

INCREASING THE SUPPLY OF WOOD FOR RENEWABLE ENERGY PRODUCTION IN SCOTLAND

A REPORT BY THE WOOD FUEL TASK FORCE TO THE MINISTER FOR THE ENVIRONMENT January 2008

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EXECUTIVE SUMMARY

The Woodfuel Task Force was launched by Michael Russell Minister for the Environment in June 2007 with the aim of increasing the supply of wood for renewable energy production.

Scotland's Climate Change Programme estimates that 0.75m green tonnes of wood will be used for bioenergy by 2010, rising to 1m green tonnes by 2020. Overall, bioenergy measures are estimated to contribute to removals of an additional 0.12 MtC per year by 2010, rising to 0.18 MtC per year by 2015 and 0.23 MtC per year by 2020ⁱ. Current projects underway mean that these targets will be exceeded and there will be increasing competition for woody raw material. Expansion of the resource is a key aim for the Scottish Forestry Strategy and a Forward Strategy for Agriculture. SEPA also reports significant potential in the use of waste biomass from several sources.

Bioenergy cuts across a wide range of policy areas, including agriculture, forestry, energy, transport, waste management, rural development, and climate change. The make up of the Wood Fuel Task Force reflects this, and this report recognises the need for all sectors to work together to deliver the optimum mix of woody biomass to support the continuing development of this important part of the renewable energy sector.

The Task Force has looked at resource availability from a wide range of sources – established forests and woodlands, agricultural sources of short rotation coppice, and material broadly classified as waste. These indicate that there is significant potential to increase the amount of material available for the bio-energy sector. Our best estimate of the volumes of material available to the sector is shown in the table below.

Type of material	Volume	2007/11	2012/16	2017/21
		Oven Dry (t)	Oven Dry (t)	Oven Dry (t)
Hardwood - Logs	New	87,519	85,701	78,395
Softwood – Logs/SRW	Existing	240,000	868,500	1,264,500
Sawmill chips+	Existing	0	153,982	251,002
Softwood Brash / Branchwood	New	381,695	394,001	394,000
Softwood Stumps/roots*	New	35,000	35,000	35,000
Small & Neglected woods++	New	50,000	50,000	50,000
Arboricultural arisings	New	268,000	268,000	268,000
Short rotation coppice	New	2,400	8,000	8,000
Short rotation forestry	New	0	0	0
Landscaping	New	98,000	98,000	98,000
Commercial and Industrial+++	New	5,400,000	5,400,000	5,400,000
Wood processing	New	244,000	244,000	244,000
Similar to agricultural waste	New	531,000	531,000	531,000
Total		7,337,614	8,136,184	8,621,897

+ Calculation of volumes based on 35% of softwood sawlog volume

++ Very rough estimate based on area and conservative volume production

+++ All potentially useable biomass, but not all woody biomass

* Rough estimate for FCS land only

The Task Force has made a number of recommendations to both access these sources of material, and encourage their improved management. The recommendations are indicated in bold text throughout the report, and are summarised below in five broad categories. These are resource availability, market drivers, supply chain, support, and regulatory mechanisms.

Estimates of resource availability are constrained by a lack of **good quality data** for some of the raw material sources. To address this, with respect to wood materials, we recommend:

- 1. Demonstration sites and best practice examples need to be developed, to promote bioenergy as an additional opportunity to add to the many other benefits valued by owners and other stakeholders. This should be combined with an assessment of the likely impacts of short rotation coppice and/or short rotation forestry on land values, and the potential to maximise the amenity, conservation and shooting values. Dissemination should be via a series of regional advertising and awareness raising campaigns. **Priority: High**
- 2. Delivering the information via a single "Scottish Forest Industry" wood fuel website, which provides a single reference point with a regularly updated definitive data set on woody biomass using common terminology. This should be accessible in a freely available GIS layer to:
 - assist in planning and targeting future woodfuel developments.
 - make regional resource estimates, where appropriate, available to potential woodfuel buyers and farmer co-operatives **Priority: High**
- 3. Undertaking an annual update of woodfuel useage in Scotland. In the longer term, a full review of woodfuel market development is needed in 2010 to assess progress, and determine if mechanisms and policies need to be changed. **Priority: High**
- 4. Commissioning a series of research projects to address specific needs in short rotation forestry, and forecasting volume from existing woodlands. The research must be carried out quickly and the information has to be effectively communicated through a series of specific seminars and training events. **Priority: High**
- 5. Further work to improve the volume estimates of the potential resource from waste streams, and identify it in terms of location and type. **Priority: High**
- 6. Require that a new 'wood for bioenergy' category be inserted into WasteDataFlow, and to seek improvements in the data returns from licensed or permitted landfills for commercial and industrial waste wood and other biomass sources. **Priority: High**
- 7. Direct canvassing of companies to improve the data on wood waste collected by landscape firms. **Priority: Medium**
- 8. Improving knowledge on the potential for short rotation coppice on more marginal ground to set against growing concerns about food security. The development of a life cycle assessment model to enable the calculation of carbon benefits/dis-benefits from the various biomass growing/utilisation options would help to address some of these difficult issues. This is something that the Scottish Environmental Protection

Agency, Scottish Natural Heritage and Forestry Commission Scotland with Scottish Government support should investigate developing jointly for the biomass sector. **Priority: Medium**

The Task Force considered **market drivers** and their impact on the supply of raw material. A variety of issues including the development of standards, aspects of logistics, pricing, and owner motivations to bringing material to market were considered. Two recommendations will help to address the main areas of concern.

- 9. Price transparency is poor in the market. The task force considers it would be worthwhile to investigate the issues around setting up a market trading floor for biomass. This will help to determine whether it should be left to the market to provide this, or whether government support is appropriate to initiate the process. **Priority: Medium**
- 10. Forestry Commission Scotland should explore the potential to lead biomass development where market failure is evident. Other public and private bodies, such as the National Farmers Union, across a range of sectors should also take an exemplar role in developing and promoting the market for wood fuel. **Priority: Medium**

Understanding the quantities and location of raw material is essential, but just as important is the need for a co-ordinated and **efficient supply chain** to make the biomass supply available to the developing market. Elements of this are still weak, and need strengthening to allow new energy and heat installations to take place. The Task Force recommends that:

- 11. Support for producer groups and wood heat clusters continues, and their impact on the market is reviewed as part of a future study. **Priority: High**
- 12. Long-term supply contracts and trading of woodfuel products using standardised measures and specifications become a priority for the industry. The potential for front-loaded contracts from biomass buyers should also be explored as a means of providing confidence and cash flow to growers. **Priority: Medium**
- 13. Forestry Commission Scotland should work with management companies and woodfuel buyers to find mechanisms and identify areas with a reasonable chance of success, which will provide continuity of work for regional contractors, to encourage them to invest in skills. **Priority: Medium**
- 14. A review of the application of pre-treatment for landfill regulations is undertaken as an encouragement to the commercial and industrial waste producing sector to improve source segregation to maximise the availability of clean wood and increase awareness of opportunities to avoid landfill tax. **Priority: High**
- 15. Appropriate infrastructure is developed to utilise arboriculture arisings as a wood fuel and avoid the material entering the waste stream. **Priority: High**
- 16. Sufficient safeguards are put in place to protect and further develop existing wood recycling initiatives, which recognise the validity of wood

as a renewable fuel. This is clearly a preferred route for this material in terms of overall energy balances. This would be helped by the development of a fuel standard from waste biomass to increase the amount of wood fuel drawn out of the waste stream. **Priority: High**

Over the last few years, a range of **support and incentives** have been made available to support the development of the bioenergy sector. The Task Force recognises and welcomes the contribution these have made, and believes that the further expansion of the sector, at this critical stage in its development, will continue to require well targetted and effective incentives. These should include:

- 17. The development of a branch wood and brash recovery grant to help to encourage growers to bring this material to market, and to do more thinning in their forests and woodlands. **Priority: High**
- 18. A commitment to sustaining a range of supply-chain capital grants and access and timber transport grants for the next 3-5 years. This would include the continuation of the Scottish Biomass Support Scheme and the Scottish Timber Transport Fund, in conjunction with rural development contracts. **Priority: High**
- 19. Increasing the rate of new woodland creation for future biomass supplies. This can be done by ensuring that Rural Development Contract (RDC) incentives reflect land use priorities. The task force recommends a review of incentives in 2009 if uptake of RDC woodland creation grants is low. **Priority: High**
- 20. Incentives such as free or subsidised deposit for woody material at recycling centers to make it worthwhile for landscapers to transport the wood residues to council recycling centers. **Priority: High**
- 21. Improved grant aid to the SRC grower, particularly new support mechanisms, to bridge the establishment period for short rotation coppice. **Priority: High**
- 22. Higher ROC banding for SRC converted via CHP systems as the key to developing the resource. FCS should monitor uptake of SRC establishment grants in the new SRDP and in the lead up to banded ROCs. This needs to be followed up with a review in 2010 and consideration of additional opportunities for support if uptake is still unsatisfactory. **Priority: High**

The Task Force has also identified some **regulation and planning** issues, which would support additional bioenergy market growth. We recommend:

- 23. More effective integrated planning to ensure new woodfuelled developments are located (in so far as is possible) in areas where timber is readily available and energy facilities located where heat use is viable. **Priority: High**
- 24. That the potentially available material from arboriculture arisings is not classified as waste, and is treated the same way as green forest industry residues are. There should be a clear distinction between virgin (unprocessed) and waste material. **Priority: High**

- 25. That council operated recycling centres are required to offer waste biomass recovery services and that a study of incentive and charging options for such facilities is undertaken. **Priority: High**
- 26. Finally the Task Force recommends that a working group is set up to oversee the implementation and monitoring of the accepted recommendations.

1.

INTRODUCTION

1.1. The Scottish Government has set new highly ambitious targets to generate 50% of Scotland's electricity demand from renewable sources by 2020, with an interim milestone of 31% by 2011. There are no specific targets set for biomass, but with major projects underway by E.ON at Lockerbie (now operating), Caledonian Paper at Irvine, and Balcas at Invergordon, the sector will make a significant contribution. Whilst electricity is the main focus of the renewable energy support scheme, it is increasingly clear that if waste heat is utilised the contribution to renewable energy supply and carbon off-setting from biomass schemes can be significantly higher. The Scottish Biomass Support Scheme (SBSS) is providing assistance to more than 70 projects, of which 66% are new installations, and the others are supply chain developments. In terms of biomass use, Changing Our Ways: Scotland's Climate Change Programme (Scottish Executive, 2006) estimates that 750,000 green tonnes of wood will be used by 2010, rising to 1,000,000 green tonnes by 2020. Overall, the report estimates that bioenergy measures will contribute to removals of an additional 0.12 MtC per year by 2010, rising to 0.18 MtC per year by 2015 and 0.23 MtC per year by 2020. With projects in development, these targets will be significantly exceeded and there will be increasing competition for woody raw material. Increasing, and making more use of the renewable energy resource, are key aims of both the Scottish Forestry Strategy and the Forward Strategy for Agriculture. A renewable heat strategy is also due to be produced early in 2008, which will have implications for woody biomass. There is also significant potential in the use of waste biomass from several sources as reported by SEPA.

1.2. Bioenergy cuts across a wide range of policy areas, including agriculture, forestry, energy, transport, waste management, rural development, and climate change. The make up of the Wood Fuel Task Force reflects this, and this report recognises the need for all sectors to work together to deliver the optimum mix of woody biomass and other similar materials, such as agricultural biomass, to support the continuing development of this important part of the renewable energy sector. This builds on the current utilisation by the panel and paper industries of small dimension wood and 'clean waste' wood.

1.3. The woodfuel task force was launched by Michael Russell Minister for the Environment in June 2007. Led by Forestry Commission Scotland, the task force is comprised of representatives from the renewable energy, wood processing, waste, and land management sectors. A full list of members of the Task Force and other contributors to its work can be found at Annex 1.

2. TERMS OF REFERENCE

2.1. The terms of reference of the Task Force were

- i. to identify and quantify currently under-exploited sources of woody material suitable for woodfuel.
- ii. To identify barriers to accessing the sources of woody material and propose actions to overcome these barriers, in the short and

long-term, in relation to woody material from: established forests (such as thinnings, brash, deadwood and stumps); small and neglected woodlands; short rotation coppice and energy forestry; arboricultural and landscaping activities; and recycled wood & waste wood.

- 2.2. Additionally the Task Force was asked:
 - iii. To advise on any environmental limits to exploiting wood resources.
 - iv. To advise on the impact of market price and trading mechanisms on supply from these sources to wood fuel and other processing sectors.
 - v. To advise on the range of technological and utilisation issues involved in making best use of the wood fuel resource

3. FINAL REPORT

3.1. The final report was presented to the Minister for Environment on the 9th January 2008. The Task Force has compiled its report with several aspirations.

3.1.1. To support the developing biomass energy sector by identifying the wide range of different woody raw materials available to the sector

3.1.2. To provide the best possible match between sources of supply and power and/or heat installation

3.1.3. To ensure that effective mechanisms, incentives, and/or regulatory measures are put in place to encourage the mobilisation of the available resource in an efficient way.

4. BACKGROUND

4.1. Current Support Mechanisms

4.1.1. Current support for heating with biomass is available through a number of schemes, targeted at both demand-led schemes and through direct support for the supply chain infrastructure. Annex 2 details the current support schemes in place, with indications of support provided to date.

4.1.2. Demand-led support

4.1.2.1. Renewables Obligation (Scotland): the revenue support to energy developers available through the ROC mechanism has, to date, had limited impact on biomass development. The only wood-fired plant now operating in Scotland is the electricity only E-ON plant at Lockerbie which also received capital grants under the DTI Bioenergy Capital Grant Scheme. To address this slow development, the recent Energy Review has proposed increasing support for biomass Combined Heat and Power (CHP) and biomass electricity using energy crops to 2 ROCs. This will make larger-scale biomass projects viable and should help to stimulate the supply chain.

4.1.2.2. Capital grants such as the Scottish Community & Householder Renewables Initiative (SCHRI), the H&I Woodfuel Development Programme and the SBSS have been successful in stimulating local woodfuel supply clusters by creating a local heat demand for woodfuel. The main issue with capital grants is their short-term, stop-start nature. This uncertainty creates a higher risk for businesses entering the supply chain, as they need a growing market to justify their investment.

4.1.3. Supply-led support

4.1.3.1. A number of successful grant schemes have allowed businesses to set up as woodfuel suppliers at a range of scales. This will support mainly virgin fibre supply chain infrastructure to complement the more advanced waste wood sector. The increase in landfill tax, combined with the National Waste Strategy and emerging waste policy, will help to make more waste material available for bioenergy.

4.1.3.2. Support for woodland and energy crop expansion will be provided through establishment and management grants under RDCs. The crucial forestry contractor base has also been given support to invest in some of the large-scale specialist equipment required for this new market. This type of support will continue through Rural Development Contracts, and other schemes. One such is the Scottish Timber Transport Scheme, which will help to enable access improvements.

4.2. Future Support Mechanisms

4.2.1. The Wood Fuel Task Force acknowledges that a wide range of new support mechanisms, outlined below, are due to be put in place over the next few years. It has therefore concentrated its efforts on identifying gaps in support provision, which require addressing as a matter of urgency.

4.2.2. Increased support for biomass electricity and CHP under the RO is likely to stimulate the market further by encouraging investment in large-scale plants. This in turn is likely to provide major investment opportunities for the industry.

4.2.3. Support for renewable heat is currently a focus of policy development by the FREDS Renewable Heat Sub-Group. Even a modest level of contribution by woody biomass to any future renewable heat target in Scotland, as for example proposed by Rippengal (2005)ⁱⁱ, would increase demand by around 1.5 million green tonnes. The key issue for support through capital grants is that substantial and reasonably long-term financing would be required.

4.2.4. At all scales, there is already a strong, and developing, supply chain industry in place. Any future capital support for supply chain infrastructure should therefore include careful assessment of additionality in the grant award process. Support should be targetted appropriately, where gaps could lead to

market failure, and particularly towards SMEs who may not be able to finance the substantial investment costs of large-scale specialised equipment.

4.2.5. The main focus now for supporting the supply chain should be on capacity building and implementation of standards. There also needs to be greater co-ordination by the industry itself in developing customer confidence, securing the supply chain and promoting the market and trading conditions.

5. MARKETS AND TRADING

5.1. The over-riding priority for stimulating markets and more efficient trading practices is in sustaining the demand pull for wood fuel. To do this, wood needs to be competitively priced to make bioenergy an attractive investment. As outlined above, investor confidence is a critical element of this. A commitment to sustaining capital grants to support new installations over the next 3-5 years will provide this. There are a variety of factors, combined with support mechanisms, which can influence the market price of biomass for woodfuel. These can be categorised as standards, logistics, pricing, and owner motivations. A more detailed discussion of each of these topics can be found at Annex 3. Where market failure is evident, the potential for FCS to lead biomass development can be explored. However, the Task Force is strongly of the opinion that there is an exemplar role for public bodies in developing and promoting the market for wood fuel.

5.2. To avoid displacement, it will be important to recognise existing users of small roundwood and 'clean waste' by focusing support on new supply streams to grow the size of the utilised resource. This will help the market to mature and stabilise as the raw material streams combine. There is a need to promote standardised measures and specifications for woodfuel and woodfuel products and other sources of biomass suitable for conversion to energy. This will also facilitate development of effective trading mechanisms.

There seems to be potential for sufficient wood fuel price movement to 5.3. draw in increased supply, though traditional pricing mechanisms are not transparent. The forest sector is well known for its commercial confidentiality over prices. Given the fact that woodfuel is a commodity product, like coal, oil or gas, there are good commercial reasons for creating a biomass trading floor. This would create transparency in the market, and help to reduce supply chain costs of inefficient transport, and local shortages. This has the potential to develop further into futures and options markets, on an international scale. Trends in feedstock sourcing should be monitored and published as this would help to identify whether support mechanisms, and more widely bioenergy policies, are adequate or need to be changed. As for the electricity sector specifically, consideration may be given to the development of a reporting system modelled on the carbon and sustainability reporting system proposed under the Renewables Transport Fuels Obligation. This is an issue which requires further investigation to determine whether it should be left to the market to provide this, or whether government support is appropriate to initiate the process.

5.4. The forest industry has traditionally been unwilling to enter into long term contracts for supply. This has the effect of reducing the prices that customers are willing to pay, and acts as a disincentive to offer material to the market. The task force encourages the development of long-term supply relationships and trading of standardised woodfuel products. The potential for front-loaded contracts from biomass buyers should also be explored as a means of providing confidence and cash flow to growers.

5.5. It is important that the impact of woodfuel on existing and new users is well understood as the market for renewable energy from biomass develops. An annual update of woodfuel useage in Scotland should be undertaken. In the longer term, the task force recommends that a full review of woodfuel market development is undertaken in 2010 to assess progress, and determine if mechanisms and policies need to be changed.

6. TECHNOLOGICAL AND UTILISATION ISSUES

6.1. The recent rapid development of biomass utilisation technology has resulted in a wide range of suppliers, products, and approaches to making efficient use of the resource. These have their own challenges to overcome, but by and large are providing benefit to customers and users. The greatest threat to the further development of the bioenergy sector in Scotland may come from a completely different direction. Namely, do we grow biomass crops for energy production, or alternative crops for biofuel for the transport sector?

Traditionally biofuels have been derived from agricultural crops such as 6.2. oil seed rape, sugar beet, and wheat. These have produced biodiesel and bioethanol. Biodiesel has been more popular in Europe, with Germany the main producer at some 2 billion litres per year. The USA is the main producer of bioethanol, producing some 18.2 billion litres per year, 6 times more than the rest of the world combined. Emerging technology is moving towards the development of 2nd generation biofuels, produced from lignocellulosic feedstocks. These include forestry residues, wood chips, straw, and energy crop willows, as well as waste biomass. Several processes, such as Fischer Tropsch, and pyrolysis can convert woody biomass into hydrocarbons, and then into biofuels for transport. In Europe, it is estimated that if 10% of liquid biofuel requirements are to be met with woody biomass by 2017, then about 148 M m³ of forest biomass will be required. The pressure on biomass for fuel is likely to become intense, as wood-based biofuels can help minimise expected increases in food commodity prices. Thus both food security and fuel security issues can be addressed. It is important that as Scotland develops its biomass for energy sector we do so in such a way as to gain maximum benefit in terms of carbon mitigation and energy security with minimal impacts on land use, food supply and the wider environment.

6.3. The scale of the forest sector in Scotland and the rest of the UK is unlikely to be sufficient to support the intake required by the current size of biorefinery. However, technological advances and political pressures may

change this, and determine that biomass supplying the bioenergy sector is diverted to other uses. It will be important to monitor progress in this area carefully. The development of a life cycle assessment model to enable the calculation of carbon benefits/dis-benefits from the various biomass growing/utilisation options would help to address some of these difficult issues. This is something that SEPA, SNH and FCS with Scottish Government support should investigate developing jointly for the biomass sector.

6.4. A strong and dynamic supply chain relies on a ready supply of raw materials at a fair price. This report next considers how the existing supply of raw woody biomass material can be improved and strengthened, by detailed analysis of the current resource.

7. ESTABLISHED FORESTS AND NEGLECTED WOODS

7.1. Scotland's established forests are widely distributed throughout the country. They can be both concentrated or dispersed at local level, and contain both conifer and broadleaved species. The holdings are split between the state (34%) and private sector (66%). Potential outputs are very site specific and may depend on the owners objectives of management. They range from intensively managed large commercial forests to small and neglected woods. The latter may include farm woods, native woods, policy woods, urban woods and roadside trees. Experience suggests that the majority of small woods will be associated with a farm business but the larger native woods tend to be owned and managed by upland estates and urban woods by local authorities.

7.2. The type of material that may be available for woodfuel comprises conifer (softwood) and broadleaf (hardwood) subdivided into: Stemwood traditional products such as small round wood and retained products with a diameter of less than 7 cm; brash and/or branchwood left as a result of harvesting activity; and stumps and or roots which are not normally removed as part of traditional forestry operations. There is also a wider range of poorer quality material that may be suitable due to form, type of species, windblow, etc. which would not be considered a 'traditional product'. Management companies manage large areas of forest, but find it hard to carry out profitable thinning operations. This would be helped by the introduction of support mechanisms to encourage thinning. To encourage growers to bring this material to market, the Task Force recommends the development of a branch wood recovery grant to help mobilise this new woodfuel resource. This will stimulate both the removal of thinning and felling branchwood and brash material for woodfuel. The main silvicultural issues associated with greater removal of brash are:

 disproportionately greater removal of nutrients, especially Calcium. This would lead to acidification in time. It is possible that ash recycling could compensate for the removal of P,K and especially the base cations on some sites. In Nitrate Vulnerable Zones, removal of Nitrogen could be turned into an advantage.

- loss of soil organic matter and carbon, leading in theory to reduced water holding capacity, nutrient retention and ultimately to reduced growth.
- damage to the physical structure of soils due to additional trafficking on one hand and less brash to provide soil protection on the other – compaction could result in decreased growth in the next rotation and formation of ruts could provide routes for surface water flow, hence erosion, loss of soil capital and damage to fisheries if the sediment reached streams.

Care must therefore be taken when planning brash removal operations to take these factors into consideration. Some sites may be unsuitable for brash removal. Wood fuel forecasts should be able to take these factors into consideration in estimating potentially available volumes.

Destumping, which involves removing the tree stumps, will result in soil 7.3. physical damage. This may cause erosion and compaction, and lead to reduced soil fertility. The practice can also have adverse impacts in terms of carbon storage. Soil organic content in Scottish soils is high with carbon stock in organic soils estimated at 1778 MtC while organic mineral soils hold 957 MtC^{III}. Disturbance of these soils will result in carbon emissions, which will offset the carbon savings achieved by replacing fossils fuels with woodfuel. Silvicultural issues with removal of stumps are similar to those for brash removal above but in addition the physical disruption of the soil on slopes risks landslides as well as erosion if water is channelled down a series of pits. There may also be a risk that any archaeological remains could be destroyed. Some potential advantages are: less cover for browsers including Hylobius; easier restocking terrain, therefore lighter machines; easier access for walkers; less of an eyesore following clearfelling. It is essential that the environmental impacts and carbon costs of destumping in a range of site types and soil conditions are well understood and further research is undertaken to address gaps in information.

7.4. Forest Managers are very comfortable selling timber products in m³ or tonnes, less so at specific moisture contents or GJ/tonne and distinctly uncomfortable if energy price linkages, Renewable Obligation Certificate values or some other indices such as RPI or CPI are added in. There is an urgent need to make the process transparent and to assist growers in their understanding of units of measure linked to pricing. A common terminology understood by all in the supply chain, buyers and sellers is essential, as confusion is creating unnecessary lack of understanding.

7.5. The Forestry Commission currently publishes production forecast data on a 5 yearly basis or on demand for specific enquiries. The forecast does not offer an estimate of production for stemwood below 7cm diameter, or for brash wood or stumps. Currently, the private sector production forecast does not forecast any hardwood volume. FCS estimates that from its approximately 9% of the hardwood area, the National Forest Estate produces around 20-25 km³ a year. The National Inventory of Woodland and Trees (NIWT) includes woodlands down to 0.1 ha with an estimate of linear features and groups. There are estimated to be 28,697 ha of woodland between 0.1ha and 2 ha in size, averaging 0.48ha with 40% being assessed as broadleaved species. Whilst not all this volume will come to market, the figures suggest a potential of some 100,000 m³ per year. Recent work in Easter Ross for the NPP Northern WoodHeat project may provide a methodology for improving the assessment of standing volumes in small farm woods to improve the estimates at a Scotland level.

7.6. No single "woodfuel" forecast of production is currently available, and those that are, are highly variable. Current demand for this material is highly competitive, and the supply is mostly taken up. In 2007 demand is estimated at 3.9 million green tonnes¹ logs and 2.9 million green tonnes small roundwood. Our estimate of the potential availability of woodfuel from all sources can be found in section 10. We believe there is a total potential availability in Scotland of some 1.4 million green tonnes per annum from established woodlands. Our estimates suggest that this is partly comprised of:

- 325,000 green tonnes of hardwood. Additional woodfuel resource assessment of Scotland's small woods under 2 hectares and private sector broadleaved woods, based on the NIWT is likely to add to this.
- 600,000 green tonnes of "forestry residues" (all "new" to the marketplace). The accuracy of this will be improved if we can derive a greater understanding of the interaction of forest soils and potential removals of branchwood and tops. We also feel the need here to emphasise the potential for conflict with deadwood provision for environmental benefits under UKWAS 2 against the environmental benefits of using biomass fuel. There is a specific debate to be had on the environmental benefit of leaving dead standing trees on site versus harvesting them for fuel.

7.7. In addition, in the Small Round Wood sector² we see some market displacement to wood fuel of some 475,000 green tonnes. This amounts to some 20% of this sector. It is recognised in a free market economy there will be winners and losers. The key to ensuring a successful and vibrant woodfuel market in Scotland is to get a firm understanding of available volumes and to recognise there are existing traditional outlets for timber which contribute significantly to the Scottish economy and for which large scale displacement is not desirable.

7.8. To ensure that the available information is delivered consistently, we recommend the creation of a "Scottish Forest Industry" wood fuel website, providing a single reference point with a regularly updated definitive data set using common terminology.

7.9. The spatial relation between supply, transport and demand is important to the overall sustainability of the bioenergy supply chains. Currently, applications for processing plants can entail EIAs but there is no mechanism to require that the applicants provide details of the source of the fuels. This leads to some uncertainty on the wider impacts of bioenergy developments on the natural heritage and the carbon balance of the supply chains. The

¹ One m³ is roughly equivalent to one green tonne.

² Panel, pulp, and fencing manufacture

availability of resource estimates through a portal will contribute to improved decision making in terms of the location and size of processing plants and in identification and maintenance of required transport routes. However mapping of existing resources alone will be insufficient to advise on the opportunities for bioenergy developments. Proposals for processing plants should take account of the availability and suitability of the local woodfuel resource, the potential for the creation of new resources in the longer term, taking into account environmental constraints, and the likely patterns of resource demand. The provision of better information, provided through a GIS layer, available to all by making regional resource estimates, where appropriate, available to potential woodfuel buyers and farmer cooperatives, will stimulate both demand and supply.

7.10. The provision of spatial guidance in a single reference point would not only be of use to woodfuel buyers but would also help planners fulfil the objectives of the *Scottish Planning Policy 6: Renewable Energy* and guide developers towards the most suitable locations for processing plants and type and scale of developments. It would also be a useful reference for land managers and statutory bodies assessing applications for woodland creation under Rural Development Contracts, as an indication of areas that are most suitable for new plantings. This can be supported by project officers and staff from other parts of government providing a resource assessment service to owners and facilitating contact with timber buyers and/or management companies. Linked to information on potential business models, appropriate equipment, and costs of harvesting and supplying woodfuel this can be delivered through the unified SRDP process.

7.11. There are a range of financial barriers to woodfuel mobilisation from forests and woodlands. These include the value of traditional products, as well as strong competition for wood fibre and the ability of industry to pay for it. The principal markets must offer positive returns to ensure that woodfuel can be both accessed and generated profitably. The rising timber production programmes and new emerging markets for woodfuel in Scotland will require a significant influx of haulage resources, at a time when the haulage sector is shrinking. The same is true for the in-forest harvesting contractors who are having difficulty in recruiting and retaining their workforce. Specialised machinery will, in all probability, be required, but there is a lack of incentives to encourage this. Fluctuating, short term capital grant schemes, such as the SBSS do not inspire confidence in the sector to invest. ROCs do provide a long-term support mechanism but are driven from the demand side and are currently focused only on electricity production. The Task Force believes that a commitment to sustaining supply-chain capital grants for the next 3-5 years is essential.

7.12. The physical barriers to mobilisation are better understood, but no less challenging. These include difficult working terrain, differing soil types and the physical location of forest areas. These factors combine with biological factors such as species constraints, and soils. However, these are understood, and relatively straightforward to deal with. Roading constraints, both in forest and public roads can pose problems of access to the material, and there is a need

for more dedicated in forest haul routes. The distances from markets, and their impact on the haulage resource, its availability and cost, affects the development of an immature supply chain. The Task Force believes that a commitment to sustaining access and timber transport grants for the next 3-5 years is essential.

7.13. Less simple to resolve are the cultural barriers. Growers are reluctant to engage in the woodfuel market for a variety of reasons. These include a lack of understanding, leading to fear of the unknown market, a fear of long term commitment restricting flexibility, and loyalty to traditional outlets. Making more productive use of the woods can be perceived as compromising other benefits, such as shelter for stock, sporting interests and leaving a mess in surrounding fields and on the farm and woodland tracks. This can lead to sensitive issues relating to the landscape, public use and biodiversity as local communities are not used to harvesting and management activity.

7.14. When combined with political effects, such as perceived policy clashes, a recent lack of new planting activities, and uncertain support for restocking, the overall impact does not instill long term confidence. For growers, there is a need to restore confidence in the future of the sector. This has been reflected in recent years by low levels of new planting, which if not addressed, will have a significant future impact on both timber processing and the supply of material for bioenergy developments. We need to increase the rate of new woodland creation for future biomass supplies. This can be done by ensuring that Rural Development Contract incentives reflect land use priorities. More work needs to be done on integrating farming and forestry, and bioenergy offers the forest sector an opportunity to engage better with colleagues in the agricultural sector. The provision of well targetted training and information will aid both growers and developers to improve their understanding of each others needs. Demonstration sites and best practice examples need to be developed, to promote bioenergy as an additional opportunity to add to the many other benefits valued by owners and other stakeholders. These should include sensitive sites, and funds need to be made available to support public and neighbour awareness raising activity ahead of operations. The use of regional advertising and awareness raising campaigns for new woodfuel material is required. As an example, Northern WoodHeat has set up a focus group of farmers to look at short rotation forestry opportunities. Promotional material linked to a series of regional demonstration events for invited owners of small woods will aid this process. This work should be done in conjunction with NFUS, SAC and Farm Machinery Rings to make use of their networks. It will also be important to monitor new woodland creation incentives and review them if uptake is low. The task force recommends a review of incentives in 2009 if uptake of RDC woodland creation grants is low.

7.15. The continuing development of the supply chain is also a key priority, both for virgin wood, and other sectors. Many of the owners of small and farm woodlands either tend to have a lack of awareness of the potential value of the woods, or any interest in timber working and do not see it as a priority. The small scale and fragmentation of the woods, in often inaccessible

locations with a lack of harvesting infrastructure leads to higher working costs. This also has led to a lack of understanding on the size and potential of the available resource. There are few examples of co-operative working, which could mitigate this, and this leads to failure to supply market requirements in terms of quantity and quality of product. Positive encouragement for cooperative harvesting and marketing of timber by, for example, producer groups can be pilotted through the Breadalbane and Grampian Farm Forest Initiatives. Good case studies like this can be used to promote the activities of local woodfuel supply chains and co-operatives. Local producer groups or supply co-operatives have the benefits of maintaining pricing confidentiality, while enabling local contacts between suppliers and customers. Around one third of the awards under the SBSS have gone to setting up supply chain initiatives. These may also be the most effective mechanism to engage less commercially minded owners. The task force recommends that support for co-located producer groups and wood heat clusters continues, and their impact on the market is reviewed as part of a future study. If these can be combined with effective integrated planning to ensure close proximity between new woodfuelled developments, ready availability of woody biomass, and viable use of the heat produced, then their effectiveness will be increased.

7.16. There is a skills shortage in working small woodlands, and there is a need for a training programme targeting contractors who are interested in small scale working. This must be linked to the above capital grants to subsidise the regional purchase of equipment, and the provision of harvesting infrastructure, such as fit for purpose tracks, stacking areas and turning points. FCS should work with management companies and woodfuel buyers to find mechanisms and identify areas with a reasonable chance of success, which will provide continuity of work for regional contractors, to encourage them to invest in skills.

7.17. Research and development is a further area that in particular stands out as needing considerable input. Immediate needs which encompass both the physical and biological barriers are:

- A "decision tree" at the stand level to assist with modelling for woodfuel production
- More research and modelling into woodfuel production from broadleaved species
- The creation of a woodfuel production forecast including all species and material categories
- Research into balancing market demands with supply availability
- Various machine and method studies for both harvesting and haulage systems
- Destumping practice and environmental impacts
- Further research on silvicultural models and options for planting of new forests with energy forestry in mind

7.18. A programme of research needs to be carried out quickly and the information needs to be effectively communicated through a series of specific seminars and training events.

8. SHORT ROTATION COPPICE (SRC) AND SHORT ROTATION FORESTRY (SRF) ENERGY CROPS

8.1. Short rotation coppice (SRC) is based on the use of fast-growing tree species repeatedly cut back (coppiced) and harvested for energy use at regular intervals throughout the crop's lifespan of 15-20 years. The only species currently developed commercially is willow. Arguably there are several advantages to growing SRC over conventional forestry for wood fuel, as well as the obvious advantage it offers farmers in diversifying from traditional agriculture. The time from planting to harvesting, and hence financial return, is much shorter than for conventional forestry. In addition, the crop can be sold into other industries, such as fibreboard and basketry.

The main market driver currently for SRC is the Renewables Obligation 8.2. for electricity supply, which increases the market value of the crop. To date, this has resulted in the crop itself being used mainly for co-firing with coal in large power stations. Up to the end of 2006, it is estimated that only 300ha had been planted or approved for planting for SRC in Scotland. By the end of 2008, this should increase to about 1000ha, driven largely by demand from large dedicated biomass plants coming into operation, such as the 44MW E.ON plant at Lockerbie. There are a number of large consented biomass combined heat and power (CHP) plants due to be built in Scotland, and it is worth remembering that up to 30% of the fuel supply for such plants could be via SRC. At such levels, it is estimated that up to 30,000ha would need to be planted to meet the demand. As a comparison, this is roughly equivalent to the area of oilseed rape grown in Scotland^{iv}. This would represent a fairly significant change in land use, particularly as suitable sites for growing SRC correspond mostly to land under arable and improved grassland management^v.

8.3. SRC offers a very different habitat from open farmland, which results in opportunities for some species and threats for others. Willow coppice can support a diverse invertebrate community in the canopy^{vi} and attracts bird species characteristic of scrub and woodland edge-type habitats. It is less beneficial overall for open farmland birds, with evidence suggesting a risk of displacement of some species^{vii}.

8.4. Short rotation coppice offers an opportunity to help Scottish farmers diversify, whilst contributing to carbon savings in energy generation. There is a risk that if farmers do not take up this opportunity, and supply of SRC does not match demand, there may be increased imports of unsustainably produced biomass. There may also be an increase in market prices for conventional forestry – putting additional pressure on this sector. Finally, investment in biomass energy could be put at risk.

8.5. The main barriers to sourcing SRC are land availability and impact on land value, knowledge about economics and market barriers, and the current political context.

8.6. There are approximately 900,000 hectares of arable land and 900,000 hectares of permanent improved grassland in Scotland. Most of the former, and some of the latter would be suitable for SRC. The availability of land is reduced by competition both with traditional agricultural use, and with the new demand for biofuels. There is arguably an issue of Government subsidy in these sectors competing against itself. This is compounded by a concern that the cultivation of SRC could have an impact on land values, for instance in "tying the land up" for several years. The long-term expense associated with growing this crop is simply not known, including the costs of drainage problems, and of removing the crop and restoring the land to other uses. Although much will depend on soil-type and location, there may be an opportunity to make use of lower value, poorer quality land to grow SRC. This may also include reinstated derelict or contaminated land outwith agriculture. To set against growing concerns about food security, there is a need for improved knowledge on the potential for SRC on more marginal ground. This will help to target particular land in the future for SRC with the least impact on food production. Marginal ground, in this context, is taken to mean improved grassland, and land which is unsuitable for traditional agricultural machinery. Care must be taken not to replace existing habitats of greater local biodiversity value with SRC or break up the continuity of semi-natural habitats. Willow coppice should not be located in or adjacent to sensitive wetlands areas because of its high water requirements. Standing SRC will have different effects from cut SRC in terms of landscape, in-field biodiversity and habitat connectivity, and this should be taken into account in harvesting practices.

8.7. The lack of experience and knowledge of the economics of growing and market for SRC has created much uncertainty. Presently the market offers limited opportunities, and its future expansion is not guaranteed, despite the existence of large consented projects. One of the major disincentives to potential SRC growers is the delay of 3 to 4 years before the first crop, as this could present cash-flow problems. This is a short-term issue, but significant, given the high establishment costs. The uncertainty over future yield may prevent agreement on fixed annual payments. **The Task Force believes that support mechanisms, through grants and buyer contracts, to bridge the establishment period would help to reduce some of the disincentives.** In assessing applications for government support, consideration should be given to both the potential threats mentioned above, but also to any opportunities for SRC to deliver wider benefits. For example, with regard to flooding alleviation or habitat connectivity.

8.8. In addition, there is the external factor of high grain prices which reduces the commercial rationale for SRC cultivation, and confusion over the net environmental benefits of growing biomass as opposed to biofuels. These business risks are increased by the short term nature of current financial incentives, unlike support for energy generators under the Renewables Obligation. The Task Force has considered some additional ways of addressing these barriers. The Scottish Government could consider underwriting payments to farmers using the organic sector system as a template. There could be a competitive grant scheme under the Scottish Rural

Development Programme. A 3-year cash loan could be offered at 0% interest, to be drawn down each year against predicted yield. An innovative solution might be to reward farmers for improving the carbon balance of their land, getting "points" for carbon saved. The market could be developed to encourage farmers to build heat energy supply businesses, retailing heat and energy directly to homes and businesses.

8.9. As part of a wider review of support under the Renewables Obligation, energy crops may be banded as an "emerging technology" at 2 Renewables Obligation Certificates (ROCs) per MWh of electricity (as opposed to the current single ROC). Also the current cap limiting the level of energy crops in co-firing will be lifted. It will be for the Scottish Government to decide whether to implement the proposed changes under the Renewables Obligation (Scotland), and one option (subject to legal authority) would be to band energy crops even higher, in order to compensate growers for the costs of reinstating their land to other uses in the future. We believe that higher ROC banding for SRC converted via CHP systems is the key to developing the resource. FCS should monitor uptake of SRC establishment grants in the new SRDP and in the lead up to banded ROCs. This needs to be followed up with a review in 2010 and consideration of additional opportunities for support if uptake is still unsatisfactory.

8.10. Lastly, domestic food security in Scotland may become a political imperative, driven by economics, climate change, and global population pressures. This may mitigate against the production of SRC.

8.11. Short rotation forestry (SRF) is the cultivation of forestry for energy use using medium to fast growing species. These include Alder, Ash, Birch, Poplar, Sycamore, Eucalyptus and Beech. There is as yet no commercial SRF planting in Scotland, and thus experience is limited. Some research has been carried out on the potential impact of SRF on biodiversity, soils, hydrology, pests and diseases, and landscape; this found no major issues (subject to a number of important caveats being met) to large scale SRF going ahead. A major attribute given for SRF is flexibility. It has potential for both biofuel use and as a timber resource. This attribute creates a conundrum for management; is the primary aim of the crop biofuel, timber or both? If both, does this maximise productivity or reduce it because of lack of focus?

8.12. As one measure to address the information gap, FCS proposals to establish demonstration sites are welcomed. In general, farmers need more information. An independent body should develop information on production costs, markets, yields, and agronomy, based on actual figures achieved in commercial production. ROC-trading information should also be more readily available. Case studies could be developed on both the economic and carbon balance of energy crops in order to help farmers make informed decisions. Farmers need to be encouraged to treat SRC and SRF as a "crop", and hence take out insurance on that crop as they would with any other.

8.13. SRF has not yet been used in Scotland, so there is no current resource. SRF is likely to be able to make use of lower value, poorer quality

land. Other advantages are that no new resources are likely to be required. SRF is single stemmed forestry, which needs no special establishment or harvesting machinery. The lack of good information indicates a clear need for further research, which will be provided by FCS demonstration sites. This will address basic issues of species choice, spacing, and establishment techniques. Baseline data on soil nutrients and carbon, hydrology, and biodiversity are essential. Existing methodologies for data collection, where they exist, should be used to allow direct comparisons with other work to be made. In addition it is recommended that an assessment is undertaken of the likely impacts on land values, and the potential to maximise the amenity, conservation and shooting values. **The Task Force strongly recommends that further research on establishment, species choice, economics of production, and environmental implications is undertaken.**

9. RECYCLED, WASTE WOOD & ARBORICULTURE ARISINGS

9.1. These sources of material represent a significant resource for the bioenergy sector. Where collected, woody waste is either recycled directly into produce, composted or if contaminated, directly landfilled. Significant quantities of both treated and untreated waste wood and other sources of biomass still go to landfill. The quantities going for energy recovery at the moment are very small. There is a clear need to maximise the amount of wood waste as wood fuel to reduce the amount going to landfill, and relieve pressure on virgin wood markets. We believe that the rise in landfill tax from £24 now to £48 in 2010 will have a major impact on achieving this. In conjunction with proactive use of the Business Waste Framework, and in particular the potential for selective bans on materials going to landfill, these should prove to be strong mechanisms. Many Scottish local authorities have facilities for collecting wood waste for recycling or composting, much of which could be used directly as a wood fuel or for recycling purposes. However, policies amongst Scottish local authorities to enable use of recycling centres to recover waste wood and other waste biomass from commercial and industrial sources are highly variable. A growing number of private waste companies are also now collecting waste wood. It will be important to improve the consistency of use of such facilities for commercial producers and ensure that recycling initiatives recognise the validity of wood as a renewable fuel. There is a need to ensure there are sufficient safeguards in place to protect and further develop existing wood recycling as this is clearly, in many cases, a preferred route for this material in terms of overall energy balances. **However**, the development of waste wood markets for use as fuels would be helped by the development of a fuel standard from waste biomass to increase the amount of wood fuel drawn out of the waste stream. There is already an established recycling supply chain to the panel board sector. Assisting the elimination of market conflict by developing proper waste steams is considered to be an essential element in ensuring a sound marketplace for virgin wood fibre. There is a risk that if significant 'clean' waste wood is diverted from current recycling processes into energy use, then there may be a need to import the shortfall or use primary (virgin) sources. Much wood from the commercial and industrial (C&I) sector is currently landfilled where it continues to produce climate changing gases. An unknown percentage of this

is from manufacturing processes containing glues, preservatives etc. and as such, may have to be treated very differently. A review of the application of pre-treatment for landfill regulations should be undertaken to encourage the commercial and industrial sector to promote segregation of wood waste at source and increase awareness of opportunities to avoid landfill tax.

Of the 320,000 tonnes^{viii} of 'agricultural' waste collected each year by 9.2. local authorities, a recent study by AEA^{ix}, suggest that 98,000 tonnes is considered as suitable for energy use (76% of which is estimated to arise in the North East, Tayside and Lothian). More detailed information could be collected from licensed and permitted disposal points which would give information on quantities but would not cover material shredded on site. SEPA has recently carried out a study, but there are still gaps in the data. The limited nature of the information that is available about on secondary biomass from agricultural systems needs to be addressed, and further work is required to improve the volume estimates, and identify it in terms of location and type. In terms of other woody waste, discounting domestic sources of waste biomass (and similar C&I waste of around 5.4 million tonnes) the AEA study estimates that around 775,000 tonnes is potentially available for energy use each year. Of this, 244,000 tonnes arises from wood processing (i.e. furniture production), and 531,000 tonnes from material similar to the agricultural sector. There are some data gaps in relating to C&I wood waste in terms of the amount 'clean' or uncontaminated wood and those containing contaminates, and what is recycled for use by the panel board sector. To address some of the data gaps, we recommend that a new 'wood for bioenergy' category be inserted into WasteDataFlow³, and that improvements are sought in the data returns from licensed or permitted landfills for commercial and industrial waste wood and other biomass sources.

The term arboriculture arisings encompasses all the material produced 9.3. during arboricultural, or tree surgery, operations and can include stems, branches and leaf material. The bulk of materials from landscaping arboriculture arisings tend to be seasonal and consist mainly of wood trimmings, dead or replacement plants and grass cuttings. Recent trends have seen much of the woody material dealt with on site by shredding and chipping^x or taken to authorised collection sites for composting. There is a good opportunity for some of this material to be processed into woodfuel, most commonly woodchips. There is a need to establish links with the arboricultural and composting sectors to explore the development of a more co-ordinated supply chain. Much of this material is located in urban areas or along roads and railway lines, and co-ordinated harvesting and collection for wood fuel supply can be challenging. The Task Force supports the promotion of appropriate infrastructure and guidance to utilise arboriculture arisings as a wood fuel and avoid the material entering the waste stream.

³ The statutory electronic form used by all local authorities to record waste collected by or on behalf of local Authorities.

9.4. To date, there has been no formal study of arboriculture arisings in Scotland, other than that done in the Forest Research Woodfuel Resource Study 2003. Of the total GB resource, approximately half (53%) was in the form of stem wood and 23% was already chipped with 20% as branchwood. Foliage represented a minor component. However, there were significant variations in the composition of the arisings by geographical region, so the above split may not be applicable to Scotland. The study identified a potentially available resource of 22,000 oven dry tonnes, of which an estimated 18,000 ODT were considered to be operationally available. In addition to these figures, it is estimated that a total of 500,000 green tonnes of arisings are produced each year⁴. Of this around 250,000 green tonnes are collected by local authorities. Approximately 25,000 green tonnes (10%) of this is oversize woody material, in the form of individual logs or butts. To improve the data on wood waste collected by landscape firms, we recommend direct canvassing. However, it should be recognised that in the past such firms have shown a reluctance to respond to canvassing either through 'yet another form to fill in' attitude or business confidentiality issues.

For material produced by landscaping operations, there appear to be 9.5. no significant environmental pollution risks, as most of the waste collected for disposal is composted. There are some concerns that if landscapers had an incentive to remove the material (as a by-product) for energy use rather than shredding and leaving it on site as a mulch that this may lead to an increase in the use of biocides for weed suppression with increased potential for environmental pollution. The removal of wood which is usually left on site (such as brash) may result in environment damage from use of heavy vehicles, increased use of fossil fuel and potential losses of the nutrient value of the material. The nature and location of the resource means that it is usually found in small quantities, often combined with other green waste, produced over a large geographical area. It frequently has a high moisture content, and may contain contaminants, such as chlorine or metals. This causes problems, and additional cost with quality control and separation processes to exclude the other material.

9.6. Significant amounts of landscaping material are of high wood content, so could be regarded as wood fuel. However if this material is being discarded under current regulations it may be regarded as waste^{xi} and may be required to be burned in a Waste Incineration Directive compliant plant^{xii}. We believe that there should be a clear distinction between virgin and waste material. **There is a need for clear guidelines to ensure that the potentially available material from arboriculture arisings is not classified as waste, and is treated the same way as green forest industry residues are. As much of this material is collected by small landscape firms and either left on site as a mulch or taken directly to disposal points some verifiable data exists on quantities arriving at local authorities sites. Incentives through, for example, free deposit or the use of differential are needed to make it worthwhile for landscapers to transport the wood residues to council recycling centres. The Task Force would like to see Local Authorities**

⁴ Source: Wood Fuel Task Force arboriculture sub-group expert members' own assessment.

offering reduced cost recovery services to local trades to deposit waste wood at their sites for recycling or energy recovery. **Council operated recycling centres should also be required to offer waste biomass recovery services and a study of incentive and charging options for such facilities is undertaken.**

10. OVERALL POTENTIAL RESOURCE AVAILABILITY

10.1. The Task Force assessed all of the sources of woody biomass to determine the total current and future potentially available resource. This is indicated in Table 1. below. These volumes represent our best estimate of what would be available in the absence of existing markets, and if the material is in a form or location which allows it to be made available to the market. The sections in the report describing the different types of resource identify the constraints and barriers to accessing the material, which will need to be resolved before it can be utilised. The volumes have been converted to oven dry tonnes (ODT).

Type of material	2007/11	2012/16	2017/21	
	Oven Dry (t)	Oven Dry (t)	Oven Dry (t)	
Hardwood - Logs	112,519	110,701	103,395	
Softwood – Logs/SRW	3,446,500	4,075,000	4,471,000	
Sawmill chips+	844,393	998,375	1,095,395	
Softwood Brash / Branchwood	382,695	395,001	395,000	
Softwood Stumps/roots*	35,000	35,000	35,000	
Small & Neglected woods++	50,000	50,000	50,000	
Arboricultural arisings	268,000	268,000	268,000	
Short rotation coppice	2,400	8,000	8,000	
Short rotation forestry	0	0	0	
Landscaping	98,000	98,000	98,000	
Commercial and Industrial+++	5,400,000	5,400,000	5,400,000	
Wood processing	244,000	244,000	244,000	
Similar to agricultural waste	531,000	531,000	531,000	
Total	11,414,507	12,213,077	12,698,790	

Table 1 Total estimated potential resource availability

+ Calculation of volumes based on 35% of softwood sawlog volume

++ Very rough estimate based on area and conservative volume production

+++ All potentially useable biomass, but not all woody biomass

* Rough estimate for FCS land only

10.2. From Table 1 it can be seen that the potential resource is considerable, exceeding the current annual woodfuel usage of some 300-400 k ODT by a factor of 30. However, some of the resource is already committed to existing markets, and it is important to factor that out of the figures. This material includes most of the softwood resource, and a small amount of the hardwood material, much of which is exported to England. We estimate that few of the other sources of material are currently being utilised, and there are no reliable data to enable us to make estimates of useage. Table 2 takes our existing understanding of market demand into account.

Type of material	2007/11	2012/16	2017/21
	Oven Dry (t)	Oven Dry (t)	Oven Dry (t)
Hardwood - Logs	25000	25000	25000
Softwood – Logs/SRW	3206500	3206500	3206500
Sawmill chips	844393	844393	844393
Softwood Brash / Branchwood	1000	1000	1000
Softwood Stumps/roots	0	0	0
Small & Neglected woods	0	0	0
Arboricultural arisings	0	0	0
Short rotation coppice	0	0	0
Short rotation forestry	0	0	0
Landscaping	0	0	0
Commercial and Industrial	0	0	0
Wood processing	0	0	0
Similar to agricultural waste	0	0	0
Total	4076893	4076893	4076893

Table 2 Material already committed to existing markets

10.3. Subtracting the material already committed to markets from the total estimate of potential availability allows us to provide an estimate of the volumes and types of material which can be brought new to the market. As described in 7.7 above, there may be some current market displacement of small roundwood volumes to woodfuel. The figure for the estimated displacement of small roundwood has been included in Table 3 below. Our estimate is that there are in excess of 7 million oven dry tonnes of material which has the potential to be utilised for bio energy production.

Type of material	Volume	2007/11	2012/16	2017/21
		Oven Dry (t)	Oven Dry (t)	Oven Dry (t)
Hardwood - Logs	New	87,519	85,701	78,395
Softwood – Logs/SRW	Existing	240,000	868,500	1,264,500
Sawmill chips+	Existing	0	153,982	251,002
Softwood Brash / Branchwood	New	381,695	394,001	394,000
Softwood Stumps/roots*	New	35,000	35,000	35,000
Small & Neglected woods++	New	50,000	50,000	50,000
Arboricultural arisings	New	268,000	268,000	268,000
Short rotation coppice	New	2,400	8,000	8,000
Short rotation forestry	New	0	0	0
Landscaping	New	98,000	98,000	98,000
Commercial and Industrial+++	New	5,400,000	5,400,000	5,400,000
Wood processing	New	244,000	244,000	244,000
Similar to agricultural waste	New	531,000	531,000	531,000
Total		7,337,614	8,136,184	8,621,897

Table 3 Potentially available material additional to existing market consumption

+ Calculation of volumes based on 35% of softwood sawlog volume

++ Very rough estimate based on area and conservative volume production

+++ All potentially useable biomass, but not all woody biomass

* Rough estimate for FCS land only

Annex 1

Task Force Members

Simon Hodge **Roger Coppock** Jamie Farquhar David Sulman Jonathan Hall Keith Arbuthnott Jason Ormiston Peter Whitfield Andy Wiseman **Richard Palmer** Willie McGhee Les Bryson Sue Kearns Julian Bell John Ferguson John Risby Rob Pedersen Bruce Laird George Webb Ron Vass Simon Stockwell

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Annex 2					
Current or recent support mechanisms for biomass					

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Scottish Community & Householder Renewables Initiative	Current	Scottish Government managed by the Energy Saving Trust and H&I Community Energy Company	Funding towards development and capital costs of renewables projects for communities.	Over £1.4 million has been allocated to more than 30 wood-fired community projects. Nearly £250,000 allocated to householders for the installation of biomass boilers.
Biomass Heat Acceleration Project	Closed	Scottish Government	Focusses on reducing costs and supply chain risks.	Currently working with 10 existing installations in Scotland.
Renewables Fuel	One off	Scottish Government	Potential for including renewable ter	chnologies in the fuel
Soottich	Closed	Soottich Covernment	£10 5 million	74 projecto
Scottish Biomass Support Scheme.	Closed	managed by Forestry Commission Scotland	funding package for supply chain infrastructure and installations projects across a range of scales, public and private organisations	 74 projects 46 heat only installations 1 CHP plant 1 anaerobic digester 24 supply chain businesses, and 2 training initiatives (a number of projects have withdrawn, mainly due to the limited timescale)
Regional Selective Assistance	Current	Scottish Government	Create and safeguard jobs in Assisted Areas.	Support for Caledonian paper CHP
Demonstration projects	Complete	Scottish Government Prior to the Biomass Support Scheme	Queen Margaret University College - £400,000 to supportthe installation of a biomass plant.Perth and Kinross PPP School Projects - £400,000 tosupport the installation of biomass heating systems in 6schools to be build under PPP.Pilot Biomass Grant Scheme in Highlands and Islands -	
Additional support for renewable energy.	Current	UK Support.	Enhanced Capital Allowances Low Carbon Buildings Programme	
Renewables Obligation (Scotland)	Current	Market	Supports electricity, co-firing, and CHP	Numerous projects including E.ON, Caledonian, Balcas
Scottish Forestry Grant Scheme	Closed	Forestry Commission Scotland	grants for the planting, restructuring and management of existing woodlands.	
SFGS Developing Woodland Energy	Closed	Forestry Commission Scotland	Grants for capital costs of setting up supply chains	A £325,000 grant scheme, under which nine successful applicants received support for the development of local wood energy supply chains.

SRC willow or	Closed,	Scottish Government	£1,000 a hectare for farmers who	223 hectares to date
poplar as an	but SRDP		have a supply contract with an	800 in pipeline for
energy crop	option.		end user, such as a power	2007
	-		generating company.	
Aid for	Current	Scottish Government	€45 per hectare Areas sown	
Energy Crops			under energy crops	
Strategic Waste	Current		Main source of funding for local	
Fund			authorities wanting	
			to develop infrastructure to treat	
			residual waste	
Highlands &	Closed			
Islands			Development of local clusters of	Funding of £375,000
Woodfuel			woodfuel suppliers and small	was awarded to 15
Development			business users	SMEs to set up supply
Programme.				chains and install
				woodfuel boilers, to
				develop 8 local
				woodfuel clusters
Bioenergy	Closed	DEFRA	Supply	Funding of over
Infrastructure			chain development	£750,000 has been
Scheme.				awarded to 18
				businesses across the
				UK for supply chain
				infrastructure to local
				woodfuel markets and
				to large-scale CHP
				and power projects.

Annex 3 Factors affecting markets

- 1) Standards. The European Union has developed specifications and standards – CEN TC335 for solid biofuels and CEN TC343 for solid recovered fuels. The Biomass Energy Centre is currently working with these to provide guidance for producers which is simpler to understand, and more practical to use. The British Pellet Club is also seeking to develop a Wood Pellet Accreditation Scheme based on the CEN technical specifications. Meanwhile in the industry it is common to use the Austrian Onörm standard for wood chip which has three specifications (material, particle size and moisture content).
- 2) Logistics is a matter of getting the raw material to the point at which it will be utilised to produce energy. There are a variety of challenges in this area, but most are fairly well understood, and rely on an existing and sophisticated supply chain to address them. Waste and recycled wood is an important component of the woodfuel mix in Scotland. Mechanisms need to be explored to prevent or discourage wood-rich waste being accepted into land-fill. Awareness raising amongst the construction and demolition sector and clients of opportunities to avoid landfill tax will help.
- 3) Pricing is more difficult, and does not always follow what might be considered to be logical market behaviour. Since the 1980s the industry has been experiencing falling timber prices, which have reflected by and large the price of timber in global markets. The total delivered wood cost cannot be arbitrarily increased to create a better margin for forest owners, as processors must also be competitive in their markets. Despite historically low prices, timber production has continued to grow broadly in line with the production forecast. This has been in response to demands for material if not higher prices from the processing sector. While the Forestry Commission has an objective of supporting the wood processing sector, the private sector forest owners have no such obligation. Yet, in the main, this is what they have continued to do. To some extent, external factors such as wind firmness, and UKWAS will have played a role in this, and for some players cash flow will have been a priority regardless of prices. The estimated costs of thinning and chipping using small-scale harvesting techniques are in the region of £35-40 per green tonne. Woodfuel values are variable, not least due to costs of transportation and capital installation, however these costs may make it economically viable to supply local clusters of demand close to the location of small woods.
- 4) Price paying capability. A variety of models have been developed to ascertain the price paying capability of wood users. These indicate, for the biomass sector, an ability to pay higher prices to bring wood to market. As the supply/demand balance tightens, prices are expected to rise to mobilise raw material. The impact of incentives, such as the Renewable Obligation, and capital support schemes is a major influence on the price consumers are prepared to pay. It is possible that RO support for dedicated biomass electricity could be a key promoter of a supply chain

that can also supply into heat markets. Strategically, the optimum scale for this should tend towards small and local rather than large and central. However, there are problems with placing an obligation on the heat market in the same way as for electricity suppliers. The products are different and the suppliers are different, and there is uncertainty as to who receives the obligation. A more effective mechanism would be to provide capital support as an alternative for demand management and domestic supply side measures. This would help to resolve issues around the current high cost of biomass boilers. The FREDS Renewable Heat Sub-Group will shortly produce recommendations on this, so any direction from the Task Force on this should wait until these are received. It would also be helpful if biomass heat is made exempt from the Carbon Reduction Commitment regulations.

- 5) Owner motivations have always played a large part in determining when timber comes to the market. For many owners it is a way of generating a large capital sum to offset some expected future expenditure. For others it is a regular cash flow from a well managed forest estate which is important. A 2005 study by Jaakko Poyry Consulting found some concerning results from a series of interviews with major private sector players.
- 6) Private growers are not seeing sufficient return from forestry. There was no evidence that planting (for production) would be expanded. Growers favour spot market behaviour. Private growers tend to be less able to respond to changes in market price movement and this is in part due to management. Private growers are themselves complex - small to large holdings, resident and non-resident owners, new investors and traditional estates etc. Approx. 15% institutional, 20-25% traditional owners and estates (50% commercial, 50% non-wood), 20% private (high net worth), 35-40% hobby, recreation, passive. These have differing objectives and decision criteria. The large percentage of owners categorised as hobby, recreation, and passive is a major area of uncertainty in estimating whether these supplies will ever come to the market. This type of owner/investor has been increasing during the last decade, and many do not engage with the traditional timber supply chain. While the more traditional growers and investors tend to favour the spot market, this group may be indifferent to market prices, and may need an entirely different motivation to manage their woods in a way which will support the timber and biomass sectors.
- 7) The financial investor is hindered by the low returns on forestry and a fragmented ownership base. They seek large scale and returns attractive to participants (e.g. pension funds, individuals etc.). Availability of fiscal incentives, such as relief on inheritance tax, remains a prime driver. Investors favour spot market behaviour.
- 8) Processors are already hindered in their development and investment plans by uncertainty of private wood supplies.

ENDNOTES REFERRED TO IN THE MAIN TEXT

ⁱ Biomass Action Plan for Scotland. Forestry Commission Scotland and Scottish Executive, 2007.

ⁱⁱ Scoping Study: The Commercial Opportunities of Wood Fuel Heating in Scotland. Report for Scottish Enterprise 2005.

ⁱⁱⁱ Scottish Executive (2007) ECOSSE: Estimating Carbon in Organic Soils - Sequestration and Emissions: Final Report, Edinburgh, Scottish Executive, <u>http://www.scotland.gov.uk/Publications/2007/03/16170508/0</u>

^{iv} Scottish Executive (2006) *Revisions the 2003, 2004 and 2005 June Agricultural Census results*, Edinburgh, SE.

^v Andersen, R.S., Towers, W. and Smith, P. (2005) 'Assessing the potential for biomass energy to contribute to Scotland's renewable energy needs', *Biomass & Bioenergy*, Vol 29, 73-82.

^{vi} Cunningham, M., Bishop, J.D, McKay, H.V. and Sage. R.B. (2004) *The Ecology of Short Rotation Coppice – ARBRE monitoring crops*, NES: B/U1/00727/00/REP, Harwell, UK.

^{vii} Sage, R., Cunningham, M. and Boatman, N. (2006) 'Birds in willow short-rotation coppice compared to other arable crops in central England and a review of bird census data from energy crops in the UK', *Ibis*, Vol 148, 184-197.

viii http://www.sepa.org.uk/publications/wds/index.htm

^{ix} The Evaluation of Energy from Biowaste arising in Scotland AEA Energy & Environment study in preparation, due to be published December 2007

^x <u>http://www.sepa.org.uk/agriwaste/index.htm</u>

xi http://www.sepa.org.uk/pdf/guidance/waste/is_it_waste_v2.pdf

^{xii} <u>http://www.sepa.org.uk/pdf/guidance/air/thermal_treatment_guidance.pdf</u> and <u>http://www.netregs.gov.uk/netregs/275207/1108823/?version=1&lang=_e</u>