Cairngorms NATIONAL PARK

Cairngorms National Park
Woodfuel Action Plan

The Cairngorms National Park Woodfuel Action Plan has been prepared by Highland Birchwoods on contract to the Cairngorms National Park Authority, with input from the Cairngorms Woodfuel Steering Group. The steering group comprises representatives from Cairngorms National Park Authority, Forestry Commission Scotland, ConFor, Highland Council, Moray Council, Aberdeenshire Council, Scottish Enterprise, Highlands and Islands Enterprise and Community Woodlands Association.

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Executive Summary

This report examines the potential woodfuel supply and the heat demand in the Cairngorms National Park (CNP) and identifies the opportunities and barriers to meeting that demand through woodfuel markets. It then makes a series of recommendations for action to develop further opportunities and to overcome the barriers. There is considerable scope to expand the woodfuel supply within the CNP to meet a significant proportion of the potential demand.

In line with Scottish Government policy the overall aim of the action plan is to develop the woodfuel sector in the CNP area in a way that demonstrates that rural development can be compatible with biodiversity and landscape benefits on the one hand, and reductions in carbon emissions on the other. The measures suggested throughout the plan are wide ranging and delivery will be both complex and demanding. A steering group will be required comprising the lead partners for the various actions.

In developing the Cairngorms Woodfuel Action Plan it was important to ensure that it both mirrored the policy context and linked with existing projects and initiatives. Accordingly it emphasises building upon what is already there; whether in the form of action on the ground or in the provision of training and advice and as such, provides a framework for the continued expansion of sustainable woodfuel use in the CNP area.

The quantity of available timber was assessed taking a broad range of constraints such as designations, topography and access into consideration, establishing that about 47% of the readily available timber is required to meet total heat demand within CNP. However, demand for timber is such that much of this will be committed to industries with high value end products.

To ensure that woodfuel market development proceeds at a steady pace it should be possible to facilitate the parallel development of woodfuel markets and markets for better quality timber. Much of public sector forestry is tied to existing markets; hence the key to providing sufficient woodfuel for significant market expansion is to stimulate felling and thinning in the private sector. The report highlights the need for best practice guidance on management for wood fuel to maximise production without displacing other timber industries or compromising conservation, landscape, amenity values.

More information with respect to private sector forestry would enable effective targeting of training, information, support and advice to encourage resource diversification and expansion. Additionally, the dissemination of best practice guidance on forest management is required to ensure that the markets stimulated can be supplied on a sustainable basis.

In order to assess current demand, and the potential increase in demand, a detailed heat-mapping exercise was undertaken which identified suitable sites for woodfuel installations at different scales. This, in combination with the supply forecasts, has been utilised to assist in the identification of realistic development targets.

The report shows that barriers to realising potential demand included the perception that woodfuel is costly, inconvenient and unreliable, poor access to information, concerns relating to ecological sustainability and lack of confidence at all levels in the supply chain. These can be addressed by raising awareness of successful installations and businesses, for example through case studies, provision of advice, information and training. Developing stronger linkages and communication between the supply and demand sides of the market also promotes the sector as a coherent whole so that potential consumers are aware of its growing strength and resilience.

Difficulty in accessing advice and information at all stages of the supply chain has been identified as a barrier to further woodfuel development in the Highlands. The plan calls for resolution of this issue through collation and co-ordination of existing information and support services, specialist and basic training. To achieve the best results it will be essential to maintain open channels of communication with resource managers so that individual wood fuel projects can make an informed assessment of their timber supply and any issues that they will need to address. Close co-operation between CNPA staff, other government agencies and local landowners will be important in achieving this.

It has been suggested in the plan that targets for rural development should be based on employment created and additional woodfuel sold as a result of the action plan. The landscape and biodiversity benefits could be measured by the area of woodland re-stocked with mixtures incorporating significant proportions of native species which refers to woodfuel production in the SRDP application.

The most important measure is the reduction in carbon emissions. The plan suggests that the CNPA aims to have firm plans in place by the end of the first three years to reduce its CO_2 emissions by 16% as a result of replacing 20% of its heat and hot water demand with biomass. In order to achieve this it will be necessary to ensure that 20,000 tonnes or 34,000 m^3 of timber is available on a sustainable basis. The estimated annual value of this is £1.6m at £80/tonne and anything up to £2.8m for boilers and infrastructure. CO_2 savings would be 172,000 tonnes.

The actions evolving from the plan are detailed at the end of each chapter and bought together in chapter 6, wherever possible existing projects and initiatives have been identified as delivery mechanisms for the actions. In many instances these are already at least part-funded and, if the assumptions in the final section of the report are correct, implementation of the action plan over three years may already be 43% funded. Options for securing further funding are discussed.

Chapter 1: Introduction

Wood has always been an important energy source, and an open log fire is still an icon for relaxation comfort and security. When dry, wood is a very good source of heat having, weight for weight, almost 80% of the calorific value of coal. It is also effectively a carbon neutral fuel if the wood is from a sustainable source because the CO_2 absorbed from the atmosphere during tree growth equals the CO_2 released into the atmosphere as the resulting wood is burnt. Wood also gives off low levels of SO_x, and NO_x. In addition, it brings greater rural development benefits than other forms of renewable energy.

For all of these reasons there has been growing interest in woodfuel as an alternative energy source which also contributes to improved fuel price stability and security of supply. Reinforced by a range of EU, national and local policy initiatives and support measures, this has resulted in steady, if slow, growth of woodfuel markets.

Despite some notable successes progress throughout the Highlands has been patchy and inconsistent. Led in many ways by the Aberdeen Renewable Energy Group and assisted by the proactive role taken locally by both the local authority and Forestry Commission Scotland, progress in Aberdeenshire has been more rapid than it has been in Highland where difficulties with some prominent projects have hindered wider supply chain establishment.

In Angus, the success of Angus Biofuels has encouraged the local authority and others to take a positive view of biomass and as a result the number of biomass installations is continuing to increase.

The difficulties encountered in developing woodfuel markets stem from a range of actual and perceived market failures and institutional barriers. These barriers apply as much to the Cairngorms National Park (CNP) area as they do to the rest of the Highlands. Apart from the incentives referred to above there are additional benefits to developing woodfuel markets within the CNP. Firstly, if the woodfuel resource is developed and managed appropriately it can also make an important contribution to landscape and biodiversity values. Secondly, local woodfuel markets can provide an economic incentive for more active management in plantation forests and so to improve local timber quality and value thus ensuring that more of the carbon stored in woodlands is sequestered in long term construction projects as a substitute for concrete and steel, whilst producing woodfuel as a crop on an ongoing basis. Finally, given their importance in terms of natural heritage, landscape, biodiversity and economic value, National Parks are ideally placed to act as exemplars of how tangible multipurpose public benefit can be delivered through sustainable environmental management of natural resources such as wood.

The development of woodfuel markets, particularly as part of a multipurpose approach to forest management and utilisation requires the balancing of potentially conflicting market forces. Woodfuel markets compete with existing small roundwood (SRW) using markets for a finite timber supply. Woodfuel also competes with other forms of energy for its markets.

Current energy prices are comparatively low and the challenge is to supply woodfuel at a price which is sufficiently attractive to the consumer to ensure a reasonable payback time for the significant additional costs of a woodfuel installation compared with oil, gas or electricity powered systems. At present this is proving extremely difficult without extensive grant support, which makes it all the more important for supply chains to reflect best practice in natural resource management and use, and in carbon management, thereby ensuring wider public benefit from the use of public funds.

As energy prices rise woodfuel will become more attractive to consumers, and suppliers may also have more market headroom to raise prices. This in turn increases the SRW price that they can pay, which gives rise to a risk that existing SRW using industries might be displaced. Alternatively it means that woodfuel supply chains can afford longer haulage distances and import timber from further afield, or that they can afford to purchase higher quality timber that would otherwise be used in construction.

None of these scenarios results in best use of the natural resource or best practice in the management of carbon and the difficulty facing all involved in woodfuel market development is to facilitate the balancing of market forces in a way that results in optimal use of resources to deliver public benefit. Such issues are of particular importance to CNP given its exemplar role and if we can demonstrate that developing local woodfuel markets brings into use undermanaged or new woodlands then the displacement effect can be minimised. Underpinning all of this work are the four aims of the National Park and the protection of the landscape and natural heritage along with the sustainable use of natural resources are fundamental.

The Cairngorms National Park is the largest national park in the UK covering an area of 3,800 square kilometres. It has 52 summits of over 900m with 10% of the land area over 800m and 68% over 400m above sea level. Sixteen thousand people live within the Park at an average population density of 4.2 people per square kilometre. The major centres of population are Aviemore, Ballater, Braemar, Grantown-on-Spey, Kingussie, Newtonmore and Tomintoul.

Approximately twenty per cent of the Park area is forested (753 square kilometres) split almost equally between planted and semi-natural woodland. The Park contains the most extensive tracts of Caledonian forest in Britain, comprising pine, juniper and broadleaved species together with bog woodland, montane scrub and stands of aspen.

Policy Context

The EU Biomass Action Plan was drawn up in December 2005 and aimed to double the proportion of EU energy needs provided by biomass from 4% to 8% by 2010. The EU Council of Ministers endorsed the plan in March 2007 and set further targets for 20% of EU energy supply coming from biomass by 2020. It was intended that these policy targets would be reflected in national commitments made through national and local biomass action plans.

The Scottish Government already has a national biomass action plan in place (the Biomass Action Plan for Scotland) and a parallel Renewable Heat Strategy was launched at the end of

2008 which anticipated biomass playing a major role in the meeting of ambitious targets for the supply of heat from renewable sources.

Just as the EU action plan depends upon national commitments, the achievement of these national commitments requires corresponding plans and commitments at a local level. The Cairngorms National Park Woodfuel Action Plan (CNP WAP) has been developed to support these EU and national commitments and demonstrate how these can be met in a way that contributes to local economies, whilst enhancing biodiversity and landscape values and ensuring long term sustainability and at the same time delivering the aims of the National Park and contributing to the priorities in the National Park Plan.

In developing the Cairngorms Woodfuel Action Plan it was important to ensure that it both mirrored the policy context and linked with existing projects and initiatives. Accordingly it emphasises building upon what is already there; whether in the form of action on the ground or in the provision of training and advice and as such, provides a framework for the continued expansion of sustainable woodfuel use in the CNP area. It sets out strategic priorities to address market failures and identifies operational objectives which make effective use of the outputs from previous woodfuel initiatives and projects, transferring their conclusions from the wider context to the local one.

The Cairngorms Woodfuel Action Plan will be impossible to implement without the cooperation and contribution of many partner organisations both within and outside the park. It will be extremely important to maintain contact between relevant agency, NGO and private sector interests. CNPA's main role is to act as a co-ordinator in the delivery of the National Park Plan and that role will be equally important in the implementation of CNP Woodfuel Action Plan in order to maintain and enhance these linkages.

Because the Cairngorms Woodfuel Action Plan is focussed on the National Park, there are opportunities to access initiatives and funding streams that are not available elsewhere. It is recognised that supply chains will cross administrative boundaries and there may be instances where benefit within the park can be secured by using these opportunities beyond park boundaries. The CNPA has always worked with a view that the National park has 'porous boundaries' and has recognised the benefits of this approach.

The Cairngorms Woodfuel Action Plan is organized into key areas for attention and under each of these, specific issues have been highlighted and recommendations defined to address them.

These recommendations address issues of perception, supply, demand, and access to information which has been highlighted by extensive stakeholder consultation, the work of the Cairngorms Woodfuel Steering Group and experiences derived from recent work in woodfuel development covering either the CNP area specifically, or the Highlands in general (e.g. The Northern WoodHeat project).

Particular areas addressed in the Plan reflect the constraints on market expansion perceived within both the Highlands in general and the CNP in particular and include:

- Perceptions of woodfuel
- Access to information
- Concerns about quality & security of fuel supply
- Ecological sustainability
- Access to training
- Poor supply chain linkages
- Financial issues
- Poor data on potential supply and demand

All the units used in this report for energy values, moisture content, emissions and fuel costs are set out in Appendix 2.

Summary of Actions

1.1 Delivery and monitoring

Action:

1.1.1 Develop a delivery body - a steering group to work together, monitor and coordinate implementation

Chapter 2: Supply Assessment and Resource Appraisal

The development of a sustainable local woodfuel market requires some knowledge of the local forest resource and its utilisation. Without this neither suppliers nor consumers can enter the market with any confidence in its future viability or in the carbon management and sustainability benefits which are often the prime motivators for many market entrants.

It is important not only to quantify the volumes of wood available to the biomass stream, but also to indicate the locations of resources in order to target new developments near to sources of sustainable supply to: provide confidence to potential users in the future local sustainability of supply; reduce haulage costs to a minimum; and, reduce carbon footprints to a minimum.

The potential forest-derived woodfuel supply was analysed using data held in the Scottish Semi-natural Woodland Inventory (SSNWI) for the CNP area to give an indication of the annual increment and the non-market constraints on recovering that increment. However this approach only gives an indication of the potential sustainable yield in the long term. In the shorter term this is affected by: planting dates and their impact harvesting dates; forest management regimes; and, market conditions. Forestry Commission Scotland (FCS) production forecast data was then used to take account of these factors and give a practical assessment of the available resource.

2.1 Roundwood Increment

All woodland compartments identified in the SSNWI were stratified by tree canopy type. A Yield Class (YC) was assigned to each, in discussion with FCS, and an annual increment was calculated.

TABLE 1 Yield Class

80-90% Broadleaf	4
80-90% Conifer	12
Scots Pine	7
Broadleaf	4
Conifer	12
Mixed Broadleaf / Conifer	8
Scrub	0

TABLE 2 Annual Roundwood Increment

Compartments	**Area (ha)**	**Annual Increment m^3**
8,157	**81,802**	**838,396**

The Yield Classes used were conservative to try and ensure that any errors were of under-estimation rather than over confidence.

2.2 Woodfuel Supply Constraints

The woodland compartments were then stratified into three constraint classes. These reflect the statutory and physical constraints which may have an impact on the ability of the compartments to supply extractable timber and are indicative of potential constraints, rather than barriers to the production of woodfuel or timber.

The constraint classes are:

RED

- Nature conservation constraint, usually an SSSI, or
- Listed as open or developing canopy in the SSNWI, or
- Forest cover <10%

Although it has been assumed that this woodland would not be available for harvesting, some compartments with statutory nature conservation status could benefit from the removal of exotic species or from restructuring to encourage natural regeneration. This would need to be considered on a case by case basis.

Similarly, the Open, Developing and <10% canopy categories listed in SSNWI could indicate future woodfuel resources but may only be considered as potential woodfuel sources in the medium or long term, possibly after management interventions such as fencing to allow regeneration/canopy development.

ORANGE

- Not containing “Red” constraints but
- Forest cover >10% to < 49%, or
- Slope > 32%

“Orange” compartments are a potential woodfuel resource, but have physical constraints that may preclude their economic harvesting for woodfuel because of slope or low canopy cover.

Compartments constrained by low (>50%) canopy cover may provide either a mid- to long-term resource after management intervention (possibly fencing and planting or natural regeneration). Alternatively larger compartments with low canopy cover may provide an equivalent volume to that in a smaller denser compartment, although the larger and less dense compartment is likely to have higher harvesting costs.

Compartments where Slope > 32% are unlikely to provide a woodfuel resource which would contribute to a supply chain as the costs of extraction would be relatively high. Slope sites with good site access and relatively large area may be economic to harvest.

GREEN

- All remaining woodlands.

"Green" woodlands are expected to be readily available as woodfuel, subject to the demands from other markets.

The traffic light constraints system is intended to be indicative and has been developed to stratify compartments into categories which are likely to determine how 'winnable' woodfuel is from each compartment. It does have the potential to be developed into a replicable and updatable inventory if a data handling protocol were to be developed to allow collected data on species, age, access, slope, terrain and soils for discrete compartments to override the derived data.

The division of the total theoretically available annual increment between the constraint classes, and the percentage required to meet the demand identified in chapter 3 assuming no further constraints or competing markets, is shown in table 3

TABLE 3 Global demand as percentage of supply by constraint class

Constraint	**Annual Increment m^3**	**Annual Demand m^3**	**% Demand / Supply**
GREEN	356,485	169,980	47.7%
ORANGE	89,946	169,980	189.0%
RED	391,965	169,980	43.4%
Total	**838,396**	**169,980**	**20.3%**

That only 47.7% of the readily available timber is required to meet total heat demand within CNP is very encouraging. However, as noted by the Woodfuel Task Force, demand for timber is such that much of this will be committed to industries with high value end products. In the event of anticipated timber shortfalls becoming a reality local woodfuel markets may well find that woodlands on designated sites become their largest single available resource. If this becomes the case best practice guidance on its management for wood fuel without compromising conservation values will be required (see biodiversity chapter).

2.3 Analysis of potential supply by sector

The maps in Figures 1 and 2 illustrate that there is a correlation between the forest resource and the settlements in the CNP area. The topology, demographic characteristics and road network in the CNP lend themselves to aggregation of demand into five geographical areas within which supply chains could function without extensive haulage operations. Avoidance of long haulage distances is important because transport costs are the largest single factor in woodfuel costs, and are also the largest single negative impact on the potential carbon neutrality of wood as a fuel.

The potential wood fuel supply and demand figures for the different sectors are given in table 4 below. The figures in the final column show the contribution of each constraint class to the total energy demand for each sector.

As an example, the part of Table 4 below for Sector 1 shows that 68% of the total annual increment for the "Green" constraint class would be required to meet the entire heating demand for all of the buildings in the Sector. Conversely, it would take 211% of the "Orange" constraint class to meet the sectoral heat demand (i.e. the orange class alone could not satisfy the demand).

TABLE 4 Supply – Demand balance by sector (see figure 1 for a breakdown of sectors)

		Compartments	Annual Increment	Productive Area	Woodfuel Demand m^3	% constraint class to meet demand
Sector 1	GREEN	1,629	176,621	17,522	119,739	68%
	ORANGE	1,138	56,654	6,432	119,739	211%
	RED	2,166	284,071	27,423	119,739	42%
	All	4,933	517,346	51,377	119,739	23%
Sector 2	GREEN	643	74,095	6,981	20,910	28%
	ORANGE	584	32,417	3,859	20,910	65%
	RED	727	67,135	6,589	20,910	31%
	All	1,954	173,647	17,429	20,910	12%
Sector 3	GREEN	193	52,809	4,499	5,994	11%
	ORANGE	91	583	55	5,994	1028%
	RED	182	32,884	2,766	5,994	18%
	All	466	86,276	7,320	5,994	7%
Sector 4	GREEN	240	32,630	3,098	9,898	30%
	ORANGE	156	1	0	9,898	989800%
	RED	204	2,599	277	9,898	381%
	All	600	35,230	3375	9,898	28%
Sector 5	GREEN	121	20330	1788.64	3,853	19%
	ORANGE	38	291	62.7	3,853	1324%
	RED	45	5276	448.18	3,853	73%
	All	204	25,897	2299.5200	3,853	73%

The park was divided into sectors reflecting areas of settlement, heat use and forestry. The five sectors referred to in the table above are illustrated in figure 1 on page 13. The key factor emerging from this table is that the green or constraint free class is capable of supplying all the potential demand in each sector in the absence of competing markets. It should not be assumed that the orange and red classes are incapable of supplying fuel wood. The constraints have been derived generically, and further investigation would be necessary to determine their impact on potentially available increment. Most red woods are within SSSI designated areas, but may have felling or management as permitted operations.

FIGURE 1 CNP Woodfuel Supply Chain Sectors: Forestry

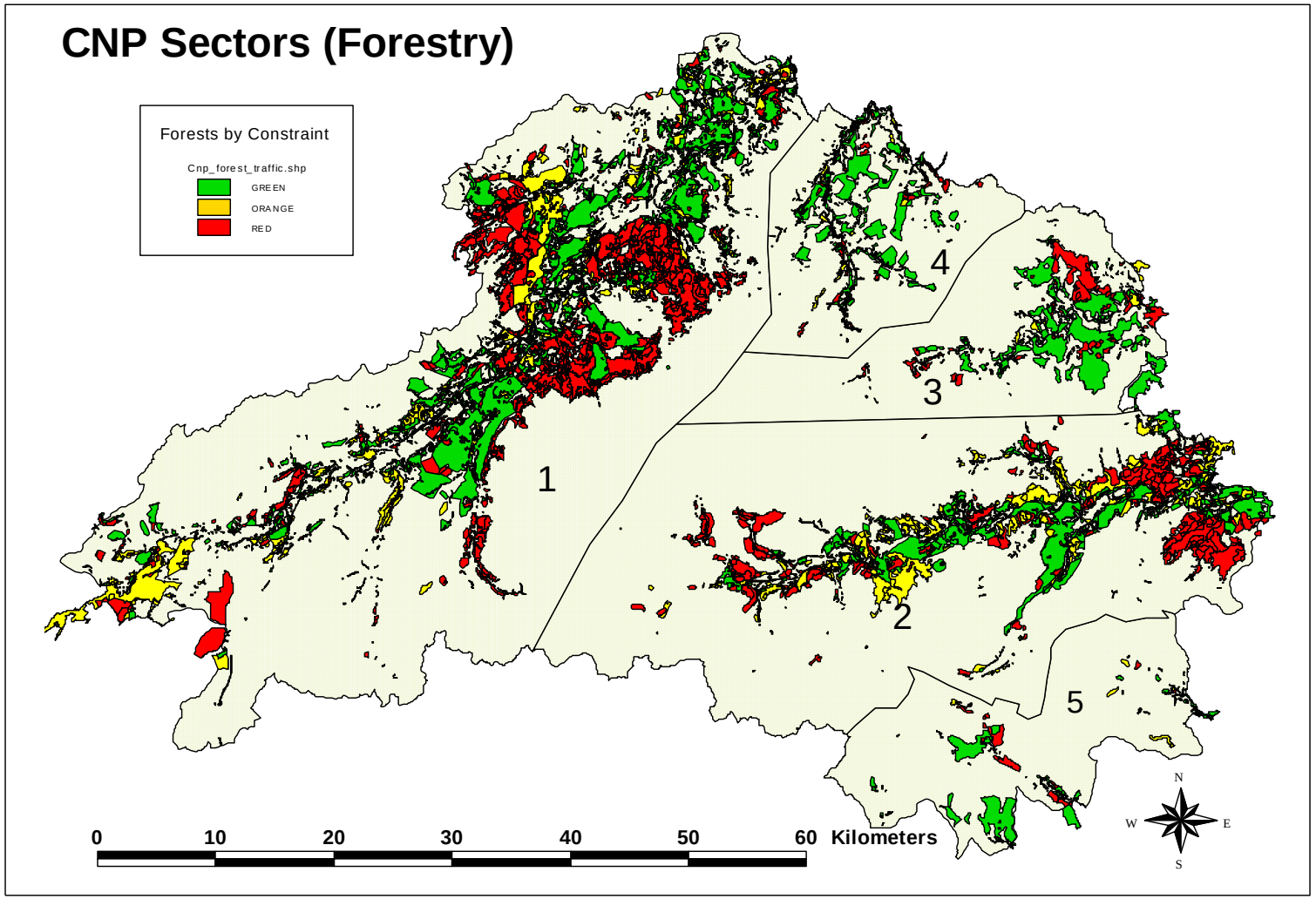
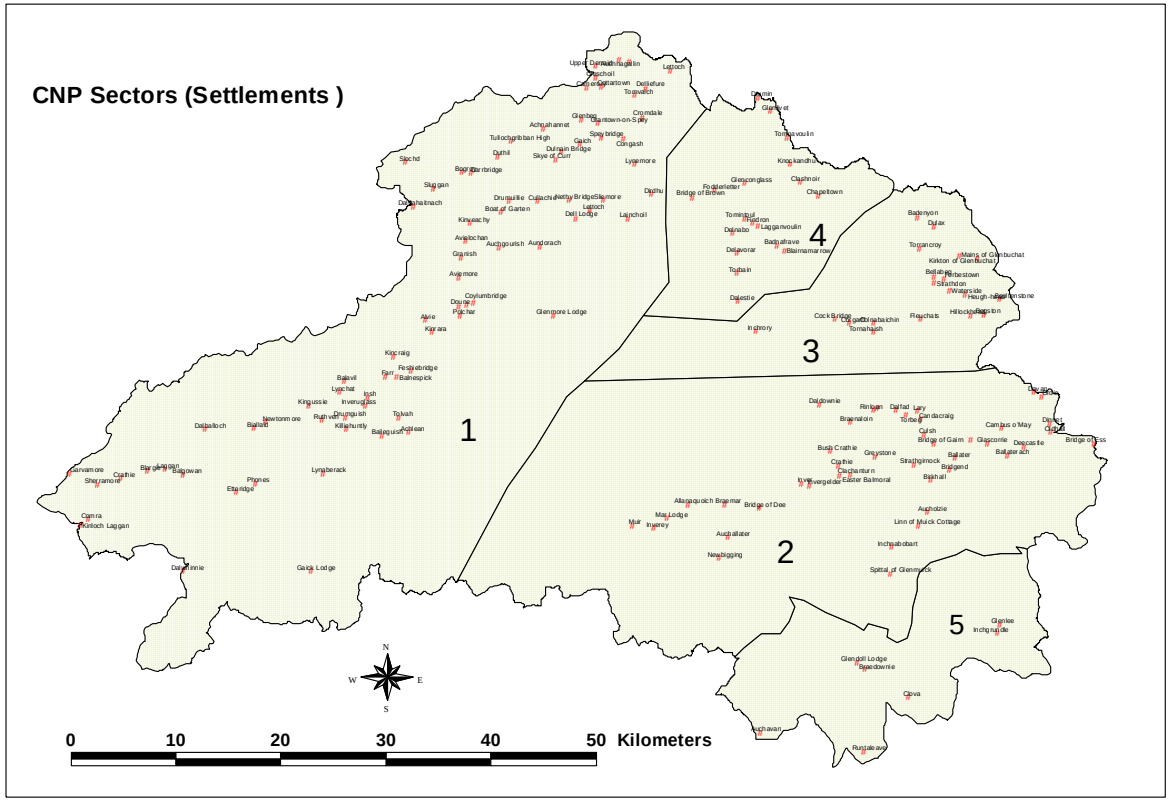


FIGURE 2 Distribution of CNP Settlements

This figure is intended to be illustrative of the geo-spatial distribution of settlements.



2.4 Other sources of woodfuel

There are opportunities to enhance the available woodfuel resource from existing woodlands through different harvesting techniques and recovery of harvest residues.

2.4.1 Additional forest increment

By amending the harvesting specification from the usual 7cm top diameter to the stem snap point, and by accepting bent, twisted and damaged stems it is possible to increase conventional small roundwood yields by somewhere in the order of 20%. This has been demonstrated in the Forest Research Technical Department (FRTD) report 1400S/48/07 "Rumster Northern Woodheat Woodfuel Pilot Study" (see attached documents)

Although sawlog markets can still be supplied using this harvesting method, felling to tip effectively precludes supplying small roundwood (SRW) markets other than woodfuel because of their minimum top diameter requirements. However it does mean that a woodfuel supply can be derived from a smaller area, freeing up a greater area to supply existing SRW demand.

The potential additional increment from modified harvesting specifications has been incorporated into the figures in Table 7.

2.4.2 Forest residues

Forest residue recovery can also significantly enhance woodfuel availability. Volumes per hectare vary according to average tree size, the timber harvesting specification, species and form.

TABLE 5 Dry weight of residues as a percentage of dry weight of merchantable timber

Species	**%**
Sitka Spruce	26.26
Norway Spruce	23.78
Scots Pine	20.15
Lodgepole Pine	20.45
Corsican Pine	19.6
Japanese/Hybrid Larch	22.94
Douglas Fir	22.5

The dry weight of residues as a percentage of the dry weight of merchantable timber, for the commonest conifers[1], is given above. Experience in Scandinavia suggests that residues will comprise 25-30% of timber volumes, only 65% of which will be recovered[1].

Residue harvesting has implications for site nutrient cycles as branch and foliage material have much higher nutrient concentrations than stemwood and should only be undertaken on suitable sites.

[1] OPET Finland, (2001). Production of forest chips in Finland. OPET Report 6

For the purposes of this resource assessment the findings of the Forestry Commission Scotland assessment of the proportion of sites where residue harvests are viable was applied to both state and private sectors. The results of this analysis showed that forest residue availability is unlikely to exceed 500m^3/yr.

Residues are a low quality woodfuel which is inappropriate for small to medium scale boilers (<500 KWh) and most woodfuel development in the CNP area is likely to be at this scale. Moreover, if amended harvesting specifications are used, the availability of residues decreases significantly. For these reasons residues have been discounted in the final assessment of the potential resource.

2.4.3 Non forest sources of woodfuel

Sawmill co-products have also been discounted because there is already a strong demand and, at least in the short term, a diminishing supply as a result of economic recession. Waste/recycled wood has also been discounted owing to difficulties in reducing contamination to levels appropriate for small and medium scale boilers, and also in achieving "clean" combustion without emission of pollutants that are not present in virgin wood.

Arboricultural arisings have been discounted because volumes are very low, and are already consigned to existing local firewood markets and are therefore unavailable for market expansion.

2.5 Potential Supply based on FCS production forecasting data.

Table 6 below shows the Forestry Commission Scotland roundwood production forecast for the CNP, and takes account of the volumes of sawlogs which might command a higher price in markets other than woodfuel to give a volume of roundwood potentially available to woodfuel markets. The woodfuel production figures take no account of modifications to harvesting specifications.

TABLE 6 FCS roundwood production forecast for the CNP

Years		Vol. M3					
		Production Figures					
		Sawlogs 18+cm T. Diam.			**Wood fuel 7-18cm T Diam**		
From	**To**	**PS**	**FE**	**Total**	**PS**	**FE**	**Total**
2007	2011	118,053.50	24,722	142,775.5	76,463.90	45,812	122,275.9
2012	2016	133531.1	27481	161012.1	77158.8	33302	110460.8
2017	2021	129730.3	35922	165652.3	72969.8	28964	101933.8
2022	2026	136460.8	27423	163883.8	68501.2	23380	91881.2
2027	2031	144506.9	20263	164769.9	67883.6	22721	90604.6
2032	2036	132687.7	33355	166042.7	57638.2	29080	86718.2

Key:
PS – Private Sector
FE – Forest Enterprise

2.6 Influence of market behaviour

The forecasted timber production volumes given above are only realised if the timber comes to market. Consultation with the roundwood trade indicates that all state sector timber production is already committed to existing markets. In the private sector only 50% of the available production is currently being harvested because of the depressed state of timber markets, and all of this is to fill existing demand. While it is reasonable to expect price to mediate the displacement of some of the private sector timber to woodfuel markets, widespread displacement of the timber supply to existing markets might detract significantly from the benefits of woodfuel market development to the local economy.

In the second half of the 20th century state sector timber dominated the timber supply and Forest Enterprise Scotland has, to date, played the lead role in providing security of supply to large roundwood using enterprises, even in adverse market conditions. However the state and private sector supply is now balanced, and over the next 10-15 years the private sector will become the major source of roundwood in Scotland. It is vital that the private sector woodland owners and managers are involved in woodfuel projects at an early stage to ensure that additional volumes are felled to cater for new demand.

Ideally woodfuel is derived from the small dimension and poor quality timber component of harvests, particularly from thinning. However current thinning programmes are unlikely to provide sufficient woodfuel for significant market expansion and the key to providing large volumes of woodfuel is to stimulate felling in the private sector by encouraging development of markets for the better quality, higher value portion of the timber crop, which helps to improve the lower returns from small roundwood harvests. This would also help to stimulate more regular thinning to increase the volumes of timber fit for higher added value markets. These thinning operations would, in turn, create smaller dimension roundwood suitable for woodfuel markets.

Alternatively, the woodfuel market could offer a sufficient price premium to attract all parts of the timber crop into woodfuel markets. As discussed in the preceding chapter this would have a significant negative impact on the potential value of the timber resource to the local economy as it would no longer be available to higher added value markets. Also it would significantly constrain attempts to improve the sustainability of construction and reduce the embedded carbon in buildings by substituting steel and concrete with timber unless that timber was imported, which would bring its own impacts on carbon emissions and local added value.

Moreover, if sawlogs only fetch a woodfuel price, there is no longer an incentive to grow better quality timber. Indeed the most profitable form of forestry would be to plant dense thickets of fast growing exotic species with little landscape or biodiversity value and harvest them at the earliest opportunity.

If woodfuel market development proceeds at a steady pace it should be possible to facilitate the parallel development of woodfuel markets and markets for better quality timber. To do this would require stimulation of demand and dissemination of best practice guidance on

forest management to ensure that the markets stimulated can be supplied on a sustainable basis.

To take account of the realities of current roundwood markets the following assumptions have been made in Table 7:

- All state sector production is unavailable for new markets
- The state sector will not enhance its production by using modified harvesting specifications as this will disrupt capacity to supply existing markets
- The private sector will continue to send 50% of its production to existing markets and fell the currently unharvested 50% of its production for wood fuel
- The private sector will re-instate thinning regimes
- The private sector will use modified harvesting specifications in all thinning and wood fuel harvests from the currently unharvested increment

TABLE 7 Woodfuel availability from the private sector

Years		Vol. M3 Production Figures			
		LOGS 18+cm T. Diam.	Woodfuel up to 18cm T.D.		
			SNAP-18		
From	**To**	**PS**	**PS Fell**	**PS Thin**	**Total**
2007	2011	77,566.44	39,565.8	36,235.74	75,802
2012	2016	84229.4047	44046.17	31204.47	75250.64
2017	2021	82155.5922	41626.33	30257.19	71883.52
2022	2026	87325.3498	39425.37	30642.83	70068.2
2027	2031	91922.1085	40159.65	30042.43	70202.08
2032	2036	81867.4714	36655	22393.44	59048.44

Key:
PS – Private Sector

The total figures in the far right column represent the total woodfuel availability in m^3. The increased private sector saw log production compared with Table 6 is a reflection of the impact of a full resumption of thinning, and is an indicator of how a woodfuel market can help to deliver added value to the wider forest resource.

The accuracy of any production forecast depends on the availability and accuracy of data and, particularly for the private sector, there is a shortage of data. Given the significance of the private sector in the CNP area this means that any production forecast has an element of guess work in it and although the figures are adequate for strategic planning purposes individual projects should make their own supply assessment and revise it on a regular basis.

2.7 Sustainable Management of the Woodland Resource.

The timber supply data in this section demonstrate that there is potential to create woodfuel supply chains based on local resources if the private sector can be engaged in the supply chain. Although there is theoretically sufficient timber supply to meet all potential demand, it is clear that competing markets will dictate that this is not possible in practice.

The creation of woodfuel supply chains has the potential to contribute to the sustainable management of the woodland resource, enhancing its landscape and biodiversity value as well as contributing to the sustainable provision of energy and rural employment. Options for doing this are discussed below.

2.7.1 Species Diversity

The Scottish Rural Development Programme (SRDP) can only grant-aid restocking if the aim is to restructure woodlands for purposes other than the existing management regime. Combined with dissemination of the opportunities within the SRDP, the development of woodfuel markets gives the potential to influence restocking and restructuring policies to increase the proportion of semi-natural planting in existing woodlands to improve landscape and biodiversity values, and improve the functional connectivity of woodlands to allow species to migrate and adapt to climate change.

The incentives in the SRDP for landholders to restructure plantations to deliver additional benefits should be disseminated.

2.7.2 Structural Diversity

As with the species diversification described above, there are opportunities to encourage structural diversity through alternatives to clear fell, thinning and use of natural regeneration.

Thinning can improve timber quality but is often omitted from management regimes or delayed because such operations incur short term costs in the absence of profitable markets. However, development of local woodfuel markets means that thinning operations may be possible at cost recovery, or with a small return, and presents an opportunity for specialised contractors to recover fuel stock whilst increasing the future value of the crop. Just as woodfuel can encourage a resumption of thinning, regular thinning could be a significant factor in providing the woodfuel supply required in the early stages of market expansion. Moreover thinning operations can, in some circumstances, increase the roundwood volume production over a full rotation by up to 10%.

2.7.3 Management Regimes for Woodfuel Recovery

Most forest land holders do not manage for woodfuel at the moment and there is a need to integrate additional operations into routine forest management. These operations include use of modified harvesting specifications, the recovery and stacking of brash for collection and conversion to fuel stock for larger (>500 kW) boilers, and creation of stacking sites for drying small roundwood for collection in the future.

2.7.4 Collaboration

For many forest land owners, the supply of fuel stock for woodfuel will be a minor element of their forest management operations. For such forest owners to make a sufficiently long term woodfuel supply commitment to ease customer concerns about energy security, they will need to collaborate to ensure co-ordination of woodfuel harvesting and processing operations. To facilitate this it will be necessary to create a strong and accessible network of woodfuel suppliers that are able to co-operate, either formally or on an ad hoc basis, to fulfil large and long term supply contracts and to share machinery costs where appropriate. If such a network was visible to consumers it would help to resolve concerns over security of supply.

2.7.5 Establishing New Woodland Areas

One way of avoiding potential future conflict between woodfuel and other SRW using markets would be to expand the woodland resource, particularly near population centres. Because forest establishment has slowed significantly since the peaks of activity in the 1960's and 1970's the woodfuel resource actually declines between now and 2036, with a significant decline after 2030 (See Table 7), it would be advantageous to identify potential new planting sites now which can deliver biodiversity, landscape, amenity and biomass outputs while still contributing to the timber supply to more traditional markets. Time is of the essence, as Sitka Spruce planted now is unlikely to be ready for thinning to produce fuel until approximately 2040 and Scots Pine is unlikely to be ready until 5-10 years later at the earliest.

Given that supply constraints will only be felt in a very buoyant market, there will be an incentive for owners to fell prematurely for a short period, and this should be sufficient to cover the lean years between 2036 and 2045.

If the newly established woodland area has the capacity to supply woodfuel and conventional timber markets the owners will not be dependent on woodfuel for a financial return. Short Rotation Forestry (SRF) using native and naturalised species on 15-20 year rotations could produce the required woodfuel without additional risk to the owner as, unlike Short Rotation Coppice (SRC), SRF can always be retained for conventional timber markets if anticipated woodfuel markets do not materialise, it could also be used as a nurse crop for timber.

The alternative would be to wait until there is a well established woodfuel market, by which time it may be difficult to produce the required biomass without compromising biodiversity and landscape values by using fast growing exotic species under intensive SRC management regimes.

2.7.6 Residue Recovery and Soil nutrition

Whole Tree Harvesting (WTH) can cause nitrogen and phosphate losses to increase by a factor of two or three, and losses of base cations of potassium, calcium, magnesium and sodium can be 1.5-2 times greater than in conventional harvesting[2]. WTH results in reduced

[2] Nisbet T., Dutch J., & Moffat A., (1997). Whole Tree Harvesting. Forestry Commission Practice Guide.

growth in second rotation Sitka Spruce, partly due to reductions in site fertility, and partly due to increased post planting exposure[3].

Accordingly, residue harvesting may be inadvisable on poor acid soils and/or areas of high exposure, precluding it in much of the CNP area. However there are some benefits in terms of speed and ease of restocking or fire prevention that may outweigh the need for remedial fertilizer applications. Different managers will make different judgements. Any woodfuel inventory should take very careful account of prevailing site conditions when determining the availability of residues, and confirm these assumptions with resource managers if they are critical to security of supply.

Where residues are recovered the operation should be delayed until needle drop as this alone will reduce nutrient loss substantially. Sourfelling techniques (leaving whole trees to dry through continued transpiration) are particularly useful in early thinnings or poor quality crops, all of which are destined for energy markets, and can reduce nutrient loss by as much as 45% while also reducing the moisture content of the fuel source.

This gap in the nutrient cycle can be reduced further by recycling the ash from combustion back on to the site. This will replace almost all of the nutrients removed from the site, the exception to this being nitrogen, which is often the limiting factor on tree growth. Supplementary nitrogen inputs may be required on some sites.

Although residue recovery is unlikely to play a major part in woodfuel supply in the CNP area, clear protocols based on existing research and location-specific research should be established to ensure that biomass heating remains truly sustainable without diminishing the carrying capacity of the forest area through over exploitation.

2.7.7 Rationalisation of Haulage

Woodfuel has a relatively low energy density and is best treated as a local fuel. Transport distances should be minimised throughout the supply chain with processing depots located near demand centres, or at the harvesting site. In this way both carbon impacts and fuel production costs will be kept to a minimum.

2.8 Existing supply infrastructure

According to local information there are two wood chip suppliers based within the Cairngorm National Park at Alvie and Tomintoul, both producing material for sale as well as for estate use. The only currently available national list of wood fuel suppliers that is maintained on a regular basis is on www.usewoodfuel.org.uk which confirms this and also identifies 3 producers of chips and/or pellets near the CNP at Aboyne, Banchory and Forres.

There are two suppliers, one of pellets and one of chip, which undertake to supply any location in Scotland. Both of these are located some distance from the CNP and as such should only be viewed as suppliers of last resort because of the diminished benefits in terms

[3] Proe M. & Dutch J., (1994). Impact of whole tree harvesting on second rotation growth of Sitka Spruce: the first 10 years. Forest Ecology & Management 66.

of carbon footprints and local added value, but their existence does provide some security of supply for the consumer.

Within the Park there are three sawmills, the largest by far at Boat of Garten and the other two at Nethybridge and Newtonmore. Two further sawmills were identified close to the Park boundaries at Nairn and Aboyne. According to FCS information none of these operations is currently producing woodfuel owing to buoyant demand for sawmill products from the paper, panel and board industries.

One of the chip suppliers within the park produces chopped firewood, and several other local firewood producers operate on an informal basis. Because the firewood market is largely informal at present it is difficult to gather information about its size, but two issues are apparent: customer concerns over variable fuel quality and over unreliability of service. As discussed in section 3.4.3, there is considerable potential to expand log markets if these issues are addressed. A study of the local press and shop windows in the west of the CNP area indicated four operations. It was the opinion of consultees that around a dozen or so of these are working in the Park as a whole.

2.9 Supply Conclusions.

Woodfuel supply chains in the CNP have evolved iteratively as demand has increased, and there is considerable scope to expand the woodfuel supply within the CNP to meet a significant proportion of the potential demand highlighted in this report

The private sector will have a key role in woodfuel supply in the future and that much better information on the available private sector resource is required. Also, in order to access that resource, care must be taken to facilitate an appropriate balance between the development of woodfuel markets and development of all timber markets.

An essential corollary to this will be the development of guidance on appropriate forest management techniques which optimise woodfuel production whilst creating timber for other markets and adding to local woodland landscape and biodiversity values.

Facilitation of linkages between fuel suppliers and timber suppliers will help maintain short supply chains with a robust woodfuel supply and, if machinery is pooled, optimised capital costs. If a proactive policy towards accelerating the use of biomass is adopted in the Park it will also be necessary to develop linkages with boiler installers and energy suppliers.

One very effective private sector led model for achieving these linkages is the Energy Supply Company or ESCO, which will install the boiler, deliver the fuel and maintain the system in return for an index linked unit price for metered energy delivered. This gives the consumer all the convenience and security required while sparing them the initial investment costs, and also gives the timber and fuel suppliers some confidence in demand. Because the ESCO has an interest in efficiency and cost effectiveness it takes responsibility for sourcing timber/fuel supplies from the nearest viable source thereby ensuring that carbon footprints are managed effectively.

The ESCO model is unfamiliar to the Scottish energy supply industry other than at national utility level but has much to recommend it and action should be taken to encourage its adoption as markets expand.

2.10 Summary of Actions

2.10.1 Sustainable use of woodland resource

In order to expand the woodfuel market an accurate inventory of the public and private sector forestry should be developed. This information can then also be used to improve the accuracy of production forecasts which in turn will provide invaluable information for strategic planning of woodfuel installations. In addition it is desirable to assess the 'sustainability limit' of the resource across the park to help avoid compromising the broader park objectives and other timber and wood based markets.

Actions:

2.10.1.1 An assessment of forest resource

2.10.1.2 Produce definitive 'sustainability limit'

2.10.2 Sustainable management of woodland for woodfuel

If woodfuel market development proceeds at a steady pace it should be possible to facilitate the parallel development of woodfuel markets and markets for better quality timber. To do this would require stimulation of demand and dissemination of best practice guidance on forest management to ensure that the markets stimulated can be supplied on a sustainable basis.

Actions:

2.10.2.1 Production of best practice guidance on opportunities to restructure plantations for woodfuel protecting biodiversity and landscape

2.10.2.2 Disseminate best practice guidance on optimisation of woodfuel recovery including residues

2.10.2.3 Promote opportunities for small woodland and farm based woodfuel processing and supply – especially firewood

2.10.3 Expansion of existing woodland resource

Encouraging SRDP applications is one of ways to help facilitate expansion of the woodland resource.

Action:

2.10.3.1 Encourage and support SRDP new woodlands applications

2.10.4 Expansion of the woodfuel supply chain

For the private sector to make a sufficiently long term woodfuel supply commitment to ease customer concerns about variable fuel quality, unreliability of service and energy security they will need to collaborate to ensure co-ordination of woodfuel harvesting and processing operations.

Actions:

2.10.4.1 Appraise existing and potential supply network

2.10.4.2 Improve access to information

2.10.4.3 Invest in supply chain

2.10.4.4 Improve supply chain cooperation

2.10.4.5 Support and facilitate the emergence of energy suppliers

Chapter 3: Demand and Actions to Stimulate Demand

A detailed heat-mapping exercise was undertaken by Highland Birchwoods in 2009 to identify suitable sites for woodfuel installations at different scales. In combination with the supply forecast presented in Chapter 2 the results assist in the identification of realistic development targets.

3.1 Demand

For the purposes of this action plan demand refers to space and hot water heating demand rather than total energy demand, because wood is far more effective at producing heat than it is at producing electricity at the small and medium scale. Effective electricity production from woodfuel is only currently commercially available at a scale that requires large fuel catchments and extensive haulage operations that would be inappropriate in the CNP context.

Smaller scale CHP units are being developed and trialled, but even if these prove cost effective it will be on the basis of a year round market for the "waste" heat developed during electricity generation which represents about 60% of the output of a CHP plant. Given the seasonal nature of space heating and hot water (see Table 17) in the CNP this means that with currently available technology profitable operation of CHP plants will be dependent on adjacent constant demand for process heat. As a result CHP developments are unlikely to have a significant role in the CNP until effective small scale plants with improved electricity: heat ratios have been developed and thoroughly tested.
Demand has been mapped on the assumption that all buildings with post codes require heat and hot water. The methodology for mapping demand is set out in Appendix 3.

In addition to mapping heat demand the process also estimates costs, CO_2 emissions, fuel volume requirements and total energy demand. The figures in Table 8 summarise the results of the modelling process. Based on the above figures, to heat all the heated buildings in the CNP area with woodfuel would require about 100,000 tonnes of woodfuel at 30% moisture content (MC) a year, or a softwood equivalent of 170,000 m^3 of annual increment. The findings in Chapter 2 suggest that this represents about 20% of the annual increment of all of the woodland compartments, but after constraints on availability are taken into account the available woodfuel resource is only in the order of 30% of this.

An assessment of the individual settlement heat demand, wood demand, costs and emissions is included as Tables 25 to 34 in Appendix 4.

TABLE 8 Global demand figures

Number of heated buildings	9,097
Per annum costs	**£**
Oil Cost @ £0.40 per litre	14,013,555
Wood Cost @ £80 per tonne delivered	7,968,684
Cost Difference (oil minus wood)	6,044,871
Per annum CO_2 emissions	**Tonnes**
CO_2 emissions oil	105,286
CO_2 emissions wood	19,175
CO_2 emissions Difference (oil minus wood)	86,111
Per annum fuel volumes	
Heating oil requirement (litres)	30,126,446
Wood requirement (tonnes)	99,609
Wood requirement ($m^{3)}$	169,980
Per annum energy demand	
Energy demand (MWh)	348,630

3.2 The nature of the demand

3.2.1 Current Situation

Available local information indicates that there are nine wood chip boilers in the CNP and compared with potential demand this indicates significant growth potential. Moreover the small number of suppliers (see 2.7) indicates a lack of competition and consumer choice. However the existence of two nationwide suppliers, albeit based outside the CNP, does offer some security of supply to potential consumers.

However issues of supply security, carbon management, price competition and local economic benefit are best addressed through further development of local supply chains.

When assessing potential demand there are two important factors to consider: the scale of the boilers required, which affects fuel type and quality; and the spatial distribution, which affects the economic viability and carbon footprint of the supply chain.

In terms of scale, the important issue is whether or not a building should have its own boiler. The potential to link buildings into heat clusters served by a single boiler has been assessed. This identified 1,242 heat-using buildings which should be treated as individual installations. The remaining 6,103 buildings all have the potential to join one of 315 potential micro-heating grids or a full district heating system.

The findings of this assessment are summarised below:

TABLE 9 Potential number of heat clusters in the CNP

No of buildings in cluster	No of clusters
1	1242
2-5	256
6-10	29
11-25	12
26-50	4
51-100	3
101-1000	9
1001+	2

In terms of the five sectors of the CNP area referred to in the preceding chapter, the sizes, comparative oil and woodfuel costs, woodfuel demands, fuel costs and carbon savings are given in Table 10.

The most viable sector is Sector 1; the portion of the Park along the A9 trunk road corridor.

It is probable that Sectors 3 and 4 would need to be aggregated as the markets in both are relatively small.

Sector 5 is geographically linked to the area outside of the CNPA area, and has a very small number of settlements. It is likely that any woodfuel supply chains connected to this sector will be located outside of the park boundary.

TABLE 10 Fuel cost comparison across each sector of the park (Assuming woodfuel at £80 / tonne)

SECTOR 1 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)	Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
TOTALS	**5,561**	**8,187,319**	**4,655,647**	**3,531,672**	**58,196**	**99,310**	**203,685**	**11,203**	**61,513**	**50,310.01**

SECTOR 2 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)	Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
TOTALS	**1,086**	**1,723,854**	**980,254**	**743,600**	**12,253**	**20,910**	**42,886**	**2,358**	**12,951**	**10,593**

SECTOR 3 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)	Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
TOTALS	70	**116,304**	**66,136**	**50,168**	**827**	**1,411**	**2,893**	**159**	**873.82**	**714.68**

SECTOR 4 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)	Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
TOTALS	**314**	**529,920**	**301,333**	**228,587**	**3,767**	**6,428**	**13,183**	**725**	**3,981.38**	**3,256.30**

SECTOR 5 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)	Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
TOTALS	**224**	**317,661**	**180,635**	**137,026**	**2,258**	**3,853**	**7,903**	**435**	**2,387**	**1,952**

3.3 Demand other than heat

As noted above, although woodfuel can be used to generate electricity the process is only commercially available at scales inappropriate to the CNP. As a result electricity generation is excluded from this assessment of demand as is the use of wood to generate liquid biofuels or gas.

However there is one other potentially significant area of demand that falls outside the assessment of heat requirements in buildings; charcoal. Given the emphasis on tourism, leisure and recreation in the park this market may well be significant in volume terms. In addition to the obvious local economic benefit, if the product was branded and the labelling included some factual information about woodfuel developing this market could also raise awareness of the benefits of woodfuel amongst consumers residing outwith the park, raise the profile of the CNP and promote both the woodfuel action plan and the energy trail discussed in the next chapter.

In addition charcoal production could make a valuable contribution to the management of native woodlands because hardwoods do make a superior product. Also, most charcoal burning operations are small scale and do not require large volumes of timber at any one time meaning that small scale interventions are possible which have minimal impact on sensitive sites.

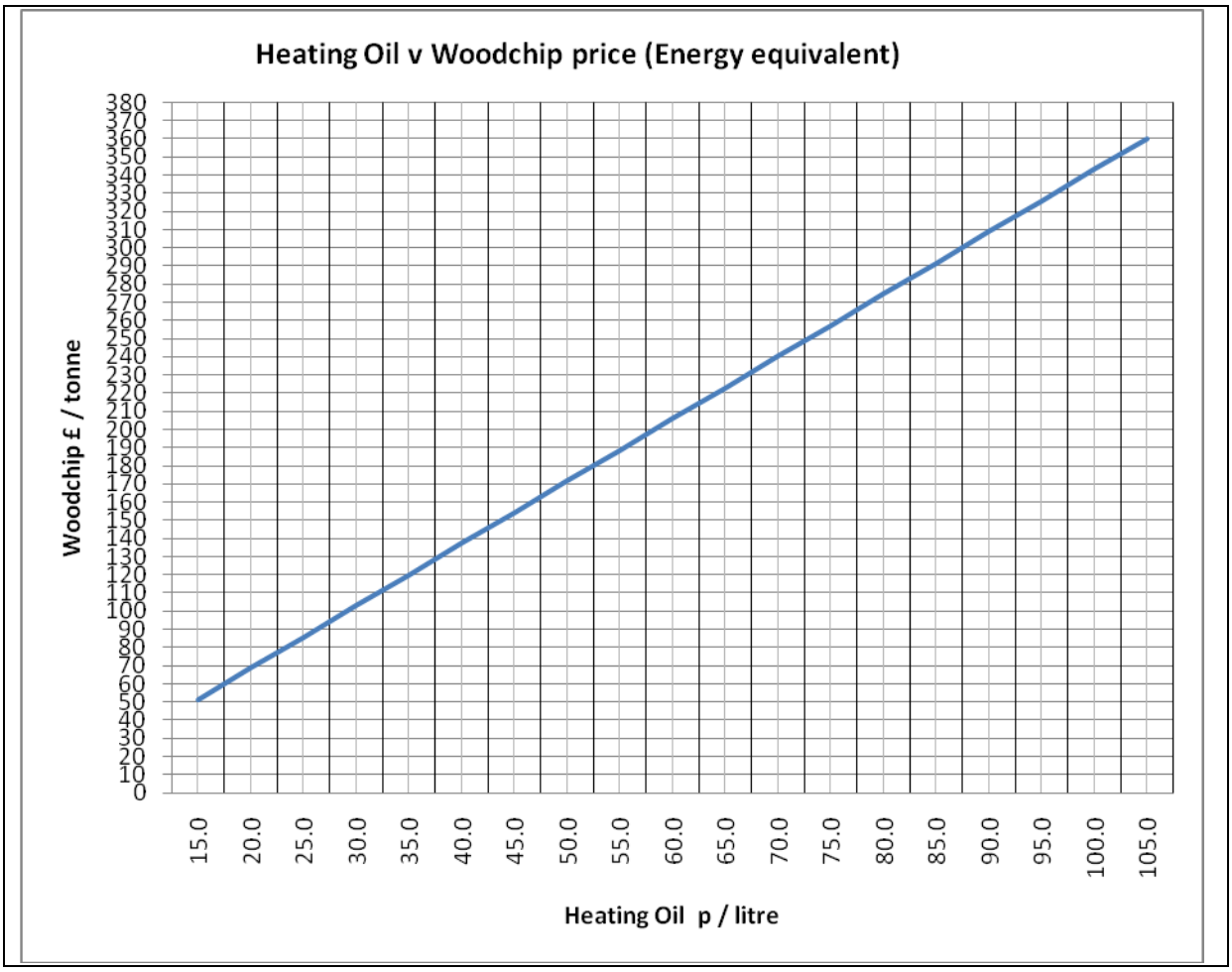
3.4 Barriers to realising potential demand

3.4.1 Price

The calculations in the table above and throughout this report are based on a heating fuel cost of £0.40 per litre. Experience in 2008 demonstrated that the heating oil price is volatile, with maximum heating oil prices reaching £0.70 per litre. Figure 3 shows the energy equivalent price of woodchips compared to heating oil. However it does not include the need to defray capital costs, which are higher for biomass boilers than for conventional ones. This means that the effective price for woodfuel needs to be below the oil price equivalent to maintain parity of heating costs.

The proposed introduction of the Renewable Heat Incentive may help defray these additional costs. Hopefully effective from April 2011, it aims to provide financial support to encourage individuals, communities and businesses to switch from using fossil fuel for heating, to renewable technologies and sources. The scheme will support a wide range of technologies including biomass boilers. The payments will be made to the owner of the equipment over a number of years, calculated on the annual amount of heat output, expressed in kilowatt hours. This will allow the beneficiary of the incentive to receive a set amount on the deemed output this could effectively be the major driver for woodfuel supply and utilisation across the UK.

FIGURE 3: Heating Oil vs Woodfuel costs



3.4.2 Comparative costs of heating plant installation

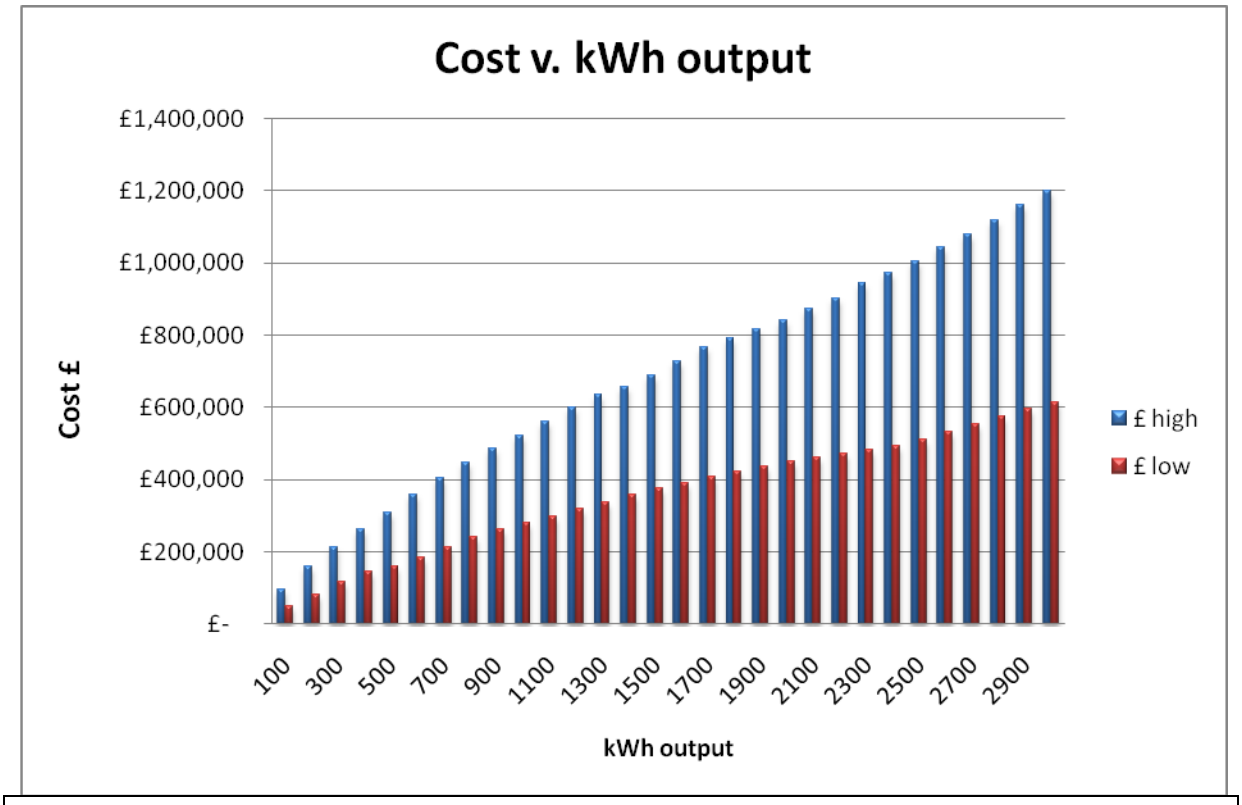
Boiler installation costs vary considerably depending on the complexity of the installation and the type of boiler installed. District heating schemes require more infrastructure than single building applications because of the ground works associated with installing a network. Total costs will also depend upon whether a new boiler house is required and the complexity of the delivery and storage infrastructure requirements.

Figure 4, Burning plant costs per installed kWh, below, has been adapted from the Carbon Trust publication "Biomass Heating a practical Guide for Potential Users"

http://www.carbontrust.co.uk/publications/publicationdetail.htm?productid=CTG012 - put this as a footnote to a bibliography rather than a link in the text

This shows that boiler installation costs (in 2008) varied by up to 100% in each output class. Costs for smaller buildings are range from £30,000 – £50,000 for a 30kW – 50kW chip boiler and from £16,000 - £20,000 for an automated log boiler, depending upon infrastructure and boiler house costs.

FIGURE 4 Burning plant costs per installed kWh



3.4.3 Individual buildings

The information in Appendix 4: Sector Heat Cluster annual and monthly demand figures, assists in the making of an estimation of the economics of installing biomass heating by allowing a comparison between current fuel costs; assumed to be heating oil at £0.40 per litre and biomass fuel costs at £80 per tonne.

Although the price of fuel will change over time, this analysis has been carried out on the assumption that both costs will remain the same over the assumed 20 year lifetime of a biomass boiler. Additionally, it has been assumed that the most suitable technology for single buildings will be an automated log boiler.

There are three advantages for encouraging chopped firewood as a fuel for single buildings. Firstly it is familiar, requires comparatively little investment and specialist equipment to produce, and gives the consumer a self supply option. Secondly, accumulator boilers are usually only fuelled once every 2-10 days from outside the home, making them far cleaner and more convenient that traditional stoves and fireplaces. Thirdly, although accumulator boilers are far more efficient and therefore cost effective both in monetary and carbon terms, many homes already have fireplaces and solid fuel stoves which can use logs as fuel without further investment. For this reason, prospects for rapid expansion of chopped firewood markets are good if fuel quality and customer service issues are addressed.

Using the data from Table 33, Appendix 4, average figures were calculated which compare annual and 20 year running costs for an oil and a log fired accumulator boiler for a single building in cluster 5.

TABLE 11 Average costs for an oil fired and log fired boiler

	Total Buildings	Total Oil Cost (£)	Total Wood Cost (£)	Cost Difference (£)	Wood (tonnes)	Softwood (M^3)	Annual energy (MWh)
per annum	**1**	1,636	931	705	12	20	41
per 20 years	**1**	32,727	18,609	14,118	233	397	814

The average figures in the above table suggest that at current fuel prices there would be a cost saving of £14,118 over 20 years per 'average' boiler. This would not in itself be sufficient to buy, install and maintain a boiler at today's prices. The introduction of grant aid through the Communities and Renewable Energy Scheme, CARES (community users) into the equation would bring the cost down to say £14,769. This would make the installation of a log boiler feasible, without leaving any additional funds for maintenance or interest payments on the capital costs of installation. If the price of heating oil were to rise above the current price of £0.40/ litre or the delivery cost of logs was below £ 80 / tonne the differential would increase and make the installation of a log boiler cost effective.

In well developed woodfuel markets pellet boilers and stoves are often the preferred option for single homes, but as fuel costs are very similar to heating oil costs at present it is difficult to make an economic argument for the installation of pellet boilers under current market conditions.

TABLE 12 Cost Comparison: Wood pellets vs heating oil

Woodchip	**£**	**80**	**Tonne**	**Insert facts**	**Here 2**
Wood pellets (bagged)	**£**	**175***	**tonne**	**@ 4,800 kWh per tonne**	**3.65p/kWh**
Wood pellets (bulk)	**£**	**160***	**tonne**	**@ 4,800 kWh / tonne**	**3.33p/kWh**
Heating oil	**£**	**0.40**	**Litre**	**@ 10.2 kWh / litre**	**3.92p/kWh**

*Based on Balcas costs

3.4.4 Multi-building Clusters

The data in Table 13 show the economics of heating all the potential clusters in the CNP area. These figures are based on the same assumptions as the economic assessment of single building boilers above, but show the lifetime cost difference between heating oil and woodfuel costs for each 'Buildings per Heat Centre' class. As with the previous data on

operating costs for single buildings, these figures only reflect comparative fuel costs. However, unlike installations in single buildings the per kWh cost of a district heating installation is generally lower, shortening pay back times and improving viability.

TABLE 13 Economics of heating all potential CNP clusters

Heat Clusters	Buildings per Heat Centre	Average 20 year difference per Building (£)	Average 20 year difference per Heat Centre (£)
1,242	**1**	13,910	13,910
163	**2**	16,510	33,020
48	**3**	15,463	46,388
30	**4**	13,878	55,513
15	**5**	13,053	65,266
6	**6**	17,028	102,167
6	**7**	13,648	95,539
7	**8**	16,709	133,674
7	**9**	14,047	126,424
3	**10**	15,333	153,330
3	**11**	14,721	161,929
1	**12**	18,835	226,026
4	**13**	17,622	229,080
1	**19**	12,360	234,847
1	**22**	21,573	474,610
1	**23**	12,660	291,191
1	**25**	16,654	416,359
1	**28**	11,543	323,201

Heat Clusters	Buildings per Heat Centre	Average 20 year difference per Building (£)	Average 20 year difference per Heat Centre (£)
1	**36**	11,853	426,723
1	**37**	19,583	724,581
1	**43**	12,994	558,742
1	**72**	11,484	826,873
1	**74**	19,943	1,475,761
1	**97**	11,914	1,155,677
1	**146**	12,638	1,845,078
1	**203**	12,850	2,608,595
1	**277**	13,460	3,728,465
1	**291**	12,442	3,620,584
1	**297**	12,171	3,614,674
1	**387**	12,812	4,958,122
1	**583**	12,591	7,340,455
1	**638**	12,492	7,970,064
1	**906**	12,901	11,688,633
1	**1,115**	12,839	14,315,604
1	**1,547**	11,573	17,903,863

TABLE 14 Woodfuel sale figures and volumes for the same heat centre classes

Buildings per Heat Centre	Woodfuel sales value (£ per annum)	Wood (tonnes per annum)	Wood (m^3 per annum)
1	1,155,668	14,446	24,652
2	360,025	4,500	7,679
3	148,947	1,862	3,177
4	111,397	1,392	2,375
5	65,488	819	1,398
6	41,004	513	875
7	38,344	479	817
8	62,593	782	1,334
9	59,199	740	1,263
10	30,769	385	657
11	32,495	406	693
12	15,119	189	323
13	61,295	766	1,307
19	15,709	196	334
22	31,747	397	677
23	19,479	243	415
25	27,851	348	594
28	21,619	270	461

Buildings per Heat Centre	Woodfuel sales value (£ per annum)	Wood (tonnes per annum)	Wood (m3 per annum)
36	28,544	357	609
37	48,468	26,424	45,092
43	37,376	17,533	29,920
72	55,312	15,496	26,444
74	98,716	26,909	45,920
97	77,304	16,076	27,433
146	123,419	17,052	29,099
203	174,491	17,339	29,588
277	249,401	18,162	30,993
291	242,191	16,788	28,649
297	241,791	16,422	28,024
387	331,656	17,287	29,500
583	491,028	16,989	28,992
638	533,136	16,856	28,765
906	781,868	17,408	29,706
1115	957,623	17,324	29,564
1547	1,197,611	15,616	26,648

An examination of the two tables allows the most viable Heat Clusters to be selected and the potential economic viability of setting up a processing plant to be assessed. By matching supply and demand in this way it is possible to target the development of a settlement-wide district heating scheme and assess the annual processing facility turnover.

The potential Heat Cluster sites include some major settlements and there would be infrastructure difficulties associated with connecting all buildings. However the networks are large enough to consider installing several boilers in several locations over time. The experience of the Lerwick District Heating System is that more people wish to connect over time. In some Scandinavian towns there are a number of Heat Centres and an integrated heating network. This gives some redundancy to the system and allows for maintenance of different boilers at different times. It also allows boilers to work at high efficiency with the potential to increase the number of boilers 'on line' as demand approaches peak load.

There are also social considerations to be taken into account and a potential reluctance for clients to change systems. Aviemore already has the advantage of the Albyn Homes boiler being in situ and this gives a psychological advantage for the conversion of attitudes.

A full list of the settlements, annual energy use, fuel use, cost and emissions is included as Appendix 4 Sector Heat Cluster annual and monthly demand figures. The nominal boiler power figures are very approximate as they are dictated by many factors including peak use and the network pipe length. The nominal boiler size is calculated by aggregating the nominal building boiler sizes and does not include network losses. These cannot be calculated until the actual network length is known and a generic figure of 40 Wm^{-1} has been used.

The figures for woodfuel use are aggregated net building use values. The gross figures will need to accommodate boiler efficiency rates and network losses. As a rule of thumb an additional 20% can be added to these figures. Network efficiency varies with load, and boiler efficiency depends upon many factors apart from load. The data in Appendix 4 can be used as indicative indicators of viable District Heating Systems, but should be used as the start rather than the end of the analytical process.

The distribution of individual heat clusters and their relative carbon footprints are shown in Figures 5 and 6 below.

FIGURE 5 Heat Centre Distributions by Demand

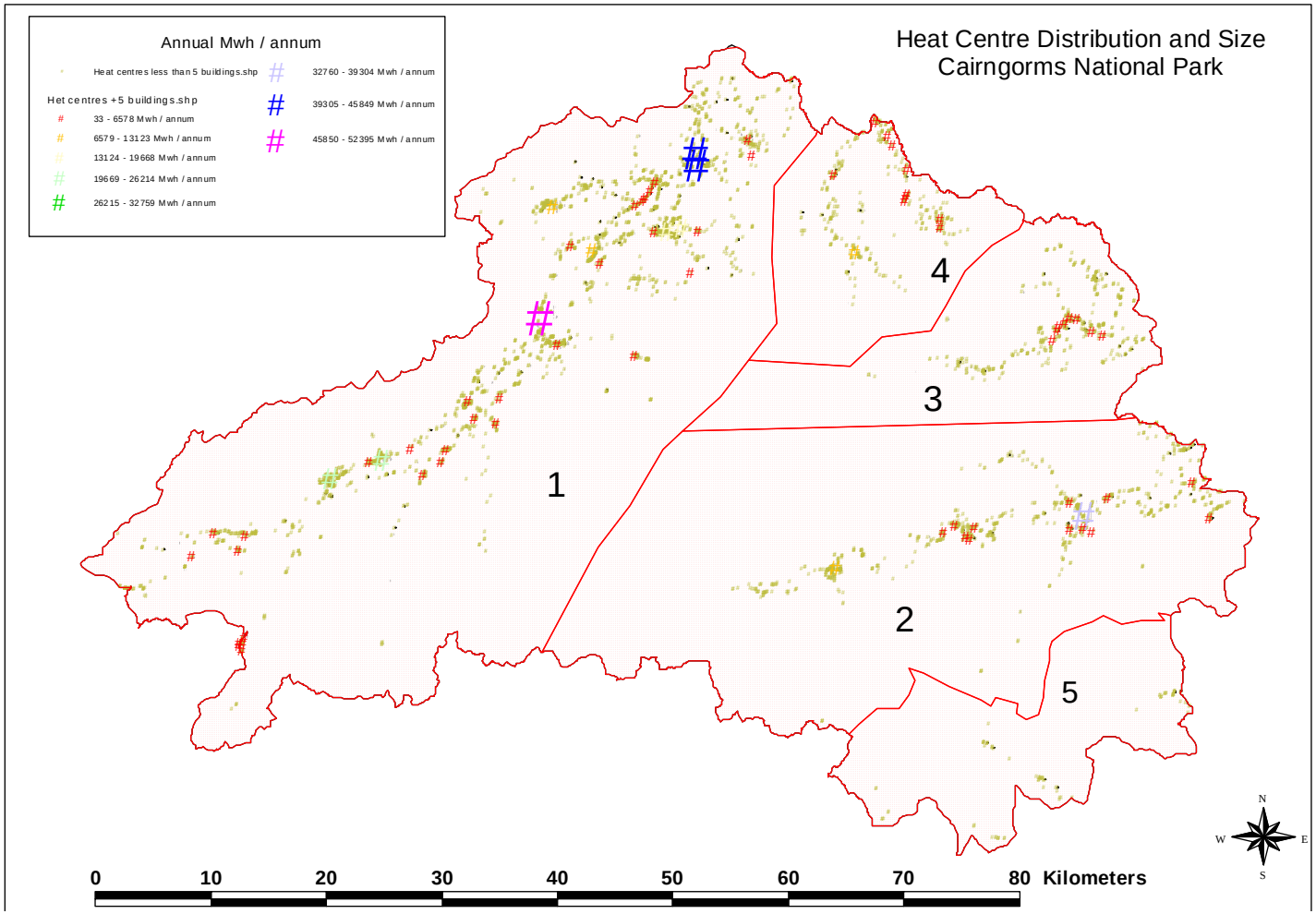
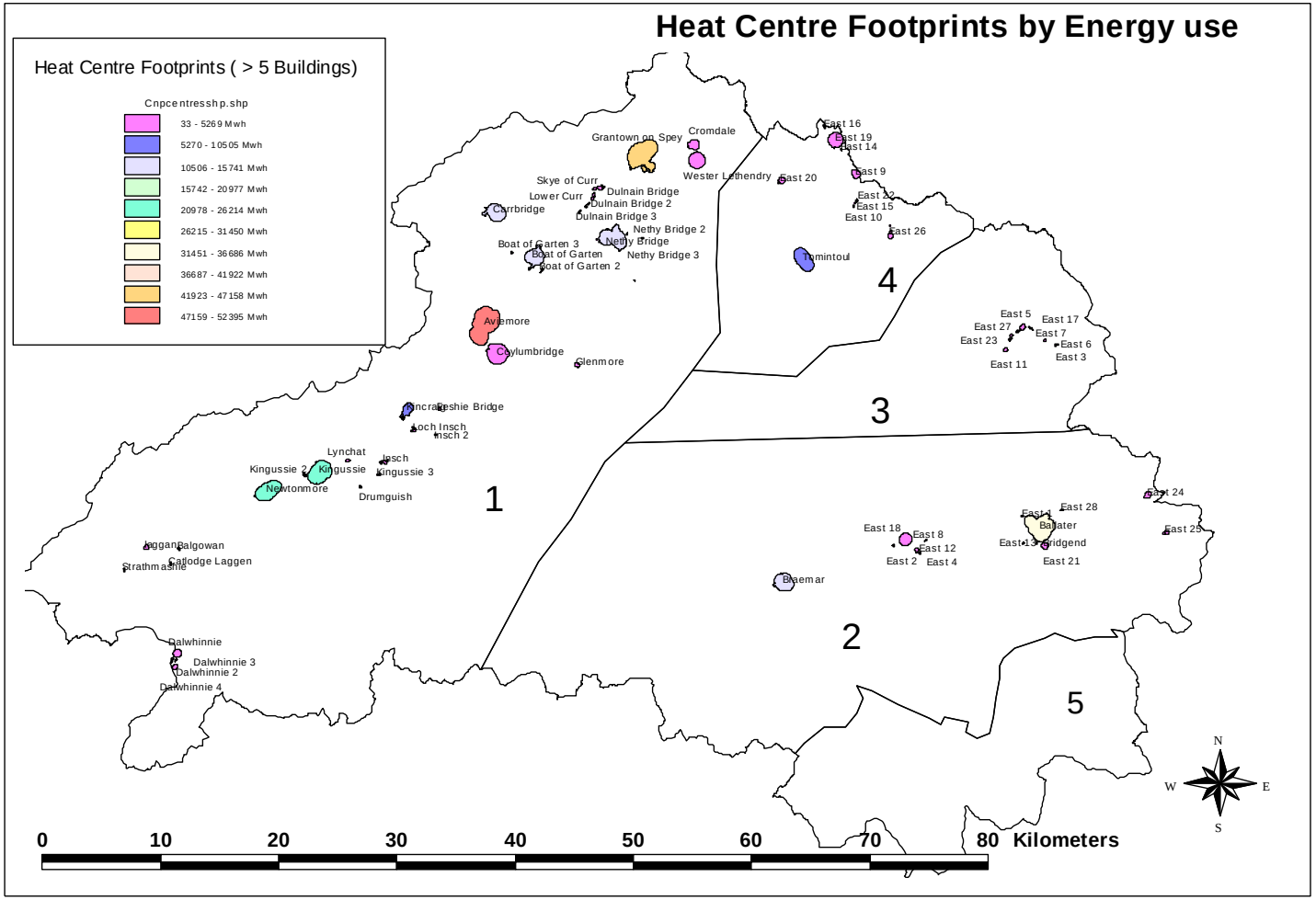


FIGURE 6 Heat Centre Distribution by potential footprint

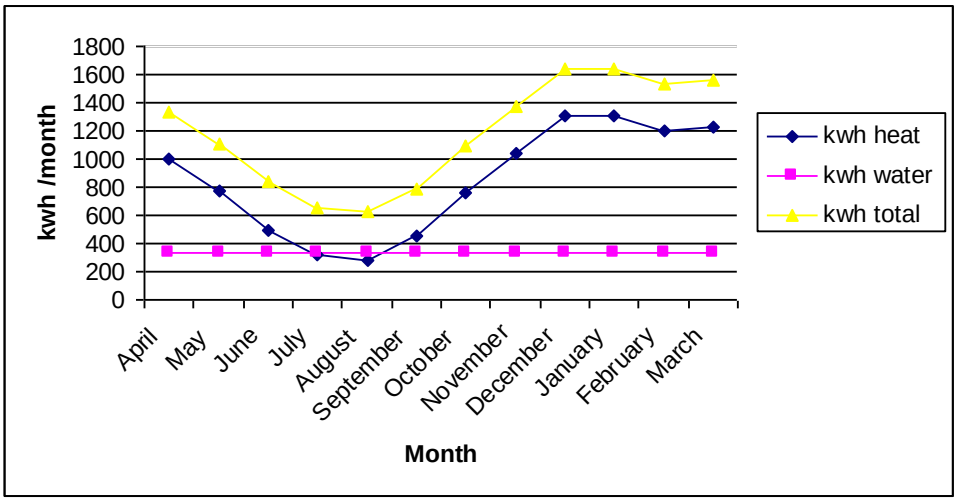


3.4.5 Seasonal fluctuations in demand

Heating is a seasonal market, but hot water demand is constant throughout the year. The heating figures in this report refer to heating and hot water. The seasonality of the market is illustrated by Figure 7 which gives heating and hot water demand for an average house in northern Scotland based on local Degree Day data.

An understanding of this point helps forest land holders, suppliers, processors and operators plan felling, drying, storage and transportation. The general pattern can be expected to scale up as the number of buildings in a supply chain increases. The supply curve needs to be taken into account by suppliers to enable cash flow to be predicted, monthly fuel volumes to be predicted and to ensure that there is sufficient processing and delivery capacity for the months when there is maximum demand. This will be an important consideration for ensuring the reliability and robustness of any supply chain. Timber needs to be purchased or secured with sufficient time to allow it to be dried before processing. An acknowledgement of the seasonal demand patterns by suppliers will enable work patterns to be determined to ensure that the logistics of a supply chain are as efficient as possible.

FIGURE 7 Hot water demand for an average house in northern Scotland



3.4.6 Barriers to demand

While it is straightforward to assess plant and fuel costs and their potential impact on market development it is far more difficult to assemble evidence of the non economic barriers to market expansion as much of it is anecdotal.

Documentary evidence from elsewhere in Europe indicates that the following issues have been significant:

- Perceptions of woodfuel as a costly, inconvenient “fringe” renewable energy
- Poor access to information for market entrants
- Consumer concerns about security/reliability and quality of supply
- Forest owner/management concerns about ecological sustainability

- Lack of training for all stages of the supply chain

- Poor linkages between different parts of the supply chain

These issues are all reflected in the findings of three pieces of work carried out in the Highlands since 2007: the report from the clim-ATIC woodfuel workshop held in Alvie in 2008; the findings of a scoping study carried out in 2007 by Highland Birchwoods into the feasibility of a one-stop shop for woodfuel advice and, the findings of a report commissioned by FCS in early 2009. These reports also highlighted installation costs and shortage of installation and maintenance engineers, lack of understanding in the building and financial services sectors and lack of accurate supply and demand data for both sector and enterprise planning.

3.4.7 Perceptions of woodfuel

We live in a clean, convenient age where energy is delivered on demand without direct intervention by the consumer. In direct contrast there is a widespread perception that woodfuel is inconvenient, unreliable and dependent on the consumer handling the fuel and lighting fires. Until this perception is replaced with a more accurate one woodfuel will remain a fringe activity and the benefits of widespread adoption will be unrealised. Achieving improvements in both fuel quality and customer service will be essential corollaries to the promotional campaign required to realise this new perception.

3.4.8 Access to information

There are three dimensions to this problem. Firstly, public awareness and understanding of energy is limited, with very few householders being aware of their energy consumption, or the fluctuations in it. Secondly, particularly in the light of the first point, it is extremely difficult to evaluate different energy supply options and to migrate from a mainstream non-renewable to a “fringe” renewable is at best onerous and at worst, intimidating. Thirdly, even if a consumer is prepared to consider a woodfuel option, there are many different technical issues to consider and seek advice upon.

It is also extremely difficult to access such a wide range of information and support from any one source and there is a litany of anecdotal evidence to the effect that even highly motivated consumers eventually become frustrated and opt for a more convenient (often non-renewable) option.

The key to overcoming these informational issues is to co-ordinate existing advice and support services effectively. Valuable adjuncts to this will be accessible energy audits, access to accurate information on woodfuel installation costs and advice on how to plan and project manage a woodfuel installation.

3.4.9 Concerns about quality and security of supply

These concerns are major issues for consumers and are a reflection of two factors. Firstly conventional firewood markets have a reputation for poor quality and unreliability which is instinctively transferred to emergent wood chip markets by potential consumers, and secondly there are concerns that fledging wood chip supply chains may prove uneconomic and short-lived.

Woodfuel quality is one of the most important factors for building confidence in biomass systems. Poor fuel quality results in breakdowns, inefficient and ineffective operation, and high energy costs. Fuel suppliers within the CNP area should be made aware of the current fuel quality standards and aspire to exceeding them.

It is vital that fuel quality and customer service issues are addressed through training and adoption of appropriate quality standards. In addition, it is essential to develop stronger linkages between the supply and demand sides of the market and also to promote the sector as a coherent whole so that potential consumers are aware of its growing strength and resilience.

Approximately 86% (298/348 GWh) of the biomass potential in the CNP area is related to multi building clusters and the most efficient and cost effective method of delivering biomass heat is through district heating systems connected to a single heat centre. The data from Tables 25 to 34 should be studied to identify potential district heating systems and their potential cost benefits and a provisional report should be presented to selected community councils, outlining the potential for conversion to biomass.

3.4.10 Concerns over ecological sustainability

Throughout the EU there are many instances of resource owners and managers declining to recover woodfuel because of concerns over long term ecological sustainability. Conversely there are also many instances where attempts to maximise recovery have led to ecological damage. Clear guidance on sustainable woodfuel management practices is required to inform managers and address the ecological concerns of what is likely to be an environmentally aware consumer.

Related to this issue is the management of supply chain haulage distances which can undermine both the economics of woodfuel supply and its low carbon footprint, which is often the incentive for highly motivated consumers to enter the market in the first place. It is important that advice and support is available to ensure that supply chains are sustainable.

3.4.11 Access to training

Woodfuel supply chains require new skills and business models for the energy supplier and for the specifiers and engineers who install and maintain woodfuel boilers. One of the rural development benefits of biomass is the creation and retention of local jobs. The development of an infrastructure to install and maintain plant through enterprises based in the Park will increase the economic benefits of biomass and increase confidence as service and repair work can be carried out locally.

The most important training issue at present is accreditation of installation and maintenance engineers. The clean and safe operation of biomass systems is dependent on regular servicing. There are currently very few installers in the Highlands who are accredited to carry out a biomass installation that qualifies for a Scottish Government grant payment and this is having serious impacts on the cost of individual installations and on the rate of market expansion. Moreover there are also substantial delays both for installations and repairs and this creates an impression of an unreliable, marginal energy source rather than an efficient and carbon neutral one. Accessible, cost effective solutions to these issues are urgently required.

Supply chain training is also required in four main areas; ecological sustainability, fuel quality, customer service (as referred to above) and development of new business models, particularly co-operatives and energy supply companies (ESCOs).

Architects and specifiers also require some awareness raising concerning the viability of woodfuel and the space requirements for boilers, hoppers and fuel delivery vehicles.

3.4.12 Poor supply chain linkages

The need to improve linkages between fuel suppliers and potential consumers has already been noted. There is also a need to ensure that resource managers, harvesting, chipping and haulage contractors, building managers and boiler suppliers and installers have clear communication links to ensure that the correct plant is installed and receives an appropriate fuel supply.

3.4.13 Financial considerations

Biomass heating can provide long term financial and non monetary benefits but, as noted above, has medium term capital costs which need to be overcome before these benefits are realised. Over time some of these costs will reduce as the fledgling industry becomes well established with a viable throughput. However, in the short term, particularly in the current economic climate, a programme of incentives will be required to prevent consumers incurring significant additional costs in the short term.

At district heating scale, as well as maintenance and improvement of incentives, it will be important to improve relationships between the woodfuel sector and the financial services sector. At present financial institutions often have an unrealistic perception of risk which must be addressed through better understanding of the woodfuel sector.

3.4.14 Lack of accurate supply/demand data

Lack of accurate supply/demand data has been noted as a significant issue at EU, national and regional levels. The demand model in this chapter is based on data derived from readily available sources. However the model could be retained and developed so that derived data could be overwritten by actual data whenever it was available.

There is also a shortage of information on the available woodfuel resource, particularly within the private sector. Action should be taken to review developments in timber supply modelling and assess their impact on potential wood fuel supply. Without accurate information there is a real danger of over exploitation of the resource, leading at best to suboptimal use, and at worst to ecological and social damage.

3.5 Demand Conclusions

There is considerable scope for the installation of biomass heating plants in the CNP area, with consequent savings in CO_2 and reductions in the extractive economy which results from importing fuel to the area.

The figures presented for energy, costs, CO_2 and wood fuel volumes are based on the entire building stock of the CNP area converting to biomass. This is unlikely to happen and the figures should only be used as a planning tool to identify potential sites for the installation of different scales of technology. They can also

be used to identify potentially profitable sites for future installations and as the first step in a planning process.

The Aviemore North plant has demonstrated the feasibility of providing heat to a client base. Although it supplied new build housing, the technical challenges of building a heating network under a railway must be at least as challenging as retrofitting to an existing settlement. It represents an excellent opportunity to develop a consumer focussed case study to facilitate a change in consumer attitudes to district heating.

3.6 Summary of Actions

3.6.1 Improved perceptions of woodfuel

To increase confidence in the woodfuel market issues relating to the perceptions of woodfuel as costly, inconvenient, concerns with respect to supply, and its ecological sustainability all need to be addressed.

Actions:

3.6.1.1 Promote woodfuel through a variety of coordinated media

3.6.1.2 Hold events to encourage change in perception

3.6.2 Increased number of installations

The small number of suppliers and installers within and close to the Park leads to a lack of competition and consumer choice. Awareness and understanding of energy is limited with few householders being aware of their consumption. Additionally even if a consumer is prepared to consider a woodfuel option, there are many different technical issues to consider and seek advice upon. Co-ordination of existing advice and support services effectively is essential to help consumers evaluate information effectively and help them to plan and project manage a woodfuel installation.

Actions:

3.6.2.1 Promote success of existing installations

3.6.2.2 Improve understanding and consistency of building standards

3.6.2.3 Promote Renewable Heat Incentive and other support mechanisms

3.6.2.4 Increase awareness in construction industry

3.6.3 Increased number of district heating schemes

Identification of potential district heating systems and their potential cost benefits is the first step. However it is vital that fuel quality and customer service issues are addressed through training and adoption of appropriate quality standards. In addition, it is essential to develop stronger linkages between the supply and demand sides of the market and also to promote the sector as a coherent whole so that potential consumers are aware of its growing strength and resilience

Actions:

3.6.3.1 Increase awareness and encourage installation

Chapter 4: Information Provision, Skills, Training and Demonstration sites

4.1 Information Provision

Difficulty in accessing advice and information at all stages of the supply chain has already been identified as a barrier to further woodfuel development in the Highlands. Resolution of this issue is best affected through collation and co-ordination of existing information and support services.

This may be addressed through linkages to the outputs of other projects and the web-sites provided by other agencies. Currently available web-sites include the Forestry Commission's www.usewoodfuel.co.uk which allows access to lists of local suppliers of both fuel and equipment together with a list of events and details of how to contact an area specific adviser. Further technical advice and details of funding available to the different sectors are available on the web-sites of Community Energy Scotland www.communityenergyscotland.org.uk, the Energy Saving Trust www.energysavingtrust.org.uk and the Carbon Trust www.carbontrust.com.

Both www.highlandbirchwoods.co.uk and www.northernwoodheat.net have a wider range of technical leaflets, case studies and best practice guidance available. Updating and re-badging of these to match other Action Plan promotional material would meet most needs of both existing and potential woodfuel supply businesses and the less technical and more general requirements of potential consumers.

Possibly the most important issue is to co-ordinate the existing sources of advice in a way that avoids both client frustration and duplication of effort. Creation of a monitored "one-stop shop" advice service in this way will be the main output of the Renewable Heat Advice and Support Service (Use Green Heat), a project initiated in June 2009 ending in 2012. The outputs from this project will be complimentary to those from the existing Forestry Commission project which covers the Grampian area. The organisations delivering these two projects are partners in the Cairngorms Woodfuel Action Plan and so close liaison with both these projects will be achieved. Providing information that is impartial, fit for purpose and relevant to the interest of different users will help to ensure that consumers, resource managers and suppliers have the technical information and contacts required on supply chain management, energy issues and boiler installation to enter the market.

4.1.1 Access to supply/demand data

The currently available datasets are adequate for strategic planning, but not for individual project planning. Energy audits are a prerequisite for any woodfuel proposal as is an accurate assessment of wood fuel availability

Difficulties in obtaining accurate private sector production forecasting data have been noted earlier. As a result it will be essential to maintain open channels of communication with resource managers so that individual wood fuel projects can make an informed assessment of their timber supply and any issues that they will need to address. Close co-operation between CNPA staff, other government agencies and local landowners will be important to achieving this.

4.1.2 Grants

The availability of grants will have a major influence on woodfuel market development. The currently available grants frequently change and the situation would need constant monitoring and changes could be disseminated by the most appropriate mechanism available: websites, newsletters and existing advice points.

In addition thought should be given to the production and circulation of an information note about opportunities under the SRDP to develop and manage woodfuel resources and supply chains.

4.2 Skills and Training

Specialist training issues have already been highlighted and the following priorities indicated:

- Accredited installer training
- Customer service and fuel quality training for fuel suppliers
- Sustainable resource management and woodfuel harvesting best practice dissemination
- Business models seminars

For the next 2 - 3 years there are opportunities to work with the RHASS, RBAN and clim-ATIC projects to ensure delivery of the above.

The comparatively small number of supply chains within the CNP (see sec 2.8) suggests that as woodfuel markets expand, apart from the more specialist training highlighted above, there will also be a need for more basic training in land-based skills such as machine operation and chainsaw use. The Land Based Business Training (LBBT) programme is well placed to take on this role and also to continue to deliver the training courses developed through other projects to meet the specialist needs once these projects have ended.

The impact of the current shortage of accredited installers has already been discussed.

The solution is to ensure that more installers are accredited and in the long term the best provider of accredited training for installers will be Inverness College and development of a close working relationship with it is recommended. However, apart from difficulties in accessing accredited training, there are also cost issues to consider. Fees and related attendance costs are high, and often amount to more than the additional income the accreditation is likely to generate within the first year given current rates of market expansion. It will be important to work closely with both training providers and funding sources to ensure that the costs of accreditation do not outweigh the benefits.

Arguments that accreditation is unnecessary are unlikely to find much sympathy given the regulatory framework applied to other forms of energy installation. Replacement of accreditation with an inspectorate would increase the cost of installations. Given that wood fuel installations are not cost effective without grant support at present this option might well become a further constraint on market expansion. Also, given that electrical installations must now be carried out by a fully qualified and paid up electrician, prior to examination by an inspector, it is unlikely to find favour with regulators.

Staying with the installation theme the clim-ATIC project will run a one day event on project managing your own woodfuel installation in association with LBBT. An event of this nature would do much to increase the confidence of motivated consumers who are considering a move to woodfuel. This event should be rerun periodically for several years to come.

4.3 Demonstration Sites and an Energy Trail

"Actions speak louder than words" and "seeing is believing".

In the same vein, a range of demonstration sites within the Park covering different technologies and scales of application would be far more effective at mobilising demand than any other form of information dissemination. Moreover, if these demonstration sites included woodlands managed for woodfuel as well as boiler installations and supply chain depots, and were also arranged and promoted as an energy trail, there could be wider benefits.

Apart from mobilising demand inside the Park such an energy trail would be able to demonstrate and disseminate information about the linkages between woodfuel and the maintenance and improvement of landscape and biodiversity benefits in woodlands. It would also be possible to raise awareness of the rural development and carbon reduction benefits that local woodfuel markets could deliver.

Developed in this way an energy trail could facilitate a wider understanding of the local woodland resource and it's potential to have a direct, positive influence on the quality of life in the Park. It could also help to explain the extractive economy of imported fuels and help to generate a desire for change.

The existence of a trail would also help to spread the culture of "communal" heating schemes; encouraging collective rather than individual attitudes to the provision of energy solutions.

In addition, an energy trail would provide an amenity resource for visitors which would further enhance the "Green" credentials of the Park and provide a unique selling point for the attraction of visitors.

The Energy Trail does not have to be a physical trail. It should however be very prominent throughout the Park, with facts and figures for each demonstration on public display in a uniform format.

Of existing woodfuel installations within CNP, the Alvie supply chain and the Aviemore North District Heating Scheme are potential candidates for inclusion in a trail, as are the school at Aboyne and the Glenlivet Estate Office at Tomintoul. An obvious addition to this list would be an exemplar installation at the CNPA headquarters where a biomass burner would demonstrate leadership, by example.

4.4 Summary of Actions

Provision of accessible information that is useable, practical, relevant, and in appropriate formats for all audiences is the key to the plan. This can be achieved through use of a range of mechanisms from practical case studies to technical guidance and advice.

4.4.1 Improved information

Actions:

4.4.1.1 Develop a series of general case studies

4.4.1.2 Production of technical guidance notes re woodfuel quality standards

4.4.1.3 Improve access to advice, information and training

4.4.2 Increased number of installers

The limited number of installers within and close to the park presents an issue with respect to choice. One of the problems facing prospective installers is accreditation, lack of knowledge costs etc. Training and provision of information to encourage installers and maintenance engineers to go through the process is imperative to improve the market and extend choice for consumers.

Actions:

4.4.2.1 Increase number of accredited installers

Chapter 5: Influencing and Developing Policy

Because the woodfuel market is an emerging one that cuts across a range of EU, government and local authority policy areas there are often instances where policy aspirations conflict and the capacity to influence policy is often important to on-going market development.

5.1 Current policy framework

Woodfuel policy is dealt with at EU and Scottish levels primarily through policies on renewable energy and biomass, and to date these policies have focussed on setting ambitious targets for expansion. More recently greater attention has been given to promoting use and encouraging overall market development.

5.1.1 EU Woodfuel policy

At EU level the most relevant policy measure to the use of woodfuel to supply renewable heat is the Biomass Action Plan referred to in Chapter 1 which was drawn up in December 2005 and aimed to double the proportion of EU energy needs provided by biomass from 4% to 8% by 2010. This would have the effect of reducing oil imports by 8%, preventing greenhouse gas emissions of 209m tonnes CO_2-equivalent per year and creating up to 300,000 new jobs in the agricultural and forestry sector.

The EU Council of Ministers endorsed the plan in March 2007 and set further targets for 20% of EU energy supply coming from biomass by 2020 and for 10% of liquid fuel consumption being met from biofuels by the same date. It was intended that these policy targets would be reflected in national commitments made through national and local biomass action plans.

The EU also signed a new Renewable Energy Directive in December 2008 which set a target for the UK of increasing the proportion of energy derived from renewable sources from the current level of 1.3% to 15% by 2020.

The EU summit which signed the new Directive also discussed an integrated climate change and energy policy which was finally agreed in April 2009. The new legislation was intended to meet the EU's 2020 climate goals to reduce greenhouse-gas emissions by 20% below 1990 levels and incorporates the targets in other current polices including the Biomass Action Plan and the Renewable Energy Directive.
Central to the integrated policy is a recognition that energy and climate-change policies should go hand in hand. It stresses the need for "decisive and immediate action" on climate-change and underlines "the vital importance of achieving the strategic objective of limiting the global average temperature increase to not more than 2°C above pre-industrial levels". To achieve this the following were agreed:

- A binding target to slash the EU's greenhouse gas emissions by 20% in 2020 compared with 1990 levels. EU leaders agreed that the objective should be pursued "unilaterally" even if there is no international agreement on reducing greenhouse-gas emissions after 2012 when the Kyoto targets expire, and;

- A commitment to reduce emissions by 30% provided that other industrialised nations, including the US, commit themselves to comparable emission reductions and that "advanced developing countries" (i.e. China and India) contribute as well in the framework of a post-2012 agreement

5.1.2 Scottish woodfuel policy

The Climate Change Scotland Act sets extremely demanding greenhouse gas emission targets. The delivery plan for the act sets out 4 transformational outcomes which must be achieved to progress towards these targets. One of these is decarbonising the heat sector, which is to be delivered through managing demand/changing behaviour, energy efficiency and low carbon heat.

Greater use of district heating networks and biomass boilers are highlighted in the delivery plan which also notes that:

"The conditions need to be created in which the choice by a householder or small business to invest in a low carbon heating source, such as solar thermal, ground or air source heat pumps, or biomass boilers, is no more unusual than purchasing a new gas or oil boiler. This requires a clear framework in which suppliers can meet demand, installers are properly trained and accredited, householders know the cost implications and benefits of the low carbon heat source, and consideration is given to the air quality implications of the installation of biomass boilers"

The delivery paper notes that the Renewable Heat Strategy will provide the overarching framework for decarbonising the heat sector. This strategy, which runs in parallel with the Biomass Action Plan for Scotland, was launched at the end of 2008 and anticipates biomass playing a major role in the meeting of ambitious targets for the supply of heat from renewable sources; possibly supplying up to 125,000 homes with heat by 2012.

Based on the work of The Forum for Renewable Energy Development Scotland the drivers for the Renewable Heat Strategy are; the need to tackle climate change and the potential for renewable heat to deliver sustainable economic growth. Renewable heat is seen as a vital component in an overall heat strategy which contributes to a low carbon and energy efficient future.

The strategy is based on a series of recommendations, many of which are directly relevant to this Action Plan, in particularly that:

- a consistent approach to heat mapping is developed
- a further analysis of the potential of heat markets in Scotland is conducted which takes account of barriers and costs
- district heating is supported and promoted, particularly by local authorities and housing associations
- public bodies take the lead in implementing renewable heat
- renewable heat is part of the process of progressively tightening and fully enforcing building regulations to accelerate progress to deliver zero-carbon new building stock.
- an analysis is carried out to determine the most appropriate mechanism(s) for developing a Scottish heat market, taking into consideration scale, technology, capital and fuel costs, innovative financial models, and market price to ensure no undue burden is placed on the end user

- CPD workshops and seminars are run to ensure that building and energy professionals give informed consideration to renewable heat

- a co-ordinated training programme is developed incorporating: micro generation, energy efficiency, and renewable heat.

- the benefits of renewable heat are promoted in a coordinated and easily accessible fashion, including through web promotion by appropriate agencies and other general awareness raising activities.

5.1.3 Council Woodfuel Policies

Woodfuel is not prominent in any Council policy statement but it is clear from consultation with both elected members and officials that the development of local woodfuel markets at appropriate scales is widely supported.

The development of a policy is probably most advanced with The Highland Council who published a Renewable Energy Strategy in 2006. This designated the Greater Cairngorm Area as one where there is a moderate opportunity to develop biomass energy. This means that there is a perceived opportunity to develop installed capacity of between 10 and 100MWh. Within areas where opportunities to develop biomass have been identified there is a target of 22% of energy use being supplied by it by 2020.

Apart from setting targets for installed capacity the strategy also addresses a range of other issues including:

CO_2 emission reductions

Capacity building

Public engagement

Combating fuel poverty

Energy Efficiency

Conservation of the natural heritage

Community and local ownership/involvement/benefit

Moray Council are currently preparing a Renewable Energy Strategy for the county which will "be subject to the requirements of Strategic Environmental Assessment".

The Dundee and Angus Structure Plan 2001 – 2016 prepared by Angus Council refers to renewable energy in general and notes that "proposals will be favourably considered where they deliver quantifiable environmental and economic benefits, and any significant or cumulative adverse impacts can be satisfactorily addressed". In mid-2008 it was agreed to prepare an Angus Woodland and Forestry Framework. This Framework specifically excludes that part of the county that lies within the Cairngorms National Park.

Aberdeen, City and Shire have recently (17th August 2009) published a new structural plan, replacing the previous one dated 2001. The new Plan specifically excludes that part of Aberdeenshire within the Cairngorm National Park.

Generally Aberdeenshire was supportive of woodfuel schemes for both heating and generation. The Renewable Energy Strategy of 2004 promised to "provide support and encouragement to the biomass sector by 2006".

5.2 Influencing mechanisms

Because of its high profile, and because it is expected to be a best practice exemplar in terms of land and environmental management the Cairngorms National Park Authority is in an advantageous position to influence policy and the status that it enjoys is possibly the most effective mechanism available to it for influencing policy, particularly through its working relationship with the Scottish Government.

The very existence of the Cairngorms Woodfuel Action Plan enhances this capacity to influence by virtue of the Steering Group assembled to oversee delivery. If key individuals could be attracted on to this body it would be in an excellent position to influence the policies and operational plans of several important stakeholders, particularly amongst public agencies.

Further opportunities to influence both policy and policy delivery could be generated by developing external linkages, particularly land management agencies, social housing providers and with large scale energy users such as the NHS, all of which would add substantial weight to any lobbying for grant support or regulatory change at local or national level. Indeed possibly the single most useful action that CNPA could take is to maintain close working relationships with colleagues in organisations such as these to ensure that opportunities are optimised through collaboration, rather than negated through attempting to realise them without the relevant support and expertise.

Active lobbying, particularly of political decision makers is a skill in its own right and CNPA should consider developing these skills through attendance at training courses in this area such as those offered by Sullivan & Frost and others.

5.3 Lobbying priorities

The main areas where some influence on policy is required are grant mechanisms, accreditation processes, forestry policy development and planning and building control issues.

5.3.1 Grant mechanisms

There are many grant mechanisms for the development and management of biomass resources and for the installation of biomass technologies. However access to them is often difficult and they are often designed to assist specific client groups and operational contexts.

There is a strong argument for developing a grant specifically for CNP as it is a very useful, finite test bed for new approaches. Possibly this could take the form of a top up grant or interest free loan for domestic consumers to ensure that there is no short term rise in their energy costs as a result of installing a woodfuel boiler.

It is possible that a grant like this could be delivered through an ERDF funded project if sufficient match funding could be located from Scottish Government or other sources. Such a grant would certainly fit well with the Renewable Heat Strategy.

5.3.2 Accreditation procedures

At present accreditation is difficult to access and is a costly, time consuming process that gives the buyer of the accreditation access to a market that is likely to provide only a very small part of their business turnover for some time to come. Because of the link between installer accreditation and grant eligibility this is having a major impact on market expansion as noted above. In the absence of a grant to cover full costs of accreditation a change in policy is required to reduce the burden accreditation imposes on installers, at least until markets are expanding at a rate which would justify the investment.

5.3.3 Planning & Building Control Issues

Although recent regulatory changes, coupled with the release of a new Planning Advice Note and the Highland Council Sustainable Design Guidelines, have helped to overcome many "teething" problems there are still areas of potential misunderstanding, particularly over lorry movements and fuel storage. Contact should be maintained with the relevant officials covering the CNP area to ensure that they are given, or know where to ask for, the information required to make informed decisions. The lobbying priority in this area should be for planners and building control inspectors to agree an appropriate protocol for assessing installation proposals. It will be important to ensure that any dialogue with officials is informed by thorough consultation with specifiers and installers.

5.3.4 Forestry Policy Development

It is essential that knowledge of the available timber resource improves and any influence that can be used to expedite an improvement would be effort well spent. Options include linking forestry grant eligibility to the availability of a production forecast for the woodland being grant aided.

5.4 Summary of Actions

5.4.1 Respond to steering group suggestions

Action:

5.4.1.1 Respond to new policy and other drivers

Chapter 6: The Cairngorms National Park Woodfuel Action Plan

6.1 Aim

The overriding aim of this plan is to develop the woodfuel sector in the CNP, leading to a reduction in carbon emissions, demonstrating that rural development can be compatible with biodiversity and landscape benefits.

This aim is in line with recent EU and Scottish Government policy initiatives which recognise the importance of integrating these benefits in biomass policy delivery.

Successful implementation of the plan is dependent on developing targets against which delivery of these benefits can be measured.

6.2 Costs and Funding

The table setting out the plan in 6.5 has been constructed on the assumption that there will be a three year initial delivery period for the action plan. However the table should not be treated as a project budget without re-examining the costs in detail, discussing proposals with the nominated lead partner and checking assumptions on existing funding.

Instances where an action is part of an existing remit but will incur additional non-staff costs are shown as part funded. Instances where no cost is shown against an action indicate that the work is required fits so closely into an existing remit that it would be difficult to separate for accounting purposes.

Secondly, although the individual householder is a significant market, as the Demand section of this report demonstrates, the greatest gains area available in the district heating market, which is easiest to fund, and more likely to achieve success, if it is financed by a social landlord or a community group. It is for this reason that the plan includes an action for community consultations and facilitation of community led district heating projects. However it is impossible to predict the outcome of these consultations so no budget has been included for specific projects.

6.3 Implementation

Delivery of the recommendations outlined above is a complex task that will require sustained effort and monitoring of output for several years, and as a result, will require a motivated steering group led by someone with the time and resources to actively champion the plan. This Steering Group should reflect as broad a range of stakeholder interests as possible, including local community, government agency and private sector representation.

The recommendations could be delivered by the steering group if the different member organisations were prepared to sign a Memorandum of Agreement detailing actions they, as individuals, were responsible for completing, and would therefore take the lead role in pursuing funding for. This would require a co-ordinator with sufficient time to motivate and support lead partners, monitoring their progress and ensuring that new opportunities are not overlooked.

6.4 Targets & Monitoring

The overall aim of this plan is to develop the woodfuel sector in the CNP area in a way that demonstrates that rural development can be compatible with biodiversity and landscape benefits on the one hand, and reductions in carbon emissions on the other.

This aim is in line with recent EU and Scottish Government policy initiatives which recognise the importance of integrating these benefits in biomass policy delivery.

Successful implementation of the plan is dependent on developing targets against which delivery of these benefits can be measured.

6.4.1 Carbon emission reductions

The figures in Table 18 below show the amount of CO_2 displaced against biomass energy generated. Precise determination of targets is the prerogative of the steering group, but a realistic target might be to achieve a 16% reduction in CO_2 emissions by converting 20% of the heating capacity of the national park area to biomass. This will require a supply chain capable of producing 20 000 tonnes or 34 000 m^3 of biomass fuel at 30% moisture content per annum. This is the equivalent of replacing all of the non renewable heat in Kingussie, Newtonmore, Nethy Bridge and Carrbridge. The figures in Appendix 4 should be used to select the appropriate settlements to encourage converting to biomass.

It is not expected that the capacity will be installed by the end of the first three years, but the aim should be to ensure that the planning, design and fuel supply is at an advanced stage.

TABLE 15 CO_2 Emission savings from conversion to biomass

% CNP Biomass heat energy provided	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MWh Produced	34863	69726	104589	139452	174315	209178	244041	278904	313767	348630
Oil CO_2 (tonnes)	10529	21057	31586	42114	52643	63172	73700	84229	94757	105286
Biomass CO_2 (tonnes)	1917	3835	5752	7670	9587	11505	13422	15340	17257	19175
Oil CO2 Displaced (tonnes)	8612	17222	25834	34444	43056	51667	60278	68889	77500	86111
CO_2 Reduction (%)	8%	16%	25%	33%	41%	49%	57%	65%	74%	82%

6.4.2 Biodiversity and landscape benefits

The simplest measure of this might be the area of woodland re-stocked with mixtures incorporating significant proportions of native species which refer to woodfuel production in the SRDP application. FCS should be consulted to determine a realistic target.

6.4.3 Rural Development benefits

The two best measures of this are the added value and the employment created which can be measured simply by calculating the additional woodfuel used as a result of the action plan, and the number of additional jobs created in the entire woodfuel supply chain.

6.3 Action Plan

Cairngorms Woodfuel Action Plan - Implementation Summary								
	Output		**Action**	**Delivery mechanism**	**Lead partner**	**Other Partners**	**Target Date for Action**	**Priority**
1	**Delivery and monitoring**	**1.1**	Develop a delivery body - a steering group to work together, monitor and coordinate implementation	Regular meetings (at least twice a year) to update and monitor delivery	CNPA	RHASS/SNH/FCS/SEPA/EST/CES/Crown estate/Saw Mills/Private land owners	Immediate	High
Chapter 2	**Woodland Resource and Supply chain development**							
	Output		**Action**	**Delivery mechanism**	**Lead partner**	**Other Partners**	**Target Date for Action**	**Priority**
2.10.1	**Sustainable use of woodland resource**	**2.10.1.1**	Update private woodland inventory including private sector timber production forecasting data	Through FCS inventory work	FCS/CNPA	FR - TOSIA/FCS/SNH	Year 1	High
		2.10.1.2	Produce a definitive 'sustainability limit' with regard to timber production within the Cairngorms without compromising other objectives	Work with Nortosia project case study	FR/FCS?	FR/FCS/SNH	Year 1	High
2.10.2	**Sustainable management of woodland for woodfuel**	**2.10.2.1**	Best practice guidance on opportunities to restructure plantations for woodfuel protecting biodiversity and landscape	Production of best practice guidance for sustainable management	HBW	FR/FCS/SNH/CNPA	Year 1	High
		2.10.2.2	Disseminate best practice guidance on optimisation of woodfuel recovery including residues	Organise 2 awareness raising events and develop guidance	HBW/CNPA	FCS/SNH	Year 1 - 3	Medium
		2.10.2.3	Promote opportunities for small woodland and farm based woodfuel processing and supply - especially firewood	Develop training events and demonstrations. Promote FCS updated guidance	HBW/CNPA	FCS/FR	Year 1 - 3	High
2.10.3	**Expansion of existing woodland resource**	**2.10.3.1**	Encourage and support SRDP new woodlands applications	Provide proactive support and encouragement for new applications - priority for habitat networks, new native woodland and riparian woodland	CNPA/FCS	HBW/Catchment Partnerships	Ongoing	Medium
2.10.4	**Expansion of the woodfuel supply chain**	**2.10.4.1**	Appraise existing and potential supply network	Undertake an audit of existing supply and opportunities/barriers for expansion	CNPA	UHI/Clim-ATIC	Ongoing	High
		2.10.4.2	Improve access to information	Suppliers/Installer list on websites	RHASS/CNPA	FCS/other organisation websites	Ongoing	High
		2.10.4.3	invest in supply chain	Investigate possibility for soft loans (low/no interest) for woodfuel processors to secure timber supplies	CNPA/HIE/SE	FCS/HBW	Year 2	Medium

		2.10.4.4	Improve supply chain cooperation	Organise events to encourage stronger working relationships within the supply chain including raw material/fuel suppliers	CLIM-ATIC/CNPA/HBW	FCS	Year 2	High
				Facilitate co-operative working among farmers and forestry producers	FCS/CNPA	HIE/SE		High
		2.10.4.5	Support and facilitate the emergence of energy suppliers	Present business modelling seminars for prospective energy suppliers	HBW	CNPA	Year 2 - 3	Medium
Chapter 3	**Developing demand**							
	Output		**Action**	**Delivery mechanism**	**Lead partner**	**Other Partners**	**Target Date for Action**	**Priority**
3.6.1	**Improved perceptions of woodfuel**	**3.6.1.1**	Promote woodfuel through a variety of co-ordinated media	Strategy showing targets audiences and actions planned	CNPA	Steering Group	Year 1	Medium
		3.6.1.2	Hold events to encourage change in perception	Jointly plan and co-ordinate events in the National Park	HBW/CNPA/UHI	FCS	Ongoing	High
3.6.2	**Increased number of installations**	**3.6.2.1**	Promote success of existing installations	Through promotions activity and Energy Trail	CNPA	FCS/HBW	Ongoing	Medium
		3.6.2.2	Improve understanding and consistency application of Building Standards	Work with Local Authorities and CNPA Planning dept to provide guidance and training	CNPA	LAs/FCS	Year 1	High
		3.6.2.3	Promote Renewable Heat Incentive and other support mechanisms	Updates on websites and press releases	HBW/FCS/CNPA	FCS	Year 2	Medium
		3.6.2.4	Increase awareness in construction industry	Awareness raising events/promotion and production of guidance	CNPA/FCS	HBW	Year 2- 3	Medium
3.6.3	**Increased number of district heating schemes**	**3.6.3.1**	Increase awareness and encourage installation	Promote through design guidance and a demonstration site	CNPA	FCS/HBW/Las	Year 1 - 3	Medium

Chapter 4	Information, Skills and Training							
	Output		**Action**	**Delivery mechanism**	**Lead partner**	**Other Partners**	**Target Date for Action**	**Priority**
4.4.1	**Improved information**	**4.4.1.1**	Develop a series of general case studies	Multi-media, printed material and web based resources	CNPA/HBW/FCS	Cllim-ATIC	Year 1	High
		4.4.1.2	Production of technical guidance notes re woodfuel quality standards	Multi-media, printed material and web based resources	HBW	CNPA	Ongoing	Medium
		4.4.1.3	Improve access to advice, information and training (links to actions in sections 2.4 and 3.1)	Develop joint training events	CNPA/FCS?	RHASS/FCS/EST/CWA/CES/ Soil Association/HB	Ongoing	High
				Develop web based resources	HBW/CNPA/ FCS	UHI/Clim-ATIC	Ongoing	High
				Develop a budget series of best practice guides and information notes	CNPA	HBW/FCS	Year 1 - 3	High
4.4.2	**Increased number of installers**	**4.4.2.1**	Increase number of Accredited installers (await outcome of RHI before action)	Investigate barriers in the current system of accreditation regulation	MIB	CNPA/RHASS	Year 2	Medium
				Provide affordable access to accredited training for woodfuel boiler installers	HBW	Inverness College	Year 2	Medium
Chapter 5	**Influencing and Developing Policy**							
	Output		**Action**	**Delivery mechanism**	**Lead partner**	**Other Partners**	**Target Date for Action**	**Priority**
5.4.1	**Respond to Steering Group suggestions**	**5.4.1.1**	Resend to new policy and other drivers	Through influence and organisational strategies	Steering Group	-	ongoing	Medium

Appendix 1: Cairngorms Woodfuel Action Plan Brief

Highland Birchwoods will produce the above plan on behalf of a project partnership comprising CNPA, FCS and Highland Birchwoods.

The plan will cover the following key areas:

1) **Indicative mapping existing and potential sources of woodfuel supply within the National Park, and identifying potential demand**
2) **Determining local skills capacity, and addressing shortfalls**
3) **Improving access to information for, and linkages between, end users, and for all parts of the supply chain**
4) **Improving understanding of fuel quality**
5) **Disseminating best practice in woodfuel resource management to ensure sustainability and enhanced landscape and biodiversity values**
6) **Ensuring linkages with other projects and priorities for landscape management and biodiversity, particularly Forest Habitat Networks**
7) **Providing a context for, and linkages with national renewable energy priorities and current projects such as CLIM-ATIC, Make It Be and PelleTime, and identifying options for attracting additional funding**
8) **Assessing the costs and potential economic impact of all the above in terms of business start ups, local employment and local added value**
9) **Identifying funding sources and partners for implementation**

Cliff Beck,
Chief Executive,
17th December 2008

The agreed brief for the format of the Cairngorms Woodfuel Action Plan stated that it should address five Key Areas:

Woodfuel Supply / Resource Base
Woodfuel Demand
Information Provision
Skills and Training
Influencing and Developing Policy

During the development of the Plan it was recognised that two further Key Areas should be included, namely:

Human Resource Requirements
Acquisition of Additional Data

A geo-spatial assessment of the first two Key Areas, Supply and Demand, has been presented in Chapters 2 and 3 of this Report. These chapters provide the baseline data for the development of a woodfuel supply chain. The data provided are intended to give a considered appraisal of the potential within the CNP area for the balancing of potential supply against potential demand. The analysis represents the start of a process, which requires significant refinement under the Key Areas defined in this Chapter, especially those under 4.5 Acquisition of Additional Data.

Appendix 2: Energy conversion Emissions cost and Yield Class Constants

Physical Constants

TABLE 17 Energy Values

Heating oil	10. 2kWh / l
Solid Hardwood (Broadleaf)	2.73 MWh / m3
Solid Softwood (Conifer)	2.04 MWh / m3
Woodchips	0.88 MWh / m3

http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,20041&_dad=portal&_schema=PORTAL

TABLE 18 Mass - Volume conversions

Solid Hardwood (Broadleaf) @ 30% MC	786 kg / m3
Solid Softwood (Conifer) @ 30% MC	586 kg / m3
Woodchip @ 30% MC	250 kg / m3

Forestry Commission

TABLE 19 CO2 Emissions

Heating Oil	0.302 kg / kWh
Wood	0.055 kg / kWh

http://www.highlandbirchwoods.co.uk/UserFiles/File/publications/Woodfuel/carbon%20balance%20report.pdf

General Assumptions - Unless otherwise stated, the following assumptions have been made:

TABLE 20 Costs

Heating oil	£0.40 / litre
Woodchips	£ 80 / tonne
Heating oil	£0.03922 / kWh
Woodchips	£0.02207 / kWh

TABLE 21 Yield Class

80-90% Broadleaf	4
80-90% Conifer	12
Scots Pine	7
Broadleaf	4
Conifer	12
Mixed Broadleaf / Conifer	8
Scrub	0

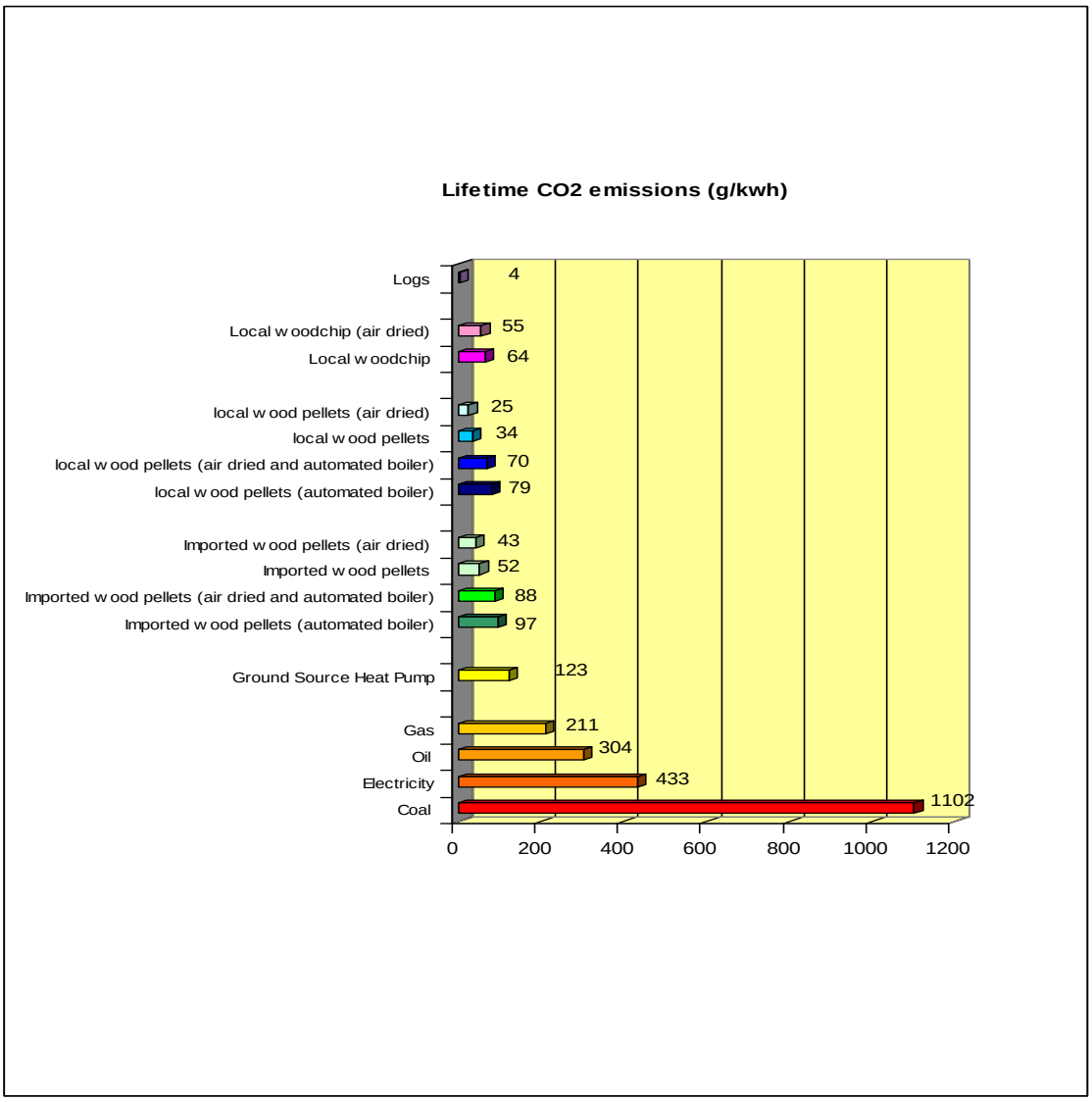
Yield Class figures from Forestry Commission
Scots Pine averaged from Forestry Commission and estate data

CO2 calculations are based on The Carbon Balance of Woodfuel (Highland Birchwoods 2008)

http://www.highlandbirchwoods.co.uk/UserFiles/File/publications/Woodfuel/carbon%20balance%20report.pdf

The CO2 values used represent the lifetime emissions of fuels rather than the emissions attributable to combustion by the end user. Woodchip values are based on the lower value given in the report of 55g/kWh for local air-dried woodchips. Values for other fuels are shown in Figure 8.

FIGURE 8 Extract from "The Carbon Balance of Woodfuel"



Woodchip Species type - Unless otherwise stated it has been assumed that all woodchip is made from coniferous species. This allows for 'like for like' comparison between tables.

Burning Plant Efficiency - Delivered (Net) energy values have been used because different burning plant have different efficiency rates. It has been assumed that all plant will be automated woodfuel or closed domestic stoves. Gross requirements will be higher.

Open fireplaces are about 35% efficient and will require about three times the woodfuel volumes estimated.

The efficiency of automated burning plant and domestic stoves ranges from 80% – 95% efficiency and will require about 10% more than the woodfuel volumes estimated.

The following conventions have been used throughout the Supply and Demand sections:

Power and Energy Units - Power is modelled in watts rather than the SI unit of joules. This is because most energy applications are rated in watts or (kilo)watt hours.

Determination of buildings requiring heat - Unless otherwise stated all demand values relate to buildings with postcodes. These are assumed to be buildings requiring heat.

Lifetime Plant and Energy costs - The lifetime of burning plant has been assumed to be 20 years. The costs of both oil and woodfuel have been assumed to remain at today's price for the lifetime of the plant. No costs have been included for the replacement or servicing of existing oil burning plant.

Energy Use - Energy use figures are based on delivered heat. Boiler efficiency and network losses have not been calculated as network length can only be calculated at the design stage and boiler efficiency varies depending on plant type. Where network losses are used to calculate district heating connectivity, a figure of 40Wm-1 has been used.

Appendix 3: Demand Model Process

Demand calculations

The energy demand figures are based on heat map modelling. They have been produced by applying an algorithm to each building which averages the difference between minimum and maximum fabric U-values for all of the radiant surfaces. The algorithm uses the factors in Table 22 plus factors for the Building Use Class (BUC), degree days (DD), air changes and the hot water requirement, to generate generic data. It is important to note that the algorithm supplies a derived figure and does not necessarily represent the actual power and energy requirements of any given building.

TABLE 22 Building Fabric U-values

TABLES			**Factors used**	**Factors used**
Table 1 Window Factors			**Min**	**Max**
	Detached	0.17	0.17	0.25
	Semi-detached	0.2		
	Mid terrace	0.25		
	Flat	0.25		
Table 2 Window U-values				
	Double glazed wood/plastic	3	3	5.8
	Double glazed metal frames	4.2		
	Single glazed wood/plastic	4.7		
	Single glazed metal frames	5.8		
Table 3 Wall U-values				
	Filled cavity wall	0.45	0.45	2.1
	Unfilled cavity wall	1.6		
	Solid wall 220mm	2.1		
Table 4 Roof U-values				
	Pitched < 50mm insulation	2.6	0.44	2.6
	Pitched 50-75mm insulation	0.99		
	Pitched > 75mm insulation	0.44		
	Flat uninsulated	2		
	Flat 50mm insulation	0.54		

As there is no data set for fuel choice by building, it has been assumed that all the buildings are heated by heating oil. This is one of the cheapest fuels available at the time of writing (June 2009) and is a common fuel choice for rural areas. The current price of oil is about £0.0392/kWh. The comparative costs of other fuels are outlined below in Table 23.

TABLE 23 Comparative Fuel Costs

Fuel	Price per unit	kWh per unit	pence per kWh
Wood chips (30% MC)	£80 per tonne	3,500 kWh/t	2.3p/kWh
Wood pellets	£185 per tonne	4,800 kWh/t	3.9p/kWh
Natural gas	4.1p/kWh	1	4.1p/kWh
Heating oil	35p per litre	10 kWh/ltr	3.5p/kWh
LPG (bulk)	34p per litre	6.6 kWh/ltr	5.2p/kWh
Electricity	14.0p/kWh	1	14.0p/kWh

http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,59188&_dad=portal&_schema=PORTAL
Last revised by site managers July 2009.

TABLE 24 Other common fuels in Cairngorm National Park area

Fuel Type		Cost	Unit	kW / unit	pence / kWh
Coal	£	12.50	50kg bag	405	3.09
LPG (cylinder)	£	47.00	47kg	648.6	7.24
Logs 20% MC	£	65	M^3	1700*	3.8

*Averaged figure based on Biomass energy centre calculation of 1400 – 2000 kwh / m^3 Price based on purchase of $4M^3$ load (bagged) September 2009.

Appendix 4: Sector Heat Cluster annual and monthly demand figures.

TABLE 25 Sector 1 – costs, demands and emissions @£80/tonne

SECTOR 1 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)		Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Nominal Boiler Size (kW)		Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
Aviemore	1,547	2,106,091	1,197,611	908,480		14,970	25,546	52,395	3,536		2,882	15,823	12,941.67
Grantown on Spey	1,121	1,703,513	968,688	734,825		12,109	20,663	42,380	3,066		2,331	12,799	10,467.87
Kingussie	638	937,562	533,136	404,426		6,664	11,372	23,325	1,654		1,283	7,044	5,761.20
Newtonmore	583	863,511	491,028	372,483		6,138	10,474	21,482	1,531		1,182	6,488	5,306.14
Nethy Bridge	392	590,715	335,905	254,810		4,199	7,165	14,696	1,058		808	4,438	3,629.85
Carrbridge	291	425,913	242,191	183,722		3,027	5,166	10,596	750		583	3,200	2,617.19
Boat of Garten	297	425,208	241,791	183,417		3,022	5,158	10,578	738		582	3,195	2,612.86
Kincraig	146	217,042	123,419	93,623		1,543	2,633	5,400	386		297	1,631	1,333.69
Coylumbridge	74	173,600	98,716	74,884		1,234	2,106	4,319	376		238	1,304	1,066.75
Cromdale	97	135,946	77,304	58,642		966	1,649	3,382	233		186	1,021	835.37
Dulnain Bridge	72	97,270	55,312	41,958		691	1,180	2,420	162		133	731	597.71
Insch	43	65,728	37,376	28,352		467	797	1,635	119		90	494	403.89
Wester Lethendry	22	55,830	31,747	24,083		397	677	1,389	124		76	419	343.07
Laggan	28	38,019	21,619	16,400		270	461	946	64		52	286	233.62
Skye of Curr	23	34,254	19,479	14,775		243	416	852	61		47	257	210.49
Dalwhinnie 4	8	23,569	13,403	10,166		168	286	586	54		32	177	144.83
Dalwhinnie 2	10	22,859	12,999	9,860		162	277	569	49		31	172	140.47
Loch Insch	9	21,221	12,067	9,154		151	257	528	46		29	159	130.41

Boat of Garten 2	13	21,097	11,996	9,101		150	256	525	39		29	159	129.64
Glenmore	8	18,540	10,543	7,997		132	225	461	40		25	139	113.93
Lynchat	11	16,646	9,465	7,181		118	202	414	30		23	125	102.29
Kingussie 2	9	15,800	8,985	6,815		112	192	393	31		22	119	97.09
Dalwhinnie 3	10	15,156	8,619	6,537		108	184	377	27		21	114	93.13
Strathmashie	13	14,977	8,517	6,460		106	182	373	22		20	113	92.03
Drumguish	9	14,142	8,043	6,099		101	172	352	26		19	106	86.9
Kingussie 3	8	12,919	7,347	5,572		92	157	321	24		18	97	79.38
Dalwhinnie	9	12,751	7,251	5,500		91	155	317	22		17	96	78.35
Catlodge Laggan	7	12,180	6,925	5,255		87	148	303	24		17	92	74.84
Feshie Bridge	9	12,149	6,908	5,241		86	147	302	20		17	91	74.66
Dulnain Bridge 2	8	11,787	6,703	5,084		84	143	293	21		16	89	72.43
Boat of Garten 3	7	10,946	6,224	4,722		78	133	272	20		15	82	67.26
Lower Curr	7	10,007	5,691	4,316		71	121	249	17		14	75	61.5
Balgowan	5	9,918	5,640	4,278		71	120	247	20		14	75	60.95
Dulnain Bridge 3	6	9,280	5,277	4,003		66	113	231	17		13	70	57.02
Insch 2	5	8,072	4,591	3,481		57	98	201	15		11	61	49.6
Nethy Bridge 3	5	7,986	4,541	3,445		57	97	199	15		11	60	49.08
Skye of Curr 2	6	7,837	4,456	3,381		56	95	195	13		11	59	48.16
Nethy Bridge 2	5	7,276	4,137	3,139		52	88	181	13		10	55	44.71
TOTALS	**5,561**	**8,187,319**	**4,655,647**	**3,531,672**		**58,196**	**99,310**	**203,685**			**11,203**	**61,513**	**50,310.01**

TABLE 26 Sector 1 – Monthly Woodfuel Demand

SECTOR 1 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Aviemore	1,547	25,546	52,395	2506	1929	1257	805	720	1124	1908	2618	3298	3278	3030	3073
Grantown on Spey	1,121	20,663	42,380	2027	2027	1017	651	583	909	1544	2118	2668	2651	2451	2486
Kingussie	638	11,372	23,325	1116	1116	560	358	321	500	849	1166	1468	1459	1349	1368
Newtonmore	583	10,474	21,482	1027	1027	515	330	295	461	782	1074	1352	1344	1242	1260
Nethy Bridge	392	7,165	14,696	703	703	353	226	202	315	535	734	925	919	850	862
Carrbridge	291	5,166	10,596	507	507	254	163	146	227	386	530	667	663	613	621
Boat of Garten	297	5,158	10,578	506	506	254	162	145	227	385	529	666	662	612	621
Kincraig	146	2,633	5,400	258	258	130	83	74	116	197	270	340	338	312	317
Coylumbridge	74	2,106	4,319	207	207	104	66	59	93	157	216	272	270	250	253
Cromdale	97	1,649	3,382	162	162	81	52	47	73	123	169	213	212	196	198
Dulnain Bridge	72	1,180	2,420	116	116	58	37	33	52	88	121	152	151	140	142
Insch	43	797	1,635	78	78	39	25	22	35	60	82	103	102	95	96
Wester Lethendry	22	677	1,389	66	66	33	21	19	30	51	69	87	87	80	81
Laggan	28	461	946	45	45	23	15	13	20	34	47	60	59	55	55
Skye of Curr	23	416	852	41	41	20	13	12	18	31	43	54	53	49	50
	8	286	586	28	28	14	9	8	13	21	29	37	37	34	34

SECTOR 1 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Dalwhinnie 4															
Dalwhinnie 2	10	277	569	27	27	14	9	8	12	21	28	36	36	33	33
Loch Insch	9	257	528	25	25	13	8	7	11	19	26	33	33	30	31
Boat of Garten 2	13	256	525	25	25	13	8	7	11	19	26	33	33	30	31
Glenmore	8	225	461	22	22	11	7	6	10	17	23	29	29	27	27
Lynchat	11	202	414	20	20	10	6	6	9	15	21	26	26	24	24
Kingussie 2	9	192	393	19	19	9	6	5	8	14	20	25	25	23	23
Dalwhinnie 3	10	184	377	18	18	9	6	5	8	14	19	24	24	22	22
Strathmashie	13	182	373	18	18	9	6	5	8	14	19	23	23	22	22
Drumguish	9	172	352	17	17	8	5	5	8	13	18	22	22	20	21
Kingussie 3	8	157	321	15	15	8	5	4	7	12	16	20	20	19	19
Dalwhinnie	9	155	317	15	15	8	5	4	7	12	16	20	20	18	19
Catlodge Laggan	7	148	303	15	15	7	5	4	7	11	15	19	19	18	18
Feshie Bridge	9	147	302	14	14	7	5	4	6	11	15	19	19	17	18
Dulnain Bridge 2	8	143	293	14	14	7	5	4	6	11	15	18	18	17	17
Boat of Garten 3	7	133	272	13	13	7	4	4	6	10	14	17	17	16	16
Lower Curr	7	121	249	12	12	6	4	3	5	9	12	16	16	14	15
	5	120	247	12	12	6	4	3	5	9	12	15	15	14	14

SECTOR 1 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Balgowan															
Dulnain Bridge 3	6	113	231	11	11	6	4	3	5	8	12	15	14	13	14
Insch 2	5	98	201	10	10	5	3	3	4	7	10	13	13	12	12
Nethy Bridge 3	5	97	199	10	10	5	3	3	4	7	10	13	12	12	12
Skye of Curr 2	6	95	195	9	9	5	3	3	4	7	10	12	12	11	11
Nethy Bridge 2	5	88	181	9	9	4	3	2	4	7	9	11	11	10	11
TOTALS	**5,561**	**99,310**	**203,685**	**9742**	**9742**	**4886**	**3128**	**2801**	**4370**	**7418**	**10179**	**12821**	**12741**	**11778**	**11947**

Sector 2

TABLE 27 Sector 2 – costs, demand and emissions @£80/tonne

SECTOR 2 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)		Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Nominal Boiler Size (kW)		Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
Ballater	906	1,374,976	781,868	593,108		9,773	16,678	34,207	2,473		1,881	10,330	8,449.04
Braemar	277	438,592	249,401	189,191		3,118	5,320	10,911	808		600	3,295	2,695.09
East 24	36	50,197	28,544	21,653		357	609	1,249	86		69	377	308.45
East 8	13	43,988	25,013	18,975		313	534	1,094	104		60	330	270.3
East 25	13	27,730	15,768	11,962		197	336	690	58		38	208	170.4
East 12	19	27,626	15,709	11,917		196	335	687	48		38	208	169.76
Bridgend	6	19,363	11,011	8,352		138	235	482	46		26	145	118.98
East 18	8	10,891	6,193	4,698		77	132	271	18		15	82	66.92
East 2	7	9,560	5,436	4,124		68	116	238	16		13	72	58.74
East 28	5	8,909	5,065	3,844		63	108	222	17		12	67	54.74
East 4	5	8,160	4,640	3,520		58	99	203	15		11	61	50.14
East 21	5	7,550	4,293	3,257		54	92	188	14		10	57	46.4
East 13	5	6,997	3,979	3,018		50	85	174	12		10	53	43
East 1	5	6,977	3,968	3,009		50	85	174	12		10	52	42.88
TOTALS	0	**2,041,515**	**1,160,889**	**880,626**		**14,511**	**24,763**	**50,789**			**2,793**	**15,338**	**12,545**

TABLE 28 Sector 2– Monthly Woodfuel Demand

SECTOR 2 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Ballater	906	16,678	34,207	1636	1259	821	525	470	734	1246	1709	2153	2140	1978	2006
Braemar	277	5,320	10,911	522	522	262	168	150	234	397	545	687	683	631	640
East 24	36	609	1,249	60	60	30	19	17	27	45	62	79	78	72	73
East 8	13	534	1,094	52	52	26	17	15	23	40	55	69	69	63	64
East 25	13	336	690	33	33	17	11	9	15	25	34	43	43	40	40
East 12	19	335	687	33	33	16	11	9	15	25	34	43	43	40	40
Bridgend	6	235	482	23	23	12	7	7	10	18	24	30	30	28	28
East 18	8	132	271	13	13	6	4	4	6	10	14	17	17	16	16
East 2	7	116	238	11	11	6	4	3	5	9	12	15	15	14	14
East 28	5	108	222	11	11	5	3	3	5	8	11	14	14	13	13
East 4	5	99	203	10	10	5	3	3	4	7	10	13	13	12	12
East 21	5	92	188	9	9	5	3	3	4	7	9	12	12	11	11
East 13	5	85	174	8	8	4	3	2	4	6	9	11	11	10	10
East 1	5	85	174	8	8	4	3	2	4	6	9	11	11	10	10
TOTALS	**1310**	**24,763**	**50,789**	**2429**	**2052**	**1218**	**780**	**698**	**1090**	**1850**	**2538**	**3197**	**3177**	**2937**	**2979**

Sector 3

TABLE 29 Sector 3 – Costs, demand and emissions @£80/tonne

SECTOR 3 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)		Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Nominal Boiler Size (kW)		Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
East 7	11	24,645	14,013	10,632		175	299	613	53		34	185	151.44
East 23	10	16,096	9,153	6,943		114	195	400	30		22	121	98.91
East 5	11	15,855	9,016	6,839		113	192	394	28		22	119	97.43
East 17	9	15,477	8,801	6,676		110	188	385	30		21	116	95.10
East 11	7	13,841	7,871	5,970		98	168	344	28		19	104	85.05
East 3	9	12,565	7,145	5,420		89	152	313	21		17	94	77.21
East 27	8	10,075	5,729	4,346		72	122	251	16		14	76	61.91
East 6	5	7,753	4,408	3,345		55	94	193	14		11	58	47.64
TOTALS		**116,304**	**49,602**	**66,703**		**827**	**1,411**	**2,893**			**159**	**873.82**	**714.68**

TABLE 30 Sectors 3 – Monthly Woodfuel Demand

SECTOR 3 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
East 7	11	299	613	29	23	15	9	8	13	22	31	39	38	35	36
East 23	10	195	400	19	19	10	6	5	9	15	20	25	25	23	23
East 5	11	192	394	19	19	9	6	5	8	14	20	25	25	23	23
East 17	9	188	385	18	18	9	6	5	8	14	19	24	24	22	23
East 11	7	168	344	16	16	8	5	5	7	13	17	22	22	20	20
East 3	9	152	313	15	15	7	5	4	7	11	16	20	20	18	18
East 27	8	122	251	12	12	6	4	3	5	9	13	16	16	14	15
East 6	5	94	193	9	9	5	3	3	4	7	10	12	12	11	11
TOTALS		1,411	2,893	138	138	69	44	40	62	105	145	182	181	167	170

Sector 4

TABLE 31 Sector 4 – Costs, demand and emissions @£ 80/tonne

SECTOR 4 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)		Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Nominal Boiler Size (kW)		Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
Tomintoul	203	306,855	174,491	132,364		2,181	3,722	7,634	551		420	2,305	1,885.59
East 19	37	85,235	48,468	36,767		606	1,034	2,120	184		117	640	523.77
East 9	25	48,978	27,851	21,127		348	594	1,218	100		67	368	300.97
East 26	12	26,588	15,119	11,469		189	323	661	57		36	200	163.38
East 20	8	22,294	12,677	9,617		158	270	555	51		31	168	137.00
East 15	7	10,898	6,197	4,701		77	132	271	20		15	82	66.97
East 16	6	9,347	5,315	4,032		66	113	233	17		13	70	57.44
East 14	6	6,824	3,880	2,944		49	83	170	10		9	51	41.93
East 22	5	6,538	3,717	2,821		46	79	163	11		9	49	40.17
East 10	5	6,362	3,617	2,745		45	77	158	10		9	48	39.09
TOTALS	0	529,920	301,333	228,587		3,767	6,428	13,183	1,009		725	3,981.38	3,256.30

TABLE 32 Sector 4 – Monthly Woodfuel Demand

SECTOR 4 SETTLEMENTS	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Tomintoul	203	3,722	7,634	365	281	183	117	105	164	278	382	481	478	441	448
East 19	37	1,034	2,120	101	101	51	33	29	45	77	106	133	133	123	124
East 9	25	594	1,218	58	58	29	19	17	26	44	61	77	76	70	71
East 26	12	323	661	32	32	16	10	9	14	24	33	42	41	38	39
East 20	8	270	555	26	26	13	9	8	12	20	28	35	35	32	32
East 15	7	132	271	13	13	6	4	4	6	10	14	17	17	16	16
East 16	6	113	233	11	11	6	4	3	5	8	12	15	14	13	14
East 14	6	83	170	8	8	4	3	2	4	6	9	11	11	10	10
East 22	5	79	163	8	8	4	2	2	3	6	8	10	10	9	10
East 10	5	77	158	8	8	4	2	2	3	6	8	10	10	9	9
TOTALS	314	6,428	13,183	631	631	316	202	181	283	480	659	830	825	762	773

TABLE 33 Sector 5 – Costs, demand and emissions @£ 80/tonne

SECTOR 5 SETTLEMENTS	Buildings	Oil Cost (£)	Wood Cost (£)	Fuel Cost Difference (£)		Wood (tonnes)	Wood (m^3)	Energy (MWh per annum)	Nominal Boiler Size (kW)		Wood CO_2 (tonnes)	Oil CO_2 (tonnes)	CO_2 Difference (tonnes)
27	1	850.1	362.55	488		6.0	10.3	21.1	4.828539		1.163	6.387	5.22
39	1	1977.39	843.32	1,134		14.1	24.0	49.2	11.23151		2.706	14.856	12.15
40	1	1406.97	600.05	807		10.0	17.1	35.0	7.991553		1.925	10.571	8.65
51	1	1477.53	630.14	847		10.5	17.9	36.8	8.392237		2.022	11.101	9.08
99	1	1499.31	639.43	860		10.7	18.2	37.3	8.515982		2.051	11.265	9.21
105	1	1689.26	720.44	969		12.0	20.5	42.0	9.594977		2.311	12.692	10.38
113	1	1172.86	500.2	673		8.3	14.2	29.2	6.661872		1.605	8.812	7.21
124	1	1412.76	602.51	810		10.0	17.1	35.1	8.024429		1.933	10.614	8.68
186	1	2239.31	955.02	1,284		15.9	27.2	55.7	12.71918		3.064	16.824	13.76
201	1	1516.51	646.76	870		10.8	18.4	37.7	8.613699		2.075	11.394	9.32
202	1	1549.23	660.72	889		11.0	18.8	38.5	8.799543		2.12	11.64	9.52
203	1	3081.88	1314.36	1,768		21.9	37.4	76.7	17.50479		4.217	23.155	18.94
216	1	2290.71	976.95	1,314		16.3	27.8	57.0	13.01096		3.134	17.211	14.08
217	1	1300.03	554.44	746		9.2	15.8	32.3	7.384018		1.779	9.767	7.99
266	1	2007.24	856.05	1,151		14.3	24.3	49.9	11.40091		2.746	15.081	12.34
267	1	1572.9	670.81	902		11.2	19.1	39.1	8.934018		2.152	11.817	9.67
279	1	1931.74	823.85	1,108		13.7	23.4	48.1	10.97215		2.643	14.514	11.87
294	1	2362.07	1007.38	1,355		16.8	28.7	58.8	13.41644		3.232	17.747	14.52
1107	2	5472.23	2333.8	3,138		38.9	66.4	136.1	31.08174		7.488	41.114	33.63
1112	1	1939.34	827.09	1,112		13.8	23.5	48.2	11.0153		2.654	14.571	11.92
1113	1	1498.76	639.19	860		10.7	18.2	37.3	8.512785		2.051	11.26	9.21
1114	1	3619.07	1543.46	2,076		25.7	43.9	90.0	20.55594		4.952	27.191	22.24
1121	1	1413.19	602.7	810		10.0	17.1	35.2	8.026941		1.934	10.618	8.68
1122	1	1640.91	699.82	941		11.7	19.9	40.8	9.32032		2.245	12.328	10.08

1130	1	1719.26	733.23	986		12.2	20.9	42.8	9.765297		2.352	12.917	10.57
1131	1	1551.33	661.61	890		11.0	18.8	38.6	8.811416		2.123	11.655	9.53
1137	2	4863.5	2074.19	2,789		34.6	59.0	121.0	27.6242		6.655	36.54	29.89
1143	2	3974.91	1695.22	2,280		28.3	48.2	98.9	22.57717		5.439	29.864	24.43
1215	1	3825.94	1631.69	2,194		27.2	46.4	95.2	21.73105		5.235	28.745	23.51
1216	1	2779.92	1185.58	1,594		19.8	33.7	69.2	15.78973		3.804	20.886	17.08
1242	2	7978.51	3402.68	4,576		56.7	96.8	198.5	45.31735		10.917	59.944	49.03
1243	1	1582.89	675.07	908		11.3	19.2	39.4	8.990639		2.166	11.893	9.73
1244	1	2747.86	1171.91	1,576		19.5	33.3	68.4	15.60753		3.76	20.645	16.89
1301	1	2265.41	966.16	1,299		16.1	27.5	56.4	12.86735		3.1	17.02	13.92
1305	1	1615.2	688.85	926		11.5	19.6	40.2	9.174201		2.21	12.135	9.93
1360	2	4176.19	1781.06	2,395		29.7	50.7	103.9	23.72032		5.714	31.376	25.66
1393	1	1335.11	569.4	766		9.5	16.2	33.2	7.583333		1.827	10.031	8.20
1394	1	1712.84	730.5	982		12.2	20.8	42.6	9.728767		2.344	12.869	10.53
1473	2	2371.5	1011.4	1,360		16.9	28.8	59.0	13.46986		3.245	17.817	14.57

TABLE 34 Sector 5 – Monthly Woodfuel Demand

SECTOR 5 Heat Centres	Buildings	Wood (m^3)	Energy (MWh per annum)	Volume (m^3) requirement per Month											
				April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
27	1	10.3	21.1	1.01	0.78	0.51	0.32	0.29	0.45	0.77	1.06	1.33	1.32	1.22	1.24
39	1	24.0	49.2	2.35	1.81	1.18	0.75	0.68	1.06	1.79	2.46	3.10	3.08	2.84	2.89
40	1	17.1	35.0	1.67	1.29	0.84	0.54	0.48	0.75	1.27	1.75	2.20	2.19	2.02	2.05
51	1	17.9	36.8	1.76	1.35	0.88	0.56	0.51	0.79	1.34	1.84	2.32	2.30	2.12	2.16
99	1	18.2	37.3	1.78	1.37	0.89	0.57	0.51	0.80	1.36	1.87	2.35	2.33	2.15	2.19
105	1	20.5	42.0	2.01	1.55	1.01	0.64	0.58	0.90	1.53	2.10	2.65	2.63	2.43	2.47
113	1	14.2	29.2	1.39	1.07	0.70	0.45	0.40	0.63	1.06	1.46	1.84	1.83	1.69	1.71
124	1	17.1	35.1	1.68	1.29	0.84	0.54	0.48	0.75	1.28	1.76	2.21	2.20	2.03	2.06
186	1	27.2	55.7	2.66	2.05	1.34	0.85	0.77	1.20	2.03	2.79	3.51	3.49	3.22	3.27
201	1	18.4	37.7	1.80	1.39	0.90	0.58	0.52	0.81	1.37	1.89	2.38	2.36	2.18	2.21
202	1	18.8	38.5	1.84	1.42	0.92	0.59	0.53	0.83	1.40	1.93	2.43	2.41	2.23	2.26
203	1	37.4	76.7	3.66	2.82	1.84	1.17	1.05	1.65	2.79	3.84	4.83	4.80	4.43	4.50
216	1	27.8	57.0	2.72	2.10	1.37	0.87	0.78	1.22	2.07	2.85	3.59	3.57	3.29	3.34
217	1	15.8	32.3	1.55	1.19	0.78	0.50	0.44	0.69	1.18	1.62	2.04	2.02	1.87	1.90
266	1	24.3	49.9	2.39	1.84	1.20	0.77	0.69	1.07	1.82	2.50	3.15	3.13	2.88	2.93
267	1	19.1	39.1	1.87	1.44	0.94	0.60	0.54	0.84	1.42	1.96	2.46	2.45	2.26	2.30
279	1	23.4	48.1	2.30	1.77	1.15	0.74	0.66	1.03	1.75	2.40	3.03	3.01	2.78	2.82
294	1	28.7	58.8	2.81	2.16	1.41	0.90	0.81	1.26	2.14	2.94	3.70	3.68	3.39	3.45
1107	2	66.4	136.1	6.51	5.01	3.26	2.09	1.87	2.92	4.96	6.81	8.58	8.52	7.86	7.99
1112	1	23.5	48.2	2.31	1.78	1.16	0.74	0.66	1.04	1.76	2.41	3.04	3.02	2.79	2.83
1113	1	18.2	37.3	1.78	1.37	0.89	0.57	0.51	0.80	1.36	1.87	2.35	2.33	2.15	2.19
1114	1	43.9	90.0	4.30	3.31	2.16	1.38	1.24	1.93	3.28	4.50	5.67	5.64	5.20	5.28
1121	1	17.1	35.2	1.68	1.29	0.84	0.54	0.48	0.76	1.28	1.76	2.21	2.20	2.03	2.06
1122	1	19.9	40.8	1.95	1.50	0.98	0.63	0.56	0.88	1.49	2.04	2.57	2.56	2.36	2.40

1130	**1**	**20.9**	**42.8**	**2.04**	**1.57**	**1.03**	**0.66**	**0.59**	**0.92**	**1.56**	**2.14**	**2.69**	**2.68**	**2.47**	**2.51**
1131	**1**	**18.8**	**38.6**	**1.84**	**1.42**	**0.92**	**0.59**	**0.53**	**0.83**	**1.41**	**1.93**	**2.43**	**2.42**	**2.23**	**2.26**
1137	**2**	**59.0**	**121.0**	**5.78**	**4.45**	**2.90**	**1.85**	**1.66**	**2.60**	**4.41**	**6.05**	**7.62**	**7.57**	**6.99**	**7.10**
1143	**2**	**48.2**	**98.9**	**4.73**	**3.64**	**2.37**	**1.52**	**1.36**	**2.12**	**3.60**	**4.95**	**6.23**	**6.19**	**5.71**	**5.80**
1215	**1**	**46.4**	**95.2**	**4.55**	**3.50**	**2.28**	**1.46**	**1.31**	**2.04**	**3.47**	**4.76**	**6.00**	**5.96**	**5.50**	**5.58**
1216	**1**	**33.7**	**69.2**	**3.31**	**2.55**	**1.66**	**1.06**	**0.95**	**1.49**	**2.52**	**3.46**	**4.36**	**4.33**	**3.99**	**4.06**
1242	**2**	**96.8**	**198.5**	**9.49**	**7.30**	**4.76**	**3.04**	**2.73**	**4.26**	**7.23**	**9.93**	**12.50**	**12.43**	**11.46**	**11.65**
1243	**1**	**19.2**	**39.4**	**1.88**	**1.45**	**0.94**	**0.60**	**0.54**	**0.85**	**1.43**	**1.97**	**2.48**	**2.47**	**2.27**	**2.31**
1244	**1**	**33.3**	**68.4**	**3.27**	**2.52**	**1.64**	**1.05**	**0.94**	**1.47**	**2.49**	**3.42**	**4.31**	**4.28**	**3.95**	**4.01**
1301	**1**	**27.5**	**56.4**	**2.69**	**2.07**	**1.35**	**0.86**	**0.78**	**1.21**	**2.05**	**2.82**	**3.55**	**3.53**	**3.26**	**3.31**
1305	**1**	**19.6**	**40.2**	**1.92**	**1.48**	**0.96**	**0.62**	**0.55**	**0.86**	**1.46**	**2.01**	**2.53**	**2.52**	**2.32**	**2.36**
1360	**2**	**50.7**	**103.9**	**4.97**	**3.82**	**2.49**	**1.59**	**1.43**	**2.23**	**3.78**	**5.20**	**6.54**	**6.50**	**6.00**	**6.10**
1393	**1**	**16.2**	**33.2**	**1.59**	**1.22**	**0.80**	**0.51**	**0.46**	**0.71**	**1.21**	**1.66**	**2.09**	**2.08**	**1.92**	**1.95**
1394	**1**	**20.8**	**42.6**	**2.04**	**1.57**	**1.02**	**0.65**	**0.59**	**0.92**	**1.55**	**2.13**	**2.68**	**2.67**	**2.46**	**2.50**
1473	**2**	**28.8**	**59.0**	**2.82**	**2.17**	**1.41**	**0.90**	**0.81**	**1.27**	**2.15**	**2.95**	**3.72**	**3.69**	**3.41**	**3.46**

Appendix 5: SRDP Renewable Energy Incentives and Assistance (as at June 2009)

SRDP Collaborative Local Development Strategies

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/AccessRecreationCom/localdevelopmentstrategie#top

Introduction
This Option aims to empower communities to look at the wider picture and evolve a development strategy suited to local needs. This would allow all development works to fit into a coherent and integrated framework.

Local Development strategies make good use of limited resources and through their emphasis on forward planning are key features of a thriving community. The most effective strategies are arranged well in advance following considerable research and input from those leading the strategy before project work begins.

What will this achieve?
This Option will demonstrate how development works will contribute to clearly identified local priorities. This will maximise the benefits to be gained from a co-ordinated policy of investment and hence maximum benefit to the community. Its objective is to empower rural communities to gain capacity and confidence to engage with funders.

What you can do
This Option funds the set up and running costs of maintaining a partnership between public and private organisations. The partnership can consult, create and maintain a development strategy for the area and can co-ordinate applications for grants and project implementation.

Who can apply?
Public-private partnerships including key stakeholders engaged in rural development within affected communities.

Eligibility criteria
Partnerships should be made of at least 33% non-public sector representatives.

What costs could be supported

- Studies of the area
- Provision of information about the area and the local development strategy once developed
- Training of staff involved in the preparation and implementation of the local development strategies
- Promotional events
- Training of leaders
- Implementation, by public private partnerships, of the local development strategy including applying for funding and monitoring of projects. The strategy should encompass one or more measures to diversify the rural economy, improve the quality of life in rural areas or to provide complementary training for economic actions.

Rate of support
Variable, dependent on type of activity funded and availability of other funding. A maximum of 15% of the public expenditure relating to the relevant local development strategy, if approved, can be devoted to the running costs of the public-private partnership.

Although there is a single application stage, payment will be made in two stages, 50% on initial application, and the remaining on approval of the development strategy.

Inspections/verification
An application should include the following:

Group

- A copy of the group's membership and constitution (e.g. Grazings Regulations, Articles of Association)
- Evidence of local democratic processes, e.g. (Meetings advertised and Minutes produced)
- The appointment of a local development strategy co-ordinator(s)
- Evidence of understanding public and private sector funding available and how to access.

Where applicable

- A note of any sub-groups involved in the planning and implementation process
- Evidence of the cross partnership arrangements between the Group and Sub-Group for agreeing and implementing the strategy.

Requirements For Release of Payment:
First Phase (Planning)

- 50% of the award will be released on approval

Second Phase (Implementation)

- Fully evolved development strategy
- Evidence of monitoring by the Plan Co-ordinator(s)
- Evidence of Community Meetings/events held/reports to disseminate information to all participants
- Evidence of community skills acquisition
- Evidence of implementation activity, e.g. sourcing additional grants

List of links to relevant technical guidance

- Scottish Council for Voluntary Organisations - http://www.scvo.org.uk
- Big Lottery Fund - http://www.biglotteryfund.org.uk
- Business Gateway - http://www.bgateway.com
- Scottish Enterprise - http://www.scottish-enterprise.com
- Highlands and Island Enterprise - http://www.hie.co.uk
- Crofters Commission - http://www.crofterscommission.org.uk

SRDP Improving Rural Community Services

Why are we funding this outcome?
The Scottish Government is committed to maintaining strong, prosperous and growing communities in rural Scotland. Research suggests that having access to certain services is important for the quality of life in rural communities. They also need help to provide adequate services and enjoy a good quality of life.

What will this package achieve?
This package will help small rural communities provide basic services and community facilities.

What you can do
You should choose which of the following Options will help deliver the outcome you have selected.
We suggest the following Options may all be appropriate:

- Some Options- shown in the top list - will always deliver the desired outcomes. If you choose any of these Options, you will not be expected to provide any justification for choosing that Option.
- Other Options - those in the bottom list - will only help achieve the desired outcome in specific circumstances. If you choose any of these, the application system will ask you to explain how you see this Option helping to achieve the outcome. You can select as many, or as few, Options as you think you will need. You must judge which Options will most effectively deliver the desired outcomes taking account of your circumstances.

These Options will always deliver the desired outcome:

- Community services and facilities
- Area access management

These Options will help to achieve the desired outcome in specific circumstances:

- Support for renewable energy - non land-based
- Reducing bacterial contamination in watercourses
- Development/creation of micro-enterprises
- Information and awareness raising
- Collaborative Local Development Strategies
- Skills development
- Sustainable management of forests - Low-impact silvicultural systems
- Sustainable management of forests - Areas of high public usage
- Woodland improvement grant - Long term forest planning

SRDP Community Services and Facilities

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/Improvingruralcommunity/Provisionofleisurerec

Introduction
This Option is to provide funding for projects that add to or improve community facilities in a rural area.

What will this achieve?
This Option will allow local communities to address the gaps in their facilities that are not currently being addressed by public or other providers. Its objective is to encourage communities to enhance development in the area in line with local strategic objectives and national outcomes.

What you can do
You can use this grant Option for improvements to the infrastructure, facilities or services in your area. Projects must be of benefit to local people and must not be detrimental to the environment.

Who can apply?
Any recognised community group in a rural area can apply for funding.

Eligibility criteria
The Community group must have a Constitution or Articles of Association so that it can receive funding in its own right, and a bank account. A rural settlement in this context is defined as having a population of less than 3,000.

There should be a clear demonstration of community need and demand for the service or facility. Projects should make a contribution to the strategic outcomes for the area and enhance community development. The application should show that the project has taken account of environmental sensitivities.

What costs could be supported
Examples include:

- Capital costs - Building renovation/new build, Internet café facilities, Sports equipment/facilities, Catering accommodation/upgrade.
- Non capital costs - Feasibility studies, Project management.

Rate of support
Up to 100% of approved project costs. Payment may be one-off or spread over time dependent on delivery of results and nature of project.

Inspections/verification
Capital projects in excess of £5,000 will be subject to a physical inspection. For other projects we will need evidence of expenditure/outcome (invoices, receipts, photos of outcome). In the application you will be asked to explain how the project benefits the community. You will also need to provide evidence that you have thoroughly investigated costs and considered what is best value - for small projects (< £5000) we need a minimum of one quote and for larger a minimum of two (unless there is a good reason such as only one supplier within a reasonable distance). You will need to sign a declaration confirming that this grant would be the only source of Scottish Government or European funding for the project.

List of links to relevant technical guidance

Guidance for community groups:

- Scottish Council for Voluntary Organisations - www.scvo.org.uk/
- Rural Gateway - www.ruralgateway.org.uk/
- Community Right to Buy - www.scotland.gov.uk/Resource/Doc/1112/0005125.pdf

SRDP Development of Renewable Energy Provision

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/renewableenergy

Why are we funding this outcome?
To encourage rural businesses and communities to invest in small scale renewable energy systems and contribute to increasing the amount of electricity and heat produced from renewable resources.

What will this package achieve?
The package will help to develop small scale renewable energy capacity from a range of renewable technologies (biogas, biomass, bio-fuel and micro-renewables) that:

- improves business viability
- benefits the wider rural community
- produces environmental benefits

What you can do
You should choose which of the following Options will help deliver the outcome you have selected.
We suggest the following Options may all be appropriate:

- Some Options- shown in the top list - will always deliver the desired outcomes. If you choose any of these Options, you will not be expected to provide any justification for choosing that Option.
- Other Options - those in the bottom list - will only help achieve the desired outcome in specific circumstances. If you choose any of these, the application system will ask you to explain how you see this Option helping to achieve the outcome. You can select as many, or as few, Options as you think you will need. You must judge which Options will most effectively deliver the desired outcomes taking account of your circumstances.

These Options will always deliver the desired outcome:

- Support for renewable energy - non land-based
- Support for renewable energy - forestry businesses
- Support for renewable energy - agricultural businesses
- Restructuring of agricultural businesses

These Options will help to achieve the desired outcome in specific circumstances:

- Skills development
- Provision and upgrading of infrastructure
- Manure/slurry storage
- Manure/slurry treatment
- Short rotation coppice crops of willow or poplar
- Diversification out with agriculture
- Development/creation of micro-enterprises
- Collaborative local development strategies
- Community services and facilities

SRDP Processing and Marketing of Primary Products

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/ValueAddedProcessing/ProcessingMarketProducts

Introduction
Sustainable and profitable production is a core activity of the land-use sectors and therefore supports economic activity in rural areas. Business support can assist diversification and development of farm holdings and support the development of local and national supply chains which in turn supports local communities. Adding value to food and other primary products is a critical factor in achieving viable businesses and will depend on identifying and exploiting a range of business and market opportunities. Under the SRDP, support can be provided for the processing and marketing of primary products through two different funding mechanisms. Through Rural Development Contracts - Rural Priorities you can apply for support for:

- on farm/near farm processing and marketing of food and drink products
- the processing and marketing of agricultural and horticultural raw materials into non-food products
- adding value to timber products

If your project does not fall into one of these categories, there is also a stand alone scheme, the Food Processing, Marketing and Co-operation Scheme (FPMC) within the SRDP, which can provide funding for larger or wider food processing projects. Further guidance on the scope and eligibility for this scheme can be found elsewhere on this website.

This Option of **Rural Priorities** provides assistance to develop facilities to process and add value to primary products to ensure that more value is retained by both land-holders and rural processors. It aims to encourage innovation and new product development, adding value and co-operation to exploit new markets. The objective is to link producers with processors, and support the development of employment opportunities in rural communities, thus retaining wealth and developing local services.
The objectives under this Option are to:

- Guide production in line with foreseeable market trends and encourage the development of new products or outlets for primary products
- Strengthen local supply chains through support for processing and marketing of locally produced food, other agricultural and forestry outputs
- Share resources and experience to control costs and increase incomes
- Improve or rationalise marketing channels or processing procedures
- Improve the profitability, efficiency and transparency of the supply chain
- Improve the presentation and preparation of products or achieve the better use or elimination of by-products or waste
- Apply new technology and/or innovation
- Improve quality beyond normal expected standard
- Support consumer education

Eligibility
The primary product sectors covered by this Option will be those listed in Annex 1 to the European Treaty (except fishery products) and forestry products. It is expected the following sectors will benefit from assistance for processing and marketing: red meat (in particular beef, lamb and venison); pigmeat; milk and milk products; eggs; poultry; cereals; oil producing crops; fruit and vegetables (including potatoes); wood and timber products. This list is not exhaustive as support may also be provided to new and

innovative products which involve the processing of newly developed crops. Assistance will also be available for the processing and production of drink products where they involve annex 1 products, e.g. fruit drinks.

Eligible costs include the development, improvement or expansion of new or existing facilities, together with the purchase of plant and equipment. Assistance may also be available to support a range of business development activities to further benefit the processing operation.

The purchase of second-hand equipment is also eligible for assistance, under the following conditions:

- The seller of the equipment must provide a declaration stating its origin, and confirm that at no point during the previous seven years has it been purchased with the aid of national or community grants
- The price of the equipment must not exceed its market value and must be less than the cost of similar new equipment
- The equipment must have the technical characteristics necessary for the operation and comply with applicable norms and standards

The following items of expenditure are ineligible for grant aid:

- Working capital
- Vehicles for external transportation (forklift trucks, or similar, are eligible)
- Harvesting equipment
- The Company's own labour and equipment costs
- Consumables
- Repair and maintenance costs
- Office equipment and other furniture (specific telephone equipment, computers, and software related to the development are eligible)
- Landscaping and ornamental work
- General costs, such as fees relating to planning, building and works, etc., exceeding 11% of the total cost of the project

It should also be noted that State Aid Restrictions, which may be subject to further development and change by the European Commission, may preclude certain types of assistance or assistance in particular sectors. If you have any concerns regarding this issue you should contact your Case Officer or your local SRDP office.

Who can apply?

Individuals, partnerships, businesses (including social enterprises) and groups of producers who are involved in the processing and marketing of primary agricultural, horticultural or forestry products. Support will be largely targeted towards micro, small and medium sized enterprises although larger businesses can be funded at a lower rate. See Section 3 below for definitions.

Eligibility criteria

For food processing proposals, projects will be eligible for assistance if:

- They do not have separate accounts for the farm business and processing business
- Turnover is less than £150,000 for the processing business

For non food and forestry products, assistance may be available to all forms and sizes of business, from individual on-farm processors to larger, independent processing Companies. There is no definitive list of eligible projects, but examples of potential proposals could include:

- the production of tallow from animal fat
- the processing of oil-seed crops into pharmaceutical products
- the manufacture of paper from hemp
- the processing of arable crops and by products into bio-fuels
- the processing of timber products into woodfuel

Rate of Support

In the Highlands and Islands assistance is up to 50% of the eligible costs, and up to 40% elsewhere in Scotland. However, support at the maximum rate is limited according to the size of the business, as follows:

- On farm/near farm food processing and marketing. The maximum turnover of the processing business is limited to £150,000.
- The processing and marketing of agricultural and horticultural raw materials into non-food products. The maximum rate of assistance is limited to micro, small and medium-sized enterprises, i.e. those businesses which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million.
- For businesses with fewer than 750 employees or with a turnover of less than the EUR 200 million, the maximum aid intensity is halved. If the business is part of a larger Group of Companies, these employee and turnover limits are determined by those of the ultimate Holding or Parent Company.
- Adding value to forestry products. Support is limited to micro-enterprises, i.e. those businesses which employ fewer than 10 persons and which have an annual turnover not exceeding EUR 2 million.

Inspections/Verification

In line with the general conditions of Rural Priorities, you may be subject to an on the spot inspection to verify the progress or completion of the development which has been supported.

You will be required to provide evidence that the work has been undertaken and the expenditure made through the production of invoices and evidence of payment. You may also be required, through regular monitoring forms, to provide details of the project and the benefits which the funding has delivered.

SRDP Co-operation - non food and forestry supply chain

Introduction
Sustainable and profitable production is a core activity of the land-use sectors and therefore supports economic activity in rural areas. Business support can assist diversification and development of farm and forestry enterprises and support the development of local and national supply chains which in turn supports local communities. The adoption of a co-operative approach, whether between groups of producers or across the various elements of the supply chain, can help to achieve a broader impact than action by a single individual or business.

Under the SRDP, support can be provided to help meet the costs of co-operative activity, through two different funding mechanisms. Through Rural Development Contracts - Rural Priorities you can apply for support for projects dealing with all non food and forestry products.

For all co-operative projects dealing with food products there is also a stand alone scheme, the **Food Processing, Marketing and Co-operation Scheme (FPMC)** within the SRDP. Further guidance on the scope and eligibility for this scheme can be found elsewhere on this website.

What will this achieve?
The objectives under this Option are to:

- Encourage co-operation between groups of primary producers or land managers to achieve 'landscape scale' impacts from more joined up working
- Strengthen local supply chains through support for a co-ordinated approach to production, processing and/or marketing of locally produced agricultural and forestry outputs
- Facilitate sharing of resources and experience to control costs and increase incomes
- Improve or rationalise marketing channels or processing procedures
- Improve profitability, efficiency and transparency across supply chains.

Eligibility Criteria
Groups of two or more sole traders, partnerships or other businesses (including social enterprises) who are involved in the production, processing, retailing or other elements of the supply chain for (non-food) agricultural, horticultural or forestry products.

What costs could be supported?
Costs eligible for funding will include additional incurred costs (both tangible and non-tangible) which are directly attributable to the adoption of a co-operative approach to delivering the identified Regional Priority outcome. The kinds of costs envisaged would include those associated with the production of development plans, feasibility studies, and facilitation costs. However, this list is illustrative rather than exhaustive and all applications will be considered on their merits.

Costs will be exclusive to where new co-operation or collaboration is taking place and will not support existing expenditure in respect of current business practices. Where the costs incurred are associated with the development of new products, technologies or processes, support can only be provided for operations **prior** to commercial use. Individual applications will also be assessed against restrictions set by the relevant State Aid regulations.

Rate of support
Assistance can, in certain circumstances, be up to 100% of eligible costs but in general terms the level of support will be in the region of 50%

Inspection/Verification
In line with the general conditions or Rural Priorities, you may be subject to an on the spot inspection to verify the progress or completion of the activity/product which has been supported.

You will be required to provide evidence that the work has been undertaken and the expenditure made through the production of invoices and evidence of payment. You may also be required, through regular monitoring forms, to provide details of the project and the benefits which the funding has delivered.

SRDP Support for Renewable Energy - Non Land-Based

What is this about?
To encourage rural communities and businesses to install small scale renewable energy capacity as a way to help diversification of the rural economy and improve the quality of life for rural areas. As part of a wider programme of rural diversification measures, sharing the cost of investment in renewable energy projects, can contribute towards this aim.

What will be achieved
- Strengthen rural communities
- Reduction in carbon emissions
- Environmental improvements
- Help towards developing a local, sustainable energy supply
- Result in improvement in the viability of any non-land based business enterprise

What you can do?
Develop small scale renewable energy capacity that uses a range of renewable technologies, such as biogas, biomass, and microrenewables where the investment will contribute to the achievement listed above.

Who can apply?
- Rural communities (definition of <3000)
- Rural (other than agricultural or forestry) businesses (employing fewer than 10 people and whose turnover and/or annual balance sheet total does not exceed €2m)
- Producer Networks

Eligibility Criteria
- Micro renewable energy systems (defined as up to 50kW or 45kW heat) must be installed by a registered installer on the Microgeneration Accreditation list.
- All Combined Heat and Power (CHP) installations must meet the criteria set for Good Quality for the purposes of Enhanced Capital Allowances (ECA) scheme as set out in the CHP Quality Assurance (CHPQA) Programme.
- If located in a Smoke Control Area, must install an exempt appliance

What costs are supported?
Up to 50% of costs of:
- purchase and installation, construction, upgrading or development of infrastructure and/or equipment of renewable device
- purchase of specialist equipment for harvesting, pre-use processing, quality assurance and handling, if involved in the supply of woodfuel
- direct set up costs related to the creation of producer groups, including legal and administrative work in setting up, rental of office accommodation and purchase/rental of office and IT equipment.

What technologies are supported?
- Small scale wind turbines
- Hydro-electric turbines
- Bio-diesel treatment and storage equipment
- Solar panels
- Automated woodfuel boilers

- Heat pumps
- Solar water heating
- Specialist equipment for harvesting biomass, pre-use processing (e.g. dryers, chippers, pelletisers), quality assurance (e.g. for checking moisture content, chip size, etc.) and handling.
- Supply chain equipment

Rate of support?

- Up to 50% of eligible cost
- Revenue costs based on sliding scale, up to 100% in first year, 80% in second year, 60% in third year.

Type of Support.

One-off capital grant, one-off payment against equipment and installation of renewable energy scheme
Start up: reimbursement against total costs.

Inspections/verification

- All final claims must be certified with relevant invoices
- All least one visit to the site will be undertaken prior to payment of final claim
- Microgeneration Accreditation list of registered installers will be checked
- If applicable, the criteria set for good quality CHP Programme will be verified for compliance
- If located in a Smoke Control Area must install an exempt appliance and this licence will be verified
- Where applicable, applications must show that a viable fuel supply and an adequate installation and after sales support will be available to the end user.

Before payment is received potential beneficiaries must:

- produce the necessary documentation to demonstrate that renewable energy system was installed by registered installer and that technology is on DTI accredited list
- ensure all final claims to be certified by an independent accountant.

Technical Guidance

- Registered installers and accredited appliance information can be found at www.greenbooklive.com
- All heat appliances that qualify for Enhanced Capital Allowance (ECA) must meet the criteria for inclusion on the Energy Technology list (www.eca.gov.uk)
- Further information on CHPQA Programme (www.chpqa.com)
- Further information on Smoke Control Area (www.uksmokecontrolareas.co.uk)

SRDP Renewable Energy - Forestry

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/ValueAddedProcessing/RenewableEnergyForestry

Renewable Energy - Forestry

What is this about?
To encourage forestry businesses to install small scale renewable energy capacity, **mainly for own consumption**, as a way to help to combat climate change and improve business viability

What will this achieve?
- Improved business efficiency
- Reduction in carbon emissions
- Help to develop a local sustainable energy supply

What you can do?
Install small scale renewable energy capacity, up to 250kw, such as biogas, biomass and microrenewables where the investment will contribute to the achievements listed above.

Who can apply?
Forestry businesses

Eligibility Criteria
- Micro renewable energy systems (defined as up to 50kW or 45kW for heat) must be installed by a registered installer on the Microgeneration Accreditation list.
- All CHP installations must meet the criteria set for Good Quality for the purposes of the Enhanced Capital Allowances (ECA) scheme as set out in the CHP Quality Assurance (CHPQA) Programme
- If located in a Smoke Control Area you must install an exempt appliance

What costs could be supported?
Operations eligible for support are:
- Purchase and installation of equipment
- Construction, upgrading or development of infrastructure

What technologies are supported?
- Small scale wind turbines
- Hydro-electric turbines
- Bio-diesel treatment and storage equipment
- Solar panels
- Automated woodfuel boilers
- Heat pumps
- Solar water heating
- Anaerobic digestion equipment using slurry and other agricultural by-products in the production of energy
- Specialist equipment for harvesting, pre-use processing (e.g. dryers, chippers, pelletisers), quality assurance (e.g. for checking moisture content, chip size, etc) and handling.
- Supply chain equipment

Rate of support?

- Up to 50% of eligible cost in Less Favoured Areas (LFA).
- Up to 40% in non- LFAs.

Inspections/verification

- All final claims must be accompanied by relevant invoices
- At least one inspection visit to the site will be undertaken prior to payment of final claim
- Microgeneration Accreditation list of registered installers will be checked
- If applicable, the criteria set of good quality CHP Programme will be verified for compliance
- If located in a Smoke Control Area must install an exempt appliance and this licence must be verified

Technical Guidance

- Registered installers and accredited appliance information can be found at www.greenbooklive.com
- All heat appliances that qualify for ECA must meet the criteria for inclusion on the Energy Technology list (www.eca.gov.uk)
- Further information on CHPQA Programme (www.chpga.com)
- Further information on Smoke Control Area (www.uksmokecontrolareas.co.uk)

SRDP Development/Creation of Micro-Enterprises

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/ValueAddedProcessing/Microenterprises

Introduction
This measure is about creating the right conditions for rural businesses and communities to flourish, particularly in more remote areas. This will be achieved by supporting a progressive rural economy and business community, and encouraging individual entrepreneurship. Its primary aim is to promote individuality and develop an economic strategy in rural areas which will create employment opportunities, and widen the range of services and facilities in the local communities, as well as the wider population.

What this will achieve
The objectives of this measure are two-fold:

- to keep the family within the rural community by encouraging non-agricultural managers (i.e. those other than farmers) to diversify or add value to their existing land based enterprises in order to complement or supplement their income from traditional land management activities
- to encourage other potential entrepreneurs to set up or develop unique businesses which will contribute to the vibrancy of the rural community, create employment opportunities and/or meet market demand for the provision of certain facilities and services in rural areas.

What you can do
You may receive assistance towards the setting up or expansion of any diversified (i.e. non-agricultural) enterprise where it can be shown that there is a proven market for the proposed product or service, and that you have, or can acquire, the skills and resources to provide these on a commercial basis.

Who can apply?
Existing micro enterprises [1] or persons wishing to set up a new micro enterprise in a non agricultural business off-farm.
[1] Fewer than 10 workers and turnover of less than €2m

What costs could be supported
Funding will be provided under this measure for you to undertake the same types of diversified activities as those funded under the 'non agricultural diversification measure' for farmers and their families. These include the categories listed below (although it should be recognised that this is not an exhaustive list but is for illustrative purposes):

- provision of leisure, recreation and sporting facilities
- retailing of processed agricultural products
- processing of forest products
- provision of other commercial services (illustrative list only)
- commercial storage
- contracting (building, fencing, etc)
- farrier
- gardening
- sheep shearing/scanning
- provision of or upgrading of existing tourism accommodation and conversion of redundant farm buildings into rent*

*Projects involving provision of tourist or residential letting accommodation must not include more than 20 bed spaces. Housing for rent will require a lease agreement of not less than 6 months. It does not

include rent to a member of the immediate family of the eligible applicant or any of the employees of the eligible business. Development will have a recognised demand and be consistent with local housing strategies.

Eligibility criteria
The capital investments eligible for assistance will include identified costs related to new or upgraded buildings or structures, the development or upgrading of services or other infrastructural elements, new machinery or equipment including information technology, and general professional costs related to these expenditures, e.g. statutory consents, architects, engineers or consultants fees, marketing and promotional costs.

Rate of support
The maximum amount of assistance for this measure will be in the form of a variable capital grant which is required to allow the proposals to go ahead, capped at 50% of the eligible costs of the project.

Inspections/verification
You must complete the work as described in your approved proposal including compliance with any notified conditions of statutory consents. It is a condition of funding that you allow any person, duly authorised, to have access to allow an inspection to take place. An inspection may take place at any reasonable time either before or after completion.

SRDP Short Rotation Coppice Crops of Willow or Poplar

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/Promotingcarboncapture/EstablishmentofShortRo#top

What is this about?
This Option supports the establishment of short rotation coppice crops, through the planting of willow or poplar cuttings, to help deliver both economic and environment benefits.

What will this achieve?
The planting of new woodland, to be managed as short rotation coppice, will provide an Option for farm diversification that has the economic potential to take advantage of any emerging local woodfuel markets and renewable energy projects.

Creating a substantial source of local produce for woodfuel markets will encourage the movement of cost-effective processing closer to the rural timber resource and help to support associated local businesses.
In addition to the potential economic benefits provided by short rotation coppice, the establishment of this new woodland will contribute to carbon sequestration to support the Scottish Government's Climate Change Programme.

What you can do?
Plant and establish tree crops of willow or poplar, to be subsequently managed as short rotation coppice on a 2 to 5-year cropping cycle.

Who can apply?
Owners or occupiers of agricultural land.

Eligibility criteria

- The minimum eligible block of tree planting is 2 hectares.
- At least 10,000 willow or poplar cuttings per hectare must be established and maintained for a period of at least 5 years.
- Proposals must demonstrate that they have established an end use for the produce, e.g. evidence of a supply contract, and that the produce will be used to develop a fuel supply for renewable energy products.
- All tree planting proposals must comply with the requirements of the **UK** Forestry Standard.
- The boundary of the planting area must be accurately drawn on a1:10000 map and submitted with the proposals.

If your proposals fall above certain minimum-size thresholds and are likely to have a significant effect on the environment, an application for consent under the Environmental Impact Assessment (Forestry)(Scotland) Regulations 1999 may be required.

We will consult local authorities and other statutory organisations about your proposals. We will take their views into account before approving your proposals.

What costs will be supported?
We will provide a contribution to the total costs incurred in establishing the trees as short rotation coppice.

Rate of support
The payment rate will be at 40% (50% in Less Favoured Areas) of the actual costs, up to a maximum cost of £1540 per hectare, based on receipted invoices, i.e. the maximum payment will be £616/ ha (£770/ ha in LFAs).

Inspections and verification
The planting will be subject to inspection once we receive your claim for payment. We will inspect the work to ensure that it accords with the eligibility criteria.
List of links to relevant technical guidance:

- The UK Forestry Standard - www.forestry.gov.uk/pdf/fcfc001.pdf/$FILE/fcfc001.pdf
- The Environmental Impact Assessment (Forestry)(Scotland) Regulations 1999 www.forestry.gov.uk/forestry/INFD-5ZGKWL

SRDP Improving the Economic Value of Forests

http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Packages/Promotingcarboncapture/Economicvalueofforests#top

What is this about?
The quality of the timber produced is a key element in the competitiveness and economic viability of a forest holding. This often requires the use of specific silvicultural operations that will enhance timber quality.

This Option provides support for a range of specified operations that will improve timber quality. We will only support the net cost of operations and so you must provide evidence of operational expenditure and income.

If your woodlands are undergoing certification, in accordance with the UK Woodland Assurance Standard (UKWAS), we will support some of the costs.

What will this achieve?
The economic value of the forest, and thus business viability, will be improved through:

- Investment in the production of high quality timber
- Applying appropriate silvicultural practice
- Extending timber marketing opportunities
- Committing to sustainable forest management

What you can do
Carry out the agreed operations in your investment plan to receive a contribution to the costs.

Who can apply?
Private owners or occupiers of existing woodlands.

Eligibility criteria
You must be managing your forest holding in accordance with an approved Forest Plan.
You must produce an investment plan that outlines operations to enhance the quality of timber. The plan must quantify the estimated costs of operations and any income to be derived from the produce.

If you are applying for support for controlling Grey Squirrels you must keep records of areas where control has been undertaken and the location of active traps or hoppers. Where traps are used, you must also keep records of trapping dates and the number trapped and despatched. The spatial data should be recorded on an OS 1:10000 or larger scale map.

The control of grey squirrels must accord with the guidance given in Forestry Commission Practice Note 'Controlling Grey Squirrel Damage to Woodlands'.

You must carry out the approved operations in accordance with the published specifications and in the agreed year(s).

For auditing purposes you must keep invoices for actual expenditure and income associated with these operations.

What costs will be supported?
The operations eligible for support are:

- early pruning to improve timber quality
- high pruning to improve timber quality
- pre-commercial and non-commercial thinning to improve average stem quality
- controlling Grey Squirrels to prevent bark stripping damage and enable quality timber production from broadleaved woodland
- re-spacing of natural regeneration where stem density exceeds 4,000 trees/hectare; and
  Where independent certification has been undertaken, in accordance with UKWAS, the costs of preparing and implementing a plan required by the Certification Body to close out Corrective Action requests will also receive support.

Rate of support
Using the approved estimates in your investment plan or receipted invoices we will pay 50% of the net actual costs from whichever provides the lesser amount:

Operation	**Maximum Net Cost**	**Maximum Payment**
Early pruning	£250/ha	£125/ha
High pruning	£400/ha	£200/ha
Pre-commercial and non- commercial thinning	£150/ha	£75/ha
Controlling Grey Squirrels	.	.
- using traps	£55.50/ha	£27.75/ha
- using hoppers	£32.50/ha	£16.25/ha
Re-spacing natural regeneration	£500/ha	£250/ha
Certification 'corrective actions' cost	£850	£425

Inspections and verification

- We will inspect all areas of early pruning, high pruning, thinning and respacing against the specifications
- We will inspect all Grey Squirrel control records, operational hoppers/traps and the crop to ensure that the control has been implemented effectively.
- We will require to see the certification documentation.

Appendix 6: Selection of UK funding bodies with eligibility in Scotland.

The following funding and case study information has been cut and pasted from the appropriate web sites. It is the responsibility of the end user to ensure that the information is up to date.
The links to the web sites are included for further reference.

http://www.scotland.gov.uk/Topics/SustainableDevelopment/funding/ClimateChallengeFund

LEADER

LEADER is part of the Scottish Rural Development Programme (SRDP), aimed at promoting economic and community development within rural areas. LEADER is a bottom-up method of delivering support for rural development through implementing a local rural development strategy. Support will be aimed primarily at small-scale, community driven projects that are pilot and innovative in nature.

The aim of LEADER is to increase the capacity of local rural community and business networks to build knowledge and skills, and encourage innovation and co-operation in order to tackle local development objectives. LEADER will account for 5% of the total SRDP allocation (around £38m). An additional £19.2m Convergence Funding has been awarded to 7 LAGs in the Highlands and Islands in recognition of its previous status as a disadvantaged and remote area. Funding is awarded by Local Action Groups (LAGs) who take decisions on projects which are community driven and have a wide community benefit. These LAGs are a partnership made up of representatives from:

- The local council
- Local Enterprise Company
- Business people
- Other public agencies
- Voluntary action groups
- Community groups

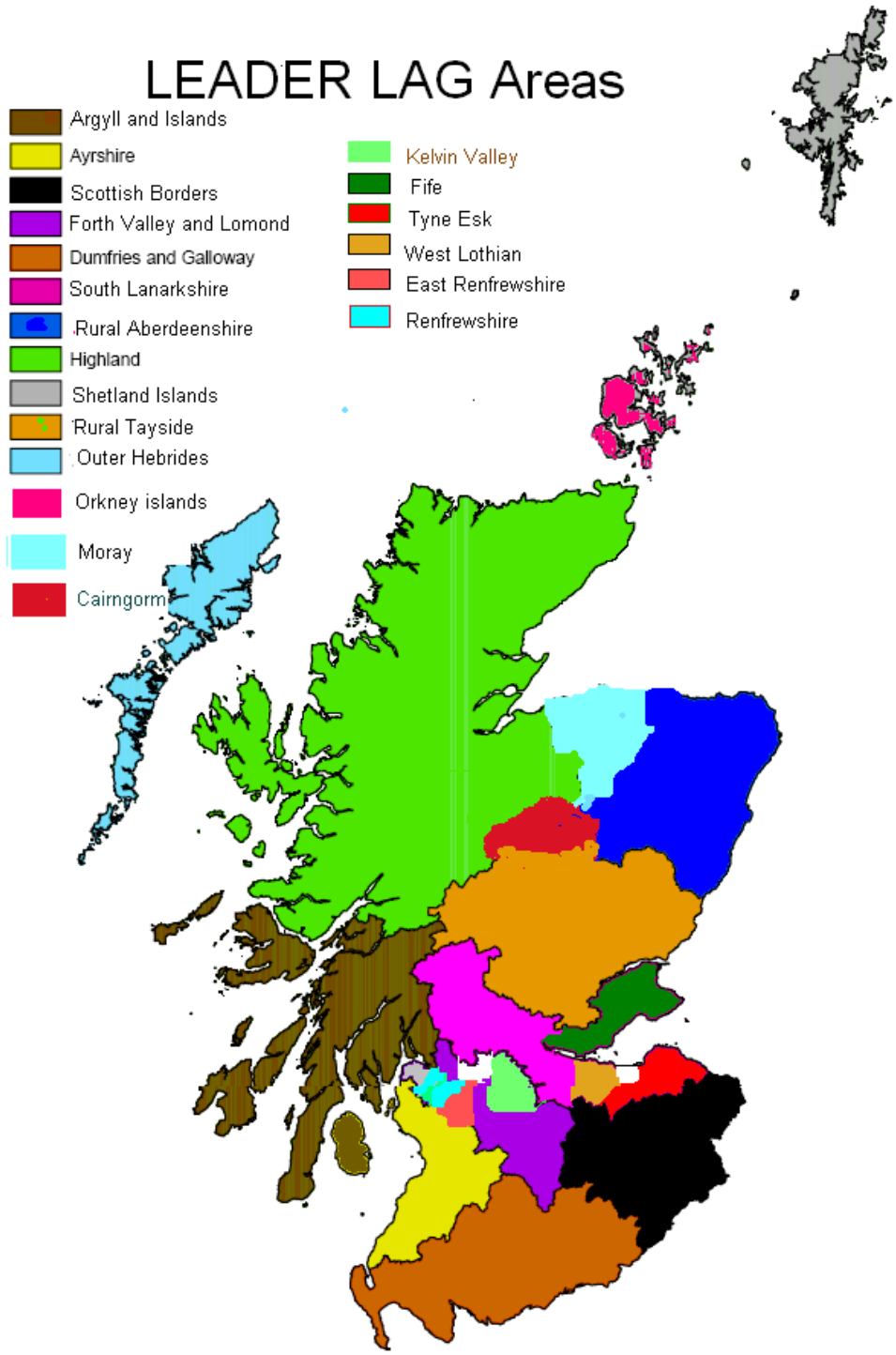
20 LAGs cover around 95% of rural Scotland with quality local rural development strategies. Details of these groups, the amounts awarded and contact points are listed below. A map of LAG areas can be viewed here.

TABLE 35 Leader information

LAG	LEADER (£m)	Convergence (£m)	Contact	E-Mail
Cairngorms	**1.00**	**1.17**	**Patricia Methven**	patriciamethven@cairngorms.co.uk
Highland	**6.76**	**7.50**	**Nicole Wallace**	nicole.wallace@highland.gov.uk
Moray	**1.44**	**0.40**	**David Watson**	david.watson@moray.gov.uk
Rural Aberdeenshire	**3.36**		**Vicky Thomson**	vicky.thomson@aberdeenshire.gov.uk
Rural Tayside	**2.00**		**Rita Callander**	Callanderrb@angus.gov.uk

Cairngorm has its own LEADER funding. It may be that other surrounding areas are eligible for applications from within the CNPA area. It will be necessary to check with the contacts above to establish the eligibility and area fund criteria.

FIGURE 9 LEADER LAG Areas



Carbon Trust (Business Funding)
Public Sector Interest Free Loans

http://www.carbontrust.co.uk/carbon/PublicSector/public-sector-loans.htm

£50 million in interest free loans to help the public sector save energy – available for a limited period only.

Following the April 2009 Budget the Government, in partnership with the Carbon Trust, will provide £51.5 million in new interest free loans to help public sector bodies take advantage of energy efficient technology. These loans will not require match funding and are offered on a first come first served basis.

Amongst others schools, hospitals, local authorities, universities and central government departments will be able to save money and reduce their carbon emissions by taking up the new loans, which the Carbon Trust has made available through Salix Finance.

These loans are additional to funding available through the existing Salix Finance scheme and are available for around 80 different energy efficiency technologies, including building insulation, boiler and lighting upgrades, improved cooling systems and IT energy efficiency improvements.

To be eligible projects must payback over a maximum 5 year period and save at least £100 per tonne of CO2 over its lifetime.

For further details on the available funding please visit **Salix**
http://www.salixfinance.co.uk/loans.html

CAfE Community Support Network

http://www.energysavingtrust.org.uk/cafe/Green-Communities/About-us/Latest-Community-News/node_68288/Members-latest-news/News-from-CAfE-April/(energysavingtrust)/211449

CSN
With 24 communities benefiting from support through the CAfE Community Support Network in the last year we have met loads of great people working on really exciting projects. These have ranged from helping a local rugby club to decide on the most sustainable options for heating their pavilion, to helping a Quaker hall reduce their energy use before they install a renewable energy system, and helping an allotment association to decide how best to heat and power their off grid site.

This financial year we are pleased to be able to offer lots more technical support to communities across the country so do get in touch if you are at a stage where you need expert advice on funding, renewable energy installations or community project development. We often run through an initial support process before matching you with an expert to ensure that you gain as much as possible from the help.

To provide this support we are also looking for experts to help groups with a wide range of community energy projects. If you are experienced in the field of sustainable energy or / and community projects and would like to find out more about how you too can help community projects to become a reality do contact us for an application form.

Training

We are pleased to announce that we are beginning to take requests for our partnership training courses for this year. We provide a trainer for the day, the training resources and manuals, and ask for you to find a venue and the delegates. We can also provide up to £150 towards refreshments for your group.

In addition to the courses we ran last year we will be adding additional courses and modules to this years programme. These including: Funding Your Community Energy Project; Local Planning Systems how to get involved and the application process; and Energy Auditing in Old and Listed Buildings. If you are interested in CAfE running a training event for community representatives in your area we would be pleased to hear from you. Please call to speak to one of our advisors on 0844 848 0077 or email

Future Friendly Bursaries

http://www.futurefriendly.co.uk/awards/
From forward-thinking schools and community groups, to parishes and individuals, the Future Friendly nominees from 2009 all proved the importance of encouraging others to work together to contribute to fight climate change – even through the smallest of changes. The overall winner was Ravenscliffe High School whose efforts, all in the name of sustainability, won them a bursary worth £20,000.

Low Carbon Buildings Programme
http://www.lowcarbonbuildingsphase2.org.uk/

Grants for the installation of microgeneration technologies are available to public sector buildings (including schools, hospitals, housing associations and local authorities) and charitable bodies.

Following the Budget announcement on 22 April an additional £45 million has been allocated to the Low Carbon Buildings Programme (LCBP).

LCBP Phase Two has received an additional £35 million of funding. This is extremely good news and means that we can continue to support schools, communities and other organisations to install microgeneration technology.

This sees the current programme deadline for grants to be made and installations to be completed extend from 1 July 2009 until April 2011, up to the introduction of Feed-in Tariffs and the Renewable Heat Incentive.

£5 million of the £45 million has already been allocated to solar PV funding under Phase Two to deal with the majority of PV applications in the pipeline and we have made a further allocation of £9 million to meet demand.

From 1 July 2009

- The extended programme will continue to provide grant funding to charitable organisations, community groups and the public sector.
- The upper limit for heat technologies has been raised to 300kW.
- Organisations may apply for up to 50% of the cost of installing approved technologies up to a maximum of £200,000 (though maximum grant levels may depend on the nature of the organisation).
- There will be a £9 million pot for solar PV.

- All other technologies will benefit from the remaining £21 million.

The programme is now open to all products and installer companies registered on the Microgeneration Certification Scheme (MCS). In terms of the additional products this also includes Solar Keymark for solar thermal collectors, and the Environmental Technology List (ETA part of the Enhanced Capital Allowance Scheme) for biomass boilers and heat pumps rated above 45kW and up to 300kW thermal.

For further information on products, please refer to:
http://www.microgenerationcertification.org/
www.eca.gov.uk/etl/find

Carbon Trust Company Interest Free Loans
http://www.carbontrust.co.uk/energy/takingaction/about-loans.htm

On 29th June 2009 changes were made to the size of the loan and size of enterprise supported by the loan scheme. We could now lend your enterprise as much £400,000 or as little as £3,000 to undertake energy saving projects that reduce your energy costs.

We also now lend to businesses that do not qualify for participation in the Carbon Reduction Commitment*. As a guideline this is typically an annual electricity spend of £500,000.

In today's economic climate, it may be difficult to get the credit you need to upgrade to more energy efficient equipment. Our loans could be the solution. They not only offer interest free credit to help you make your business more efficient, they also help you lower your energy bills and cut carbon emissions.
An unsecured 0% loan that could pay for itself

The Carbon Trust's Energy-Efficiency Loans are unsecured and interest free, with no arrangement fees and a straightforward application process. Loans can be repaid over a period of up to four years, and many of our borrowers have found that their energy savings more than cover their repayments.

Enhanced Capital Allowance
http://www.carbontrust.co.uk/energy/takingaction/eca.htm

Give yourself a break – investing in energy-saving equipment does more than just save your business money. It's often more tax efficient.
Enhanced Capital Allowances (ECAs) are a straightforward way for a business to improve its cash flow through accelerated tax relief. The ECA scheme for energy-saving technologies encourages businesses to invest in energy-saving plant or machinery specified on the Energy Technology List (ETL) which is managed by the Carbon Trust on behalf of Government.

The ECA scheme provides businesses with 100% first year tax relief on their qualifying capital expenditure. The ETL specifies the energy-saving technologies that are included in the ECA scheme. The scheme allows businesses to write off the whole cost of the equipment against taxable profits in the year of purchase. This can provide a cash flow boost and an incentive to invest in energy-saving equipment which normally carries a price premium when compared to less efficient alternatives.

Appendix 7: Case Study - Kingussie Community Development Company
http://www.kcdc.org.uk/index.php

Green Communities Case Study

Kingussie Community Development Company

People from the highland town of Kingussie really want their community to be the best it can be. That's why they set up the Kingussie Community Development Company (KCDC) in 2005.

KCDC works on all sorts of projects to benefit the surrounding area, including sustainable energy and environmental projects. The idea for the company came from three local people who took the initiative to organise a public meeting and got 150 members on board. The company got off to a great start when they won £2,500 in start up money from the Highlands and Islands Community Energy Company. Seven directors now head up KCDC.

Kingussie Community Development Company and the Energy Saving Trust

Kingussie's electricity was originally produced using the nearly River Gynack's water. However, this changed when mains electricity came to the area. One of KCDC's first goals was to bring hydro power back by restoring a turbine on the river. The company knew this would be a greener form of energy, with the added bonus of earning money for the community.

KCDC Chairman Donald Grant came to the Energy Saving Trust's community programme for advice on renovating the turbine.

Donald did two Energy Saving Trust training courses, including 'Making it Happen', which helps groups and individuals get their project off the ground and find funding. He met people from other community groups at the courses who gave him advice. Donald visited other hydro projects with them to see how it was done. He was able to see firsthand what could be achieved, but also problems that can occur. For example, one of the schemes he visited had to close down for a few days because an eel got into the machinery.

Kingussie Community Development Company's achievements

KCDC has contributed to saving energy in Kingussie in other ways too. The group launched an Energy Day in the town to show people how they could reduce their carbon footprint and save money. Demonstrations and advice were available on everything from wind, hydro and solar power to wood fuel boilers and greener transport. The Energy Saving Trust provided information leaflets and posters.

The Energy Saving Trust also put on a free training day in the town. Twenty local people and organisations came along and were taught how to save energy.

energy saving trust

Kingussie Community Development Company's challenges

After a lot of research, KCDC came to the conclusion that it would cost too much to install and maintain the hydro turbine. Its energy output would have been too low to justify the expense but they're journey hasn't stopped there.

The future for Kingussie Community Development Company

Just because the hydro turbine project failed, it doesn't mean KCDC are giving up. They've set up a sub committee to look at other renewable energy projects they could pursue. The first thing they are investigating is the viability of a joint flood prevention and hydro power scheme at another site on the River Gynack.

KCDC is always on the look out for new project ideas. Each year they have a series of meetings where locals can come along and offer suggestions.

The company is also planning another Energy Day showing people how to change the gas and oil energy systems in their homes to more sustainable systems.

Contact information

Donald Grant, Chairman

http://www.kcdc.org.uk/

www.energysavingtrust.org.uk/community
greencommunities@est.org.uk
0844 848 0077