



**Biomass energy register
for sustainable site development
for European regions**

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BEn

**Biomass energy register for sustainable site development
for European regions**

Intelligent Energy – Europe (IEE)

Horizontal action: Bio Business Initiative

Deliverable D4.4: Masterplan

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1. Introduction

1.1. Background

1.1.1. European context

The European Commission has a clear objective to develop Energy Policy with a strong emphasis on maximising generation from renewable energy sources and in particular, biomass. However, it remains vital to satisfy three important criteria: competitiveness, sustainable development and the security of supply.

To promote renewable energy sources in the broader context of energy policy, the European Commission has prepared a series of regulations to implement which address several specific issues including the Renewable Energy Directive and the Biomass Action Plan.

1.1.2. National and regional context

The UK Government has set very high carbon reduction targets, cutting Greenhouse Gas emissions by 80% of 1990 levels by 2050. The vast majority of these targets are to be met by substitution, rather than sequestration. A massive growth in the renewable market is expected and is required to achieve these goals. A range of 'carrots and sticks' have been implemented to accelerate the growth of the renewable sector including importantly financial incentives for electrical and heat generation from renewable sources. These mechanisms are designed to contribute to strategically preferential renewable technology mixes in which biomass is identified as playing a very important role.

The North East has a long history of association with solid fuel, specifically coal. For many decades, the North East was a significant energy exporter, with millions of tonnes of coal having been exported from the Region to power the industrial revolution. This association with solid fuel has long since dwindled. However, important new drivers are emerging to drive forward the deployment of biomass as a fuel, and the North East is very well placed to return to it's former years as a region once again powered by solid fuels.

The North East has undergone a significant period of political and leadership change during the lifetime of the BEn project. At the outset of the project, a key delivery partner for economic development within the North East was the One NorthEast, the Regional Development Agency (or RDA). With a significant budget and clear goals and drivers for change, the RDA was one of the primary audiences for the BEn Master Plan and an organisation capable of accepting and adopting the plan as a strategy. At a leadership level, the former Government Office role has now been entirely removed. However, the work of the BEn project and this Masterplan will be used to inform the development of Local Development Frameworks, and will be used to assist future local policies and directions of local authorities.

1.2. Aims for the development of master plan

In the North East of England the Master Plan is developed to support the sustainable development of the biomass sector in the Region. All regional partners are invited to participate in the development of the document and present their positions.

Due to the changing political and administrative situation this document is designed to identify possible areas requiring intervention, barriers to the success of a flourishing biomass industry and to assist with the creation of a vision of the North East's biomass sector in the future. This plan will help to steer the direction of development of the biomass market in the region and recommend areas for intervention and actions which needs to be addressed to achieve these goals.

1.3. Methodology for the development of master plan

1.3.1. Definitions

Master Plan

SWOT – Strengths, Weaknesses, Opportunities, Threats analysis

RDA – Regional Development Agency

RHI – Renewable Heat Incentive

ROC – Renewable Obligation Certificate

DECC – Department of Energy and Climate Change

NNFCC – National Non Food Crop Centre

1.3.2. Quality control

The quality control over the process of development of the Master Plan is assured by a Master Plan Working Group which has assisted with the initial steer by overseeing the development process. It consists of the representatives of significant stakeholders in the biomass market in the region:

Forestry Commission – Richard Pow

North East Biomass Forum – David Maunder (Chair of the NE Biomass Forum)

ONE North East – RDA (Strategic Economic Team) – Alex Fowler

ONE North East – RDA (Energy Team) – Andrea Horner

ANEC – Association of North East Councils – Steve Robson / Claire Megginson

Northwoods/ RDI Ltd. – Ben Tansey

BEn / RDI Ltd. – Kasia Zielewska

2. Target region portrait

2.1. General characteristics of the region

2.1.1. Geographical setting, natural conditions

North East England is the most northern administrative region in England located on the east coast just at the border to Scotland. It covers an area of 8500km² populated by 2.5 million inhabitants (approximately 4% of the UK population) with an average density of 294 people /km². The settlement pattern of the region is characterised by 62% in urban and 38% in rural areas.

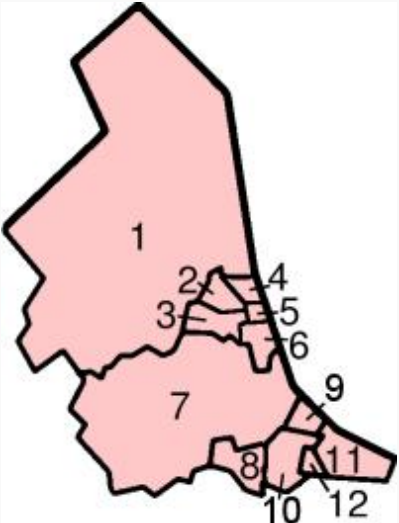
The region is characterized by a great diversity of landscape character. Much of the region has been recognized as Heritage Coast, Northumberland National Park or Area of Outstanding Natural Beauty. This is a clear acknowledgement of the national importance of the region's landscape, particularly in the uplands and the coastal areas, which are the most popular recreation and tourist destinations. The industrial and highest population areas tend to be found in the central coastal area of the region, with a rural hinterland running from the Scottish Border along the Pennines through Northumberland and County Durham.

The North East contains a high percentage of forest cover - 12% in comparison to the UK average of 10%. Woodlands are generally of a small size, occur in most character areas and include a number of biodiversity rich habitats. Being an important element of the landscape they deliver important ecosystem services and wood fuel for local energy needs.

2.1.2. Administrative structure

North East England is one of the nine regions of England created in 1994. It covers the counties of Northumberland, County Durham, Tyne and Wear, and Teesside (including parts of North Yorkshire).

Table 1: Administrative divisions within the North East of England ¹

Map	Ceremonial county	Unitary authority	Metropolitan districts
	1. Northumberland		
	Tyne and Wear *	2. Newcastle upon Tyne, 3. Gateshead, 4. North Tyneside, 5. South Tyneside, 6. Sunderland	
	Durham	7. Durham	
		8. Darlington	
		9. Hartlepool	
		10. Stockton-on-Tees (North of River Tees)	
	North Yorkshire (part only)	10. Stockton-on-Tees (South of River Tees)	
		11. Redcar and Cleveland	
		12. Middlesbrough	

* = metropolitan county

Cities and towns in the region include: Darlington, Durham, Gateshead, Hartlepool, Hexham, Middlesbrough, Morpeth, South Shields, Stockton-on-Tees, Sunderland and Newcastle upon Tyne.

¹ http://en.wikipedia.org/wiki/North_East_England

2.1.3. Demography and settlement pattern

Table 2: NE England age structure²

Age Band	24 and under	25-34	35-44	45-54	55-64	Over 65
Percentage of population	6.4%	14.9%	24.8%	33.3%	19.0%	1.5%

There are two main industrial zones in the region stretching around Newcastle and Sunderland in the centre of the region and around Middlesbrough, Darlington, Stockton-on-Tees and Hartlepool in the south. Developed on the basis of coal, iron and steel industries they faced major structural changes in last 40 years: the number of jobs in the primary sectors, particularly in mineral extraction and manufacturing has fallen since 1971, whilst service sector jobs have increased.

The uplands cover 53% of the area. Sparsely populated in contrary to the south of the region they have been officially declared as Less Favoured Areas. This area is in the west part of the region and supports a wide range of habitats.

2.1.4. Economics

The North East has the lowest GDP per capita in England. The economy was for several decades principally based on two industries, ship building and coal mining (in Durham and Northumberland. Ship building has declined to the extent of being non-existent, however the coal industry still has a small presence, with signs of expansion e.g. UK Coal is about to start surface mining at Steadsburn near Widdrington Station and Stobswood in Northumberland.

However, since this the region has diversified into many other sectors as shown in Figure 1:

² "Local Government Demographics Oct 2010", Local Government Association, www.lga.gov.uk/lga/aio/15142156

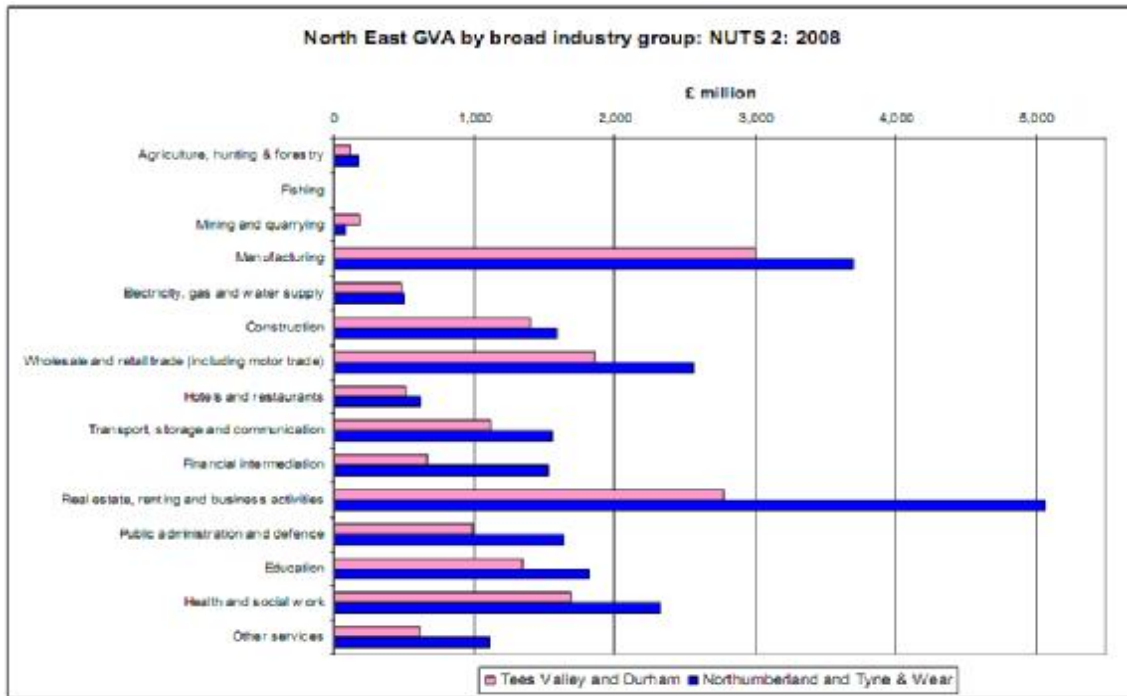


Figure 1: NE England GVA by sector³

It is also worth noting the strong economic influence of the neighbouring economic regions and on the economy of the North East. Scotland has a very different political and economic power base and yet exerts a strong influence on the economy of the North East. For example, the independent Scottish Government can create certain economic situations to favour the development of specific sectors (such as forestry) and in doing so, practitioners in the North East may suffer, or be attracted to operate in Scotland rather than in the North East.

2.2. Current energy situation

2.2.1. Current energy infrastructure

Natural gas; Teeside in the North East has one of only 6 natural gas terminals in the UK, where gas is piped into the UK from offshore gas fields, The terminal, known as the Central Area Transmission System (CATS) Terminal processes about 34 million cubic metres of gas a day⁴, which is approximately 12% of the North Sea production and then transfers it to the UK network. The North East has an extensive gas infrastructure in the urban areas, however the natural gas network is limited in the more rural areas, with large areas of Northumberland and County Durham not covered. Natural gas is one of the cheapest fuels in the UK, therefore a common occurrence in off-gas areas is higher levels of fuel-poverty (see Figure 2).

³ "Briefing Note – Release of regional and sub-regional GVA Estimates – NE Region", Office of National Statistics Dec 2010,

<http://www.nerip.com/Download/1200/North%20East%20GVA%20Briefing%20Note%20December%202010.pdf.aspx>

⁴ <http://www.catspipeline.com/cats/content/brochure/brochure.asp?sectionid=7>

Electricity; The North East has 3,879MW of total electrical production capacity which is approximately 5% of the UK production capacity. 150MW (3.9%) is renewable. Of this renewable element 93MW (2.4% of the total, 62% of the renewables) is from biomass (including municipal waste and co-firing). 78% of the production is dominated by 2 very large power stations – Teeside Gas Power Station at 1,875MW and Hartlepool Nuclear Power Station at 1,190MW.

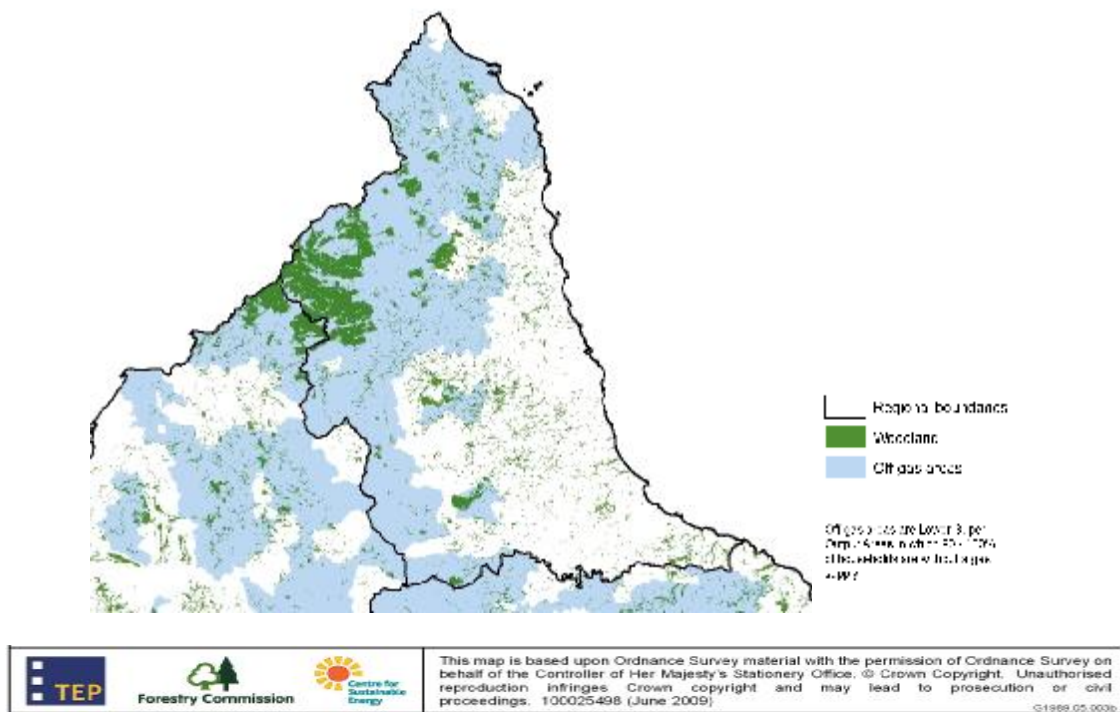


Figure 2: Map of off-gas areas and forest cover, North East England

2.2.2. Energy supply and consumption

Table 3: Total Energy Supply in the NE

Current Energy supply in the region						Data source	No of producers (2007)	Ofgem 2008 (i.e. Selling electricity to the grid)
Energy type	Energy Capacity		Energy production					
	Power or/and Heat Output (MW)	%	MWh/yr	%				
Non-renewables	Coal	420	10.92	2,940,000	12.48	DECC	1	
	Oil	195	5.07	1,365,000	5.80	DECC	1	
	Gas	1,875	48.75	11,250,000	47.76	DECC	1	
	Nuclear	1,190	30.94	7,140,000	30.31	DECC	1	
	Total non-renewables	3,680	95.67	22,695,000	96.35			
Renewable	Biomass	152	3.93	803,436	3.41	TNEI,2007 (2005), Ofgem 2008	Wilton 10 (35.5MW) + 12 (landfill gas 29MW) + 77 small scale woody biomass (22 MW) + Egger (42MW) + Lynmouth Co-firing (15MW)	landfill gas 13 (29444 kW) - Wilton 10 (35 224)
	Hydro	6	0.16	4,700	0.02	TNEI,2007 (2005)	12 + 3 (microhydro)	2 (6169)
	Solar	unknown		n/a		TNEI,2007 (2005)	83 (mostly small thermal and PV systems)	0
	Geothermal	unknown		n/a		TNEI,2007 (2005)	7	0
	Wind	31	0.80	50,400	0.21	TNEI,2007 (2005)	56	16 (30693 kW)
	Total renewable	189	4.88	858,536	3.65			

	bles							
Combin ed		3,869		23,553,5 36				

Total large scale energy production (electricity and heat) in the North East of England is dominated by fossil fuels with 66% (coal 12%, gas 48%) and nuclear power (30%). The share of renewable sources is only 4%. Of the renewables, biomass dominates with 94% of all renewable energy, contributing about 3% of the total energy supply.

2.3. Analysis of bioenergy potential

The bio-energy market in the UK is expected to increase over the next 10 years, due in the main to the fact that the UK has committed to a legally binding target for primary energy generation from renewable sources by 2020 set at 15%⁵.

2.3.1. Predictions for 2020 (UK)

By 2020 the UK energy use in all sectors is forecast by the Renewables Advisory Board to slightly decrease from today's figures, to 1,745 TWh⁶, therefore if renewable energy usage reaches the target of 15%, this would equate to approximately 262 TWh. If we use the same energy use distributions as the government, of 49% of total energy supplied as heat⁵, with the remainder assumed split evenly between electricity and transport (25.5% each), then that gives each sector the following energy figures:

Table 4: Market share of each energy sector by 2020

Sector	Market share (%)	TWh
Heat	49	855.05
Electricity	25.5	444.975
Transport	25.5	444.975
Total		1745

The illustrative technology breakdown to reach 2020 targets of 15% total energy from renewables is outlined in Figure 3.

⁵ UK renewable energy strategy consultation, BERR, June 2008

⁶ <http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file46652.pdf>

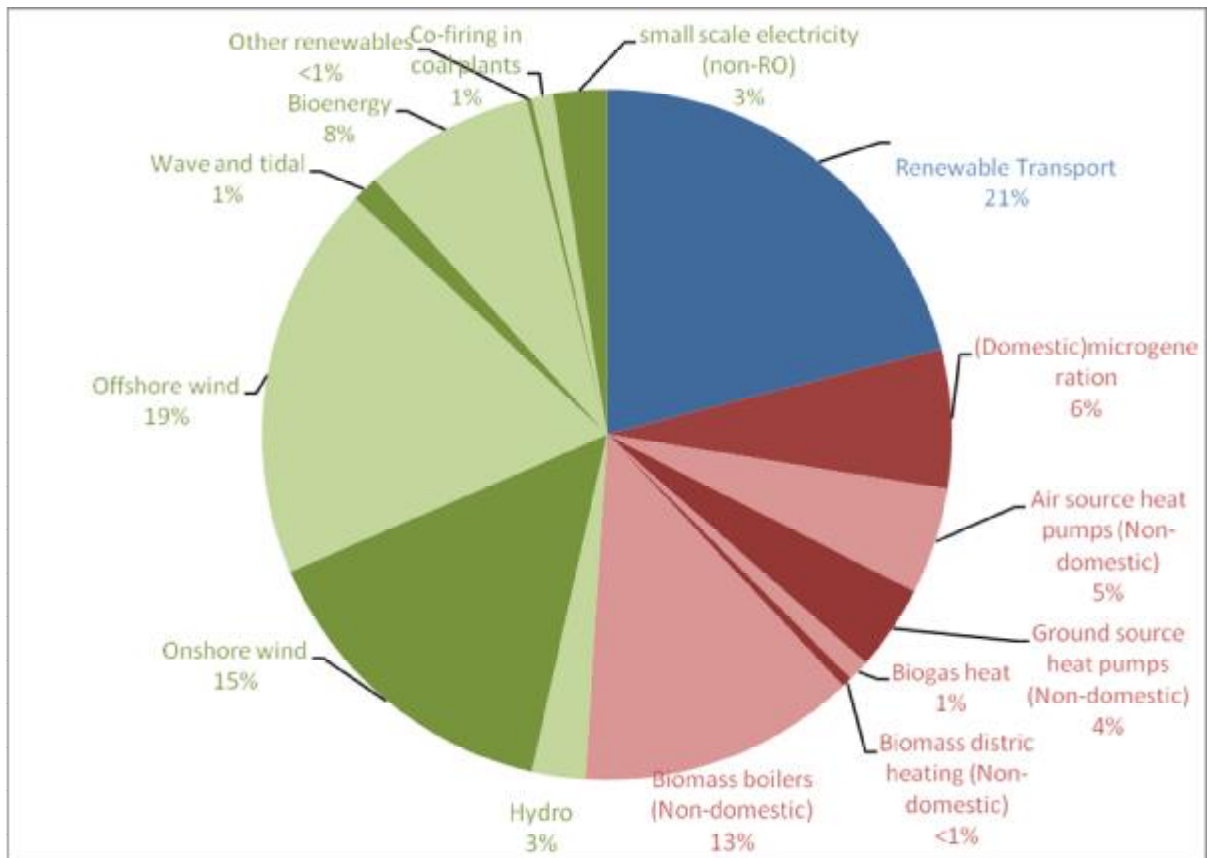


Figure 3: Illustrative breakdown of renewables by 2020⁸ (extrapolated from DECC)⁷

The breakdown of the 2020 renewables by technology enables us to calculate the proposed energy output from biomass by 2020 (Table 5), and to compare it with current output. Note that we have assumed that all of the co-firing electricity is from biomass and half the domestic heat microgeneration is from biomass.

Table 5: Energy output from biomass⁸

Energy source	Energy type	Share of total renewable energy market 2020 (%)	TWh
Dedicated heat	Heat	17.75	45.85
Dedicated electricity	Electricity	8	20.96
Co-firing	Electricity	1	2.62
Totals		26.75	69.43

⁷ <https://restats.decc.gov.uk/cms/path-to-2020>

⁸ Summation errors caused by rounding

This means that biomass will supply 69.43 TWh total energy, 26.75% of renewable energy, 59% of renewable heat, 5.36% of total heat, and 3.98% of total energy by 2020.

2.3.2. Predictions for the North East for 2020

In order to calculate the North East contribution towards the national target of 69.43 TWh from biomass, we could use several methods, we have decided to use a proportion based on population. The UK population is estimated at 62,246,610⁹, the North East has an estimated population of 2,606,600¹⁰ which is 4.19% of the UK.

Therefore if the North East is to produce 4.19% of the projected UK biomass energy in 2020, it will have to generate 2.91 TWh.

2.3.3. Existing bio-energy market

Table 6: Bio-energy consumption in the NE¹¹

System type	Capacity (kW)	Percentage of total capacity	Number of users
Biomass cogeneration power plant	15,000	9.84%	1
Biomass power plant	35,220	23.11%	1
Wastewater treatment power plant	4,940	3.24%	3
Landfill gas power plant	29,444	19.32%	13
Electricity Total	84,604	55.52%	18
Log boiler	220	0.14%	6
Pellet boiler	18,470	12.12%	44
Straw boiler	823	0.54%	3
Wood chip boiler	6,257	4.11%	26
Wood chip hot air	42,000	27.56%	1
Heat Total	67,770	44.48%	80
Grand Total	152,374		98

⁹ <http://data.worldbank.org/country/united-kingdom>

¹⁰ <http://www.nomisweb.co.uk/reports/lmp/gor/2013265921/report.aspx>

¹¹ Internal Northwoods database of biomass installations

2.3.3.1. Bio-energy consumption

In 2008, at the outset of the BEn project, the North East of England has 152MW of installed bio-energy capacity (see Table 6) with the majority (56%) being power production, as at this time in the UK, renewable electricity is subsidised but not renewable heat.

The total number of users stands at 98, with the vast majority of these being heat users (80).

Heat consumption is dominated by the 42MW biomass fuelled dryer at the Egger panel board factory, the remaining 26MW are small and medium scale heat users.

In the small and medium scale heat sector, pellets have by far the largest portion at 72%, this could be due to the lower capital costs and the commonly held belief that pellet systems are more reliable than chip systems.

2.3.4. **Bio-energy potential**

2.3.4.1. Biomass resources

The North East is very well placed to be a large biomass producer. A range of reports suggest differing quantities of biomass availability, with a potential 5.66TWh available (see Table 7). However, when you factor in constraints such as competing uses, only 2.48TWh is available, and then only if some forms of biomass are used which are not currently recovered (such as agricultural slurry and manure, arboriculture waste, forestry brush and Organic Municipal Solid Waste)

However the above figure of 2.48TWh does not take into account the efficiency on plant to convert that into useful energy. If we assume an average overall efficiency of all the conversion technologies of 70% (possibly a high estimate) then that gives us a figure of 1.74TWh of usable energy.

It should be noted that the above figures assume that access to further potential biomass is economically constrained, such as forestry timber in difficult to access woodland, or energy crops on low grade land. However if the energy price should rise sufficiently to access these, then we have the following further potential resource;

- 112,000ha of forest in the NE, with an estimated yield class of 12m³/ha/yr gives a total of about 1,120,000 green tonnes a year of which about 50% will be fuel grade which is 400,000 tonnes at 30%mc, this would make available an extra 0.78TWh available when a 70% conversion efficiency is taken into account.
- 450,000ha of land available for energy crops (SRC at these latitudes is likely) is planted, an average yield of 15 green tonnes per ha, gives 6,750,000 tonnes a year, or an extra 10.5TWh. However this would involve displacing a massive proportion of

food production land which is not desirable, if only an extra 16,000ha were converted to energy crops then this along with increased access to existing forest resource would approximately allow the North East to reach its 2020 target.

2.3.4.2. Conclusion to Biomass Availability

When this 1.74TWh of usable energy in the NE (without displacing existing markets) is compared to the 2020 target figure of 2.91TWh (see section 3.3), we see that we have a resource shortfall of about 1.17TWh or about 40%.

Therefore, in the long term, we have a regional resource limitation, which suggests we need to look at maximising the use of this resource in high efficiency system such as heat only and CHP, and attempt to exclude low efficiency systems such as electricity only generation.

Also we will need to look at either increasing the available resource through accessing currently uneconomic forest resource, planting of biomass in new forests and converting land to energy crops.

Table 7: Biomass production and potential in the NE

Biomass source	Biomass type	Biomass resources (maximum potential)				Biomass resources (available with competing uses)			
		Amount (t/yr)	Moisture content	Amount (MWh/yr)	Data source	Amount (t/yr)	Moisture content	(MWh/yr)	Data source
Forest	Fuel wood from forest	465,000	30	1,578,210	green harvesting figures from Forestry Commission, converted to 30%mc	71,500	30	242,671	green harvesting figures from Forestry Commission, converted to 30%mc
	Saw mill co-products	200,000	50	446,000	Realistic estimate based on WRAP 2007 "regional market assesment for wood waste for NE England"	0	50	0	Estimate based on current uses
Agriculture	Energy crops	2,900	30	9,900	Estimates based on DEFRA planting data, assuming 12.87t/ha @30%mc	2,900	30	9,900	Estimates based on DEFRA planting data, assuming 12.87t/ha @30%mc
	Dry residues	260,000	15	1,041,600	ARUP 2011 "North East England Renewable and Low Carbon Energy Capacity Assessment"	0	15	0	Estimate based on existing uses and the undesirable effect of having to use more CO2 intensive fertilisers
	Wet residues	1,800,000	n/a	275,000	ARUP 2011 "North East England Renewable and Low Carbon Energy Capacity Assessment"	1,800,000	n/a	275,000	ARUP 2011 "North East England Renewable and Low Carbon Energy Capacity Assessment"
Arbiculture / brush	Lopings - green waste from gardens	100,000	50	223,000	WRAP, 2007 "Regional Market Assessment"	100,000	50	223,000	WRAP, 2007 "Regional Market Assessment"

	Forestry Residues				for Wood Waste for North East England"				for Wood Waste for North East England"
	Arboricultural arisings from municipal areas								
Waste	Recovered/waste wood (not already converted to pellets)	418,000	20	1,661,550	WRAP,2007 "Regional Market Assessment for Wood Waste for North East England"	327,000	20	1,299,825	WRAP,2007 "Regional Market Assessment for Wood Waste for North East England"
	Recovered waste / pellets	50,000	15	213,300	The Journal	50,000	15	213,300	The Journal
	Organic waste from households	301,026	Energy assumed at 400kW h/t	120,410	270kg per average household (WRAP "The food we waste", 2008) x 1,114,911 dwellings for NE	301,026	Energy assumed at 400kW h/t	120,410	270kg per average household (WRAP "The food we waste", 2008) x 1,114,911 dwellings for NE
	Organic waste from food industry	115,119	Energy assumed at 400kW h/t	46,047	WRAP 2009 "Commercial and industrial organic waste arisings – a gap analysis"	115,119	Energy assumed at 400kW h/t	46,047	WRAP 2009 "Commercial and industrial organic waste arisings – a gap analysis"
	Sewage sludge	67,000	0	49,000	ARUP 2011 "North East England Renewable and Low Carbon Energy Capacity Assessment"	67,000	0	49,000	ARUP 2011 "North East England Renewable and Low Carbon Energy Capacity Assessment"
Totals		3,779,045		5,664,017		2,834,545		2,479,153	

2.3.4.3. Biomass installers in the region

Most of the UK installers will work throughout the UK, including the North East, however we have included those with either a regional presence or a strong link to the North East.

Table 8: Biomass installers in the NE

Company	Address	Postcode	City	Contact	Phone	E-mail	Website
Anaerobic-Digestion.net							
AnDigestion A Summerleaze Company							
Ashwell Engineering Services			Hexham		0143 4 674 349 / 0166 1 853 870	a.swoodfuel@yahoo.co.uk	
Boiler Services	56 Bridge Street	TD151A Q	Berwick-upon-Tweed	Ian Chappell	0128 9 3069 10	igchappell@aol.com	
Econergy							www.econergy.ltd.uk
GAIA Power	Gaia Power Limited 71a High Street Yarm	TS15 9BG	Yarm		0164 2 7844 00		www.gaiapower.co.uk
Broag Remeha - Graham Firth Associates Ltd	Suite 115, Blyth Community Enterprise Centre, Ridley St	NE24 3AG	Blyth		0167 0 5415 54		
Sustainable Heating Solutions	Lee Moor Business Park, Rennington, Alnwick, Northumberland,	NE66 3RL	Alnwick	Ian Brown	0166 5 574 400	ian@sustainableheatingsolutions.com	
The Wood Heating Company	Unit 38, Atley Business Park	NE231 WP	Cramlington	Mike Blakely	0167 0 735 658	sales@thewoodheatingcompany.co.uk	www.thewoodheatingcompany.co.uk

UK Biomass Ltd	13 Quay Level, St Peters Basin, Newcastle	NE6 1TZ	Newcastle	Don Lord	0191 265 4400	info@uk-biomass.co.uk	www.uk-biomass.co.uk/
Wood Energy Ltd			Middlesbrough	Chris Birrel	0845 070 7338	chris.birrel@woodenergyltd.co.uk	

2.3.4.4. Bio-energy support

In the North East we have had a history of strong support for the bio-energy industry, from Europe, Central Government and at a regional level. Some of this support has been in the form of legislation and strategy, and some in financial support (see Figure 4).

For the legislative and strategic support (see Table 9, Table 10), at a regional level we see the implementation of legislation, accord and strategies that have come from international, European, and UK government levels (see Figure 4).

Financial support for installations of bio-energy systems in the form of capital grants, such as the *Bio-Energy Capital Grant Scheme* and the *Low Carbon Building Programme*, all came to an end by 2008. Financial support now mostly is in the form of incentives, tax breaks and penalties paid on the actual renewable energy generated or carbon produced (see Figure 4).

This legislative and financial support which the government hopes will drive the UK towards its 2020 and 2050 Carbon reduction targets.

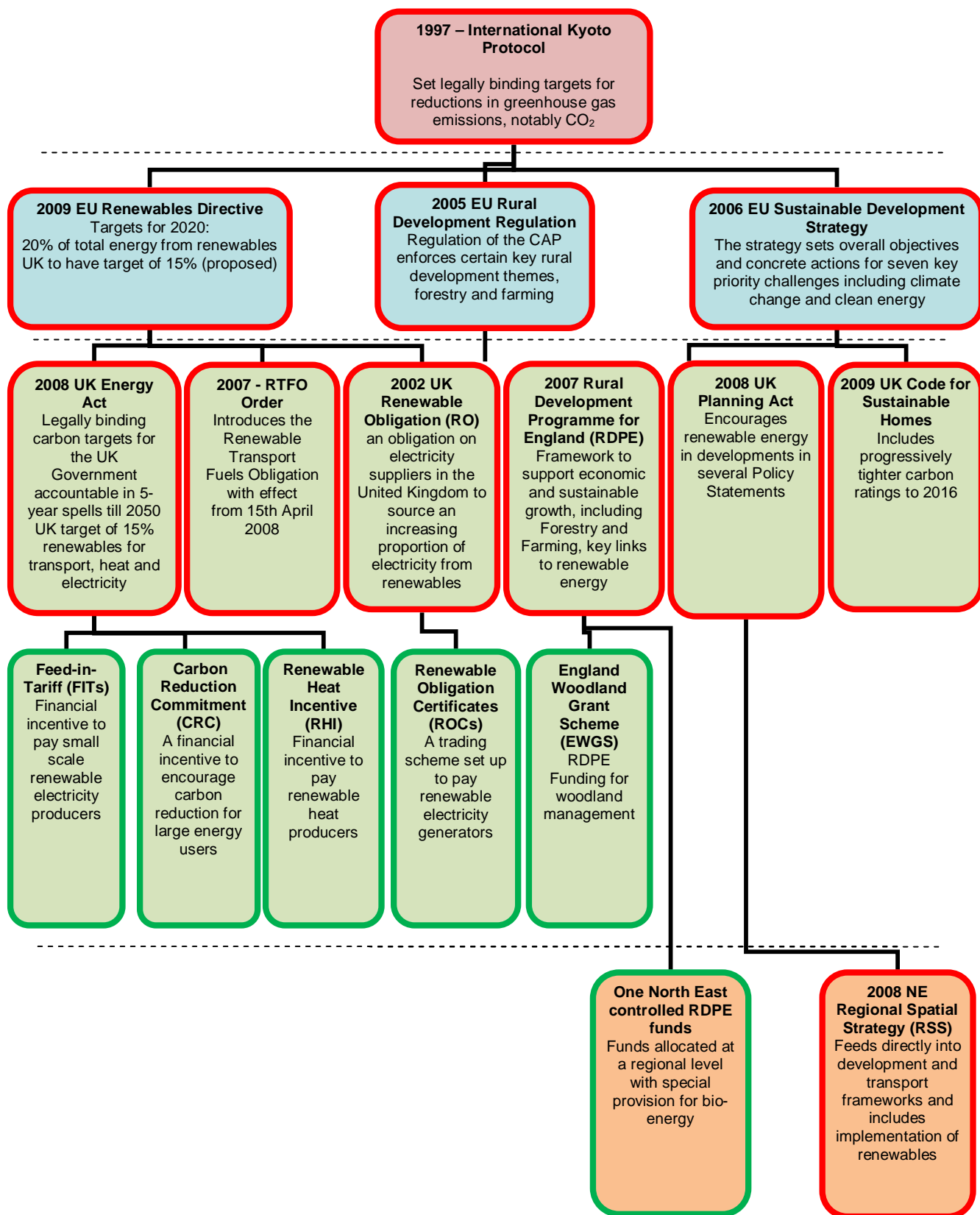


Figure 4: Overview of legislative framework and financial incentives

Table 9: European legislative support for bio-energy

Document	Publication date	Document full title	Link	Description
Directive on the Energy Performance of Buildings	2010	DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings (recast)	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF	The recast of the Energy Performance of Buildings Directive in 2010 (2010/31/EU) seeks to clarify certain aspects of the 2002 Directive, extend its scope, strengthen certain provisions, and give the public sector a leading role in promoting energy efficiency.
Renewable Energy Directive	2009	Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC	http://eur-lex.europa.eu/JOHtm1.do?uri=OJ:L:2009:140:SO M:EN:HTML	Sets a target for the UK to achieve 15% of its energy consumption from renewable sources by 2020. This compares to 3% in 2009. While analysis demonstrates it is possible to achieve the target and industry say they have the capacity to deploy at the rate required, the scale of the increase over the next 10 years represents a huge challenge and will require strong contributions from all three sectors of electricity, heat and transport.
Promotion of the use of energy from renewable sources	2008	Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources	http://ec.europa.eu/energy/climate_actions/doc/2008_res_directive_en.pdf	
Promotion of the use of energy from renewable sources	2008	European Parliament legislative resolution of 17 December 2008 on the proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (COM(2008)0019 – C6-0046/2008 – 2008/0016(COD))	http://ec.europa.eu/energy/strategies/2008/doc/2008_01_climate_action/2008_0609_en.pdf	

An Energy Strategy - Green Paper	2007	Green Paper - A European Strategy for Sustainable, Competitive and Secure Energy {SEC(2006) 317}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0105:FIN:EN:PDF	In this Green Paper, the Commission proposes a common European energy policy which will enable Europe to face the energy supply challenges of the future and the effects these will have on growth and the environment. The European Union (EU) must act quickly and effectively in six priority areas to ensure that it has an energy supply which is sustainable, competitive and secure. The internal market, energy efficiency, research and an external policy will all contribute to making Europe a strong player on the international stage.
An Energy Policy for Europe	2007	Communication from the Commission to the European Council and the European Parliament - an energy policy for Europe {SEC(2007) 12}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0001:FIN:EN:PDF	A European Energy Policy will firmly commit the European Union (EU) to a low consumption economy based on more secure, more competitive and more sustainable energy. Priority energy objectives involve ensuring the smooth functioning of the internal market in energy, security of strategic supply, concrete reductions in greenhouse gas emissions caused by the production or consumption of energy and the EU's ability to speak with a single voice on the international stage.
Renewable Energy Road Map	2007	Communication from the commission to the council and the European parliament Renewable Energy Road Map Renewable energies in the 21st century: building a more sustainable future	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0848:FIN:EN:PDF	The Renewable Energy Road Map assesses the share of renewable energy in the energy mix and the progress made in this area. It also includes the target of producing 20% of total EU energy consumption from renewable energy sources by 2020, as well as measures for promoting renewable energy sources in the electricity, biofuels and heating and cooling sectors.
Action Plan for Energy Efficiency (2007-12)	2006	Communication from the Commission - Action Plan for Energy Efficiency: Realising the Potential {SEC(2006)1173} {SEC(2006)1174} {SEC(2006)1175}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0545:FIN:EN:PDF	The Commission has adopted an Action Plan aimed at achieving a 20% reduction in energy consumption by 2020. The Action Plan includes measures to improve the energy performance of products, buildings and services, to improve the yield of energy production and distribution, to reduce the impact of transport on energy consumption, to facilitate financing and investments in the sector, to encourage and consolidate rational energy consumption behaviour and to step up international action on energy efficiency.

Global Fund proposal	2006	Communication from Commission to the Council and the European Parliament Mobilising public and private finance towards global access to climate-friendly, affordable and secure energy services: The Global Energy Efficiency and Renewable Energy Fund {SEC(2006) 1224} {SEC(2006) 1225}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0583:FIN:EN:PDF	A proposal has been made to set up a Global Fund of risk capital with a budget of 100 million to mobilise private investment in projects promoting energy efficiency and renewable energy in developing countries and emerging economies
Waste Directive	2006	DIRECTIVE 2006/12/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2006 on waste	http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_114/l_11420060427en00090021.pdf	
Biomass Action Plan	2005	COMMUNICATION FROM THE COMMISSION Biomass action plan {SEC(2005) 1573}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0628:FIN:EN:PDF	In the face of Europe's increasing dependency on fossil fuels, using biomass is one of the key ways of ensuring the security of supply and sustainable energy in Europe. This communication sets out a series of Community actions aimed in particular at increasing the demand for biomass, improving supply, overcoming technical barriers and developing research
Strategy on the prevention and recycling of waste	2005	Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and The Committee of the Regions - Taking sustainable use of resources forward - A Thematic Strategy on the prevention and recycling of waste {SEC(2005) 1681} {SEC(2005) 1682}	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0666:FIN:EN:PDF	This strategy sets out guidelines and describes measures aimed at reducing the pressure on the environment caused by waste production and management. The main thrust of the strategy is on amending the legislation to improve implementation, and on preventing waste and promoting effective recycling.

Co-generation Directive	2004	Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:052:0050:0060:EN:PDF	Directive, developed by the European Commission (EC) in 2004, aims to promote high-efficiency cogeneration (CHP) given the potential benefits with regard to saving primary energy, avoiding network losses and reducing emissions, in particular of greenhouse gases. In addition, efficient use of energy by CHP can also contribute positively to the security of energy supply .
EU Emissions Trading Scheme	2003		http://ec.europa.eu/clima/publications/docs/ets_en.pdf	The EU Emissions Trading System (EU ETS) is one of the key policies introduced by the European Union (EU) to help meet its greenhouse gas emissions target of 8% below 1990 levels under the Kyoto Protocol. A Europe-wide cap and trade scheme, it started in 2005 and is the first of its kind.
EU Biofuels Directive	2003	DIRECTIVE 2003/30/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:123:0042:0042:EN:PDF	Sets target of 10% of all road fuels must be from biofuel by 2020
Landfill Directive	2003	COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:011:0027:0049:EN:PDF	Council Decision 2003/33/EC of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC [Official Journal L 11 of 16.01.2003].
Directive on the Energy Performance of Buildings	2002	Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:001:0065:0071:EN:PDF	The directive introduced a common methodology for calculating the energy performance of buildings, introduced minimum standards for energy performance of new and existing buildings and introduced systems for energy certification.

Promotion of the use of energy from renewable sources in the internal electricity market	2001	Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market	http://eur-lex.europa.eu/pr i/en/oj/dat/2001/l 283/l 2832001 1027en0033004 0.pdf	on the promotion of electricity produced from renewable energy sources in the internal electricity market
Electricity from renewable energy Directive	2001	Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market	http://eur-lex.europa.eu/L exUriServ/LexUr iServ.do?uri=OJ :L:2001:283:003 3:0040:EN:PDF	The European Union is creating a Community framework for promoting renewable energy sources for electricity production. It is setting an objective for renewables of a 21% contribution to electricity production and is laying down specific measures relating to evaluation of the origin of the electricity, connection to the grid and administrative measures, among others.
Directive on the incineration of waste	2000	Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste, OJ L 332, 28.12.2000,	http://eur-lex.europa.eu/L exUriServ/LexUr iServ.do?uri=OJ :L:2000:332:009 1:0111:EN:PDF	
Forestry Strategy	1999	Council Resolution of 15 December 1998 on a forestry strategy for European Union	http://eur-lex.europa.eu/L exUriServ/LexUr iServ.do?uri=OJ :L:2003:011:002 7:0049:EN:PDF	The Strategy emphasises the importance of the multifunctional role of forests and SFM for the development of society, and identifies a series of key elements, which form the basis for its implementation. It states that forest policy lies in the competence of the Member States, but that the EU can contribute to the implementation of SFM through common policies, based on the principle of subsidiarity and the concept of shared responsibility.
Landfill Directive	1999	Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste	http://eur-lex.europa.eu/L exUriServ/LexUr iServ.do?uri=OJ :L:1999:182:000 1:0019:EN:PDF	The Directive is intended to prevent or reduce the adverse effects of the landfill of waste on the environment, in particular on surface water, groundwater, soil, air and human health. defines the different categories of waste (municipal waste, hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land.

Waste Water Treatment Directive	1991	Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0271:EN:HTML	The Directive sets the following targets for secondary treatment of waste waters coming from agglomerations: at the latest by 31 December 2000 for agglomerations of more than 15,000 p.e. (population equivalent); at the latest by 31 December 2005 for agglomerations between 10,000 and 15,000 p.e.; at the latest by 31 December 2005 for agglomerations of between 2,000 and 10,000 p.e. discharging to fresh waters and estuaries.
Sewage Sludge Directive	1986	Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31986L0278:EN:HTML	The Commission has adopted an Action Plan aimed at achieving a 20% reduction in energy consumption by 2020. The Action Plan includes measures to improve the energy performance of products, buildings and services, to improve the yield of energy production and distribution, to reduce the impact of transport on energy consumption, to facilitate financing and investments in the sector, to encourage and consolidate rational energy consumption behaviour and to step up international action on energy efficiency.

Table 10: UK legislative support for bio-energy (REA)

Title	Year	Link	Description
Energy Act 2010	2010	2010 EA	Aims to deliver 34% emission cuts by 2020 and 80% by 2050 on 1990 levels. Also makes provision for CCS, introduces social price support and fairness of energy markets
Green Energy Act	2009	2009 GEA	Promote the development of green energy, with a definition of "Green Energy". Targeted towards micro generation.
Climate Change Act	2008	2008 c. 27	Setting targets for emissions reductions. Establishing a Carbon Committee to monitor progress and advise on policy
Energy Act 2008	2008	2008 c.32	Provisions for nuclear decommissioning and new build. Changes (including banding) to the Renewables Obligation. And late amendments to introduce Renewable Energy Tariffs for electricity, heat and biogas and changes to the regulator's remit.
Planning Act	2008	2008 c. 29	Establishment of Infrastructure Planning Commission to handle planning for major infrastructure projects. Establishment of National Policy Statements (PPS) which encourage development of renewables, such as PPS1, one on renewables – PPS22 and other 'streamlining' measures.
Planning and Energy Act	2008	2008 c. 21	Confirms the power of local authorities to set sustainable energy targets as planning conditions (such as the Merton Rule). Originally introduced as a private member's bill by Michael Fallon MP.
RTFO Order	2007	SI 2007 No. 3072	Introduces the Renewable Transport Fuels Obligation with effect from 15th April 2008
R O Order 2006 (Amendment) Order	2007	SI 2007 No. 1078	Various 'technical' changes to the R O
Climate Change and Sustainable Energy Act	2006	2006 c.19	Various measures on micro generation, promotion of renewable heat, access to ROCs for small generators. Originally introduced as a private member's bill by Mark Lazarovich MP.

R O Order	2006	SI 2006 No. 1004	Various 'technical' changes to the R O
R O Order	2005	SI 2005 No. 926	To extend the RO quotas from 2011 to 2016, to detail inter-relations with the NIRO
Energy Act 2004	2004	2004 c.20	Enabling introduction of Renewable Transport Fuel Obligation, introduction of RO in Northern Ireland, renewable plant outside territorial waters, buy-out fund safeguards - and lots about nuclear decommissioning
Sustainable and Secure Buildings Act	2004	2004 c. 22	Enabled Building Regulations to make special provisions for energy sustainability. First introduced as a private member's bill by Andrew Stunnel MP.
R O (Amendment) Order	2004	SI 2004 No.924	Various 'technical changes' to the R O including extension of the co-firing periods
The Landfill (Scheme Year and Maximum Landfill Amount) Regulations	2004	SI 2004 No. 1936	A trading scheme for landfill
Sustainable Energy Act	2003	2003 c.30	To set various sustainable energy targets. To release £60m from the NFFO surplus for renewable energy. Originally introduced as a private member's bill by Brian White MP.
Waste and Emissions Trading Act	2003	2003 Ch. 33	Limits the amount of waste that can be diverted to landfill and enables the introduction of the Landfill Allowance Trading Scheme
R O Order	2002	SI 2002 No. 914	Introduces the Renewables Obligation in England and Wales with effect from 1st April 2002
Utilities Act	2000	2000 c.27	Replaced clauses in the Electricity Act to enable the Renewables Obligation
Electricity Act	1989	1989 c.29	Enables Govt. to place requirement on suppliers, facilitating the introduction of the Non-Fossil Fuel Obligation (NFFO)
Strategy			
Woodfuel Implementation Plan	2011	2010 FC	Forestry Commission strategy launched to free additional woodfuel resource into the UK's markets and provide a guide to development of the wood to fuel energy markets.
Renewable Energy Roadmap	2011	2011 RERM	Sets out a comprehensive action plan to accelerate the UK's deployment and use of renewable energy, and put us on the path to achieve our 2020 target, while driving down the cost of renewable energy over time.
National Renewable Energy Action Plan for the UK	2010	2010 NREAP	Under Article 4 of the European Renewable Energy Directive (2009/28/EC) each Member State was required to submit a National Renewable Energy Action Plan (NREAP). The NREAP is based on a template set by the European Commission, which asks for the trajectory and measures that will enable the UK to reach its target for 15% of energy consumption in 2020 to be from renewable sources. The 'lead scenario' set out in the UK NREAP demonstrates that it is possible to achieve the 15% target and provides one view of the technology mix in 2020. However, this scenario does not represent a target for any particular sector or technology and it should not be seen as an upper limit to the UK's ambition for renewables deployment.
UK Renewable	2009	2009 RES	DECC's action plan for achieving the UK's 15 percent share of the

Energy Strategy			EU 2020 renewable energy target. To meet this target, suggests a need for 12 percent renewable energy in heat, over 30 percent in electricity (including 2 percent in small-scale generation) and 10 percent in transport. DECC's analysis indicates that around 30 percent of the overall renewable energy target could come from biomass heat and power, rising to around 50 percent if biofuels for transport are included.
UK Low Carbon Transition Plan	2009	2009 LCTP	Plots how the UK will meet the 34 percent cut in emissions on 1990 levels by 2020 – UK emissions of the basket of six greenhouse gases covered by the Kyoto Protocol were 22.0 per cent lower in 2008 than in the base year, down from 779.9 to 608.4 million tonnes carbon dioxide equivalent. The Plan shows how reductions in the power sector and heavy industry; transport; homes and communities; workplaces and jobs; and farming, land and waste sectors could enable carbon budgets to 2022 to be met.
UK Low Carbon Industrial Strategy	2009	2009 LCIS	The Low Carbon Industrial Strategy sets out the action being taken to ensure that British businesses and workers are equipped to maximise the economic opportunities and minimise the costs of the transition to a low-carbon economy. It includes information on some of the initiatives to help remove the barriers to the use of low-carbon renewable construction materials.
NE Regional Spatial Strategy	2008	2008 RSS	A broad framework of planning strategy for the North East Region – a visionary document highlighting where development should be encouraged with a target date of 2021.
UK Biomass Strategy	2007	2007 BS	Provides a framework for the sustainable development of biomass for: <ul style="list-style-type: none"> • heat and power • transport fuels • industrial products. <p>This strategy draws on detailed work, which considers the part biomass can play in meeting our future energy and industrial material needs in a sustainable way.</p>
A Woodfuel Strategy for England	2007	2007 WFSE	The Forestry Commission's Woodfuel Strategy for England. The main aim of the strategy is to bring an additional two million tonnes of wood into the market, annually, by 2020 saving 400,000 tonnes of carbon a year – the equivalent of 3.6 million barrels of crude oil and enough to supply 250,000 homes with energy. To achieve this target Forestry Commission will be focusing efforts on the potential wood resource available in the 60% of English woodlands that are currently under-managed.
North East Regional Forestry Strategy	2005	2005 NERFS	The North East's first Regional Forest Strategy published in 2005 sets out the role our trees, woodlands and forests have over the next twenty years in making the region a better place for us all to live, work and do business. The delivery of the Strategy will be co-ordinated via action plans and delivery will be monitored.
North East Biomass Action Plan	2003	2003 NEBAP	Prepared by TNEI for the Environmental Industries Federation. The Action Plan presents an approach that will assist the development of a local market for wood heat in the short, medium and long term. It also recommends actions to ensure that every assistance is given to any potential large scale user and to any party wishing to supply overseas markets.

This suite of legislation, financial incentives and carbon taxes has been designed to help the UK meet its renewable energy targets under the Energy Act 2008. Therefore if we assume that these measures are effective, and the UK meets the targets, then we can model the expected growth in the bio-energy market as a result of these measures.

3. Regional biomass energy vision

The vision for the North East of England biomass sector is to create an economically, ecologically and socially sustainable biomass sector, maximising the benefit to the Region of its natural biomass assets in terms of resource supply potential and technical expertise.

3.1. Biomass energy vision

3.1.1. Production and use of biomass resources

The Region needs ensure that it's using its currently available resources as efficiently as possible. As already identified during the production of the master plan, we have an expected shortfall of solid biomass (which expected to form the large proportion of future demand) by some 1.17TWh or 40% of the total requirement by 2020. In order to realise the biomass energy vision of a sustainable future.

3.1.2. Sustainable Management of Biomass Resources

With the forecast growth in demand for biomass and existing supply chains in the North East, it is clear that competing demands for biomass will result in an undersupply over the forthcoming years.

Ensuring that we efficiently utilise the local resource as much as possible must remain a key priority for the biomass sector of the North East of England. The following graph illustrates graphically where the potential opportunity lies in terms of the 'best returns' (environmentally and economically) for the investment in support of strengthening the local supply chains:

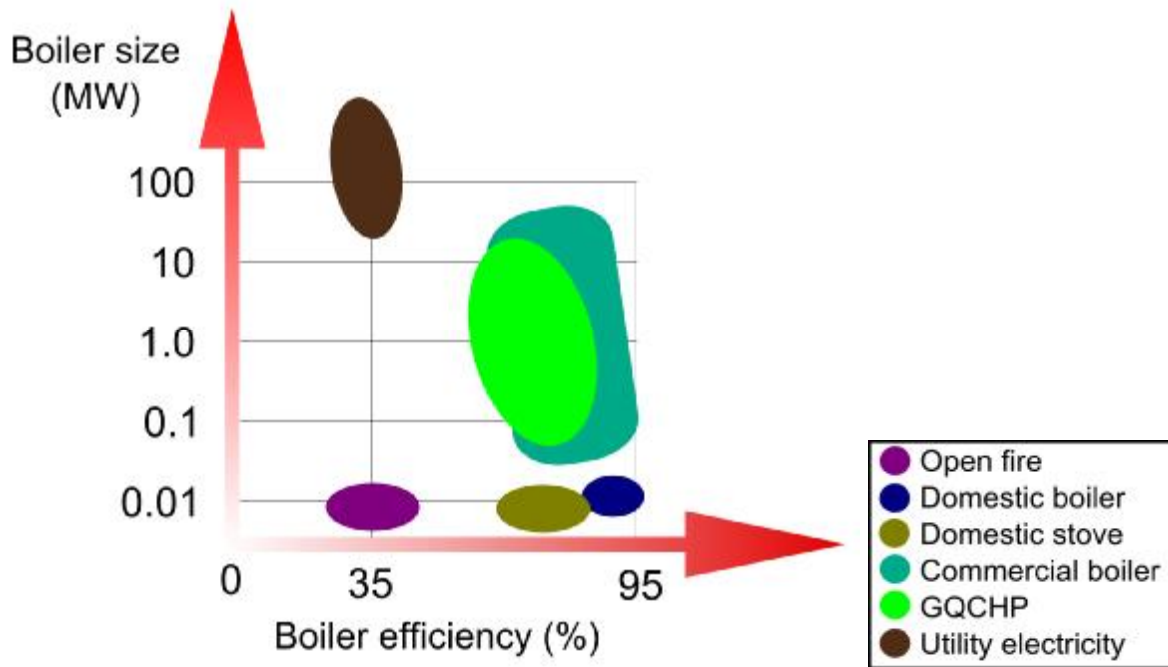


Figure 5: Adapted from D. Clubb, Northwoods. Figures are illustrative

The greatest opportunities in terms of efficient utilisation of limited resource and efficient return on energy yield from available resource are when biomass fuels are used in high efficiency technologies, maximising energy yields.

3.1.3. Bio-energy technologies

The advancement of technology development is to a certain extent beyond the influence of the region. Within the North East region, there is currently very little capacity in terms of research and development or manufacture of technological equipment, with the noted exception of the Teeside biodiesel manufacturing facility and NaREC wind and solar PV testing facility. Biodiesel is controversial in terms of its environmental credentials and remains out with the scope of this plan. Development of this sector of the biomass industry predominantly has the same overall issues as the supply sector above, with the additional specific barrier of equipment production capacity. The vast majority of technology installed in the UK is from continental Europe, these manufacturers have undergone significant growth over the last few decades due to the economic environment of the European biomass technology 'hot-spots'.

An opportunity for the North East of England could be to consider the manufacture of biomass technology. The Region does have several Universities with internationally excellent reputations in Engineering, combined with traditional heavy engineering and steel working, there could be an opportunity to design and develop biomass energy generating technologies within the North East of England.

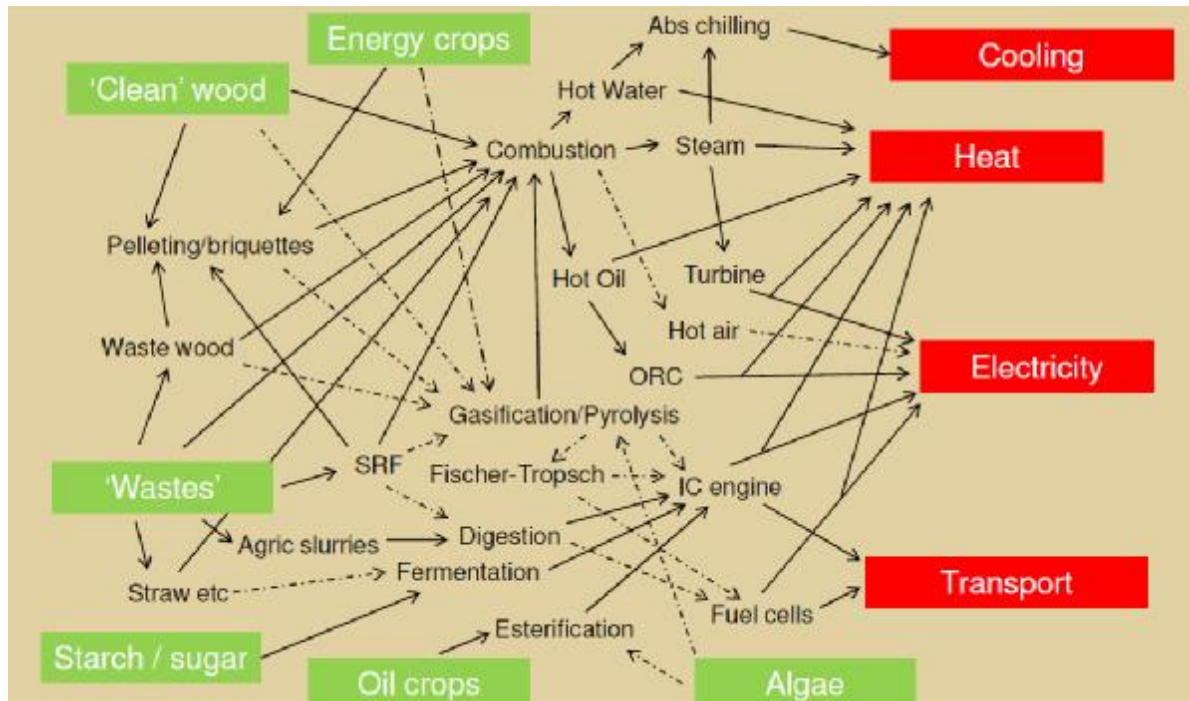


Figure 6: Biomass to energy technology development, reproduced with kind permission of Dr D Mauger, chair North East Biomass Forum. Solid lines represent established 'market ready' technologies, dotted lines indicate theoretically possible, but probably not co

3.1.4. Bio-energy generation and use

A thriving biomass sector for the North East needs the generation to pull through the development of the supply chain and the technological developments to maximise the potential of the sector. Analysis of the barriers to increased generation and use is often difficult as evidence is often anecdotal. The SWOT analysis carried out throughout the delivery of the Master Plan is the closest the sector has come to analysing and capturing these barriers.

3.2. Milestones

MS1. Maximum use of available sustainable yield is achieved from the North East's available resources, with little waste generated and improvements achieved in the quality of the North East's woody biomass resource. Achieve a reduction in the unutilised forest resource yield down from 50% by 2020.

MS2. The maximum potential yield is utilised from biomass waste streams (agricultural, food waste etc.) by 2020.

MS3. The North East increases it's areas of woodland cover to make best-use of the land resource available and to ensure the long-term supply of timber is established. Achieve a sustainable overall increase in forest cover achieved by 2020.

MS4. Maximise the efficiency of installed biomass technologies and encourage the further uptake of higher efficiency biomass technologies to make best use of the resources available.

4. Strategy – vision into action

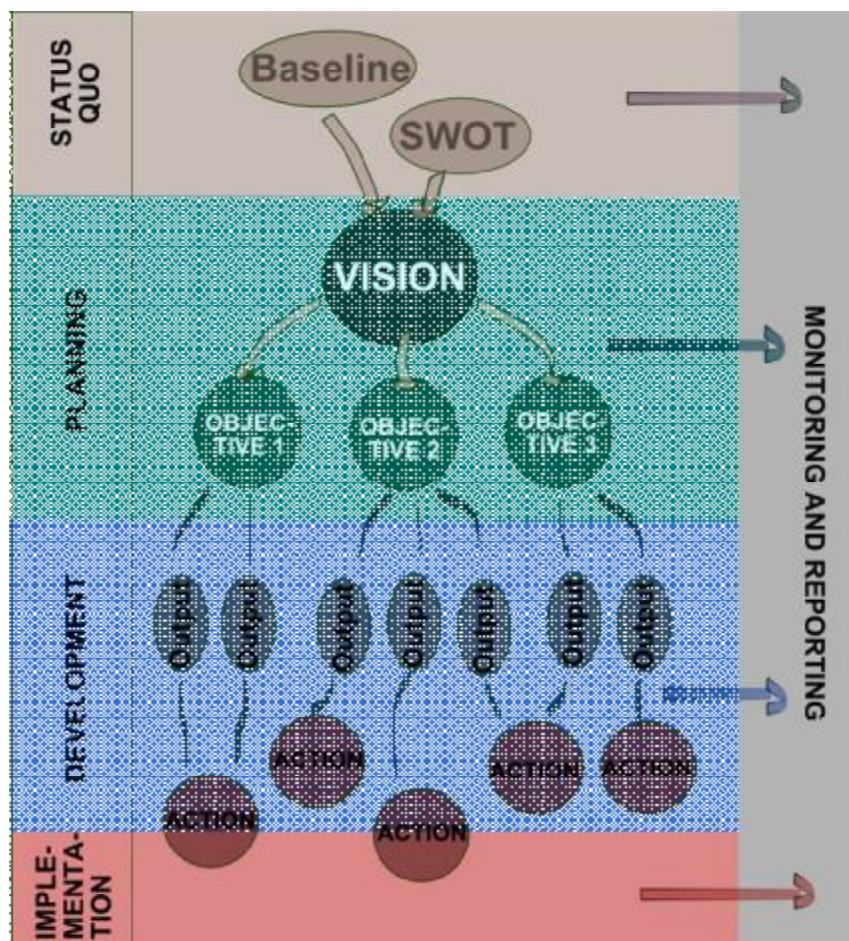


Figure 7: Phases of Master Plan development (K. Zielewska)

4.1. SWOT analysis

STRENGTHS

Internal attributes of the North East region that can help us achieve an objective of a strong bio energy sector

- Region readily accessible by road (A1, A19, A69)
- Teesside port
- Urban areas located very close to rural areas (in relative terms), which reduces logistical problems for domestic and small scale supply
- Large areas off gas network that can benefit from switching from oil / lpg
- Good forestry and waste wood regional resources
- Underutilised straw resources
- In principle there is a huge opportunity for growing biomass crops in the NE region due to extensive areas of agricultural land.
- Extensive, high-yield wheat and oilseed rape production
- Big timber processors - sawmill co-products are an important biomass source, mainly used in Eggers on long term contracts

- There is a large demand for biomass in the region from one large end user on Teesside
- Considerable developments at the smaller community CHP level

- The North East has a growing reputation as a leader in the renewables sector with:
 - Active stakeholders
 - Strong existing biomass users
 - Growing robustness of fuel supply chain / Strong timber supply chain based on large forest resource and established industrial markets
 - Large public forestry estate holding 50% of forestry land in the region
 - Woodfuel suppliers' group
 - Growing biomass installation sector
 - Active support through stakeholders and woodland initiatives
 - Increasing demand from the domestic sector for biomass heating
 - Good regional forum for those in the biomass sector
 - Support from RDA or equivalents going forward
 - Universities in the region have quite a large involvement in bioenergy research as well as larger scale projects
 - Rural Development Initiatives (RDI) and Northwoods supporting biomass supply chain

- Large-scale biodiesel, bioethanol and biomass power generation facilities
- Access to strong supply chain links via North East Biofuels

WEAKNESSES

Internal attributes of the region that could prevent us achieving an objective of a strong bio energy sector

- Other than Teesside no large scale ports for shipping delivery of biomass
- Lack of manufacturers of biomass systems in the region (or UK) – most systems will be imported from EU
- Lack of large woodfuel producers/suppliers with a well known/trusted/household name
- Poor quality of wood fuel
- Lack of trained installers, training provision
- Lack of installers for domestic sector registered on grant scheme (LCBP)
- Poor supply chain for pellets, patchy access to logs
- Wood for fuel comes from a variety of sources - should there be more coordination, e.g., through tree stations
- Poor professional awareness of biomass (architects, engineers etc)
- The small (if any) number of businesses in the region who are able to do all of the following in one package
 - a. Carry out feasibility studies of properties (which set out simply the total investment required with pay-back times)
 - b. Source appropriate funding
 - c. Source the equipment from reputable manufacturers (boilers etc.)
 - d. Organise certified installers to fit systems and recycle/dispose of old heating systems and to
 - e. Establish long term supply contracts and relevant maintenance contracts
- I.e. a company who will take on all aspects which someone must consider when deciding to install a biomass system in their home or business. Typically this will fall in the hands of the home/business owner to organise with some support for certain parts of the process but not the whole process
- RDI's activities could be increased and strengthened; the work they carry out is very valuable to the biomass industry in the local region. It is a free source of good independent advice and support
- North East not given sufficient credit for its achievement (distance from London!)
- The region lacks a bioenergy research centre along the same seam as NaREC (who are more involved in PV and Wind). This would be useful to promote the region as a centre for biomass energy to encourage development of advanced technologies and the establishment of related projects. The benefit to the region of NaREC over the past 5 years or so has been invaluable
- Biomass industry currently dependent on continuing public sector support to maintain growth
- A lack of larger scale end users raises concerns from some potential growers as to the security of end market
- While there is a large scale end user on Teesside (which is well placed for growers in the south of the region) there is not an equivalent end user in the north of the region. This means haulage

distances for biomass can be prohibitive for growers in the north of the region

- The North East climate is only suitable for the growing of Short Rotation Coppice (SRC). Miscanthus cannot be grown economically in the region
- Farmers' perception of bio-energy is limited mainly to SRC and is negative due to pitfalls with planting SRC in NE earlier on
- Limited resources of organic animal waste due to the domination of extensive free range farming.

OPPORTUNITIES

External opportunities that can help us achieve the objective of a strong bio energy sector in the region

- UK and EU parliaments recognising the need for a strong bio energy sector . Biomass rapidly moving up political, policy and media agenda
- Governmental support for biomass systems (NewHeat, Bioenergy Capital Grants Scheme, Renewable Heat Incentive, Low Carbon Buildings Program). There is a big opportunity for the Government to kick start the renewable heating industry in the UK with the Renewable Heat Incentive, provided the plans they lay down are adequate and pre-qualified to avoid potential consumers delaying installation to claim tariff payments.
- Funding streams available to cover part of the establishment costs of biomass crops
- Promotion of biomass systems for new buildings
- Need to capitalise on biomass programmes e.g. NewHeat to establish supply chains
- General public opinion that bioenergy schemes are good for the environment/local economy
- Private and public sector interest in biomass fuelled heating. Emerging firewood market.
- Stronger promotion of DEFRA'S 'Biomass Energy Centre' website
- More comprehensive list of regional suppliers on the biomass energy centre website (currently approximately 15 for the North East)
- Gas and oil supplies exposed to the security and price fluctuations of international markets
- Extensive rural areas using heating oil, resulting in homeowners being directly exposed to oil price fluctuations - likely to be open to more stable alternatives
- Sewage sludge resources currently underutilised for energy production
- Scope to reduce imports, especially of wood pellets
- Waste wood resources possibly overestimated at present - any available review of earlier estimates?
- Nitrate vulnerable zones; regulations could be a chance to motivate farmers to deal with animal waste in a more efficient and ecological manner e.g. utilising it for AD. The expansion of Nitrate Vulnerable Zones (NVZ's) in Northumberland should encourage more cautious disposal of animal waste
- Forestry sector increasingly recognising the benefits of bio-energy to the value of forestry products
- Expertise in advanced processes for biomass conversion (e.g. gasification and pyrolysis) is

available at Newcastle University, both on the main campus and at its Cockle Park farm in Northumberland. There is also a large bio-refinery project under development

THREATS

External opportunities that could prevent us achieving the objective of a strong bio energy sector in the region

- Large users of biomass such as the proposed projects on Teesside and beyond consume a large proportion of the regions biomass, resulting in limited supplies and rising prices for smaller consumers
- Co-firing with waste biomass from abroad - ecological issues/ factor of negative influence on local biomass supply chain. (However these supplies go mainly to Wilton 10 which does not affect local market)
- Global economic situation leading to funding difficulties
- Biomass & fossil fuel price fluctuations
- Exchange rates fluctuations (£ vs. €)
- Lack of leadership from Government in plugging gap before introduction of Renewable Heat Incentive
- Lack of biomass systems manufacturers compared to other EU countries
- The national system for applying for funding and monetary support from various sources is very complex and there is probably a significant proportion of people who are put off by the complexity of funding and grant procedures. There needs to be a single support structure which is simple to follow
- Lack of good financial incentives to meet initial capital cost of installing biomass boilers, difficult access to Capital for investment
- Process of applying for grants and funding too complex
- No financial assistance/incentive to help with initial capital costs
- Security of local fuel supply e.g. logs
- Competition for land with crop based oilseed rape/corn/sugar beet to be used for biofuels and food crops
- The current strength of the agricultural economy with strong arable and livestock prices means that SRC is not particularly competitive
- Public opposition to the construction of 'new' biomass thermochemical processing technologies (gasification, pyrolysis, torrefaction) on the grounds of NIMBY-ism (Not In My Back Yard) which is widespread in the UK. This may mainly be attributed to lack of understanding of technologies exacerbated by agendas of local protest groups
- The delay in seeing a return from land planted with SRC for 3-4 years following planting does not encourage land managers to consider growing this crop on a large scale
- The misconception by land managers that SRC will render land unusable for any future conventional cropping due to the cost of reinstating land to arable production

- EA regulations and planning processes not very helpful for farmers
- Landowners are slow to take up the challenge and opportunity of growing more trees in upland areas

Other comments

There is great interest in biomass in the domestic sector across the North East, with many stoves being fitted. People are now looking for where to source local fuel and need to be sure that supply is secure. There is interest in switching from oil to biomass for heating but when the capital cost of installing is mentioned, people are not so keen. Replacing a boiler is still a stress purchase even with the price of oil rising.

SWOT analysis is useful, but there is merit in also looking at what is needed and the range of benefits delivered by taking certain action.

- Has anyone looked to see if there are opportunities for liquid fuels from wood perhaps based around the Teesside chemical industry?
- Is the region strong on other relevant research/development capacity?

In summary the main issues identified by the SWOT analysis, to be used to inform the objectives and outputs of the Master Plan, can be summarised in the following categories:

Sustainable Development of Demand

- Poor perceptions of bioenergy in the marketplace
- Lack of accurate information and an understanding of the issues associated with energy generation from biomass
- Concern raised about the reliability and possibly security of supply of biomass
- Capital installation costs associated with technologies
- Availability of installation and maintenance engineers
- Addressing concerns relating to the ecological sustainability of biomass

Sustainable Development of Bioenergy Supply

- Sustainable use of our existing woodland resource
- Expansion of woodland cover to meet future demand
- Sustainable and continued growth and expansion of the supply chain
- Improvements in the quantity and quality of fuel supplies
- Accurate data on current, potential and future supply availability

Sector Support Mechanisms

- Training and Skills development
- Wider biomass network development and support

In the following section of the Master Plan we explore these points in further detail:

4.2. Sustainable Development of Bioenergy Demand

4.2.1. Poor perceptions of bioenergy in the general marketplace

Across the UK, bioenergy and specifically woodfuel, is perceived as being unreliable and inconvenient fuel to use, often requiring manual intervention. The effective global deforestation campaigns often contribute to the perception that burning wood is a 'bad thing to do' in environmental terms therefore controlled forestry must also be bad, there is also a general unawareness that biomass is a carbon neutral fuel. Competing energy sources are often delivered in a no-hassle, on demand, easily delivered way. Other 'competing' renewable energy sources have a higher public profile and are immediately recognisable as renewable.

The UK biomass market is immature in comparison to other regions in Europe, and therefore knowledge and awareness in the public is low and in some cases incorrect.

These perceptions need to change in order for bioenergy to be accepted in the wider market place and increase the uptake of biomass. An effective marketing and promotional campaign is required to improve perceptions of bioenergy, with these specific points being addressed. The Forestry Commission has an awareness campaign based around the benefits of forestry for climate change to help educate and dispel misinformation (<http://www.forestry.gov.uk/climatechange>).

4.2.2. Lack of accurate information and an understanding of the issues associated with energy generation from biomass

Due to the immature UK and North East biomass market, information provision on biomass can be fragmented and incomplete. Public understanding and perceptions of biomass create a barrier with very few energy consumers fully understanding their own complete energy usage map. It is often extremely difficult for individual consumers to accurately analyse and evaluate their options in relation to renewable energy alternatives, with biomass often not on the list of options, or very low down the order of priorities. If the above barriers are indeed surmounted, it's often the case that the assessing the technical issues associated with integrating biomass into current energy supply is very difficult.

The key to overcoming these issues is to co-ordinate advice provision and provide continuity of advice provision which has historically been patchy and has fallen to several Government

and non-Governmental departments to provide. The accurate training of planners, energy advisors and energy auditors is also critical to breaking the barriers associated with the uptake of bioenergy. The Forestry Commission has set up the Biomass Energy Centre (BEC) www.biomassenergycentre.org.uk in 2006 to provide a centralised point of information on biomass for the UK. On a regional level the point of contact is Northwoods, in addition this project has produced the NE specific guides to help address this.

4.2.3. Reliability and security of supply of biomass

Often a perception issue, but for longer term planners and for larger scale bioenergy consumers it's critical to fully understand the implications of locally sourcing bioenergy supplies. Consumer confidence in the reliability and the quality of the supply of biomass is essential to help remove barriers associated with

As this plan has highlighted, the largest opportunity, with the greatest environmental, economic and ecological impact is to use our locally grown sources of biomass within the North East in high efficiency energy conversion technologies – typically combustion to heat technologies (high efficiency wood burning stoves, boilers and in 'Good Quality CHP' systems).

The public perception of bioenergy, specifically wood as a fuel is often tainted by experiences of consuming wood as a fuel at a domestic level where supplies have often been unreliable, inconsistent and don't adhere to recognised quality standards. The other constituent parts of the supply sector are often tainted by these perceptions and can add to the problem.

Promotion to the market of existing Quality Assurance standards and accreditation such as the EN suite of biomass standards and the HETAS Solid Biomass Assurance Scheme (SBAS) or Woodsure Scheme is crucial to give the market confidence that the supply sector can produce a consistent quality product.

Security of supply is closely linked to the available local resources from forestry, agriculture and associated industries, from analysis of available resource in an earlier section, see that currently we only use 16% of the available resource, which would allow for a 6 fold increase in the market without any pressure on these.

The only issue is that of these resources being tied into long term contracts for other uses (e.g. panel board manufacture). In the NE a large amount of the available forestry resource and waste wood is tied into long term contracts from the Forestry Commission and waste management companies. Therefore it can be considered that the public woodland resource is almost entirely spoken for the immediate future, however this still leaves the large private sector resource which can easily accommodate a 4 fold increase in the market.

It is vital to address fuel supply quality at all scales – from domestic scale through to larger scale wood consumers in order for the wider perception of wood as fuel to be addressed. As

mentioned above, the adoption of recognised wood supply quality assurance schemes (such as the Solid biomass Assurance Scheme or Woodsure) are essential in order to provide a coherent message of growing strength to potential bioenergy consumers.

4.2.4. Capital installation costs associated with bioenergy technologies

Perhaps understandably, the growth of the biomass equipment installation sector has kept pace with the slow progress in demand for installations. With ambitious targets for installed renewable energy capacity, combined with incentives to stimulate demand, the installation sector needs to be supported and clearly assisted to meet the potential demand for installed biomass systems.

The current approach in the UK is to pay for renewable energy rather than the equipment that produces it directly. This has resulted in the introduction of the Renewable Obligation for large scale renewable electricity generation, the Feed-in-Tariff for renewable electricity on a small scale and the Renewable Heat Incentive (RHI) for renewable heat. The RHI in particular is a new mechanism for stimulating demand for renewable heat and it remains unclear at this stage as to whether the scheme will deliver the ambitious targets it has been designed to achieve. With £860m available to encourage the uptake of renewable heat installations within this Government spending period, the scheme is designed to provide a 12% return on investment for those installing renewable heat generating equipment. Also the government has plans to set up a “Green” investment bank which could finance financially viable schemes with low interest loans.

However these schemes don't overcome the issue of high initial capital costs, but the government is hoping that the level of guaranteed payments for the energy will encourage private investment from banks and private companies.

Continuous monitoring against targets is required in order to keep the mechanisms focussed on delivering the intended aims – delivering carbon savings and increasing the proportion of energy derived from renewable sources. It is vital that the scheme is widely promoted and this fits well with the need for wider publicity.

4.2.5. Availability of installation and maintenance Engineers

A skilled and capable workforce is essential to the sustainable development of any sector. Work carried out specifically mapping the workforce requirements of the woodfuel sector in the North East clearly identify skills shortages relating to the provision of skilled and competent engineering capability. Skills provision for the entire sector is dealt with in a later section of this plan.

4.2.6. Addressing Concerns relating to the ecological sustainability of biomass

Evidence of biomass being transported excessive distances is often cited as a negative environmental impact which in turn has damaged the perception of biomass. If the market growth proceeds at a steady pace it should be possible to link the development of woodfuel markets with markets for better quality timber. To do this would require dissemination of best practice guidance on forest management to ensure that the market can be supplied on a sustainable basis.

At present a significant portion of the NE woodland has been under-managed or not managed for 30 – 40 years, resulting in dense, low quality stands. It is well documented that management increases not only the quality of timber but also the biodiversity within the stand. Most of the management operations within woodlands results in small roundwood product which currently has a low value, making such operations uneconomic. Woodfuel can increase the value of this product which in turn increases the economics, resulting in an increase in woodland management.

UK forestry is well governed with regard sustainable harvesting, whereby a license is required to fell more than 5m³ in any calendar quarter, and any license for final harvest has a requirement to either replant the area or allow natural regeneration. As such UK forestry is considered sustainable.

Biomass sourced from outside of UK forestry and derived products will require enhanced measures to ensure sustainable supply e.g. FSC accreditation for woody products.

4.3. Sustainable Development of Bioenergy Supply

4.3.1. Sustainable use of our Existing Woodland Resource

Key to meeting the present 'spike' in demand for solid biomass, is the potential to fully utilise the existing resource which remains available in the undermanaged woodlands and forests of the North East. The price of timber is currently increasing, but still has considerable way to go to reach former actual prices per tonne. The current price paid for poorer quality wood extracted from undermanaged woodlands has increased, as the market opportunity for lower grade wood has grown with the biomass sector.

The UK's Forestry Commission estimates that for whole of England, only 38% of the maximum sustainable yield is currently harvested. In order to meet the future demand for wood, this split needs to be reversed. The vast majority of the North East Regions' presently undermanaged woodland is in private ownership, with patterns of landlord/tenant agreements having led to unfavourable conditions to attract investment. Sporting uses often compete with forestry for timber production.

In order to maximise the opportunity to better use the regions existing woodlands, it is vital to encourage private investment in currently undermanaged woodlands.

4.3.2. Expansion of woodland cover to meet future demand

As already highlighted in this Master Plan, in the UK context, the North East has a relatively high percentage of woodland cover - extending to 12% of the land area of the North East. This is dominated by Europe's largest man-made forest - Kielder Forest which is presently in public ownership and management. However, at the time of writing it is worth noting that the future of the entire UK's public forest estate remains under discussion. The present UK Government is seeking views on the sale of the public estate to private investors as part of the UK's 2010 Spending Review (SR 2010). Having moved away from a position of actively seeking to sell off significant proportions of the public estate, the UK Government has established an Independent Panel to propose changes to patterns of ownership.

The Reade report (Forestry Commission 2009) highlights the importance of increasing woodland cover to provide a variety of benefits; economic, environmental and social. The recommendations are that woodland cover is increased by 4% to achieve maximum impact and would have a considerable effect on meeting the UK's climate change obligations. As an already heavily wooded region of the UK, Network members in the North East, it is felt that this target would be unlikely to be achievable at an increase of 340km² of forest cover.

However, it is strongly felt that we should be increasing the rate of new planting within the Region and that we should be looking to develop a strategy to identify suitable areas for new multi-purpose forestry planting in the future. Whilst we acknowledge that it is important to make sure we are planting the right tree in the right place, we would very much like to see an increase in woodland cover across the North East.

4.3.3. Sustainable and Continued Growth of the Supply Chain

The forestry supply chain has historically suffered from a significant lack of investment. Strongly allied to the point raised earlier in 5.3.1, the North East is in desperate need of the evidence.

A project run by Northwoods and informed by the BEn project, has been helping to deliver some of the capital requirements of the forestry sector in order to meet the future demand for wood as a fuel. Since launching the project in August 2008, the Rural Development Programme for England (RDPE) funded bioNErgy project has stimulated £2.1m of investment in the supply chain through the provision of capital grants towards the purchase of the forestry equipment and woodfuel supply chain infrastructure.

It is important to recognise the importance of this investment and to ensure that the development is encouraged in a sustainable way with grants being provided to address specific requirements of the sector such as smaller scale harvesting and processing equipment which will enable many of the Regions underutilised forestry resources.

4.3.4. Improvements in the Quality of fuel Supplies

Whilst already discussed in the 'Demand' section of this Master Plan, the promotion and uptake of the quality assurance standards and accreditation such as the EN biomass standards and UK's HETAS Solid Biomass Assurance Scheme (SBAS) is critical to provide the market with confidence that the supply sector can produce a consistent, high quality product.

At the time of writing (May 2011) there are no woodfuel suppliers in the North East who have any type of accreditation for the fuel that they supply. A significant effort is required to break down the barrier of lack of confidence in the supply chain which does still hold back the development of the biomass sector. A consistent approach to woodfuel production is essential and specific efforts should be made to work with individual suppliers or prospective suppliers to start the process of achieving a recognised accreditation standard and to assist with the production of high quality, reliable fuels.

4.4. Sector Support

4.4.1. Accurate data capture of current, potential and future supply availability

One of the key factors associated with the delivery of the actions identified in this and subsequent plans is the ability to accurately monitor the availability of supply within the Region. At present a variety of sources are used to assess theoretical and actual fuel availability. An agreed, regular monitoring and review system would provide an accurate foundation on which to build the North East's biomass sector. The BEn project provides the most accurate data set relating to the biomass sector in the North East and this data to a high enough resolution to be of use at a strategic and planning level.

4.4.2. Training and Skills within the bioenergy Sector

An adequately skilled workforce is crucial to the development of the sector. Unfortunately as a result of previous capital funding programmes in the UK, the growth of the sector has never been linear, the growth has been stepped. The result has been training and skills capacity in the industry has been insufficient to meet the demand at times and at other points, trained personnel have outstripped the demand for their services. It is expected that the RHI will also lead to a rapid growth in demand which may lead to a skills shortage for a time.

Therefore it is of vital importance that resources are put into training new entrants into the industry and to providing the necessary training and technical skills to those who will be a part of the growing sector in the future.

5. Objectives and Action Plan

The table below summarises the findings from the SWOT analysis, and brings together a clear set of objectives, outputs, actions and suggested implementation strategies. Several of the Actions identified have been delivered during the duration of the BEn project or are in the process of being delivered. A significant proportion of the actions identified and the action plans to deliver focus on woody biomass, as it was felt that woody biomass will make the most significant contribution to the overall biomass picture in the North East.



ISSUE	PRIORITY (L/M/H)	OBJECTIVE	OUTPUTS	ACTIONS	IMPLEMENTATION	TIMESCALE
ACHIEVING SUSTAINABLE DEVELOPMENT OF DEMAND						
Poor perceptions of bioenergy in the marketplace	M	Change perceptions of biomass and to introduce the possibility of biomass to new audiences.	Improved perception of biomass and wider acceptability of the key issues.	Deliver a marketing campaign designed to attract the attention of the general public to help improve the profile and the image of biomass.	DEFRA, Forestry Commission England, Biomass Energy Centre, Northwoods, public facing bodies such as Northumberland National Park. Action being delivered as part of the Northumberland Firewood Fair – working with Leader and other funders to promote the use of firewood.	2011 to 2013 October 2011
			Increased number of biomass to energy installations.	Host open-days and events at some of the Region's large and small scale biomass installations, encouraging public involvement.	National Farmers Union, Country Land Business Association, Renewable Energy Association, Blyth Renewable Energy event.	2012 to 2013
				Involvement of main stream media in renewable events.	NE Biomass Forum, NREG, Forestry Commission press,	2010 onwards
Lack of accurate information and an understanding of the issues associated with energy generation from biomass	M	Improve the level and quality of the knowledge and advice given to prospective biomass consumers.	Increased number of biomass to energy installations.	Continuing Professional Development (CPD) seminars for energy advisors, specifically focussing on biomass to energy technologies.	Northwoods, Forestry Commission England, RDI,	2011 to 2012
			Create informed stakeholders, aware of the opportunities of	Arrange 'master-class' sessions for those in a position of influence to break barriers and inaccurate	Northwoods, RDI, Forestry Commission, One NorthEast	2008 to 2012 Delivered through project BEn



			biomass.	perceptions of biomass technologies.		
		Increase the number of active participants engaged in the biomass sector	Transfer of knowledge, delivery of up to date information available	Extend the North East biomass forum BEn network to incorporate further members to become involved with active stakeholders and participants in the sector.	Northwoods, NE Biomass Forum Steering Group.	2008 onwards Delivered through the BEn project.
Capital installation costs associated with technologies	H	Increase the number of biomass installations	Encourage uptake of the FiT and RHI mechanisms	Seminars and events to promote and publicise the Renewable Heat Incentive and the Feed in Tariff mechanisms.	REA, NREG, NNPA,	2011 onwards (launch of RHI)
		Increase the uptake of the incentives in place to encourage biomass installations.	Wider understanding of incentive mechanisms available to support biomass installations.	Expert workshops and seminars relating to the opportunities in biomass and woodfuel.	Northwoods, NREG, Leader groups,	2011 onwards
Availability of installation and maintenance engineers	H	Establish a network of trained and competent installation, service and maintenance engineers.	Increased number of biomass installations	Work alongside vocational and educational institutions and professional bodies to	HETAS, biomass installation companies, Northumberland College, University of Newcastle	2011 to 2015 (first spending period for RHI)
Addressing concerns relating to the ecological sustainability of biomass	M	Increase public understanding of forestry and woodland management requirements.	Public awareness raised and greater acceptance of wood and biomass as a modern fuel.	Media campaign, events and promotion of modern forestry practices. Open-days for the forest industry.	Forestry Commission, National Trust, private woodland owners.	2009 to 2013

ISSUE	PRIORITY (L/M/H)	OBJECTIVE	OUTPUTS	ACTIONS	IMPLEMENTATION	TIMESCALE
ACHIEVING SUSTAINABLE DEVELOPMENT OF SUPPLY						
Sustainable use of our existing woodland resource	H	Increase the quantity of locally sourced biomass reaching the market from the Regions woodlands.	Higher percentage of North East woodlands under active management.	Workshops, information advice and guidance relating to managing woodlands for biomass production.	Forestry Commission, Northwoods, ConFor	2011 onwards 2011 onwards.
			Increased security of local supplies of wood.			
			Less reliance on imported fuels.	Promotion of the Woodfuel Woodland Improvement Grant – due to be announced by the Forestry Commission in Autumn 2011.	Forestry Commission, Northwoods. Action in progress – local delivery partnership formed, Northwoods working with Forestry Commission to actively promote scheme.	2011 – following announcement of Woodfuel WIG.
			Improved woodland management, improved ecological and economic potential of North East woodlands.			
			Additional value added to the Regions rural economy, ensuring biomass actively contributes to economic sustainability.			



			Improve the efficiency of existing installations to make best use available resource.	Assessments of existing installed biomass plant and ensure that efficiencies are maximised and that waste is minimised.	Combustion Engineering Association.	2012 - 2013
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Expansion of woodland cover to meet future demands	H	Increase the strategic resource of biomass, regardless of end use, by increasing the area of woodland cover.	Additional woodland cover across the North East.	Research into the barriers for land owners and managers to new planting schemes.	Newcastle University Rural Land Use research team, RDPE network research, Upland Local Action Groups, Northwoods.	2011 onwards
			Increase where appropriate the planting of energy specific crops.	Review the impact of the Energy Crops Scheme and assess reasons for the poor uptake of specific energy crop planting.	Increased engagement with RELU research, Newcastle University, National Non-Food Crop Centre	2011 onwards
			Improved environmental, social and economic sustainability.	Produce clear guidelines to good woodland establishment, emphasising the economic contribution woodlands can make.	Northwoods, NNPA, Forestry Commission, ConFor.	2011 onwards
			Increased rural resilience, aided by diversification of traditional activity into productive multi-purpose forestry.			
Continued sustainable growth and expansion of the supply chain	H	Increase the long term sustainability and viability of the fuel supply chain.	Confidence in a sector able to provide sustained yields of biomass in to the future.	Increased uptake of the Northwoods RDPE bioENERgy programme, campaigns, monitoring and further gap analysis work to keep the project focussed and delivering the growth required in the sector.	Northwoods, RDPE programme of support	2009 to 2013



				Investigate and continue to develop collaborative working within the land based sector to encourage economies of scale and investigate methods of	Northwoods, CLa, North East Wood Fuels,	2008 to 2013
		Improve the co-ordination of the supply chain for anaerobic digestion feedstocks.	A coherent and co-ordinated supply chain, bringing together those with access to feedstocks	Develop a network of farmers at a sub-regional level to work closely together to ensure maximum yields are achieved from agricultural sources.	Newcastle University, Cockle Park Farm, NFU,	2011 onwards.
				Conduct research into the specific barriers to expansion and identify opportunities within the supply chain.		
Improvements in the quantity and quality of fuel supplies	H	Improve the standards and quality of woodfuel reaching the market	A more robust supply chain, delivering quality assured fuel, increasing competition and improvements in supply chain logistics.	Design, develop and deliver an accelerated programme of support to assist fuel suppliers to achieve nationally recognised accreditation standards such as EN standards, HETAS Solid Biomass Assurance Scheme or Woodsure.	Northwoods – active project launched in August 2011 to encourage 12 food fuel supply businesses to complete HETAS Solid Biomass Assurance Scheme.	August 2011 to 2012
		Improve the quantity and of quality assured fuel available to market.	An increased quantity of guaranteed high quality woodfuel reaching the market.	Research into the viability of using biomass CHP to dry wood chip, assessment of the economics and prospective future markets.	SPECIFIC ACTION Northwoods - BEn PROJECT	2010 to 2011
Accurate data on current, potential and future supply availability	M	Improve the knowledge base on which decisions are made.	A comprehensive set of statistical data showing the current and forecast quantities of biomass	Commission an independent survey of private and public sector biomass resource availability.	NNFCC, Northwoods, independent consultant.	

			available to supply.			
			A reliable source of current biomass to energy supply costs.	Establish a long-term regionally specific set of prices indices to be paid for each type of biomass.		2012 - onwards

ISSUE		OBJECTIVE	OUTPUTS	ACTIONS	IMPLEMENTATION	TIMESCALE
DEVELOPMENT OF SECTOR SUPPORT						
Training and skills provision	H	Increased number of biomass system installers	Increased technical knowledge in the market place, more diverse bioenergy based businesses.	Close collaboration with vocational education providers to establish clear career pathways in bioenergy and increase the number of training opportunities within the Region.	Northumberland College, NaREC, Northwoods, RDI. Action underway – working with NaREC developing opportunities for biomass actors. Further development and delivery of the ignite woodfuel training programme and the Leonardo De Vinci project also to be commissioned, RDI partner representing the UK looking at European biomass training expertise.	2009 - ongoing
		Increased number of biomass suppliers with the relevant skills and expertise	Increased number of competent, accredited fuel suppliers.	Development of new training courses and materials, based on learning from international experts.		2008 - ongoing
Wider biomass network development and support.	M	Sustain the development of the North East Biomass Forum beyond the life of the BEn project.	A network of engaged practitioners and actors.	Provision of secretariat function for North East Biomass Forum. Use online support mechanisms to ensure	Formally One NorthEast, private sector members of the forum look to share responsibilities, host required for services in the future.	2011 onwards.



5.1. Concrete actions

The Action Plan identifies several key areas of work to be delivered within the framework of the BEn project. The North East of England selected the design, development and delivery of a high level training package for Planners to assist with breaking down the barriers associated with biomass projects at planning decisions. The second action selected by members of the North East Biomass Forum is to investigate the feasibility of a CHP wood chip drying facility, providing guaranteed high quality woodchip to an area of the region. The following section examines these specific actions in further detail.

6. Delivery and accountability of selected biomass actions

6.1. Quality and sustainability criteria

The following methodology was used to indicate the sustainability impact of actions:



No	Indicator	Measured size	Goal	Status
1	Fuel quality	<ul style="list-style-type: none"> Quality of the product / biomass source used acc. to CEN/TS 14961:2007 / EN14213 	Quality assurance	
2	Impact on water use and quality	<ul style="list-style-type: none"> Water consumption Comparison of water needs (irrigation) to present situation 	Economical and Sustainable water use	
		<ul style="list-style-type: none"> Water quality Change of water quality compared to present situation 	Good water quality based on Water framework directive	
3	Changes in land use	<ul style="list-style-type: none"> Quantity of land consumption Additional land consumption for the generation of bioenergy in comparison to present situation 	Minimisation of use of natural habitats	
		<ul style="list-style-type: none"> Quality of land consumption Changes of land use due to the production of bioenergy 	Improvement of land quality e.g. recultivation of open cast mining areas, or abandoned industrial areas	
4	Soil quality	<ul style="list-style-type: none"> Change of Soil C stock balance and fertility, life cycle assessment (Annex V of Directive 2009/28/CE on promotion of renewable energy sources) 	Maintaining good condition of soil, Improvement of soil quality	
5	Air quality & Net balance of greenhouse gases (GHG)	<ul style="list-style-type: none"> Life Cycle Assessment focussing on CO₂, CH₄ and N₂O, PM10, NO_x, SO_x (comparable case studies might be used/adapted, e. g. for fermentation plants) / Comparison of different scenarios using data of various energy 	Support for complying with the emission reductions stipulated in the Kyoto Protocol Improvement of air quality	

		sources (electricity, gas, petrol, oil) compared against biomass		
6	Impact on biodiversity	<ul style="list-style-type: none"> Effects on biodiversity in comparison to the present situation 	Maintaining or Improvement of biodiversity	
7	Energy efficiency	<ul style="list-style-type: none"> Energy input vs. energy production Efficiencies will be compared with energy input/output of the fossil fuel that the biomass source is substituting 	Improvement of the energy efficiency	
8	Renewable energy	<ul style="list-style-type: none"> Energy capacity Installed bioenergy capacity (kW) vs. current state 	Increase of bioenergy use in the region	
9	Impacts on international and regional development	<ul style="list-style-type: none"> Turnover of bioenergy - Contribution of the action to the total turnover from bioenergy activities in the region 	Increase of innovative technology, minimisation of waste generation, increase of regional value chain	
		<ul style="list-style-type: none"> Efficiency of organic waste utilisation Contribution of the action to utilisation of organic waste for the energy production in the region: waste utilised in the action in relation to the waste produced in the region 		
		<ul style="list-style-type: none"> Changes in the employment in the bioenergy sector induced by the action - jobs created directly (in the action) and indirectly (in the supply chain) in the course of the action 		
10	End-users and consumer needs	<ul style="list-style-type: none"> Degree of acceptance/satisfaction of inhabitants/people affected by the action by public opinion survey (interviews, open councils, regional meetings...) 	Creation of accepted products/solutions	
11	Investment feasibility	<ul style="list-style-type: none"> Simplified cost-benefit analyses of actions 	Financial sustainable action	

7. Implementation of selected actions

7.1. Action 1

7.1.1. Description of action

7.1.1.1. Technical feasibility

A high level training on planning of biomass investments - an expert Seminar "Planning and Biomass" - is proposed as a one day training to provide an expert overview of comprehensive issues involved in a biomass project and to provide a practical advice on how to address them with confidence. The seminar is addressed to the planning and

sustainability officers, planning consultants and other professionals involved or interested in the planning issues related to biomass projects. No similar courses or seminars are offered at the moment in the UK, so it is also a valuable trial and evaluation if similar training or forum could be developed or build on in the future.

The seminar comprises of seven thematic sessions:

Session 1: Overview of biomass heat and power in the UK

Session 2: Drivers, policy and incentives for using biomass

Session 3: Planning applications for biomass projects

Session 4: Practical exercise “A case considered in detail”

Session 5: Case study with an expert planner from local authority or Second practical exercise (if there are difficulties with getting a speaker for that section)

Session 6: Policy making and implementation

Session 7: Biomass fuel sustainability and air quality issues

7.1.1.2. Financial analysis

The finances necessary for organization of the expert seminar consist of the following:

- Venue & catering costs
- Speakers / Seminar delivery costs
- Stationery / Delegate packs
- Staff time for organization of the event

As the seminar has been developed as high level training a renowned venue “The Sage” Gateshead has been selected as its location.

7.1.1.3. Funding & implementation plan

Funding for the event has been secured from three sources: the Regional Development Agency ONE North East, registration fees and BEn project. The secretariat has been provided by BEn project as support for the specific BEn action.

The ONE funding towards the event covered 65% of the event costs. Missing 35% have been collected from registration fees (symbolic cost of £30+VAT) and the BEn funding for “Regional meetings” (as the seminar provided an opportunity to present the project to the new audience). By mobilizing these resources it was possible to keep the booking costs very low or even to invite selected BEn partners from public service in the region to join the event for free, as the costs turned out to be a problem to some LA's facing major government cuts.

In the future higher contribution from the participants could be recommended e.g. £50+VAT as the services provided has been evaluated very positive. The problem with payment of seminar fees for some organizations has not resulted from the amount requested but from the incapability to pay anything for staff training at the moment. To provide similar seminars

in the future some kind of funding would need to be secured to provide some free spaces and allow similar participation chances to both private and public sector.

7.1.1.4. Benefits from the action to the investor and to the region

There are many benefits to the investor (Regional Development Agency and the BEn project) as well as to the involved North East region:

- The planners get an opportunity to learn from the experts how to deal with biomass investments in a structured and efficient way
- Group work encourages active exchange of experiences and information, participants can learn each other better and their fields of expertise, what can be useful for further cooperation
- A small group of the seminar participants (up to 30) and the seminar schedule with 3 slots for coffee breaks and lunch time together allows good atmosphere for networking
- Seminar gives a great opportunity for a meeting of private (consultants) and public sector (planning officers) what is very valuable as many misunderstandings and problems occur during planning process due to the lack of efficient communication and mutual understanding of each other's interests

The seminar has been evaluated very positively. Especially the presentation of Dr. Patricia Thornley on sustainability aspects for biomass installation and the group work on a concrete case study has been of big interest for participants.

We have observed that problems for biomass planning process results from major misunderstandings between consultants and the local authorities, as well as from the lack of knowledge and experience in dealing with relevant legislation and procedures. Repeating the expert seminar every 1-2 years could allow keeping both groups updated on the newest polity and provide platform for good communication and mutual understanding. The events could be organized in a form of a discussion forum or one day refreshing training.

7.1.2. Action definition form

Action definition form	
Organisation / Company: RDI Ltd. / BEn	
Approved by: North East Biomass Forum	Signed: R.Pow, A.Horner, D. Maunder et al
Assisting regional BEn partner: Rural Development Initiatives Ltd.	
Place & date: 14.Sept 2010 The Sage Gateshead, Gateshead, UK	
Action title: Expert Seminar "Planning and Biomass"	
Description (what): A high level training of planning of biomass investments - an expert Seminar "Planning and Biomass" is proposed as a one day training to provide an expert overview of comprehensive issues involved in a biomass project and to provide a practical advice on how to address them with confidence. The seminar is addressed to the planning and sustainability officers, planning consultants and other professionals involved or interested in the planning issues related to biomass projects. No similar courses or seminars are offered at the moment in the UK, so it is also a	



trial for similar training or forum to be developed or build on in the future.			
Objective reference:		Output reference:	
Technical specification: The seminar comprises of seven thematic sessions on subjects relevant to planning of a bioenergy project (See attached flyer). The case study session with a planner from one of the local authorities from the region may be substituted with group work session if necessary.			
Location (where): The Sage Gateshead (renowned regional venue)			
Timeframe (when):	(start)	(finish)	(duration)
14. Sept. 2010, 9.00 am		14. Sept. 2010, 4.00 pm	1 day (7 hours)
Estimated cost: Per person: £30 + VAT (with co-funding from RDA)			
Financing scheme / Investor: ONE RDA: 65% Participation fees: 20% (for future reference 35%) BEn: 15% & staff time for organization			
Subprojects / tasks:		Responsibility	Deadline
1) Elaboration of the event idea and confirmation of acceptance from the regional stakeholders		NE, RDI	March
2) Securing funds and budgeting		RDI, ONE	March
3) Reservation of the venue and signing a contract with the firm delivering the seminar		RDI	March-May
4) Agreement on the seminar program and the event flyer		RDI, NE	Beg.Aug
5) Establishment of the registration system (online, phone, email)		RDI	Beg.Aug
6) Establishment of the invoicing system (CC, check, invoice)		RDI HO	Beg.Aug
7) Confirmation of the catering and eventual alternations to the program		RDI, NE	Mid.Aug
8) Confirmation of the event to participants, directions		RDI	06.09.10
9) Confirmation of the no. of participants to the venue		RDI	07.09.10
9) Delivery of the event		RDI, NE, SAGE	13.09.10
10) Evaluation & documentation of the event		RDI	14.09.10
11) PR from the event (NW news, BEn news etc.)		RDI	End Sept. Sept/Oct
Milestones:			
1) Funding secured, venue and delivery of the seminar contracted			
2) Seminar program agreed and flyer produced and distributed			
3) Registration and invoicing system in place			
4) Min. 15 registrations taken			
5) Catering, venue and program confirmed			
6) Final reminders and confirmations sent to participants			
7) Event has been delivered & evaluation forms have been completed			
8) Evaluation and PR from the event has been done (NW news, BEn news, NEBF, ConFor etc.)			
Applicable quality criteria:		Indicators value:	
1) Evaluation form		1) Number of responses	
2) Satisfaction evaluation re. content of the seminar		2) Positive/ neutral / negative	
3) Satisfaction evaluation re. organization of the seminar		3) Positive/ neutral / negative	
4) Funders valuation		4) Positive/ neutral / negative	

7.2. Action 2

7.2.1. Description of action

7.2.1.1. Technical feasibility

A feasibility study working with several key regional stakeholders has been proposed as the second specific action. The feasibility study will examine existing markets and prospective markets for woodchip and examine the likely future markets and predicted market growth for dry wood chip in a part of the North East region. As part of a wider study looking at the installation of a potential CHP unit, the proposed feasibility study will be an integral part of assessing the financial viability of the CHP project as the proposed use for the heat would be to dry woodchip. The regional partners and stakeholders bring together a range of expertise and financial backing for a proposed CHP project in the Region.

UK Biomass Ltd – Consulting Engineers equipment selection and design

ARUP – Consultants working on environmental and planning considerations

Banks Group Ltd – Developers with renewable energy experience

RDI Ltd – biomass supply chain development and network expertise, feasibility work

In summary, the following sections of the feasibility study are proposed:

- Collate data on existing feasibility studies to gather baseline data
- Sensitivity analysis on the baseline data for effect of the RHI
- Overall Market analysis summary
- Technical support on “Good Quality CHP” requirements
- Production of final report

7.2.1.2. Financial analysis

The financial feasibility of the CHP project will be dependent on the effective utilisation of the heat produced by the CHP system. The initial proposal is to use the heat produced to dry wood chip, or to explore other potential outlets for the heat produced from the CHP. In order to financially determine the feasibility of the project this report will examine markets for dry woodchip. The financial viability of the project will be assessed based on the providing chip to existing and prospective future markets based on a range of future funding scenarios such as the proposed Renewable Heat Incentive.

7.2.1.3. Funding & implementation plan

The project implementation plan will be developed following the results of the feasibility study. During the study phase, funding options will be examined and developed with the Banks Group Ltd, an investor with considerable involvement in the renewable energy sector, predominantly in the development of wind farms across the North East.

7.2.1.4. Benefits from the action to the investor and to the region

There are benefits to the investor Banks Group and to the region:

- The opportunity to examine the scale and the future markets for wood fuel following the government stimulation with the Renewable Heat Incentive and the Feed in Tariffs.
- Detailed examination of prospective markets for a renewable wood fuel at a local level, taking into consideration incentives, existing markets and
- Examination of the requirements for the project to fulfil the Good Quality CHP and access the additional incentives.

Whilst it is anticipated that the report will contain some commercially sensitive material, we would also release (with the permission of the consortium) a version of the report which will demonstrate the methodology used and provide a detailed examination of the prospective economic opportunities related to wood chip supply in a sub-region of the North East.

7.2.2. Action definition form

Action definition form		
Organisation / Company: UK Biomass Ltd, Arup and Banks UK		
Approved by: North East Biomass Forum	Signed: D Maunder, R Pow	
Assisting regional BEn partner: Rural Development Initiatives		
Place & date: NE England, November onwards until Jan 2011		
Action title:		
Description (what): Feasibility Study into a Biomass CHP plant with a woodfuel drying facility, carrying out detailed market analysis for the dry woodfuel product, including sensitivity analysis on the possible effects of any Renewable Heat Incentive. Also including a small element of technical support on chip driers.		
Objective reference:	Output reference:	
Technical specification: The feasibility study will comprise a detailed market evaluation concerning the economic and environmental sustainability of a biomass CHP system with associated wood chip drying facility. The economic evaluation will form the final section of a technical and commercial report.		
Location (where): Looking at the whole NE England Market		
Timeframe (when): (start) Nov 2010	(finish) Feb 2011	(duration) 4 months
Estimated cost: £8,000		
Financing scheme / Investor:		
Subprojects / tasks:	Responsibility	Deadline

1) Collate data on existing feasibility studies to gather baseline data	John Farquhar	Nov-30 th
2) Sensitivity analysis on the baseline data for effect of the RHI	John Farquhar	Dec – 15th
3) Overall Market analysis summary	John Farquhar	Dec – 30 th
4) Technical support on “Good Quality CHP” requirements	John Farquhar	Jan – 15th
5) Production of final report	John Farquhar	Feb – 30th
...		
Milestones:		
1) Report on NE England wood chip market present to expected 2015		
2) Guidance on “Good Quality CHP” requirements for biomass		
3) Evaluate effects of Government incentives on growth in biomass sector		
4) Market analysis and summary produced		
5) Production of FINAL report for circulation		
...		

8. Conclusions and outlook

The North East Biomass Master Plan captures the aspirations for the sustainable growth of the biomass sector within the North East of England. Whilst the North East has significant potential to supply a significant proportion of its renewable energy from biomass, this plan highlights the need predominantly to invest in the supply chain to ensure the maximum benefit is gained to the region from the expansion of biomass markets.

Whilst this plan has been under development, the UK has gone through considerable changes in the planning frameworks, the Government structures and the support and incentives for the renewable energy sector, impacting greatly on the development of the biomass sector. On the positive side, the emergence of some of the world’s first incentives to produce renewable heat have happened and at the same time the significance of regions within the UK has diminished, as the Government moves to centralise a great deal of the functions once performed at a regional level.

This plan will be impossible to implement without the cooperation and contribution of many partner organisations both within and outside the region. It will be extremely important to maintain contact and networks between relevant agency, NGO and private sector interests. The role of the network created by the BEn project is to act as co-ordinator in the delivery of the Master plan and that role will be equally important in the implementation of the specific actions.

A.1 BEn Biomass guides

The BEn Guides provide detailed technical information for project developers considering involvement in the biomass sector and provides a comprehensive overview of the Technical, Managerial and Financial aspects of project development.

[BEn Biomass Guides](#)