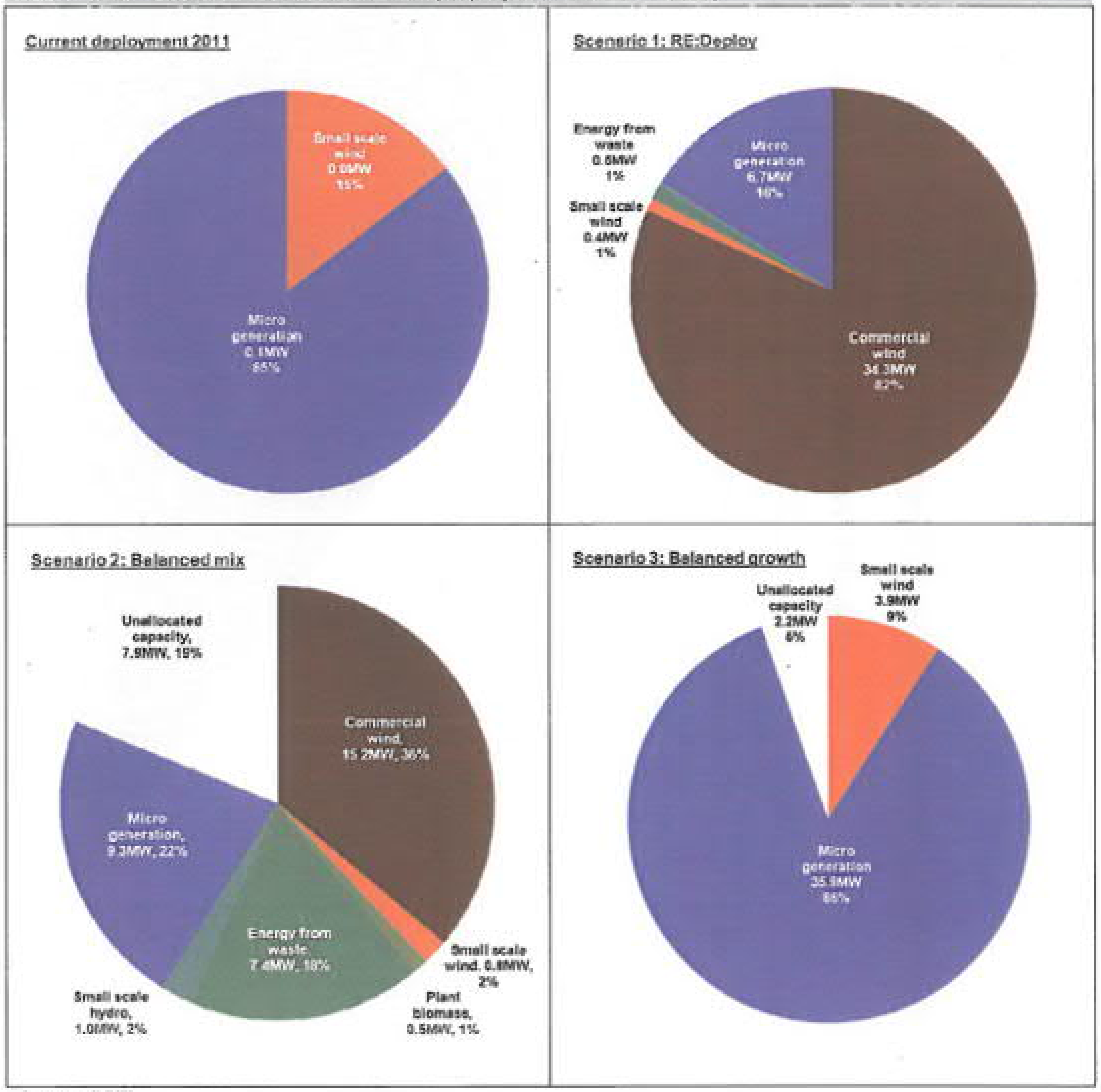
Source: SQW

Table D-15: Pendle renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	34.3	34.3
Small scale wind	0.0	0.4	0.4
Plant biomass	0.0	0.0	0.0
Energy from waste	0.0	0.5	0.5
Small scale hydro	0.0	0.1	0.1
Microgeneration	0.1	6.6	6.7
Total	**0**	**42**	**42**

Source: SQW

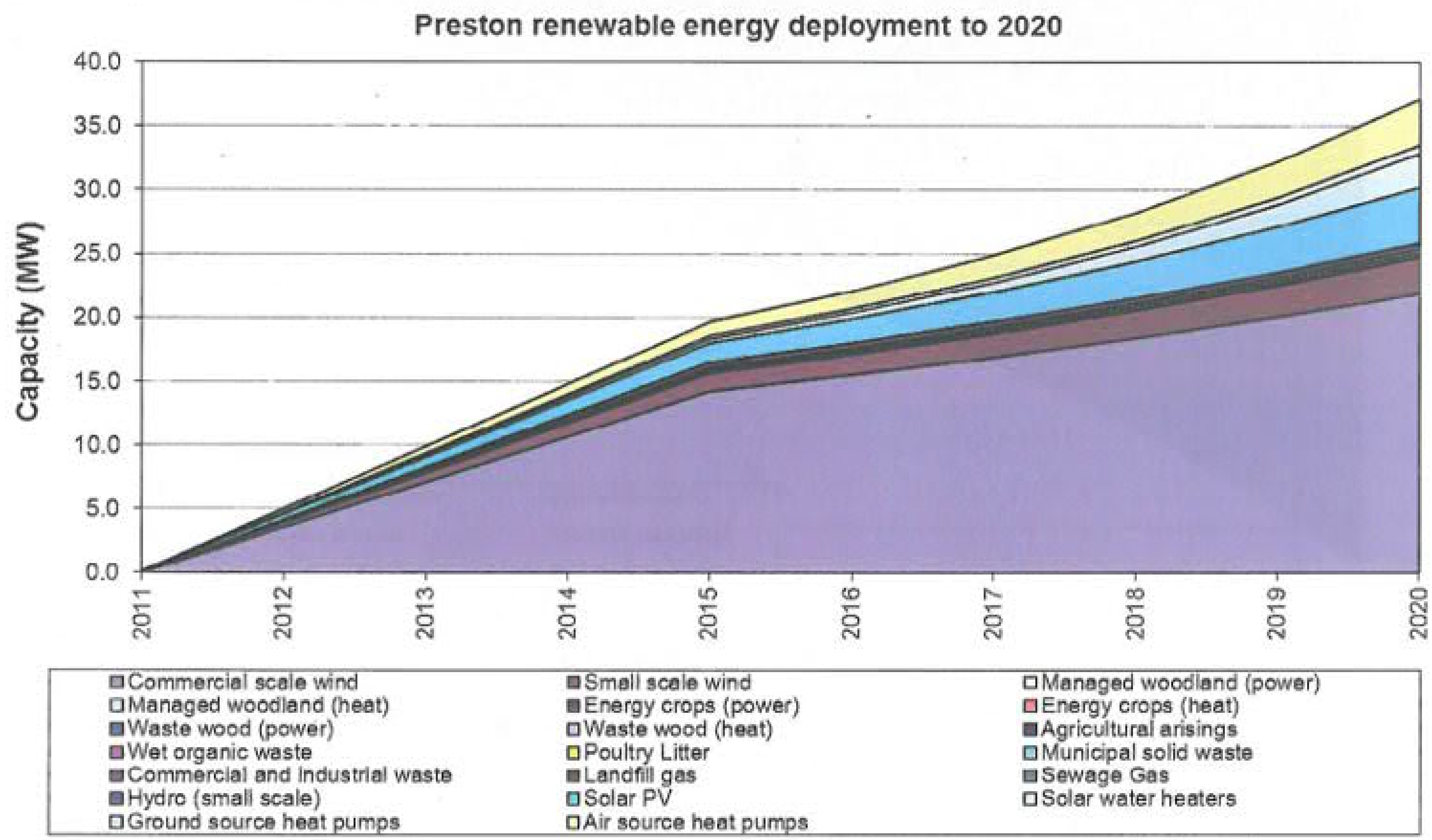
Table D-16 Scenario results for Pendle (Deployment total = 42 MW)



Source: SQW

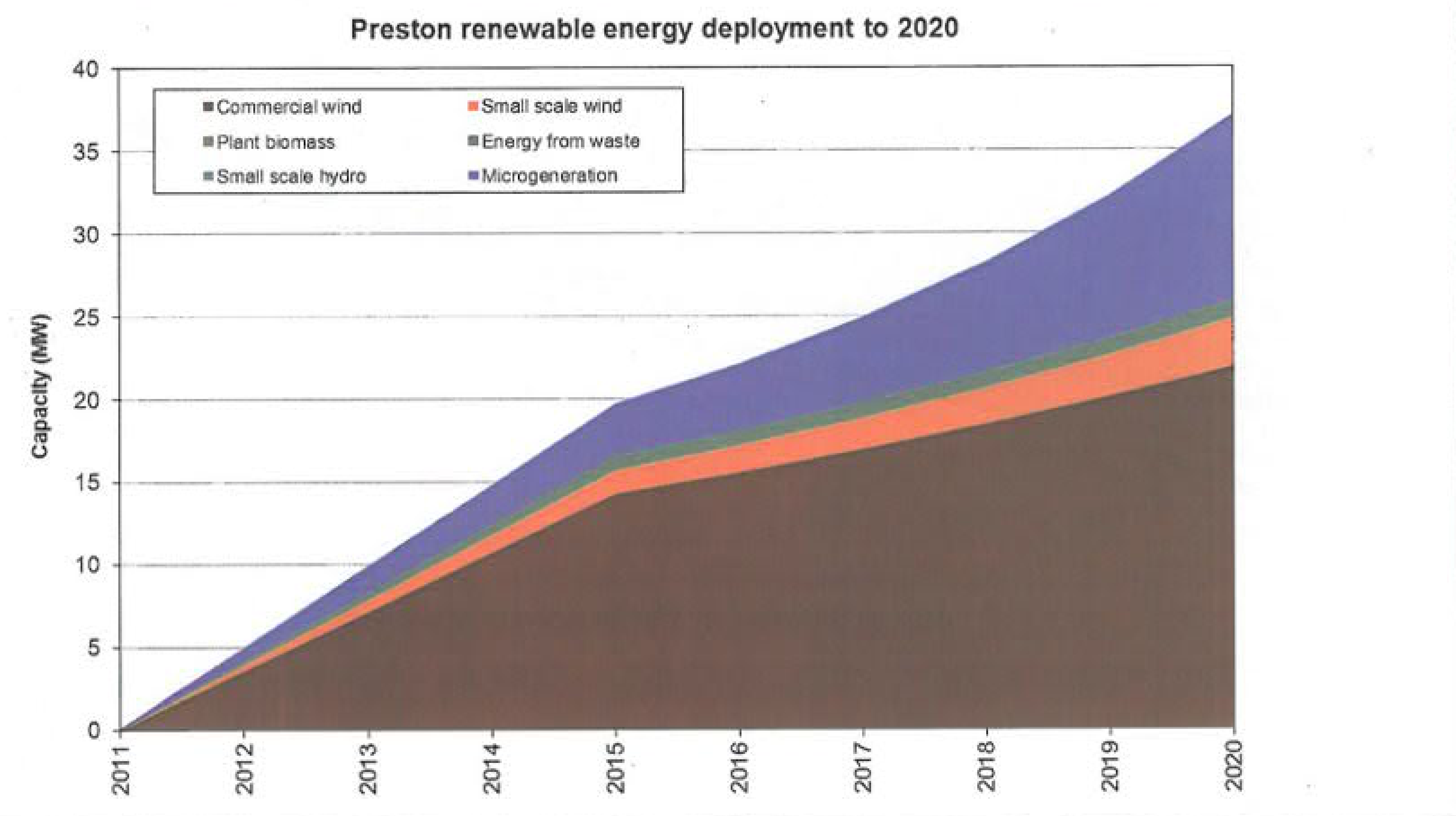
Preston

Figure D-17: Detailed renewable energy deployment curve for Preston to 2020



Source: SQW

Figure D-18: Simplified renewable energy deployment curve for Preston to 2020



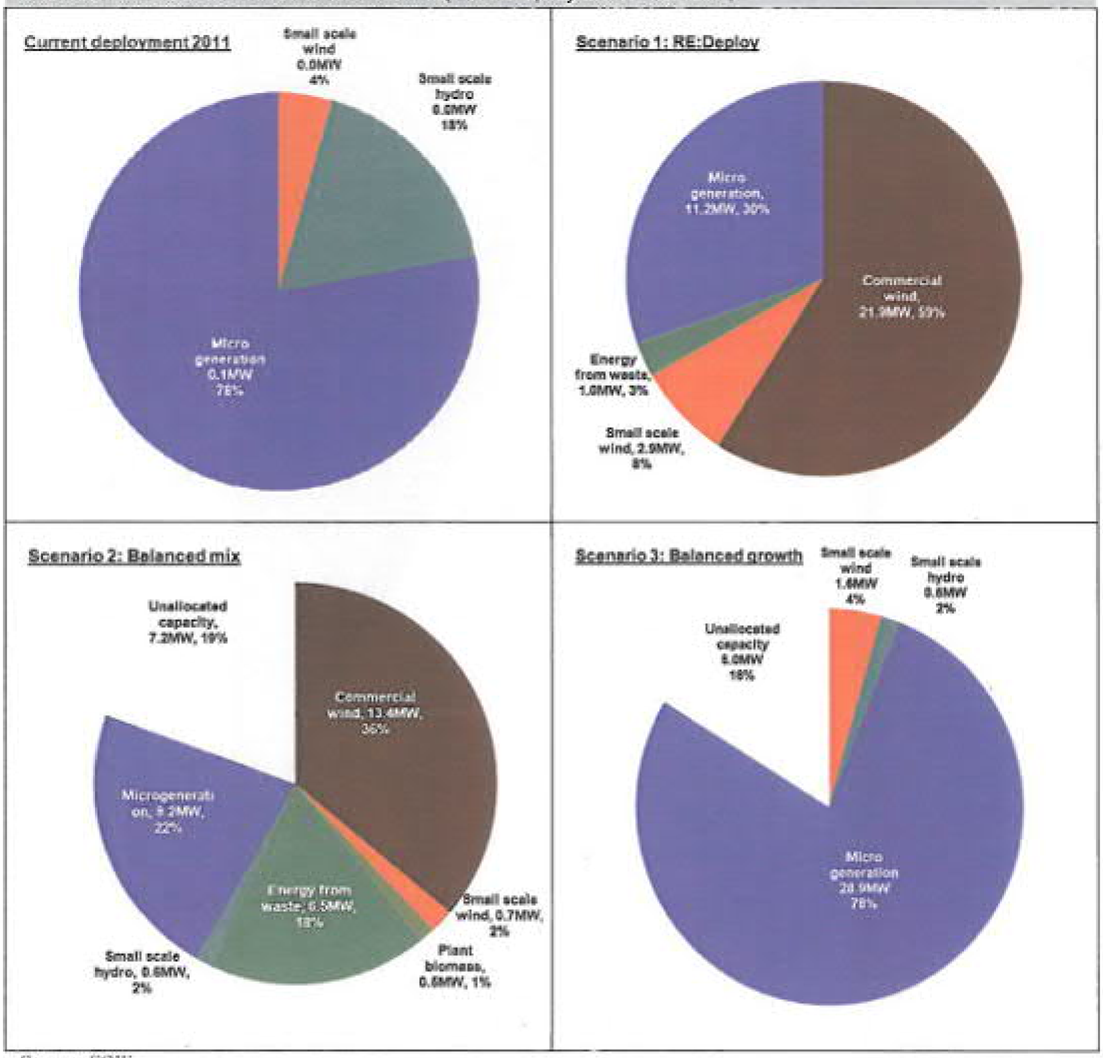
Source: SQW

Table D-17: Preston renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	21.9	21.9
Small scale wind	0.0	2.9	2.9
Plant biomass	0.0	0.0	0.0
Energy from waste	0.0	1.0	1.0
Small scale hydro	0.0	0.0	0.0
Microgeneration	0.1	11.1	11.2
Total	**0**	**37**	**37**

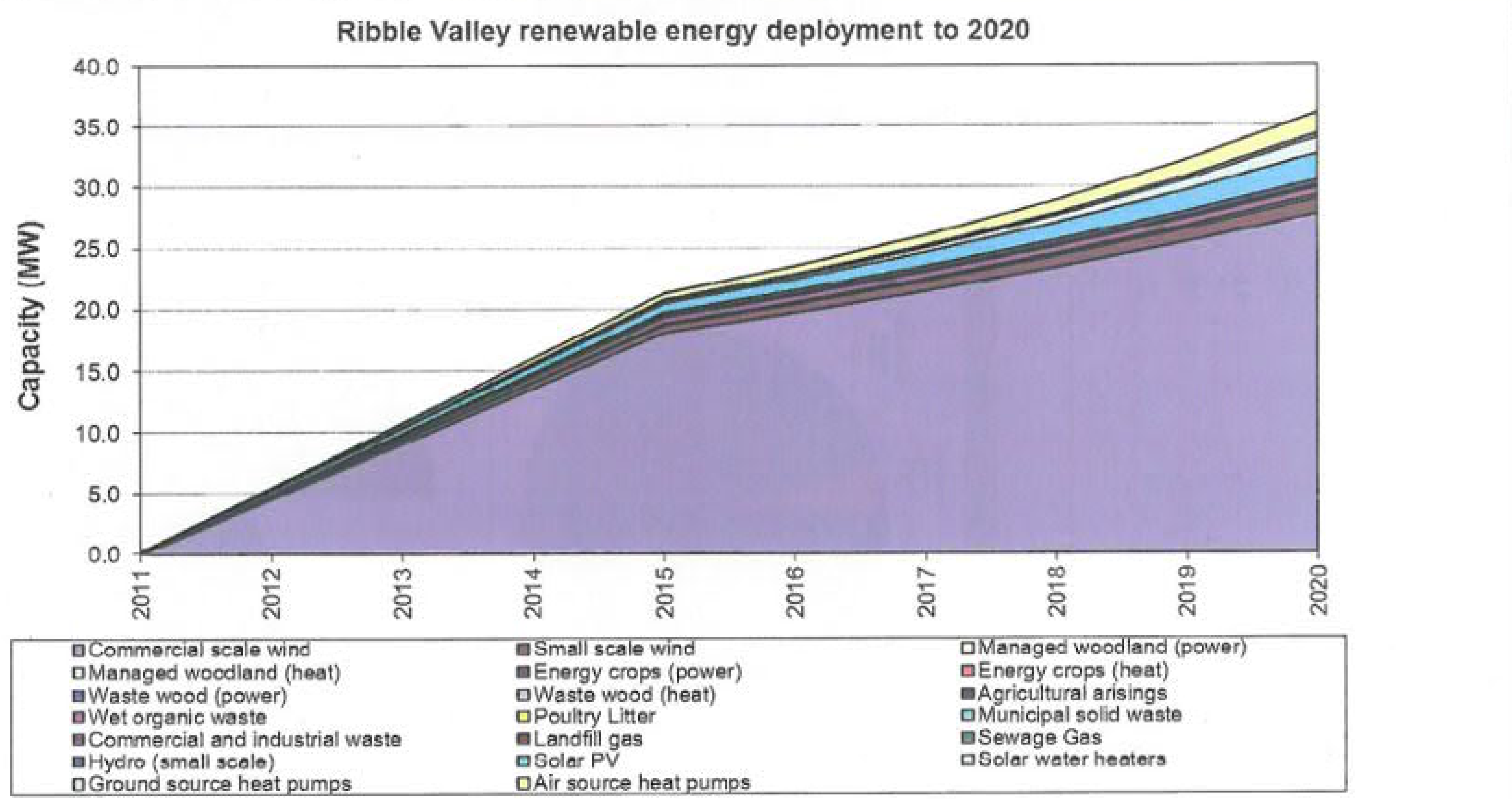
Source: SQW

Table D-18: Scenario results for Preston (Total deployment = 37 MW)



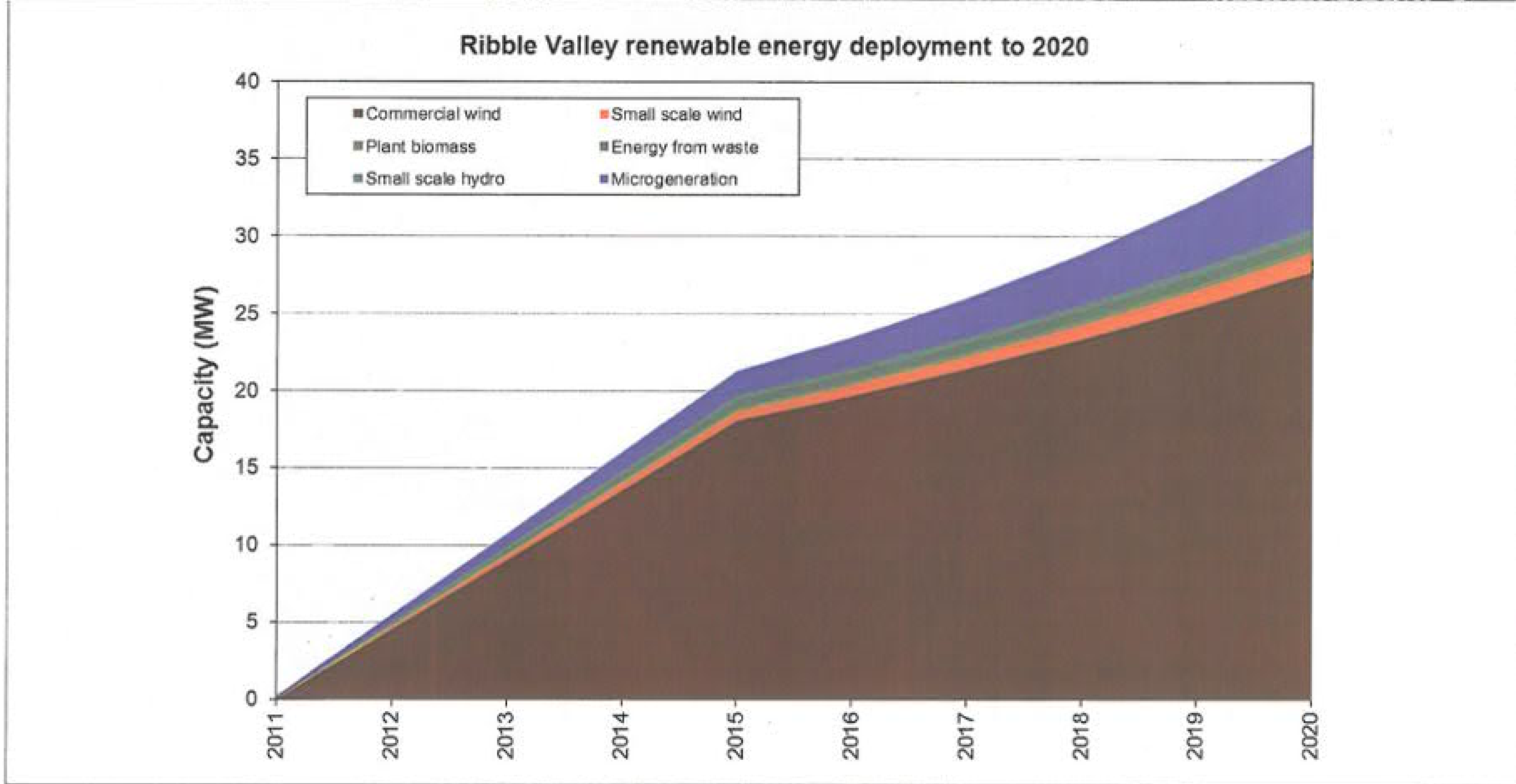
Source: SQW

Figure D-19: Detailed renewable energy deployment curve for Ribble Valley to 2020



Source: SQW

Figure D-20: Simplified renewable energy deployment curve for Ribble Valley



Source: SQW

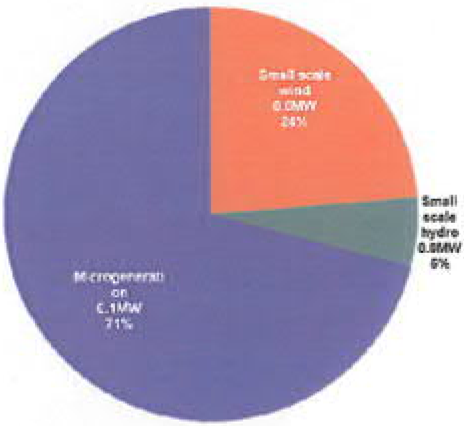
Table D-19: Ribble Valley renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	27.7	27.7
Small scale wind	0.0	1.2	1.2
Plant biomass	0.0	0.3	0.3
Energy from waste	0.0	0.8	0.8
Small scale hydro	0.0	0.4	0.4
Microgeneration	0.1	5.4	5.5
Total	**0**	**36**	**36**

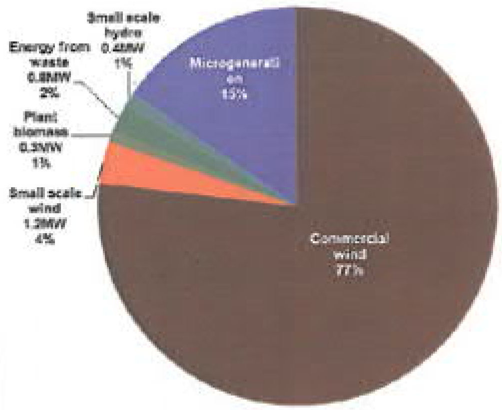
Source: SQW

Table D-20: Scenario results for Ribble Valley (Total deployment = 36 MW)

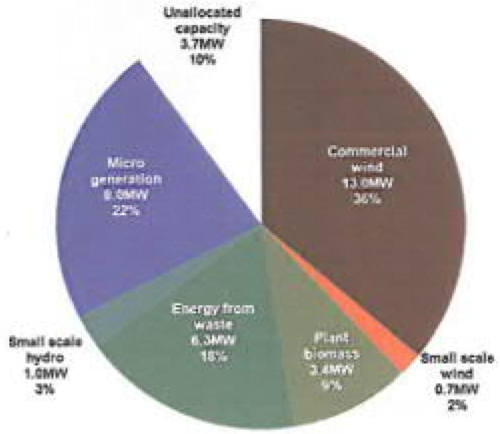
Current deployment 2011



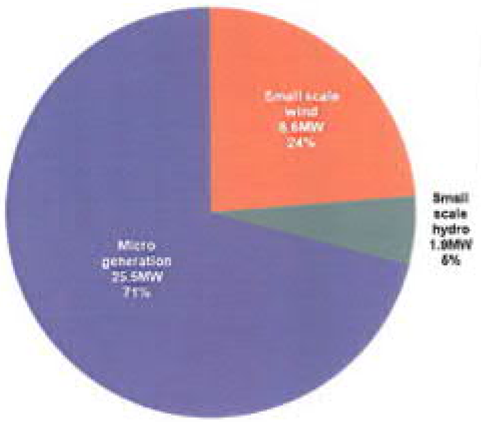
Scenario 1: RE:Deploy



Scenario 2: Balanced mix

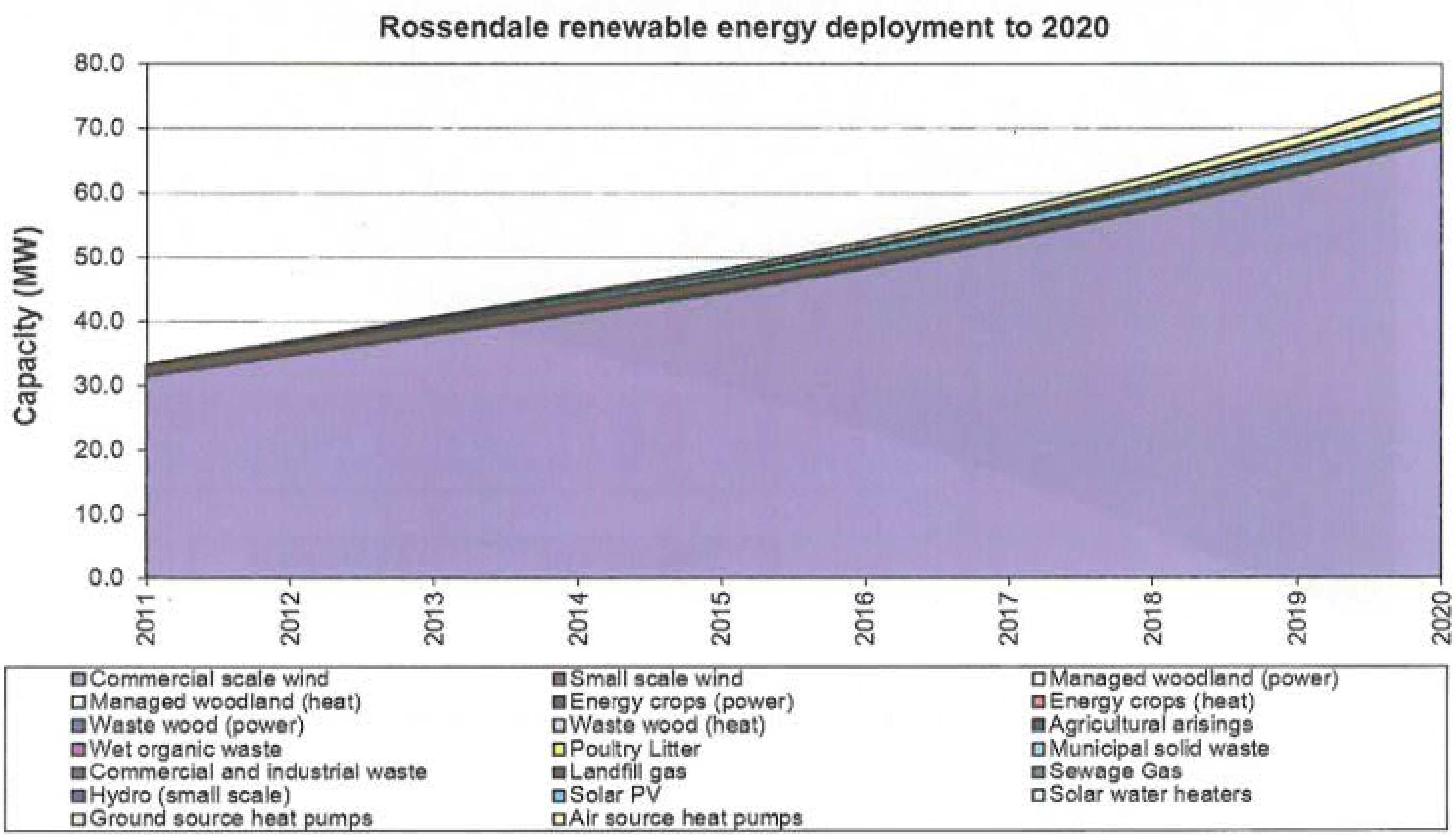


Scenario 3: Balanced growth



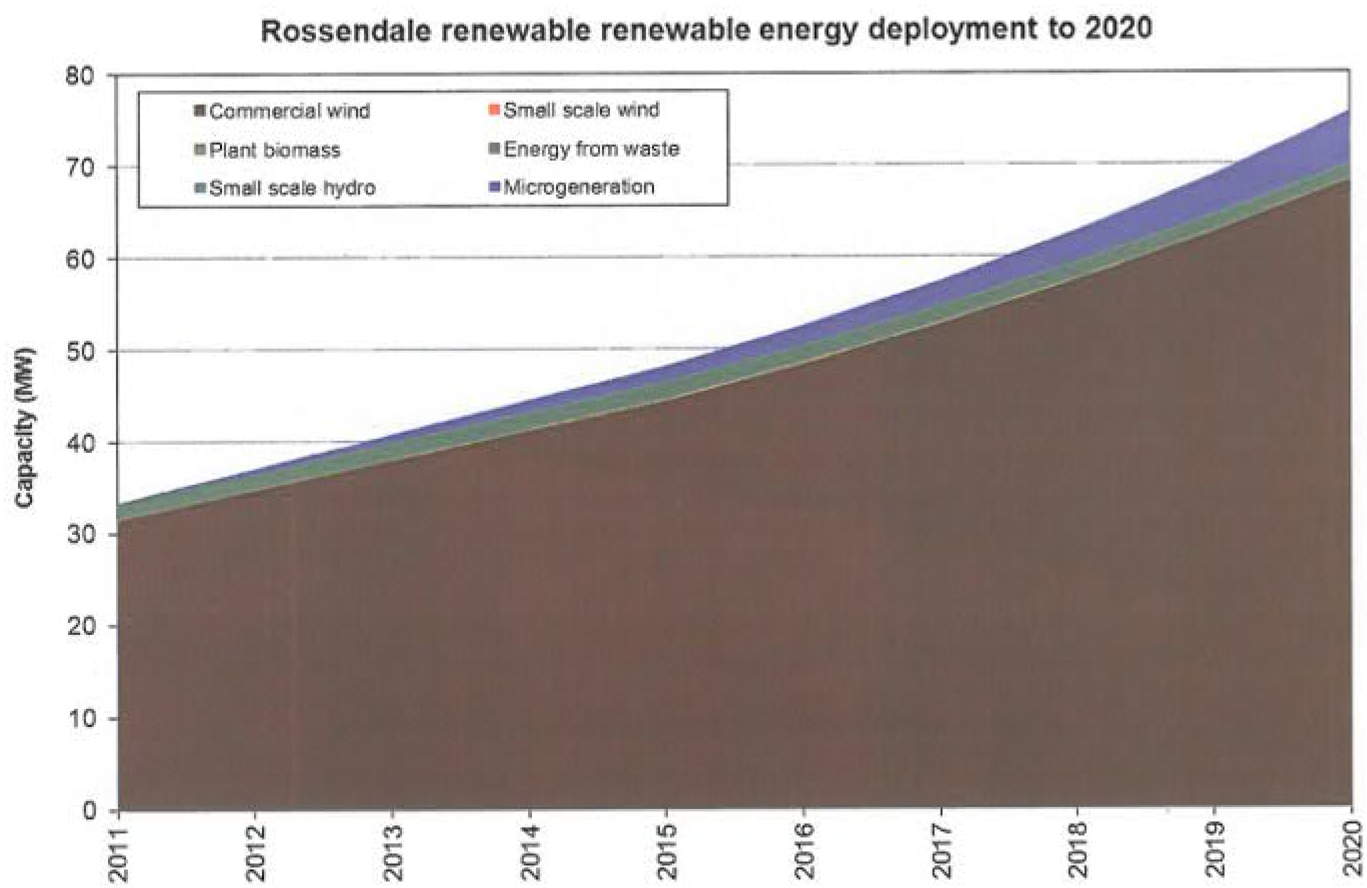
Source: SQW

Figure D-21: Detailed renewable energy deployment curve for Rossendale to 2020



Source: SQW

Figure D-22: Simplified renewable energy deployment curve for Rossendale to 2020



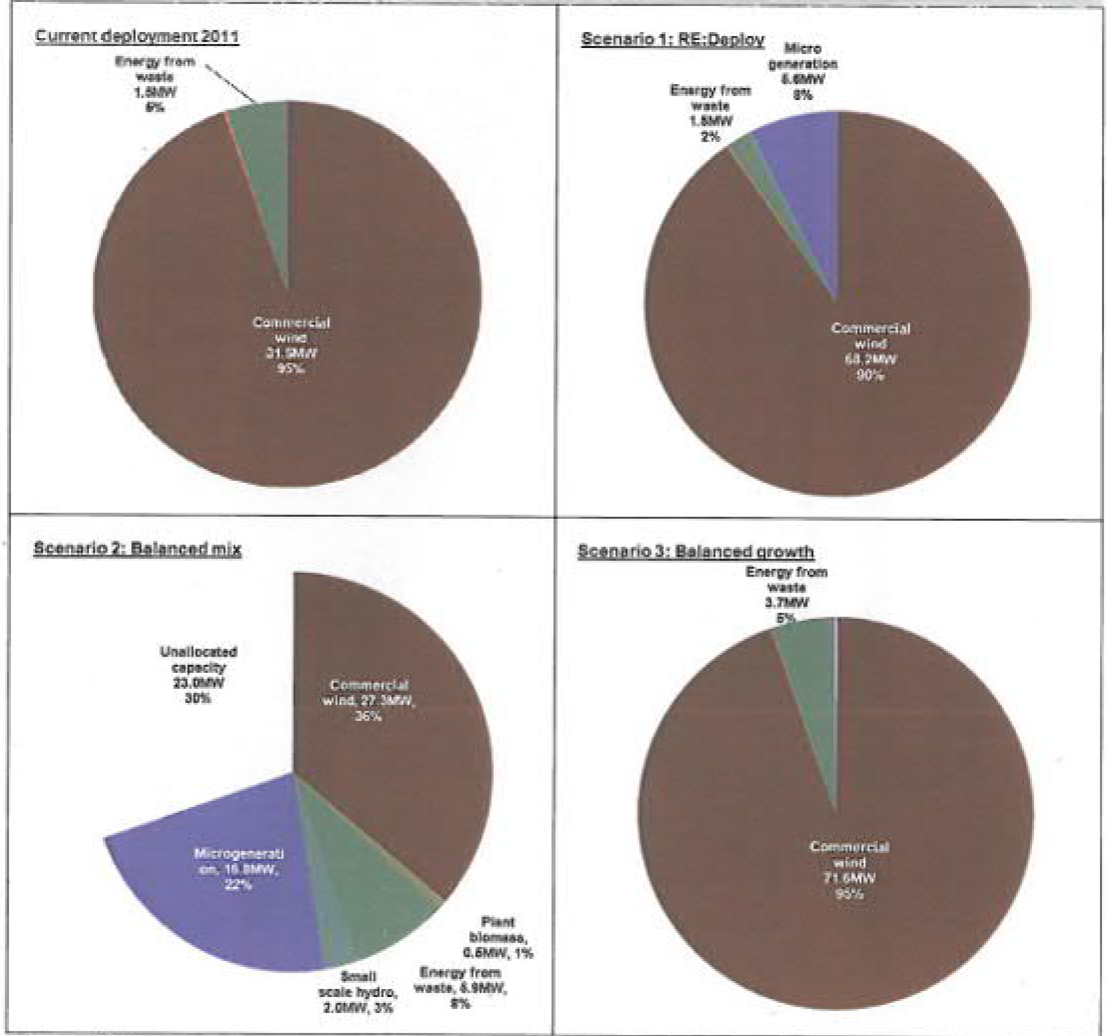
Source: SQW

Table D-21: Rossendale renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	31.5	36.7	68.2
Small scale wind	0.1	0.0	0.1
Plant biomass	0.0	0.0	0.0
Energy from waste	1.6	-0.1	1.5
Small scale hydro	0.0	0.2	0.2
Microgeneration	0.1	5.5	5.6
Total	**33**	**43**	**76**

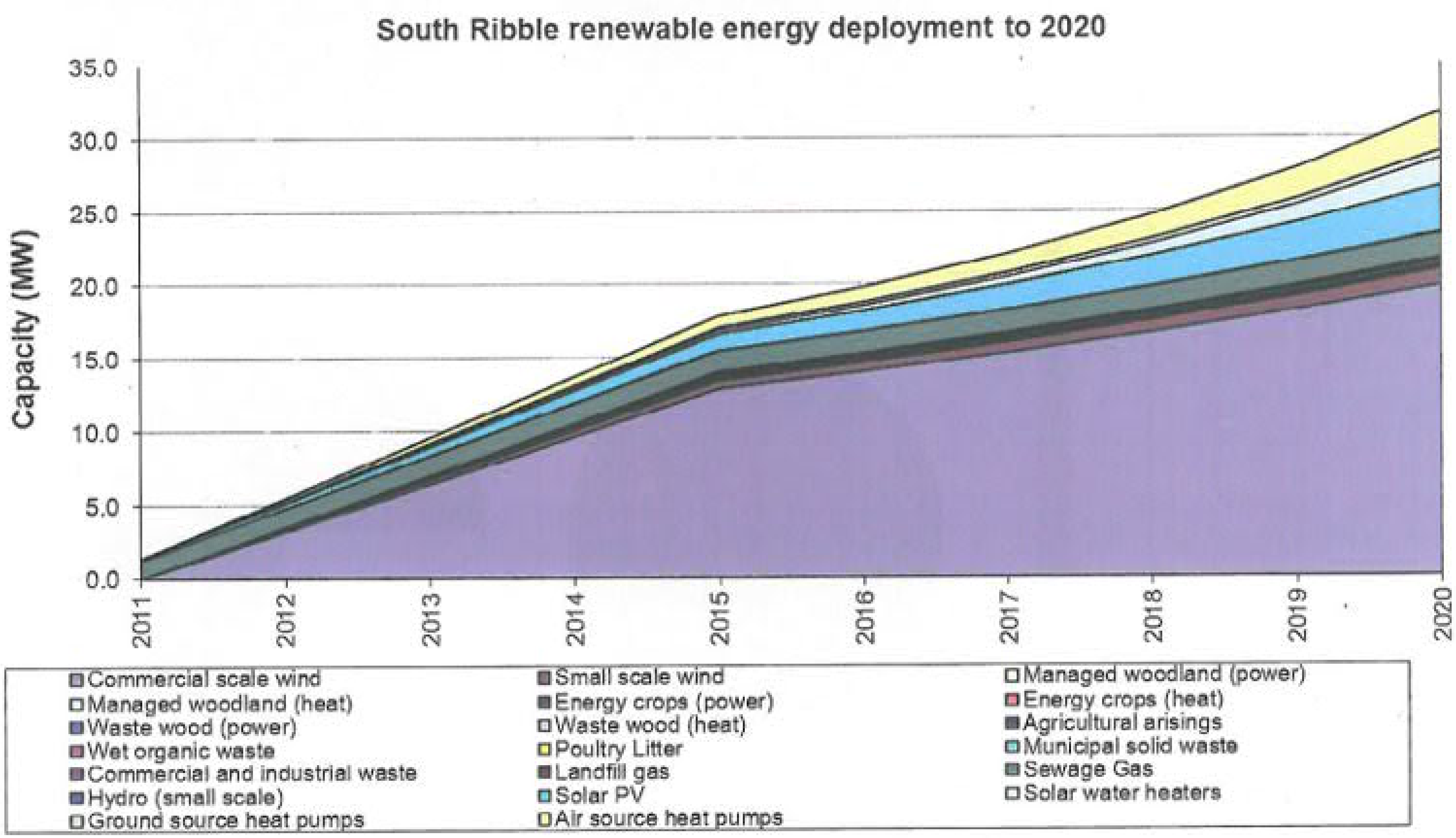
Source: SQW

Table D-22 Scenario results for Rossendale (Total deployment = 76 MW)



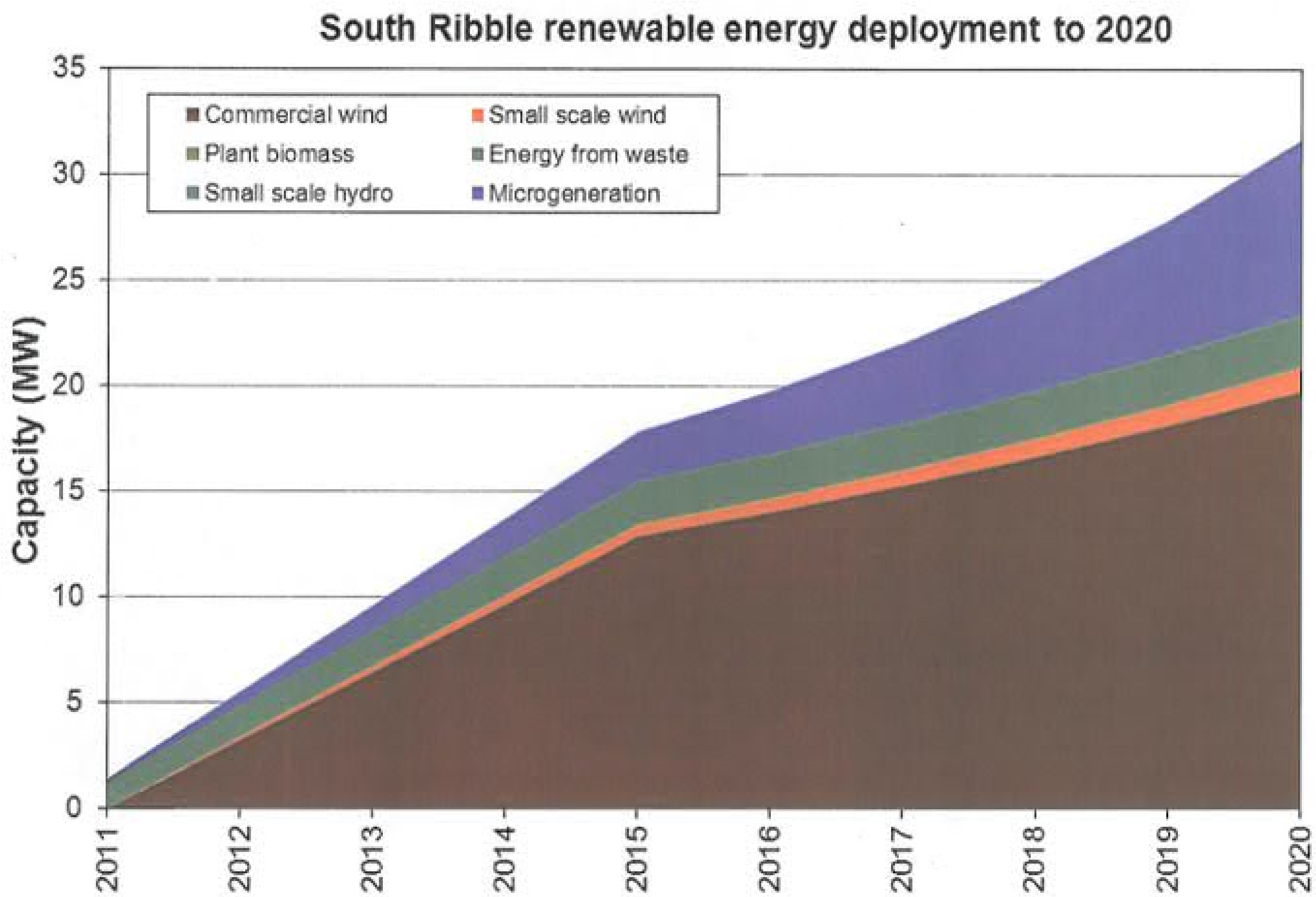
Source: SQW

Figure D-23: Detailed renewable energy deployment curve for South Ribble to 2020



Source: SQW

Figure D-24 Simplified renewable energy deployment curve for South Ribble to 2020



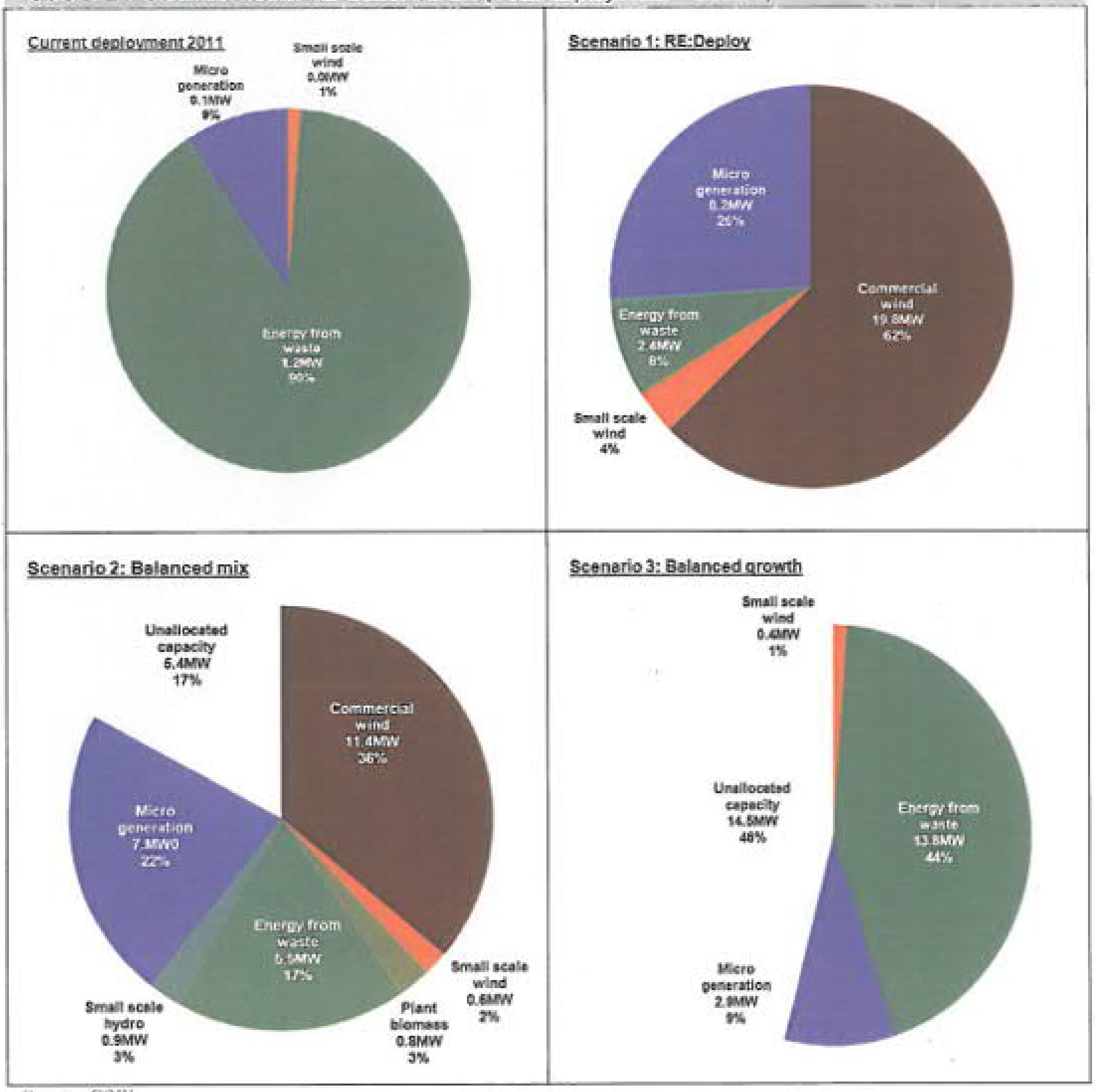
Source: SQW

Table D-23: South Ribble renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	19.8	19.8
Small scale wind	0.0	1.1	1.1
Plant biomass	0.0	0.1	0.1
Energy from waste	1.2	1.2	2.4
Small scale hydro	0.0	0.1	0.1
Microgeneration eration	0.1	8.1	8.2
Total	**1**	**31**	**32**

Source: SQW

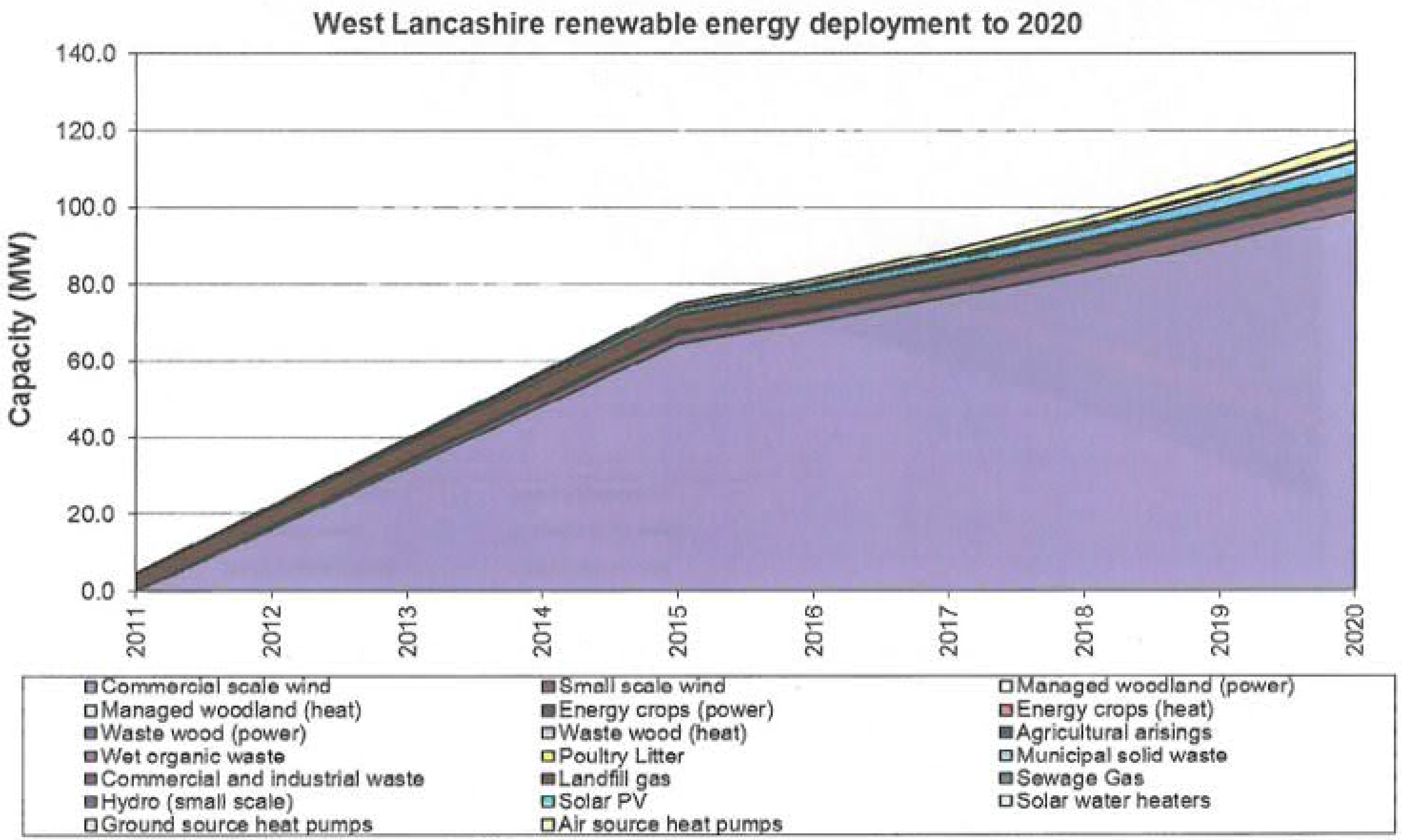
Table D-24 Scenario results for South Ribble (Total deployment = 32 MW)



Source: SQW

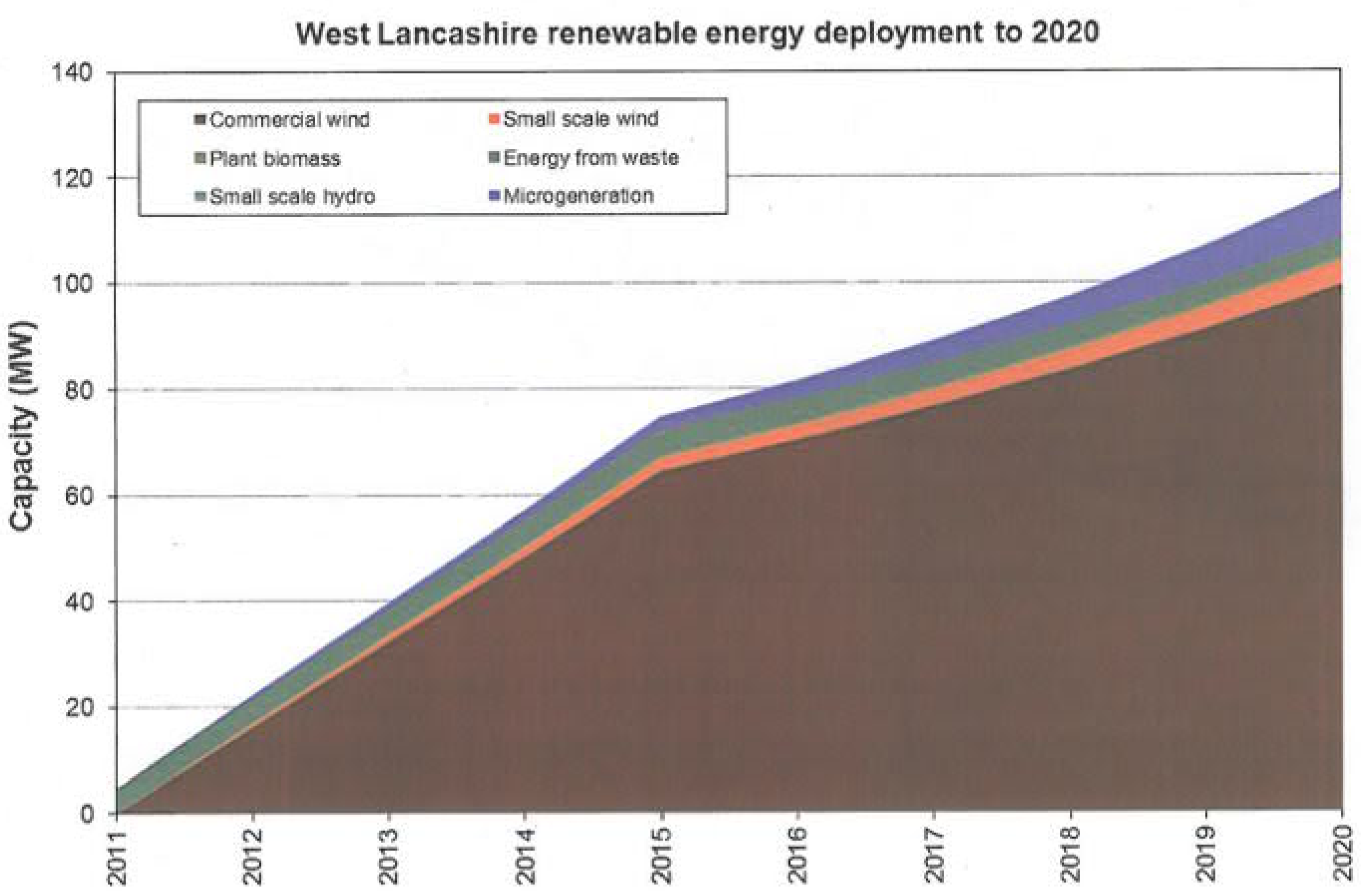
West Lancashire

Figure D-25 Detailed renewable energy deployment curve for West Lancashire to 2020



Source: SQW

Figure D-26 Simplified renewable energy deployment curve for West Lancashire to 2020



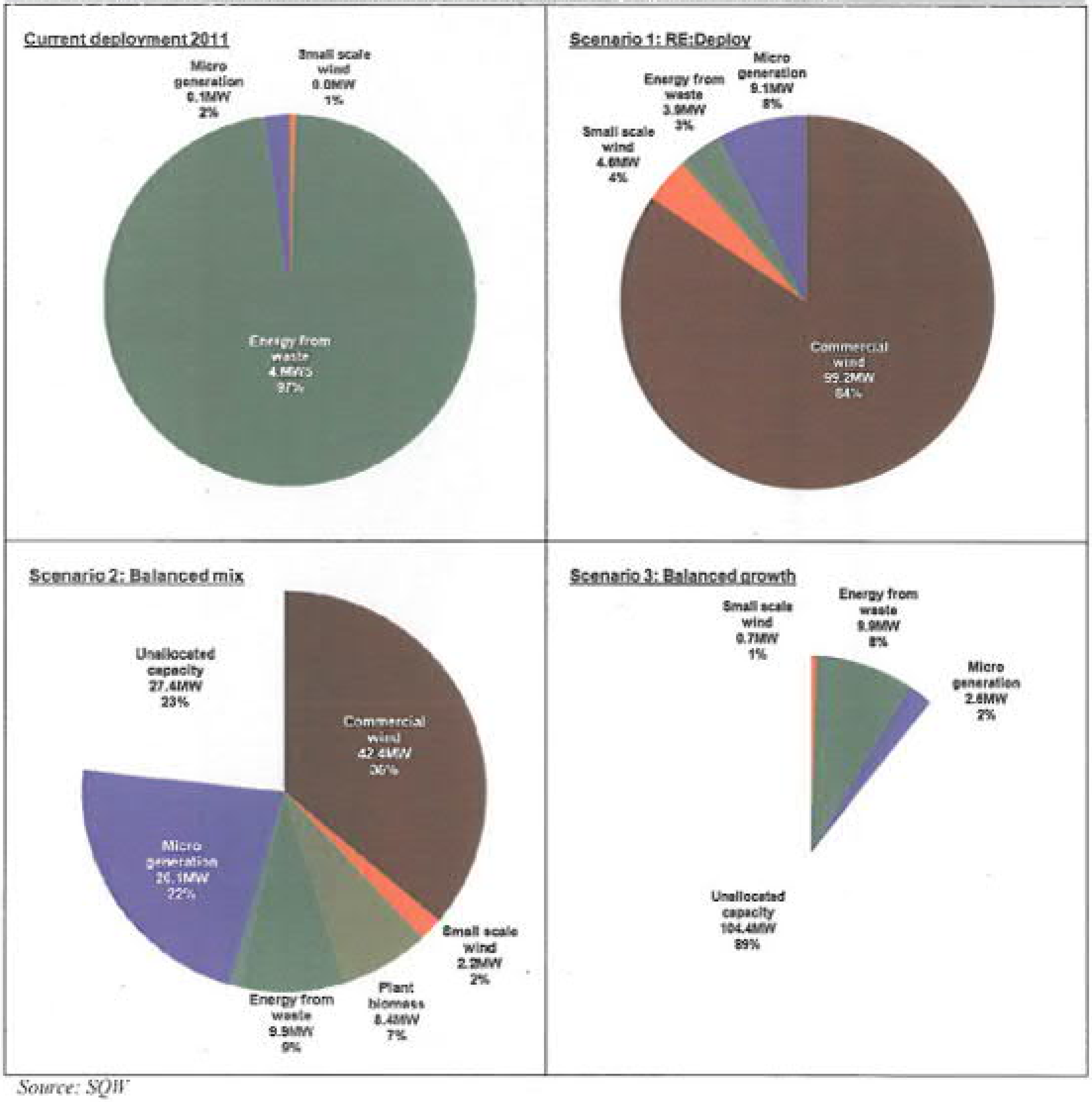
Source: SQW

Table D-25 West Lancashire renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	0.0	99.2	99.2
Small scale wind	0.0	4.6	4.6
Plant biomass	0.0	0.6	0.6
Energy from waste	4.5	-0.6	3.9
Small scale hydro	0.0	0.1	0.1
Microgeneration eration	0.1	9.0	9.1
Total	**5**	**113**	**118**

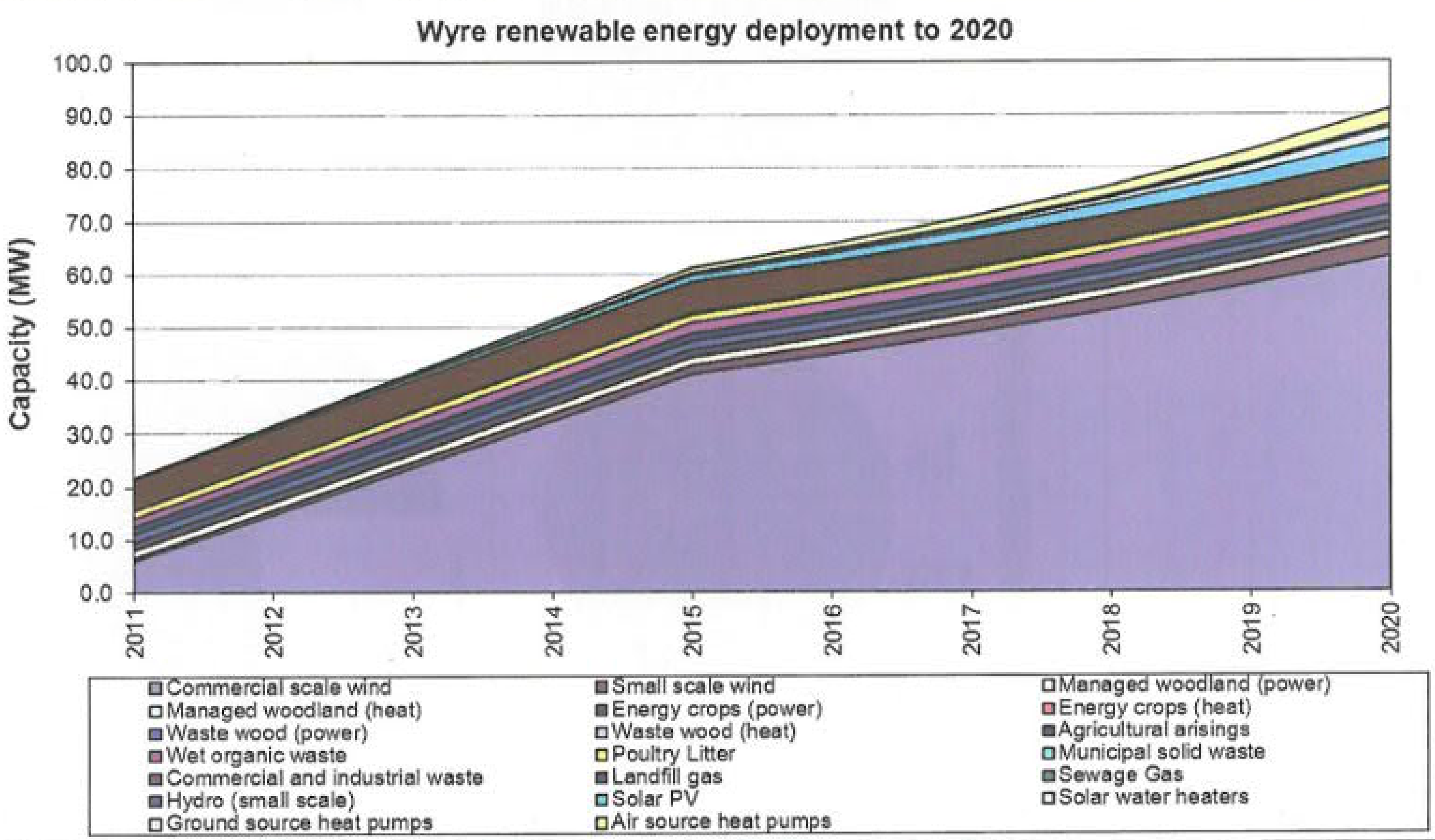
Source: SQW

Table D-26 Scenario results for West Lancashire (Total Deployment = 118 MW)



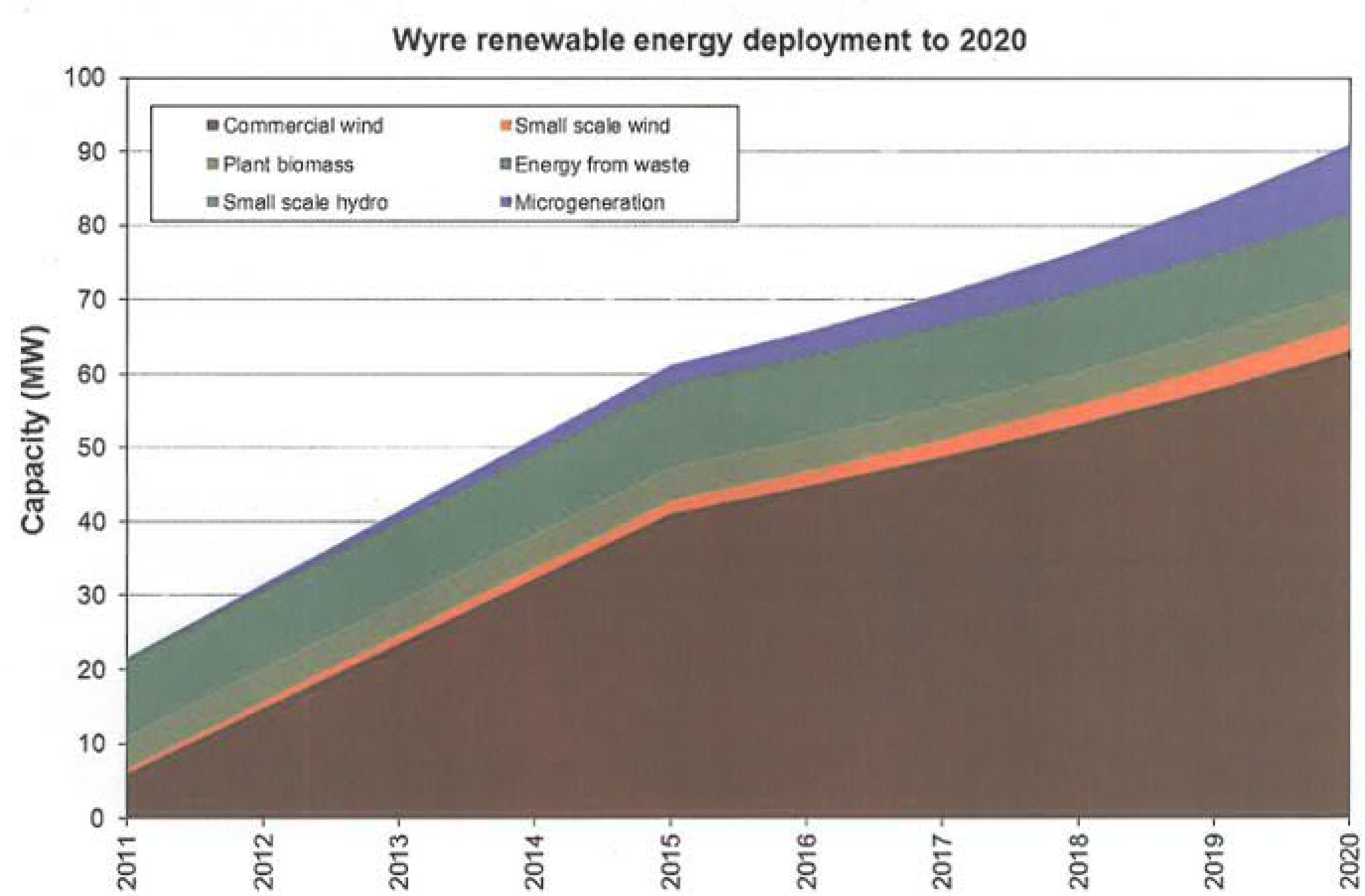
Source: SQW

Figure D-27: Detailed renewable energy deployment curve for Wyre to 2020



Source: SQW

Figure D-28: Simplified renewable energy deployment curve for Wyre to 2020



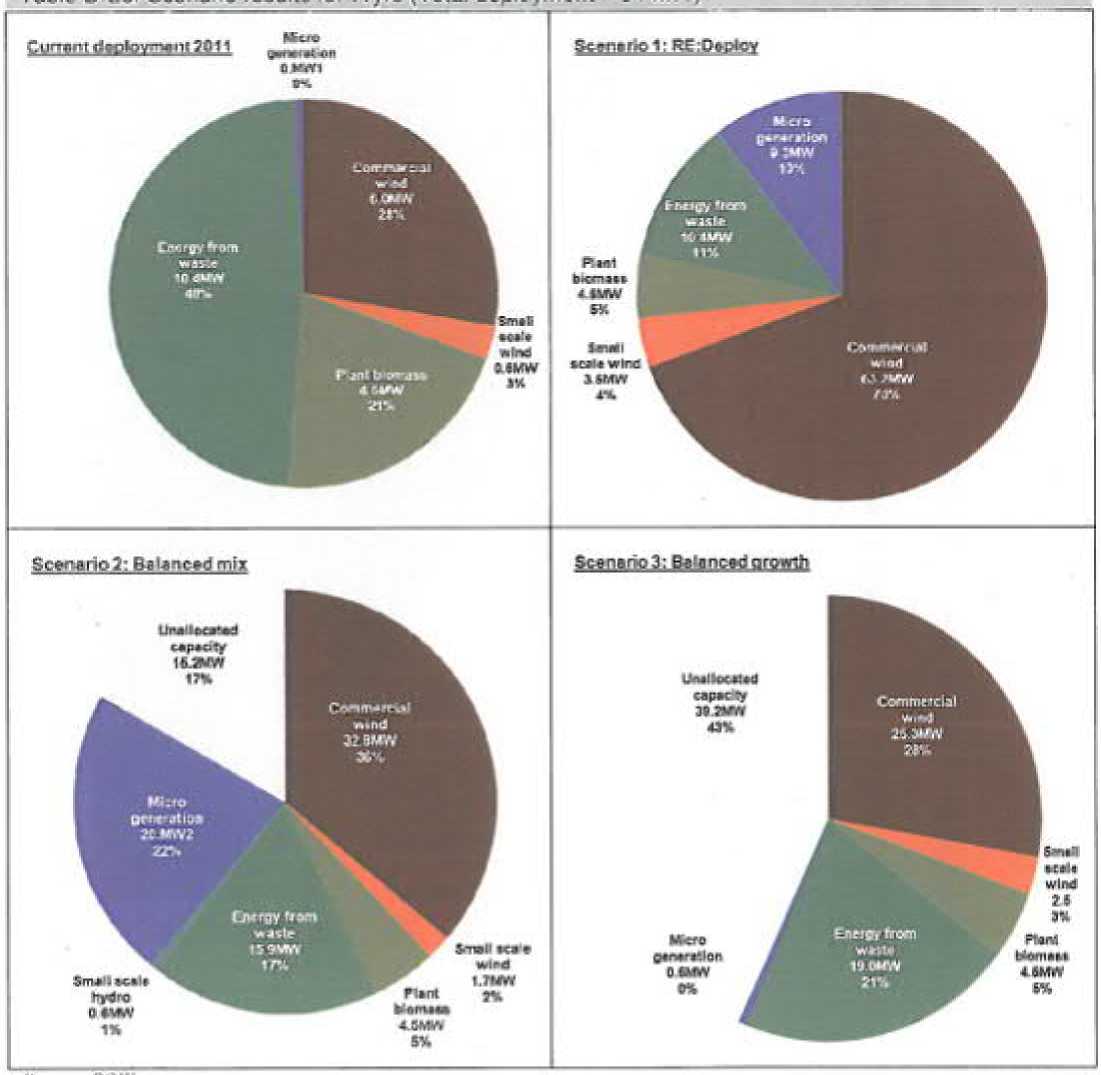
Source: SQW

Table D-27: Wyre renewable energy deployment projections, 2020

Technology	Existing deployment at 2011	Additional deployment to 2020	Total deployment 2020
Commercial wind	6.0	57.2	63.2
Small scale wind	0.6	2.9	3.5
Plant biomass	4.5	0.1	4.6
Energy from waste	10.4	0.0	10.4
Small scale hydro	0.0	0.1	0.1
Microgeneration eration	0.1	9.2	9.3
Total	**22**	**69**	**91**

Source: SQW

Table D-28: Scenario results for Wyre (Total deployment = 91 MW)



Source: SQW