Development of a Renewable Energy Assessment and Targets For Yorkshire and the Humber

Final Report to Government Office Yorkshire and the Humber

VOLUME 1 – Main Report

July 2002

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Development of a Renewable Energy Assessment and Targets for Yorkshire and the Humber

FINAL REPORT to

Government Office for Yorkshire and the Humber

CONTENTS OF VOLUME 1

GLOSSARY

AMWS	Average Mean Wind Speed : An indicator of the relative strength of the wind energy resource at a particular location
AONB	Area of Outstanding Natural Beauty
DEFRA	Department for Environment, Food and Rural Affairs
DTI	Department of Trade and Industry
DTLR	Department for Transport, Local Government and the Regions
EC / EU	European Community / European Union
GWh	Gigawatt-hour : a unit of energy, used to show how much energy is actually generated from a scheme
ha	Hectare : A unit of land area (100ha ≡ 1 km^2)
km	Kilometre
kW	Kilowatt: A unit of power, which indicates a capacity to generate energy. Domestic photovoltaic installations might typically be of "kilowatt" size.
kWh	Kilowatt-hour: a unit of energy, used to show how much energy is actually generated from a scheme (1 GWh = 1000 MWh = 1,000,000 kWh)
kW_p	Kilowatt peak output : the power capacity of a photovoltaic cell measured under standard conditions
M/s	Metres per second : an indicator used to measure wind speeds
MW	Megawatt: A unit of power, which indicates a capacity to generate energy. Large wind turbines have a capacity of about 1 MW or more.
NFFO	Non-Fossil Fuel Obligation : A previous Government approach to the encouragement of renewable energy schemes, currently in the process of being superseded by the Renewables Obligation
odt	Oven-dry tonne : A unit typically used for expressing weights of biomass (the moisture content of biomass greatly influences its weight)
PIU	Performance and Innovation Unit (of the Cabinet Office)
PPG	Planning Policy Guidance
PV	Photovoltaics
RE	Renewable Energy
REF	Regional Energy Forum
RO	Renewables Obligation : The Government's new approach to encouraging renewable energy electricity production
RPG	Regional Planning Guidance
RSDF	Regional Sustainable Development Framework
SRC	Short Rotation Coppice : Fast-growing coppice crops such as willow which can be used to provide additional biomass for fuel
Yr.	Year

EXECUTIVE SUMMARY

This report presents the findings of a study to develop an assessment and targets for renewable energy across Yorkshire and the Humber, to 2010 and beyond, to 2021. It has involved a review of technical opportunities and existing policy backgrounds against a backdrop of stakeholder consultation. It builds upon the earlier foundation provided by the DTI's Lancashire and Yorkshire Renewable Energy Study (LYREPS) and the more recent regional energy baseline study undertaken for the Regional Energy Forum.

Because the majority of renewable energy technologies produce no gaseous emissions in operation (and typically also require relatively low quantities of energy to manufacture) they are seen as one of the major means through which the UK Government can fulfil its international climate-change commitments. They can also assist the UK to develop a greater security within its energy supply, given the eventual run-down of domestic fossil fuel sources and the risks associated with energy imports from unstable areas of the world.

But this is not all. Renewable energy sources have excellent long-term prospects for assisting economic and social re-generation, whether through the development and sustenance of strong domestic and international business, or via the direct involvement of local communities in the definition and usage of local sources of power and heat. It has been estimated[1] that in the region of 2,250 jobs could be created through the greater regional utilisation of wind energy and biomass alone with other prospects existing in the longer term.

The context for the development of renewable energy (RE) sources across the region is very varied. The region contains areas of dense urban population with high energy use, has a wide and continuing legacy of industrial development and activity, and yet consists in great part of highly productive farmland and protected rural and upland characters. This geographical context leads to relatively abundant opportunities for wind and biomass energy sources. A factor providing an unusual context for the region is the extremely high quantity of current installed electricity generation plant, a consequence of Yorkshire's coal legacy and its current generation of gas-fired power plant.

Section 2 of the report sets out a review of the regional baseline, in terms of existing renewable energy schemes and – in contrast – an analysis of the reasons why more schemes have not proceeded across the region to date. Section 3 documents our technical analysis of the possibilities for future renewable energy deployment, informed by technical, economic, institutional, environmental and other factors. The context for existing and future development is further analysed in Section 4, which reviews the planning policy, Local Agenda 21 and previous Non-Fossil Fuel Obligation backgrounds across the region. A brief summary of the consultation processes that we undertook in the derivation of proposed targets is shown in Section 5, and the proposed targets are set out within Section 6. The final part of the report, Section 7, describes the elements of a regional Action Plan that we believe is essential for the achievement of the proposed targets.

[1] "Energy Forum Foundation Study", Ecotec Research and Consulting for Yorkshire Forward, September 2001. This report estimates that in the region of 13,000 jobs could be created across the region from domestic, buildings and transport energy efficiency, large scale CHP, energy from waste, micro CHP, biomass and wind energy.

We recommend the adoption of *renewable energy electricity targets* for Yorkshire and the Humber as set out within the Table below.

	Now	2010	2021
Proposed RE Target (MW)	*≈78*	670	1850
% of Current Regional Generation Capacity	*0.6*	5.1	14.1
Proposed RE Target (GWh)	*≈370*	2344	5597
% of Current Regional Electricity Distribution	*1.5*	9.4	22.5

Regional Electricity Distribution is defined within the recent Regional Energy Forum Foundation Study[1] as an estimate of the electricity actually distributed within Yorkshire and the Humber.

The key components of the 2010 target are as follows:

- A projected deployment of two offshore wind farms off the coast of the region;
- Approximately 300MW from onshore wind turbines from a combination of single turbines, clusters and wind-farm developments;
- A number of large and medium-scale biomass to energy schemes totalling around 175MW, part of which may come from co-firing of biomass within existing power generation plant;
- A greatly expanded deployment of photovoltaic power in domestic and commercial buildings, laying the ground for an even greater increase in PV over the period to 2021.

The Table below gives an indicative "sub-regional" breakdown for how the 2010 target might be manifested across the region. It represents a judgement of one possible way in which the regional target might be achieved, based upon the characteristics of each of the technologies considered and of the potential sub-regional resource.

Sub-Region	Installed Electricity Generation Capacity (MW)
All **Existing** Regional RE Capacity	53
New Capacity in North Yorkshire	183
New Capacity in West Yorkshire	64
New Capacity in South Yorkshire	94
New Capacity in Humber	280
TOTAL	**674**

The 2021 target envisages significantly greater levels of deployment across all technology areas and additionally proposes that wave power will also provide a major contribution by this time.

In reaching these conclusions we have taken account of significant stakeholder feedback from a wide variety of sources. From this feedback we concluded that:

- There is strong support for the adoption of ambitious regional targets;
- Challenging regional targets must be linked explicitly to a challenging and rigorous Action Plan for their adoption;
- Offshore wind energy deployment should be encouraged;
- Opportunities for onshore wind energy should be sought at all scales of application. Further action is required at local level to foster a process of dialogue regarding wind deployment, leading to better mutual understanding of realistic locational opportunities;
- Further deployment of wood biomass for energy use is supported, particularly where this can lead to local economic benefits;
- Photovoltaic power sources should be encouraged despite their current cost disadvantages;
- Energy-from-waste schemes should be separately presented within our report rather than included with other renewable energy sources.

We view these proposed targets as challenging but achievable. Their delivery requires a concerted region-wide Action Plan, as shown in Section 7. In the first instance we have defined a series of 20 Short-Term Actions forming the primary elements of the first three years of such an Action Plan. These Actions include clear and specific responsibilities, timescales and outcomes. **In line with these short-term Actions, we recommend that – as a matter of primary importance – the region should place a priority on immediate activities over the next 12 months, demonstrating clear commitment and progress towards the achievement of the targets.**

1. INTRODUCTION

1.1 Why Renewable Energy?

Renewable energy is the term used to describe a wide range of naturally occurring, replenishable energy sources. It can take many forms, from wind turbines or biomass-to-energy schemes, to smaller-scale photovoltaic electricity panels, and appear at many scales of application.

Because the majority of renewable energy technologies produce no gaseous emissions in operation (and typically also require relatively low quantities of energy to manufacture) they are seen as one of the major means through which the UK Government can fulfil its international climate-change commitments. They can also assist the UK to develop a greater security within its energy supply, given the eventual run-down of domestic fossil fuel sources and the risks associated with energy imports from unstable areas of the world.

But this is not all. Renewable energy sources have excellent long-term prospects for assisting economic and social re-generation, whether through the development and sustenance of strong domestic and international business, or via the direct involvement of local communities in the definition and usage of local sources of power and heat. It has been estimated[1] that in the region of 2,250 jobs could be created through the greater regional utilisation of wind energy and biomass alone with other prospects existing in the longer term.

To set against these advantages will be issues associated with the unfamiliarity of many of the technologies. Concerns over the visual implications of wind energy are perhaps the most obvious point of contention but other technologies may raise uncertainties that need to be understood and addressed as the UK moves towards a more "renewable" future.

There is a widely supportive context for the further development of renewable energy within the UK. The framework is set by a number of national[2] and international[3] reports and obligations which all point strongly towards wider and increasing renewable energy deployment over the short, medium and long-term. This study represents a part of this context, by providing an analysis of the region's capacity to deploy renewable energy sources over the next 20 years.

[2] Cabinet Office Performance and Innovation Unit, "Renewable Energy in the UK – Building for the Future of the Environment", November 2001 / Royal Commission on Environmental Pollution, "Energy – the Changing Climate", June 2000 / DEFRA (formerly DETR), "Climate Change – The UK Programme", 2000

[3] European Commission (2001), Directive 2001/77/EC of the European Parliament and of the Council of September 27th 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.

1.2 Project Aim & Objectives

The overall aim of the project, as defined in the Project Brief (see Annex A), is to prepare an assessment of renewable energy (RE) potential, targets for renewable energy across Yorkshire and the Humber and an action plan for implementation.

The principal objectives for the study to deliver are as follows:

1. An assessment of the region's capacity to generate electricity from renewable sources and the establishment of targets for the development of renewable energy generation in Yorkshire and The Humber initially to 2010, and then beyond this to 2021. Providing targets to 2021 is required to assist the next review of RPG.

2.Targets must be sub divided between different renewable energy sources and the following sub regions in Yorkshire and The Humber:

'Humberside'
North Yorkshire
South Yorkshire
West Yorkshire

Sub–targets should be set for individual Structure Plan and Unitary Development Plan areas where it is sensible to do so. Our region is a varied one, and it is anticipated that any targets will reflect different parts of the region making different contributions to individual elements of renewable energy generation.

3.Targets must be expressed as 'MW installed targets, which translate at 2001 baselines to a % of overall generation capacity and % of consumption targets for the region', and include time-scales/ delivery profiles. Whilst this work will have regard to the Government targets, they are not to be regarded as a limit or 'final' provision for renewable energy within the region.

4.Identify how those individual elements and targets will be delivered, and make recommendations on areas where specific types of renewable energy development should be encouraged.

5.Define broad locations for specific renewable energy development, and set out criteria, model policies, case studies and examples of good practise, to help local authorities select suitable sites and support applications for development.

6.Identify any barriers to those assessment targets being realised and solutions to enable them to be overcome.

7.Identify any robust and economically realistic opportunities where promotion of specific renewable energy development proposals can bring significant overall benefits to the region and its economy.

8.Identify where specific types or scales of renewable energy development will be resisted, or not counted towards the regional renewable energy targets. These recommendations will need reasoned justification and make clear the implications for the region's renewable energy targets.

9.Produce an Action Plan with priorities for implementing study recommendations, and

10.Set out appropriate Indicators and Delivery Profiles to assess future performance at all levels across the planning framework.

1.3 Project Background

As part of its national and international commitment to tackling climate change, the Government is seeking to encourage greater RE deployment over the next decade and beyond. A number of European and national policy measures are in place or planned to help achieve this, notably:

- A European Directive, encouraging the generation of electricity from renewable energy sources within the European electricity market;
- The introduction of a Renewable Energy Obligation, intended to oblige all licensed suppliers of electricity across England and Wales to source an increasing percentage of their total sales from eligible renewable energy sources;
- The exemption of renewable electricity from the Climate Change Levy;
- Various packages of direct financial support worth over £260 million over the next few years;
- Freedom for most existing (unbuilt) Non-Fossil Fuel Obligation (NFFO) projects to move location to overcome planning difficulties;
- A regional approach to planning and targets for renewable energy.

In respect of the latter point, the Government has set a target that 5% of UK electricity requirements should be met from renewables by the end of the year 2003 and 10% by 2010. Within this approach, DETR (now DTLR) and DTI Ministers agreed that a strategic approach to renewable energy provision needed to be developed at the regional level as a key mechanism for translating the targets into suitable development on the ground. This study is one of the regional contributions to that process.

In addition, the specific context within Yorkshire and the Humber is currently set by Regional Planning Guidance to 2016, published in October 2001 and the region's Regional Sustainable Development Framework document, formally launched in February 2001. For these reasons, this study seeks to provide longer-term indicative regional targets for renewable energy to the year 2021.

More specifically still, Yorkshire and the Humber is relatively well-served by existing regional energy information sources. These are briefly summarised below.

Lancashire and Yorkshire Renewable Energy Planning Study (LYREPS) (1998)

The LYREPS study, undertaken by ETSU and Terence O'Rourke plc and listed in the Study Brief, was one of the last of an earlier generation of studies undertaken directly within the DTI's Renewable Energy Programme. The study has provided a strong basis on which to develop resource analyses, targets and a suitable Action Plan.

LYREPS STUDY
The central aims of the Lancashire and Yorkshire Renewable Energy Planning Study were to:

- identify renewable energy resources in the region and evaluate the opportunities for their deployment; and
- promote a local-level development plan policy framework for the utilisation of renewable energy sources.

Its chief differences to the current study were that (1) it did not aim to set targets for renewable energy deployment (2) that it was based on the old NORWEB and Yorkshire Electricity REC areas (and thus included Lancashire (including Rochdale and Oldham) but not the then Humberside areas) and (3) its lack of consideration of mechanisms for delivery of RE potential. Since LYREPS was completed, resource assessment techniques have improved and there has been progress in terms of the way in which development plans in the study area deal with renewable energy.

Energy Forum Foundation Study (2001)

This study, supported through the Regional Energy Forum, has provided an up-to-date survey of the current "energy baseline" across Yorkshire and the Humber. It covers a broader canvas than the current work and thus provides a wider context within which this RE targets study can be placed.

In addition it should be noted that this study, concentrating as it does upon renewable energy sources, forms only part of a co-ordinated regional approach to wider energy matters, both for energy generation and energy efficiency and reduction measures. Yorkshire Forward has initiated a Regional Energy Forum (REF) which is intended to provide a means through which all energy issues can be addressed. The REF will be integrally involved in taking forward this study's action recommendations and **we therefore recommend that the REF and other relevant parties should seek to apply our recommendations within this wider energy context.**

1.4 Project Approach & Activities

The work to fulfill this project has fallen into three main areas of activity. These are an **analysis of renewable energy resources** (Section 3), an **analysis and review of the planning, Local Agenda 21 and other policy backgrounds** relevant to RE (Section 4), and **stakeholder consultation processes** (Section 5). This has provided an initial understanding of the viability of RE deployment at the scales, and with the natures, implied by the technical analysis, and has enabled us to provide an outline of the current regional baseline for renewable energy (Section 2). These areas of activity come together in the final stages, the derivation of regional targets for 2010 and 2021 (Section 6) and the preparation of an Action Plan for the region to fulfil these targets (set out within Section 7).

We have undertaken these activities in an integrated way, so that at each stage of the work the emerging results and views can be tested one against another. This is an appropriate approach in which both fact and opinion need to be blended in order to ascertain the extent to which renewable energy targets for Yorkshire and the Humber are achievable from technical, economic, environmental, infrastructural and social viewpoints.

This Volume of the report presents our main findings and the key evidence that we used to support our conclusions and recommendations. Further, more detailed, information can be found within the Annexes in Volume II of the report.

2. THE EXISTING REGIONAL CONTEXT FOR RENEWABLE ENERGY

2.1 Regional Schemes and Exemplars

The recent "energy baseline" assessment undertaken for the Regional Energy Forum[4] provides a listing of the principal existing electricity-producing renewable energy schemes across the region. This listing is shown below.

Site Address	*Max Capacity (MWe)*	*Annual GWh**	*Energy Source*
Live NFFO Contracts (as reported at 5/12/2000 by the NFPA)			
Biffa Landfill Site, Morley, Leeds	1.8	10.4	Landfill Gas
Winterton Landfill, West Malton	3.8	21.9	Landfill Gas
Queens Road, Immingham, North East Lincs.	1.2	6.9	Landfill Gas
Micklefield, Near Garforth, Leeds	3.9	22.5	Landfill Gas
Woodhouse Road, Beighton, Sheffield	1	5.8	Landfill Gas
Skelbrooke L/fill, nr Doncaster, South Yorkshire	1	5.8	Landfill Gas
Rufforth, Near York	2.4	13.8	Landfill Gas
Eggborough, Near Selby, North Yorkshire	8	46.1	Coppice
Bernard Road, Sheffield (more energy to district heating)	(6.1 max) 2.1 contracted	12.1	Incineration.
Other Schemes (mainly ex NFFO supported)			
Harewood Whin, nr York	3	17.3	Landfill Gas
Howden Clough Road, Leeds	1.85	10.7	Landfill Gas
Peckfield Quarry, nr Garforth, Leeds	4.1	23.6	Landfill Gas
Seamer Carr, Scarborough	1.15	6.6	Landfill Gas
Shawcross Landfill, Osset, Wakefield	0.6	3.5	Landfill Gas
Scunthorpe	16.7	96.3	Biomass
Coal Clough Wind Farm, West Yorkshire	9.6	25.1	Wind
Naylor Hill, Howarth	0.23	0.6	Wind
Royd Moor, South Yorkshire	5.85	15.3	Wind
Ovenden Moor, Yorkshire	9.2	24.0	Wind
Chelker Reservoir, Yorkshire	1.2	3.1	Wind
Recent NFFO Schemes (post 2000)			
Out Newton, East Riding	9.1	Recently built	Wind
Total (20 sites)	87.78	371.3	

In addition North Yorkshire County Council provided to the project a list of additional renewable energy schemes within their area, as shown below.

Technology Type	**District**	**Scheme Location**
Small wind turbine	Yorkshire Dales National Park	Newby Head
Small wind turbine	Yorkshire Dales National Park	Malham Moor
Small hydro	Yorkshire Dales National Park	Kilnsey Water Park
Small hydro	Yorkshire Dales National Park	Malham Moor

The relationship between this existing capacity and the likely scale of a proposed regional target for renewable energy can be understood when it is realised that the region also has approximately 13,000MW of electricity-producing capacity from fossil-fired power production plant**.**

Wind energy is currently represented by eight schemes across the region, four windfarms and four individual turbines[5]. The most recent development is the Out Newton wind farm in

[4] "Energy Forum Foundation Study", Ecotec Research and Consulting for Yorkshire Forward, September 2001

East Riding, which has an installed capacity of 9.1MW from 7 turbines. The long gap between the commissioning of the early wind generation plant and the Out Newton scheme has seen rapid developments in wind technology world-wide. The typical turbine capacity in the earlier schemes (around 0.3-0.4MW) has now increased 4-fold and the consequent turbine heights and blade diameters have also increased[6]. Whilst this means that significantly fewer turbines are needed to provide the same electricity output capability, the size and scale of each turbine has increased in parallel. Both of these trends are continuing. In terms of regional windfarm examples, Out Newton is clearly the best available prospect given its recent nature – however its planning history was not without incident and its suitability as an example should be viewed in that light.

Examples of smaller-scale wind deployment (on-site schemes, see Section 3) are less numerous. Nevertheless with time examples of this type of scheme, perhaps brought forward with support from the Countryside Agency's Community Renewables Initiative, should be sought for regional promotion purposes.

The region also hosts two biomass energy generation plants, the world-leading Project ARBRE at Eggborough and a chicken litter combustion plant in Scunthorpe.

The former project utilises high efficiency combined cycle gasification technology to generate electricity, fuelled by 43,000 dry tonnes of wood per annum, the wood being supplied via fuel derived from forestry residues and short rotation coppice. The £30m plant has a total installed capacity of 10MW and is considered likely to have significant replication potential both within the UK and overseas at a range of scales. The plant currently supports 40 full time jobs and 124 full-time job equivalents. This project should be considered as a regional exemplar.

Kirklees hosts one of the DTI's Photovoltaic Domestic Field Trial projects at Heron Close, Ravensthorpe, Dewsbury. The retrofitting of 250 dwellings into "zero energy" residences will be secured through incorporating high energy efficiency standards and utilising both photovoltaic (solar electricity) systems and a wood fuelled combined heat and power system. This project is still in the construction phase and so should be reviewed for its potential suitability as a regional exemplar in due course.

In common with many of the other English regions, much of the existing regional installed capacity is from waste-to-energy schemes (landfill gas, waste incineration). The role of waste-to-energy projects, and their place within a regional renewable energy target, is discussed more fully within Section 5.

[5] Note that the Coal Clough wind scheme actually straddles the border between Lancashire and Yorkshire, but has been included within the statistics for the North West regional renewable energy assessment. We assume therefore that it should be excluded from our analysis here.

[6] The tower heights at the Royd Moor windfarm are 35m, at Out Newton they are around 50m. The turbine blade diameters in these two examples are respectively 37m and 62m.

2.2 Planning Policy in Practice – The Regional Experience

Planning position

We have undertaken a review of planning policies across the region, summarised within Section 4 of this report. In parallel, we have analysed some of the issues arising from planning policy implementation, in respect of those NFFO contracted schemes that have been granted planning permission and those that have not obtained planning approval. This analysis is presented here as part of a regional baseline assessment.

There are 75 NFFO contracted schemes in the Yorkshire & Humber region with a total contracted capacity of 288.608MW. Since the introduction of NFFO, planning permission has been granted for 40 schemes across the region, and one scheme did not require express consent by virtue of permitted development rights. There are two schemes that are currently the subject of a planning application. Both applications were submitted a number of years ago and it appears unlikely that they will be determined in their current form. Six schemes have been refused planning permission. The table below summarises the planning approval/refusal position of schemes by technology band.

Technology band	Total number of schemes	Number of schemes approved	Number of schemes refused
Landfill Gas	33	24	1
MIW	7	4	0
Sewage Gas	1	0	0
Energy Crops & Agric-ultural & Forestry Waste	4	2	0
Hydro	4	2	0
Wind	26	8	5

One additional hydro scheme did not require express planning consent

Landfill Gas

It can be seen that landfill gas schemes in the region, for which there are generally few planning problems, have made significant planning progress. 73% of schemes have been granted planning permission.

The primary purpose of landfill gas schemes is generally not the production of renewable energy as it is a form of waste management. The generation of electricity is a means of dealing with the by-product of this form of management. The scale of equipment needed for such schemes is relatively small and therefore the visual impact on the surrounding area is generally not significant. However, the siting of such plant, particularly in relation to any adjacent residential properties has been an issue resulting in negotiations regarding siting with some local authorities.

A number of the schemes in the region are located within designated areas, principally Green Belt. Such schemes are generally located on the edge of the region's urban areas and often are expected to be restored to open countryside or for recreational use once landfilling has ceased.

Unusually one landfill scheme has been refused planning permission at Cromwell Bottom Landfill Scheme in Calderdale. In this case the primary issue of concern to the Council was the nature conservation interest of the site. Part of the site was designated by the Council as a Site of Ecological or Geological Interest to ensure that species were retained and wildlife refuges created as the range of species found at the site is found in very few parts of the District. No general issues arose that would prevent the development of landfill gas schemes generally. Detailed consideration of this decision can be found in Annex C3.

Municipal & Industrial Waste

The experience of NFFO contracted MIW schemes in the region is very positive given that they are generally controversial. Of the seven NFFO contracted schemes located in the region four have been granted planning permission. These included the refitting of an existing MIW by CHP plant and the replacement of a decommissioned plant. Planning permission has also been granted for a MIW plant on the site of former engineering works. Sufficient funding for this scheme was not subsequently gained and it is understood that the contract was sold but has not subsequently been brought forward. A further scheme located in Scunthorpe has been operational since 1993.

It is known that the location of one scheme is not favoured by planning officers due to its proximity to the site to the existing built-up area and the direction of the prevailing wind. However, the primary reason the scheme has not been progress as with one other scheme, is the lack of a waste contract.

Sewage Gas

There is only one NFFO contracted sewage gas scheme in the region at Knostrop in Leeds. Whilst a planning application was submitted in 1992 it remains undetermined as a waste contract was not gained, effectively making the scheme impossible to implement.

Energy Crops and Agricultural and Forestry Waste

There are four such NFFO contracted schemes in the region, two of which have been granted planning permission. The Hydro Leeming Anaerobic Digestor was to utilise chicken litter as its fuel, being supplied by the farm on which the scheme was to be located. However, implementation of the scheme was not possible to a lack of funding. The scheme may be progressed at an alternative site, subject to planning permission being granted, by a new company.

Eggborough Biomass Power Station is well known within the region and beyond. The planning application was regarded as a departure from the local plan and was subsequently referred to the Secretary of State. It was not called in and planning permission was granted by Selby District Council.

Hydro

Of the four NFFO contracted hydro schemes two have been granted planning permission and one did not require express planning consent as it involved the refurbishment of an existing building. Of those that did require consent, one scheme also required listed building consent as the weir is Grade II listed, whilst the other was approved despite objections from local residents, who expressed concerns regarding the effect on public access and the remains of the mill. It is understood that the original contractor of the

remaining hydro scheme went into receivership and the contract has not therefore been brought forward.

Wind

In contrast with the above technologies NFFO contracted wind schemes, which make up a significant proportion of the overall number of schemes in the region, have not made such good planning progress and have the highest number of schemes refused planning permission.

Whilst eight schemes have been approved six have been refused. Of the six approved schemes one was subject to an appeal, one was considered at a public inquiry and one was granted planning permission contrary to the officer's recommendation.

All of the eight wind turbines/farms approved have been located in areas subject to landscape or other designations. These include Green Belt, Areas of Great Landscape Value or equivalent designations and Undeveloped Coastal Zone. Whilst the impact of the schemes on these areas will have formed part of the local planning authorities' overall consideration in each case this was not felt to be of overriding concern. Indeed one of the early wind developments, at Chelker Reservoir just outside the Yorkshire Dales National Park, had its planning permission renewed in 2001 for another 15 years.

A number of common issues arise in respect of the five wind farm schemes refused planning permission including landscape impact, Green Belt and impact on local communities. More detailed consideration of these schemes can be found at Annex C3.

In the case of the Eastfield Farm scheme the applicants had chosen this site, taking into account the Council's landscape character assessment for wind proposals and other factors. The site fell within the landscape character report type identified as having a moderate capacity to accommodate development up to the scale of a large wind farm. Notwithstanding this, both the Council and the Secretary of State considered this particular site unsuitable for such a development due to impact on the surrounding landscape.

Where proposed wind farms have been sited within areas designated for their landscape value, this has been taken particular account of, even if only locally designated. In each case concern has been raised as to the impact on the character and appearance of these areas.

The issue of the acceptability of siting wind farms in Green Belts is raised by both the Dry Hill Wind Farm and Hepworth Clay Pipeworks Wind Farm schemes (and indeed the Ovenden Moor scheme, which is within Green Belt). In the former case the Inspector disagreed with the Council's view that the proposal constituted inappropriate development in the Green Belt. He considered, in relation to Green Belt policy guidance, that wind turbines fall within 'other uses appropriate to a rural area' as by their nature they require open exposed locations, that by necessity, must include rural areas.

In the case of Hepworth Clay Pipeworks Wind Farm the Inspector considered the proposal both in terms of the purposes of including land within Green Belt and the types of development considered appropriate to Green Belt. Whilst he concluded that the proposal fell within 'other uses of land which preserve the openness of the Green Belt' he went on to

say that the wind turbines would be so conspicuous that they could be legitimately regarded as encroaching into the countryside. This would be contrary to one of the purposes of Green Belt.

These two appeals give conflicting messages as to the acceptability of locating wind farms within Green Belt in terms of the uses that are acceptable under national policy guidance. Whilst this sample is very small there may be a need for clearer guidance on as whether, in principle, wind farms are acceptable within Green Belt.

In each of the cases examined, the Inspector has gone on to assess the acceptability of the proposal in terms of its impact on the Green Belt. In each case this has been found to be unacceptable due to visual impact and impact on character.

The impact of schemes on local residents is an issue identified in four of the five wind schemes examined. Visual impact is of particular concern, with issues of noise, shadow flicker lesser concerns. Whilst in many cases the benefits of each scheme, particularly in terms of their contribution to local electricity requirements and the need to utilise wind resources where they occur, had been taken into account in all cases this was considered to be outweighed by the local impacts of schemes. However, a majority of wind turbine proposals in this region have been granted planning permission and are operating successfully. Evidence drawn from public attitude surveys elsewhere in the country (see, for example, www.bwea.com) suggest that public perceptions of wind energy are not a significant constraint on appropriate wind energy development.

Summary

To conclude, it should be noted that the previous overall rate of planning success for schemes within the region has been relatively high. The exception to this is for wind energy projects. Here the evidence appears to suggest that:

- lack of consistency in the planning system's treatment of projects is an issue (e.g. placement of schemes within the Green Belt);
- appropriate wind energy schemes are capable of being accommodated throughout the region, subject to their context;
- the presence of a designated area is not in itself an absolute barrier to wind energy deployment. Each scheme should be treated on its merits and on its relationship to its surroundings.

3. SUMMARY OF RENEWABLE ENERGY RESOURCE ASSESSMENTS

3.1 The Nature of Renewable Energy Assessments

The availability of renewable energy resources is typically assessed in a hierarchical way, in which the maximum deployment of each technology is progressively reduced due to the application of physical, infrastructural, environmental, cost and other types of constraints. This approach varies according to the technology under consideration but generic resource definitions can be used to clarify the extent to which the renewable energy resources have been "limited" by the application of constraints. For the purposes of this study, we have used two or - at most - three resource categories for the description of each technology. These are:

- **Technical Resource:** A measure of the highest level of available renewable energy resources, limited only by technical limitations (e.g. wind turbine efficiency).
- **Accessible Resource:** A moderated view of available renewable energy resources, in which the technical resource is constrained by practical incompatibility (e.g. a wind turbine cannot be located on roads) and by institutional factors (e.g. the effect of land use and environmental designations).
- **Practicable Resource:** This is the lowest level of availability. It entails the most constraints and is typically also the most subjective. It applies further constraints to the accessible resource that reflect practicalities (e.g. integration with the electricity distribution system, economic realities) and acceptability to society (e.g. the likelihood of planning permission where required).

The practicable resource, and estimates of its range for different technologies, is the main focus of our assessments for this study. Indeed the approach to this study explicitly explores the "acceptability to society" constraint directly through the process of consultation.

We show below – and in more detail within Annex B1 - a series of estimates of possible energy contributions that could be supplied from renewable energy sources across Yorkshire and the Humber. In deriving these figures we attempted in the first instance to provide figures which could be used directly for the process of consultation. The figures and ranges shown are therefore intended to reflect ranges of **practicable resource** which might be achievable under certain assumptions about the future context for each technology.

In general terms, these estimates are derived by taking account of the following kinds of issue. The particular approach for each technology may vary but the issues fall essentially into common categories which apply to a lesser or greater extent to most RE sources:

- Locational Opportunities and Limitations: RE sources are typically only exploitable at – or near – to where they arise. Some technologies are very specifically constrained in location (such as small hydro power, by the location and nature of water courses or infrastructure), whereas others (e.g. biomass schemes) can locate further from the actual fuel sources;

- Resource Intensity: The relative "strength" of the resource may be a factor limiting its location. An example of this is wind energy, where the average mean wind speed a certain distance above ground level is a key indicator of the strength of resource at that location;
- Economic Factors: Development of RE resources has to be an economic proposition for schemes to proceed, where developed by the private sector, as is largely the case at present in the UK. We use "economic proxies" to judge the likelihood that schemes of certain scales and natures might be possible in certain places (e.g. AMWS for wind energy, available biomass within certain geographical areas, assumptions regarding the grant regime for photovoltaics, etc.);
- Physical or Environmental Constraints: The presence of woods, towns, water and other existing constraints limits the potential locations for wind energy, for example. It is also possible to consider the limitation of wind energy deployment due to designated areas such as National Parks and AONBs;
- Previous Development Precedent and Informed Judgement: It is possible to form a view of the likelihood of certain RE schemes appearing in certain forms based upon previous precedent. However, given the circumstances of this study, in which the wider context implies a strong future acceleration in the rate of RE deployment, we have also used our expert judgement to extrapolate forward from the current position.

Section 5 of this report discusses how the data from these estimations were used to seek stakeholder feedback, and how this process - coupled with our technical judgements and policy reviews – was then used to derive our proposed renewable energy targets for Yorkshire and the Humber.

3.2 Renewable Energy Technology Assessments

WIND ENERGY

Wind power uses the power of moving air to rotate turbine blades whose motion can be converted to electricity. Wind turbines can be deployed singly, in small clusters or in larger groups (wind farms).

In recent years wind turbine technology has continued to advance significantly. This is manifested in larger turbines of increasing energy density, a factor that is likely to reduce the number of turbines required to attain target, all other things being equal.

We have considered the following types of wind energy deployment as contributors to regional targets.

- Offshore wind
- Onshore wind farms
- Single turbines providing on-site power
- Off-grid wind energy

Offshore wind

The deployment of offshore wind is still at a relatively early stage world-wide. There are potential advantages of consistent available wind resources (in the right locations), allowing the possibility of deployment of larger-scale turbines. However, these are balanced at present by significant techno-economic hurdles stemming from deployment in challenging environments and – for the UK at least – a series of practical implementation issues deriving from the nature of the permitting process[7].

Considering the time horizons for this study (2010 & 2021), a review has been carried out of the most critical initial opportunities and limitations for offshore wind deployment off the coast of the region. A fuller description of our analysis is contained within Annex B1.

Taking into account the conditions in Yorkshire and the Humber and the increasing UK drive to build offshore wind, we estimate that up to two wind farms of between 60-100 MW each could be built in the region by 2010. If these wind farms are built it seems most likely that they will be off the south of the region in the Humber area. Annual mean wind speeds at hub height are expected to be between 8 and 9m/s. This will result in an estimated annual energy output of up to 490 GWh from wind farms with a total capacity of 160 MW.

In the longer term, to 2021, there could be further offshore wind deployment off the region's coast, assuming that technology develops which is cost-effective in deeper water. Under these circumstances, the deployed resource could consist of up to four windfarms of 100 MW each by this time (giving an estimated annual energy output of up to 1226 GWh). These schemes might be more evenly spread between the North Yorkshire and Humber coasts.

Onshore wind farms

Onshore wind farm development linked to the electricity grid is likely to offer significant scope for growth in UK renewable energy over the next 10 years. Across the region, there are already 8 existing grid-connected wind energy schemes, a reflection of the promising wind regime.

A detailed review of the prospects for onshore wind is set out within Annex B1. It proposes a series of scenarios and calculates the implications of these in terms of regional and sub-regional "nominal" wind farms. Our approach has focused primarily on alternative views of wind scheme spacing and on the effect of designated areas upon deployment. We have however not explicitly assessed an alternative "landscape character" approach to wind energy deployment - which could potentially be well-suited for identifying the "capacity" of certain landscape types to accommodate wind energy - since this approach requires significant further elucidation before it can be applied with confidence. This latter approach is an important analysis tool and should certainly be considered as part of the work on renewable energy that the region will wish to continue beyond this study. Annex B3

[7] Beyond the low-water mark conventional land-use planning control does not apply, so that offshore wind turbine deployment in the UK will require a variety of permissions. Draft guidelines for obtaining offshore consents (including "one-stop shop" support) were issued by the DTI (with Crown Estates) in October 2001.

contains an overview of some of the issues underlying landscape character assessment for the region.

Figures 1 and 2 show how wind speeds vary across the region, and how they overlay with designated areas. For the purposes of our assessment we show all areas with an AMWS of 7 metres per second or above, which is taken to be indicative of the threshold for economic viability for windfarm development under current support measures.

Using the results of this review, target ranges for grid-connected wind energy across the region for 2010 and 2021 were proposed for consultation. These ranges do not necessarily represent any one set of assumptions about the future but are rather an amalgamation of the numerous factors that could influence future deployment. These are described below and the proposed target ranges are outlined in Table 1.

Assumptions at Lower End of 2010 Range (55MW)

- Wind energy schemes will typically come forward within a moderately supportive regional and sub-regional planning context. This is likely to result in close scrutiny of all proposed schemes and also those in close proximity to existing schemes elsewhere within the region. It is assumed that there will be no examples of deployment within nationally designated areas;
- The renewable energy obligation results in few additional wind energy schemes (beyond NFFO) until the last few years of the decade.

Assumptions at Higher End of 2010 Range (280MW)

- Wind energy schemes will typically come forward within a supportive regional and sub-regional planning context. There will be scrutiny of all schemes and any cumulative impact issues but with less restriction. There will probably be some isolated examples of deployment within nationally designated areas but these will remain tightly controlled and of small scale;
- The renewable obligation results in additional wind energy schemes coming forward at a moderate rate from early in the decade.

Assumptions at Lower End of 2021 Range (280MW)

- Wind energy schemes typically come forward within a moderately supportive regional and sub-regional planning context. This is likely to result in close scrutiny of all proposed schemes and also those in close proximity to existing schemes elsewhere within the region. It is assumed that there will be no examples of deployment within nationally designated areas;
- The renewable energy obligation results in more numerous additional wind energy schemes (beyond NFFO) coming forward in the second decade.

Figure 1: Average Mean Wind Speeds (AMWS) at 45m Above Ground Level Across Yorkshire and the Humber

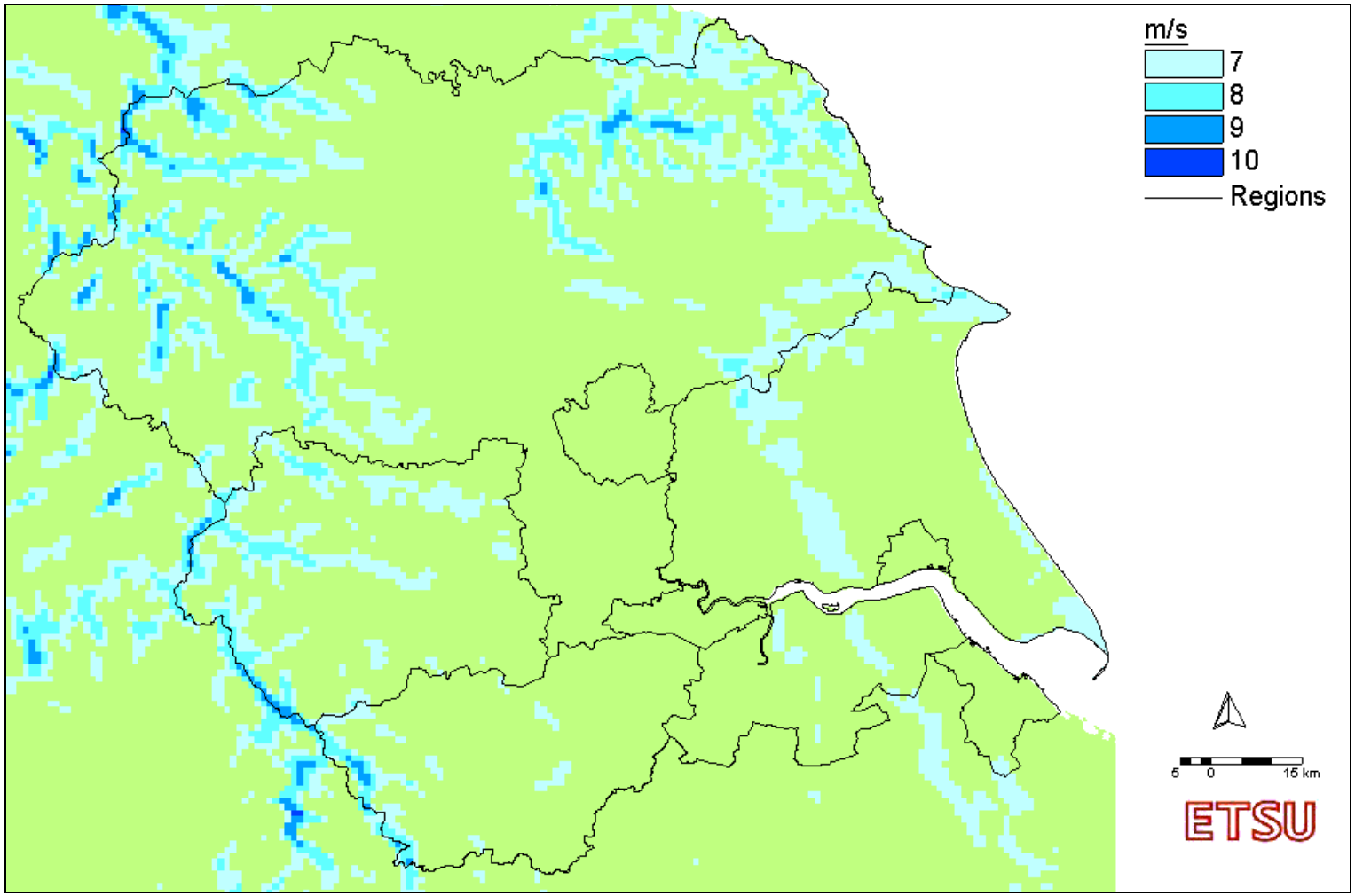
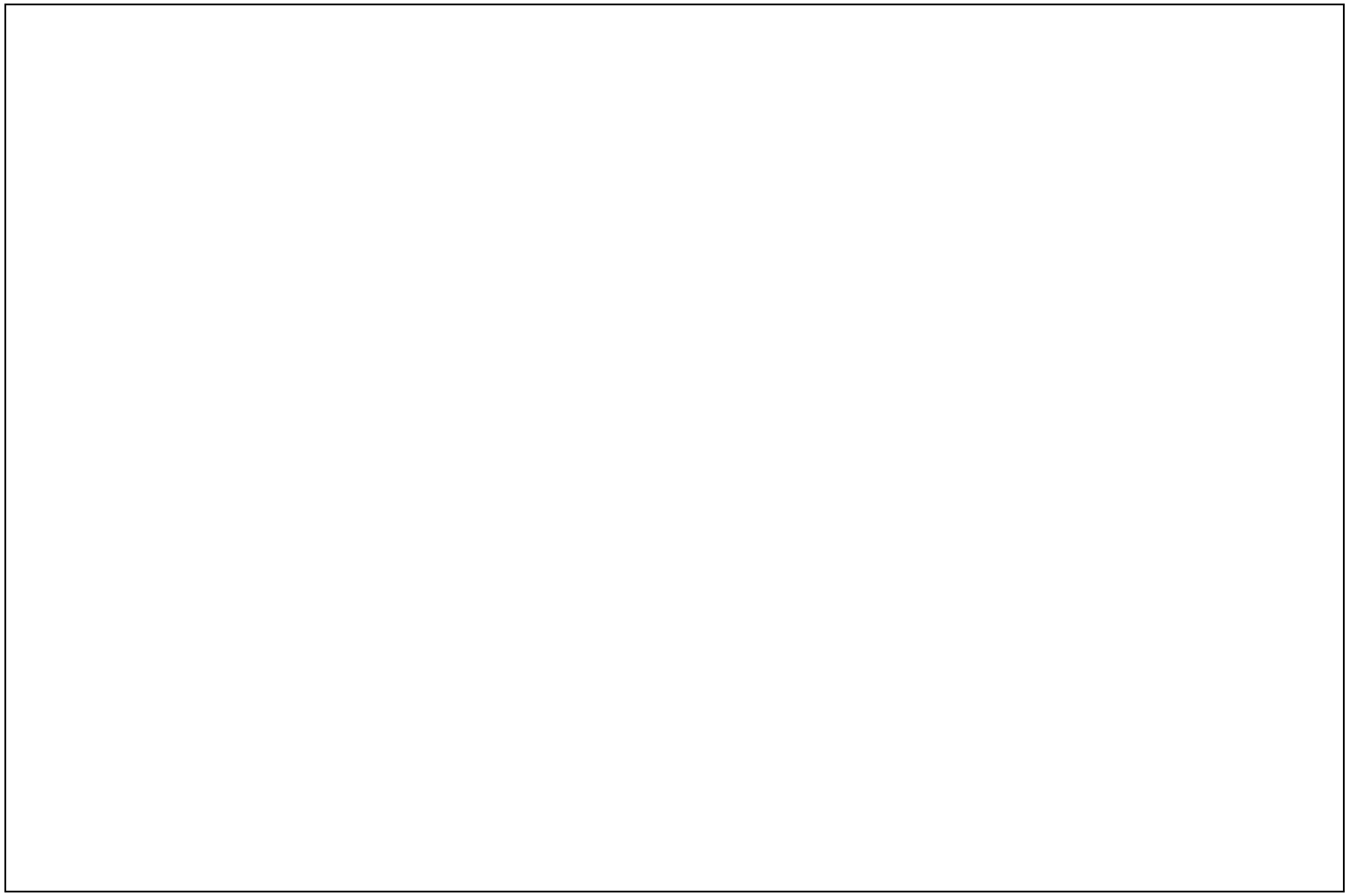


Figure 2: AMWS at 45m Above Ground Level Overlaid by Potential or Actual Constraints



Assumptions at Higher End of 2021 Range (700MW)

- Renewable energy – and wind technology – becomes the "accepted norm" for deployment through both "centralised" and "community" schemes. There is a strong planning presumption "in favour" of wind energy schemes across the region. Some schemes will be deployed within nationally designated areas but these remain closely controlled;
- The renewable energy obligation leads to large numbers of new wind energy schemes from mid-way through the first decade of this century.

Table 1 - Target ranges for electricity from new grid-connected wind energy in Yorkshire and the Humber

Sub-Region	Target Range for New Installed Capacity (MW)		Implied Annual Energy Output (GWh/yr)	
	2010	2021	2010	2021
Humber	13.5 - 95		35 – 248	
North Yorkshire	38.5 - 133		101 – 347	
West Yorkshire	1.5 - 38		4 – 99	
South Yorkshire	1.5 - 14		4 – 37	
TOTAL	**55 - 280**	**280 - 700**	**144 – 731**	**731 – 1827**

The analysis summarised in Table 1 cannot predict with certainty where schemes will appear and their actual scale, but rather shows prospects for deployment based upon key indicators such as wind speed, scheme spacing and the presence of constraints. The pattern of existing wind developments within the region is somewhat different from the pattern implied above – however the location of previous schemes is not necessarily a guide to future developments.

Wind Power for On-Site Use

This category of wind energy deployment is taken to include a strong and specific "institutional" - or alternatively "community" – linkage in the procurement and deployment of wind technology, which relates specifically to powering individual buildings or sites (rather than a development whose power output is sold to an electricity supplier or other third party).

The opportunities across the region for deployment of this kind of wind power are predominantly at the small scale (from around 2kW to, say, 300kW). This in turn implies that:

- Deployment of this form of wind power across the region is not necessarily a conventional commercial proposition but is instead encouraged through "institutional" or "community" groupings who perceive additional benefits besides economic factors;
- At the small scale assumed, many individual opportunities must be forthcoming for a major contribution to be made to the region's renewable energy target.

The consultation process was generally supportive of the principle of applying wind energy (and other renewable energy sources) at the smaller scale. Nevertheless the overall contribution that this form of wind energy deployment is likely to make to a regional target will be small. It is difficult to estimate the precise contribution that single, distributed wind turbines could make. Clearly there are an enormous number of businesses and farms in the region, a fraction of which will have space suitable for an "on-site" wind turbine and a wind speed which is sufficiently high to make it economic. It is proposed that – by 2010 - up to 30 organisations across the region might install turbines with an average capacity of

30kW, i.e. a total capacity of around 0.9MW. This might generate about 2GWh of electricity per year. By 2021 it is proposed that a major increase in deployment might occur, leading to the installation of up to 250 turbines of this size (totalling 7.5MW), generating around 16GWh of electricity per year.

Examples of businesses that might be able to supply their own power from wind are farms, large hotels, supermarkets, petrol filling stations and tourist attractions, even perhaps schools. Two examples of "school wind" schemes, at Skegness Grammar School, East Lindsey[8] and Cassop Primary School, County Durham[9], provide an indication of the possibilities.

Wind Power for Off-Grid Properties

This category of wind energy allows for the utilisation of wind turbines to provide power for properties or other applications currently without access to the electricity network. Such turbines would be small-scale for which machines of a maximum power output of 10's or 100's of Watts would be appropriate.

It is estimated that the overall regional resource is likely to be in the range 350 to 450 kW, which could form the basis of a regional target in this area (generating between 0.6 – 0.8GWh/yr). The size of this resource is unlikely to increase significantly over the period 2010 to 2021.

ENERGY FROM BIOMASS

Forest Residues and Energy Crops

Existing wood resources and specifically-grown energy crops (willow, poplar or miscanthus) can be used in combustion plant to generate power, heat or both, at a wide range of scales. It is likely that most new biomass projects will source their fuels from a mix of existing and new purpose grown sources.

In terms of the utilisation of these resources, the Government's final stages of the Renewables Obligation consultation envisages that these sources of wood biomass might be used in two ways:

- Within discrete "stand-alone" thermal conversion plants, where existing wood and energy crop sources may be used as required;

[8] A 6kW turbine has been installed together with PV panels with a peak power of 2.5kW. DC power is stored in a bank of 48V batteries which, via a pair of 6kW inverters, powers a computer room, lights in the Science block and the hot water heating control. Mains power is available as back up. The total cost (including changes to the school electricity systems, a weather station and an 'intermediate' 2.5kW turbine (supplied as a stand in for the 6kW which wasn't immediately available) was £75,000. Two thirds of the funding was supplied by the Wolfson Foundation the rest was provided by the school. The wind speed at the site is estimated to be average for the UK.

[9] A 50kW turbine was installed at the school and connected to the mains network. The site is quite windy and the turbine is said to generate 145MWh/y, of which only 40MWh/y is used by the school, the remainder (more than 70%) being sold to the electricity supplier who has supported the turbine installation. The total project cost was £115,000, of which Northern Electric and Gas contributed £55,000; the company was keen to install a turbine in the location to strengthen its Grid supplies in the area. The remainder came from Durham County Council.

- Within existing power generation plant, where "co-firing" is envisaged as a route to assist the greater procurement and utilisation of energy crops. This means of utilising biomass has restrictions placed upon it that encourage the short-term adoption of energy crops for this purpose.

The technology utilised for "stand-alone" power production can be either conventional combustion equipment or more advanced gasification technology, which increases combustion efficiency and cost-effectiveness.

Full details on the assessment of the technical potential for wood resources and the growth of energy crops across the region are presented in Annex B1. The context for future encouragement of energy crops in England is set by the Energy Crops Scheme, a DEFRA scheme run in partnership with the Forestry Commission. The scheme has two elements:

- **Establishment grants for short rotation coppice and miscanthus**
  Grants are available towards the costs of establishing these energy crops. Short rotation coppice (either willow or poplar) and miscanthus are considered the most commercially ready for exploitation.
- **Grants for establishing producer groups - for short rotation coppice only**
  Given that fuels need to be grown fairly close to the point of utilisation it is expected that producer groups will be set up to supply short rotation coppice to power stations and other energy end uses. DEFRA will provide funding of up to 50% of costs to assist in setting up associations of SRC growers.

Figures 3 and 4 show the predicted yields and geographical distribution of wood from existing forestry sources across Yorkshire and the Humber, using Forestry Commission data. Figure 5 shows a theoretical analysis of potential yields and geographical distribution for the growth of short rotation willow coppice across the region. The analysis uses physical conditions such as temperature, soil conditions and pH to indicate the prospects for short-rotation coppice growth. It takes no account of financial factors.

Co-firing of Biomass within Existing Combustion Plant

The Renewables Obligation envisages that – after 2011 – co-firing of biomass will be ineligible to satisfy suppliers' obligations in respect of renewable energy. It also envisages that at least 75% of the biomass utilised in this way must be energy crops after April 2006. The combined effect of these provisions is to provide immediate incentives for operators of existing coal-based combustion plant to give serious consideration to energy crop usage. However it should be borne in mind that this is not a trivial undertaking, given – for example - the need to negotiate appropriate supply contracts and deal with any required re-licensing in a relatively short space of time.

Across Yorkshire and the Humber, existing coal-fired plant (e.g. Drax, Eggborough, Ferrybridge) could potentially be used for such co-firing. We assume that – in line with the Renewables Obligation – potential contributions to a regional target could take place up to 2010, but that any such co-firing of biomass has ceased by 2021, the second "target" timescale. We show below alternative "outcomes" for adoption of biomass co-firing across the region.

Figure 3: Predicted Geographical Distribution of Annual Yield from Coniferous Wood, in Oven Dried Tonnes (odt) per square km

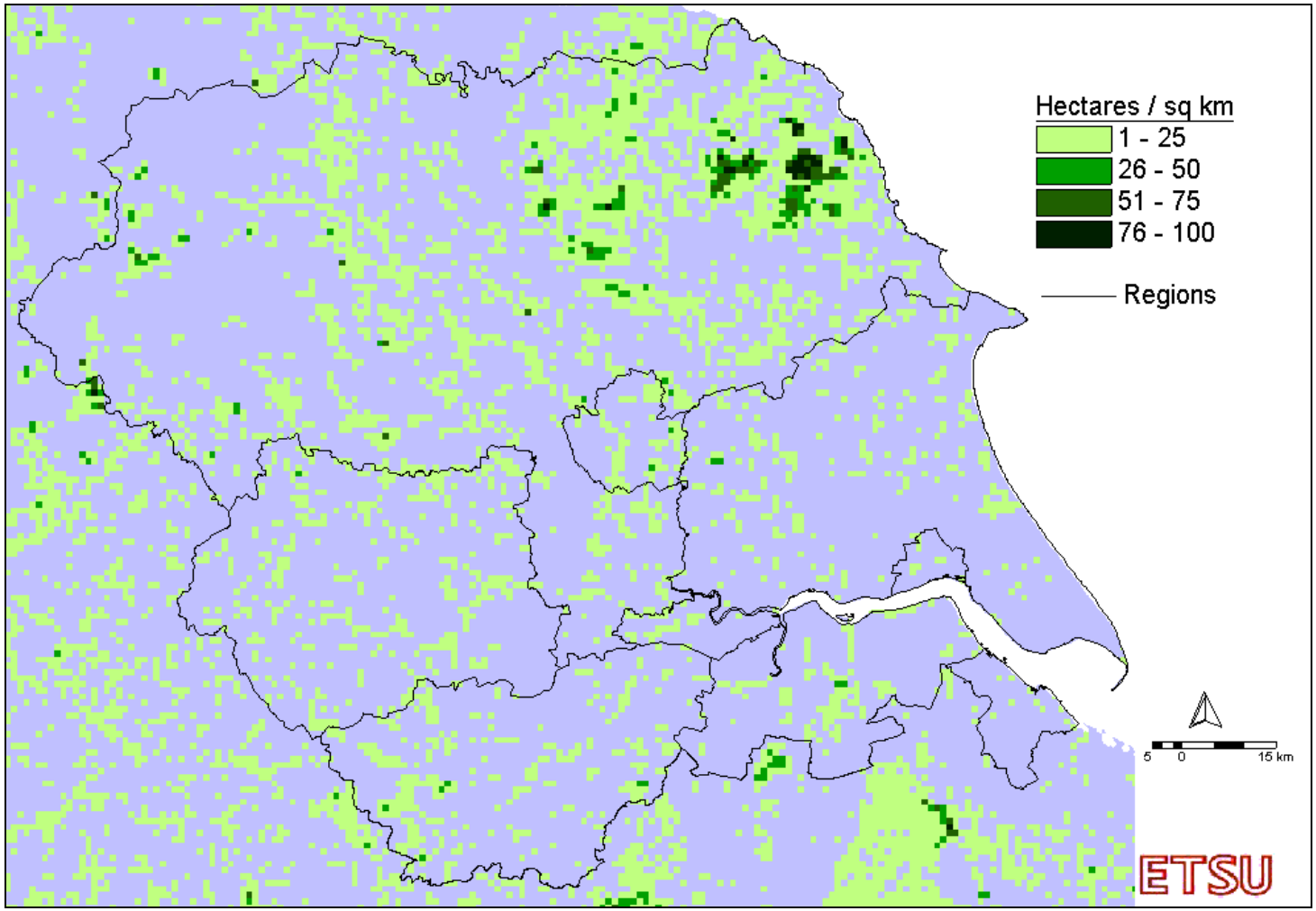


Figure 4: Predicted Geographical Distribution of Annual Yield from Deciduous Wood, in Oven Dried Tonnes (odt) per square km

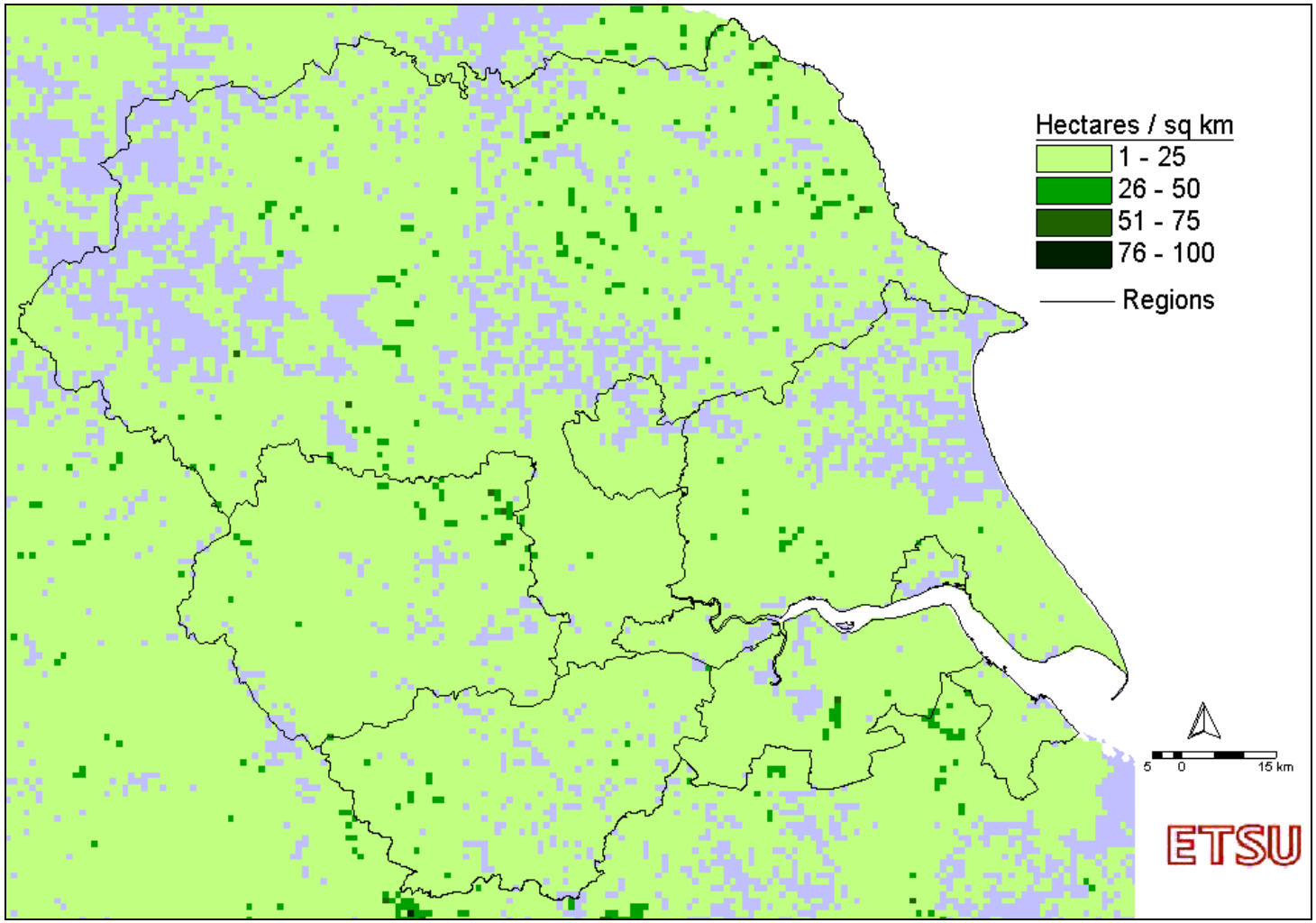
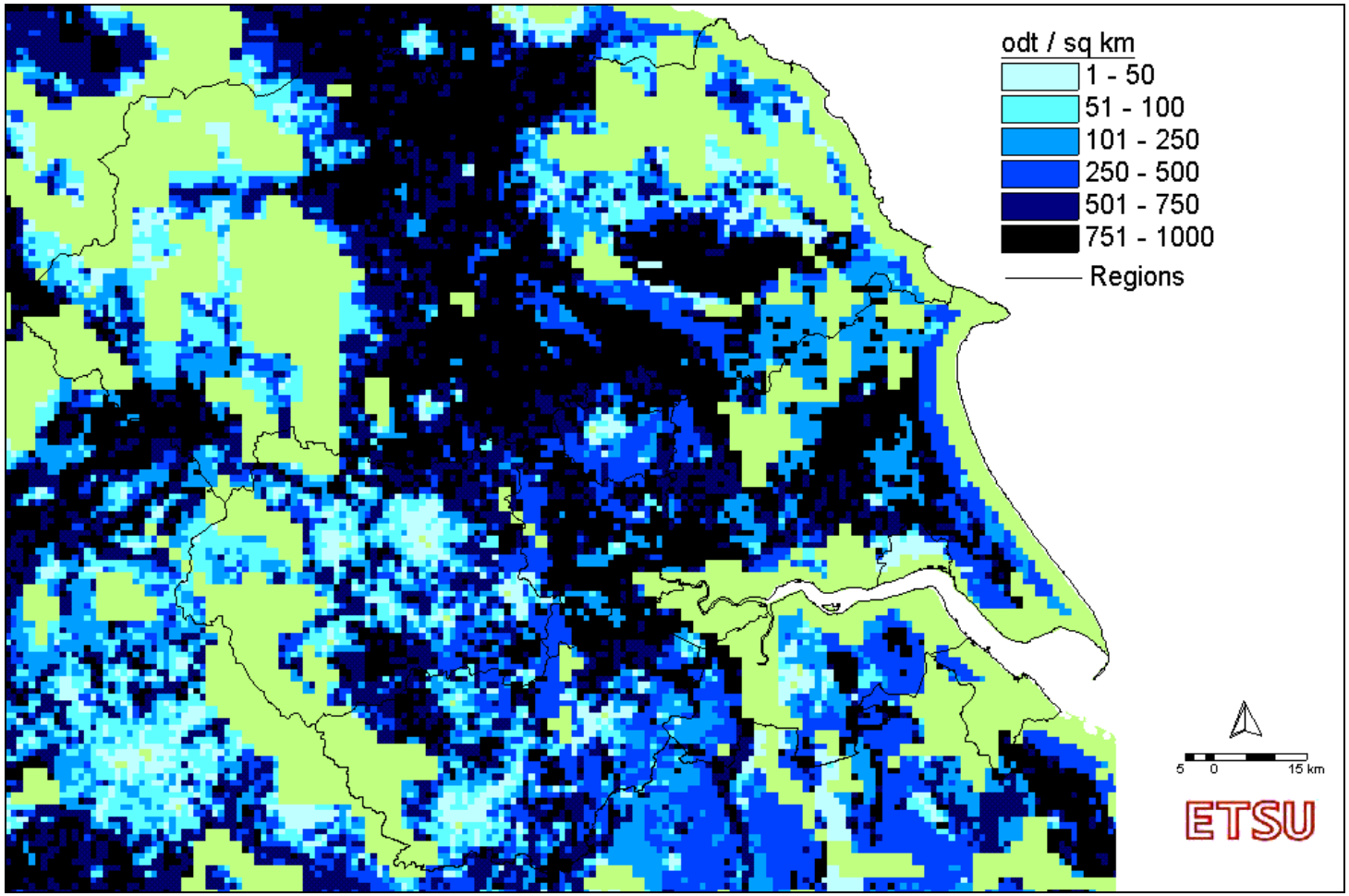


Figure 5: Theoretical Distribution of Annual Yield from Short Rotation Willow Coppice, in Oven Dried Tonnes (odt) per square km



Scenario 1: No Regional Co-Firing of Biomass. This assumes that operators of existing plant fail to implement any biomass co-firing primarily due to their assessment of the overall economics.

Scenario 2: Support for Biomass Co-firing. In this scenario, two existing plants adopt co-firing of wood up to a level of around 1% of their existing generation capacity. This results in a contribution from biomass sources equivalent to around 50MWe of installed capacity, of which the vast majority comes from energy crop sources.

Generation of Electricity from Discrete Biomass Power Plants

In deriving estimates of the practicable potential for electricity generation from discrete biomass power plants, the following assumptions have been made:

- a transport distance of 40km defines a radius within which suitable schemes could emerge, based at or near to existing forestry or other resources[10];
- schemes of a scale between 5 and 40MW_e best describe the likely "economically deployable" possibilities, with significantly larger schemes being currently favoured[11];
- it requires approximately 5,000 oven dry tonnes / year (or approximately 500 hectares of coppice) of wood to fuel a plant of 1MW capacity;
- even if large-scale deployment of Short Rotation Coppice (SRC) occurs within the region by 2010, usage of other wood resources from outside Yorkshire and the Humber is likely to be significant on the grounds that the region has little indigenous wood. Beyond this time, and with increased regional coppice output, regional "self-sufficiency" in wood for energy can be expected to increase.

"Alternative outcomes" are shown below for the practicable potential, to both 2010 and 2021, based on the growth of new SRC ranging between negligible or very substantial. In effect it is likely that the actual potential will fall between these two extremes.

2010 - Scenario 1: Little or No New Coppice Appears within the Region. Under this Scenario, existing wood from within and without the region remains the principal resource, whether from forestry operations or other sources. Issues related to availability of the resource and transportation requirements act as possible constraints on the exploitation of these resources. Economics continue to favour large-scale schemes. It is assumed that 42MW_e of new capacity appears across the region, based upon the plant currently planned in South Yorkshire.

2010 - Scenario 2: Significant Amounts of New Coppice appear within the Region. Within this scenario, many suitable parts of the region (e.g. areas within the Humber and North Yorkshire, concentrations of derelict land) deploy moderate quantities of coppice by

[10] Although it should be noted that current schemes either in operation or in advanced stages of planning may well be assuming significantly greater collection distances at present, an assumption based upon current low levels of Short Rotation Coppice growth in most parts of the UK.

[11] These assumptions depend upon further developments within this area over the next decade. At least one major developer is working on the basis that schemes of 40MWe and above will characterise future implementation. A scheme of 42MWe (gross) capacity is well-advanced in South Yorkshire. The economic prognosis for medium-scale (ca. 5MWe) schemes could be significantly improved where combined heat and power (CHP) is an option.

2010, leading to sufficient additional regional wood resource to provide the basis for a further 30MW_e capacity from discrete wood biomass plants[12]. A total of up to 72MW_e new capacity then appears within the region by 2010. The economics of wood combustion become more favourable for medium-scale schemes, allowing 5MW_e plants to be constructed.

2021 - Scenario 1: Relatively Little New Coppice Appears within the Region. The amount of coppice available within the region is assumed to be comparable to that for "2010 Scenario 2". However at this later timescale the coppice resources utilised previously for co-firing within existing fossil-fuelled power stations are now assumed to be "diverted" to discrete biomass-burning plants due to the in-eligibility of co-firing under the Renewables Obligation after 2011 (see discussion above). This results in a total of 90MWe new capacity (compared to 2002).

2021 - Scenario 2: Very Significant Amounts of New Coppice appear within the Region. Regional growth of SRC increases considerably, supported by sustained rural diversification initiatives and increasing knowledge within the farming community of the economic and social benefits of this form of crop production. The amount of SRC grown is sufficient to support a total new capacity of 320MWe[13] (compared to 2002). Regional "self-sufficiency" in biomass production is achieved, and growth of energy crops at this scale displaces other agricultural activities.

The notional outcomes from these scenarios are summarised in Table 2.

Table 2 - Target ranges for electricity from new wood biomass plants in Yorkshire and the Humber

Sub-Region	Target Range for New Installed Capacity (MW)		Implied Annual Energy Output (GWh/yr)	
	2010	2021	2010	2021
Humber	0		0	
North Yorkshire	0 – 25		0 – 144	
West Yorkshire	0		0	
South Yorkshire	42 – 47		242 – 271	
TOTAL	**42 - 72**	**90 - 320**	**242 – 415**	**518 – 1843**

It should be noted that the deployment of energy crops implied within the upper ranges in Table 2 is large. Achieving this level of deployment is therefore of some significance for the region's RE target and will require further attention (see Section 7). The Government has a support scheme for the establishment of energy crops that envisages a number of levels of support depending upon the crop and land type[14].

[12] Using the assumptions that 5,000 oven dry tonnes of wood per year is required to fuel 1 MW of installed capacity and that mature Short Rotation Coppice can typically generate 10 odtonnes/ha/year, the total amount of SRC required to fuel the additional capacity from co-firing (50MW) and discrete biomass plants (30MW) in 2010 might be around 40,000 ha. This is equivalent to about 2.6% of the land area (1,543,500ha) in Yorkshire and the Humber. Prospective future increases in the yield of SRC per hectare could decrease this figure.

[13] This new capacity would require of the order of 160,000 ha of land within the region (10.4% of the region's land area**)** devoted to SRC growth by the end of the second decade of the 21st century. Prospective future increases in the yield of SRC per hectare could decrease this figure.

[14] Energy crops' establishment is supported within the England Rural Development Programme. For coppice crops the rate of support is either £1000 or £1600 per ha, dependent upon current land status.

Straw

An assessment of the regional straw resource shows that there are large quantities of straw within the region, primarily based around the agricultural activities within North Yorkshire and the Humber. This is true both in absolute terms and in comparison with other regions (see Annex B1). However there are current alternative agricultural uses for the resource and this suggests that the prospects for schemes may be relatively restricted. We anticipate that – by 2010 – the region could see between 0 – 40MWe of installed capacity from such schemes (0 - 230GWh/yr of energy output). We would not envisage that any increase in this potential would occur over the period to 2021, particularly if energy crop growth begins to displace other agricultural activity as discussed above.

Poultry Litter

A review of the resource (see Annex B1) indicates that sufficient litter for around 10MW of nominal capacity may be available in the region. However, the existing plant at Scunthorpe (installed capacity 16.7MWe) can be anticipated to be already utilising this resource and more from outside the region. On this basis, it is considered that any additional plant is unlikely within the region over the period to 2010 and beyond.

Other Farm Livestock Manure

Slurries from housed pigs or cattle can be digested[15] to generate energy. Two scales can be considered, a larger-scale (around $0.5MW_e$) centralised digestion facility, and a small-scale (around $50kW_e$) facility on individual farm units. The former approach has been developed in Europe through farm co-operative systems but is untested in the UK, which has had more – albeit limited - experience of the latter scale.

The practical uptake of the resource (see Annex B1) for electricity generation is very significantly constrained due to a combination of economic, technical and infrastructural factors. Up to 2010, it is proposed that a maximum of two centralised plants (with a total capacity of $1MW_e$) might be deployable across the region. Beyond this, to 2021, we assume that changes in agricultural practices and the economics of such schemes could lead to a major increase in schemes, up to a maximum of 20 (10MWe installed capacity).

Figures 6 – 8 show predicted yields and geographical distributions of straw, poultry litter and farm manures, based upon agricultural census data.

[15] Bacteria acting on wet wastes in the absence of oxygen produce a methane-rich biogas which can be burned to supply electricity and/or heat.

Figure 6: Predicted Geographical Distribution of Annual Yield from Straw Residues, in Oven Dried Tonnes (odt) per square km

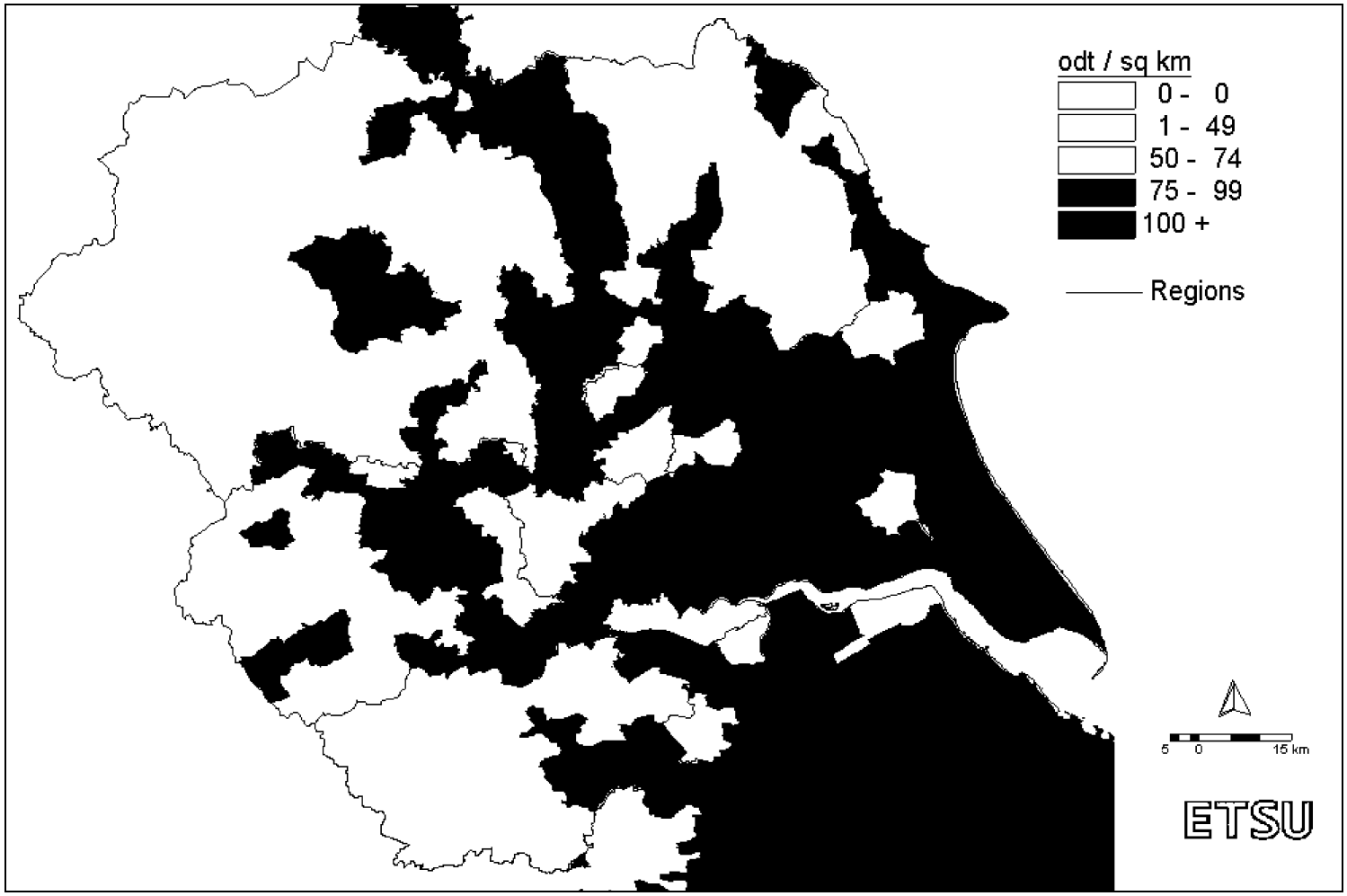


Figure 7: Predicted Geographical Distribution of Annual Yield from Poultry Litter, in Oven Dried Tonnes (odt) per square km

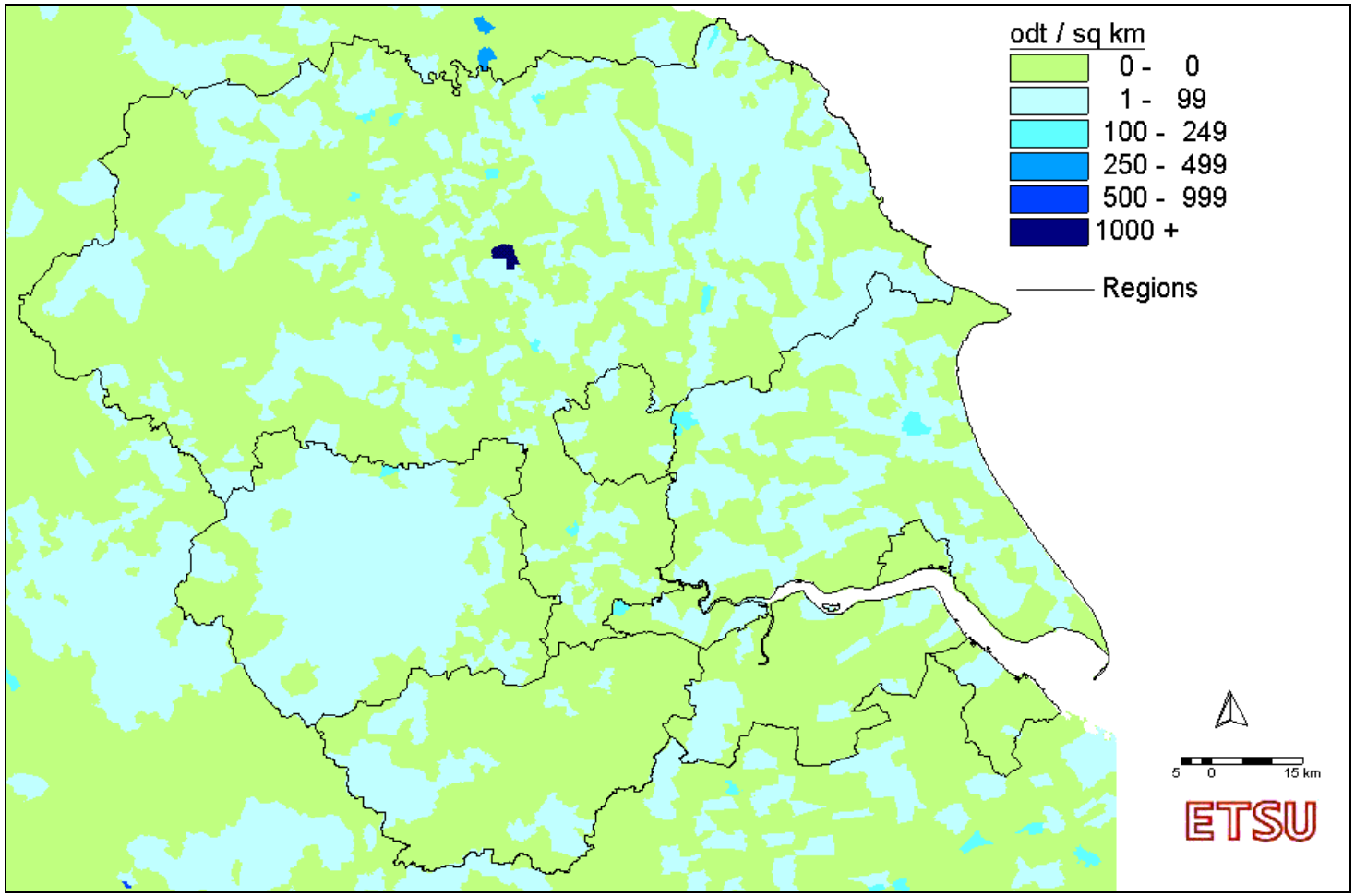
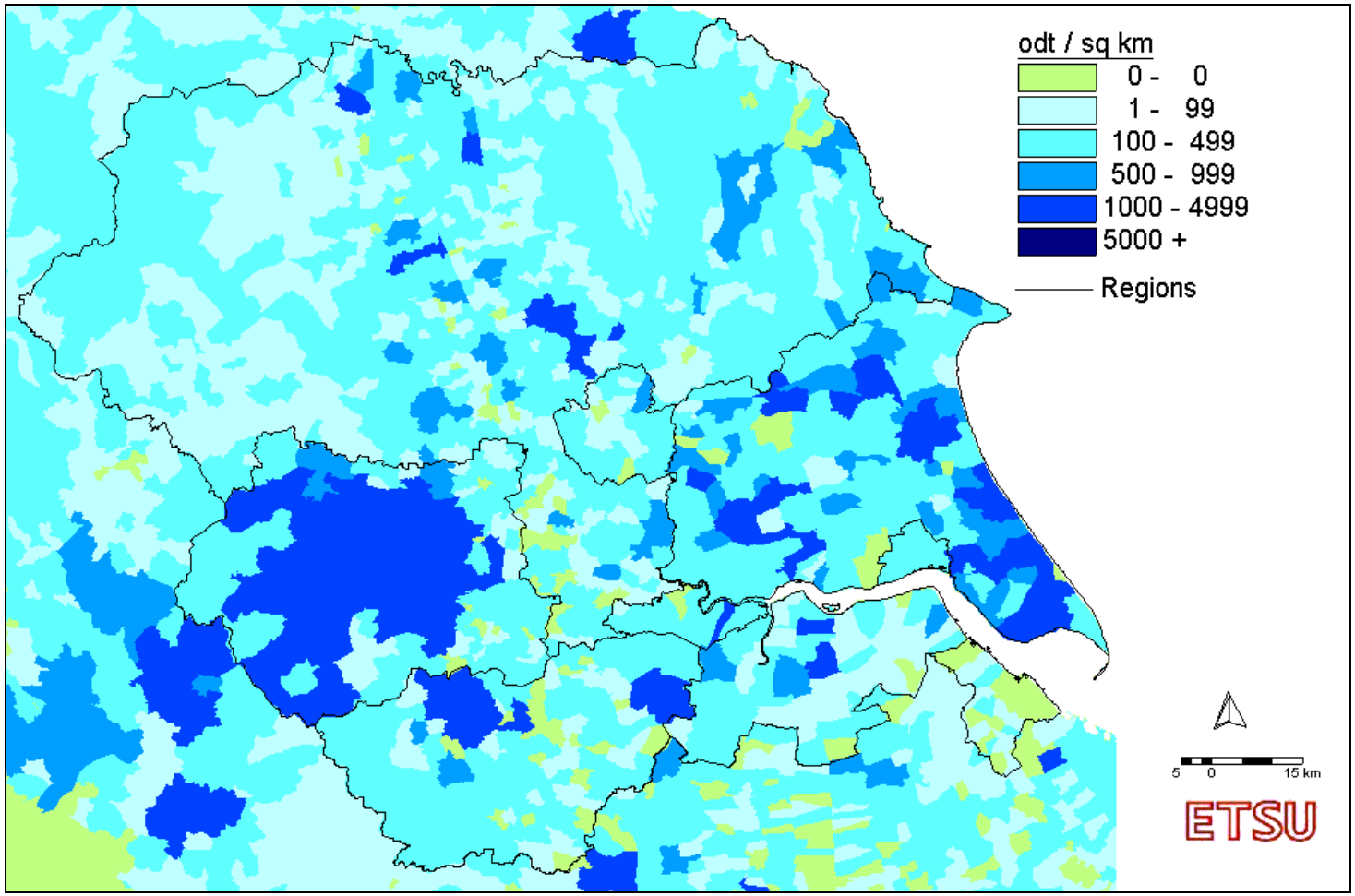


Figure 8: Predicted Geographical Distribution of Annual Yield from Livestock Manure, in Oven Dried Tonnes (odt) per square km



SMALL SCALE HYDRO POWER

A major UK study of hydro sites[16] undertaken by the University of Salford includes a significant number of river-based sites across Yorkshire and the Humber. The potential electricity generating capacity from the 54 sites identified in the region (see Annex B1) is considered to be around 9.5MW. Other sites may exist, notably within the utilities' water supply infrastructure across the region, but these may be relatively restricted in numbers and scale, and will be dependent upon the utilities' current and prospective development plans. It should be noted that the region has an enduring legacy of water power from mills and so further opportunities, perhaps through farm diversification activities or prospective support from the Community Renewables Initative, may prove to be forthcoming.

Nevertheless, small scale hydro schemes can often prove difficult for developers to pursue on economic grounds, given the nature of economic returns on investment, or to gain abstraction licensing approval because of environmental impacts. For these reasons and others the deployment of hydro power schemes is likely to be significantly less than the accessible resource outlined above. Nevertheless it is possible to envisage that Yorkshire and the Humber could significantly increase its current deployment of small hydro schemes. Table 3 presents possible targets for the region, which assume that small hydro schemes are given greater levels of support and that statutory requirements governing licensing procedures prove to be relatively straightforward for a good proportion of potential schemes.

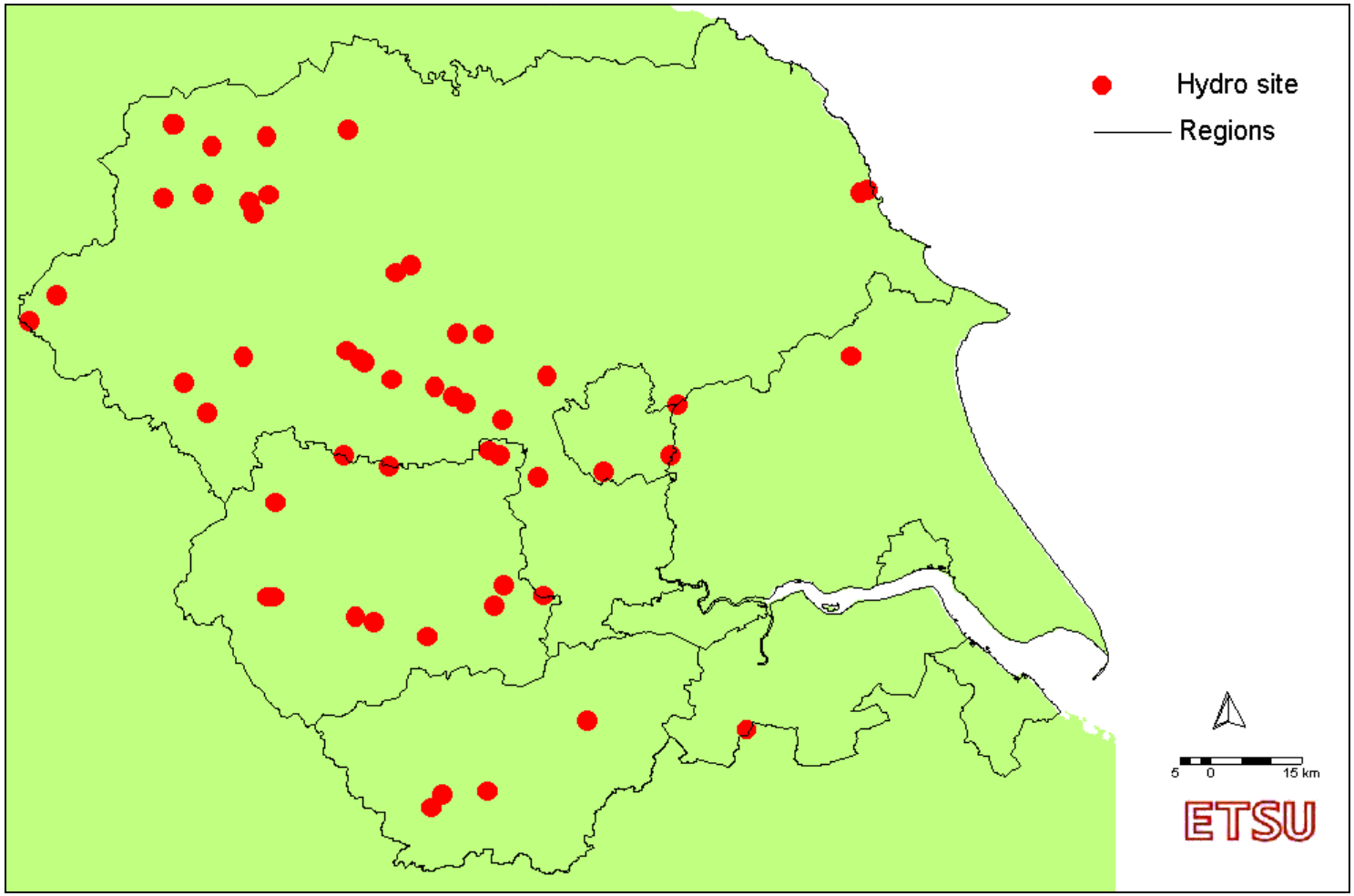
Table 3 - Target ranges for electricity from new small hydro power schemes in Yorkshire and the Humber

Sub-Region	Target Range for New Installed Capacity (MW)		Implied Annual Energy Output (GWh/yr)	
	2010	**2021**	**2010**	**2021**
Humber	0		0	
North Yorkshire	0.6 – 2.2		2 – 7	
West Yorkshire	0.2 – 0.4		0.5 - 1	
South Yorkshire	0.2 – 0.4		0.5 - 1	
TOTAL	**1 – 3**	**3 – 5**	**3 - 9**	**9 – 16**

Figure 9 shows the geographical distribution of "run of river" small hydro sites identified within Ref. (16). This study does not necessarily provide an exhaustive analysis of all possible hydro sites, particularly at the micro scale. In addition there may be some prospects for deployment within the water utilities' supply infrastructure.

[16] "Small-scale Hydroelectric Generation Potential in the UK", (ETSU SSH-4063, Parts 1-3) (1989). This study brings together much of the data required to characterise available SSH sites, such as geographical location, physical site parameters, meteorological and hydrological characteristics, power and energy yield estimates and economic analysis.

Figure 9: Geographical Distribution of Potential Small Hydro Sites Identified Within Reference (16)



SOLAR ENERGY TECHNOLOGIES

Solar Photovoltaics

Photovoltaic (PV) power comes from materials that can generate electrical power when illuminated. In the UK's climate it is anticipated that integration of PV units into the electrical systems of domestic, commercial, public or other buildings (through roof- or wall-mounted systems) will be the main route to deployment. For the purposes of this work, the prospects for deployment of PV incorporated within motorway sound barriers - a practice which is becoming widespread in continental Europe - has also been reviewed (see Annex B1 for our detailed assessments of PV deployment).

Although costs continue to fall dramatically, the technology presently remains expensive in terms of cost per kWh of electricity generated and the prognosis is that major deployment in the UK by 2010 is unlikely without financial support and high profile demonstration (both of which are in fact beginning to emerge within new Governmental programmes[17]). Beyond this time - up to 2021 - we envisage that significant enhancement of deployment may be possible due to:

- The inclusion of energy measures such as PV within both the building regulations and planning guidance governing orientation and shading for new building developments;
- Further measures to encourage cost-reductions and other forms of financial support, for example the continued evolution of grant-support programmes to encourage more and faster take-up.

These assumptions are reflected in our proposed targets in Table 4 and discussed further within Annex B1.

[17] A major photovoltaic demonstration programme was announced in the Government's White Paper (February 2001). The intention is that the programme will encourage good quality inward investment by the PV industry leading to a level of market activity, which will be self-sustaining within ten years. Phase 1 of the programme will last for 3 years and have a budget of £20 million. The proposed scheme outlined following a consultation exercise envisages support for individual homeowners for projects ranging from 500W to 5kW in size, and for medium or large scale projects of 5kW to 100kW in size. The levels of support have yet to be finalised but it has been suggested that homeowners might receive a 50% subsidy, and that for the larger schemes the subsidy might vary from 35% for large profit-making organisations up to 65% for publicly run organisations. The Programme was launched in April 2002.

Table 4 - Target ranges for electricity from new photovoltaic power schemes in Yorkshire and the Humber

Sub-Region	PV Deployment Type	Target Range for Installed Capacity (MW) [Installations]		Implied Annual Energy Output (GWh/yr)	
		2010	2021	2010	2021
Humber	Dwellings	0.41 - 2 [280 – 1300]		0.3 – 1.5	
	Commercial Buildings	0.2 - 0.6 [4 – 12]		0.2 – 0.4	
	Motorway	0 - 0.8 [0 - 5]		0 – 0.6	
North Yorkshire	Dwellings	0.34 - 1.6 [235 – 1100]		0.3 – 1.2	
	Commercial Buildings	0.1 - 0.4 [2 - 8]		0.1 – 0.3	
	Motorway	0		0	
West Yorkshire	Dwellings	0.88 - 4.2 [600 - 2800]		0.7 – 3.2	
	Commercial Buildings	0.45 - 1.3 [9 - 26]		0.3 – 1.0	
	Motorway	0 - 0.8 [0 - 5]		0 – 0.6	
South Yorkshire	Dwellings	0.57 - 2.7 [385 - 1800]		0.4 – 2.0	
	Commercial Buildings	0.25 - 0.8 [5 - 16]		0.2 – 0.6	
	Motorway	0 - 0.8 [0 - 5]		0 – 0.6	
TOTAL	**Dwellings**	**2.2–10.5 [1500–7000]**	**10.5–142 [7000–95000]**	**1.7 – 7.9**	**7.9 – 107**
	Commercial Buildings	**1–3.1 [20–62]**	**3.1-6.5 [62-130]**	**0.8 – 2.3**	**2.3 – 4.9**
	Motorway	**0–2.4 [0-15]**	**2.4-6.4 [15-40]**	**0 – 1.8**	**1.8 – 4.8**

Solar Water Heating

Solar water heating (or "active solar") entails the collection of the Sun's heat through highly absorbent collectors, and its transfer to water. In the UK the applications are typically domestic installations or swimming pools. These systems generate heat alone and so cannot contribute directly to a renewable electricity target, nevertheless the technology can be considered as a means to displace electricity use, where this is used for heating water.

An assessment of the potential for solar water heating has been undertaken across the region using similar methods to those outlined for PV (see Annex B1). This assessment envisages that there could be a regional potential (from both domestic and swimming pool systems) of between 3.6 - 19.5GWh/yr by 2010, and that this might increase to between 7.5 - 42GWh/yr by 2021.

Passive Solar Building Design

Passive solar design (PSD) is a mature technology where solar energy is deliberately used in building design to provide contributions to heating, lighting and to assist natural ventilation. An integrated approach to building design carefully balances potential benefits and conflicts of PSD and energy efficiency to optimise the total energy consumption of the building whilst maintaining acceptable levels of comfort for the occupants. In theory PSD displaces other energy sources, used for lighting, heating and ventilation, but can also increase energy consumption - if poorly implemented - due to the need for air-conditioning to reduce overheating arising from high glazing proportions.

An assessment of energy use in the building sector shows that electricity demand has remained roughly constant over many years - reductions in energy use from energy efficiency measures, including PSD, have been neutralised by the increased demand for comfort levels and domestic appliances.

We have estimated the potential savings that might be achievable from PSD (see Annex B1), but propose no explicit targets. This is because we assume that major breakthroughs in the wider achievement of this form of energy saving will be better achieved through a holistic approach to the whole question of energy efficiency improvements in the building stock, perhaps implemented through changes to building regulations.

WAVE ENERGY

Wave energy devices convert the uneven motion of waves to electricity. Wave energy conversion devices can be installed on the shoreline or offshore, although most experience with wave energy devices to date has been obtained with shoreline devices.

Within Yorkshire and the Humber, exploitable wave energy resources are likely to be limited by the status of the technology in the short to medium term. Under these circumstances, the region is not favoured for economically viable wave deployment over the period to 2010. Beyond this time, it is possible to envisage that successful deployment of wave energy elsewhere in the UK will lead to opportunities off the region’s coast, due to advances in current technical and economic barriers to deployment (see Annex B1). Table 5 shows the range of possible deployment that might then be achievable.

Table 5 - Target ranges for electricity from wave power schemes in Yorkshire and the Humber by 2021

Sub-Region	Target Range for Installed Capacity (MW)	Implied Annual Energy Output (GWh/yr)
	2021	2021
TOTAL	**1 – 153**	See Footnote[18]

FUEL CELLS

Fuel cells are electrical devices similar to batteries except that the fuel (usually a hydrogen-rich gas) and oxidant are supplied from an external source, to produce both electricity and heat directly. They are clean, highly efficient and represent a key enabling technology to a future hydrogen economy, and therefore to the longer-term widespread deployment of renewable energy technologies. They are being actively considered for distributed power, residential and commercial scale CHP, as well as transport and portable power applications. One of the key issues influencing the timetable for their wider deployment will be their long-term reliability and hence their cost competitiveness.

Annex B1 estimates regional prospects for the deployment of fuel cell technologies to 2010 and 2021, with the expectation that the later date is much more likely to witness wide fuel cell deployment.

In terms of their status as a source of "renewable energy", it is true that fuel cells can utilise fossil fuel sources as an alternative to RE-generated hydrogen. This is discussed further in Section 6.2.

OTHER TECHNOLOGIES

There are a number of other technologies that may potentially provide renewable energy resources in Yorkshire and the Humber. In this respect, geothermal and tidal energy prospects are assessed.

Geothermal Energy

Although Yorkshire and the Humber has potential aquifer sources in the Eastern part of the region, the thermal quality of these sources is insufficient for the generation of electricity. Previous DTI research studies have revealed that the aquifer underlying the coast from Scarborough southwards to Grimsby and beyond has some potential to provide hot water at low temperatures (45-50^{o}C), in association with activities such as horticulture or under-floor building heating. In practice it is not envisaged that geothermal aquifer sources are likely to

[18] The technical uncertainties surrounding wave energy are such that – at this time – it is not feasible to provide definitive energy output figures for this prospective deployment.

contribute to the region's heat energy needs over the period to 2010, with the prospects beyond that time being governed by issues such as energy prices and the availability of competing "green" heat-supply options.

Tidal Energy Technologies

Energy from tides can be exploited by the flow of water into and out of estuaries through tidal barrages, or from the placement of turbines to exploit tidal currents.

Tidal Barrages for the production of power are a technically mature technology, based on operating experience from a number of sites outside the UK. Within the UK, no schemes have been deployed to date due to limiting economic and environmental factors. Given the mature status of the technology, no major cost reductions can be foreseen and the potentially significant environmental implications of schemes are another major barrier to prospective deployment.

In terms of possible deployment of tidal barrage technology within the region, Yorkshire and the Humber's mean tidal range is unlikely to be high enough for it to be seriously considered as a location for barrage technologies. A possible exception to this might be if barrage-type structures were to be under active consideration for flood defence purposes. However, no barrage type structures for flood defence across the Humber are envisaged by the Environment Agency in the Humber Estuary Shoreline Management Plan. A feasibility study undertaken in the 1980s on a Humber Barrage found it to have significant cost, environmental and maritime navigation drawbacks.[19]

Tidal Currents are potentially exploitable for energy production by devices resembling submerged windmills.

The UK has a good marine current resource with many potential sites, concentrated on the West Coast. However, across Yorkshire and the Humber, there are likely to be limited opportunities, not amongst the first to be exploited in the UK.

Although the technology has to date remained at the prototype stage, there are plans under consideration for deployment of larger scale devices elsewhere in the UK.

[19] Information supplied by the Environment Agency.

ENERGY FROM WASTE

The UK produces large volumes of domestic, commercial and industrial waste. Despite attempts in recent years to improve its ability to reduce, re-use or recycle wastes, progress in this respect remains slow. Recent targets to increase recycling and reduce landfilling, prompted in part by the EU's Landfill Directive[20] will undoubtedly affect municipal waste combustion and landfill gas resources, and their potential for electricity production into the future.

Parts of Yorkshire and the Humber are heavily populated and therefore have significant pressures due to waste treatment and disposal issues. Nevertheless energy production from these options will always be of secondary importance as implied within the UK's Waste Strategy.

We have considered the prospects for a number of waste sources and technologies to contribute to the region's energy needs, below and within Annex B1. Our analysis considers the following categories:

- Landfill gas
- Thermal treatment of municipal waste
- Digestion of sewage

The more fundamental issue of whether these energy technologies are properly considered to be "renewable" was put forward for discussion within our consultations. These consultation findings and our consequent recommendations for the treatment of energy from waste technologies are discussed within Sections 5 & 6 of this report.

Landfill Gas

When landfilled, some types of waste degrade biologically, giving rise to a methane-rich mixture of gases referred to as landfill gas. This can be used for the generation of electricity, and indeed across the UK large amounts of capacity (25.8MW_e in Yorkshire and the Humber) is currently operational through installed NFFO-type schemes.

The resource proposed here reflects the current reality, that landfill gas schemes will continue to be brought forward within the region in the short term with a legacy of support from the NFFO process. The resource will however - in the longer term - diminish as old schemes become exhausted and waste is diverted away from landfill. This process is likely to result in further growth of capacity until 2010 and then a slow decline thereafter.

Our estimates of potential resources for 2010 are therefore based initially on the remaining NFFO schemes within the region that are as yet non-operational (see Annex B1), but with the possibility that further landfill sites may still emerge within the region. In the longer term,

[20] Council Directive 99/31/EC

waste reduction and diversion continues so that the main focus of attention by 2021 is how quickly the region's energy-generating capacity from landfill reduces.

These considerations are illustrated in Table 6 below.

Table 6 - Target ranges for electricity from new landfill gas schemes in Yorkshire and the Humber

Sub-Region	Target Range for New Installed Capacity (MW)		Implied Annual Energy Output (GWh/yr)	
	2010	2021	2010	2021
Humber	Up to 11.1		Up to 64	
North Yorkshire	Up to 3.2		Up to 18	
West Yorkshire	Up to 33		Up to 190	
South Yorkshire	Up to 8.9		Up to 51	
TOTAL	**Up to 56**	**0 - 28**	**Up to 323**	**0 - 161**

Thermal Treatment of Municipal Solid Waste

A review of the current status of Waste Authorities' plans has been carried out across the region (see Annex B1), to estimate the potential for combustion schemes. The estimate reflects an interpretation of these existing or emerging plans, such that they could lead to a realistic chance of such schemes appearing over the next decade. The estimates are shown in Table 7.

We have assumed that only those schemes at or near to fruition at the present time will appear, and that at later time horizons the existing schemes may be decommissioned in the light of progress on waste minimisation, re-use etc.

Table 7 - Target ranges for electricity from new municipal waste combustion schemes in Yorkshire and the Humber

Sub-Region	Target Range for New Installed Capacity (MW)		Implied Annual Energy Output (GWh/yr)	
	2010	2021	2010	2021
Humber	0 – 14.3		0 – 82	
North Yorkshire	0		0	
West Yorkshire	9		52	
South Yorkshire	13.3		77	
TOTAL	**22.3 – 36.6**	**0 – 36.6**	**129 – 211**	**0 – 211**

Sewage Gas

The anaerobic digestion of sewage sludge has been widely used by water utilities to stabilise and disinfect sewage sludge prior to recycling to land or – in previous years – disposal to sea. The biogas produced from this process has in turn often fuelled CHP schemes producing heat and electricity at sewage treatment works.

It is not envisaged that there will be significant uptake of sewage sludge digestion schemes across the region so we therefore propose limited target ranges for new schemes. To 2010 this might be between 0 and 2 schemes, each of capacity 0.5MWe (0 – 1MWe total, generating 0 - 8GWh/yr). By 2021 this could increase to between 2 and 4 schemes (1 – 2MWe total, generating 8 - 17GWh/yr). The sub-regional breakdown of such a target range cannot be specified without more detailed knowledge of the utilities' current waste disposal plans.

3.3 Renewable Energy as Embedded Generation

One of the issues having an influence upon the regional deployability of RE sources is the capacity of the electricity network to accept large quantities of relatively small-scale "embedded" RE generation. Historically, the electricity network has been designed for the transport and organisation of electrical power from large-scale generation sources, a fundamentally different premise from that of most sizes and scales of RE generation.

We have reviewed the regional position for this issue as shown in Annex B2. From this we conclude that there appears to be reasonable overall opportunity for the region to achieve its proposed regional target for RE by 2010, notwithstanding any specific technical issues which might arise for specific schemes. Beyond this timescale, however, it appears very likely that major changes will be required to the network to enable the achievement of the proposed RE target for 2021.

These **technical** constraints relating to the physical nature of the electricity network are paralleled by **institutional** issues for RE deployment which derive from the current nature of the electricity industry and the market within which it operates. These institutional issues require attention in the pursuit of the region's RE targets and are highlighted further within Section 7 of this report.

OVERALL SUMMARY

The Tables in Annex B4 show how the estimates above were summarised and used to provide a basis for the consultation process. They are accompanied by descriptions of the Scenarios used to focus and prompt stakeholder discussions.

4. SUMMARY OF PLANNING, LA21 & NFFO REVIEW FINDINGS

Our detailed reviews of the land-use planning and LA21 policies across the region, and our analysis of the current status of Non-Fossil Fuel Obligation (NFFO) renewable energy schemes, are shown respectively in Annexes C1, C2 & C3. These reviews and assessments were subject to further commentary during the consultation process as detailed further below in Section 4.

4.1 Review of National and Regional Planning Policy Context

Development plans are prepared by each of the county, unitary and district authorities in the Yorkshire and Humber Region under the terms of the Town and Country Planning Act 1990 (as amended). The plans set out policies on development and the use of land, and identify the main considerations on which planning applications are decided.

In the current planning context, the particular importance of development plans arises from a statutory requirement, introduced by the Planning and Compensation Act 1991, that the determination of individual planning applications should be in accordance with the development plan unless material considerations indicate otherwise. Material considerations are relevant matters relating to the use and development of land. Development plans provide the framework within which development control decisions are made.

PPG22
Planning Policy Guidance Note 22: Renewable Energy (1993) provides planning policy advice to local planning authorities on renewable energy development. It states that development plan policies should take into account local, regional and national requirements for renewable energy, taking into account that renewable energy sources can, in some cases, only be exploited where they occur. Planning authorities are also asked to bear in mind that investment in renewable energy can make an important contribution to the national economy, and can help to meet international commitments on limiting greenhouse gas emissions.

PPG22 currently advises that Part I of each UDP (and Structure Plans) should contain general policies and proposals for the provision of renewable energy in their area. Part II of each UDP and local plans should include more detailed policies for developing renewable energy resources. This may include the identification of broad locations or specific sites for particular renewable energy technologies.

It has been noted by this and other regional studies that current planning policy guidance on renewable energy is outdated and in need of revision. Significant technical progress has been made in many technology bands and there has been a general shift in national planning policy. This is particularly so given the publication of the Green Paper on proposed reforms to the planning system in December 2001.

Consultation with relevant parties has recently begun, such that a draft revised version of PPG22 will be published during 2002. The importance of PPG22 in providing the national planning policy context for renewable energy cannot be underestimated. It has been clearly shown through revisions to PPG3 and PPG13 that shifts in the national context of particular issues can have a fundamental effect on development proposals coming forward. Careful thought must therefore be given to the revised PPG giving clear guidance that will ensure that local planning authorities take a positive approach to renewable energy provision.

In the view of the consultants, a number of key issues should be tackled within revised PPG22, as outlined below.

All relevant organisations within the region, including Government Office, Yorkshire & Humber Assembly and local authorities should seek to influence the content of revised PPG. Revised PPG should be shorter and more precise. Whilst it should be based on current and future predicted technology it should not be prescriptive such that anticipated changes in technology cannot be accommodated by the planning system.

The revised PPG22 should acknowledge the potential contribution that both large and small-scale schemes can make with guidance relevant to each type detailed. It should also acknowledge the potential contribution from non-grid connected schemes, from combined heat and power and from heat-only schemes.

The revision of PPG22 also represents an opportunity to introduce more innovative ways in which renewable energy can be promoted - or required to be installed - through the planning system. These could include:

i) A requirement for a percentage of new housing on a development to include solar panels or passive solar design (or other technologies as appropriate). This could operate on a similar basis to the provision of affordable housing;
ii) Developments above a certain size must have a particular percentage of their energy requirement from renewable energy. This may be in the form of direct renewable energy provision on site e.g. a wind turbine or be provided through a contribution to a renewable energy project off-site;
iii) Commercial developments above a certain size should only be permitted if a planning obligation is entered into to secure the procurement of a percentage of power used from renewable sources;
iv) Enhancing the understanding of sustainable energy use in considering urban and rural regeneration and new urban forms. For example, whilst considerable effort and policy has been developed to achieve green transportation in urban areas little thought has been given, to date, to for example district heating from renewable sources;
v) Adopting a more pro-active planning policy stance in development plans and other related documents, as illustrated by Bradford's unitary development plan.

The relationship between PPG22 and other PPGs should be clarified. PPG7 (The Countryside), PPG20 (Coastal Planning) and PPG3 (Housing) are particularly relevant. The potential roles of

renewable energy in support of both rural and urban re-generation should be specifically considered.

The revised PPG ought to provide clearer guidance on the relationship between renewable energy proposals and landscape designations, this being an important consideration to many schemes. It should also emphasise the weight in favour of schemes that help to meet national and regional renewable energy targets. It is considered that revised PPG should acknowledge that renewable energy can be an appropriate form of development in designated areas including Green Belt and landscape designations.

The revised PPG should give guidance as to areas that should be covered by renewable energy policies (the policy quality indicators can be used as a guide) in development plans. Such policies should be clear and succinct. The revised PPG should emphasis the need for equal weight to be given to renewable energy policies with other policies contained in the plan.

There is also an opportunity within PPG22 for the concept of "Energy Local Plans" to be promoted, within which renewable energy can sit.

Regional Planning Guidance
In addition, regional planning guidance (RPG) will be of increasing importance in providing guidance on how renewable energy development should be planned for, not least because it will in future be expected to set targets for renewable energy use set out in regional sustainable development frameworks. Regional planning guidance for Yorkshire and the Humber (RPG12) has recently been revised with new guidance published in October 2001. Its main purpose is *"to provide a regional spatial strategy within which local authority development plans and local transport plans can be prepared"*.

Annex C1 describes our review of these existing policy contexts in more detail.

Existing development plan coverage in Yorkshire and the Humber
To provide an understanding of the nature and extent of existing planning policy coverage of renewable energy, the project team has examined all 28 unitary development plans (UDP) and local plans in Yorkshire and the Humber (it should be noted that there are four plans relating to East Riding as the district-wide local plan has not yet been adopted). For consistency, the renewable energy content of these plans was appraised against a series of policy quality indicators, summarised below.

The policy quality indicators are summarised below:

- Supporting text of the plan outlines government policy on renewable energy and makes reference to planning policy guidance.
- Supporting text of the plan shows awareness of potential renewable resources in the Plan area and makes reference to a county/regional study where appropriate.
- Supporting text of the plan recognises the balance between potential benefits of renewable energy developments and any adverse environmental impacts that may arise.
- Policies express specific support or encouragement in principle for renewable energy proposals.
- Policies provide clear guidance on the circumstances in which renewable energy proposals will be permitted.
- Policies are phrased so that it is applicable to all renewable energy technologies. No technology is excluded unless fully justified.
- Policies address the development requirements of specific technologies.
- Policies refer to other policies in the plan.
- Policies contain no unrealistic expectations.

The overall result of this analysis is summarised in the table below; a fuller discussion of the review is given in Annex C1 of this report.

Table 8: Renewable energy content of development plans in Yorkshire and the Humber: outcome of policy quality appraisal

Grade	Number of plans	Percentage of total
Excellent	1 (Bradford)	4
Good	23	82
Satisfactory	3	10
Poor	1	4

Bradford's positive planning stance towards renewable energy is borne out by the fact that of the three NFFO schemes in the authority all have been approved. These include two landfill gas schemes and a single wind turbine. This latter is located in the Green Belt and in an Area of Local Landscape Significance.

One further wind farm scheme located in Bradford, but not subject of a NFFO contract has been refused planning permission due to visual impact and noise. The site was subject to similar designations to the NFFO contracted schemes.

Development Control

The implementation of planning policies is examined in detail in the context of NFFO contracted projects in Section 4.3 and Annex C3. It can be concluded from this section that there has generally been a positive approach to renewable energy schemes from local authorities in the region. There are 75 NFFO contracted schemes in the region. Of these planning permission has been sought and a decision made on 47 schemes, 87% of which have

been approved. Of these schemes, 21 are operational. This suggests that a positive framework is, to an extent, already in place. The policy quality analysis has, however, identified areas for improvement and it should be an aim of every authority to achieve excellence in each of the criteria used for assessment in this policy analysis.

Whilst indicator three acknowledges that there is a balance to be achieved between the benefits of renewable energy and its impact on other considerations the region should aim to ensure that renewable energy proposals are considered in a positive way, set within a framework of positive and encouraging policies. There should be a clear understanding of the balance to be achieved between pro-active renewable energy policies and policies of restraint such as those for areas of landscape value and nature conservation sites. Policies should be afforded equal weight and there should not be an automatic assumption that renewable energy schemes cannot be accommodated within for example areas designated for their landscape value.

Consideration of proposals should be set within the overall regional context for sustainable development set out in the Regional Sustainable Development Framework and RPG.

Schemes should be assessed on their merits with regard to the individual scheme and to local circumstances. Past experience in the region suggests that it is possible to accommodate renewable energy schemes within designated areas, including Areas of Outstanding Natural Beauty, Green Belt, areas valued for their landscape quality, and coastal areas. With regard to local landscape designations, local authorities should take particular note of the advice contained in PPG7. This states that local designations carry less weight than national designations and development plans should not apply the same policies. Such designations may unduly restrict acceptable development and economic development, such as renewable energy schemes, without identifying the particular features of the countryside which need to be respected or enhanced. Such designations should only be maintained or extended where normal planning policies cannot provide the necessary protection.

Good Practice

A number of examples of good practice have been identified within and outside of the region. These cover existing policies, other planning measures that may be utilised together with examples of how policies can be applied to ensure increased deployment of renewable energy. These are detailed below.

Within the region the unitary development plans of Bradford and Scarborough have been identified as achieving a particularly good rating under the policy quality analysis. Bradford achieved the only excellent rating in the region. Both plans score highly against each indicator showing a good awareness of the national and planning policy background surrounding renewable energy, an awareness of the possibilities at the local level and the need to achieve a balance between the benefits of renewable energy and any adverse impacts that might arise.

Bradford has sought to go beyond what could be regarded as the standard policy text seeking to promote renewable energy even where there may be conflict with other policies in the plan. The latter half of the policy is as follows:

"Where a proposal fails to meet these requirements [the criteria noted above] the benefits of the following will be taken into consideration:
(1) The potential contribution to meeting local, regional and national energy needs and reducing global pollution;
(2) The extent to which the development would provide research benefits which would assist the further development of renewable technologies.
In doing so it will be acknowledged that certain renewable energy sources can only be harnessed where the resource occurs."

Full details of the policies of Bradford and Scarborough are contained in Annex C1 which also identifies areas where improvements can be made.

Outside of the region the Oldham Unitary Development Plan, First Deposit Draft, October 2001, has been identified as being a particularly good example of planning policies and supporting text for renewable energy. Details of the relevant policies and supporting text are contained in Annex C1.

An assessment of the plan against the policy quality indicators detailed above has resulted in a score of excellent against each indicator, with the exception of the first indicator against which the policy was assessed as good. Whilst the plan refers to PPG22 it does not refer to the overall national policy context for renewable energy. An excellent rating could be achieved in the first indicator by including reference to current national policy.

The Oldham plan is to be commended on its thorough and comprehensive approach to its renewable energy policy. Of particular note are the following: the supporting text not only acknowledges existing renewable resources in the area, identified within the LYREPS study and also the recent North West of England's regional renewable energy study, but goes further to identify the potential prospect of coal bed methane being developed in the future. It goes further to identify the particular types and scales of schemes that Oldham could potentially contribute to. Such an approach could be developed in the Yorkshire and Humber region following more detailed work at a more local level.

The Council's general policy towards energy developments provides a supportive framework for the development of renewable energy in the Borough with further more detailed policies setting out a clear set of criteria against which proposals will be assessed. There is an opportunity to improve this policy further through the addition of a section similar to that detail in the Bradford Deposit Local Plan that emphasises the importance of the benefits of renewable energy.

Whilst reference is made in the supporting text to the considerations of other policies contained in the Plan there is an opportunity for more emphasis to be made to the positive contribution that renewable energy can make to other policy areas. These have been highlighted elsewhere in this report. Also whilst reference is made to the global benefits of renewable energy reference to the local benefits that may result from schemes is limited. The

supporting text could be improved by referring to the wider benefits that can occur at the local and regional level.

4.2 Review of LA21 Strategy Context across the Region

To gain further insight into the extent of renewable energy policy coverage at the local level, the project team has reviewed Local Agenda 21 (LA21) strategies across Yorkshire and the Humber.

LA21 is an initiative that arose out of the 1992 Earth Summit in Rio de Janeiro. It is a process of developing local policies for sustainable development and building partnerships between local authorities and other sectors to implement them. Thus, it provides an opportunity for the local community to work together on local issues that also affect the global environment.

All local authorities in the UK are encouraged to prepare strategies. In Yorkshire and the Humber, as elsewhere, these are at various stages of preparation and review. As each document is based on the local context their scope and content varies from authority to authority.

LA21 review assessment
Six review criteria have been used to assess the LA21 strategies of the regions' Local Authorities. Each of the criteria represents a differing aspect of how renewable energy policy may be approached. If a LA21 strategy is acceptable under the criteria (see below), then it was deemed to have 'passed'. Otherwise, a "fail" was awarded if the strategy did not satisfy the criteria's specifications. Ideally, a LA21 strategy would pass all six of the criteria, but this was rarely the case. These criteria were as follows:

- Renewable energy policy
- Specific objectives
- Quantified targets
- Technology-specific policy
- Local initiatives
- Monitoring

In terms of the overall success of individual local authorities, the results from the six review criteria awarded for each associated plan were combined to calculate a score out of six. A score of three or more was awarded a pass; below three was considered a fail. In respect of this, only two authorities passed and could thus claim to have a good LA21 strategy in terms of renewable energy. These were Kirklees Agenda 21 Action Plan and York Local Agenda 21 Plan.

During the review of the LA21 strategies, a number of examples of 'best practice' coverage of renewable energy issues were uncovered. These are discussed further within Annex C2.

4.3 Analysis of Regional NFFO Schemes

The Electricity Act 1989 provided, amongst other things, a means by which public electricity suppliers are obliged to secure specific amounts of power from non-fossil fuel sources, including renewables. Through the Act a number of Renewables Orders have been made, with this system operating as the Non Fossil Fuel Obligation (NFFO) in England and Wales. The Order established a market for renewable energy.

Annex C3 shows an analysis of the NFFO as it has applied to date across the region. There are a total of 75 NFFO-contracted schemes across Yorkshire & the Humber, having a total contracted capacity of 288.7MW (representing 8.9% of the total for England and Wales). Of these, planning permission has been granted for 40 schemes and one scheme did not require express consent by virtue of permitted development rights. Six schemes have been refused planning permission. There are 22 operational schemes with an operational capacity of 58.6MW. Many of these are within the landfill gas technology band where schemes are less controversial from a planning perspective and simpler to implement from a practical point of view. Eight wind schemes have been granted planning permission across the region. They are all operating successfully and are also all located in or adjacent to areas of landscape importance. One of the earliest proposals at Chelker Reservoir on the edge of the Yorkshire Dales National Park has recently had its planning permission renewed for a further 15 years.

In terms of schemes that have been refused planning permission, the scheme at Cromwell Bottom Landfill site is considered unusual, with site-specific issues preventing the NFFO contract being brought forward. For those wind farms refused planning permission there are clearly issues associated with landscape impact and impact on local residents. These issues continue to be raised where sites fall within local landscape designations rather than national ones, and even where the site and surroundings are not subject to any form of designation.

4.4 Planning Indicators and Profiles

Introduction

The analysis of the current planning regime in Yorkshire and Humber has established that a positive framework is in place to an extent. Nevertheless, the analysis of earlier regional planning refusals (Section 2.2) and the observation by planning officers during the consultation process that they await RE schemes of the type encouraged within their plans prompts further questions about the existing planning context. This section attempts to move forwards from the current analysis and outline ways in which the performance of the planning system in response to RE can be enhanced. The discussion below should be read in conjunction with proposed short – term actions relevant to the planning system, set out within Section 7.

Indicators of planning performance

The planning policy quality analysis has established that planning policies within the region are generally of an acceptable standard. A need for improvement has, however, been identified

in a number of areas. The policy quality indicators have been developed by the consultants through successive regional renewable energy studies and through development plan monitoring work carried out for the Department of Trade and Industry. They are considered by the consultants to represent the essential elements that should be included in each authority's local plan section concerned with renewable energy. The indicators are detailed below.

Development plans and renewable energy: policy quality indicators

- Supporting text of the plan outlines government policy on renewable energy and makes reference to planning policy guidance.
- Supporting text of the plan shows awareness of potential renewable resources in the Plan area and makes reference to a county/regional study where appropriate.
- Supporting text of the plan recognises the balance between potential benefits of renewable energy developments and any adverse environmental impacts that may arise.
- Policies express specific support or encouragement in principle for renewable energy proposals.
- Policies provide clear guidance on the circumstances in which renewable energy proposals will be permitted.
- Policies are phrased so that it is applicable to all renewable energy technologies. No technology is excluded unless fully justified.
- Policies address the development requirements of specific technologies.
- Policies refer to other policies in the plan.
- Policies contain no unrealistic expectations.

An example as to how each local plan has been assessed against the criteria shown below is detailed in the planning policy section (Bradford) and can be used as a guideline for future assessments that it is recommended are carried out.

Criterion No.	Quality Indicator	EXCELLENT no amendments or clarification required	GOOD minor amendments would be useful	SATISFACTORY some changes or clarification required	POOR major amendments or clarification required	Comments
1	Supporting text of Plan outlines Government policy on renewable energy and makes reference to planning policy guidance	●	○	○	○	Text refers to PPG22 and also to national targets for renewable energy development.
2	Supporting text of Plan shows awareness of potential renewable resources in the Plan area and makes reference to a county/regional study where appropriate	●	○	○	○	Plan identifies a number of renewable energy resources as having particular potential. There is reference to the 1997 LYREPS study
3	Supporting text of Plan recognises the balance between potential benefits of renewable energy developments and any adverse environmental impacts that may arise	●	○	○	○	Reference to the need to balance benefits and disbenefits.
4	Policies express specific support or encouragement in principle for renewable energy proposals	●	○	○	○	General policy expresses support.
5	Policies provide clear guidance on the circumstances in which renewable energy proposals will be permitted	●	○	○	○	Limited set of criteria listed under the general policy with issues identified in the supporting text.
6	Policies are phrased so that they are applicable to all renewable energy technologies. No technology is excluded unless fully justified	●	○	○	○	General policy included.
7	Policies address the development requirements of specific technologies	●	○	○	○	Specific wind farm policy included.
8	Policies refer to other policies in the Plan	○	○	●	○	General reference to other policies in the Plan.
9	Policies contain no unrealistic expectations	○	●	○	○	
	OVERALL	●	○	○	○	

POLICY QUALITY INDICATORS - BRADFORD REPLACEMENT UNITARY DEVELOPMENT PLAN, FIRST DEPOSIT, JUNE 2001

All local authorities in the region should aim to achieve an excellent rating in each category. Given the overseeing role that Government Office for Yorkshire and the Humber plays in the review of development plans produced in the region it suggested that the role of ongoing monitoring of planning policies for renewable energy might be accommodated within their existing role. Whilst a region-wide body concerned specifically with renewable energy could take on this role, the statutory basis on which GOs comment on development plans provides a much stronger tool for ensuring that a positive framework for renewable energy is set up in the region.

Model planning policies

Careful consideration of comments from stakeholders in the region together with a consideration of existing planning policies for renewable energy suggests that it would not be appropriate to apply one standard renewable energy policy across the region at the local level. The set of policy quality indicators can be used to ensure that the key elements of policy are included. Local authorities within the region can then adapt and supplement these elements to suit their local situation.

In the case of criteria number seven the range of technology specific policies adopted by a local planning authority will clearly be dependent on the resources available within that authority. Such policies are most likely to be criteria based. These criteria will be dependent on the technology involved and the area to which they are to be applied. PPG22 identifies a range of planning implications for each of the technologies considered. These can be used as a starting point for the identification of suitable criteria. It should be noted, however, that there have been significant technological advances since the publication of PPG22, particularly in respect of wind, that should be taken account in formulating policies for particular technologies.

Criteria for RE location

Whilst it is possible to identify broad types of locations where renewable energy schemes might be more acceptable in the region the location of some technologies will be limited by their very nature. Criteria can be used to establish broad areas of search for particular technologies but this approach is not widely used throughout the UK.

There has been mixed reaction from stakeholders as to the merit of providing criteria for the location of areas of search/schemes. The broad range of criteria that would need to be examined to identify particular locations, including commercial criteria, make it difficult for individual authorities to establish with confidence areas that might have particular merit. A number of stakeholders also raised concern that the use of criteria in this way may result in the exclusion of areas that do have merit from further consideration. The use of a broad criteria-based policy evolving from a set of detailed policy indicators as set out above is considered to represent a useful means of dealing with schemes on a case by case basis. In this way the relative merits and disbenefits of a particular scheme can be assessed in the light of the particular local circumstances. This must be set within a positive planning framework for renewable energy.

4.5 Landscape Character Issues

Given the perceived importance of landscape character to the location of renewable energy schemes in the region and the lack of a comprehensive analysis of landscape character assessment at the local level, that takes into account the implications of renewable energy, it is not considered appropriate within this study to identify specific locations. The role of landscape in assessing renewable energy schemes is emphasised by the importance given to this issue in the majority of NFFO-contracted schemes refused planning permission in the region.

It is the conclusion of the landscape character assessment section of this report (see Annex B3, Volume II) that in order to provide greater certainty as to the influence of landscape character on the planning decision-making process for renewable energy schemes each local authority should have an up-to-date landscape character assessment. This can inform and assist the local plan and development control process. This analysis should also draw conclusions on specific types of renewable energy development as drawn out by the Holderness study referred to elsewhere in this report.

There is a developing base of landscape character assessments already in place in the region which should be used, as far as possible, when RE proposals are under consideration. This should be updated and extended such that each authority in the region is covered by an assessment. In addition to assisting with RE proposals the outcome of this work can also be used in other aspects of each authority's work.

An assessment of the impact of proposals on the landscape forms part of the EIA process for the majority of larger scale renewable energy projects. This can be informed by a district-wide landscape character assessment. Such assessments can be regarded as adding value to the assessment of applications for planning permission.

Further, it should be recognised that renewable energy is not generally restricted in location, unlike for example minerals. Whilst there may be optimal locations for particular technologies, sub-optimal locations can also be considered. Flexibility in location is therefore an inherent advantage.

It is our conclusion that the use of areas of search could prove to be divisive, preventing developments from being brought forward in areas that are suitable technically, economically and socially. The breadth of factors that must be taken into account in identifying areas of search make the satisfactory choice of such areas difficult to achieve.

However we recommend - as a key part of the short term Actions in Section 7 - that "Local Renewable Energy Forums" should be instituted as a means to encourage greater mutual understanding of the relevant issues between developers and the planning community. This approach would - we believe – help to provide a suitable means of dealing with the "areas of search" conundrum on the ground.

5. SUMMARY OF CONSULTATION PROCESS AND RESPONSES

At the outset of this work it was clear that a major element of the work would be the process of consultation with a variety of parties. Specific objectives of the consultation strategy were therefore as follows:

- at an early stage to engage stakeholders and encourage understanding & support for the purposes of the study;
- to build confidence that planning and environmental considerations will be taken fully into account in resource assessment and definition of the region-wide targets;
- to facilitate the free flow of new data required in the resource assessments;
- to provide an effective 'early-warning' system for potential problems and conflicts;
- generally, to ensure that the assessment and targets enjoy legitimacy amongst planning authorities, other relevant bodies and communities across the region.

In pursuing our consultation strategy we undertook the following activities, designed to encourage participation and to invite feedback and further information from stakeholders:

- **Preparation of Stakeholder Briefing Material:** A number of separate documents and maps were produced to assist stakeholders (see Annex D1);
- **An Introductory Stakeholders' Seminar:** To launch the study, explain the purpose of the work and the nature of the assessments, engage stakeholders and seek feedback. A summary of this event is shown in Annex D2;
- **Consultation on methodology:** Information disseminated at the Introductory Seminar gave participants an opportunity to review our methods and to provide other relevant information to the study;
- **Written stakeholder statements:** A significant part of stakeholder feedback for this project is the written stakeholder statement, which has enabled information to be provided to the project in response to a series of questions. The stakeholder statements received by the project are shown in Annex D3;
- **Liaison with stake-holders:** Specific discussions with a number of parties helped to elucidate further views and information throughout the project. We used a project web site (www.etsu.com/y&hre-study/) to keep a wider audience informed of our progress and to post additional information;
- **Stakeholder Consultation Workshops:** Four stakeholder seminars were held in the week of 3rd December to present our interim findings and to discuss in detail the consultation scenarios (Annex B5). These seminars are summarised in Annex D4;
- **Local Authority Planners Meetings:** Three LA planners meetings were held, one on 4th December and two on 14th / 15th January. These were intended to provide an opportunity for planning staff to understand and comment on the prospective targets and for them to provide insights into the targets' deliverability at local level. These seminars are summarised in Annex D5;
- **E-mail consultation on Draft Final Report Summary:** A brief synopsis of the draft Final Report was e-mailed to stakeholders for final comments. An overview of the responses received is shown in Annex D6.

This major consultation effort provided a large body of comments on various aspects of the study. These included: the overall scale and nature of a renewable energy target for Yorkshire and the Humber to 2010 and 2021, specific comments about individual technologies, the wider context for implementation, and suggestions and inputs for the definition and implementation of the Action Plan. Key points within each of these areas are shown below.

The Scale and Nature of RE Targets for Yorkshire and the Humber

- Strong support was expressed overall for the adoption of an ambitious regional target, particularly to 2010, but also - by inference - over a longer timetable;
- Relatively little direct comment was expressed about the precise scale of such a target, a debate which was clouded to some extent by sub-debates over "generation vs. consumption" and/or "future energy efficiency gains". The desired scale of the target appeared most closely related to Scenario C for 2010 (see Annex B4, Volume II);
- Those concerned about the achievability or desirability of an ambitious regional target tended to argue in terms of specific issues delaying or restricting deployment, rather than arguing for a low target overall;
- Many commentators expressed the view that a challenging regional target must of necessity be linked explicitly to a challenging and rigorous plan for its adoption;
- Education and awareness-raising for the general public over the medium-term and beyond was widely seen as essential in order to achieve ambitious targets.

Views on the Desirability and Deployability of Specific Technologies

- **Wind Energy:** There appeared to be a general acceptance that onshore wind energy schemes should form a significant part of any target, even if this acceptance was implicit rather than explicit in some quarters. Locational concerns were expressed, with emphasis away from areas of national designation and landscape value and towards brownfield sites and other less "restricted" locations. Offshore wind energy appears also to be accepted as a deployment option to be encouraged;
- **Wood Biomass:** For wood biomass, some comments were noted about the likely placement and implication of areas of short rotation coppice crops but there was little dissent from the levels of deployment proposed within "Scenario C";
- **Photovoltaics:** A widespread recognition that PV should be encouraged but a number of doubts about its ability to do so from the economic standpoint;
- **Waste technologies:** Energy-from-waste schemes were generally thought to be "less renewable" than other technology options. From this we inferred that these technologies should not be included within the region's targets for RE generation, and should be separately presented within our report;
- **Fuel Cells:** A number of comments querying the status of fuel cells as a renewable energy source;
- **Other Technologies:** There was some questioning of the low identified potential for small-scale hydro within the consultation scenarios.

The Context provided by Potential/Desirable Scheme Locations

- A number of comments reflected nervousness over deployment of wind energy (and SRC) in designated or high scenic value locations. Some calls were made for this to be dealt with through a strategic approach to deployment but equally doubts were raised about the efficacy of "areas of search" in this respect;
- Conversely there was a desire for wind energy to move towards lower wind-speed areas where possible, and to locate by preference in "brownfield" or "transport corridor" sites;
- Despite the approval for PV, some concerns were expressed over its ability to fit within conservation areas.

Suggestions for Definition of the Action Plan

- In taking forward targets to "sub-regions" (and below), additional **regional expertise** was perceived to be required. There was support for the concept of **devolving the regional target**;
- Forums such as a **regional sustainable energy forum** and/or a **planners forum for RE** were highlighted as desirable;
- The whole area of regional action should be contained within a suitable **strategic approach**. This would help to reconcile the problems of putting principle into practice;
- **Local ownership or identification** with schemes was seen as extremely important for achieving wider acceptability;
- **Education** was widely perceived to be of key importance in promoting RE deployment more widely. A **cultural change** was required;
- **Planning** – A wide range of issues related to land-use planning and renewables were raised, e.g. the planning system should become more proactive and consistent / a "planning history" of RE within the region would be helpful / there should be links to emerging **community plans** (Bradford was cited as an example) / RE could have "**permitted development rights"** / there should be **Supplementary Planning Guidance** for renewable energy schemes (e.g. Cumbria)**;**
- There could be a role in linking RE deployment more closely to **"Best Value" initiatives** within Local Authorities. This would help to galvanise Member interest;
- **Local Authority green power purchasing** should be seen as a route assisting RE;
- The role of the Regional Development Agency (RDA) was considered crucial in encouraging appropriate approaches towards RE. As part of this the RDA's role in enabling a "low-carbon" economy was queried;
- To help achieve ambitious targets there was an extremely important need for **integration of existing policies and funding streams at the regional level** (which were currently very disparate when emanating at the national level). This implied the need for **co-ordination** between key regional parties;
- There should be more **illustrations of sub-regional good practice**;
- **A regional figurehead or regional "champion"** was needed to galvanise action;
- The benefits of RE as a generator of **new business and employment** should be highlighted;

We used stakeholder input as an integral part of the approach to developing regional targets for RE, discussed in Section 6 below.

6. A RENEWABLE ENERGY TARGET FOR YORKSHIRE AND THE HUMBER

The previous Sections of this report have described the technical & policy analyses, and the stakeholder views and commentaries, that we have produced and collated during the study. This Section now attempts to put all of this information into context within proposed targets.

6.1 The Context for Renewable Energy Targets

The first point to bear in mind is the overall national context for this study, which seeks to elucidate a target based upon Yorkshire and the Humber's production of renewable energy electricity by 2010 - this we have taken as our primary priority. We have also derived an indicative scenario breakdown of this 2010 electricity target within the four sub-regions (North Yorkshire, West Yorkshire, South Yorkshire, Humber).

The study has additionally sought feedback on a renewable energy electricity target to 2021, and information on the prospects for heat production (and/or CHP) from RE sources to both dates. We show electricity target figures below, along with separate assessments for heat production from renewable energy for clarity.

A second point which also has significance for the eventual target is the treatment of energy-from-waste technologies. In the light of the consultation feedback and other inputs, and in the further knowledge of the prospective approaches towards energy-from-waste set out within the Government's Renewables Obligation consultation[21] and the European Union directive on renewable energy sources[22], we have concluded that:

- Energy data and prospective deployment figures for energy-from-waste technologies should be presented within our report;
- Energy-from-waste schemes (i.e. municipal and industrial solid waste incineration, anaerobic digestion of sewage sludge, landfill gas) should be **excluded** from the renewable energy target.

We have also concluded in response to feedback received that fuel cell technologies should not be included within the target figure.

Finally, it should be noted that we have attempted throughout this study to use appropriate "bottom-up" approaches to the derivation of deployable renewable energy schemes, proposing numbers of schemes which might be capable of being put in place, and then subsequently calculating their energy output. This we feel is a more robust and appropriate approach than defining a "top-down" target based upon a percentage of the region's electricity usage and then using this to define a number of schemes "to fit".

[21] "New and Renewable Energy – Prospects for the 21st Century : The Renewables Obligation Statutory Consultation (closing date for comments, 12th October 2001)
[22] Directive 2001/77/EC, issued 27th September 2001

6.2 Composition of Renewable Energy Targets

Renewable Energy Electricity to 2010

Tables 9 & 10 below summarise the details of prospective electricity targets for renewable energy across Yorkshire and the Humber to 2010, firstly in overall terms and secondly - by way of illustration - how these regional targets might be broken down at the sub-regional level. Annex B4 shows the consultation scenarios from which these target figures evolved. Details of the composition of these figures are discussed further below.

Wind Energy

We propose targets for wind energy for 2010 based upon the numbers presented within our Consultation Scenario C. In so doing we attempt to balance stakeholders' willingness to pursue ambitious region-wide targets with the caution expressed in some quarters about placement of onshore wind energy schemes. This level of deployment implies that wind energy schemes will typically come forward within a supportive regional and sub-regional planning context. There will be scrutiny of all schemes and any cumulative impact issues but with less restriction. There will probably be some isolated examples of deployment within nationally designated areas but these will remain tightly controlled and of small scale. In achieving these targets it is possible that some selected development will occur within Green Belt areas, where existing regional precedents provide some support for the principle.

Biomass Energy

Our proposed targets for 2010 are based upon the levels of deployment envisaged in Consultation Scenario C. There may however be residual uncertainties in the short-term over the likely balance between biomass co-firing and stand-alone plant, which are in turn likely to be influenced by the final outcome of the Government's Renewables Obligation consultation process. This level of deployment implies that many suitable parts of the region (e.g. areas within the Humber and North Yorkshire, concentrations of derelict land) deploy moderate quantities of coppice by 2010. The economics of wood combustion become more favourable for medium-scale schemes.

Small Hydro Power

We have put forward figures which assume an increased potential deployment relative to Consultation Scenario C. This reflects comments received during the consultation process, and implies that small hydro schemes are given greater levels of financial support and that statutory requirements governing licensing procedures prove to be relatively straightforward for a good proportion of potential schemes.

Solar Energy Technologies

For photovoltaic power deployment options, we propose targets for 2010 in line with Consultation Scenario C. This attempts to reflect the support for ambitious solar energy targets reflected in stakeholder feedback, whilst keeping in mind the barriers to wider deployment. This level of deployment implies that PV benefits from further measures to encourage cost-reductions and other forms of financial support, for example the continued evolution of grant-support programmes.

Fuel Cell Installations

We propose regional levels of fuel cell deployment to 2010 in line with those put forward originally in Consultation Scenario C. However, to reflect stakeholder comments that fuel cells are not truly "renewable energy", we present prospective regional targets for fuel cells separately as noted above. This implies that an ambitious approach to regional deployment of the technology is still adopted, but outside the context of the RE target figure.

Table 9 - Proposed Target for Renewable Energy Electricity across Yorkshire and the Humber by 2010

Renewable Energy Type / Indicative Size[23]	**Existing Situation**			**Prospective Total by 2010**		
	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)
Offshore Wind Farms (60-100MW ; 20-30 turbines)	0	0	0	2	160	490
Wind Farms (25MW; 10-20 Turbines)	3	24.15	63	10	200	522
Small Wind Clusters (6 MW; 4-10 Turbines)	1	1.2	3	13	73	191
Single Large Wind Turbines (1.5 MW)	4	0.78	2	24	31	81
Single Small Wind Turbines/Chargers (0.03 MW)	?	?	?	30	0.9	2
Co-firing of Biomass in Existing Fossil-Fuelled power stations	0	0	0	2	50	288
Large CHP / Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural & Forestry Biomass (AFB) (20+ MW)	1 Wood 1 Chicken Litter	10 16.7	58 96	3 Wood 2 Straw 1 Chicken Litter	72 40 16.7	357 230 96
Small CHP Plants Fuelled by the Combustion of Energy Crops and/or AFB (5-10 MW)	0	0	0	2 Wood	10	58
Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)	0	0	0	2	1	8
Small-Scale Hydro Power (0.1 MW)	0	0	0	15	3	9
Domestic PV Installations (1.5-3kW$_p$)	?	≈0.15	< 1	7000	10.5	8
Commercial PV Installations (50kW$_p$)				62	3.1	2
Motorway PV Installations (160kW$_p$/km)				15	2.4	2
TOTAL	***10***	***53***	***222***	***106 + PV***	***674***	***2344***

Energy from waste technologies and fuel cells are shown separately within Tables 13 and 14.

The percentages of installed capacity implied by this technology mix for 2010 are:
Wind Energy OnShore: 45%
Wind Energy OffShore: 24%
Biomass Sources: 28%
Solar Photovoltaics: 2%
Small Hydro: < 1%

[23] The categories shown below are indicative of the possible scales at which particular technologies might be deployed. They do not therefore show all possible scales of implementation. For example, small biomass schemes producing electricity and heat at below the 5MW scale are technically possible but are not considered likely to be deployed in large numbers under current support regimes. Similarly, our categorisation of wind clusters as between 4 and 10 turbines does not imply that wind energy schemes of 2 or 3 turbines are not possible.

Table 10 – Indicative Scenario for Sub-Regional Breakdown of Renewable Energy Electricity across Yorkshire and the Humber by 2010

Indicative Renewable Energy Generation Type/Size	EXISTING	NEW				
	Existing Schemes	Humber	North Yorkshire	West Yorkshire	South Yorkshire	TOTAL
Offshore Wind Farms (60-100MW ; 20-30 turbines)	0	2 (160)	0	0	0	2 (160)
Wind Farms (25MW; 10-20 Turbines)	3 (24.15)	2 (50)	4 (100)	1 (25)	0*	10 (200)
Small Wind Clusters (6 MW; 4-10 Turbines)	1 (1.2)	6 (36)	4 (24)	1 (6)	1 (6)	13 (73)
Single Large Wind Turbines (1.5 MW)	4 (0.78)	6 (9)	6 (9)	4 (6)	4 (6)	24 (31)
Single Small Wind Turbines/Chargers (0.03 MW)	?	6 (0.18)	4 (0.12)	12 (0.36)	8 (0.24)	30 (0.9)
Co-firing of Biomass in Existing Fossil-Fuelled power stations	0	0-1 (0-20)	0	0-1 (0-20)	1 (30)	2 (50)
Large CHP / Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural & Forestry Biomass (AFB) (20+ MW)	1 Wood (10) 1 Chicken Litter (16.7)	1 Straw (20)	1 Wood (20) 1 Straw (20)	0*	1 Wood (42)	3 Wood (72) 2 Straw (40) 1 Chicken Litter (16.7)
Small CHP Plants Fuelled by the Combustion of Energy Crops and/or AFB (5-10 MW)	0	0*	1 Wood (5)	0*	1 Wood (5)	2 Wood (10)
Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)	0	1 (0.5)	1 (0.5)	0*	0*	2 (1)
Small-Scale Hydro Power(0.1 MW)	0	0	11 (2.2)	2 (0.4)	2 (0.4)	15 (3)
Domestic PV Installations (1.5-3kW$_p$)	?	1300 (2.0)	1100 (1.6)	2800 (4.2)	1800 (2.7)	7000 (10.5)
Commercial PV Installations (50kW$_p$)		12 (0.6)	8 (0.4)	26 (1.3)	16 (0.8)	62 (3.1)
Motorway PV Installations (160kW$_p$/km)		5 (0.8)	0*	5 (0.8)	5 (0.8)	15 (2.4)
Total	**10 (53)**	**24/25 + PV (280/300)**	**33 + PV (183)**	**20/21 + PV (44/64)**	**18 + PV (94)**	**106 + PV (674)**

Each cell within the table above gives an indication of the number of schemes and the potential installed electricity capacity from those schemes, in the form {Schemes (Installed Capacity)}

*The analysis summarised in Table 10 cannot predict with certainty where schemes will appear and their actual scale, but rather shows prospects for deployment based upon key indicators such as resource availability and the presence of constraints. For example, the pattern of existing wind energy developments within the region is somewhat different from the pattern implied above, and a "zero" does not imply that future schemes of certain scales are out of the question.

Renewable Energy Electricity to 2021

Table 11 shows a prospective overall electricity target for the region to 2021. In general terms our proposals are for targets in line with Consultation Scenario C for 2021, amended in line with the general comments made above for the 2010 electricity target.

Table 11 - Proposed Target for Renewable Energy Electricity across Yorkshire and the Humber by 2021

Renewable Energy Type / Indicative Size	**Existing Situation**			**Prospective Total by 2021**		
	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)
Offshore Wind Farms (60-100MW ; 20-30 turbines)	0	0	0	4	400	1226
Wind Farms (25MW; 10-20 Turbines)	3	24.15	63	18	400	1044
Small Wind Clusters (6 MW; 4-10 Turbines)	1	1.2	3	36	211	551
Single Large Wind Turbines (1.5 MW)	4	0.78	2	84	121	316
Single Small Wind Turbines/Chargers (0.03 MW)	?	?	?	250	7.5	16
Co-firing of Biomass in Existing Fossil-Fuelled power stations	0	0	0	0	0	0
Large CHP / Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural & Forestry Biomass (AFB) (20+ MW)	1 Wood 1 Chicken Litter	10 16.7	58 96	11 Wood 2 Straw 1 Chicken Litter	290 40 16.7	1670 230 96
Small CHP Plants Fuelled by the Combustion of Energy Crops and/or AFB (5-10 MW)	0	0	0	8 Wood	40	230
Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)	0	0	0	20	10	85
Small-Scale Hydro Power (0.1 MW)	0	0	0	30	5	16
Domestic PV Installations (1.5-3kW$_p$)	?	≈0.15	< 1	95000	142	107
Commercial PV Installations (50kW$_p$)				130	6.5	5
Motorway PV Installations (160kW$_p$/km)				40	6.4	5
Wave Energy installations (1 or 30MW)	0	0	0	8	153	??
TOTAL	***10***	***53***	***222***	***472 + PV***	***1850***	***5597***

The percentages of installed capacity implied by this technology mix for 2021 are:
Wind Energy OnShore: 40%
Wind Energy OffShore: 22%
Biomass Sources: 21%
Solar Photovoltaics: 8%
Wave Energy: 8%
Small Hydro: < 1%

Renewable Energy Heat to 2010 & 2021

Table 12 shows prospective target figures for RE heat production to 2010 and 2021. Whilst not explicitly considered during the consultation process we have attempted to propose targets compatible with a "Scenario C" approach to the relevant technologies.

Table 12 - Anticipated Levels of Deployment for Renewable Energy heat production across Yorkshire and the Humber by 2010 and 2021

Renewable Energy Type / Indicative Size	**Existing Situation**		**Prospective Total by**			
			2010		**2021**	
	Schemes	Output (GWh)	Schemes	Output (GWh)	Schemes	Output (GWh)
Domestic-scale Solar Water Heating installations (1.2 MWh/yr)	4,800	5.8	15,800	19	27,800	33.4
Solar Water Heating installations for Swimming Pools (6 MWh/yr)	?	?	1,100	6.6	2,300	14
Solar Water Heating (14 MWh/yr) for commercial/industrial installations	?	?	25	0.35	50	0.7
PSDesign in Domestic dwellings (1-2 MWh/yr)	?	?	2,500	2.5 - 5	Up to 100,000	Up to 100 – 200
PSDesign in Comm. Buildings (3-9kWh/m^2/yr)	?	?	140,000m^2	0.42 – 1.26	Up to 1,000,000 m^2	Up to 3 – 9
Plants fuelled by wood wastes (0.25MW_{th} and upwards)	?	?	75	141	400	750
TOTAL	***≈5,000?***	***≈6?***	***≈19,500***	***≈170***	***≈130,000***	***≈1000***

Applications within domestic buildings and swimming pool applications are assumed to remain the main routes to solar water heating deployment, with uptake proceeding at accelerated rates in line with projections from the Solar Trade Association.

Uptake of passive solar design within the domestic sector is assumed to proceed at a low rate to 2010 but thereafter to be driven in part through changes to the Building Regulations. Within the commercial building sector, the higher potential savings achievable within certain building types is balanced by a much wider range of savings opportunities and the complexity of implementation.

Small-scale "woodheat" plants may present opportunities within specific buildings, particularly where the driving forces for deployment include issues such as rural re-generation.

Energy from Waste Technologies to 2010 & 2021

Separately presented within Table 13 are the anticipated levels of deployment for energy from waste technologies at 2010 and 2021.

Table 13 – Anticipated Levels of Deployment for Energy From Waste technologies across Yorkshire and the Humber by 2010 and 2021[24]

Technology Type / Indicative Size	**Existing Situation**			**Prospective Total By**					
				2010			**2021**		
	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)
Anaerobic Digestion Plants Fuelled by Sewage Gas (0.5 MW)	0	0	0	2	1	8	2	1	8
CHP or Electricity Plants Fuelled by Municipal or Industrial Solid Wastes	1	6.1	35	5	42.7	246	5	42.7	246
CHP or Electricity Plants Fuelled by Landfill Gas	12	25.8	149	39	81.8	471	<39	<81.8	<471
TOTAL	***13***	***31.9***	***184***	***45***	***125.5***	***725***	***<45***	***<125.5***	***<725***

Fuel Cell Technologies to 2010 & 2021

Separately presented within Table 14 are prospective levels of deployment for fuel cell technologies at 2010 and 2021.

Table 14 – Prospective Levels of Deployment for Fuel Cell technologies[25] across Yorkshire and the Humber by 2010 and 2021

	Existing Situation			**Prospective Total By**					
				2010			**2021**		
	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)	Schemes	Capacity (MW)	Output (GWh)
Fuel Cell (FC) Installations	0	0	0	10000	≈60	??[26]	100000	≈800	??

[24] The region's approach to waste issues is currently overseen by the Regional Integrated Waste Management Strategy Group. In the process of consultation they gave a clear indication that waste-to-energy facilities in place at 2010 could – in the first instance - be assumed to be still in place at 2021. Further studies are under way within the waste strategy area which will in due course identify whether this assumption holds good.

[25] Assumed to be deployed at the scales and numbers implied within the breakdown shown in Annex B1

[26] Uncertainties surround the likely energy outputs from different fuel cell applications given the relative lack of operational data at this time. We therefore conclude that it is not appropriate to provide definitive energy output figures.

6.3 The Scale and Ambition of Yorkshire and the Humber's Renewable Electricity Targets

Tables 9 and 11 above summarise the potential composition of renewable energy outputs across the region to 2010 and 2021.

To understand the extent to which these sources can contribute to Yorkshire and the Humber's electricity demand at these dates, it is necessary to know the scale of the current and future demand for electricity across the region.

The recent Energy Forum Foundation Study[27] has provided an up-to-date assessment of the region's energy baseline, in terms of electricity generation capacity and consumption. The Table below draws upon this data to show the current position.

Table 15 – Existing Electricity Generation Capacity and Electricity Distribution across Yorkshire and the Humber

	Total Regional Electricity Generation Capacity[28]	**Estimated Regional Electricity Distribution[29]**
Existing Position at 2001	13,109 MW	24,902 GWh

The prospective regional targets for 2010 and 2021 can then be placed within the context provided by the overall regional position, as shown below.

Table 16 – Estimated Target Contributions from Renewable Energy Schemes to Yorkshire and the Humber Electricity Generation and Distribution for 2010 and 2021

	2010	**2021**
Proposed RE Target (MW)	670	1850
% of Current Regional Generation Capacity[30]	5.1	14.1
Proposed RE Target (GWh)	2344	5597
% of Current Regional Electricity Distribution	9.4	22.5

Changes will of course occur over time in the region's overall electricity generating capacity and distribution profiles, which will in turn influence the apparent percentage contribution of these RE targets to the regional energy balance.

The high level of existing generation capacity within the region is the principal reason why the proposed target of 670MW shows as a low percentage contribution. If the energy output from the proposed RE capacity is instead compared with the region's distributed electricity, it can be seen that the proposed target percentage is close to the Government's proposed national target figure of 10%.

[27] "Energy Forum Foundation Study" – Report for Yorkshire and Humber Regional Energy Forum (2001)
[28] Includes power stations, CHP installations, existing renewable energy schemes and energy from waste plant. Since the publication of the Energy Forum Study, at least one major new generation plant (Saltend at Hull, 1200MW) has come on stream
[29] This is defined within the Energy Forum Foundation Study (P17) as an estimate of the electricity actually distributed within Yorkshire and the Humber.
[30] Calculated as {Prospective RE Target} / {All Currently Existing Plant}. No account is therefore taken of changes to currently existing plant in the denominator

Assuming that landfill gas, sewage gas and the biodegradable fraction of municipal waste incineration remain eligible within the Renewables Obligation, we estimate that - for 2010 - the electricity produced from the total of these sources, in addition to the renewable sources previously identified, will amount to 11.9% of the region's distributed electricity.

7. THE REGION'S ACTION PLAN FOR DELIVERING RENEWABLE ENERGY

The challenges for wide deployment of renewable energy schemes across Yorkshire and the Humber are many and varied. To achieve the scale of deployment envisaged in the targets above requires most - probably all - of the main barriers to deployment to be removed or ameliorated.

In order to provide a means to seize opportunities and tackle barriers, the region needs to develop an Action Plan that provides a means to focus effort by various regional parties. This Section provides an outline structure for such a Plan, itemises 20 short-term Actions that make up its initial key priorities and sets out illustrative approaches for three key action Themes; Land-Use Planning, Education & Awareness, and Renewable Energy Business Opportunities.

Action Plan Outcomes

Measures of how the region will achieve its proposed target and contribute to national aspirations for renewable energy will revolve around actual regional outcomes. These should be phrased in simple terms, such as the following:

1. A regional strategy for RE adopted
2. Regional commitment to strategy recommendations
3. Help and assistance to all those taking RE forward within the region
4. Professional advice and information exchange systems in place
5. Real RE development on the ground – of all appropriate types
6. The region using, and generating from, RE sources
7. A strong regional influence on national policies and initiatives
8. A regional centre of excellence for community-led RE

These categories are not placed within any specific order – and it may be appropriate to consider other categories. Nevertheless these outcomes are taken to be a representative set for the purposes of defining required regional Actions in the first instance. Retaining simple statements of outcome as above will ensure that individual actions taken can be readily related to these.

Structure of the Action Plan

Translation of the desirable regional outcomes into specific activities requires an Action Plan which can impose a structure upon potential activities whilst retaining the flexibility to adapt to changes in circumstances. This is an important consideration in an area such as RE, which is currently relatively fast-moving in policy terms.

We propose an initial framework for Actions as shown in the Table below. The rows represent the desirable Outcomes that are to be pursued, while the columns show key groups whose involvement and participation in the RE agenda is required. Each individual cell represents an Action Area (e.g. Regional Commitment to RE by, or with, Local Authority Planning Officers) within which a number of individual Actions can be undertaken.

Table showing proposed Short-Term Actions and their relevance to Regional Outcomes and key Target Groups

	TARGET GROUPS						
	PUBLIC SECTOR			PRIVATE SECTOR		VOLUNTARY SECTOR	
OUTCOMES	**National & Regional Policy-Making Organisations**	**Local Authority Planning Officers & Members**	**Other Local Authority Staff**	**RE Developers & Business Community**	**Utility Companies**	**Local & Community Groups**	**General Public**
Regional Strategy Adopted	[1]RE report	[1]RE report	[1]RE report	[1]RE report	[1]RE report	[1]RE report	[1]Publish RE report
Regional Commitment to Strategy	[2]Maintain / develop Task Group for Actions [3]Regional / local strategies [4]Best Practice Guidance for RE [5]Energy event [6]Regular RE Confs.	[2]Maintain / develop Task Group for Actions [3]Regional / local strategies [4]Best Practice Guidance for RE [5]Energy event [6]Regular RE Confs.	[2]Maintain / develop Task Group for Actions [3]Regional / local strategies [5]Energy event [6]Regular RE Confs.	[2]Maintain / develop Task Group for Actions [5]Energy event [6]Regular RE Confs.	[2]Maintain / develop Task Group for Actions [5]Energy event [6]Regular RE Confs.	[2]Maintain / develop Task Group for Actions [5]Energy event [6]Regular RE Confs.	[6]Regular RE Confs.
Help and Assistance	[7]Case Studies / Site Visits [8]Signposting service [9]RE in existing funding [10]CRI Support	[7]Case Studies / Site Visits	[7]Case Studies / Site Visits [8]Signposting service [9]RE in existing funding	[8]Signposting service [9]RE in existing funding		[7]Case Studies / Site Visits [8]Signposting service [10]CRI Support	
Professional Advice and Info Exchange	[11]Improve delivery [12]Briefing events & "hands-on" support [13]Web site [14]Local RE forums [15]Finance workshops [16]Electricity issues	[12]Briefing events & "hands-on" support [13]Web site [14]Local RE forums	[11]Improve delivery [12]Briefing events & "hands-on" support [13]Web site [14]Local RE forums	[12]Briefing events & "hands-on" support [13]Web site [14]Local RE forums [15]Finance workshops [16]Electricity issues	[13]Web site [16]Electricity issues	[12]Briefing events & "hands-on" support [13]Web site [14]Local RE forums	[13]Web site
Development on the Ground	[17]Assist development of regional "flagships" [18]RE in public buildings	[17]Assist development of regional "flagships"	[17]Assist development of regional "flagships" [18]RE in public buildings	[17]Assist development of regional "flagships" [18]RE in public buildings	[17]Assist development of regional "flagships"	[17]Assist development of regional "flagships"	[17]Assist development of regional "flagships"
Region Using and Generating RE	[19]RE "green purchase"		[19]RE "green purchase"	[19]RE "green purchase"			
Influence on National Policies	[20]Influence national policies						
Regional Centre of Excellence for Community RE	[7]Case Studies / Site Visits [10]CRI Support [17]Assist development of regional "flagships"	[7]Case Studies / Site Visits [17]Assist development of regional "flagships"	[7]Case Studies / Site Visits [17]Assist development of regional "flagships"			[7]Case Studies / Site Visits [10]CRI Support [17]Assist development of regional "flagships"	[17]Assist development of regional "flagships"

Brief descriptions of each of these numbered Actions are shown in the accompanying text.

In drawing up the Table, we have taken the view that a clear and strong emphasis is required on **short-term actions**, which we define to be those which are initiated, pursued and achieved **within the next 2 – 3 years**. This we feel will give an impetus to the regional RE agenda which is essential if the region is to achieve the desired targets.

This should not be taken to mean that further actions can be left to one side or somehow downplayed. We recommend that Yorkshire and the Humber should turn its attention to other required actions once it has convinced itself that the RE agenda is to be pursued and that a strong regional consensus for action has become established. The region will – by this time – be in a stronger position to identify and define the types of actions that this would entail.

The Table therefore merely provides a convenient framework for the proposed short-term Actions identified. It does not imply that areas not shown are unimportant or that other Action areas are not required over the 10-year period to 2010. **The Action Plan is therefore at this stage simply the list of key Actions shown below, representing an initial programme of work.**

It is also possible within the framework to conceive of "Themes" which might represent individual rows, columns or other groups of single Action Areas. We illustrate the rationale underlying three such themes following brief descriptions of all the individual Actions below.

Description of Short-Term Actions

A brief outline of each of the Actions envisaged is shown below, summarising the Action Title, the lead party (or parties), a Description, Timescale, the Outcome, and Indicator(s) of Success.

ACTION [1]	**Publish and promote RE Assessment Report and/or Summary**
Who responsible?	Government Office
Description	The regional assessment and targets study will provide the best initial basis on which to raise the general profile of RE amongst a variety of target groups. Early publication and dissemination is essential to commence the wider process of regional engagement.
Timescale	Immediate
Outcome	Policy context, relevant information, proposed targets and actions in the public domain. Wide promotion and circulation of the report / summary.
Indicators of success	Report and/or summary published, regional interest raised (evidenced by, e.g., enquiries to GO, hits on web site etc.)

ACTION [2]	**Maintain / develop a Task Group for taking forward Actions**
Who responsible?	Government Office, Yorkshire Forward (Regional Energy Forum), Yorkshire and Humber Assembly
Description	Regular meetings of a suitable and diverse group of regional parties should be used as the means to drive forward the Actions identified here, and to monitor their success.
Timescale	Short term and continuing
Outcome	A Task Group to monitor, manage and facilitate regional activity in support of the RE targets
Indicators of success	Task Group in place, Actions initiated / achieved, progress apparent.

ACTION [3]	**Ensure that renewable energy assessment study approach and targets reflected in key regional and subsequently in sub-regional & local strategies**
Who responsible?	Yorkshire and Humber Assembly, Yorkshire Forward, Government Office, Local Authorities
Description	The content of regional, sub-regional & local strategies should reflect the renewable energy study's recommendations, recognising RE's potential contribution to energy, environmental, economic, social and other areas
Timescale	Short-medium term and continuing
Outcome	RE policy content in relevant regional strategies (e.g. Regional Planning Guidance, Regional Economic Strategy, Regional Sustainable Development Framework) and local strategies (e.g. local plans, community strategies
Indicator of success	Appropriate reference to RE in regional & local strategies, evidence that these changes are influencing RE deployment

ACTION [4]	**Produce regional Best Practice Guidance for renewable energy technologies**
Who responsible?	Yorkshire and Humber Assembly
Description	Best Practice Guidance can be used to provide a focal point for planners' consideration of RE by providing the link between national aspirations, regional targets and planning "on the ground"
Timescale	Short – medium term
Outcome	Guidance used to aid and guide consideration of RE within the planning framework.
Indicator of success	Guidance published, evidence that it is being used and is making a difference

ACTION [5]	**Hold a high-profile energy event**
Who responsible?	Yorkshire Forward (Regional Energy Forum) (with GOY&H, Yorkshire & Humber Assembly)
Description	The RE agenda and actions flowing therefrom must be placed within a wider regional energy context. An energy event would provide an appropriate forum for this.
Timescale	Short term
Outcome	Key decision-makers across many target groups directly informed on RE, the region's approach to RE and its context within wider regional energy issues
Indicator of success	Event held within next 6 months

ACTION [6]	**Regular Regional RE Update Conferences**
Who responsible?	Yorkshire Forward (Regional Energy Forum), Government Office, Yorkshire and Humber Assembly
Description	Major events involving all key target groups
Timescale	Bi-ennial?
Outcome	Opportunity for all parties to report on and celebrate progress, identify areas of success and failure, continue to raise profile of regional RE
Indicator of success	Events held on regular basis, new opportunities identified and used to continue deployment progress

ACTION [7]	**Produce and Disseminate Case Studies illustrating (a) Good Development Practice(b) Good Planning Practice, and organise associated site visits**
Who responsible?	Government Office (with Community Renewables Local Support Team, Yorkshire and Humber Assembly)
Description	Short glossy documents illustrating the elements of good approaches to scheme evolution, development, consultation and planning response within the statutory planning framework. Workshops, site visits to promote the information
Timescale	Short - medium term (existing examples from within the UK, followed in due course by good practice examples from within the region)
Outcome	Wider mutual understanding of the factors underlying successful community RE schemes and good practice approaches to planning approval.
Indicators of success	Case studies illustrating key technologies, scales of application and planning approaches. Site visits arranged and key groups attending. Workshops undertaken, interest and knowledge increased.

ACTION [8]	**Provide a "signposting service" for advice on sources of funding relevant to RE**
Who responsible?	Government Office, Yorkshire Forward
Description	Provide helpline, electronic support via web-site / E-mail, information sheets, to assist those seeking to access funds
Timescale	Short term and continuing
Outcome	Easier means of accessing funding of relevance to RE, which currently emanates from a very wide variety of sources
Indicators of success	Advice service operational and covering all relevant sources, evidence that it is making a difference

ACTION [9]	**Ensure that RE becomes an integral requirement for accessing existing relevant regional funding**
Who responsible?	Government Office (with Yorkshire Forward)
Description	Existing sources of regional funds such as the Single Programme Budget and European Structural Funds should include requirements to consider and implement RE within appropriate development activity
Timescale	Short – medium term
Outcome	RE included within development / re-development schemes part-funded by existing regional budgets
Indicators of success	Criteria for RE support in place, schemes progressing with RE content

ACTION [10]	**Provide additional regional support for the Community Renewables Initiative**
Who responsible?	Countryside Agency, Yorkshire Forward, Government Office
Description	Additional support (such as funds, staff, logistics) to complement activities such as feasibility studies, environmental assessment, awareness-raising and participation processes
Timescale	Short term
Outcome	Greater levels of support available to help kick-start the regional implementation of community schemes
Indicators of success	Support provided and making a measurable difference

ACTION [11]	**Increased networking between public sector agencies to improve delivery capacity**
Who responsible?	Government Office (with Yorkshire and Humber Assembly, Local Authorities)
Description	Many public agencies have a direct or indirect part to play in the delivery of new RE schemes and it is important to encourage a more collective approach to achieving this. Regular networking to explore and understand the roles of different agencies would help to tackle this
Timescale	Short – medium term
Outcome	Better regional understanding of the respective roles of different public sector agencies in the RE area.
Indicators of success	Regular networking forums in place, mutual understanding developed, consequent barriers or opportunities addressed

ACTION [12]	**Provide (a) regular LA planners / elected Members' briefing events, (b) "hands-on" support to LA planners and other staff**
Who responsible?	Yorkshire & Humber Assembly (with GOY&H, other providers, e.g. RTPI)
Description	(a) Informal workshops at which general and specific information would be provided to planners / Members and they would be encouraged to raise questions and seek answers. A development of this idea would be to encourage the active participation of RE developers in such meetings to facilitate free dialogue independent of the formal planning process. (b) Impartial support for all LA staff to encourage wide involvement and identification with RE issues.
Timescale	Short term and continuing
Outcome	(a) An informed context for officers and Members most directly concerned with decisions relating to scheme proposals, and in the development of appropriate enabling policies for RE. (b) Ongoing help-line support for officers to encourage a continuous interest and involvement in RE issues of all kinds.
Indicators of success	Events held / feedback suggesting better-informed audiences

ACTION [13]	**Set up, publicise and maintain a regional web-site for renewable energy issues**
Who responsible?	Government Office, Yorkshire Forward, Yorkshire and Humber Assembly
Description	An electronic means of access to a wide range of documents, initiatives, sources of help and advice etc. In the first instance this would be a one-way site seeking to put across information but subsequently could develop into an information exchange and networking resource.
Timescale	Short term
Outcome	Wide dissemination of - and access to - information on all aspects of RE within the region
Indicators of success	Web-site operational and regularly maintained. "Hit-rate" monitored to provide feedback on usage.

ACTION [14]	**Encourage Local RE Forums**
Who responsible?	Local Authorities (with Yorkshire and Humber Assembly, developers, community groups)
Description	Practical opportunities for RE developers, LPAs and others to develop broad agreement before schemes are submitted and to identify suitable "areas of search"
Timescale	Short-medium term
Outcome	Forums to carry forward the sub-regional targets at LPA level through devising "areas of mutual interest" for RE implementation, input to Local Plan Reviews
Indicators of success	Forums initiated, feedback obtained on "success stories" from this approach ("success stories" subsequently to form basis for new planning case studies, see Action [7])

ACTION [15]	**Hold RE Finance Workshops to identify new scheme ideas and sources of funding**
Who responsible?	Yorkshire Forward (Regional Energy Forum)
Description	Workshops involving finance providers, investors, RE developers, and other corporate sector bodies who are seeking involvement with RE
Timescale	Short-medium term
Outcome	Financial institutions better briefed on RE opportunities: business better briefed on financial issues relating to RE: mutual opportunities for new schemes identified
Indicators of success	Events held, new sources of finance forthcoming, new scheme ideas "on the table" and developing

ACTION [16]	Tackling Electricity Connection Issues
Who responsible?	Yorkshire Forward (Regional Energy Forum)
Description	Assessment of the constraints to RE deployment due to the regional electricity network. This would involve both technical and institutional analyses involving distribution companies, RE developers, third-party experts.
Timescale	Short-medium term
Outcome	Exploration of issues raised by NETA, connection tariffs, technical constraints: means to overcome these barriers.
Indicators of success	Outputs providing greater clarity over immediate opportunities for - and barriers to - deployment (e.g. an electrical "constraints" map or briefing). Further analysis leading to ideas for longer-term network design.

ACTION [17]	Assist the development of regional flagship projects
Who responsible?	Yorkshire Forward (with developers)
Description	A wide range of brokering and enablement activities (e.g. identification of project opportunities, facilitation of financing, discussion with planners, encouragement of high-profile backers such as major corporate sector bodies, etc.)
Timescale	Short term and continuing
Outcome	Developable and "bankable" projects across a range of technology types and scales, that carry wide support from target groups
Indicators of success	Schemes emerging, through exploiting specific opportunities and overcoming specific barriers

ACTION [18]	Encourage RE and energy efficiency in public sector buildings
Who responsible?	Government Office, Yorkshire and Humber Assembly
Description	Influence and assist the procurement of RE within public buildings. Demonstration of public sector commitment to regional targets will be highly motivating to all target groups.
Timescale	Short term and continuing
Outcome	Uptake of RE (and energy efficiency) within new or refurbished public buildings (Government or Local Authority). Ideal case study material.
Indicators of success	Three public sector buildings including RE

ACTION [19]	Securing RE green energy purchase by all key regional partners
Who responsible?	Yorkshire Forward (Regional Energy Forum), Yorkshire and Humber Assembly, Government Office
Description	A campaign to persuade the region to take up "green purchase", thereby assisting the procurement of future RE schemes.
Timescale	Short-medium term
Outcome	Large numbers of regional businesses, all Local Authorities and Government bodies purchasing green energy within 3 years
Indicators of success	One hundred organisations purchasing green across the region (including all Local Authorities)

ACTION [20]	Co-ordinated regional influence on national policies and actions
Who responsible?	Yorkshire Forward (Regional Energy Forum), Yorkshire and Humber Assembly, Government Office
Description	Strong representation of the region's approach to RE to national government, to ensure that national policies and actions support and complement the region's approach
Timescale	Short-medium term
Outcome	Coherent policy and support regimes from national government and regional bodies
Indicators of success	Influence on, for example, content and format of PPG22, consideration of energy issues within planning, permitted development rights for RE, RE within grant conditions.

Illustrative Themes

It is appropriate to consider how the Short-Term actions identified above can be grouped into "Themes". Three such Themes are described below. It should be noted that some of the proposed Actions would fall within more than one of these Themes.

Planning for Renewable Energy

The interaction of renewable energy schemes with the land-use planning system has historically been one of the major factors delaying progress towards the UK's national targets for RE deployment. At least part of the reason for this has been the unfamiliarity of the majority of Local Planning Authorities with different types of RE and their likely natures, scales and features. This is turn has been exacerbated by the legacy of the Non-Fossil Fuel Obligation process, which in practice turned out to give developers insufficient flexibility in respect of key planning issues such as scheme location. Whilst the

development background is now changing as a result of the Renewables Obligation and other Government incentives, the issue of "lack of familiarity" remains.

Across Yorkshire and the Humber, the provision of briefings and other information would help to ensure that those associated with planning decisions on RE schemes can be fully informed and up-to-date on the latest developments.

A series of Actions are proposed for this theme, to:

- Ensure that RE is included within revised regional and local strategies (Action 3)
- Produce regional Best Practice Guidance for RE (Action 4)
- Illustrate good development practice and good planning practice through case studies (Action 7)
- Undertake a regular series of planners and Members briefings and provide "hands-on" support for planning and LA staff on RE issues (Action 12)
- Encourage local RE forums, to facilitate developer / planner interaction (Action 14)

Education & Awareness Raising

Despite the increasingly high profile that renewable energy has enjoyed within the context of Government approaches to climate change and other relevant energy issues, RE has remained a minority sport in terms of public understanding. Even within the energy industry itself, RE is still widely perceived as a threat rather than an opportunity. Indeed the Education and Awareness issue underlies some of the main actions proposed within the regional Theme for Planning.

There is enormous scope for Yorkshire and the Humber to push RE up the agenda in targeted ways. This should – in general terms - aim to focus upon groups whose engagement must be sought and obtained before wider deployment can become a reality. The focus then is not so much upon widespread mass publicity but upon Actions that can draw in key regional groups to assist their identification and involvement with RE.

A series of Actions are proposed for this theme, to:

- Publish the RE Assessment Study and/or a summary (Action 1)
- Hold a high-profile energy event (Action 5)
- Hold regular regional RE update conferences (Action 6)
- Illustrate good development practice and good planning practice through case studies (Action 7)
- Provide a "signposting service" for advice on sources of funding (Action 8)
- Increased networking between public sector agencies to improve delivery capacity (Action 11)
- Undertake a regular series of planners and Members briefings, and "hands-on" support to LA planners and other staff (Action 12)
- Set up and maintain a regional RE web site (Action 13)
- Encourage local RE forums, to facilitate developer / planner interaction (Action 14)
- Hold RE finance workshops (Action 15)

Renewable Energy Business Opportunities

Renewable energy is increasingly identified as a major business opportunity for commercial organisations not currently involved with this area of activity. To encourage - and capitalise on - this situation, it is appropriate for the region to raise the profile of RE amongst the business community and to put across the benefits of participation in financial as well as environmental terms.

In addition there are a number of specific areas of activity that would help RE developers to overcome some of the existing problems facing them (for example interaction with and connection to the electricity network).

A series of Actions are proposed for this theme, to:

- Hold a high-profile energy event (Action 5)
- Hold regular RE update conferences (Action 6)
- Provide a "signposting service" for advice on sources of funding (Action 8)
- Set up and maintain a regional RE web site (Action 13)
- Encourage local RE forums, to facilitate developer / planner interaction (Action 14)
- Hold a series of finance workshops (Action 15)
- Tackle electricity connection issues (Action 16)
- Assist the development of regional "flagship" projects (Action 17)
- Encourage RE in public sector buildings (Action 18)
- Encourage RE "green purchase" uptake" (Action 19)

Beyond the Short-Term: Further Development of the Action Plan

The Actions identified and grouped above provide a basis for the region to pursue RE issues vigorously over the next 2 – 3 years. Beyond that time – and as the short-term Actions take shape – it will be necessary for the region to go further in defining the subsequent steps towards achievement of the RE targets.

Some of the subsequent steps may be apparent now, and we therefore show below some of the outline ideas that have emerged during the consultation process that will be worthy of consideration in the next phases of the regional approach to RE. Some subsequent steps will however only become apparent when progress on the short-term Actions is clearer. This rightly reflects the requirement to monitor and manage the region's RE initiatives in the light of actual progress on the ground.

Outline Ideas for Subsequent Regional Actions

* Integration of RE Actions within the wider Regional Energy Agenda. As the Regional Energy Forum's wider energy activities develop, a closer relationship should be developed between actions envisaged within the RE area and the wider regional energy context. The development of further actions for RE should reflect this need and should be drawn up so as to tackle the whole energy agenda.

* Education and Awareness for the long term. A much wider and deeper effort will be required in time to raise the profile of RE sources, both nationally and across Yorkshire and the Humber.

* Examples of best practice should continue to be sought both from within the region and outside - including European examples.

* 'Champions' should be identified/established within the region to encourage and raise the profile of renewable energy and the wider energy and climate change context.

* Local authorities in the region should be encouraged to set their own targets for renewable energy. This will ensure that particular areas have a greater sense of ownership of schemes that come forward.

* Local authorities may need to produce landscape character assessments for their area to inform the local plan process and to identify landscapes that would be more/less acceptable locations for renewable energy schemes. Wherever feasible these should utilise or build upon existing assessments.

* Strategic Environmental Assessment should be applied where appropriate to determine the technologies and potential locations of renewable energy in the region such that targets identified can be met. This may be undertaken at a sub-regional level or by individual authorities. Such studies can be used to establish the strategic framework within which individual proposals can be considered. This should result in greater certainty and guidance for developers of renewable energy proposals.

* Organisations within the region should make the provision of renewable energy a consideration when dealing with the disposal of land.

* A RE Development Agency, funded (for example) by the utilities, the Yorkshire and Humber Assembly, Yorkshire Forward, developer contributions and revenue from energy sales should be encouraged. In addition to encouraging and bringing forward schemes a RE Development Agency could act as a body to remediate and restore contaminated land.

* The legality and practicality of requiring developers to contribute to RE should be reviewed, either directly through adoption of RE technology in new development / re-development or indirectly through – say – a RE Development Agency.

* The Government Office, the Yorkshire and Humber Assembly, Yorkshire Forward and all local authorities (and other appropriate bodies) should encourage the development of a suitable skills base. This is particularly required for solar energy deployment, where increase of deployment above the current low level of uptake will probably create noticeable skills shortages.

* Local authorities should be encouraged to be more pro-active where they have established that there are particular opportunities for the deployment of renewable energy in their area. This is likely to be of greatest benefit where a co-operative approach is taken within Councils, encouraging relevant departments to adopt a joint approach. In light of the Renewable Obligation local authorities may consider liasing with power providers to achieve positive solutions.

* Planning proposals should include an energy use assessment. This can be used to encourage developers to consider the energy (electricity and heat) requirements of proposed developments at an early stage in the development and planning process.

This might be achieved through a number of measures:
- Production of supplementary planning guidance addressing the energy implications of proposals. This should include both electricity required and heat inputs/outputs;
- Development briefs can be used to seek an element of renewable energy within schemes being brought forward. This must be based within the context of a supportive planning policy framework as outlined above;
- Energy requirements of proposals should be included in formal consultation on planning applications. The existing role of energy managers within local authorities could be expanded to take on the role of consultees in this respect.