

Biomass Development Service

**Making Biomass Work in the North York Moors National Park,
Howardian Hills AONB and Ryedale District**

April 2007 – September 2008

Project Report

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1. Background

This report sets out the achievements of the Biomass Development Service project funded by the North York Moors National Park and Howardian Hills AONB sustainable development funds, Ryedale District Council and Yorwoods. There is also an identification of further biomass opportunities in the local market, an overview of the state of the local biomass supply chain and barriers to woodfuel adoption. The report sets out the next steps in terms of ongoing support for project beneficiaries in an exit strategy, conclusions are drawn and finally, as an appendix to this report, a study on the practical potential of local woodlands to contribute to woodfuel supply in the project area is provided.

2. Project Objectives

The original project application set out the following key objectives:

1. Develop a dedicated resource to provide a clear and unbiased information, facilitation and networking service for biomass development in the area;
2. Promote the use of wood and other biomass for heat and power generation;
3. Work in close partnership with the Community Renewable Energy project and the existing community groups where biomass has been identified as a potential scheme;
4. Engage with and bring into management, through woodfuel supply opportunities, unmanaged and undermanaged woodlands in the project area. Ensure the management of these woodlands is to a high standard of sustainability and enhances the special qualities of the National Park and AONB and contributes to the landscape enhancement of these areas;
5. Gain a greater understanding of the capacity for the local woodland resource to supply timber for woodfuel;
6. Encourage the use of biomass for heat in public buildings, schools, leisure services, rural estates, farms and other suitable applications;
7. Strengthen the development of the contractor supply chain and infrastructure;
8. Develop and provide technical training packages for local installers, communities and those involved in the supply chain
9. Provide assistance with feasibility work where required
10. Establish biomass heating and Combined Heat and Power (CHP) installations for community and district heating schemes and provide assistance with accessing the range of funding opportunities available.

3. Outputs and outcomes

Outputs set

The original project plan set out the following outputs in the first year:

- Identification of 3 community based biomass renewable energy projects across the NYMNP, Howardian Hills AONB and Ryedale District.
- Identify 10 biomass suppliers within the project area and provide information, advice and guidance and training and connect these suppliers with potential biomass schemes
- Create 1 job
- Bring into management 500ha of local woodland through increased use of wood as a renewable fuel in the local supply chain
- 10 training opportunities in woodfuel systems and the supply chain by assisting beneficiaries to access existing training initiatives such as the Ignite programme
- Create an online woodfuel resource base of local fuel and equipment suppliers

It should be noted that the following outputs were provisionally set for the second and third years of the project if such extensions were granted:

- Develop 3 community based biomass renewable energy projects across the NYMNP, Howardian Hills AONB and Ryedale District
- Support 20 businesses in the biomass supply chain through information, advice and guidance and training
- Safeguard 3 jobs in the supply chain
- Create 2 jobs in the supply chain
- Bring into management 500 ha of local woodland through increased use of wood as a renewable fuel in the local supply chain
- Provide 10 training opportunities in woodfuel systems and the supply chain by assisting beneficiaries to access existing training initiatives such as the Ignite programme

Outputs Achieved

The project supported the following community schemes:

1. Ryedale District Council: installation of woodfuel boilers at Ryedale House, Pickering Swimming Pool and new business starter units in Malton. The project focused on supporting the development of a woodchip fuelled heating system at Pickering Swimming Pool. A design and engineering feasibility study was commissioned for the scheme and this is being used to inform a funding package and tendering scheme for the project.
2. Community woodfuel project at Bransdale: assisting the National Trust to scope out the potential for wood heating uptake amongst tenants in Bransdale and bringing forward supplies of woodfuel from nearby FC owned woodland. A survey combining the applicability of wood fuelled systems and thermal efficiencies of the all the buildings (National Trust and non National Trust properties alike) has been completed. This survey will be used to inform a wider report on the creation of a Bransdale wide woodfuel project and any funding streams that can be accessed.

3. Community woodfuel supply project at Beck Holes: assisting Beck Hole community group to scope out the potential to bring forward supplies of woodfuel from local woodlands. Beyond initial advisory visits and correspondence, this scheme has not progressed as far as the Bransdale project.

Other outputs achieved are as follows:

1. Feasibility reports completed for 8 woodfuel supply and or heating projects:
 - Castle Howard
 - Hawnby Estate
 - Pickering Swimming Pool
 - Spikers Hill Farm
 - Urra Estate
 - Broom House
 - Botton Village
 - Thimbleby Estate
2. Advice given to 19 businesses on woodfuel production and supply
3. Ignite woodfuel production and supply training course delivered to 10 local individuals and businesses.
4. Information on woodfuel made publically available on the Yorwoods web site and via the Yorwoods office.

It can be seen that the project has been successful in most areas. Three community based projects have been identified, Ryedale DC swimming pool at Pickering, Bransdale and Beck Holes communities. Information, advice and guidance has been given to 19 woodfuel suppliers in the project area to date. Training in woodfuel production and supply has been given to 10 individuals and businesses in the project area through the ignite course run on the 27th February 2008. However, the project has not been successful in bringing 500ha of woodlands into management. This target was reliant on the community based heating schemes in Bransdale and Beck Holes advancing beyond the initial feasibility stages which they have not yet done and no management activity has been undertaken as yet. However, the project has been successful in advising private woodland owners on how to manage woodlands for fuel production and how best to utilise this themselves. Over 850 hectares of woodlands have been reported on in this way.

The uptake of services offered by the project has been much lower than anticipated at the start of the project. This was despite a targeted and sustained promotional campaign that saw an early project launch, press releases and wide ranging mail outs to local residents and parish councils in the project area. In addition to this, the woodfuel heat market in the project area (and further afield) has been slower to develop than anticipated. This is due to a combination of lack of knowledge and awareness from potential end users, an immature supply chain and that fossil fuel prices are still relatively affordable for most. However, the fossil fuel price rises we have seen in 2008 (see section 4 for more details) has resulted in a spate of enquiries towards the final three months of the project.

4. Further Biomass Opportunities in the Local Market

Since the start of the project in spring 2007, the price of oil was still relatively low at \$65 US a barrel. It wasn't until spring 2008 that prices rose above \$130 US. This has had a major influence on the uptake of small scale renewable energy technologies, particularly in rural areas that are off the mains gas network.

Woodfuel in particular has become very competitive price wise with fossil fuels. Table 4.1 shows a comparison of the energy costs of different fossil fuel types against the common forms of wood fuels that are readily available in the project area.

Table 4.1

Fuel Type	Unit cost	Unit	p/kWh
Fire wood (<25% moisture content)	£110	Tonne	2.75
Wood chips (<35% moisture content)	£85	Tonne	2.40
Oil	£0.60	Litre	5.70
LPG	£0.45	Litre	6.20
Electricity	£0.175	kWh	17.50

Given this rise in fossil fuel prices and the relative cheapness of woodfuels, there are two major market expansion opportunities for woodfuel in the project area:

1. Domestic use
2. Small scale commercial/industrial use

1. Domestic use: a large part of the project area is off the mains gas network and the main forms of energy use for heating and hot water is oil, LPG or electric. A simple survey of population and households in the project area shows that there are about 150,000 residents and about 70,000 households (including the larger populated areas of Malton, Pickering, Scarborough and Whitby). A substantial proportion of these households will not be suitable for woodfuel heating technologies due to size, location, type of building (flats, shared housing etc.). However, if a modest 5% of these households converted to some form of woodfuel heating and with an average property using about 20,000 kWh of energy a year, this would generate a requirement for about 22,500 tonnes of woodfuel in either log or chip form to be sourced from the locality. This is a significant amount of timber and represents about 25% of the Forestry Commissions annual cut from the North York Moors forest district alone.

2. Small Scale commercial/industrial: there have been a number of private estates, farms and rural businesses that have come forward during the life of the project, in particular, rural mixed farming and forestry estates and tourism and leisure businesses. Many of the private estates have large houses and numerous other dwellings attached that suit district heating networks well. The project area has a number of good examples of this including Urra Estate near Chop Gate that operates a log gasifying boiler, Beadlam Grange near Kirbymoorside operating a multi fuel biomass system and the Kirkdale Manor woodchip district heating network near Helmsley. These projects combined require an annual consumption of around 300 tonnes of woodfuel and the proposed woodfuel project at Pickering Swimming Pool has been given an estimated annual woodchip requirement of 400 tonnes of timber alone. There is significant growth opportunity within this sector to increase the uptake of woodfuel

heating and a requirement similar to that of the domestic market could easily be reached by a modest number of commercial and industrial applications in the project area.

More accurate figures are required to give a clearer picture of the potential of biomass renewable energy in the project area. This would require not insignificant additional research and market assessments as the figures provided above are estimates based on the information gathered during the project.

5. State of the Local Biomass Supply Chain

The project has worked with 19 businesses either currently involved in woodfuel supply or that are looking to get involved in woodfuel supply. There are a number of firewood merchants in the project area that have not been identified but nonetheless play an important part in the supply of woodfuel products

The woodfuel supply operatives in the project area that we have worked with are currently supplying around 3,000 to 4,000 tonnes of woodfuel products to the existing local woodfuel markets (this excludes the firewood merchants we have not engaged with). These operatives are well equipped and have adequate infrastructure to meet the current requirement. However, it can be seen from the estimates in section 4 of the potential of the biomass market that additional suppliers, equipment and infrastructure will be required to meet any increase in demand. This will be particularly the case for supplies of woodchips to commercial/industrial woodchip fired systems.

The Yorwoods Woodland Resource study (see appendix 1) highlighted that there could be a significant proportion of the woodlands in the project area that could be brought into more productive management, particularly privately owned woodlands and that there could be up to 5,200 ha available. If we take a conservative average yield class of 10 (yield class refers to the volume of timber 1 ha puts on in a year) for these woodlands, then the annual sustainable cut from the currently unmanaged private sector resource could be as high as 52,000 tonnes per year, enough to meet the estimated market growth in section 4 above. If a woodfuel market of 52,000 tonnes develops within the project area, this will displace some 50,000 tonnes of fossil CO₂, a not insignificant amount that would help contribute to the regional CO₂ reduction target of 5 million tonnes by 2010 as set by Yorkshire Forward.

It should be noted that other sources of woody biomass can be brought into play and no doubt will be given time and market expansion. The project area could also benefit from woodfuel products sourced from the following resources:

1. Sawmill co-products: this includes slab wood, off cuts, chips, shavings and dust. Beckdale Sawmill is actively involved in supplying woodfuel products to local users and Duncombe Sawmill has expressed a strong interest in doing so. Beckdale alone has the ability to produce in excess of 10,000 tonnes of fuel quality woodchips.
2. Arboricultural arisings: this includes woody material produced as a result of street tree management, line clearance and high ways maintenance. It is not possible to provide an estimate of the amount of material that could be made available but it is true to say that a lot of arboricultural arisings are currently disposed of or composted and these streams could easily be diverted into the local woodfuel market as it grows.

3. Recycled/reclaimed clean post consumer waste wood: this includes clean waste wood products such as pallets, packaging and dunnage. As with arboricultural arisings, it is very difficult to put an estimate on the amount of material that could be made available.
4. Energy crops: woody biomass energy crops could be grown in less landscape sensitive sites of the project area such as land out with the National Park and AONB where deemed appropriate. There are current planting incentives in the form of the Energy Crops Scheme and for the first time, certain native species of tree are eligible such as birch, ash and alder which may fit with both landscape and biodiversity objectives as well as providing a sustainable yield of woodfuel. Again, it is not possible to put an estimate on this resource as it is unknown how much energy crop is present in the project area and what the potential is for this to be increased.

More accurate figures are required to give a clearer picture of the potential of biomass renewable energy in the project area. This would require not insignificant additional research of the supply chain as the figures provided above are estimates based on the information gathered during the project.

6. Local Barriers to Woodfuel Adoption

As mentioned in sections 4 and 5 above, the woodfuel market could grow significantly, even with modest uptake by domestic and commercial end users. There is also enough forest resource out there to meet a modest market growth. However, there are still significant barriers to the uptake of woodfuel in the project area despite the rise in fossil fuel prices that occurred during the lifetime of the project. These barriers can be separated into two main categories:

1. Infrastructure, skills and training
2. Awareness raising, knowledge transfer

1. Infrastructure: significant investments will be required to incentivise and facilitate the uptake of forest management in the unmanaged private sector forest resource. This will involve investment made by woodland owners to improve the harvestability of their woodlands and investments made by foresters and contractors in the machinery required to manage and extract timber from these woodlands. The low asset gearing ratios of forestry businesses makes it difficult for them to raise the finance required for these investments and this means funding schemes such as the RDPE and the new Yorwoods Woodfuel Infrastructure Programme will play a vital role in bringing forward the woody biomass supply chain in the project area. In addition to investments in the forest resource, investment will be required in the processing, handling, storage and distribution of woodfuel products to end users. Again, low asset gearing of traditional forestry and woodfuel supply businesses means public sector market intervention in the form of grant support will help stimulate the supply chain. In addition to capital investments, there is a requirement for a knowledgeable and skilled work force and there is a significant skills and training need for both woodfuel suppliers and woodfuel system installers and heating engineers.

2. Awareness raising and knowledge transfer: even though the unit price of woodfuel is cheaper than fossil fuels, uptake has been slow by both the domestic and small scale commercial sectors due to a lack of knowledge and awareness of the benefits of wood fuels. There is also an inherent mistrust of woodfuel as it is often seen as unreliable, poor quality and even expensive. These barriers can be partly addressed by national initiatives such as the Energy Savings Trust and local initiatives such as the Community Renewable Energy Project. Also, the development of successful local case studies and exemplar sites of both fuel supply and heating systems will also help to address this issue.

7. Exit Strategy

Section 3 outlines three community based schemes that the project has been working on along with a number of fuel supply chain operatives. Together, these schemes have developed a local woodfuel cluster in the Ryedale area. This cluster has been integrated into the Yorwoods Woodfuel Infrastructure Programme. This is a three year Yorkshire Forward funded programme that aims to accelerate the uptake of biomass renewable energy across the region. Yorwoods has been successful in securing funding that will allow it to continue to service the beneficiaries brought forward under this project and to continue to provide a similar service to communities and businesses across the North York Moors, Howardian Hills and Ryedale district. The programme also has a capital grant element attached and Yorwoods can provide funding to help develop the emerging supply chain.

8. Conclusions

The following conclusions can be drawn from the project:

1. The project was successful in engaging with woodfuel end users and suppliers and has brought forward a number of high profile schemes including the Bransdale community project and Pickering Swimming Pool
2. The project was not successful in bringing 500 ha of woodlands into management due to time constraints and the slow progress made by the Bransdale and Beck Holes community schemes. However, good engagement with private woodland owners was achieved and this may yield results down the line
3. There is enough timber and other woodfuel resources within the project area to meet modest domestic and small scale industrial market growth however,
4. As recommended in the woodland resource report, more detailed surveying of woodlands in the project area is required to gain a better understanding of the nature of the resource and its potential to produce woodfuel
5. Further investment in forestry infrastructure and woodfuel supply chains is required including skills and training for the work force in order to ensure an effective and resilient supply chain that can adapt to changing market conditions
6. There needs to be greater awareness and a wider appreciation of woodfuel for both the domestic and industrial markets to grow
7. Significant CO₂ savings can be achieved by growing the woodfuel market in the project area.

Appendix 1

Biomass Development Service

North York Moors, Howardian Hills and Ryedale District Council
area out with the designated landscape

A summary of the woodland resource and its use for woodfuel

1. Introduction

1.1. This summary is intended to overview the woodland resource within the project area with a view to assessing the potential of locally felled timber to supply woodfuel to the growing renewables sector. The provision of heat and power to businesses and communities through the burning of locally sourced and sustainably-grown timber has the potential to be an extremely carbon-lean product and could contribute to new or existing developments where the need to demonstrate carbon savings, or even carbon-neutrality, is required. As an energy source, and as oil and gas prices rise, woodfuel could also represent significant cost savings in comparison with some fossil fuels. It is also likely that locally sourced woodfuel will not experience the market volatility of imported fossil fuels.

1.2. The summary does not draw upon any original research. It has however been produced following a literature review and with the in-house knowledge of the Yorwoods Woodland Initiative, which has ten years experience in working with policymakers and stakeholders in the project area, offers management advice to owners and managers and has either controlled or contributed to various development projects to improve and enhance role of the forestry sector within North Yorkshire.

2. History of the woodland resource

2.1. The landscape of the North York Moors and surrounding areas has been significantly influenced by human activities. Research has demonstrated that following the most recent glaciation there was repetitive woodland disturbance by pre-agricultural human groups on East Bilsdale Moor and strong evidence for repeated local fire-clearance of woodland in the latter Mesolithic period (*Simmons and Innes 1988*).

2.2. Peterken (2002) regards the landscape as 'man-made' with the processes which developed the current landscape lasting some 6,500 years, with much of the modern woodland pattern in place by 1300 AD. The clearance of the original forest cover left remnant woods, now known as ancient woods, mainly on steep ground with thin soils, and locally on wet ground and streamsides. Most of this wooded ground lies between moorland and farmland, or within farmland on narrow, deeply incised valleys.

2.3. The loss of ancient woods continued in historical times, but new woodland was also created by planting on open ground or when trees naturally colonised vacant territory. These secondary woods differed from ancient woods in several respects: in particular, introduced tree species were common and often dominant, and most were treated as high forest. The distinction between ancient woods and the recently originated secondary woods broke down during the 20th century because traditional systems fell into disuse and many ancient woods were transformed by planting. Many ancient woods in the North York Moors and surrounding areas were restocked with conifers (*Peterken 2002*).

3. Current area of woodland resource

3.1. The project area covers the North York Moors National Park (NYMNP), plus the Howardian Hills AONB (HHAONB) and the remainder of Ryedale District Council (RDC) outwith the two designated landscapes. The Park and AONB incorporate parts of local authority areas other than Ryedale (i.e. Scarborough Borough Council (SBC), Hambleton District Council (HDC) and Redcar and Cleveland Borough Council). It is therefore difficult to estimate exactly how much woodland there is in the area as figures tend to quantify the woodland resource either in the designated landscapes or the local authority areas, but not a synthesis of both.

3.2. With reference to the Regional Forestry Strategy for the Yorkshire and Humber Region (*Forestry Commission 2005*) the total area of woodland within the RDC, HDC and SBC local authority areas is as Table 3.1:

Table 3.1: Area and woodland cover by local authority

Local Authority	Area (ha)	Woodland Area (ha)	Woodland Cover
Hambleton	131,124	7,916	6%
Ryedale	150,659	20,485	13.6%
Scarborough	82,653	10,789	13.1%
Total		39,190	

3.3. Approximately half of the 39,190 ha is owned by the Forestry Commission (FC) and managed by Forest Enterprise. The remainder is privately owned or in the ownership of other public sector organisations. However as the project area does not include 37% of SBC or 80% of HDC the above total is evidently overstated. The most significant Forestry Commission holdings (over 1000ha) are however located entirely within the National Park. These are Cropton, Dalby, Langdale and Wykeham Forests. The four forest areas are totalled at Table 3.2:

Table 3.2: Significant FC woodlands in the project area (*Forest Research 2007*)

Forest	Area (ha)
Cropton	3,662
Dalby	3,598
Langdale	3,009
Wykeham	1,117
Total	11,386

3.4. It is known that the woodland area of the NYMNP and HHAONB are as at Table 3.3:

Table 3.3: Area and ownership of woodland area in designated landscapes

Designation	Area (ha)	Woodland area (ha)	Woodland Cover	FC Ownership (ha)	Private/Other Ownership (ha)
NYMNP	144,000	28,800	20%	19,155	9,645

HHAONB	20,400	3,100	15.2%	550	2,550
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3.5. It can therefore be surmised from the above figures that the project area comprises at least 33,000ha of woodland but less than 39,190ha. At least two-thirds of the overall figure is owned by the FC and is located within the National Park. The HHAONB has a far greater proportion of privately/other owned woodland and the figures show that this proportion must be even more marked outwith the NYMNP and HHAONB. Though the figures cannot be exact for the reasons stated at 3.1 it is estimated that in the rest of the project area as little as 4% of woodland could be FC owned. It is estimated that there is a minimum of 13,000ha of privately owned woodland in the project area and that some 1,000ha of this is outwith the NYMNP and HHAONB.

4. Availability of the current woodland resource for woodfuel

4.1. It is reasonable to assume that all the Forestry Commission estate and a significant minority of the larger privately-owned woodlands in the project area are in management and are producing timber that is of significantly better quality for woodfuel provision and/or have already committed poorer quality timber to existing markets (i.e. for chip/pulpwood or for woodfuel to current users). However from Yorwoods experience in advising on and implementing policy and projects; and in proffering advice to landowners or managers with forestry interests it is assessed that as much as 40% of the private/other owned forest estate is neglected or undermanaged. From the estimation at 3.5. this therefore means that there is at least 5,200 ha of woodland which requires greater silvicultural management.

4.2. The reasons for the neglect of woodlands within the project area are varied. There has been a longstanding depression in domestic timber prices. The UK imports 72% of its timber needs and cheap supplies from Eastern Europe have reduced prices for UK standing sales in 2005 to 25% of levels in 1995 in real terms. Since 2005 timber prices have been recovering, and the overall profitability of UK forestry is around 3% (*Lawson and Hemery 2007*).

4.3. There are also issues which make the economics of harvesting and marketing timber sourced from woodlands within much of the project area more problematic. For timber harvesting operations to be viable the woodlands have to be:

- Sizeable
- Accessible (both in terms of in-forest infrastructure and by road)
- Able to provide a desired timber type and/or sufficient volumes of the product
- Able to service markets which are within an economic radius (owing to haulage costs)

4.4. Because of the very nature of the much of the woodland resource outside of the extensive conifer plantations which typify much of the FC and larger private estates (see 2.2.) some or all of the above factors can limit economic management opportunities. The FC and larger private estates had the ability, through size, well-maintained access, quality of timber and continuous management, to come through the lean economic period. The owners/managers of many smaller woodland holdings could not interest timber merchants or forestry contractors in harvesting packages that could be offered. Therefore, significant areas of woodland have been neglected and missed either optimal times for clearfelling or vital thinning operations. Following this history of intermittent management and neglect areas of woodland therefore now have a sub-optimal timber resource and would be suitable for the supply of woodfuel applications.

5. Considerations for future woodfuel supply

5.1. Overall in an area where some 8% of the total land area is woodland in non-FC ownership there is likely to be a significant amount of timber within the project area which has the potential to service woodfuel applications. There are various considerations in exploiting this resource:

- Should those forming policy or making decisions about future renewable energy targets from woodfuel in the project area require a realistic assessment of potential volume of timber available for any market, including woodfuel, some form of comprehensive survey is required. Such figures cannot be established with any degree of confidence until surveying which takes account of the factors given at 4.3. is undertaken.
- To stimulate woodfuel supply there must be local applications which require the fuel. Applications where the need to provide heat and hot water requires a boiler of >100KW output must be encouraged to consider woodfuel, primarily in the form of woodchip (in the absence of a local pellet processing facility). All local authorities and statutory agencies within the area should consider woodfuel when appropriate existing boiler systems require replacement or new build is being created. If such projects are implemented the need for woodfuel supply will encourage local contractors to source feedstock locally, therefore encouraging private sector applications to follow.
- If neglected woodlands are brought into management through provision of woodfuel supply the logical conclusion is that such activity will, in the medium to long-term reduce the availability of such material. i.e. better managed woodlands will provide better quality timber which can supply more profitable markets.

6. Key conclusions

There is a significant amount of privately-owned, undermanaged woodland in the project area.

The difficulties of harvesting timber from these woodlands economically must be considered.

The management history and nature of this woodland probably provides better than average volumes of timber per ha for prospective woodfuel markets in the short-term.

Prospective volumes cannot be established without a survey programme.

To stimulate woodfuel supply from woodlands local end-user applications must be encouraged.

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