WOOD FIBRE POTENTIAL AVAILABILITY & DEMAND IN BRITAIN & THE CIRCULAR ECONOMY 2022 – 2046

PREPARED FOR

CONFEDERATION OF FOREST INDUSTRIES (CONFOR)
FORESTRY COMMISSION (FC)
WOOD PANEL INDUSTRIES FEDERATION (WPIF)
SCOTTISH FORESTRY

BY

JOHN CLEGG CONSULTING LTD

Funded by

THE WOOD FIBRE PROCESSING & SUPPLY INDUSTRY

MAY 2023

WOOD FIBRE POTENTIAL AVAILABILITY & DEMAND IN BRITAIN & THE CIRCULAR ECONOMY 2022 – 2046

PREPARED FOR

CONFEDERATION OF FOREST INDUSTRIES
FORESTRY COMMISSION (FC)
WOOD PANEL INDUSTRIES FEDERATION (WPIF)
SCOTTISH FORESTRY

REPORT CONTENTS

UNITS

The moisture content of wood fibre in the form of logs, forest residues, short rotation coppice (SRC) and recovered wood can vary quite widely due to a range of factors that include where, and how long the material is stored, the time of year, and on whether the wood fibre is in the form of logs, recovered wood or wood pellets. All tonnes used in this report are on an "as received by customer" basis.

The alternative would have been to express all quantities on an oven dry basis assuming various conversion factors. While technically more correct, the report may have been less easy to understand for many people.

CONVERSION FACTORS

Coniferous Roundwood: 1 cu m over bark standing = 0.82 tonne on an "as received basis"

Broadleaved Roundwood: 1 cu m over bark standing = 0.9 tonne on an "as delivered basis"

Coniferous Log Volume: 1 cu m = 1 tonne "as received"

TERMINOLOGY & DEFINITIONS

Recovered Wood: This term covers wood fibre recovered post consumer / industrial use.

Recycled Wood: Wood fibre that is turned into a potentially useful material after it has been used thus reducing waste. It is often used interchangeably with recovered wood.

Reuse of Wood Fibre: Wood fibre put to the same or different use after it has

fulfilled its original function. The original form of the product is not changed.

Roundwood, Small Roundwood & Sawlogs: Roundwood is defined as round material cut from trees. Historically there was a reasonably widely accepted distinction between small roundwood (SRW) and sawlogs both in terms of log diameter and to a lesser extent length. SRW tended to be roundwood up to 16 cms top end diameter and sawlogs tended to be roundwood with top end diameters of 16 cms or more. This distinction is disappearing as most sawmills can now use roundwood with top end diameters down to 14 cms and panelboard mills, and most users of small roundwood, can use roundwood with top end diameters of 16 cms or more. The size definitions used in this report for SRW and sawlogs are therefore illustrative only and the sizes assumed are identified where they are used.

Sawmill Products: This term covers sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark.

Wood Energy Plants: This term covers electricity only, heat only and combined heat and power plants.

Zonal Log Transfers: These are quantities of roundwood that companies expect to purchase in zones other than the one where their plant is located.

ABBREVIATIONS

Cu m: cubic metres

CfD: Contracts for Difference

DECC: Department of Energy & Climate Change

Defra: Department for Environment, Food & Rural affairs

o.b.: Over bark

o.d.t: Oven dry tonnes

MSW: Municipal Solid Waste

MW: Megawatt

NFI: National Forest Inventory

NRW: Natural Resources Wales

Ofgem: Office of the Gas and Electricity Markets

RDF: Refuse Derived Fuel

ROC: Renewable Obligation Certificate

SEPA: Scottish Environmental Protection Agency

SF: Scottish Forestry

SRC: Short rotation coppice

SRF: Short Rotation Forestry

SRF: Solid Recovered Fuel

SRW: Small Roundwood. Logs with a top diameter up to 16cms

t.d.: Top diameter

t.e.d: Top end diameter

UKWAS: UK Woodland Assurance Standard

WID: Waste Incineration Directive

WRA: Wood Recyclers' Association

WtE: Waste to Energy

SUMMARY

1. This report presents an analysis of the potential availability and demand for coniferous roundwood grown in Britain and the part its virgin wood fibre plays in total wood fibre availability in Britain including reclaimed waste wood and wood fibre imported into Britain as wood and wood products.

2. Trees make an important contribution to mitigating climate change by storing carbon. When trees are harvested the carbon is stored in the products that are made from these trees and, when wood products are used instead of other energy intensive products, there is a further climate benefit. The sector is therefore very well placed to help the UK to reach its Net Zero climate target by 2050 – or in the case of Scotland, its target by 2045.

3. Britain imports some 46.9 million cubic metres wood raw material equivalent of mostly virgin fibre each year and it exports 4.7 million cubic metres of WRME under bark. The mainly coniferous wood fibre grown in Britain accounts for approximately 20% of the total apparent consumption of 53.1 million cu metres WRME under bark. This is likely to remain the case unless more coniferous woodlands are planted in Britain. If Britain imports more wood fibre because of the environmental benefits wood and wood products provide, the percentage may drop below 20%. Shortening the supply chain for the wood and wood products imported into Britain would bring both environmental and economic benefits.

Availability & Demand for Virgin Wood Fibre Produced in Britain

4. The forecast potential availability of coniferous roundwood exceeds forecast demand in Britain for the next 3 years. Demand for coniferous roundwood is then forecast to grow significantly and will match potential availability for about the next 5 years, after which there will be a period when potential availability will exceed forecast demand before dropping below demand.

5. The forecast increase in potential availability of coniferous roundwood will occur almost entirely in sawlog material with a top end diameter of 16 cms or more. By contrast the forecast availability of coniferous roundwood with a top end diameter of less than 16 cm is forecast to remain almost unchanged over the next 20 years at about 2 million tonnes per annum.

6. However, there are a number of issues that need to be taken into account, which these total figures hide, before drawing any firm conclusions on the size and robustness of the gaps that develop between the total potential availability of coniferous roundwood and the total forecast for coniferous roundwood.

7. Most of the increase in potential availability is forecast to come from the woods and forests in Scotland. Potential availability of coniferous roundwood in England and Wales slowly diminishes up to 2039 and then falls away as does the potential availability of coniferous logs in Scotland until 2046.

8. The forecast of 'potential availability' of coniferous roundwood is not a forecast of 'roundwood production'. The difference is very important (see section 18). The majority of the potentially available coniferous roundwood is in private sector ownership. This means that the roundwood is expected to come from woods in a multitude of different ownerships all of whose owners may have different objectives in managing their woods other than generating income from

timber production.

9. There are significant differences in the potential availability and demand balance for coniferous roundwood geographically within Britain. In some zones, such as Central Scotland, potential availability of coniferous roundwood exceeds demand from industries based in Central Scotland, even allowing for logs being transported from Central Scotland for processing elsewhere. In other parts of Britain, such as South Scotland, local demand exceeds the potential availability of coniferous roundwood and therefore roundwood is transported from other geographical areas to meet that demand. More detailed analyses are provided in sections 20 to 28.

10. The significant differences geographically in the availability of coniferous roundwood in England, Scotland and Wales has shaped the development of the forest industries in these countries.

11. The forecast reduction of coniferous roundwood availability after 2039 is a result of significantly reduced areas of new planting of conifers from the 1980s onwards and changes in forestry practices such as planting more broadleaved trees, leaving larger areas unplanted and using more broadleaves for landscape reasons.

12. The overall demand for coniferous roundwood is forecast to increase by about 1.5 million tonnes per annum from 2022 up to 2026 with a small increase in demand from sawmilling businesses, but a much larger increase in demand is forecast from other coniferous roundwood users of which the most significant is the panelboard industry. Use of coniferous roundwood for energy production is forecast to increase very slightly.

13. This forecast demand for coniferous roundwood by different categories of end uses presented in the report depends on present policies that influence the use, reuse and recycling of wood fibre remaining the same, and the availability and prices for recycled wood also remaining broadly unchanged. Higher prices, or reduced availability of clean recycled secondary fibre, could result in the panelboard and biomass users changing their wood fibre mix which could result in them increasing their use of coniferous roundwood.

14. There are a few companies in Britain that are presently exploring the possibility of using coniferous roundwood for producing biochemicals and related products. No allowance has been made for any conifer roundwood they may require in the demand forecasts.

15. Longer term the concerns for coniferous roundwood users will be the start of a significant forecast reduction in the potential availability of coniferous roundwood relative to demand in about 2040, and the situation in about 2046 when 'potential availability' of coniferous roundwood is forecast to match demand. This will also reduce the contributions that the sector can make to climate change and will require Britain to depend on an increasing level of imports of wood and wood products / wood fibre from conifer woods in other countries.

16. The potential availability of sawmill co-products based on survey information provided by 77 sawmills in Britain is expected to increase in line with a gradually expanding demand for sawlogs from these mills. However it is important to recognise that the pattern of end use given in the report depends on present

policies affecting wood fibre use remaining unchanged, as well as prices and availability of other sources of wood fibre. If the panelboard or wood energy users are unable to obtain the quantity of recycled wood or logs they require for their fibre mix, then the forecast pattern of end use given in the report can be expected to change.

17. The potential availability of sawmill co-products within zones within each country varies and self-evidently reflects the size of the sawmilling industry in a particular zone, with more tending to occur where coniferous woods are located.

Alternative Wood Fibre Sources for Biomass Boilers

18. There are a number of other potential sources of virgin woody fibre that could extend wood fibre availability in Britain. They are potentially suitable as substitutes for existing virgin wood fibre sources used in wood energy plants, but they are not suitable for many other ones in the forest industry, so their potential availability is important when considering how best to utilise Britain's limited source of virgin wood fibre.

19. **Forest residues** are potentially an additional source of wood fibre to coniferous roundwood and they are suitable for use as a fuel in large-scale wood energy boilers. The potential of sites to provide wood fibre for wood energy from brash and stumps will be limited in practice by costs and environmental constraints such as ground damage, soil carbon loss, loss of soil fertility and acidification.

20. Where there are no technical limitations in the wood energy plants using forest residues as a source of fuel, the scale of future use of forest residues as wood fuel will depend on the relative prices of different sources of wood fibre.

21. Seven companies are using forest residues as small parts of their biomass fuel mix to generate electricity and / or heat. Based on Ofgem data, a total of approximately 204,454 tonnes of forest residues were used by these companies in 2020 / 21.

22. **Arboricultural arisings** are another potential source of wood fibre which is suitable as a fuel for biomass plants. Ofgem statistics show that 12 energy companies used some arboricultural arisings as part of their fuel mix. The total amount of arboricultural arisings used by all 12 companies came to approximately 271,006 tonnes in 2020.

23. The opportunities to increase this quantity of arboricultural arisings is most likely to be constrained by supply, but if prices increase it may result in justifying increased haulage costs for collecting what are often scattered supplies in small quantities. If there is an increased demand for wood fibre for generating energy at some stage in the future, there may be some opportunity for companies to use more arboricultural arisings.

24. **Broadleaved woods** could potentially provide a significant quantity of roundwood for woodfuel. Forest Research estimated that 700,000 green tonnes were used as woodfuel of which approximately 161,049 tonnes went as biomass for electricity and heat production in 2020.

25. **Short Rotation Crops and Miscanthus** have been identified, and encouraged, as a potential source of fuel for use in wood energy plants. In 2021 approximately 59,506 tonnes of bioenergy crops were being used to generate electricity and / or heat, but there is a lack of clarity over whether some figures

are recorded as dry tonnes or green tonnes.

26. Any possibility of SRC crops becoming a major source of wood fibre for energy plants would require a major change in the attitudes and perceptions of farmers, and in the financial support they are offered. Rapid changes in land use over a relatively small geographical area may also not be easily accepted by local people. The available information suggests that none of the existing or planned energy plants expect to use or depend on supplies of SRC as a fuel source in the foreseeable future.

Reuse of Wood Fibre

27. The reuse of wood fibre does not increase the availability of virgin wood fibre in Britain, but it does reduce the amount of virgin wood fibre that might otherwise be needed annually from Britain's forests and woods or by imports.

28. By far the largest and most significant reusers of wood fibre in Britain within the forest sector in Britain are the pallet pool companies. They reuse at least 3.2 million tonnes of virgin wood fibre annually and this may contain up to 60% British virgin fibre. If it is assumed pallets last for 10 years, approximately 320,000 tonnes of pallet wood will have reached their end of life and will need to be replaced each year and this end of life wood will be either recycled into the wood panelboard industry for making particleboard, animal bedding or as a fuel in a biomass plant for generating electricity and / or heat depending on its quality. Outside the pallet pools, the industry is actively engaged in reusing pallets and packaging so the quantity of wood fibre being reused annually can be expected to increase.

Recycling of Wood Fibre

29. In 2021 the UK's apparent consumption of wood was 53.1 million cubic metres WMRE under bark. Consequently there is a significant volume of wood fibre potentially available for recycling annually, but only a relatively small proportion of that wood fibre will include virgin fibre produced from Britain's woods.

30. The Wood Recyclers' Association estimates that the overall size of the wood waste market in the UK is around 4.5 million tonnes per annum. The majority of the waste originates in England with only about 6.8% and 4.6% originating in Scotland and Wales respectively. Within England, the figures show that most waste originates in the North West and South East of England and London.

31. Accurate annual statistics on the composition of recycled wood are not available but it has been estimated that the 4.5 million tonnes or so of wood recycled annually could comprise 31% clean solid wood, 42% treated solid wood and 27% panel products. The clean solid wood in the UK's wood waste stream is obviously the most attractive source of recycled fibre for companies that use wood waste as it can be used in a variety of different ways without significant further sorting, cleaning or treatment, but it amounts to only about 31% of the total quantity of solid wood waste generated in the UK each year. The bigger recycling challenges lie in in finding the best way to cascade the recycling of the other 70% of the wood waste stream before it is used for generating wood energy.

32. In 2022 Wood Recyclers' Association estimates that 63% of Britain's recycled solid wood goes as biomass for energy production, 24% to the panelboard industry, 13% for use as animal bedding and other uses including exports. There

are no statistics on the quality of the recycled wood that is used by the biomass energy industry.

33. Estimates for the amount of paper and cardboard recycled vary because the collection of some recycling statistics is a devolved matter. Defra statistics on waste indicate that in 2021 5.39 million tonnes of paper and cardboard were collected in England and that 3.8 million tonnes was recycled which is a recovery rate of 70.6%. Industry estimates that overall in Britain over 70% of the fibre used in paper and cardboard production comes from paper collected for recycling by households and businesses. The rest is made up of imported virgin wood fibre from trees grown in sustainably managed and certified forests.

34. Given the environmental contributions trees and wood products can make, as well as the contributions they can make to the circular economy, these can only be increased if ways are found to increase the quantity of virgin wood fibre grown in Britain by planting more conifer trees. Even then there may be a dip in potential availability for a period until these trees can reach a size suitable for harvesting.

35. There is also a need to continue to focus on wood product innovation, and in finding operational and manufacturing efficiencies in the way British wood fibre is used as its availability is limited.

36. Given the scale and variety of demands for wood fibre, the prospects of its reduced domestic availability over the longer term will undoubtedly reduce the economic contributions that the domestic forest sector and wood energy industry can make in the future.

1. INTRODUCTION

1.1. Trees make an important contribution to mitigating climate change by storing carbon. When trees are harvested the carbon is stored in the products that are made from these trees and, when wood products are used instead of other energy intensive products, there is a further climate benefit. The sector is therefore very well placed to help the UK to reach its Net Zero climate target by 2050 – or in the case of Scotland, its target by 2045.

This Study

1.2. This independent report presents the findings of an analysis of potential wood fibre availability and demand in England, Scotland & Wales over the next 20 years, including the way wood fibre is contributing to the circular economy in Britain. It has been commissioned by the Confederation of Forest Industries (Confor) and supported by the Wood Panel Industries Federation (WPIF), Scottish Forestry (SF) and the Forestry Commission with funding provided by a number of companies in the sector.

1.3. Understanding the potential wood fibre availability and demand has always been very important for companies in the forest sector, and for policy makers in GB. Of major concern for existing wood processing companies in the sector at the time of previous analyses[1][2][3] were the financial incentives that were first offered in 2002 by Governments in GB to encourage the greater use of renewable sources of energy. Incentives were put in place to encourage the installation of biomass boilers of all sizes for heating buildings and generating electricity as biomass was considered to be a renewable natural resource. They generated a significant amount of interest at the time and numerous biomass boilers were installed and a number of other proposals reached the design stage. The forest industry in GB knew that wood fibre availability was limited and it had major concerns about whether there would be sufficient wood fibre available to supply all the existing and proposed biomass plants, in addition to existing markets, if they all went ahead as planned. Some displacement impacts were starting to become apparent both in terms of price and fibre availability, particularly where wood fibre was geographically limited. Changes in energy policy started around 2010 and these resulted in the incentives for biomass use being gradually re-targeted, and reduced. Biomass remains an important and significant fuel type for generating heat and electricity, but awareness of the limited availability of wood fibre has restricted its further expansion.

1.4. However political and public concerns have continued to increase over the need to mitigate the effects of climate change, and in some cases to meet a legal requirement to reach certain carbon targets. The search to find ways to do this has resulted in a significantly increased awareness of the important role that trees, woods and forests can play in doing this, and also an awareness in the way that carbon can be locked up in some wood products, such as in construction products, over long periods while they are in use. (2022 Progress Report to Parliament - Climate Change Committee (theccc.org.uk) Chapter 8). Growing trees in Britain, and converting them into these products is contributing significantly to the rural economy and to the provision of jobs.

1.5. Virgin wood fibre provided by trees has been traditionally converted into products such as

[1] John Clegg Consulting Ltd, 2006: Forecast Wood Fibre Availability & Demand in Scotland & Northern England (Parts 1 & 2)

[2] John Clegg Consulting Ltd, 2010: Wood Fibre Availability & Demand in Britain 2007 – 2025

[3] John Clegg Consulting Ltd, 2016: Wood Fibre Availability & Demand in Britain 2013–2035

sawn timber, panelboard, paper, pallets and packaging, fencing and furniture products. Sawn timber and panel board products are materials that are widely used in the building and furniture industries. Innovations, such as engineered wood products and combining the use of wood with off-site construction methods in the forest sector are widening both these products appeal and their uses.

1.6. Life cycle analysis has shown that wood products have a much lower carbon footprint than many other products with which they compete, and the wood fibre in many wood products can potentially also be reused and recycled when the end of their initial life comes. The positive environmental profile of wood products means they are becoming increasingly attractive products to use.

1.7. As a material, wood has traditionally been used in its solid form, for example, either by cutting it up and using it in various forms such as sawn timber, furniture or panelboard products, or by separating it into fibres and reforming it into various paper and packaging products. Increasing attention, mostly overseas, is now being directed at the chemical composition of wood (predominantly cellulose, hemi-cellulose and lignin) and to identifying what the opportunities are to make compounds and products from it such as ethanol, vanillin and nano-cellulose. Although this type of research is at an early stage, some of the findings suggest that in the long term wood could provide some new high value products.

1.8. This means that there is likely to be an increased demand for all types of wood products over time in GB, and globally, given the timescales for combating climate change. At present Britain only produces about 20% of the virgin wood fibre it is presently using. This virgin wood fibre comes from the roundwood or logs harvested annually from Britain's forests and woods and so it is particularly important to understand the potentially available virgin wood fibre and demand situation that exists in GB now and over the next 25 years.

1.9. There have been some significant developments affecting the potential future availability of virgin wood fibre from Britain's forests and woods and also in the potential demand for it since the last analysis in 2016. The most significant of which are:

- A new report called '25 year forecast of softwood timber availability (2022)' was released by the National Forest Inventory team in August 2022. The assumptions and information on which the 2022 forecast is based are different to those the NFI team used to prepare their forecast in 2016. The previous forecast had indicated that potential availability of coniferous roundwood in Britain would be starting to fall in about 2030. Considered in isolation, a reduction in potential availability need not necessarily be a matter of major concern, other than a potential loss of economic opportunities, but it could be if the potential demand for wood fibre exceeds supply at that point and the situation continues. Without knowing the likely future scale of demand for wood fibre, the seriousness of the situation, and when it might occur, cannot be properly assessed.

- Wood processing companies in the forest sector have made investments in new equipment and processing lines over the last 5 years, and some have plans for future expansion, so they need to have an up-to-date understanding of future wood fibre availability for their operations if they are to proceed with their investment plans.

- There are a few new companies from outside the forest sector who from time to time are interested in developing new products and processes using wood fibre. Rather than assuming there are limitless amounts of wood fibre available, it is important for them to know what the potential availability and demand for wood fibre is both in terms of quantity and type, and when deciding where they might locate their operations.

- Awareness has increased that Britain may be getting closer to reaching the limits of the availability of coniferous roundwood and other wood fibre grown in Britain and, if

this is so, what is the best way to use any remaining additional wood fibre that is potentially available over the next 25 years and what are the implications for existing users?

1.10. As Britain only produces about 20% of its wood fibre requirements it is important to use the virgin wood fibre from Britain's forest and woods, and the wood fibre Britain imports, as efficiently as possible and this report also identifies how wood fibre is being used in, and is contributing to, Britain's circular economy.

1.11. The wood fibre market is developing, and is expected to continue to develop, into an increasingly complex and inter-linked set of different markets that includes the importation of wood fibre in various forms from overseas.

Definitions Used in the Report

1.12. In this report "wood fibre" is defined and used in this report in three different ways:

Virgin Wood Fibre: In this report this term covers wood fibre that originates from trees and other plants producing 'wood fibre'. In woodlands this has included using forest residues and stumps, and in managing woods in less traditional ways such as Short Rotation Forestry (SRF). Different ways of sourcing wood fibre outside woods and forests have included establishing Short Rotation Coppice (SRC) crops on land previously used for agriculture and collecting more parts of trees that are pruned or felled as part of arboricultural work in urban areas.

Reused Wood Fibre: This is wood fibre put to the same or different use after it has fulfilled its original function. In other words the original form of the product does not change.

Recycled Wood Fibre: Wood fibre is turned into a new potentially useful material after it has been used thus reducing waste. The word recycled is often used interchangeably, but incorrectly, with the term recovered wood.

1.13. It is important to recognise that coniferous sawmill products also comprise virgin wood fibre and are not a separate additional source of wood fibre in Britain as they come directly as a result of sawing or chipping coniferous roundwood grown in Britain into pieces of timber. Strictly speaking this wood fibre is therefore already included in the wood fibre potentially available from round logs presented in this report and not additional to it. Similarly recycled or recovered wood is simply re-using existing wood fibre rather than being an additional new source of wood fibre. Ultimately the available wood fibre for users is obtained either by growing roundwood, or other sources of wood fibre in this country, or importing it. These other fibre sources, and their supply chains are presented in this report as separate fibre sources. This is to provide a more complete picture as they are either an important source of income for producers, or an important source of fibre to users, irrespective of where the fibre comes from.

Wood Energy Plants: For the purposes of this report wood pellet plants and wood fired energy plants that produce heat and / or electricity have all been categorised under the general heading of 'wood energy plants'.

Impact of Prices

1.14. The wood fibre market is very dynamic and it therefore responds fairly quickly to changes in wood fibre availability and demand through the price mechanism. This report presents an essentially static assessment of future potential availability of wood fibre and demand that has been shaped by the economic conditions and assessments of the future situation that existed during 2022. For example, if the value of Sterling changes adversely to other currencies, or a new market opens up in Great Britain where the user is prepared to pay significantly more for

roundwood or sawmill products, then, say, the present exports of logs to Ireland and Scandinavia could cease. If that happened there would be a slightly greater volume of roundwood available for utilisation in Great Britain. Relative changes in the prices of different types of wood fibre may also result in their utilisation patterns changing where this is technically possible.

1.15. Some wood processing and wood energy plants are already using, for example, a mix of coniferous roundwood and sawmill products as well as recycled wood. Other wood energy plants are using arboricultural arisings and forest residues, as well as recycled wood. In this report we have used the quantities of the different wood fibre mixes that companies have indicated. In practice the mix of wood fibre used may well change depending on the availability of the different fibre sources and their costs at any particular point in time. The figures for the amount of coniferous roundwood used by wood energy plant may not therefore precisely match those used in the forecast given in this report.

Coverage of the Report & Confidentiality

1.16. The report covers 138 existing plants or planned developments in the wood processing and energy sectors by 94 companies. All companies approached in the forest sector contributed information with some providing more information than others. Information on the energy sector's uses of wood fibre were obtained mostly from Ofgem datasets[4].

1.17. The report has benefitted from the confidential views and observations very kindly provided by a number of these companies. An undertaking was given to them all that any information provided for this study would only be presented once aggregated so that commercially confidential information about any individual business could not be identified. Where necessary we have adjusted boundaries or restricted details to ensure this happens.

Methodology

1.18. The methodology that has been used in undertaking this study is explained in section 17 in the annex to this report.

Acknowledgements

1.19. This report aims, with the help of many contributors, to provide as accurate assessment of the potential wood fibre availability and demand for virgin wood fibre in Britain as possible over the next 25 years. It's value depended on obtaining comprehensive information on the present and future demand and production of coniferous roundwood and sawmill products from existing businesses in the forest sector, from some companies involved with biomass as a user or supplier and some potential new users of wood fibre. The responses to our request for information has been outstanding and we would like to thank all the businesses for their help and co-operation which we have greatly appreciated. Their support has meant that a fairly accurate assessment of present and future demand for virgin wood fibre produced in Britain is presented in this report.

1.20. We would especially like to thank Stuart Goodall and Andy Leitch of Confor and Alastair Kerr (WPIF) for their support throughout the study and for their subsequent comments on the draft of the final report.

[4] Biomass Sustainability Dataset 2020-21 | Ofgem

2. SOURCES OF VIRGIN FIBRE IN BRITAIN

2.1.This report is concerned with the potential availability and demand for virgin wood fibre in Britain and how wood fibre is being used in, and contributing to, Britain's circular economy. This section identifies what the sources of virgin wood fibre are for Britain's domestic forest industry.

Domestic Sources of Virgin Wood Fibre

2.2.The main source of supplies of virgin wood fibre in Britain comes from the trees that are harvested annually from the forests and woods in Britain. Chart 2.1 shows the species composition and ownership of the woods and forests in Britain from which the wood fibre comes.

Table 2.1: Species Composition and Ownership of Woods in England, Scotland and Wales in 2022

'000 hectares

	Conifers	Broadleaves	Total Woodland
FE/FLS/NRW			
England	151	62	214
Wales	96	19	115
Scotland	426	42	467
Private			
England	192	918	1,109
Wales	56	140	196
Scotland	666	353	1,019
All Woodland			
England	343	980	1,323
Wales	152	159	310
Scotland	1,092	395	1,486
GB	**1,587**	**1,534**	**3,121**

Source: Forestry Facts & Figures. Forestry Research, 2022.

2.3.The three important points to note from this chart, which underlie the findings in this report, are:

- There are about equal areas of conifers and broadleaved trees in Britain's woods, but the wood fibre from coniferous trees is very different to that from broadleaved trees and there are also differences between species in these two categories.
- The majority of the virgin wood fibre produced in Britain comes from Britain's coniferous woodlands
- The majority of the coniferous woods in Britain are in Scotland.

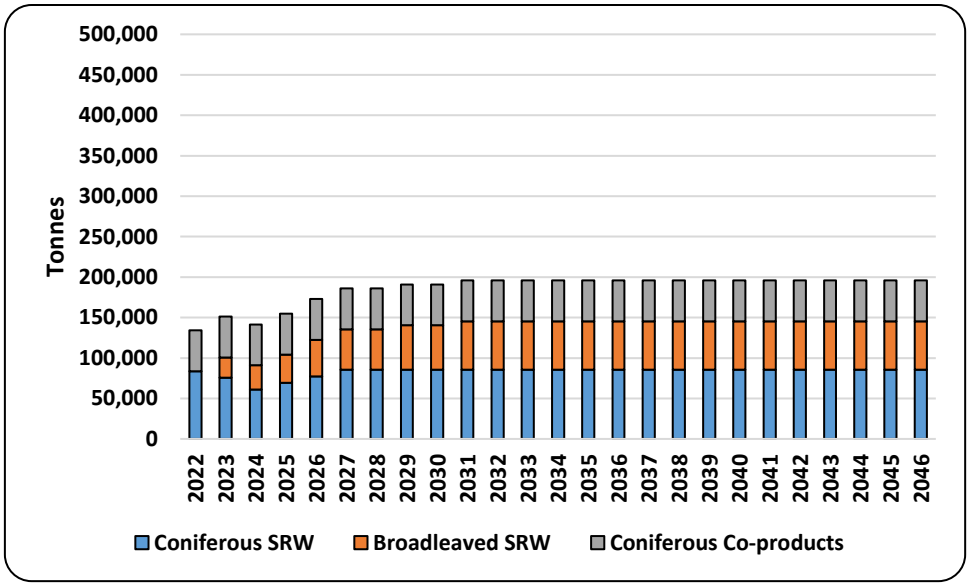
Imports of Virgin Wood Fibre as Coniferous Roundwood

2.4.In addition to the virgin wood fibre coming from Britain's woods and forests annually through roundwood harvesting, a few processing companies within Britain's forest sector are importing, and plan to continue to import a relatively small quantity of coniferous and broadleaved virgin wood fibre in the form of logs and sawmill co-products from countries in the EU. Increased log imports have occurred from time to time in the past, subject to Plant

Health Regulations, when there have been log surpluses in continental Europe, such as following major storm damage.

2.5.Imports of logs that must be bark free to meet phytosanitary standards will add to the total potential availability of virgin wood fibre in Britain as chart 2.1 shows.

Chart 2.1: Total Quantity of Virgin Wood Fibre that Companies in the Forest Sector in Britain Plan to Import up to 2046



2.6.These figures exclude imports of wood pellets that are used mainly by electricity generators, which amounted to about 7.5 million tonnes in 2021. Further details on the biomass used by the larger companies that generate either electricity and / or heat are given in section 19.

2.7.There are also small quantities of kiln dried firewood being imported into Britain from Eastern Europe to supply the domestic firewood market. These figures are not included in Chart 2.1.

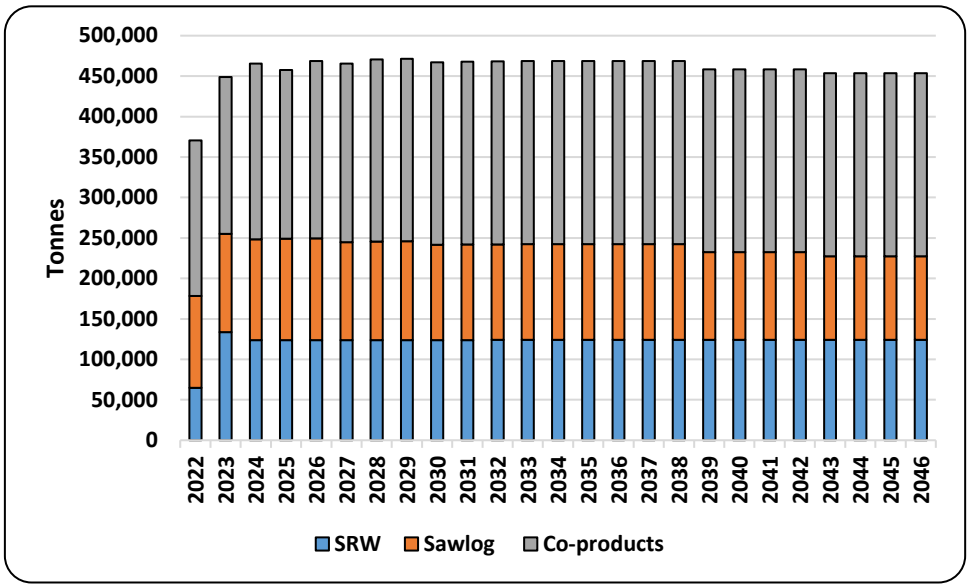
Exports of Virgin Wood Fibre Grown in Britain

2.8.Over the last 20 years or so there have been small but varying quantities of coniferous SRW exported from Scotland to Scandinavia for pulp and paper making, because of its excellent fibre quality and more recently small quantities of coniferous SRW have been exported to mainland Europe mainly for panelboard production. Over the last ten years coniferous sawlogs have also been exported to Ireland from Scotland.

2.9.There are seven companies that have exported, or plan, to export logs from Britain. Although the companies involved in exporting expect to continue to do so over the next 20 years, this is likely to depend on prices, and the duration and terms of their supply contracts. Chart 2.2 shows the total quantity of virgin wood fibre that these seven companies anticipate exporting.

2.10.Small quantities of high quality hardwood logs have been exported to mainland Europe over many years as well, but these quantities are not included in the figures in Chart 2.2.

Chart 2.2 Total Quantity of Virgin Coniferous Wood Fibre that Companies in the Forest Sector in Britain Plan to Export to Various EU Countries up to 2046



2.11. Most of the coniferous roundwood exports have been sourced and are expected to continue to be sourced from central and northern Scotland.

Net Exports of Virgin Wood Fibre as Coniferous Roundwood

2.12. Overall, after allowing for planned exports and imports of virgin fibre, the net availability of virgin wood fibre for processing by the forest sector or generating energy in Britain could be some 250,000 tonnes per annum less than the total forecast potential availability from Britain's forests and woods if these forecasts of net exports are realised.

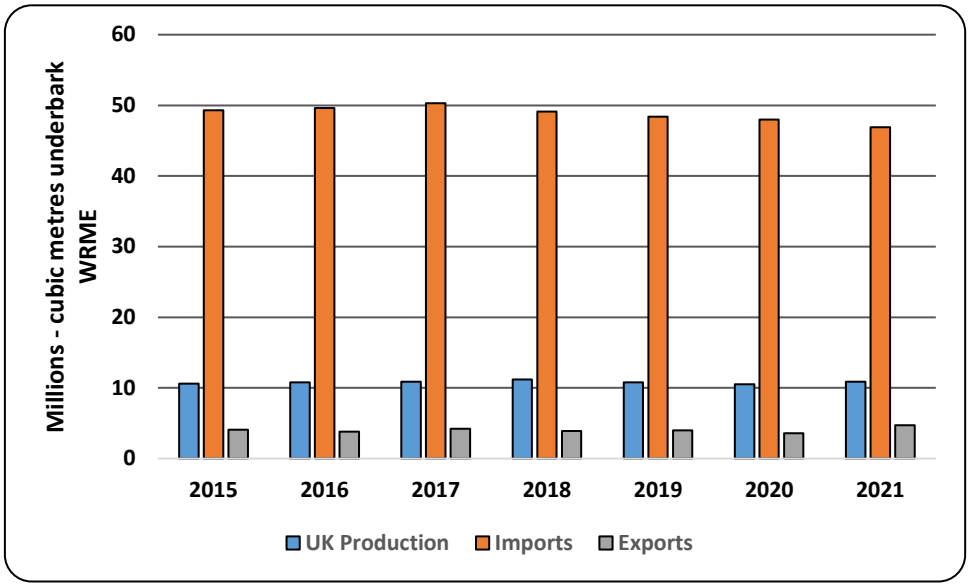
Imports of Virgin Wood Fibre in Imported Processed Wood Products

2.13. Britain has long been part of the international trade in wood and wood products that has involved mainly processed products such as sawn timber, pulp and paper and panel board products. At present the UK is the second largest net importer of forest products in the world. Most of these imported products are made from virgin fibre so Britain also imports a significant volume of virgin wood fibre in all these other wood and wood products. These products are made from trees grown and harvested in other countries around the world.

2.14. To obtain some measure of the total quantity of virgin wood fibre used, as well as the quantity being imported and exported into the UK annually by people and industries, all the different physical types of wood products imported into Britain can be converted to a wood raw material equivalent (WMRE) under bark basis using a number of different conversion factors. Apparent production is calculated as total domestic production plus imports, minus exports. Apparent consumption differs from actual consumption by the extent of changes in the level of stocks. It is not practical to collect information on actual consumption.

2.15. In 2021 the UK's apparent consumption of wood was 53.1 million cubic metres WMRE under bark. Chart 2.3 shows the apparent consumption of wood in the UK, excluding recovered paper, from 2015 to 2021. These figures will include the volumes of virgin wood fibre that have been exported and imported into the UK over this period in the form of logs and sawmill co-products by the British forest industry identified in this section.

Chart 2.3 Apparent Consumption of Wood in the UK 2015 – 2021 Converted to Wood Raw Material Equivalence



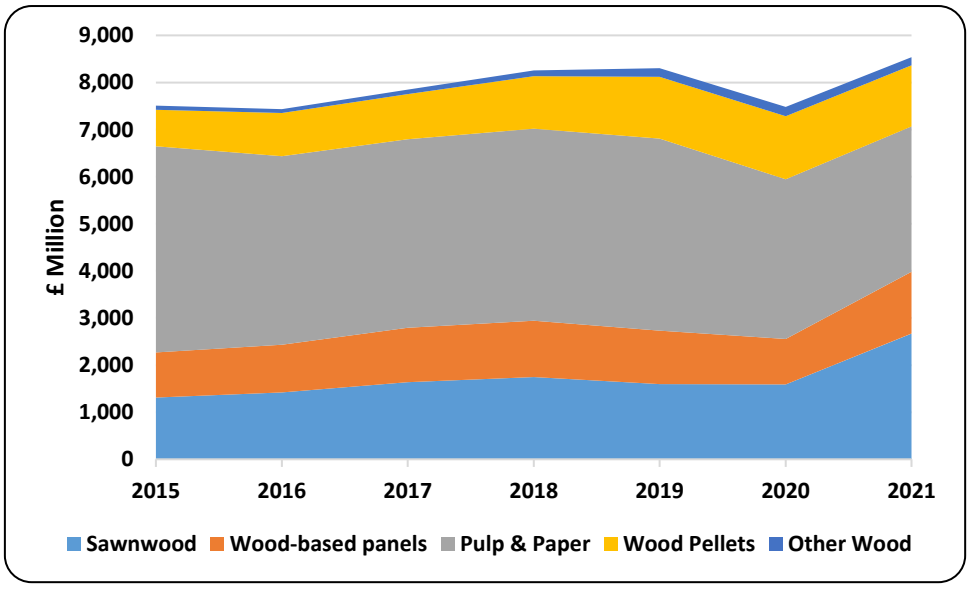
Source: Forestry Statistics 2022

2.16.The chart shows that the UK, and therefore Britain, is highly dependent on importing wood and wood products made with virgin wood fibre from other countries where the trees are grown and converted into a variety of wood and wood products.

2.17.In spite of the significant environmental benefits of using wood and wood products, the UK only produces some 20% of its virgin fibre wood needs from its own woods and forests.

2.18.The composition and size of these imports, by value, are shown in chart 2.4.

Chart 2.4 The Value of the UK's Imports of Processed Wood & Wood Products 2015 – 2021



Source Forestry Statistics, 2022

2.19.Information is not available to separate out the value of Britain's imports from those of the UK as a whole.

2.20.Given Britain's obvious dependence for wood fibre imports, Britain must maximise it's production of virgin wood fibre and ensure that this virgin wood fibre, and the wood fibre it imports, is reused and recycled as effectively and efficiently as possible.

BRITAIN'S POTENTIAL AVAILABILITY & DEMAND FOR VIRGIN WOOD FIBRE

3. CONIFEROUS ROUNDWOOD POTENTIAL AVAILABILITY & FORECAST DEMAND IN BRITAIN

3.1. Britain only produces about 20% of the virgin wood fibre it presently uses each year. This section provides information on the potential availability of the coniferous roundwood, which is the principal source of virgin wood fibre in Britain, and the demand for it. The quantities of virgin wood fibre being imported and exported identified in section 2 are included in the graphs in the main part of the report, and in the sections in the annex. They are categorised as 'existing use' as the companies involved are all well established in the forest sector.

3.2. The forecasts of potential availability do not take into account the issue of whether the coniferous roundwood that is potentially available is from woodlands that are certified under the UK Woodland Assurance Standard (UKWAS). This is an important issue for companies that are already committed to meet the required environmental standards.

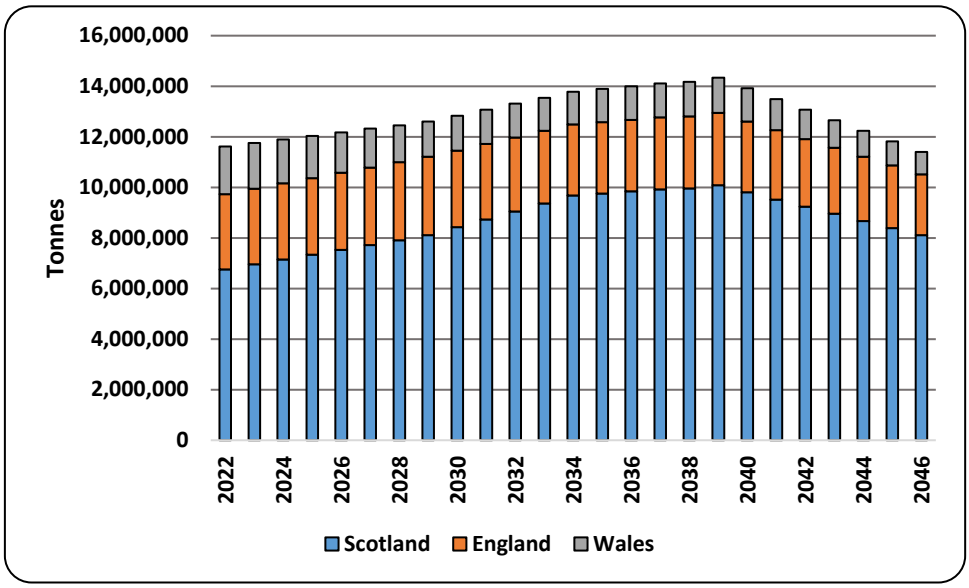
3.3. The percentage of private sector softwood removals that are certified has fluctuated over recent years; industry experts have indicated a general reduction in the level of certification amongst smaller estates and an increase in production from larger estates. 71% of private sector softwood removals in 2021 in the UK were from certified woodlands. As nearly all removals from Forest Enterprise, Forestry and Land Scotland and Natural Resources Wales woodlands are certified, this equates to around 82% of all softwood removals in 2021 from certified sources. 77% of sawmills' roundwood consumption in 2021 was certified. For round fencing manufacturers, 68% of total softwood consumption was certified (Forestry Statistics 2022).

3.4. A further very important issue that is not taken into account in the Forest Research's roundwood availability forecasts included in this report is the quality of the coniferous roundwood that is potentially available. This is of particular concern to companies who are operating sawmills who generally require straight logs with low numbers of small diameter branches. The quality of the roundwood with a t.e.d of 16 cm or more that is forecast to be potentially available may not be as large as indicated because the quality may not be good enough. However, these logs will still be suitable for some other uses such as woodfuel or for chipping.

Forecast Coniferous Roundwood Potential Availability in Britain

3.5. The forecast potential availability of coniferous roundwood in Britain by countries is given in Chart 3.1.

Chart 3.1: Coniferous Roundwood: Total Forecast Potential Availability in Britain by Countries 2022 – 2046



Source: Forest Research, 2022

3.6.The chart shows that potential availability of coniferous roundwood is forecast to steadily increase in Britain up to about 2039. Almost all this increase in potential availability is forecast to come from the woods and forests in Scotland. Potential availability of coniferous roundwood in England and Wales slowly diminishes up to 2039 and then falls away as does the potential availability of coniferous logs in Scotland until 2046.

3.7.However it is very important to understand and recognise the following in looking at the information in the chart:

- The graph shows the forecast of 'potential availability' of coniferous roundwood and not forecast 'roundwood production'. The difference is very important (see section 18). The majority of this potentially available coniferous roundwood is in private sector ownership. This means that the roundwood is expected to come from woods in a multitude of different ownerships who may have a variety of different objectives in managing their woods other than just timber production.

- There are significant differences in the potential availability and demand balance for coniferous roundwood geographically within Britain. In some zones, such as Central Scotland, potential availability of coniferous roundwood exceeds demand from industries based in Central Scotland, even allowing for logs being transported from Central Scotland for processing elsewhere. In other parts of Britain, such as South Scotland, local demand exceed the potential availability of coniferous roundwood and therefore roundwood is transported from other geographical areas to meet that demand. More detailed analyses are provided in sections 20 to 28.

- The significant differences geographically in the availability of coniferous roundwood in England, Scotland and Wales has shaped the development of the forest industries in these countries.

3.8.The forecast reduction of coniferous roundwood availability after 2039 is a result of significantly reduced areas of new planting of conifers from the 1980s onwards and changes in forestry practices such as planting more broadleaved trees and leaving larger areas unplanted and using more broadleaves for landscape reasons.

3.9.This forecast reduction in potential availability means that the sector's contributions to climate change and to Britain's economy will fall unless further planting of conifers takes place.

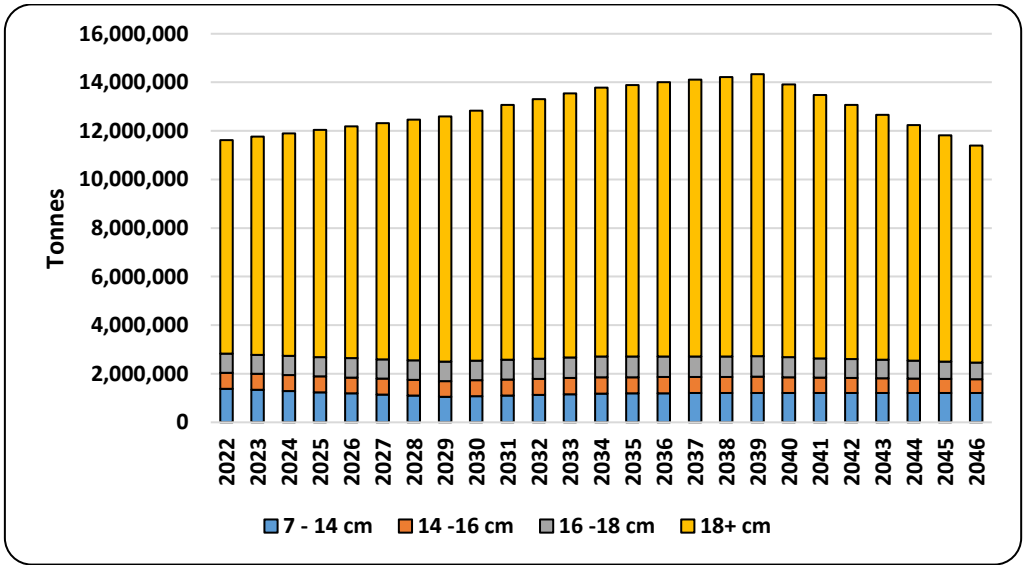
Forecast Size Composition of Coniferous Roundwood

3.10.In the past the sizes of the coniferous roundwood logs that were potentially available were quite wide reflecting the age structure of the coniferous woods in Britain, but as the woods have grown older reflecting past patterns of planting, more trees are now producing sawlog sized material.

3.11.The size of logs used to have an important influence on how they were used, and on their price, with the smaller diameter logs generally fetching a lower price than larger diameter logs, but investment and innovation have meant that companies are able to use a much wider range of log sizes than they were in the past. Logs with a top diameter of less than 16cm, which were frequently called Small Roundwood (SRW), were mostly used by roundwood fencing providers, the panelboard industry and energy plants. Roundwood that has a top diameter of 16 cm or more tended to be used primarily by the sawmilling industry, but these size categories are becoming much less important for many businesses.

3.12. The sizes of the coniferous roundwood that are forecast to become available over the next 25 years are shown in chart 3.2.

Chart 3.2: Coniferous Roundwood: Total Forecast Potential Availability by Size Categories in Britain 2022 – 2046



Source: Forest Research, 2022

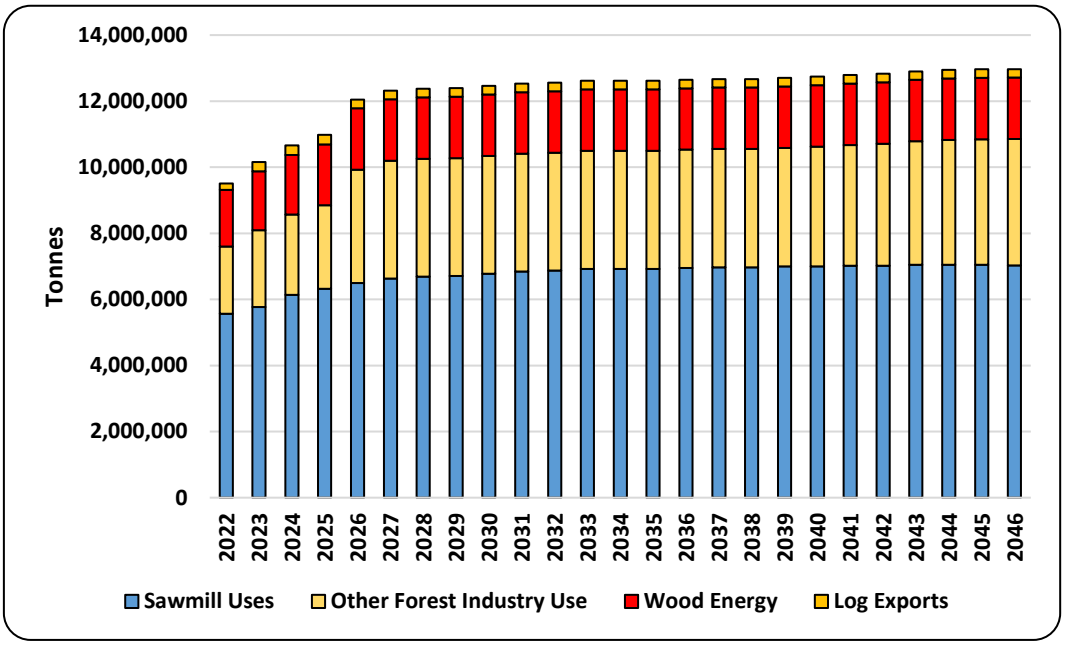
3.13.The chart shows that the quantity of roundwood logs that are forecast to become available over the next 25 years with a top end diameter of 16 cms or less remains relatively constant at about 2 million tonnes per annum. Logs with a top end diameter of 16 cms or more make up the majority of the quantity and that quantity is expected to grow up until 2039. This means that prices and not processing technology are more likely to be the main determinant of roundwood end uses in future.

FORECAST DEMAND FOR CONIFEROUS ROUNDWOOD IN BRITAIN

3.14.The structure of the wood processing sector in Britain has been, and is continuing to change with some companies investing significantly in new plant and equipment, while others are re-shaping their businesses and some medium to small sawmill have closed.

3.15.The forecast demand for coniferous roundwood for different end uses obtained from survey responses and Ofgem statistics is given in chart 3.3.

Chart 3.3: Forecast Demand for Coniferous Roundwood in Britain by End Uses



Source: Survey data

3.16.The chart shows that demand for coniferous roundwood is forecast to increase by over 2 million tonnes per annum up to 2026 with a small increase in demand from sawmilling businesses, but a much larger increase in demand from other forest industry users of which the most significant will be the panelboard users. Use of coniferous roundwood for energy production is forecast to remain fairly constant.

3.17.There are two important points to note in looking at chart 3.3:

- The forecast demand for coniferous roundwood by different categories of end uses shown by the chart depends on present policies that influence the use, reuse and recycling of wood fibre remaining the same, and the availability and prices for recycled wood also remaining broadly unchanged. Higher prices or reduced availability of recycled secondary fibre could result in the panelboard and biomass users changing the wood fibre mix they require and this might result in them increasing their use of coniferous roundwood.

- There are a few companies in Britain that are presently exploring the possibility of using coniferous roundwood for producing biochemicals and related products. No allowance has been made for any conifer roundwood they may require.

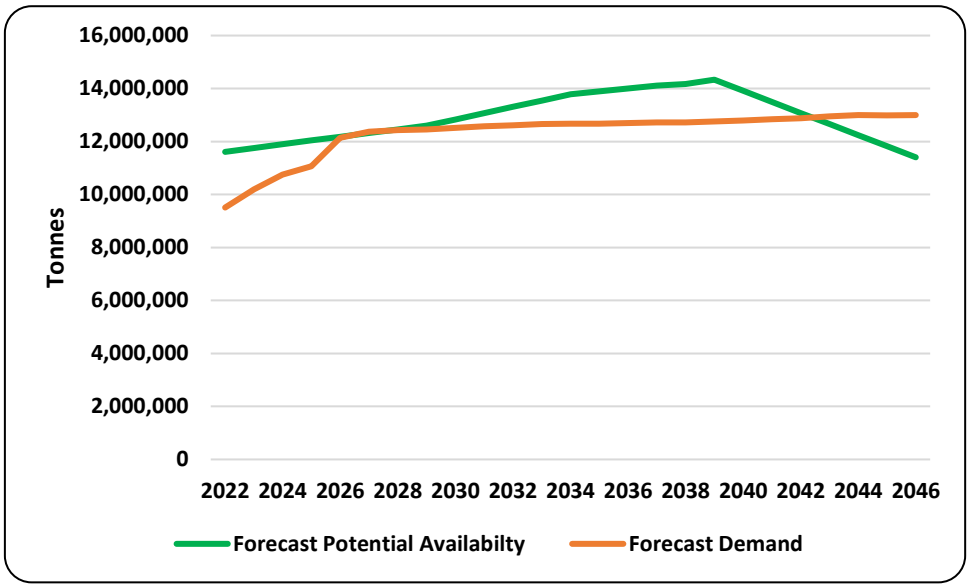
3.18.The estimated amount of coniferous roundwood being used for energy production in chart 3.3 is higher than the Ofgem statistics indicate (table 19.1). This is because the figures in chart 3.3 include the coniferous roundwood used by companies producing pellets in Britain as well as some smaller suppliers of wood chips for biomass boilers in commercial premises and houses.

FORECAST POTENTIAL AVAILABILITY & DEMAND BALANCE FOR CONIFEROUS ROUNDWOOD IN BRITAIN

3.19.The forecast potential availability and demand for coniferous roundwood in Britain is

shown in chart 3.4 using the data underlying charts 3.1 and 3.3.

Chart 3.4: Forecast Potential Availability and Demand Balance for Coniferous Roundwood in Britain 2022 – 2046



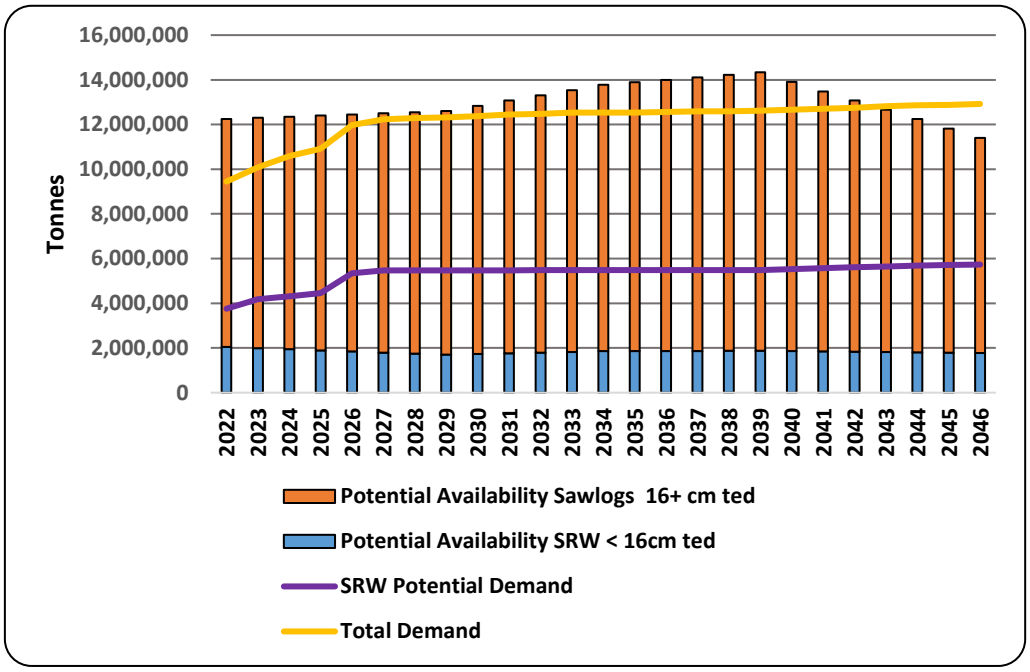
Source: Forest Research, 2022 and Survey data

3.20.The chart shows that forecast potential availability of roundwood exceeds forecast demand in Britain for the next 3 years. Demand for coniferous roundwood is then forecast to grow significantly and will match potential availability for about the next 5 years, after which there will be a period when potential availability of coniferous roundwood will exceed forecast demand before dropping below demand. However, there are some very important caveats to note in drawing any conclusions about the quantity of coniferous roundwood potentially available for further processing in Britain over the next 25 years, or the potential availability of coniferous roundwood for individual businesses, or at particular wood processing sites. These caveats were given in para 3.8 in relation to the forecast potential availability of coniferous roundwood and in para 3.17 in relation to potential demand.

3.21.Longer term the concerns for coniferous roundwood users will be the start of a significant forecast reduction in the potential availability of coniferous roundwood relative to demand in about 2040, and the situation in about 2046 when 'potential availability' of coniferous roundwood is forecast to match demand. This will also reduce the contributions that the sector can make to climate change and will require Britain to depend on an increasing level of imports of wood and wood products from conifer woods in other countries.

3.22.The future growth in coniferous roundwood availability is forecast to be in roundwood logs with a t.e.d of 16 cm or more roundwood and not in the availability of coniferous roundwood with t.e.d of less than 16 cm as is shown in chart 3.5.

Chart 3.5: Forecast Potential Availability and Demand for Coniferous Roundwood in Britain by Size Categories 2022 – 2046



Source: Forest Research, 2022 and Survey data

3.23. .The chart also shows that the forecast demand for logs of 16 cm or less t.e.d already exceeds their potential availability and demand is expected to increase further over the next few years if all the planned developments proceed.

3.24.The potential availability forecast is based on a target average stand diameter of 30cms following discussions with the sawmilling sector. The application of the UK Forest Standard requires that forests characterised by a lack of diversity due to extensive areas of even-aged trees, requires stands to be retained in adjoining felled areas until the restocking of the first coupe has reached a minimum height of 2 m; for planning purposes this is likely to be between 5 and 15 years depending on establishment success and growth rates. The practical consequence of applying the Standard is that the average diameter of trees in stands is rising above 30 cms. (see Chart 3.2). This increase in average diameter of trees coming to market is reported to be beginning to have impact on the harvesting and utilisation of sawlogs, and potentially on future windthrow liability as the trees reach a taller height.

4. CONIFEROUS SAWMILL PRODUCTS POTENTIAL AVAILABILITY & FORECAST DEMAND IN BRITAIN

4.1.Sawmills processing coniferous logs produce wood chips, sawdust, pin chips, shavings, slab wood and bark in addition to sawn timber and these products play a significant part in the wood fibre supply chain for a number of companies and end uses. All these products come from sawlogs and end up comprising some 40% to 55% of a log, depending on the log size and shape and the sawmilling equipment being used; the rest being sawn timber. They can all be regarded as virgin fibre with the exception of bark.

4.2.For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber. *It is important to note that these products are not an additional source of wood fibre to coniferous roundwood as they are*

derived from coniferous roundwood whose potential availability and demand was analysed in section 3. Their potential availability depends almost entirely on the potential availability of logs.

4.3. The type of co-product will determine its potential end use market:

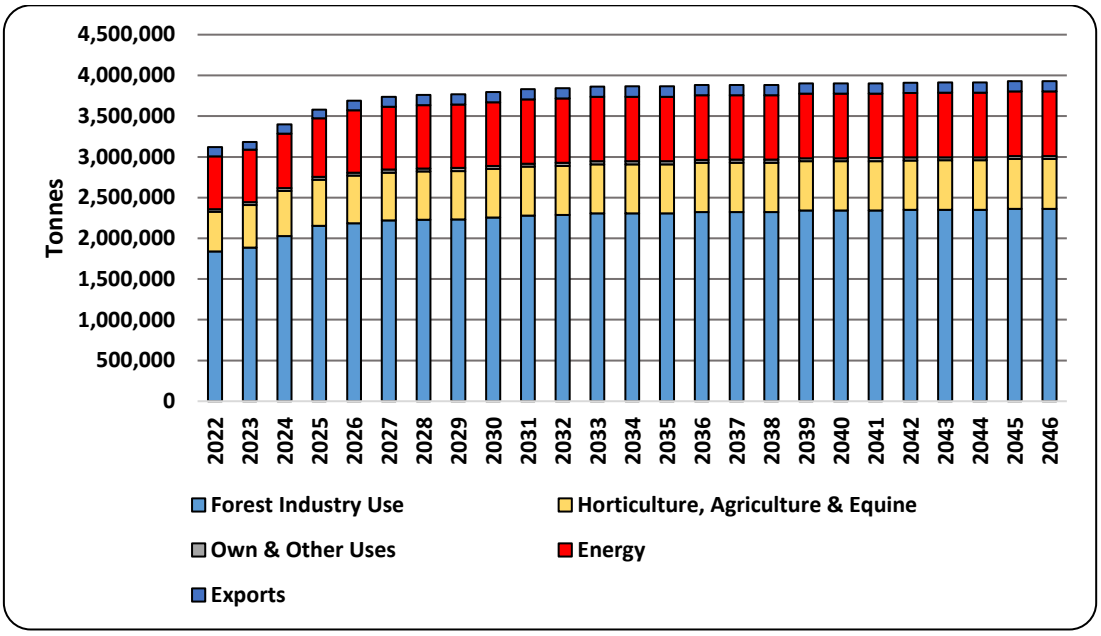
- Bark: Horticultural uses, but is sometimes burnt as a fuel.
- Chips: Panelboard & pulp mills, animal bedding or energy plants
- Wet sawdust/ pin chips: Board and pulp mills, agriculture or energy plants
- Dry sawdust / shavings: Board mills but predominantly energy plants
- Slab wood: Board mills and energy plants

4.4. All the larger sawmills have an accurate record of the co-products they produce and which end uses they go to as they negotiate prices and quantities with particular buyers. The situation is different with small sawmills who enter a contract with a contractor to take all their undifferentiated co-products on a regular basis. The contractor sells the co-products on to one of their customers. The smaller sawmills are therefore not in a position to know exactly where their co-products end up, but many had some idea what the main use was and that information has been used in presenting the information on sawmill co-products in this section.

4.5. Very small quantities of sawmill products are imported but these quantities are not significant enough to be included in any graphs.

4.6. The potential availability and expected end uses of sawmill products within Britain based on survey information provided by 77 sawmills in Britain is given in chart 4.1. However it is important to recognise that this pattern of end use depends on present policies affecting wood fibre use remaining unchanged, as well as prices and availability of other sources of wood fibre. If the panelboard or wood energy users are unable to obtain the quantity of recycled wood or logs they require for their fibre mix, then the pattern of end use shown in chart 4.1 could change.

Chart 4.1: Sawmills' Present and Expected Future Uses of Coniferous Sawmill Products in Britain to 2046



Source: Survey data

4.7. The overall quantity of sawmill co-products shown in chart 4.1 is approximately half of the quantity of logs used by the sawmilling industry which is in line with industry expectations while recognising that some sawmill lines will have a high log conversion factor and others may have a lower one.

4.8. The use of sawmill products for making panelboards and paper, which amounts to some 2 million tonnes per annum, tends to be more important in Scotland, North of England and Wales where the panel board and pulp & paper mills are located.

4.9. The quantity of co-products going for energy production is forecast to be about 650,000 tonnes per annum which is slightly lower than the 900,000 tonnes per annum indicated by Ofgem's 2020 statistics (section 19).

4.10. Agricultural, horticultural, equestrian and other uses for sawmill products tend to be more important in the south and east of England zones and this survey suggest that in total the amount ending up for these purposes is approximately 450,000 tonnes per annum. This is approximately 100,000 tonnes per annum more than the WRA's estimated amount (table 13.1).

4.11. Although there are differences between the totals in the chart and those available from other sources, they are of a similar order of magnitude. Differences may arise from collecting the statistics in different ways and from comparing them with those for slightly different years.

Zonal Movement of Sawmill Co-Products

4.12. The potential availability of sawmill products within zones within each country varies and self-evidently reflects the size of the sawmilling industry in a particular zone, with more tending to occur where coniferous woods are located. More detailed analyses of the potential availability of co-products in a zone are provided in sections 20 - 28.

4.13. It is not possible to present any accurate data on sawmill product movement between zones because many sawmills are uncertain for what purpose some of their sawmill products

eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

4.14. Transport and logistics is a major element in moving some 3 to 3.7 million tonnes of sawmill co-products per year from producers to purchasers.

5. CONIFEROUS FOREST RESIDUES

5.1. The Government's past policy of providing financial incentives to encourage the use of biomass for the generation of energy and / or heat resulted in the a number of biomass plants being established. One of the possible fuels identified for use in these plants was coniferous forest residues.

5.2. Coniferous forest residues are the tops of the trees, branches, foliage and poor quality stems, collectively known as 'brash', that are left in the woodlands and forests after conifer trees are harvested. They are a potential source of virgin wood fibre and have been used as a woodfuel in Scandinavia for a number of years.

5.3. This section looks at the present use of virgin wood fibre in coniferous forest residues and their potential availability and possible demand over the next 20 years. Broadleaved forest residues are covered in section 7.

POTENTIAL CONIFEROUS FOREST RESIDUE AVAILABILITY

5.4. In theory the potential availability of forest 'brash' and stumps comes at the time of clearfelling trees and industry sources suggested that 'brash' can yield up to 75-100 tonnes of wood fibre per ha, and tree stumps about the same amount. The total potential availability of this material is therefore directly related to the size of the annual felling programme of conifers in Britain which is of the order of 25,000 hectares per annum.

5.5. The potential of using this material as a source of wood fuel for large electricity generators and CHP boilers was investigated about 10 years ago and a number of large scale trials were undertaken by commercial companies in the Britain in conjunction with the then Forestry Commission. While it was found that it was technically possible to harvest 'brash' and tree stumps, there were a number of environmental and commercial issues that would significantly limit its availability.

5.6. The most significant constraints are operational costs and environmental ones that Forest Research[5&6] identified as being:

- Ground damage
- Soil carbon loss
- Soil fertility
- Acidification

[5] Forest Research: 2009 Guidance on Site Selection for Brash Removal

[6] Forest Research, 2009: Stump Harvesting: Interim Guidance on Site Selection and Good Practice

5.7. These issues can be particularly sensitive in upland areas where most of the managed coniferous woodlands have been planted. There, the topography can be steep and the soils are often peats or peaty gleys and consequently environmental issues often make them unsuitable for brash and stump removal. As a result the contribution that forest residues can actually make to the supply of wood fibre in Britain compared with its potential availability is very much more limited than at first sight, although good site planning, management and harvesting practices can mitigate the impact that brash harvesting and stump extraction can have on some sites.

5.8. The guidance provided by Forest Research, based on work conducted by Tilhill Forestry Ltd, also suggested that the removal of both brash and tree stumps from the same site is unlikely to be acceptable for environmental reasons.

5.9. Operationally there are a number of practical issues connected with the handling and transporting of brash. The most practical way of doing so at the time was found to involve bundling the brash into bales which requires specialist equipment. This operation was usually done as part of the harvesting operation while the material was still green and flexible. Once in a bundle it can take some time for the material to dry out and the material at the centre dries more slowly than the other material which makes it less easy to control the efficiency with which the material is burnt, but this does not prevent its use. More recently a more practical way of collecting forest residues has been to bring the brash to the ride side and chip the material directly into a trailer.

5.10. Stump material once removed from a site has to be cleaned of soil and stones before use and it also has to be dried and chipped before it can be used as a fuel. This makes it a less attractive woodfuel compared with using brash.

5.11. Commercially there are costs associated with the harvesting and bundling of brash and some sites are also a long way geographically from where energy plants might be sited, so actual production may not make financial sense after allowing for transport costs.

5.12. It is not possible with the information available to be able to predict the size of the potential available forest residues, or their geographical location, as availability will be site specific. There is undoubtedly some potential for using them, but all the indications are that the availability is very much less than theoretical availability. While an increase in the price of woodfuel might lead to some increase in availability, the overall constraints in Britain will always be environmental ones.

EXISTING & FUTURE USE OF FOREST RESIDUES

5.13. Forest residues are really only suitable at present as a fuel in large-scale wood energy boilers. Seven companies are using forest residues as small parts of their biomass fuel mix to generate electricity and / or heat. **Based on Ofgem data a total of approximately 204,454 tonnes of forest residues were used by these companies in 2020 / 21**.

5.14. Where there are no technical limitations to wood energy plants using forest residues as a source of fuel, the scale of future use of forest residues as a wood fuel will depend on the relative prices of different sources of wood fibre.

5.15. The use of forest residues could increase if the price of woodfuel rises as forest residues would be a useful additional source of woodfuel. The potential of sites to provide wood fibre for wood energy from brash and stumps will be limited in practice by costs and environmental constraints such as ground damage, soil carbon loss, loss of soil fertility and acidification.

6. ARBORICULTURAL ARISINGS

6.1. Arboricultural arisings are defined for the purposes of this report as material that becomes available as a result of tree surgery in, for example, parks, streets, school grounds and private gardens and from site clearance for building, construction and road developments. This section looks at the potential annual availability of arboricultural arisings and makes an estimate of their use for energy production based on the findings of this study.

6.2. This material is suitable for wood energy production using appropriately designed boilers, but is not suitable for panelboard production.

SOURCES & USES FOR ARBORICULTURAL ARISINGS

6.3. The main catchments for arboricultural arisings are the urban areas such as the Central Belt of Scotland, Manchester, Liverpool, Newcastle, Birmingham and London. The responsibility for managing civic amenity sites is often sub-contracted out by Councils to waste management or environmental service companies.

6.4. Historically most arboricultural arisings were sent to landfill sites or were chipped and spread around the site. Arboricultural contractors are frequently required to dispose of the arisings that come about from their tree surgery work as a condition of being awarded a contract. Many have therefore developed local markets in order to minimise the cost of transporting material. Stems and the larger branches are often used to supply a local household firewood market. Smaller material is often converted to a mulch or used for surfacing paths. Some is now being used as a fuel for energy production.

ESTIMATED POTENTIAL AVAILABILITY

6.5. There has been no recent work on the potential annual availability of wood fibre biomass from arboricultural arisings so the only available data relates to work carried out by Helen McKay in 2003. The data was collected in a survey of arboricultural companies, tree officers and local authorities, and the results for England, Scotland and Wales are given in table 6.1. Although the data relates to 2003, there is no obvious reason to suggest that these figures will not be equally applicable in 2022.

6.6. The report gave estimates in oven dry tonnes per annum, but the figures in the table have been doubled to bring them to an equivalent green tonnes to make them more comparable with roundwood and forest residue volumes given elsewhere in this report.

Table 6.1: Estimated Potential Availability of Arboricultural Arisings in England, Scotland & Wales in 2003 in tonnes per annum

Country	Arboricultural Contractor Arisings	Collected Arisings	Utility Work Arisings	Total
England	890,050	319,670	22,400	1,232,120
Scotland	32,292	25,742	11,400	69,434
Wales	22,000	12,012	5,400	39,412
TOTAL	**944,342**	**357,424**	**39,200**	**1,340,966**

Source: McKay, H. 2003. Woodfuel Resource in Britain

6.7.The figures in the table indicate that there is a significant quantity of arboricultural arisings that is potentially available in Britain that could be used as woodfuel. The table also shows the relatively small quantities of arboricultural arisings that are estimated to be potentially available in Scotland and Wales relative to England.

6.8.No forecasts were made as to how these quantities might change in the future. The quantities in table 6.1 are not thought likely to change much in the period to 2045, but they may increase slightly over time as more trees are planted in urban areas, legislation influencing the use of this material becomes tighter and it attracts higher prices as a potential wood fuel. Wood fuel boilers will need to be designed to take this material.

PRESENT & FORECAST DEMAND

6.9.Ofgem statistics show that 12 companies used some arboricultural arisings as part of their fuel mix. **The total amount of arboricultural arisings used by all 12 companies came to approximately 271,000 tonnes in 2020**. This total is almost double the quantity used in biomass plants in 2015.

6.10.The opportunities to increase this quantity of arboricultural arisings is most likely to be constrained by supply, but if prices increase it may result in justifying increased haulage costs for collecting what are often scattered supplies in small quantities. If there is an increased demand for wood fibre for generating energy at some stage in the future, there may be some opportunity for companies to use more arboricultural arisings.

7. BROADLEAVED WOOD FIBRE

7.1.Broadleaved woodlands account for approximately 45% of the woodland area of Britain and this section looks at the potential availability and demand for broadleaved wood fibre from these woodlands.

7.2.The distribution and ownership of broadleaved woodlands in England, Scotland and Wales is shown in table 7.1.

Table 7.1: Areas of Broadleaved Woodlands in England, Scotland & Wales in 2022 (ha)

Country	FE/FLS/NRW	Other Owners	Total
England	62,000	918,000	980,000
Scotland	42,000	353,000	395,000
Wales	19,000	140,000	159,000
Total	123,000	1,411,000	1,534,000

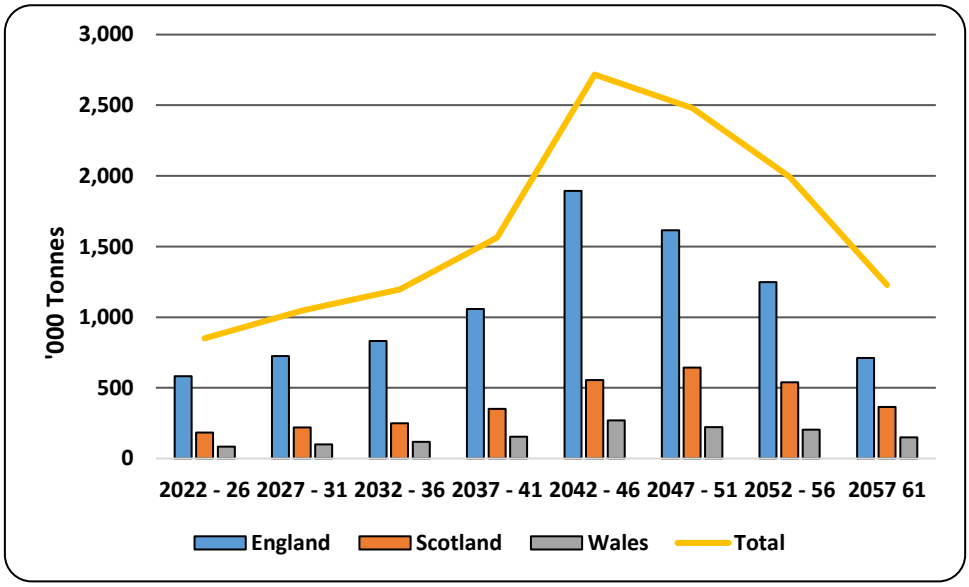
Source: Forestry Commission, 2022

7.3.The figures in the table show that most of the broadleaved woodlands in Britain are not managed by the Forestry Enterprise, Forest & land Scotland or Natural Resources Wales, but are in the ownerships and management of other organisations and individuals. Most of the woods are individually small and scattered throughout the countryside.

POTENTIAL AVAILABILITY

7.4.The Forestry Commission prepared a 50 year forecast of broadleaved roundwood availability[7] in 2014 based on those areas where the National Forest Inventory identified that there were signs of recent thinning activity. The forecast, which hasn't been revised since then, is shown in chart 7.1.

Chart 7.1: 50-Year Forecast Broadleaved Roundwood Availability in Britain 2022 – 2061, based only on Sites Showing Recent Thinning Activity



7.5.The chart shows that the potential availability of broadleaves in England, Scotland and Wales, based on sites showing recent thinning activity, is expected to increase very significantly over the next 30 years before starting to decline quite sharply after about 2042. Broadleaved roundwood availability is still forecast to be relatively small compared with forecast coniferous roundwood availability.

[7] Forestry Commission, 2014: NFI Statistical Analysis Report. 50-Year Forecast of Hardwood Timber Availability

7.6.Forest Research also estimated the potential availability of broadleaved roundwood, based on the biological potential of all broadleaves in Britain, was an average of 5.63 million tonnes per annum over the 50-year period. The difference between this volume and the forecast in chart 7.1 illustrates the potential impact of bringing more broadleaved woodland into management than is presently the case.

ESTIMATED ROUNDWOOD PRODUCTION

7.7.Forest Research has produced estimates of broadleaved production in Britain for the years ending 31st March 2017 to 2021 and these are given in table 7.2.

Table 7.2: Estimated Production of Broadleaved Roundwood in Britain 2017 – 2021 (tonnes)

Year to 31st March	Forestry Commission	Other Owners	Total
2017	85,000	651,000	736,000
2018	88,000	746,000	834,000
2019	68,000	800,000	868,000
2020	87,000	742,000	829,000
2021	96,000	727,000	823,000

Source: Forest Research: Forestry Statistics 2022

7.8.Forest Research estimated that 700,000 green tonnes of UK hardwood were used for woodfuel in 2020. A further 30,000 green tonnes were estimated to have been consumed by round fencing manufacturers and 30,000 green tonnes for other uses, including exports. (Forest Research: Forestry Statistics 2022). Of the 700,000 green tonnes that are estimated to have been used as woodfuel, **approximately 161,049 tonnes went as biomass for electricity and heat production in 2020** (pers. com supplier & Ofgem, 2021), although some of this total may have been imported.

7.9.The estimated production represents approximately 14.6% of the forecast potential average annual 50-year biological production of broadleaved roundwood (para 7.6).

7.10. There are no official individual country statistics on broadleaved / hardwood roundwood production for England, Scotland and Wales, but the majority is likely to be coming from England.

POTENTIAL AVAILABILITY & DEMAND

7.11. Actual production of broadleaved roundwood appears to be closely matched to its potential availability at present, but future availability is forecast to increase significantly. This would indicate that there is potential to double, triple or even quadruple production and use of broadleaves in Britain. However it may be difficult to do this because owners have a wide variety of objectives in owning and managing their woodlands, and commercial roundwood production is usually only one of several, and owners often give timber production a relatively low priority compared with other objectives.

7.12. In addition the felling of trees in broadleaved woodlands is subject to a number of constraints because the woodlands are recognised by the forestry and planning authorities as

making an important contribution to the landscape and biodiversity. Many broadleaved woodland owners also value their woodlands for their visual appearance; for the sporting activities they offer, or for their conservation value. There are also numerous other technical and economic constraints to any commercial timber production because the woodlands are often relatively small and scattered; access difficult or impossible; and the stem form and timber quality poor. Most of the better quality timber is found on the bigger estates where the woodlands are larger, and where they have been well managed over many years. For these reasons present identifiable roundwood production is relatively small, and is primarily driven by the market for hardwood sawlogs.

7.13. Any increase in officially recognised commercial hardwood roundwood production is likely to be driven by: higher prices for hardwood sawlogs; technical developments that will allow poorer quality material to be used economically through reprocessing; or the development of new markets for poorer quality sawn timber. There is no evidence at present of any of these developments happening in the near future.

FORECAST DEMAND FOR WOOD ENERGY

7.14. Although there appears to be significant potential for using broadleaves in Britain, the quality of much of the timber prevents its use as sawn timber on any scale. The poor quality would suggest that woodfuel would make an ideal alternative use. Use of the roundwood as a fuel for one or more large-scale energy plants is limited by the scattered locations of the woods, owners' objectives, environmental and landscape reasons, and the lack of any large scale supply chains. For this reason broadleaves are likely to be most suitable as a local woodfuel in small scale boilers.

8. POTENTIAL AVAILABILITY OF OTHER WOOD FIBRE BIOENERGY CROPS

8.1. Short rotation coppice (SRC) has been promoted as a potential source of wood fibre that could be used as fuel for generating heat and power for a number of years instead of using virgin wood fibre sourced from Britain's woods and forests. The ability of a wood fired boiler to use SRC as a source of fuel will depend on the equipment specifications and type of boiler that has been installed.

8.2. This section provides estimates of the existing areas of SRC and miscanthus and the quantities of both crops that are presently being used as a source of fuel for use in boilers generating either electricity or electricity and heat. It also considers what some of the constraints are for expanding this area and what the potential demand might be for SRC material over the next 15 years.

8.3. This report does not consider the potential availability of wood fibre from Short Rotation Forestry (SRF) i.e. trees grown at closer initial planting distances and cut after about 20 years or so, because SRF is still only at the trial stage. In the longer term it could have some potential based on overseas experience.

8.4. The information provided this section on areas and yields of SRC and Miscanthus has been taken from official statistics on areas of crops gown for bioenergy[8].

1.1. [8] Defra, 2021: Section2: Plant Biomass: Miscanthus, Short Rotation Coppice, & Straw.

ESTIMATED AREA OF SRC CROPS OF WILLOW & POPLAR

8.5.There are presently no UK data available on the area of SRC. However from 2008, official area estimates of SRC grown in England are available from the Defra June Survey of Agriculture and these are given in table 8.1. SRC (since 2009) represents less than 0.1% of the total arable area in England.

Table 8.1: Estimated Total Area of Short Rotation Crops of Willow & Poplar in England 2016 - 2020

	2016	2017	2018	2019	2020
Total Area (ha)	2,926	2,966	2,826	2,233	2,032
95% Confidence Limits +/-	665	593	1,045	1,019	227
No of Growers	437	379	305	271	306

Source: Defra June Survey of Agriculture and Horticulture Defra analysis to produce regional figures and numbers of growers. 2021.

8.6.The majority of the SRC in England was established in Yorkshire, Nottinghamshire and Lincolnshire in anticipation of supplying the Arbre wood fired power station (now closed) and the Cottam, Drax and West Burton coal-fired power stations. There are no statistics for Scotland or Wales, but information provided by companies in about 2006 suggested that there might be about 150 ha in Scotland.

8.7.There has not been any major planting of SRC since 2005/06 for a variety of reasons that includes the absence of grants, attitudes and perceptions of farmers, prices, markets and opportunities provided by alternative crops.

8.8.There are now no grants being offered by Natural England or the Forestry Commission to encourage more land owners to plant SRC or miscanthus crops in England. For these reasons it appears unlikely that there will be a major increase in planting additional areas of SRC in the short term, unless there is a significant increase in the level of grants, or fuelwood prices rise.

Forecast Yields

8.9.Much research has been done on SRC yields but as yet, no official estimates of achieved yields are available. SRC is harvested every 2-3 years and yields vary greatly according to the number of years since planting, site conditions, type of planting method, crop type (willow or poplar) as well as the standard variations of region, annual weather conditions etc.

8.10.Industry experts at the National Non Food Crops Centre (NNFCC) estimate an average SRC yield of 8 -17.5 oven dried tonnes (odt)/ha/year (taking into account the 2-3 year harvesting period) while the Forestry Commission ForestGrowth-SRC model predicts average yearly yields at 9.0 odt/ha/year and 10.3 odt/ha/year for willow and poplar respectively. Defra estimated that total SRC production in England was around 16,000 dry tonnes in 2020, based

on low end assumptions of yield. This appears to be about the maximum potential sustainable availability of wood fibre from SRC crops fibre unless planting starts again and a significantly larger area of willow and coppice are established and managed.

8.11.An estimate of the volume of UK produced SRC willow used in power stations is collated by Ofgem, as part of sustainability requirements under the Renewables Obligation and these **indicate that 17,158.75 tonnes of SRC were burnt in 2020** (see Annex 15). It is not clear from the Ofgem dataset if these are oven dry or green tonnes as data is provided by users, but Defra's estimates (para 8.10) suggest that it is probably dry tonnes. All this material was burnt as wood chips.

ESTIMATED AREA OF MISCANTHUS

8.12.Under the Energy Crops Scheme (ECS) farmers could claim subsidies to assist with the establishment of miscanthus as part of the Rural Development Programme for England. The Energy Crops scheme closed in 2013 although planting for the scheme could be undertaken in 2013, 2014 and 2015. Currently there is no data is available regarding UK-wide planting areas of miscanthus. Table 8.2 shows the total area of miscanthus established in England and the estimated number of growers for the period 2016 to 2020.

Table 8.2: Estimated Total Area of Miscanthus Established in England and the Estimated Number of Growers.

Year	2016	2017	2018	2019	2020
Total Area	7,057	7,366	7,149	8,171	8,286
95% Confidence Limits +/-	526	1,097	1,290	1,275	2,046
No of Growers	361	787	767	731	708

Source: Defra June Survey of Agriculture and Horticulture. Defra analysis to produce numbers of growers. 2021

8.13.The total area of new plantings claimed under the subsidies since 2000 was around 10,000 hectares. This includes miscanthus being grown at locations other than traditional farms (for example, country parks, and universities). These locations may not be covered by the June Agricultural Survey, which recorded 8,286 hectares of miscanthus in England in 2020. Miscanthus is grown on around 0.1% of arable land in England.

8.14.Although research has been done on miscanthus yields, as yet no official estimates of achieved yields are available. Yields vary greatly depending on a number of factors such as planting method, species, site conditions, as well as the standard variations of region and annual weather conditions. The first year's growth is not suitable to harvest; annual harvesting takes place from the second year and can continue for 15-20 years. Some industry experts estimate that current miscanthus yields average between 12-15 oven-dried tonnes (odt) per hectare (equating to 15-18 fresh tonnes per hectare) although other industry bodies suggest a lower figure of 10 odt per hectare.

8.15.Miscanthus production in England in 2020 was estimated to be 83,000 oven dried tonnes, based on the lower end assumption of yield of 10 odt per hectare, but this estimated annual volume of miscanthus produced in England should be treated as an indicative estimate because of the yield uncertainties and the assumption that the whole of the area planted is productive, which will not be the case for recently planted crops.

8.16.Usage data collated by Ofgem as part of sustainability requirements under the Renewables Obligation **shows that approximately 42,348 tonnes of miscanthus was used in biomass plants to produce electricity in 2020/21** compared with 2019/20 when only 33,000 tonnes were burnt. However, it is not clear whether the Ofgem figures are in oven dry or green tonnes. The 2019/20 figures was less than half of all miscanthus estimated to have been produced in England in 2020, based on low end assumptions of yields. The 2019/20 volume was a 32% decrease on the previous year, with volumes returning to levels last seen in 2015/16. This decrease occurred despite a previous trend of increased miscanthus use since 2013/14, which reflected a general trend of existing power stations adapting infrastructure towards increased biomass capacity, and the opening of new biomass power stations.

8.17.However, there are other outlets for using miscanthus including horse and livestock bedding, in small scale combined heat and power plants directly on farms for heating buildings and for domestic uses such as wood burners and open fires. Unfortunately, quantitative information on these end uses is not available.

POTENTIAL AREAS AVAILABLE FOR SRC CROPS

8.18.Various studies have been undertaken in the past which have indicated that there is a considerable area of land that could be used for growing SRC. For example, a study by Andersen, Towers and Smith in 2005 identified that there are between 170,000 and 520,000 ha of land in Scotland alone that is suitable for growing SRC and a further 1.2 to 1.3 million ha are moderately suitable (*Andersen R. S., Towers W. and Smith P. (2005). Assessing the Potential for Biomass Energy to Contribute to Scotland's Renewables Energy Needs. Biomass and Bioenergy 29:73-82)*. There is therefore considerable potential for SRC in Britain.

POTENTIAL AVAILABILITY & USE OF OTHER WOOD FIBRE BIOENERGY CROPS

8.19.**In 2021 approximately 59,506 tonnes of bioenergy crops were being used to generate electricity and / or heat**, but there is a lack of clarity over whether some figures are recorded as dry tonnes or green tonnes.

8.20.Any possibility of SRC crops becoming a major source of wood fibre for energy plants would require a major change in the attitudes and perceptions of farmers, and in the financial support they are offered. Rapid changes in land use over a relatively small geographical area may also not be easily accepted by local people.

8.21.The available information suggests that none of the existing or planned energy plants expect to use or depend on supplies of SRC as a fuel source in the foreseeable future.

Reuse of Wood Fibre in Britain

9. IDENTIFICATION & SCALE OF WOOD FIBRE REUSE

9.1.The reuse of wood fibre does not increase the availability of virgin wood fibre in Britain, but it does reduce the amount of virgin wood fibre that might otherwise be needed from Britain's forests and woods, or through imports.

9.2.Wood fibre reuse is defined as being an activity in which wood fibre is put to the same or different use after it has fulfilled its original function. The original form of the product is unchanged.

9.3.The sale of second hand wooden furniture, and furniture restoration, are probably the most well-known reuses of wood fibre. There are also a number of small businesses that have specialised in selling reclaimed building materials obtained from old houses when renovations are taking place or buildings are being demolished. More recently a few architects have started to think about designing buildings where all the building materials can be reused when it comes to the end of its life. Overall, the quantities of virgin fibre being reused in these activities are insignificant compared with the amount of virgin wood fibre Britain used each year. If the quantities of existing and new innovative wood products, such as Cross Laminated Timber, increase in new buildings because of the need to reduce their carbon footprints, the potential for reusing wood products will increase.

9.1.By far the largest and most significant re-users of wood fibre in Britain within the forest sector in Britain are the pallet pool companies. These pallet pool companies can be broadly categorised into three types:

Closed Loop Pallet Pool Companies: These companies own pallets and rent them out to their customers for durations that can range from a few days to weeks or months. Once a customer has finished using a pallet, the company arranges for the pallets to be collected. They are then inspected for damage and, if necessary, they are repaired before being rented out again. It is not possible to obtain a precise estimate of the total number of pallets being reused by companies that operate their own closed loop pallet pools, because the numbers are commercially confidential. Any estimate is further complicated by the fact that these pallet pools operate on a European scale and so pallets enter and leave Britain carrying imports and exports. However some indirect information[9] suggest that just over 110 million pallets could be being reused on an regular basis in Britain with some pallets being reused for up to 10 years.

Open Loop Pallet Pool Companies (The European Pallet Association e.V. or (EPAL): Companies that are registered within this system, produce pallets to agreed European standard sizes and quality so that they can be used throughout Europe. These pallets are not owned by any one company, but the common standards means any company that is registered with EPAL has access to this pool of pallets. It is not known how many pallets are being reused under the open pool system at any one time, but it could be at least 300,000 pallets in the UK and Ireland based on some recent figures published by EPAL UK and Ireland.

Company Pallet Pools: A number of larger companies operate their own pallet pools and more companies may decide to do this because of the environmental benefits of reusing pallets. The number of pallets circulating in company pallet pools is not known.

9.2.Based on approximately 110,000,000 pallets being in circulation and reused each year in pallet pools, this accounts for at least 3.2 million tonnes of virgin wood fibre being reused

[9] TIMCON & Forest Research, 2023: The UK Wood Pallets & Packaging Market in 2021. John Clegg Consulting Ltd

annually. If it is assumed pallets last for 10 years, approximately 320,000 tonnes of pallet wood will have reached their end of life and will need to be replaced each year and this end of life wood will be either recycled into the wood panelboard industry for making particleboard, animal bedding or as a fuel in a biomass plant for generating electricity and / or heat depending on its quality.

9.3.About 20 million pallets are used annually in the building and construction industries. In the past most of these pallets were not reused but ended up being recycled (see Section 11), but a number of pallet manufacturers and companies that use pallets are now exploring the commercial and environmental opportunities benefits in collecting these pallets and repairing them for reuse.

WOOD FIBRE RECYCLING IN BRITAIN

10. OPPORTUNITIES FOR RECYCLING WOOD FIBRE

10.1.Potentially most wood fibre can be recycled unlike many other materials. Recycled wood fibre is defined as fibre that is turned into another potentially useful material after it has been used, thus reducing waste. The opportunities for recycling wood fibre depend very much on the form and quality of wood fibre when making recycling decisions, and whether the wood fibres are associated with any other materials or chemicals.

10.2.The UK's annual apparent consumption of wood is of the order of 53 million cubic metres WMRE under bark. Although many of these wood and wood products will be put to a longer term use, and will therefore be storing carbon, a significant volume of wood fibre will become available over time for recycling, but only a relatively small proportion of that wood fibre will include virgin fibre produced from Britain's woods.

10.3.The form in which wood fibre becomes available for recycling can be divided into two broad categories:

Sawn Timber and Manufactured Wood Products: The major sources of virgin wood fibre produced from Britain's woods and forests that are recycled come from pallets and packaging at the end of being reused and from solid wood waste from the construction industry, demolition work or as post- consumer waste. The wood based panel industry in the UK has recycled recovered post-consumer, and a small quantity of pre-consumer wood, to produce particleboards for well over two decades. This recovered wood now accounts for a very high percentage of the fibre used to make particle board. Recovered wood is also recycled into a number of other uses such as animal bedding products, and landscaping and horticultural products. Over the last 10 years or so recovered wood has also become a significant source of fuel for wood energy plants. It is particularly attractive because of its relatively low moisture content compared with biomass produced from 'green' roundwood. Further details are given in sections 11, 12 and 13.

Paper, Paperboard & Cardboard: Only a very small quantity of virgin wood fibre from Britain's woods and forests now goes into making products such as magazine papers and paperboard. All the rest of the virgin wood fibre that goes into these and other products such as newsprint, writing papers is grown in other countries, such as Sweden, and imported into Britain. Therefore there will be almost no fibre from woods and forests in Britain in paper and cardboard products that are recycled. Further details about the recycling of paper and cardboard in Britain are given in section 14.

11. ESTIMATED POTENTIAL AVAILABILITY OF RECOVERED WOOD PRODUCTS FOR RECYCLING

11.1.There are no accurate figures on the potential available quantity of waste wood that can be recovered for recycling because of the enormous difficulties of collecting data from wherever it arises, but some estimates have been made in the past and these are given in this section. There is the additional difficulty in that the way the different waste wood streams are categorised varies.

Sources of Wood Waste

11.2.A series of estimates of the size of the market were made over 10 years ago in 2012 by consultants working for the Waste & Resources Action Programme (WRAP). The 2012[10] report drew together the findings of seven reports on wood waste completed between 2010 and 2012. The notable feature of these previous reports that have tried to quantify the overall UK wood waste tonnages, and the quantities arising from each source, is that findings have not always agreed. The estimates of the size of the wood waste market made in WRAP reports in 2010 and 2012 are given in table 11.1. The amounts originating in GB cannot be separated out from those for the UK.

Table 11.1: Estimates of the Size of the Wood Waste Market in the UK based on Estimates made in 2010 and 2012

(tonnes as delivered)

Source of Wood Waste	WRAP 2009 Report[11]	WRAP 2012 Report	WRAP 2018 Wood Packaging Report
Packaging / Commercial	1,600,000	998,000	1,291,000
Industrial		393,000	
Construction	2,300,000	854,000	
Demolition		1,068,000	
Local Authority Collected Waste	600,000	1,015,000	
Total	4,500,000	4,327,000	

Source: Defra, 2012

11.3.Tolvik Consulting in their UK Dedicated Biomass Statistics – 2019 report estimated that the total tonnage waste wood generated in the UK in 2019 was 4.52 Mt which they said agreed with the WRA estimates and excluded "informal" tonnages of waste wood falling outside waste regulations. They estimated that 86% (or 3.89Mt) was segregated from the residual waste stream as recycled wood. Their estimates of the sources of this recovered wood are given in table 11.2.

Table 11.2: Tolvik Consulting's Estimates of the Sources & Quantities of Wood Waste 2019

Source of Wood Waste	Quantities in Tonnes
Commercial	1,499,400
Industrial	583500
Household	894,700
Construction & Demolition	1,089200
Total	**3,890,000**

[10] Defra, 2012: Waste Wood: A short Review of Recent Research

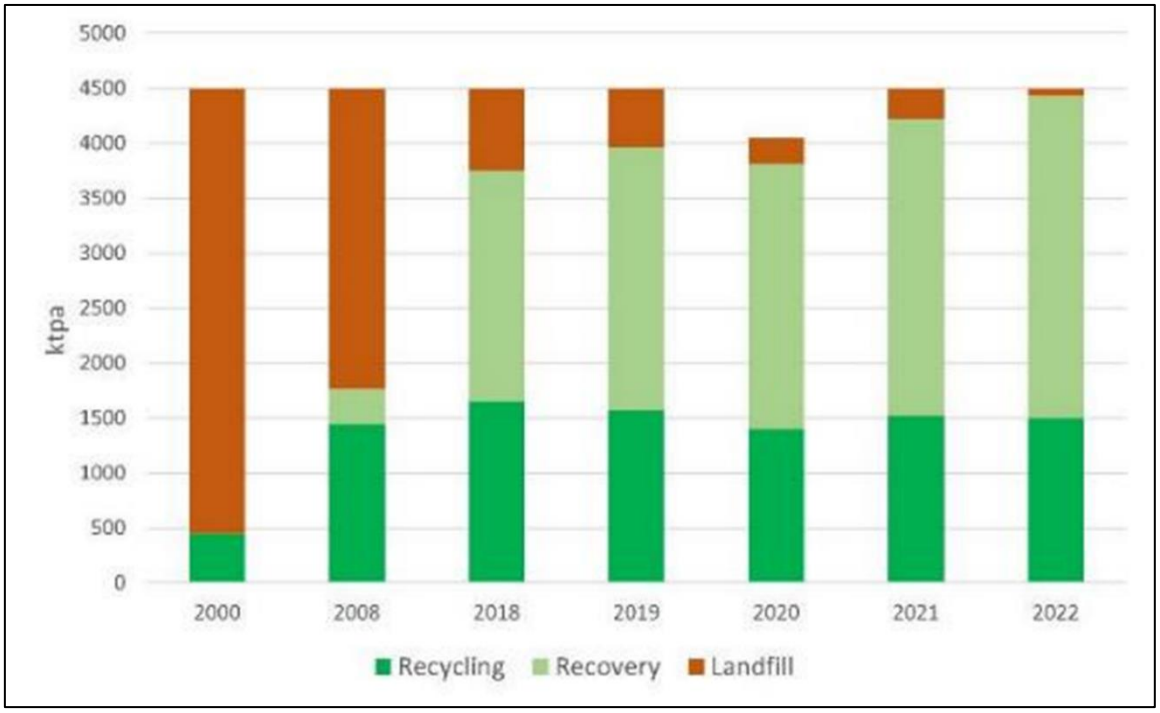
[11] WRAP. 2009: Wood Waste Market in the UK

11.4.Valpak produced a detailed report in 2020 for WRAP[12] that specifically looked at the packaging market, which is one component of the UK's waste wood market. Although this was at the start of the spread of Covid, the figures are likely to be broadly representative of the overall market as packaging was still required to move products. They estimated that the total quantity of wood packaging placed on the market in 2019, after allowing for imports and exports, was 1,358,000 tonnes. Waste from UK sourced fibre in the packaging market was estimated to be 872,000 tonnes of which 85.5% arose from wooden pallets and the remainder from packaging. Of this total; 603,000 tonnes was collected from Commercial and Industrial premises and 874,000 tonnes were sourced from Local Authorities.

QUANTITIES OF WOOD WASTE

11.5.The Wood Recyclers' Association estimates that the overall size of the wood waste market in the UK is approximately 4.5 million tonnes per annum and chart 11.3 shows that the overall market size of the waste wood market has remained at about 4.5 million tonnes per annum since 2000, apart from 2020 when economic activity was impacted by Covid.

Chart 11.3: The WRA's Estimate of the Overall Size of the Waste Wood Market 2000 - 2022



Footnote: The WRA define 'recycling' as waste wood going to the panel board industry and other products such as animal bedding and equine surfacing, and 'recovery' as waste wood going to biomass energy plants.

Source WRA, 2023

11.6.The chart also shows that the panel board industry and other products, such as animal bedding and equine surfacing, have historically been very important end use for waste wood.

11.7.It should also be noted that the estimate of the overall size of the wood waste market in GB will depend on economic activity and the levels of imports and exports in any one year.

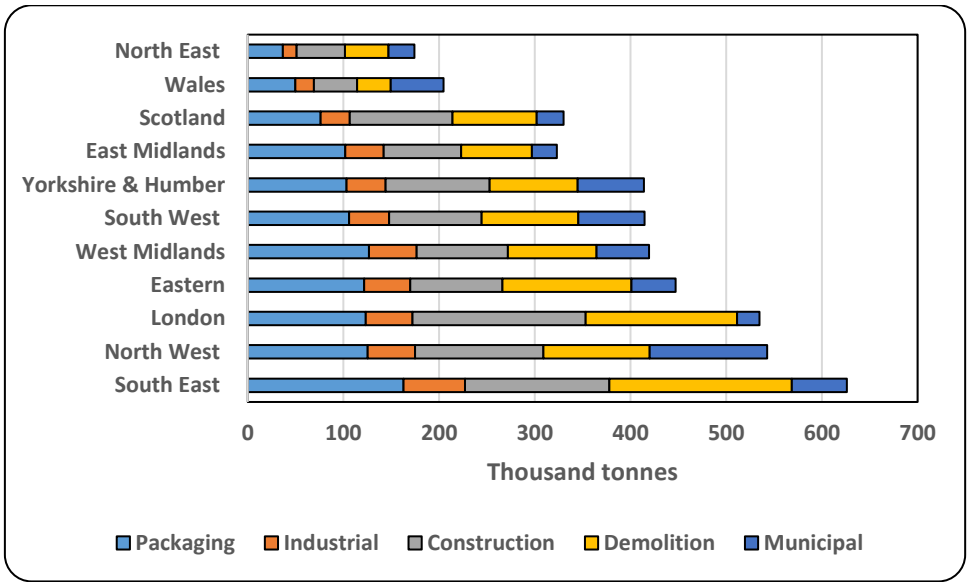
[12] Valpak, 2020. PackFlow Covid-19 Phase I: Wood

11.8.As a result of the Russian invasion of Ukraine, and the cutting off of oil and gas supplies to Europe from Russia, there has been a considerable increase in interest in using biomass as an alternative fuel source for generating energy in Europe, and particularly Germany,. This has resulted in increased demand and prices for recycled wood in Europe. As a result this may begin to affect both the quantity and prices of recovered wood in the UK.

GEOGRAPHICAL SOURCES OF WASTE WOOD

11.9.Some indication of where the waste streams come from geographically is provided in the 2009 WRAP report and these results are shown in chart 11.4. As there appears to be a broad consensus that the estimated total quantities of wood waste generated in the UK annually haven't changed significantly in the last 10 years, it is likely that the geographical sources of wood waste will have remained broadly similar.

Chart 11.4: Estimated Wood Waste Streams arisings by Region



Source: WRAP. 2009
Footnote: [1] WRAP report regional boundaries do not coincide precisely with the zonal boundaries used in this report.

11.10.The majority of the waste originates in England with only 6.8% and 4.6% originating in Scotland and Wales respectively. Within England, the figures show that most waste originates in the North West and South East of England and London.

Estimated Types & Quantities of Wood Waste

11.11.The most recent estimate of the composition of the UK wood waste stream was made by consultants working for WRAP in 2009. Their estimate of the composition of the wood waste stream, having conducted detailed personal interviews with companies across the wood waste stream, is given in table 11.3.

Table 11.3: Estimated Composition of the UK's Solid Wood Waste

Wood Waste Type	Quantity in Tonnes	Percentage of Total
Clean solid wood	1,426,000	31.1
Treated solid wood	1,903,400	41.6
Particleboard	568,300	12.4
MDF	261,900	5.7
Plywood	303,800	6.6
OSB	117,200	2.6
Total	**4,580,600**	**100.0**

Source: WRAP (2009) Wood Waste Market in the UK

11.12. The clean solid wood in the UK's wood waste stream is obviously the most attractive source of recycled fibre for companies that can use wood waste as it can be used in a variety of different ways without significant further sorting, cleaning or treatment, but it amounts to only about 31% of the total quantity of solid wood waste generated in the UK each year. The bigger recycling challenges lie in in finding the best way to cascade the recycling of the other 70% of the wood waste stream.

11.13. Waste MDF normally ends up in landfill or is incinerated, but new technology is potentially available that will allow the wood fibre in MDF to be re-integrated into the manufacture of panelboards or used to make insulation boards. If this was successfully taken up, this would increase the quantity of wood fibre that would be available for recycling.

12. TECHNICAL SUITABILITY OF RECOVERED WOOD

12.1. The approximate quantities of the different types of solid wood products found in the UK's wood waste were identified in table 11.3.

12.2. The quantity and quality of recovered wood that is potentially available depends on:

- How much of the total estimated quantity of recovered wood can realistically be re-used and sorted into grades at an economic price.
- The end use that is being considered, as only certain grades of recovered wood are suitable for particular uses.

12.3. One of the major issues in recovering and re-using wood and wood products is the presence of physical or chemical contaminates in, on or attached to the wood in about 70% of the wood waste stream. Wood and wood products that are discarded can often contain nails, screws and pieces of metal and have other materials attached to them. They can also have surface coatings of paints, glues and other types of coatings. In addition, they can be mixed in with all sorts of other materials such as glass, plastics and rubber. Some of the wood may also have been chemically treated. Although all this material is potentially available, one of the major challenges is to collect it and sort it which may often need to be done by hand where the waste streams are mixed up. Actual availability may therefore be less than the estimated size of the market as it may not be economical to sort small quantities of materials into appropriate grades.

12.4. Wood waste is graded according to its quality and the classification developed and used by the Wood Recyclers' Association is given in table 12.1.

Table 12.1: Wood Recyclers' Association: Grades of Waste Wood (2023)

Wood Waste Grade	Typical Markets	Typical Sources of Raw Material for Recycling and / or Recovery	Typical Materials	Typical Non-Wood Content Prior to Processing	Notes
Grade A **Pre-Consumer Waste Wood(1) & untreated wooden packaging = Clean untreated wood**	A feedstock for the manufacture of professional & consumer products such as animal bedding, equine & landscape surfacing. May also be used as a fuel domestic and non-IED Chapter IV biomass installations and for the manufacture of pellets & briquettes.	Wood product manufacturing, Distribution, Retailing, Packaging and Secondary Manufacturing, e.g. joinery & pallet reclamation.	Solid softwood and hardwood. Packaging waste, scrap pallets, packaging cases and cable drums. Process off-cuts from the manufacture of virgin/sawn timber & untreated board products.	Nails & metal fixings. Minor amounts of non-hazardous surface coating such as water-soluble paint.	This is a waste as defined by the waste regulations. Does not require an IED Chapter IV installation and should not contain any treated or low grade material.
Grade B **Business Waste Wood = Treated hazardous**	This is the preferred feedstock for industrial wood processing operations such as the manufacture of panel products. Can also be used for IED Chapter IV biomass.	As Grade A plus construction & demolition and demolition operations, skip operations, transfer stations.	May contain Grade A material as above plus building and demolition materials and domestic furniture made from solid wood.	Nails and metal fixings. Some paints, plastics, glass, grit, non-hazardous coatings, binders and glues. Limits on treated or coated materials as defined by end users and IED.	This is mostly solid wood. Some feedstock specifications contain a 5% to 10% limit on former panel products such as chipboard, MDF and plywood. Is a waste for the requirements of Waste Management Regulations. Will require an IED Chapter IV compliant installation for biomass. Any of the items listed in the WRA Waste Wood Assessment Guidance as 'Potentially Hazardous' (2) must be segregated and tested to prove that they are non-hazardous. Otherwise they must be categorised as Grade D – Hazardous.

See Next Page for further grades and footnotes

Grade C **Municipal waste wood = Treated Non -hazardous**	For use in the IED Chapter IV biomass installations and for panel board in controlled volumes.	All the above, plus municipal collections, transfer stations and Household Waste Recycling Centres.	All the above plus flat pack furniture made from board products and DIY materials.	Nails & metal fixings. Paints, coatings and glues, paper, plastics and rubber, glass, grit. Coated & treated timber (non-CCA or creosote).	This is mostly board products. Mainly suitable for IED Chapter IV compliant biomass installations, but also suitable for panel board manufacture with correct processing and blending. Is a waste for Waste Management Regulations.
Grade D **Hazardous Waste wood**	Requires disposal at facilities licenced to accept hazardous waste.	Waste wood from hydraulic engineering, such as wood from docks. Waste wood from industrial applications such as cooling tower timbers, woodblock flooring or moulds Waste wood from boats, carriages and trailer beds Waste wood treated with CCA or creosote Any of the items listed in the WRA Waste Wood Assessment Guidance as 'Potentially Hazardous' (2) must be segregated and tested to prove that they are non-hazardous. Otherwise they must be categorised as Grade D – Hazardous.	Agricultural fencing, telegraph poles, railway sleepers.	Copper chrome. Arsenic (CCA) preservation treatments and creosote.	These materials must be segregated and consigned as hazardous to sites permitted to accept hazardous wood.

Clean/untreated waste wood is suitable for processing into animal bedding, panel board feedstock, landscaping or equestrian surfaces and biomass. Treated, but non-hazardous waste wood is suitable for processing as a feedstock for panel board or energy recovery in a Chapter IV compliant facility. Hazardous waste wood can only be disposed of in a facility licensed for this purpose.

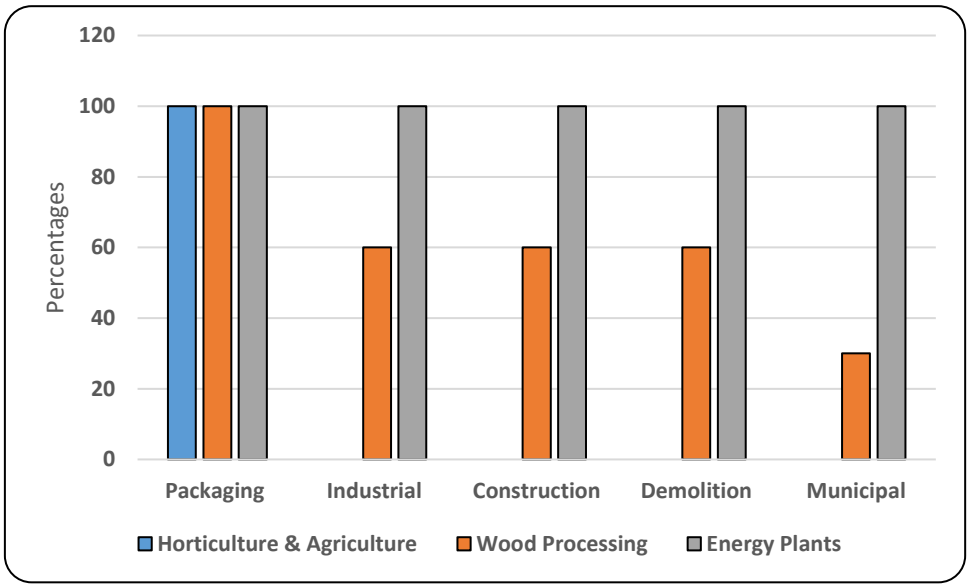
(1) Pre-consumer waste wood is waste wood material created during the manufacturing process of virgin wood, not involving the application of treatments, e.g. offcuts or trimmings from virgin/sawn timber. It is also waste wood material created during the manufacturing process of raw, untreated board products such as panel board, MDF and plywood (for clarity, this waste wood can only be used/burnt at source). Waste from joinery activity using these untreated wood materials is also included in this definition.

(2) Potentially hazardous waste wood items are: barge boards; external fascias; soffit boards; external joinery (wooden windows and conservatories); external doors; roof timbers; tiling and cladding battens; timber frames and joists from pre-2007 buildings.

Source: The Wood Recyclers' Association September 2023

12.5. The quality, or grade of recovered wood that arises from these different sources varies and some end uses can only use particular qualities of recovered wood as chart 12.1 shows.

Chart 12.1: Technical Suitability of Wood Fibre Recovered from Different End Uses



Source: WRAP, 2009 & Forest Industry estimates

12.6.The graph shows that technically all recovered wood can be burnt provided the plant is WID compliant, and it also shows that only packaging of sufficient quality can be used for agricultural and horticultural end uses. The technical suitability of recovered wood for use in wood processing varies from 100% of packaging material to about 30% of the wood coming from municipal sources.

12.7.In practice the value that the horticultural and agricultural end users add to recovered wood is higher than in wood processing so the wood processing industry can usually obtain only about 40% of the recovered packaging material it requires and so it sources the rest of its recovered wood requirements from the other recovered wood streams. There is therefore a conflict in using recovered wood to meet the needs of the forest industry for panelboard production, for use as animal bedding and burning recovered wood for producing energy.

13. PRESENT END USES OF RECOVERED WOOD

13.1.The estimated end uses for waste wood in the UK between 2018 and 2021 are shown in table 13.1.

Table 13.1: UK End Uses for Recycled Recovered Wood

End Uses for Recycled Wood	2022	2021	2020	2019	2018
Biomass Chapter IV [1]	2,715,300	2,555,000	2,420,000	2,390,000	2,100,000
Panel Board	1,052,700	1,080,000	982,000	984,000	877,000
Animal Bedding, Equine Surfaces & Other Uses	322,000	350,000	350,000	320,000	391,000
Exports / Imports netted off	130,000	107,500	10,000	170,000	313,000
Small Scale biomass	90,000	80,000	55,000	100,000	72,000
Total	4,310,000	4,172,500	3,817,000	3,964,000	3,753,000

Source: WRA 2023

Footnote:[1] Chapter IV of the Industrial Emissions Directive applies to all waste incineration and waste co-incineration plants that thermally treat solid or liquid waste, unless an exclusion applies

13.2.To ensure that recycled wood is used in the most effective way, it is also important to know the amounts and grades of recycled wood going to these different end uses (see table 12.1) and this information is not available. More detailed information is required to ensure that recycled wood is cascaded appropriately down the end use hierarchy to ensure it is used for other purposes before being used for generating biomass energy.

13.3.The results in the table are for the UK. An analysis of the waste wood consumed by biomass plants in the Renewable Obligations scheme based on Ofgem statistics indicates that 1.86 million tonnes of recycled wood were used in 22 biomass plants in GB in 2020. The majority of these plants are located in Northern and Central England and South Wales which is where most of the recycled wood becomes available (Chart 11.1). The main difference between this figure and the one in Table 13.1 will be the exclusion of the estimated quantity of recycled recovered wood used in biomass plants in Northern Ireland. Other small differences may occur in the sourcing of data, but the overall quantities are relatively close.

13.4.Biomass plants operating under the Renewables Obligation scheme imported approximately 41,200 tonnes of wood waste for their fuel mix in 2020 according to Ofgem statistics.

13.5.Various informal published information sources suggest that recovered wood has been exported to countries lying close to Britain's east coast from time to time and that recycled wood has been imported from Germany.

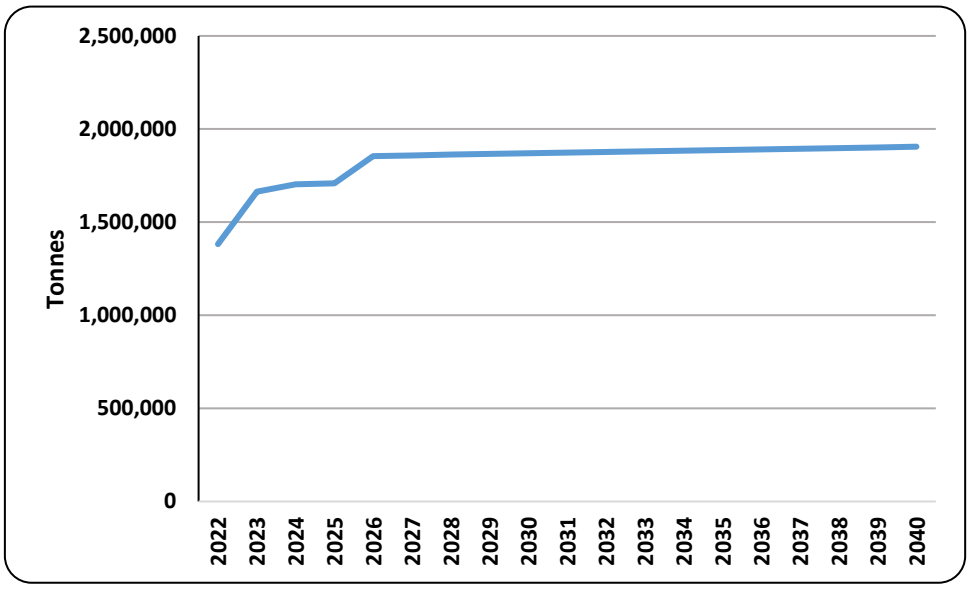
13.6.The other major end use market for recovered wood is the panel board industry. The confidential figures provided by panel board companies in GB for this study indicated that they used 1,041,418 tonnes of recovered wood in 2022. This differs slightly from the WRA figure, which is for 2022, but small differences can occur because of timing differences in requests for information. Overall the panel board sector takes approximately 1 million uses of recovered wood.

13.7.The WRA estimated that the quantity of waste wood used for animal bedding, equine surfaces etc was 472,000 tonnes in 2011. The WRA now estimate the quantity has fallen to 350,000 tonnes in 2021.

13.8.The panel board industry and the market for animal bedding, horticulture, equine surfaces both require clean waste wood. The total size of both markets is approximately 1.35 million tonnes per year. The potential availability of clean wood is approximately 1.46 million tonnes per annum (Table 11.3) based on an overall total waste wood market size of 4.5 million tonnes per annum. The possible difference between the potential availability and demand for clean recovered wood may be about 110,000 tonnes per annum at a maximum, but may be considerably closer.

13.9.There is no sign at present that the number of biomass plants is going to increase, but this situation could be expected to change if new financial incentives are introduced. However, changes in the wood fuel mixes of these plants can be expected if prices of different wood fuel sources and availability occur, However, the board industry in GB could increase its use of recycled solid wood significantly over the next 10 years as is shown in chart 13.1.

Chart 13.1: Possible Increase in Demand for Recycled Wood by the Panel Board Industry in GB 2022 – 2040



Source: Survey data, 2022

13.10.The panelboard industry requires untreated or treated non-hazardous waste wood so meeting the forecast increase in demand for waste wood by the panel board industry suggest that the market for untreated or non-hazardous waste wood could become very tight as the present surplus of potentially available clean waste wood could only be about 100,000 tonnes per annum at present.

13.11.This increase in demand for recycled wood could be met by recovering more clean wood from the waste stream in Britain. Depending on how much could be recovered, more could be obtained by displacing other users of recycled wood, or the companies might decide to change their overall wood fibre mix which would impact on the wood fibre mixes of other users, including even the possible use of more coniferous roundwood or sawmill co-products.

14. Recycling of Wood Fibres in Paper, Paperboard & Cardboard

14.1. The Confederation of Paper Industries[13] estimate that approximately 3.9 million tonnes of paper and board products and 5.3 million (kilograms / sq metre) of corrugated board are produced annually in the UK, but figures as high as 12.5 million tonnes have been quoted.

14.2. The opportunities to recycle paper, paperboard and cardboard depends on their quality. There are many types and grades of paper and cardboard but they can be very broadly divided into the following categories:

- Paper of a variety of different types and grades.
- Paperboard which is a thin material predominately used for domestic use, such as cereal boxes, juice cartons, shoe boxes and so on.
- Corrugated cardboard which is a stronger and thicker material used for heavier items like Amazon deliveries, furniture packaging etc.

14.3. Estimates for the amount of paper and cardboard recycled vary because the collection of some recycling statistics is a devolved matter. Defra statistics on waste in England for 2021 indicate that 5.39 million tonnes of paper and cardboard were collected and that 3.8 million tonnes was recycled which is a recovery rate of 70.6%. Industry estimates that overall in Britain over 70% of the fibre used in paper and cardboard production comes from paper collected for recycling by households and businesses. The rest is made up of imported virgin wood fibre from trees grown in sustainably managed and certified forests.

14.4. Cardboard can be recycled 5 to 7 times, and each time its fibres become shorter, making it thinner and less durable. At the end of its lifecycle, it can be made into paper paste and used for newspapers and egg cartons.

14.5. In the UK there are four main types of mills producing:

- Paper & carton board
- Cardboard
- Tissue products
- Newsprint.

14.6. The only two mills using virgin wood fibre sourced from woods and forest in the UK are Holmen Iggesund, which is the only mill in Britain producing carton board, and Caledonian Paper Mill which is the only mill producing light weighted coated paper in Britain.

14.7. The cardboard sector includes: DS Smith with a mill at Kemsley in Kent; SAICA at Partington; UPM in north Wales that converted to cardboard production at the end of 2021, Smurfit Kappa with a mill in Birmingham and in Kent; and northern mills including Sonoco.

14.8. Tissue mills use recovered paper and/or virgin pulp to produce tissue. The main source

[13] https://paper.org.uk/

of recycled material for this sector is office waste paper. Mills in this sector include Essity, Kimberly Clark and Northwood.

14.9.The only newsprint mill in Britain is Palm Paper in Norfolk which uses 100% recycled fibre, mainly newspapers and magazines.

14.10.The UK recycles more paper than it can use and therefore the excess is exported to Europe, China and the Far East.

15. POLICY INFLUENCES ON BRITISH WOOD FIBRE AVAILABILITY & DEMAND

15.1.The previous sections in this report have examined existing and potential wood fibre availability and demand. The present situation partly reflects a number of past and present government policies, strategies, regulations and incentives and partly prices, exchange rates and the commercial interests of companies both in Britain and abroad. This section focuses on some of the main policies in Britain that have been, and are influencing the availability of wood fibre and how it is being, and will be, used.

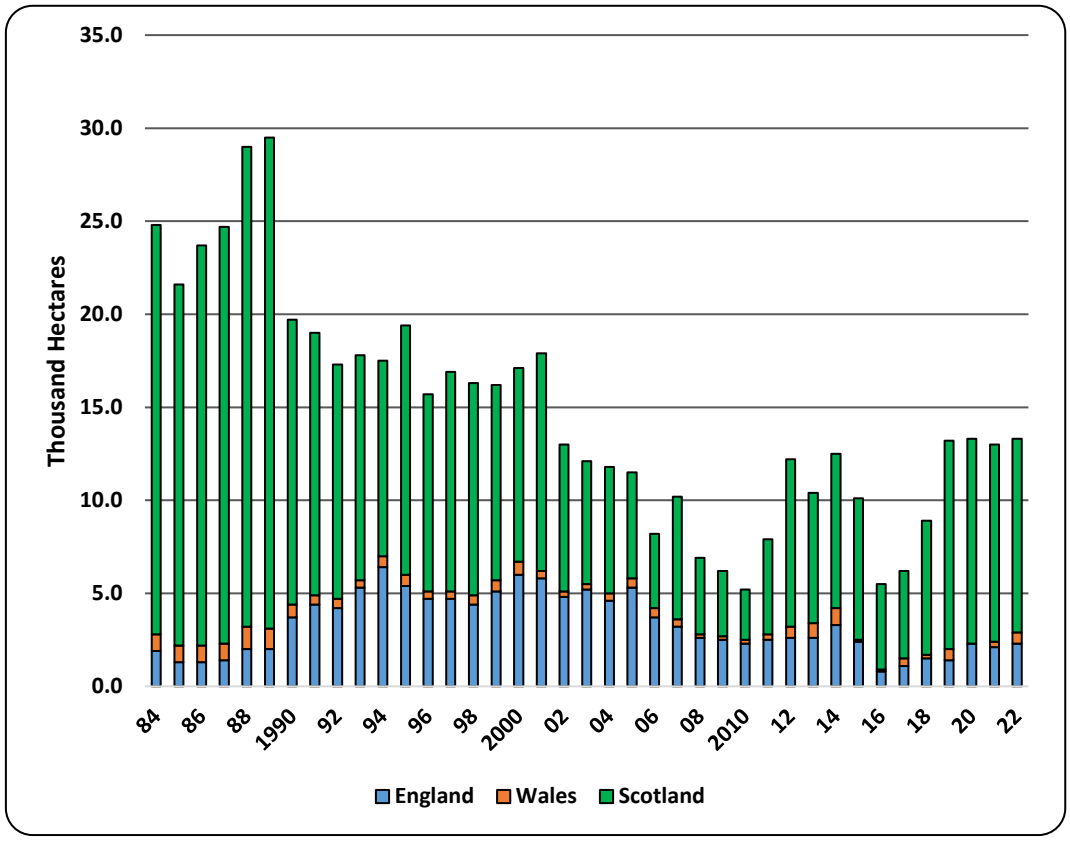
Land Use Policies

15.2.There is a significant quantity of broadleaved roundwood that is potentially available (Section 8), mostly in England, but owners of broadleaved woods have a variety of objectives in owning them and these seldom include commercial timber production. Broadleaved woods also tend to be small and scattered and valued for their contribution to the landscape which means that it is difficult to base any commercial developments of any scale on the potential availability of broadleaved roundwood.

15.3.The majority of the large scale commercial developments of the forest industry and energy production have been based on the use of conifers and the further long term sustainable growth of these businesses in Britain, will depend on the future sustainable availability of coniferous wood fibre grown in Britain. Additional wood fibre can be obtained for wood energy plants by using agricultural land for growing short rotation coppice, miscanthus or other biomass crops, but there are no grants offered for planting either crop at present. It therefore appears that the majority of any additional virgin wood fibre will need to come from planting more coniferous trees in Britain.

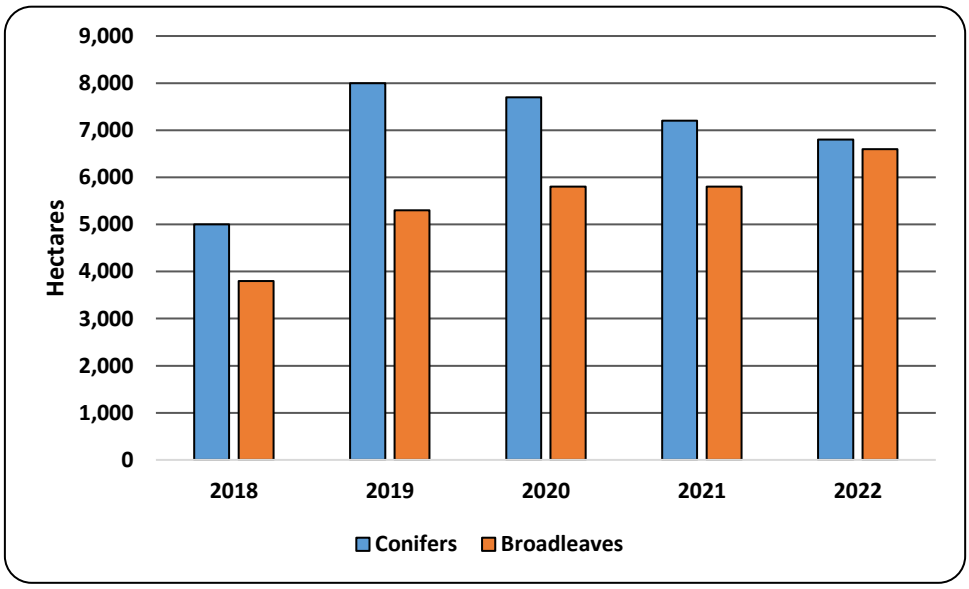
15.4.Much of the present scale of the availability of coniferous roundwood can be directly traced to the planting of new woods in the 1970s and 1980s, which was towards the end of a period when significant areas of new coniferous woodlands were established supported by the use of tax incentives. Since the end of the 1980s when the tax incentives were withdrawn and replaced by grants, the area of new planting has dropped dramatically as chart 15.1 shows.

Chart 15.1: Area of New Planting of Conifers & Broadleaved Trees in England, Scotland & Wales 1984 – 2022



15.5.Chart 15.2 shows that in the early 1980s conifers were used predominantly when establishing new woods, or re-stocking after felling, and since about 2000, the proportions are now almost equal.

Chart 15.2: Conifers & Broadleaves Used in New Planting in Britain 2018 - 2022



Source: Forest Research 2022

15.6.It should be noted that a potential consequence of the adoption of the UKWAS restocking guidelines, which promote a more diverse forest structure, could result in a reduction in the

area of productive conifers in the longer term. This will become clearer with future updates of the National Forest Inventory.

15.7. The effects of the significant reduction in new planting and the increased use of broadleaved trees are now starting to become apparent in the shape and scale of the future availability of coniferous roundwood as the graphs in section 3 show.

15.8.New woodland creation, and increased planting of conifers will both need to have higher policy priorities if the contributions that virgin wood fibre grown in Britain can provide are to be increased in the longer term, and to do this there will need to be some changes in the land use and conservation policies.

Landfill & Recycling Policies

15.9.Recovering wood and putting it to a further use rather than committing it to a landfill site creates an additional source of wood fibre. This practice was stimulated by the principles of the European Commission's 5th Programme of Policy and Action in relation to the environment and sustainable development which required the UK government to prepare a waste strategy. The waste strategy policy on landfill was to promote landfill practices which would achieve stabilisation of landfill within one generation. This resulted in the UK Government introducing a Landfill Tax which is presently set at £102.10 per tonne (as of April 2023), except for certain lower risk wastes, such as soil, where the tax is £3.25 per tonne.

15.10.The size of the landfill tax has encouraged companies to pay greater attention to recycling material that would otherwise have gone to landfill. The quality of the material remains an issue in determining its suitability for particular end uses. Changes in present policies relating to recycling, and the size of the landfill tax, will affect the amount of recovered wood that is potentially available.

Climate Change & Renewable Energy Policies

15.11.The UK was the first major economy to create a legally binding target to bring greenhouse gas emissions to net zero by 2050. This target was set after considering the latest scientific evidence and was recommended by the Climate Change Committee (CCC), the UK's independent climate advisory body. Greenhouse gas removals (GGR), like trees and carbon capture and storage technology, were considered essential to compensate for the residual emissions arising from these hard to decarbonise sectors.

15.12.A number of financial incentive schemes were introduced by the Government, starting in 2002, to move the generation of energy in the UK away from fossil fuels to renewable ones. These schemes included the Renewables Obligation incentive, the Renewable Heat Incentive which was followed by Contracts for Difference and Feed in Tariff for electricity producers. All these financial incentive schemes are now closed to new entrants.

15.13.The policy and associated financial incentive were successful and as a result a significant amount of wood fibre is presently being used to generate heat and electricity (section 19) and any policy changes leading to an increase in financial support for wood fibre use for energy production is likely to result in reduced potential availability for other wood fibre users.

Housing & Use of Sustainable Materials Policy

15.14.In 2006 the UK Government introduced the Code for Sustainable Homes with the aim of achieving higher standards of sustainable house building practices. These requirements became encapsulated in the UK Government's Code for Sustainable Homes which was being superseded. In 2016 the UK then set a target for all new homes to meet the Zero Carbon Standard and this came in advance of the Energy Performance of Buildings Directive (EPBD)

target for all new buildings in the EU to be 'Nearly Zero-Energy Buildings' from 2020. These policies are no longer being pursued.

15.15.There has been a considerable amount of research work carried out on the carbon footprint of building materials, whole life building costs, the quality of the buildings being constructed and the energy use of buildings once constructed.

15.16.The present Government policies relating to building standards centre on decarbonising homes to help to meet the 2050 target rather than focusing on building materials to be used in housing or construction.

15.17.Of all the building materials presently used, timber has the best characteristics for most easily meeting these higher building standards. British grown timber can help to meet some of these policy objectives as well as making an economic contribution.

Interrelationship of Policies

15.18.The diversity of wood fibre uses means that its demand and potential availability can be directly or indirectly influenced by a number of Government policies. When policy changes are designed *directly* to influence wood fibre availability and demand, the consequences can be seen and measured. The bigger challenge is where policy changes on the use of wood fibre are *indirect*, such as energy policies as these may not be recognised. It is hoped that this report will make a useful contribution to understanding the many important uses of wood fibre in Britain and how they inter-relate.

16. CONCLUSIONS

16.1.The potentially available supplies of virgin coniferous wood fibre grown in Britain are limited compared with the quantities of wood fibre imported into Britain. This situation will remain unless further planting of conifers takes place which will mean depending on longer overseas supply chains for wood and wood products and the loss of an opportunity to contribute to the UK climate change targets through using more trees to capture carbon.

16.2.The potential availability of coniferous roundwood varies in Britain with most in Scotland and lesser amounts in England and Wales.

16.3.Coniferous roundwood is used mainly by the sawmilling and panelboard industries and for generating energy. While the sawmilling industry is solely dependent on roundwood, the panelboard and energy industries also use sawmilling co-products and recycled wood fibre and, in the case of the biomass energy sector, it also uses some other types of wood fibre.

16.4.Based on information collected on conifer log requirements for 138 sites in Britain, this report has found that forecast potential availability of roundwood exceeds forecast demand in Britain for the next 3 years. Demand for coniferous roundwood is then forecast to grow significantly and will match potential availability for about the next 5 years, after which there will be a period when potential availability will exceed forecast demand before dropping below demand.

16.5.This report also shows that there are noticeable imbalances in potential availability and demand for coniferous roundwood in different parts of Britain and this requires users to overcome them by transporting logs between regions or zones.

16.6.The Forest Research forecast is for potential availability based on surveys of Britain's woods. It is not a forecast of actual production and there are many reasons why actual production may be less than potential availability.

16.7.There are other sources of wood fibre that the biomass energy sector can use, such as willow, arboricultural arisings, broadleaved trees and miscanthus, but their use and potential availability are limited at present.

16.8.In the absence of new financial incentives, the biomass energy sector in Britain is not expect to grow, but the sawmilling sector is expected to increase its use of coniferous roundwood slightly over the next 5 years or so.

16.9.The panelboard sector have plans to expand their operations fairly significantly and it can be expected that this will result in a significant increase in demand for wood fibre. Coniferous roundwood will be in greatest demand, followed by recycled wood and sawmill co-products. If the wood fibre is not available in the fibre mix the panelboard industry would prefer, there will probably be a re-balancing of prices between the different fibre types and possibly with the biomass energy sector who use a similar wood fibre mix. It may also result in an increase in the recovery of clean wood fibre from the present solid wood waste stream if it results in higher prices.

16.10.The sector is contributing to the circular economy through reusing some 3 million tonnes of wood fibre annually in the pallet and packaging industry and this quantity is expected to increase as the sector is seeking to repair and reuse more pallets. Reusing wood fibre does not increase wood fibre availability, but it does reduce the overall demand for wood fibre.

16.11.The sector recycles just about 4.3 million tonnes of solid wood per annum of which some 63% goes to biomass plants and about 24% goes to the panelboard industry and about 8% goes to agricultural, horticultural or equine uses. The grades of recycled wood going to the biomass plants is not known. With a large number of waste to energy plants operating there is less incentive to separate out solid wood waste from other waste streams.

16.12.Defra statistics on waste indicate that in 2021 5.39 million tonnes of paper and cardboard were collected and that 3.8 million tonnes was recycled which is a recovery rate of 70.6%.

16.13.Given the environmental contributions trees and wood products can make, as well as the contributions they can make to the circular economy, these can only be increased if ways are found to increase the quantity of virgin wood fibre grown in Britain by planting more conifer trees. Even then there may be a dip in potential availability for a period until these trees can reach a size suitable for harvesting.

16.14.There is also a need to continue to focus on wood product innovation, and in finding operational and manufacturing efficiencies in the way British wood fibre is used as its availability is limited.

16.15.Given the scale and variety of demands for wood fibre, the prospects of its reduced availability over the longer term will undoubtedly reduce the economic and environmental contributions that the domestic forest sector and wood energy industry can make in the future.

John Clegg Consulting Ltd

May 2023

ANNEXES

17. STUDY METHODOLOGY

17.1. The study has been primarily a desk based one and the methodology used is described in more detail in this annex.

Geographical Coverage & Data Presentation

17.2. The study covers England, Scotland and Wales. To identify geographical variations in wood fibre availability and demand in England and Scotland both these countries have been divided into zones. The zones are based on ones used by the National Forest Inventory in presenting their 2022 forecast. (http://www.forestry.gov.uk/inventory).

17.3. In carrying out the fieldwork and presenting the results, the National Forest Inventory used a total of 14 different geographical regions in Great Britain. This study has been based on those regions, but some of the regions have been amalgamated to protect the confidentiality of some commercially sensitive information provided by companies in support of this study. Table 17.1 shows which regions have been amalgamated for the purpose of this study and to avoid confusion the areas used in this analysis have all been called Zones.

Table 17.1: Zone Names Used in this Study and in the National Forest Inventory

Names of Zones in Present Study	National Forest Inventory Regions
Northern Scotland Zone	North Scotland
	North East Scotland
Central Scotland Zone	West Scotland
	East Scotland
South Scotland Zone	South Scotland
Northern England Zone	North East England
	North West England
	Yorkshire & the Humber
Central England Zone	West Midlands
	East Midlands
	East of England
South England Zone	South West England
	South East England & London
Wales (Zone)	Wales

17.4. Map 17.1 shows the geographical boundaries of the zones that have been used in this report.

Map 17.1: Study Zones Based on the Regions used in the 2022 NFI Forecast of Potential Coniferous Roundwood Availability

Based on: National Forest Inventory Map, 2022

17.5. The zones shown in map 17.1 are the same as those used in previous analysis of wood fibre availability and demand.

Identification of Potential Users & Exporters of Wood Fibre

17.6. The initial task was to update the identification of as many sawmills, pulp and paper mills, and panelboard mills as possible that use coniferous roundwood in England, Scotland and Wales. This

was done using information on the company's files and published information sources. All of the larger operations have been identified, but some of the smaller roundwood fencing operations that use coniferous roundwood could have almost certainly been missed. A number of smaller sawmills included in the 2016 analysis have also closed.

17.7. A breakdown showing the numbers, types of plant and their geographical locations of the plants included in the survey is given in table 17.2.

17.8. The survey has not covered:

- The wood used by the sawmills, pulp and paper and board mills for generating their process heat or running kilns as the wood fibre has been allowed for in their roundwood intake, or in their estimates of other products they have used.

- The estimated 22,340 boilers installed in domestic buildings in the UK which are using about 176,820 green tonnes per annum of wood fuel mostly in the form of pellets.

- The quantity of hardwood logs burnt in domestic fires.

- The sawmills using broadleaved / hardwood roundwood as they are all small and geographically scattered and their total demand for broadleaved roundwood is very small in relation to its potential availability, and in relation to the size of coniferous roundwood availability and demand. (See section 7).

17.9. A number of companies supply wood fibre to biomass plants throughout GB. The only companies that have been recorded in table 18.2 are the ones which we understand are supplying small quantities of wood chips to boilers in domestic premises or small businesses. If the quantities of coniferous logs and sawmill co-products that the larger companies supply directly or indirectly to the large biomass plants, it would almost certainly lead to double counting of quantities as Ofgem statistics record the total quantities of the different types of wood fibre supplied to each plant annually. Using Ofgem statistics is likely to provide a much more accurate information on the quantities of wood fibre supplied to biomass plants than building up totals from information obtained from individual supplying companies as some companies and quantities might be missed accidentally. Double counting could also occur.

Table 17.2: Geographical Locations & Types of Plants included in this Report

Zone	Plant Type									Total All Plants
	Sawmill Plants	Panelboard Mills	Paper Mills	Animal Bedding & Horticultural Products	Energy Plants using some Virgin GB Fibre	Energy Plants using Recycled Wood Fibre	Pellet Producers & Biomass Suppliers	Fencing	Exports	No
Northern Scotland	7	1			1		4			13
Central Scotland	8	1			1	1	4			15
South Scotland	13	1	1		2		2			19
Northern England	17	1	1	2	3	2	1	2		29
Central England	15			2		7	1			25
South England	9	1		1	1	4				16
Wales	8	1			3		2			14
Exports									7	7
Total	77	6	2	5	11	15	14	2	7	138

Footnotes: Sites where forestry companies are using biomass to generate heat or electricity on site and are not separately identified in the table.

Some companies own and operate more than one plant counted in the table.

Information on energy plants has been obtained from Ofgem statistics and has not been supplied by every individual company.

Eight energy plants using some virgin GB fibre also use recycled wood fibre.

Generating plants using imported wood pellets are not included.

17.10.Table 17.3 compares the present coverage of this study with the ones conducted in 2010 and 2016.

Table 17.3: Numbers of Plants Included in 2010, 2016 & 2022 Analyses

Type of plant	**2010**	**2016**	**2022**
Sawmills	61	89	76
Panelboard Mills	7	6	6
Paper & Paperboard Mills	2	2	2
Energy Plants using some GB Virgin Fibre	16	24	11
Energy Plants using Recycled Wood Fibre			15
Proposed New Energy Plants	47	13	0
Animal Bedding & Horticultural Producers			5
Pellet Producers & Biomass Suppliers			14
Fencing			2
Other	6	7	7
Total	**137**	**141**	**138**

17.11.The total number of businesses and sites covered by this study is slightly down on the 141 covered in the 2016 study, but the table also shows that there have been some changes in total numbers of plants in each category covered by the study. Animal bedding and horticultural product producers, fencing producers as well as pellet producers and biomass suppliers were included in the 2016 study but were not identified as separate categories. Another major difference is that no proposed new energy plants were identified this time, but there are three companies that are interested in new developing new products, who have not contributed any information to this study, and so there is no provision in the analyses for this report of any wood fibre two of the companies may require in the future.

17.12.Some additional small sawmills have been included in the 2022 analysis and have contributed information to this study, but other significant changes since 2016 are:

- 5 small to medium sized sawmills have closed
- 14 very small sawmills have closed
- 8 biomass plant proposals that companies had anticipated in 2016 would proceed using virgin GB wood fibre are no longer doing so.

17.13.The closures of the sawmills is almost entirely due to economics, the Covid pandemic, site constraints or the size of the investment required to upgrade plant and equipment to be competitive or to meet higher Health & Safety standards. The reason the biomass plant proposals did not proceed is probably explained by changes in energy policy which are detailed in the main report.

Survey Form Design

17.14.It was agreed with the study sponsors that very similar forms to those used in the previous studies would be used again as they were found to be satisfactory in the last two surveys. There were separate forms for sawmills, pulp and paper mills and board mills, log exporters and energy plants. The forms asked companies to supply information on the quantity of roundwood they used in 2020 and 2021, what they expect to use annually up to 2046, and the zones from which the roundwood was being or could be sourced in the future. In addition, sawmills were asked to supply information on the types and quantities of sawmill products (e.g. unbarked/barked chips, slab wood, sawdust and bark) they estimated they produced, or are likely to produce, and what the uses of these products were, or might be in the future. The panelboard and paper mills were asked about the wood fibre types they used and their zonal sourcing.

17.15.Respondents were asked to identify from which zones they expected to source their logs by providing average annual percentages. As other companies do not know these sourcing plans, the competition may be higher than anticipated and buyers may change their purchasing intentions and buy roundwood in other zones, thus shifting potential demand around between zones. Total purchasing intentions in a zone could also work out to be higher than expected so the net availability of coniferous roundwood may not be a precise figure for a particular year, but it will provide a useful indication of potential demand for coniferous roundwood in that particular zone.

17.16.Previous discussions about what roundwood size categories to use resulted in the conclusion that few mills kept a detailed inventory of the size categories of roundwood they used so there would be no merit in seeking to collect this information and trying to match it to the forecasts of potential roundwood availability.

Distribution of Survey Forms & Responses

17.17.The survey forms were all emailed out in September 2022. Reminder emails were sent out in November 2022 and further follow up emails and phone calls were made to individual companies up until the end of April 2023 with the aim of maximising the response rate and therefore the accuracy of the likely demand for coniferous roundwood. Every company identified and sent a survey form completed one.

17.18.Most of the large biomass plants were not asked to provide information because the information was available from an Ofgem dataset for 2020.

17.19.As all the companies asked for information about their demand for coniferous roundwood and supplies of sawmill co-products provided information, the response rate can be taken as one hundred percent.

Analysis of Results

17.20.The confidential information on the returned survey forms was entered on Excel spreadsheets where it was analysed. Some practical issues that were identified in analysing the data were:

- the returns from some sawmills covered only single shift working, while for others it might cover extended or double shift working. Potentially all sawmills could move to double shift working if there was the demand and there was suitable quality coniferous roundwood available at an acceptable price.

- The locations of some sawmills and wood energy plants are very close to zonal boundaries and so there will be some distortions arising from this in the zonal transfer data for coniferous roundwood and sawmill products.

17.21.As the response rate was 100% for the companies contacted, the results can be regarded as a complete and very accurate picture of the potential wood fibre availability and demand in Britain up to 2046 based on the information presently available. The study has not covered the numerous very small users so the scale of demand will be slightly underestimated.

18. Coniferous & Broadleaved Roundwood Availability Forecasts

18.1.This section begins by providing information on Britain's woodlands and describing where the forecasts of coniferous and broadleaved roundwood availability have come from that are used in this report. It then goes on to consider a number of technical issues starting with a brief analysis of the different contexts in which the term 'availability' can be used before explaining how the term is defined for the purposes of this report. The factors that will shape the overall future availability of coniferous roundwood in England, Scotland and Wales are then identified, along with the technical information that any forecast should ideally provide if it is to bring the greatest strategic and operational benefits to businesses. The remainder of the section then presents the results for the 25-year coniferous roundwood availability forecast published by the Forestry Research in 2022 and the 50-year availability forecasts for softwood and hardwood timber published in 2014 which have not been updated since then.

Area of Conifers Used in Roundwood Availability Forecast

18.2. The forecast of coniferous roundwood availability is based on different areas to the ones given in Forestry Facts and Figures. The differences are shown in table 18.1.

Table 18.1: Comparison of Areas of Conifers in England, Scotland and Wales in 2022 on which the Roundwood Availability Forecast is based with those given in Forestry Facts & Figures

'000 hectares

	Forestry Facts & Figures 2022	NFI Roundwood Availability Forecast
FE/FLS/NRW		
England	151	124.6
Wales	96	70.6
Scotland	426	335.1
Private		
England	192	153.0
Wales	56	48.7
Scotland	666	513.3
GB	**1,587**	**1,245.3**

Source: Forestry Facts & Figures. Forestry Research, 2022.

18.3. The difference of 341,700 ha difference between the two sets of figures is understood to be accounted for by 'fallow ground'.

Source of Forecasts on Roundwood Availability

18.4.The wood availability forecasts used in this study have been prepared and published by Forestry Research and are based on National Forest Inventory data. More detailed information about the methodology used to conduct the inventory and the statistical accuracy of the estimates can be found on the Forest Research's website: How our woodlands might change over time; NFI

forecast reports - Forest Research.

18.5.The following three estimates of coniferous and broadleaved roundwood availability in Britain were prepared and published by the Forestry Commission and have been used in this report:

- A 25-Year Forecast of Softwood Availability for the UK – July 2022.
- A 50-year Forecast of Softwood Timber Availability – April 2014
- A 50-year Forecast of Hardwood Timber Availability – April 2014

18.6.The methodology used in presenting these forecasts is given in the respective reports and is therefore not repeated here.

TECHNICAL ISSUES

Defining Roundwood Availability

18.7.The terms 'roundwood production' and 'roundwood availability' are sometimes used inter-changeably in certain contexts. In this report the term 'roundwood production' is taken to be the actual outturn of roundwood that is produced as a result of harvesting operations. 'Roundwood availability' refers to the roundwood that is available in the forest and it may be described as being either 'potentially' or 'commercially' available. The distinction between the two terms is very important. Where roundwood is described as being 'potentially' available it is taken to mean the maximum quantity of commercially suitable roundwood that could theoretically be harvested for commercial purposes. i.e. the biological potential. In practice there will be a number of planning, environmental, landscape, social, harvesting cost and location factors that commercial users will need to take into account in developing roundwood harvesting plans and these are likely to mean that commercial availability will be less than 'potential availability' to a greater or lesser degree at local, regional and national levels.

Some Important factors Relating to the Wood Availability Forecast

Comparison of 2022 Forecasts with the Previous One

18.8.Perhaps the two most notable results of this forecast, when compared to previous forecasts, are that:

- There is an increase of about 25% in the estimated present standing volume per hectare in privately owned woods in GB, and
- This increase in volume per hectare continues into the future.

18.9.Forest Research has identified the following reasons for this:

- The introduction of the new M1v2 growth and yield models has led to an overall increase in observed yield class (YC). This has raised the estimated average standing volume overall.
- Under the M1v2 growth and yield models, many species, including spruce, continue to grow steadily, into their 70's, 80's and 90's, well beyond the age of maximum MAI derived from the earlier M1 model, whereas the M1 models had a decline in growth in older stands.
- Stands will have grown in the 5 year period between the 2016 and current forecast, and this difference would have been forecast as higher with the application of the M1v2 yield models.

- The thinning assumptions used in the forecast management assumptions have lead to an increase in the estimates of the forecast of standing volume. In this forecast, only two thinnings in the stand's lifetime are assumed, whereas previous forecasts assumed multiple thinning events based on management table prescriptions. As a result of lower thinning volume being removed, higher standing volumes are estimated over time.

Size of Woods

18.10.The NFI includes woods of 0.5 hectares and over and consequently the potential availability figures given in this report include the quantities of roundwood from these small woods which can often not be considered to be commercially viable to harvest.

Differences Between Forecasts for the Forestry Commission, Forestry & Land Scotland & NRW Managed Woods & Privately Owned Ones

18.11.It is important to note that the forecast of coniferous roundwood availability has been developed using two quite different approaches**.** The forecast produced by Forestry & Land Scotland, the Forestry Commission and NRW has been developed using detailed information on growing stock in each Forest District, together with harvesting prescriptions from current design plans and crop management regimes. The output is therefore built up from the stand/felling coupe level and represents a production plan for the first five years and thereafter an indicative forecast of production.

18.12.The forecast for the private sector is based on much broader information about crops obtained from the National Forest Inventory (NFI). An important limitation on the private sector forecast is that the private sector woodlands are in a multiplicity of ownerships and the management and production assumptions do not include firm individual or collective plans to harvest timber at a particular time, although they are based on a set of management prescriptions provided by the larger woodland management companies.

Harvesting Scenarios

18.13.The potential availability forecasts will be influenced to some extent by when and how woods are harvested, particularly in the private sector and these scenarios are explored in the wood availability reports published by the Forest Research.

Stands Beyond Rotation Age or 'Overdue' Timber in Private Sector Owned Woods

18.14.The existence and treatment of 'overdue' timber is a very important aspect of the forecasts used in this report. The forecast reports state that "'overdue timber' is timber contained within stands that are already over the diameter prescribed for felling according to the management scenario used for a forecast at the start of the forecast period. Application of the rules of the scenario dictates that such stands be immediately felled on day one of the forecast. With this being the case, this prescription is followed in the implementation of the forecast, but the volumes immediately felled by reason of being 'overdue' are reported separately from other harvested volumes – in recognition that this is an artificial and unlikely occurrence."

18.15.Overdue timber represents a significant amount of total standing volume at the start of the forecast, indicating that a portion of the estate is not currently being managed to either maximum MAI or shorter rotations, such as those based on target diameter. This is especially so in the private sector and implies that the current practice on at least a portion of the private sector estate is to leave some stands beyond the age of maximum MAI or the target diameter. Some **98.6 million cu m of softwood timber was estimated to be overdue** on the GB private sector estate as of 31 March 2021. This is an increase in overdue volume in the private sector compared to the 2016 estimate of 49.6 million cu m. The increase is due to two key factors. The

application of a different basis for deriving felling ages, and the continued increment in existing overdue stands. For spruce in particular, the change of management assumptions between the forecasts, results in an earlier felling age thereby classifying more stands as overdue. Additionally there is continued increment in existing overdue timber as more stands reach and pass either the target diameter or age of maximum MAI without being harvested.

18.16.To produce a balanced forecast, woodland inventory data of different ages must be brought to 'one age'. To bring the base year of the private sector field data (2018) to the same as that of the public sector data (2021) the headline target diameter harvesting scenario was applied individually to stands contained in the NFI second cycle data, growing and managing each stand from its assessment date through to 2021. This assumed that a proportion of the overdue timber was harvested in this preliminary period through to the base year of the forecast (2021). Thus, the forecast assumes that a proportion of the overdue volume has already been harvested prior to the first forecast period of 2022–26. The 25-year forecast for the private sector then continues to assume that a proportion of the remaining overdue volume is harvested over 20 years and thus a proportion of the overdue volume is included in the estimates of softwood availability. Whether or not this overdue timber is harvested will depend on a number of factors, including management objectives and environmental constraints. In practice a wide array of felling and retention practices will apply to these stands, with some being retained and some felled at different points in time in the future.

18.17.For the GB public sector estate, the overdue volume is assumed to be cut in the first period of the forecast.

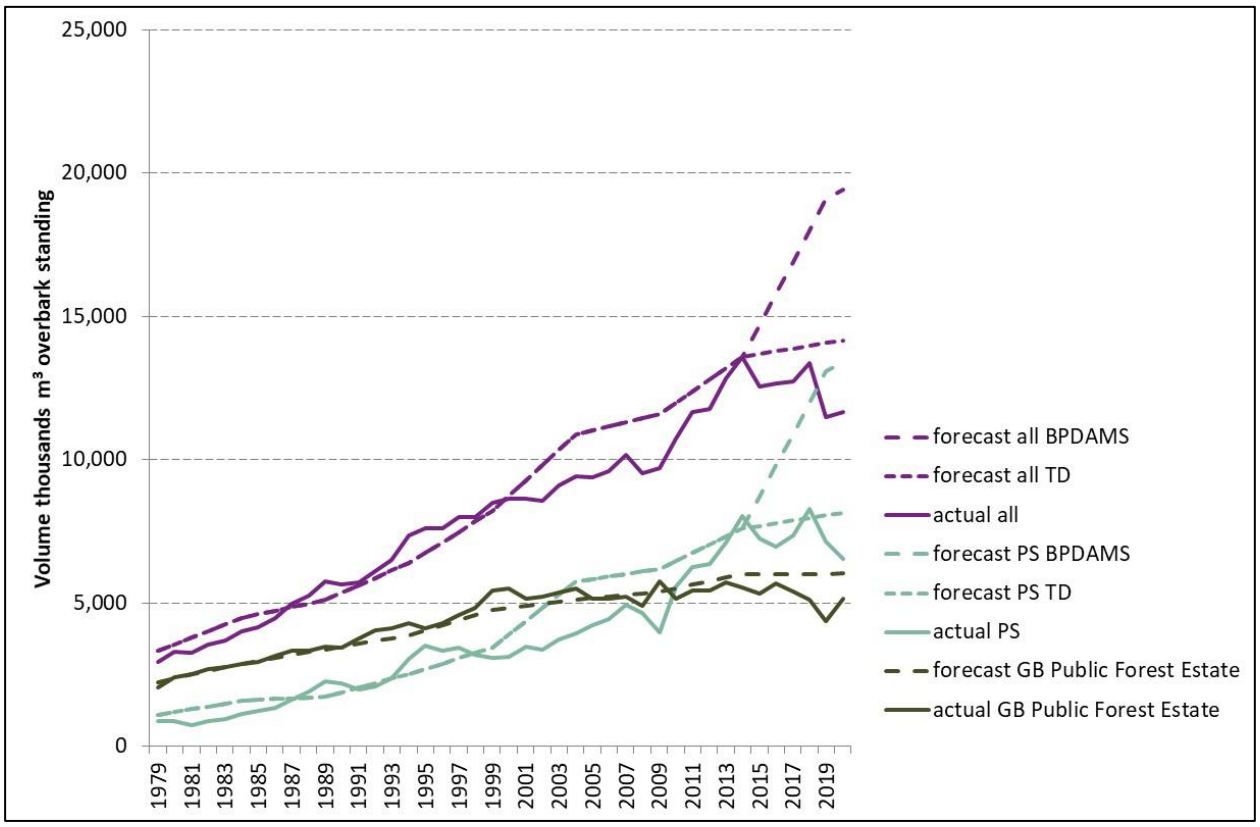
18.18."All areas felled as overdue will be restocked in the forecast on a like-for-like basis, as is the case for any other felled stand in the forecast period. In most scenarios, this approach will not materially impact on the forecast timber volumes as the replacement stands will not mature within the forecast period. For more information about the Inventory methodology, see the *National Forest Inventory forecasts methodology overview."*

Comparison Between Forecasts of Potential Availability & Actual Production

18.19.Forest Research has recently published the results of an analysis comparing forecasts of potential coniferous roundwood availability and actual production[14] and these have been copied from Forest Research's report and are shown in chart 18.1.

[14] Forestry Commission,2016. 25 Year Forecast of Softwood Timber Availability (2016)

Chart 18.1: Comparison of Forecasts of Potential Coniferous Roundwood Availability and Actual Production



Source: Forest Research NFI 2022.

Footnote: There are lines for private sector which diverge after 2014. One based on modified biological potential scenario (labelled forecast PS BPDAMS). The second based on target diameter scenario (labelled forecast PS TD).

18.20.While there will undoubtedly be a number of reasons for the differences, this gap is potentially very significant as potential availability and demand for coniferous roundwood becomes increasingly tight.

Differences in Forecasts Between 25-year and 50-year Coniferous Roundwood Availability Forecasts

18.21.The methodology used in developing the two forecasts is broadly the same and is described in detail in both reports, but the main reasons for differences are in the private sector forecasts and have been identified as:

- Age class structure
- Harvesting activity
- Overdue timber

18.22.For further information, see the Forest Research's Forecast Availability reports.

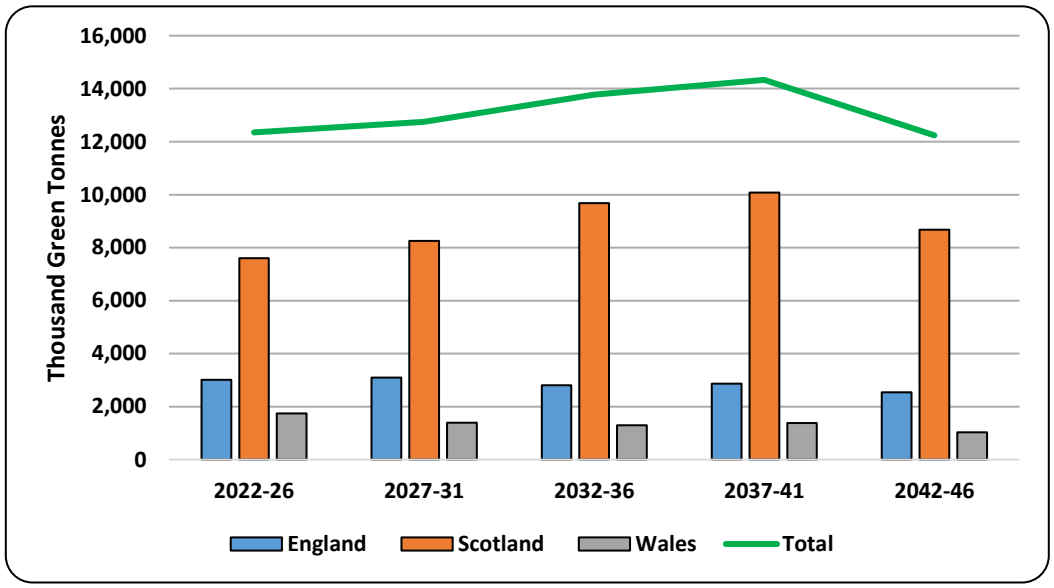
Coniferous Roundwood Potential Availability Forecast

18.23.The forecast of potential roundwood availability is based on the areas of woodland, their composition and ownership in 2022 given in table 18.1.

18.24.Forest Research's 25-year forecast is given in table 19.2 and it shows forecast average annual availability of coniferous roundwood above 7 cm t.e.d. in England, Scotland and Wales by zones for each five-year period after converting from standing volumes to roundwood outturn in tonnes.

18.25.This forecast is shown graphically in chart 18.2 for England, Scotland and Wales for each of the five year periods.

Chart 18.2: Average Potential Availability of Coniferous Roundwood in 5 yearly Intervals for England, Scotland & Wales 2022 -2046



Source: Forest Research, 2022

18.26.This chart shows that the potential average annual availability of coniferous roundwood (and therefore by implication sawmill products) is small in Wales, and also in England given the size of the country's total woodland area relative to Scotland's. The chart also shows that the total potential availability of coniferous roundwood is forecast to rise until about 2040 and then it starts falling. This is approximately 10 years later than the previous forecast Almost all the forecast increase over the next 15 years is expected to occur in Scotland.

18.27.The location of the coniferous roundwood that is forecast to be potentially available is very important for industry. Roundwood located a long way from an existing wood processing or wood energy plant may be uneconomic to purchase and transport, particularly at a time of rising fuel prices and global price competition. At present it is not possible to use GIS to show the FC's forecast availability of coniferous roundwood at a greater local detail other than zones, nor can the locations of the coniferous woods and forests underlying the forecast be shown.

Table 18.2: 5 Yearly Forecasts of Average Coniferous Roundwood Availability for England Scotland & Wales from 2022 to 2046 converted to '000 tonnes of Roundwood

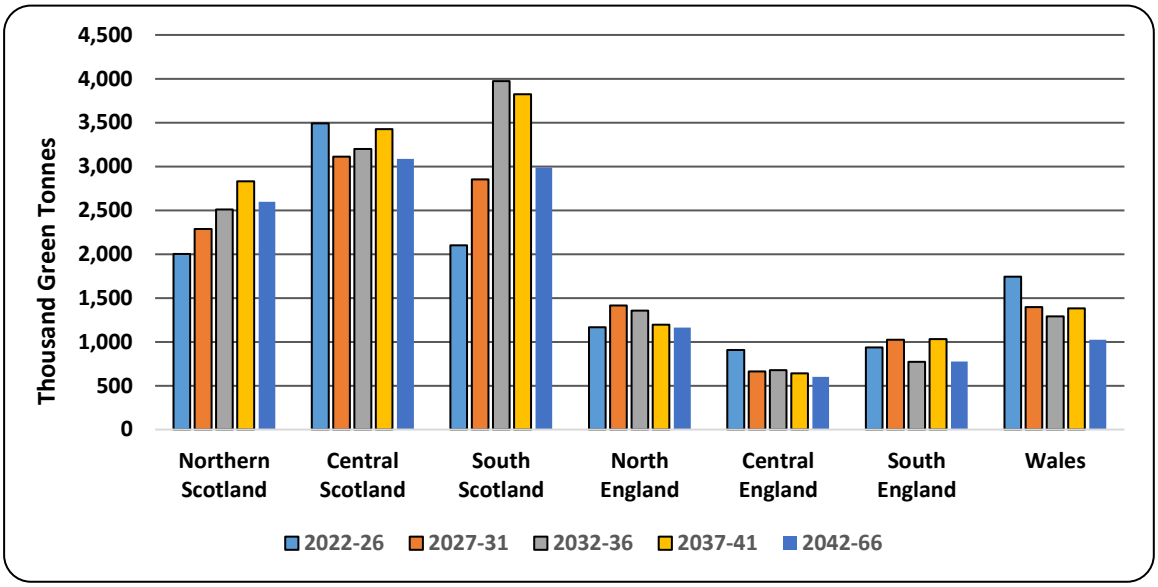
	2022-2026			2027-2031			2032-2036			2037-2041			2042-2046		
Top-diam Class	FLS / FE / NRW	PS	Total	FLS / FE / NRW	PS	Total	FLS / FE / NRW	PS	Total	FLS / FE / NRW	PS	Total	FLS / FE / NRW	PS	Total
Northern Scotland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	134	78	212	101	99	200	84	133	216	66	149	216	88	159	247
14-16 cm	62	43	106	52	58	110	43	79	122	33	85	118	33	89	122
16-18 cm	69	61	130	57	80	138	52	105	157	41	112	153	37	114	151
18 + cm	496	1,059	1,555	485	1,356	1,841	441	1,574	2,015	401	1,943	2,344	374	1,705	2,079
Total	762	1,241	2,002	695	1,594	2,289	621	1,890	2,511	541	2,290	2,831	531	2,067	2,599
Central Scotland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	230	120	349	194	117	311	151	151	302	144	182	326	157	174	331
14-16 cm	109	76	185	100	70	170	83	91	174	75	103	178	72	98	170
16-18 cm	120	102	221	114	97	211	98	122	221	87	136	223	80	125	206
18 + cm	1,179	1,557	2,736	811	1,610	2,421	778	1,724	2,502	666	2,034	2,700	593	1,788	2,381
Total	1,638	1,855	3,492	1,219	1,893	3,112	1,110	2,088	3,198	971	2,456	3,427	903	2,185	3,088
South Scotland				0											
7-14 cm	184	75	258	149	121	121	123	194	317	89	207	296	126	169	295
14-16 cm	93	42	134	83	70	153	70	120	189	50	126	176	57	102	159
16-18 cm	103	61	164	97	98	195	84	166	249	62	171	233	66	131	197
18 + cm	643	902	1,545	658	1,578	2,236	616	2,602	3,218	499	2,622	3,120	459	1,877	2,336
Total	1,023	1,079	2,102	987	1,867	2,854	892	3,082	3,974	699	3,126	3,825	708	2,279	2,987
North England	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	112	34	146	107	50	157	89	51	140	71	47	118	84	42	126
14-16 cm	52	19	71	52	30	82	45	30	75	36	26	62	39	24	63
16-18 cm	53	28	81	55	41	96	51	39	89	41	33	74	43	33	76
18 + cm	303	566	868	305	772	1,077	308	742	1,050	304	636	941	311	585	895
Total	520	646	1,166	520	893	1,413	494	862	1,355	453	742	1,195	478	683	1,161
Central England	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	24	27	51	20	16	36	19	16	35	17	21	38	23	19	42
14-16 cm	10	16	26	10	10	20	10	9	19	8	11	19	7	9	16
16-18 cm	12	24	36	12	14	26	12	12	25	11	14	25	9	11	21
18 + cm	167	628	795	179	401	580	171	428	599	159	401	560	157	366	523
Total	213	695	909	221	441	662	212	466	678	195	446	641	197	405	602
South England	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	19	38	57	16	39	56	14	31	45	21	42	62	24	22	46
14-16 cm	8	21	30	8	21	30	7	12	19	7	24	30	7	11	19
16-18 cm	9	30	39	10	28	38	8	17	25	7	32	39	8	16	24
18 + cm	136	676	812	178	725	903	168	514	682	142	759	900	144	545	689
Total	172	765	937	212	813	1,026	197	575	772	176	856	1,032	183	595	777
Wales	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	171	45	216	128	40	168	98	34	132	100	56	156	67	50	117
14-16 cm	77	27	104	62	23	84	48	21	69	48	32	80	25	25	51
16-18 cm	84	35	120	69	31	100	56	29	84	57	41	98	28	30	58
18 + cm	721	584	1,305	576	467	1,042	454	550	1,005	463	585	1,048	256	543	799
Total	1,053	691	1,744	834	561	1,395	655	635	1,290	667	713	1,381	376	649	1,025
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7-14 cm	873	416	1,289	566	484	1,050	577	611	1,188	508	704	1,211	570	635	1,205
14-16 cm	411	245	656	367	281	648	305	362	667	256	408	663	242	358	600
16-18 cm	451	340	791	414	390	804	362	490	851	306	539	845	271	461	732
18 + cm	3,645	5,971	9,616	3,191	6,909	10,100	2,937	8,134	11,071	2,634	8,980	11,614	2,294	7,409	9,702
Total	5,380	6,972	12,352	4,538	8,063	12,601	4,181	9,596	13,778	3,703	10,630	14,333	3,377	8,863	12,239

Source: Forestry Commission, 2022

Footnote: FLS – Forest & land Scotland, FE = Forest Enterprise, NRW= Natural Resources Wales and PS = Private Sector

18.28.The potential availability of coniferous roundwood by zones, and by 5-year periods, up to 2046 within England, Scotland and Wales is shown in chart 18.3.

Chart 18.3: Potential Average Annual Availability of Coniferous Roundwood by Zones in England and Scotland and in Wales by Five-Year Periods from 2022 to 2046



Source: Forest Research , 2022

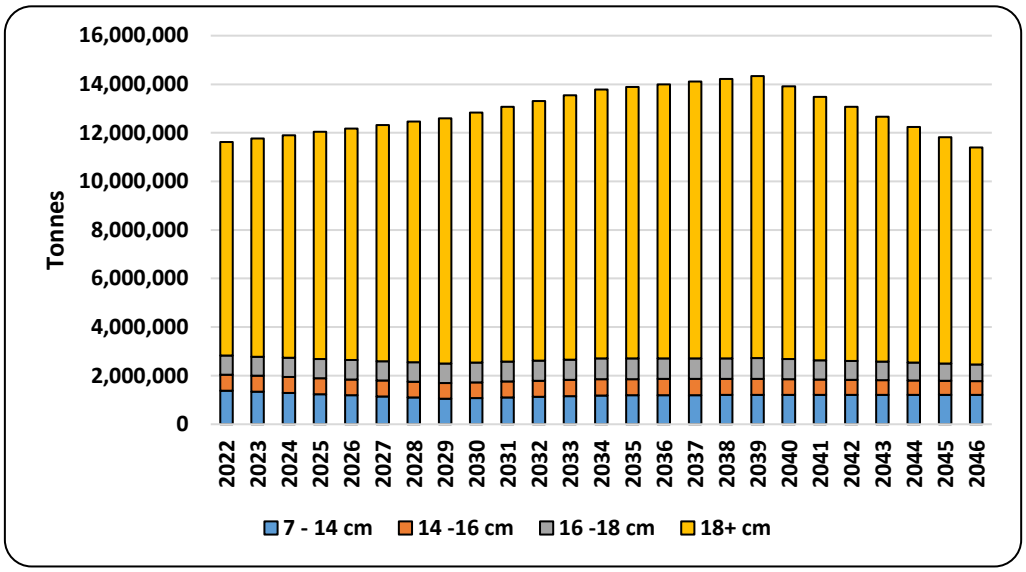
18.29.This shows that in the next 15 years the greatest increases in annual average coniferous roundwood availability is forecast to occur in Scotland. The potential availability of coniferous roundwood in Central and South England, and in the North England and Wales, zones is forecast to gradually decrease. Another notable feature is that the potential availability of coniferous roundwood is forecast to *fall* sharply in South Scotland after 2036 and this is where a significant part of the wood processing industry is located.

18.30.Forest Research's potential coniferous roundwood availability forecast is given as an average annual volume over a 5-year period throughout the rest of the report. For the purpose of presenting the data in this report, the forecast has been smoothed to show changing annual quantities on the assumption that the forecast annual quantities for a five-year period occur in the mid-point of the Forest Research's five-year forecasting period.

POTENTIAL QUANTITY & DIMENSIONS OF CONIFEROUS ROUNDWOOD

18.31.The forecast potential availability of roundwood by size categories is shown in chart 18.4 based on the information in table 14.3.

Chart 18.4: Potential Availability of Coniferous Roundwood by Top End Diameter Size Categories in Britain 2022 – 2046



Source: Forest Research, 2022

18.32.The chart shows that the future growth in availability of coniferous roundwood in England, Scotland and Wales will be in sawlogs with a top diameter of 18 cm or more, and not in logs with a top end diameter of less than 18 cm. Little change is forecast in the future availability of coniferous roundwood with a top diameter of less than 18cm.

18.33.The size of coniferous roundwood will have a major influence on its suitability for different end uses. Roundwood with a top diameter from 7 cm to 16 cm has been defined as small roundwood (SRW) for the purposes of this study and is mostly used for industrial wood processing. It is also normally lower priced than sawlogs. For these reasons this size of material is considered most suitable for use by wood fired energy plants. Roundwood with a top diameter of 16 cm and upwards has been defined in this study as a sawlog.

Quality of Coniferous Roundwood

18.34.The quality of potentially available roundwood is of considerable importance to the sawmilling industry, particularly in relation to the straightness of a log and the size of the branches, as this will have a major influence on its suitability for different end uses. Straight logs of 3 metres or more in length, preferably with small branches, originally called 'green' logs, are required if the material is to be used to produce sawn timber for the very large construction market. Other markets for domestically grown timber are smaller; more localised and are already fairly well supplied. The quality of the roundwood is not as critical for other commercial end users as the material is mostly debarked and then chipped or flaked.

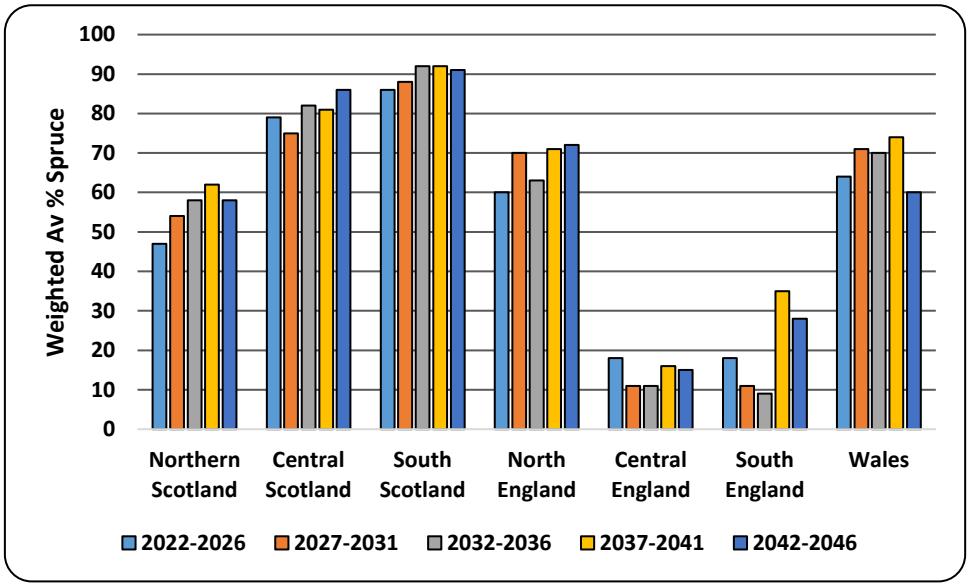
18.35.The quality of the roundwood resource is therefore critical to the expansion of the British sawmilling industry and therefore to the future potential availability of sawmill products. Forest Research's potential coniferous roundwood availability forecast does not give information on the quality (straightness) of the roundwood that is potentially available.

Species Composition

18.36.The species of tree from which the roundwood comes is important for some end uses because of the type of wood fibres it contains. Some end use processes are dependent on using spruce, such as paper and paperboard making and MDF production, but for other purposes a variety of other coniferous species can be used e.g. particle board production and

wood fired energy plants. For the purposes of this study roundwood has been categorised into Spruce (predominantly Sitka spruce) and Non-spruce. This coincides with the categorisation used in the wood availability forecasts. The spruce : non-spruce composition of the roundwood forecast in each zone or country does not vary by more than 2 or 3% points either way over the next 15 years so the average percentages for each zone in England and Scotland and for Wales have been calculated for the 15-year period and they are shown in chart 18.5.

Chart 18.5: Weighted Average Percentage of Spruce in Forecast Roundwood Availability by Zones 2022 – 2046



Source: Forest Research, 2022

18.37.The chart shows that the highest percentages of spruce roundwood are available in the Central and South Scotland zones. In the Northern England and Wales zones approximately 60% - 70% of the coniferous roundwood that is forecast to be potentially available is forecast to be spruce, and the figure for the Northern Scotland zone varies between slightly less than 50% to just over 60%. In the Central and South England zones, the percentages range from less than 10% to a maximum of 35% with the non-spruce material comprising a mix of other species, but with pines and larches predominating.

Conclusions on Coniferous Roundwood Availability

18.38.There are a number of uncertainties surrounding the forecast potential availability of coniferous roundwood from the private sector over the next 20 years for the reasons explained earlier in this section, but there are some fairly clear conclusions that can be drawn from the available information:

- *The potential availability of coniferous roundwood is forecast to increase over the next 17 years up to about 2040 with the majority of the increase forecast to occur in Scotland.*
- *After 2040, the potential availability of coniferous roundwood is forecast to decline quite sharply and this is particularly acute in South Scotland.*
- *Whether the forecast potentially available all comes to market after allowing for constraints due to cost, planning and other technical issues is unknown.*

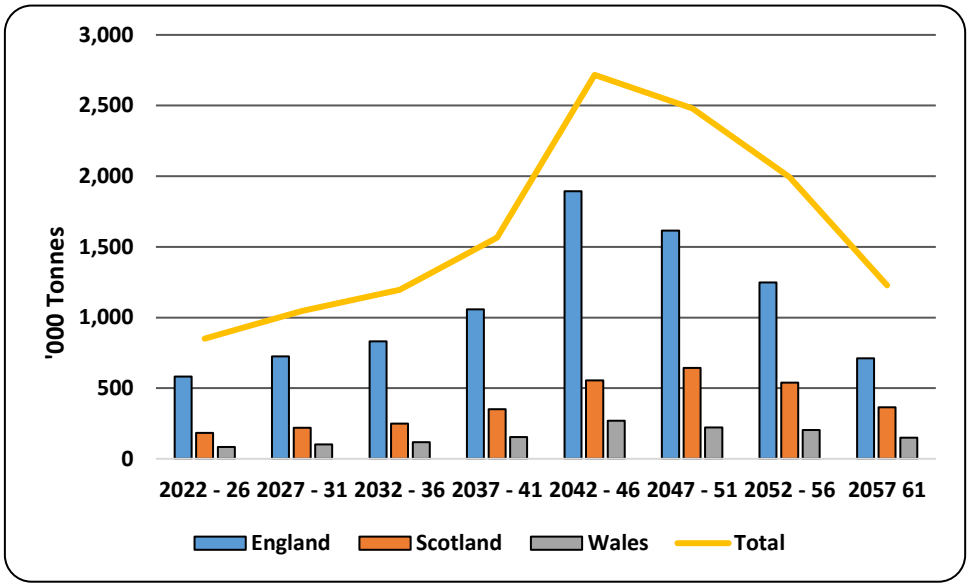
- *The majority of the forecast additional roundwood will be sawlog material of 18cm + ted and that has cost and technical utilisation implications.*
- *The quality of the roundwood that is forecast to become available is unknown, but it will influence what the roundwood can be used for.*

18.39.More detailed analyses of the potential availability and demand for coniferous roundwood by zones are given in the following sections.

Broadleaved Roundwood Potential Availability Forecast

18.40.The methodology used to produce a 50-year forecast of broadleaved availability in Britain is given in the Forestry Commission report from which this information has been taken. The forecast is shown in chart 18.6 and is based on sites showing recent thinning activity.

Chart 18.6: 50-Year Forecast Broadleaved Roundwood Availability in Britain 2022 – 2061, based only on Sites Showing Recent Thinning Activity



Source: Forestry Commission, 2014

18.41.The chart shows that potential availability of hardwood roundwood is forecast to rise over the next 35 years and that the majority of broadleaves will be in England. Eighty to ninety percent of the potential availability is forecast to be in the private sector.

19. Wood Fibre Use by Energy Plants

19.1.The use of wood fibre for generating electricity and heat really only started to develop after 2000 when the Government indicated that it wanted to encourage companies to move away from generating electricity from coal, oil and gas for environmental reasons towards using renewable fuels such as biomass. One of the incentives that was offered to companies was provided through the Renewable Obligation (RO) scheme. Another was offered to companies wanting to generate renewable electricity on a large scale under what was called the Contracts for Difference (CfD) scheme. Home owners were offered incentives to switch to renewable heating systems through a scheme called the Renewable Heat Incentive scheme and this scheme was extended to Non-Domestic buildings in 2011 and a number of companies in the forest sector took advantage of the scheme. All these incentives schemes are now closed and no new proposals to develop entirely new biomass plants using any wood fibre

have been identified.

19.2.Significant changes have taken place over the last 20 years in the numbers of companies using or proposing to use biomass to generate electricity. In 2010 there were 16 plants in Britain that were using wood fibre to generate energy, or make wood pellets, and a further 47 wood energy plants that were at the planning stage. In addition, some major electricity generators were also using some wood fibre, and other forms of biomass, for co-firing which they were mainly importing. In 2016 there were 24 wood energy and pellet plants operating in Britain and there were a further 13 plants that were either under construction, or were still at the planning stage that expected to use wood fibre if they became operational.

19.3.This section identifies the number of wood energy plants operating in Britain in 2022 and the types and quantities of virgin and recycled fibre sourced in Britain and from overseas that are presently being used to generate electricity and heat in Britain. This data has been taken from Ofgem's Biomass Sustainability Report 2020 - 21 Dataset which is the most recent dataset available at the time of preparing this report.

19.4.There are in addition three companies operating wood pellet plants in Britain, which could be described as energy plants, but they are only included in the statistics provided in this section if they are registered under the RO or CfD schemes.. They have contributed information to this survey and their wood fibre use has been allowed for in forecasting virgin wood fibre use in section 3, but no other biomass information about these companies is included in this section.

ELECTRICITY PLANTS OPERATING UNDER THE RO SCHEME

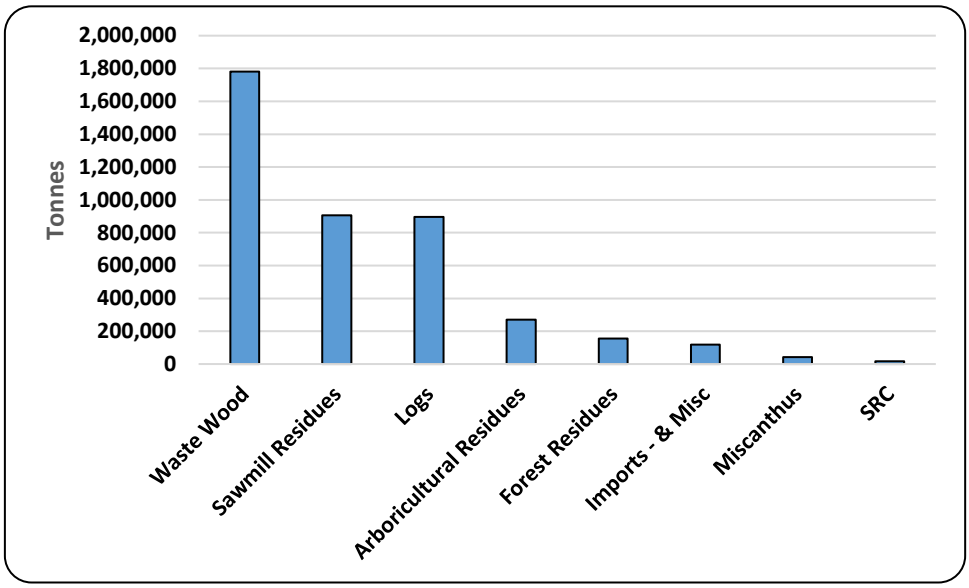
19.5.There are a total of 110 plants registered under this scheme producing electricity, or electricity and heat, using a wide variety of different fuel sources such as used cooking oil, straw, alcohol, food waste and cow slurry. Out of this total there are 12 companies that use a significant quantity of virgin wood fibre in the form of coniferous logs from Britain's forests and woods sawmill co-products, as well as arboricultural arisings and forest residues sourced from Britain's woods and forests. Their use of virgin fibre has been accounted for when assessing the potential availability and demand for virgin wood fibre in Britain in section 3. There are a further 3 biomass plants operating under this scheme whose biomass fuel supply includes sawmill co-products, but no logs and this use is allowed for in section 3 also.

19.6.There are a further 24 energy generating plants that are not using logs sourced in Britain, but are using some form of wood fibre that is recycled or reclaimed from a variety of sources within the UK, imported, or includes some virgin wood sourced within the UK such as forest residues, SRC, diseased wood or arboricultural arisings.

19.7.Drax has 3 boilers registered under this scheme and is the only company using wood pellets to produce electricity under this scheme. The company also has 1 boiler registered under the Contracts for Difference scheme which also use wood pellets.

19.8.The different types and quantities of wood fibre used by companies to generate electricity, excluding wood pellets, under the RO scheme is shown in chart 19.1.

Chart 19.1: Types & Quantities of Wood Fibre Used in GB by Companies to Generate Electricity under the RO Scheme, excluding Wood Pellets in 2021



Source: Ofgem 2022

19.9. The total quantity of wood fibre, excluding imported wood pellets, used to generate electricity based on Ofgem statistics amounted to 4.19 million tonnes of wood fibre in 2021 of which 2.23 million tonnes was virgin wood fibre sourced from Britain's forests and woods in the form of logs, sawmill co-products, arboricultural arisings and forest residues. These quantities are significantly less than the 6.7 million tonnes per annum of wood fibre forecast for 2022 in 2015 when many more wood energy plants were at the planning stages. Almost all these plants have not materialised for a variety of reasons but mainly because of the closures of the schemes that encouraged the use of biomass for electricity generation.

19.10.The mixes of wood fibre types used by companies to generate electricity varies from year to year depending on the price and availability of the different types of wood. It is therefore not possible to forecast quantities and the types of wood fibre that will be used for energy production by these existing plants in future years, but the mix has been assumed to be broadly similar in future years.

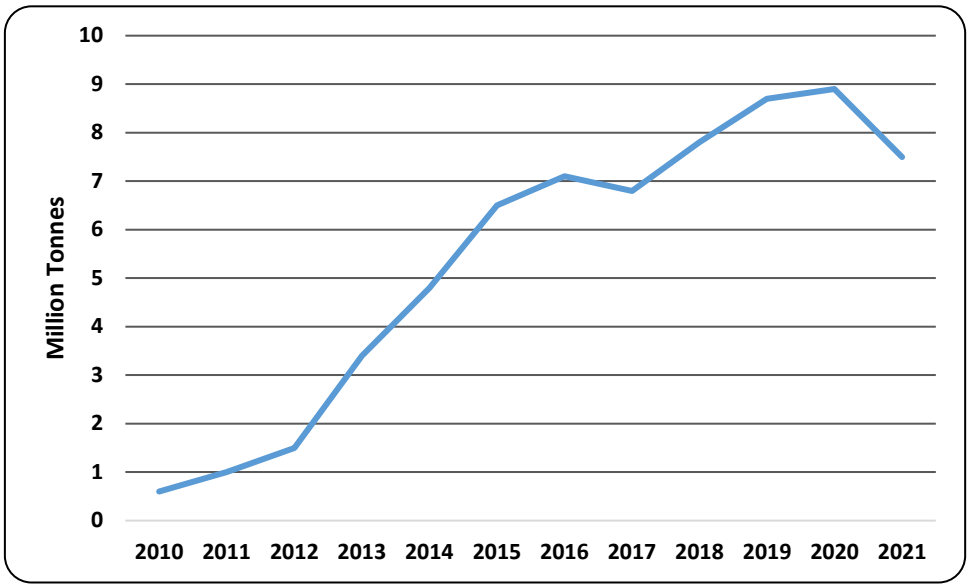
ELECTRICITY PLANTS OPERATING UNDER THE CONTRACTS FOR DIFFERENCE SCEME

19.11.Large electricity companies were encouraged to switch from using coal to biomass to under the Contracts for Difference scheme. Drax and the Lynemouth power station were successful in joining the scheme and a new company called MGT Teesside was also successful. All three companies anticipated using imported wood pellets because there is insufficient biomass available for them to use in the UK. Both Drax and the Lynemouth power station have successfully switched over from using coal to using biomass and have set up the necessary supply chains, but MGT Teesside has not yet become operational although some construction has been carried out on the site.

19.12.Steel manufacturer ArcelorMittal estimates it could use up to 2.8mn tonnes/year of biomass in the future to replace pulverized coal injected (PCI) in its blast furnaces in Europe and it is "ready to make long-term commitments", but they have also said that these are huge volumes and are difficult to find in the market today.

19.13.Chart 19.2 shows the growth of wood pellet imports into the UK.

Chart 19.2: Imports of Wood Pellet Imports into Britain Predominantly for Use by Large Scale Electricity Producers



19.14.The fall in imports in 2021 is thought to be primarily because of planned and unplanned outages at 2.6GW Drax and 405MW Lynemouth power plants.

19.15.The pellets being used are imported from a variety of sources that include Canada, USA, Estonia, Latvia and Portugal and there is potential in the longer term for supplies to come from South America. The pellets are made from material that comes from a variety of sources that include bark, sawdust, slabwood, sawmill co-products, forest residues, storm salvage and diseased wood and short and long rotation forestry.

Electricity Generating Plants Using Other Fuel Sources

19.16.It may not always be possible to sort out all wood fibre from other municipal waste and so wood fibre can also end up in Municipal Solid Waste (MSW) which is burnt to provide electricity in 329 Energy from Waste plants (EfW). Wood fibre may therefore also be found in both of the following fuels:

Solid Recovered Fuel (SRF): SRF is a high quality alternative to fossil fuel produced from commercial waste including paper, card, wood, textiles and plastic. It can be produced to a range of specifications. It has a high calorific value and a moisture content of less than 15 per cent and is used in facilities such as cement kilns.

Refuse-Derived Fuel (RDF): RDF consists largely of combustible components of municipal waste such as plastics and biodegradable waste. It has a lower calorific value than Solid Recovered Fuel. Refuse derived fuel is used in combined heat and power facilities, many of them in Europe where they produce electricity and hot water for communal heating systems in the local area. There is therefore an export trade in this type of material at present.

19.17.SRF can be distinguished from RDF in the fact that it is produced to reach a standard such as CEN/343 ANAS.

Wood Fibre Consumption in Small Boilers in Domestic & Non Domestic Premises

19.18.There is no data collected on the type and quantity of wood fibre used to generate heat in domestic and non domestic boilers under the RHI scheme. Based on some historic data it

is estimated that could amount to approximately 160,000 tonnes of wood fibre, but a significant proportion of this amount is likely to comprise wood pellets and off-cuts.

New Technology

19.19.In 2016 there were 5 relatively small plants that were planning to use virgin or recycled wood fibre to produce conventional steam based energy generation technology. The five plants were expecting to use gasification technology and to use coniferous roundwood as their source of wood fibre. However, in 2016 there were also separate public announcements of plants ranging in size from 2.5MWe to 21.5MWe in Cheshire, Northamptonshire, Birmingham, Plymouth and Dartmoor using either gasification or pyrolysis technology and there were other plants also at the planning stage using one or other technology. It appears that none of these plants have become operational or can be expected to be operational.

Co-Firing with Biomass

19.20.Some major coal fired power stations were using wood fibre biomass for co-firing but this practice appears to have stopped as a result of changes in Government energy policy since 2010 with almost all coal fired power stations closing.

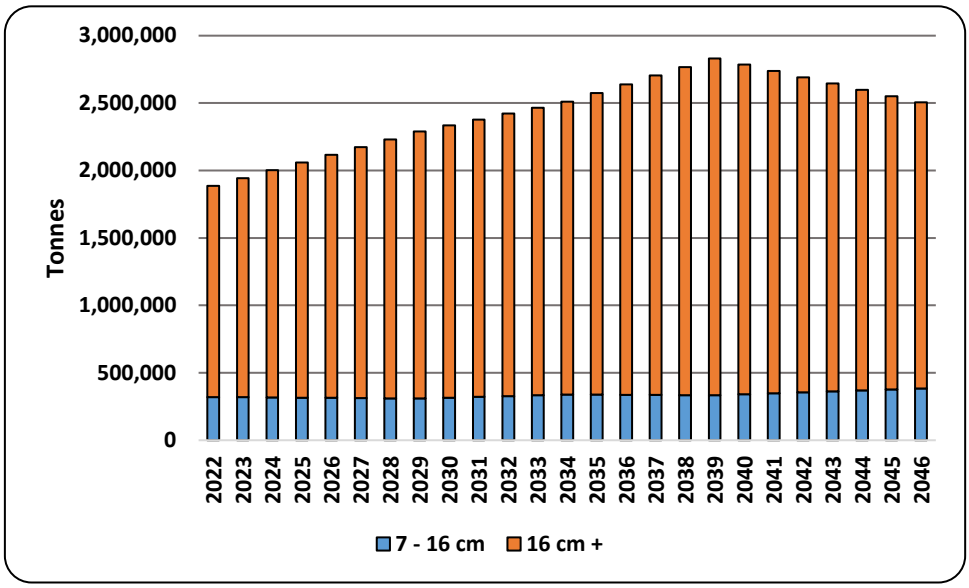
20. NORTHERN SCOTLAND ZONE: CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

20.1.The information given in this section is for the area defined as the Northern Scotland zone (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

20.2.The forecast potential annual availability of coniferous roundwood from the woods in the Northern Scotland zone over the next 20 years is shown in chart 20.1 for logs in the 7-16cm and 16cm + t.e.d size categories.

Chart 20.1: Northern Scotland Zone: Forecast Potential Coniferous Roundwood Availability 2022 – 2046 by Top End Diameter Classes

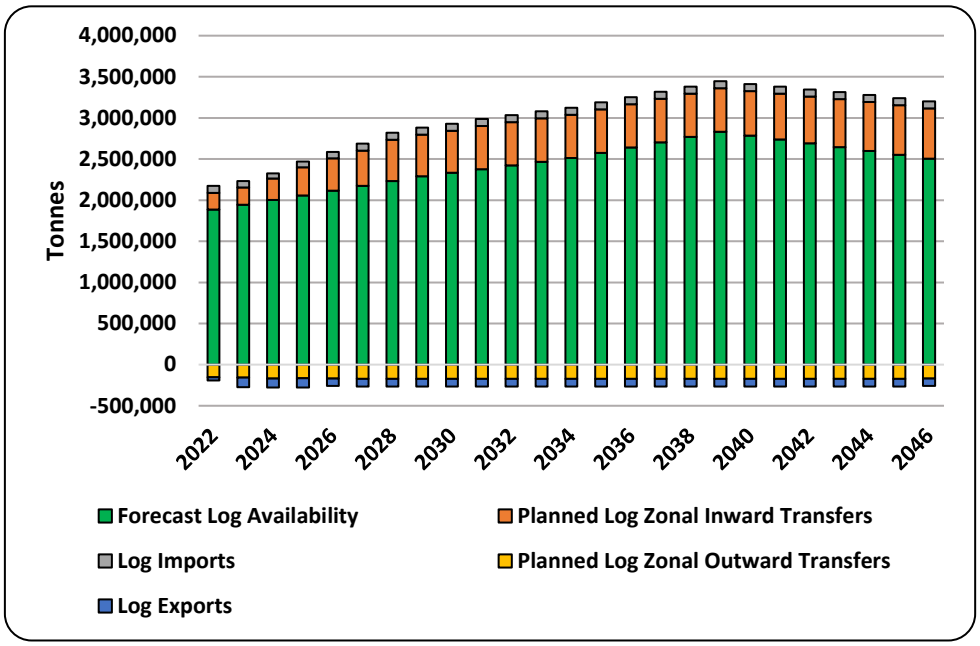


Source: Forest Research, 2022

20.3.The chart shows that the potential availability of coniferous roundwood from woods in the Northern Scotland zone is forecast to rise by about 38% over the next 20 years, with most of the increase in potential availability forecast to come from privately owned woods. The majority of this increase will be as logs of 16cm or more t.e.d. Potential availability is forecast to decline around 2039.

20.4.The potential availability of coniferous roundwood for wood users in the Northern Scotland zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the Northern Scotland zone as well as exports and imports. The situation is shown in chart 20.2.

Chart 20.2: Forecast Potential Coniferous Roundwood Availability from Woods in the Northern Scotland Zone with Expected Zonal Log Movements

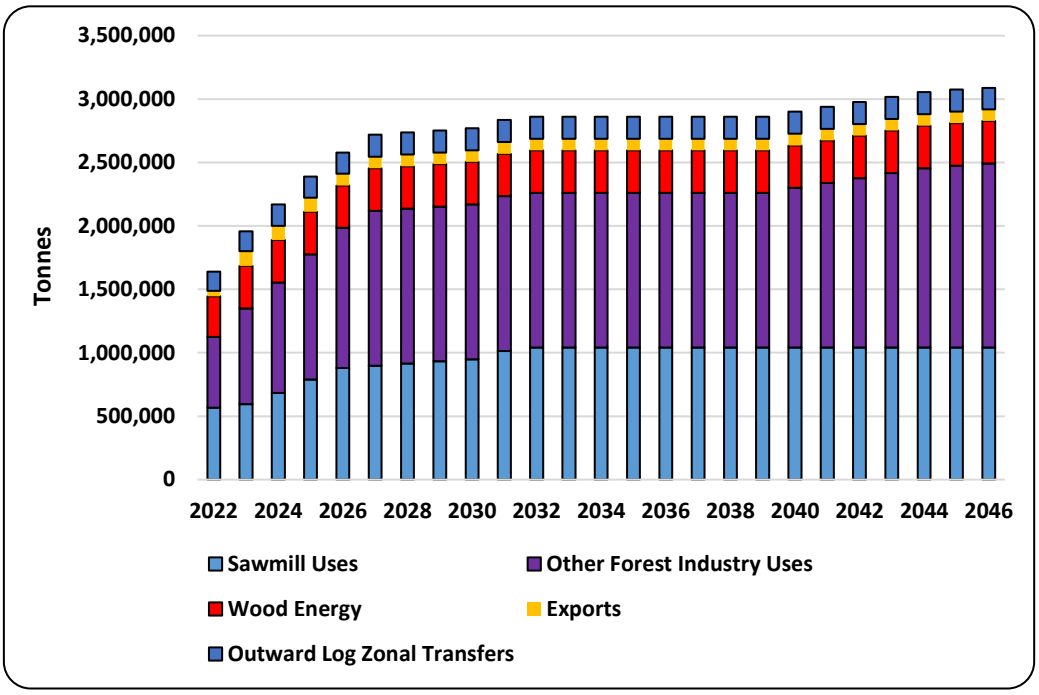


Source: Forest Research, 2022 & Survey Data

20.5.Although the potential availability of coniferous roundwood is forecast to increase up to 2040 so are log transfers into the zone. Overall the forecast zonal movements of coniferous roundwood out of the Northern Scotland zone, as well as log imports and exports, are relatively small compared with forecast overall roundwood availability of coniferous roundwood in the Northern Scotland zone, provided the log imports proceed as planned.

20.6.The use of the coniferous roundwood potentially available in the zone in the Northern Scotland zone is shown in chart 20.3.

Chart 20.3: Northern Scotland: Planned Use of GB Grown Coniferous Roundwood 2022 – 2046

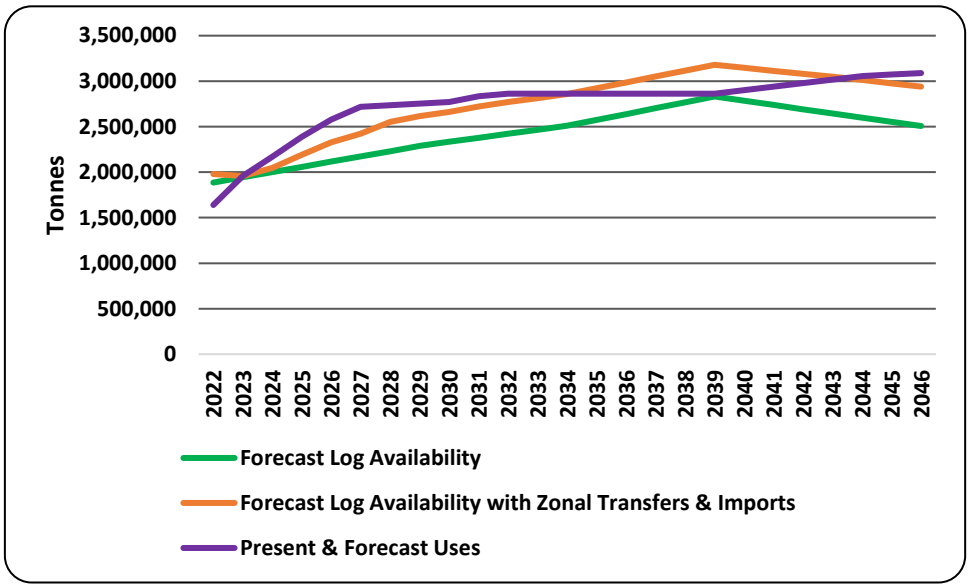


Source: & Survey Data
Footnote: The chart does not show planned inward zone transfers or log imports as the chart only identifies potential demand

20.7.The chart shows that anticipated use of coniferous roundwood by sawmills is expected to be fairly steady for the next 20 years, but other users, notably West Fraser are substantially increasing their use of coniferous roundwood over the next 10 years. The amount of coniferous roundwood used as biomass for generating energy is expected to remain fairly steady unless energy policies change.

20.8.Chart 20.4 shows the potential availability of coniferous roundwood, allowing for inward zonal transfers and coniferous roundwood imports, and the total of all the expected future uses for it in the Northern Scotland zone.

Chart 20.4: Northern Scotland: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

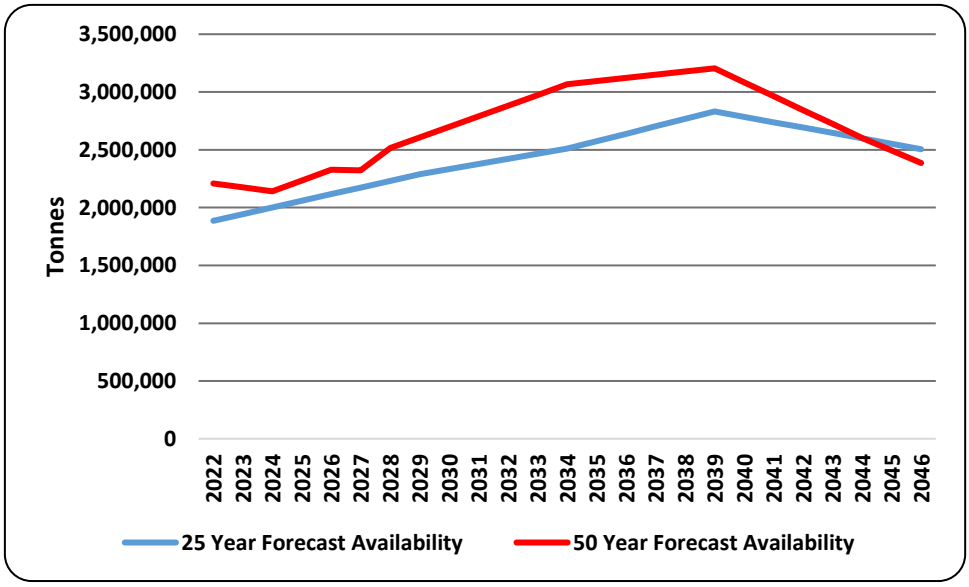


Source: Forest Research, 2022 & Survey Data
Footnote: Present and forecast uses includes exports

20.9.The chart shows that forecast potential availability for coniferous roundwood sourced in the Northern Scotland zone is expected to continue to rise up to 2040, but planned present and future uses of coniferous roundwood are likely to be in excess of local coniferous roundwood availability for the next 10 years even after allowing for imports and zonal transfers. After 2032 there is expected to be a period of time when potential coniferous roundwood availability will be slightly in excess of demand.

20.10.A 50-year coniferous roundwood availability forecast has been made by the Forestry Commission using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 20.5 and confirm an upward trend for the next 20 years.

Chart 20.5: Northern Scotland: Forest Research's 25-Year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2023 – 2046



Source: Forest Research, 2016 & 2022

20.11.Both the 25 year and 50-year forecasts show that the peak in potential coniferous roundwood availability occurs in the Northern Scotland zone around 2039 and 2040. After that potential roundwood availability starts to drop quite sharply.

20.12.This forecast reduction of coniferous roundwood availability after about 2040 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in the zone mostly in the 1980s and changes in forestry practices such as leaving larger areas unplanted for landscape or environmental reasons.

SAWMILL PRODUCTS

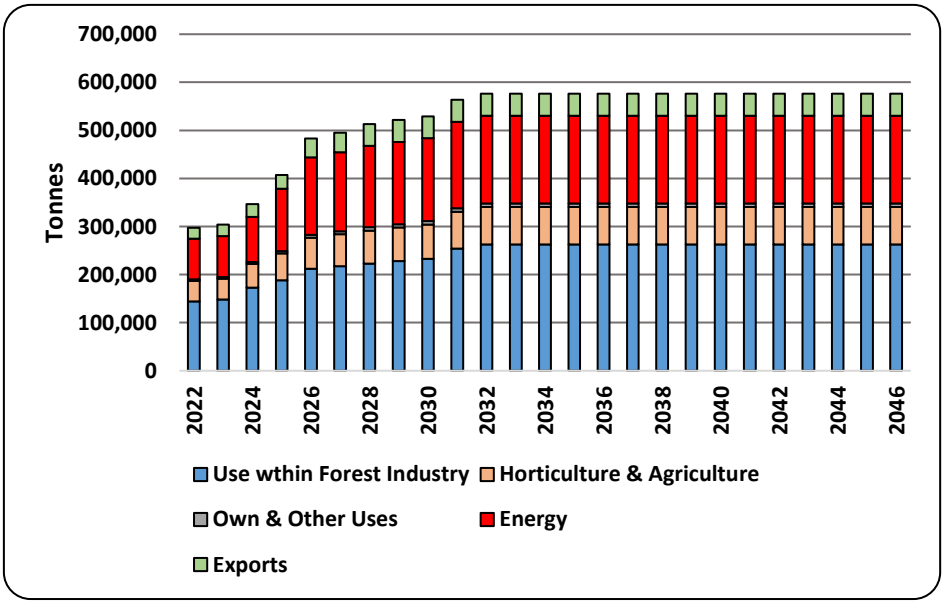
20.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

20.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the Northern Scotland zone is sold into a variety of markets. The markets in the Northern Scotland zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market overall in Britain at present for sawmill products is the panelboard industry.

20.15.The past and forecast future uses of sawmill products in the Northern Scotland zone, based on information provided by sawmills in the Northern Scotland zone, are shown in chart 20.6.

Chart 20.6: Forecast Future Production & Use of Sawmill Products Originating within the Northern Scotland Zone 2022 – 2046



Source: Survey Data

20.16.The chart shows that that the forest industry is expected to provide a market for approximately half the sawmill products originating in the zone with energy, exports, horticulture, agriculture and other uses making up the rest. The quantities of chips that are exported annually are very small.

Zonal Roundwood Transfers & Exports

20.17.It is not possible to present any accurate data on sawmill product movement between zones because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

20.18.A small quantity of sawmill co-products in the form of chips is forecast to be exported every year.

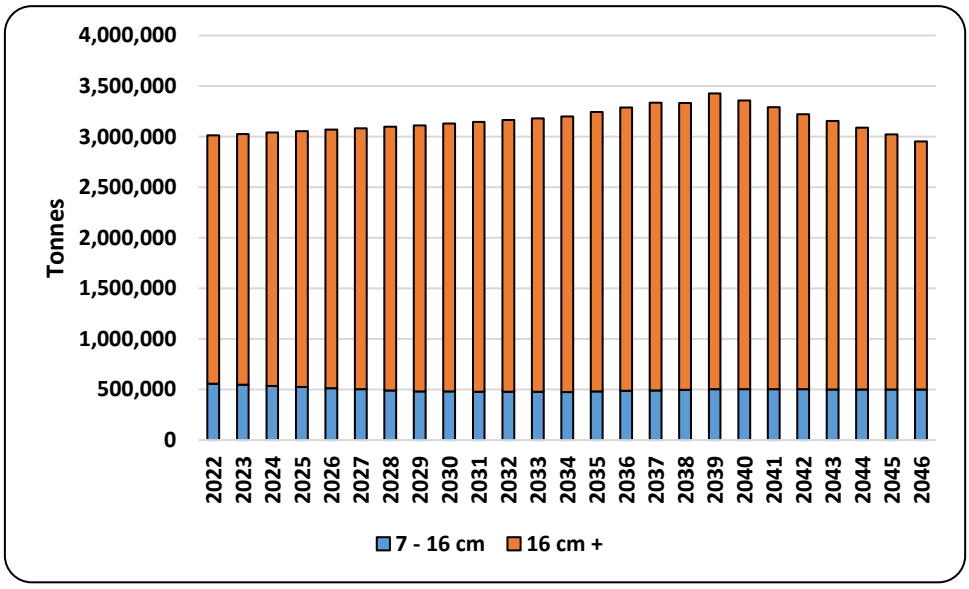
21. CENTRAL SCOTLAND ZONE: CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

21.1.The information given in this section is for the area defined as the Central Scotland zone (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

21.2.The forecast potential annual availability of coniferous roundwood from the woods in the Central Scotland zone over the next 25 years is shown in chart 21.1 for logs in the 7-16cm and 16cm + t.e.d size categories. The new forecast of potential average annual availability of coniferous roundwood has increased by about 300,000 tonnes per annum compared with the forecast quantity for 2023 made in 2016.

Chart 21.1: Central Scotland Zone: Forecast Potential Coniferous Roundwood Availability 2022 – 2046



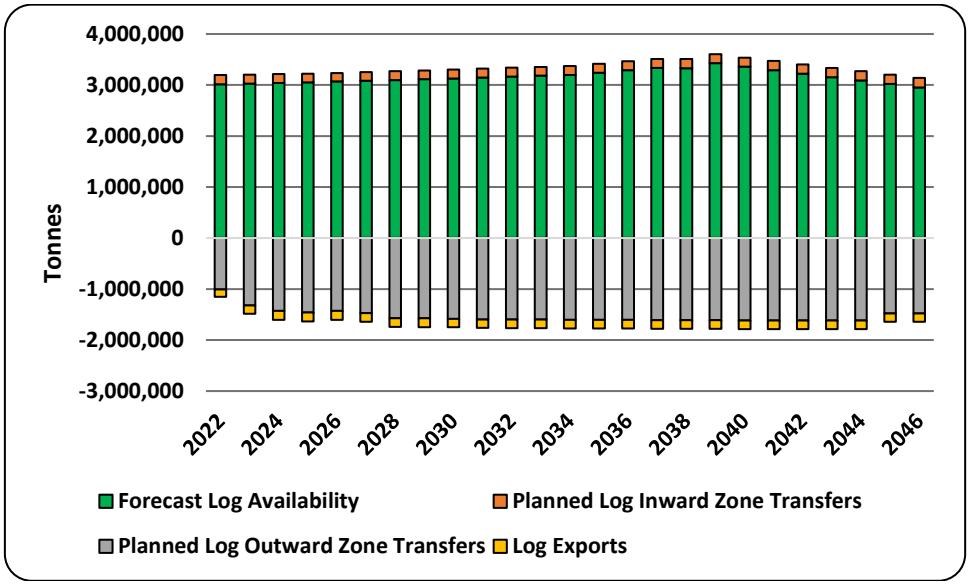
Source : Forest Research, 2022 & Survey Data

21.3.The chart shows that the potential availability of coniferous roundwood from woods in the Central Scotland zone is forecast to remain fairly constant until it rises very slightly up until 2039. After which potential availability is forecast to start falling. All the increase in potential coniferous roundwood availability is forecast to be as logs of 16 cm or more t.e.d. Almost two

thirds of the potential roundwood availability is forecast to be in the West of Scotland and the majority of the increased availability is forecast to come from privately owned woods.

21.4.The potential availability of coniferous roundwood for wood users in the Central Scotland zone is not just the forecast potential availability of coniferous roundwood from woods within the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the Central Scotland zone as well as exports. These anticipated movements of coniferous roundwood are shown in chart 21.2.

Chart 21.2: Forecast Potential Coniferous Roundwood Availability in the Central Scotland Zone with Expected Zonal Log Movements & Exports



Source: Forest Research, 2022 & Survey Data

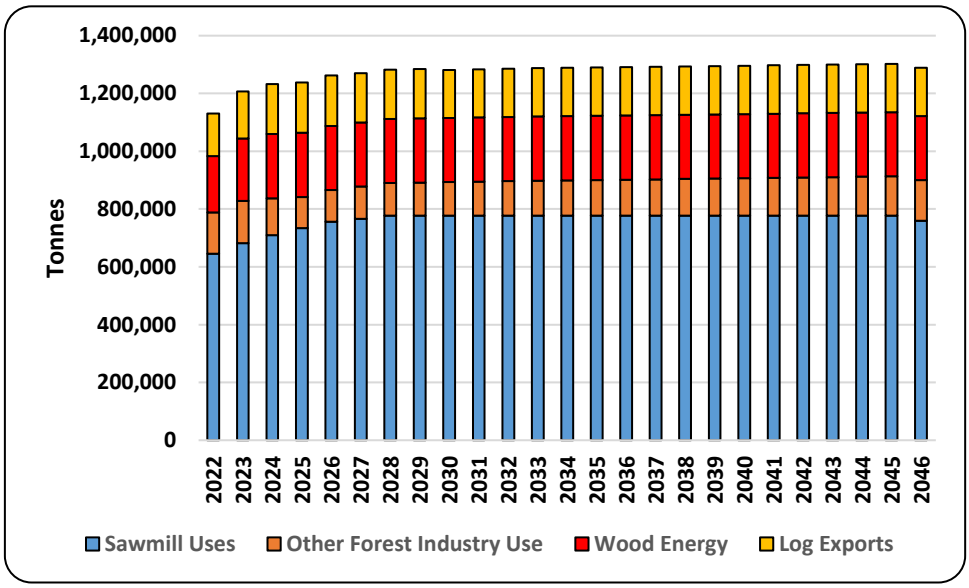
21.5.The planned transfers of coniferous logs out of the zone are some 600,000 tonnes per annum higher from 2023 onwards compared with the forecast in 2016 for 2022 and future years, but potential availability of coniferous logs is now forecast to be some 300,000 tonnes per annum higher.

21.6.At present some 70,000 to 110,000 tonnes per annum is moved from the West Coast to South Scotland by boat with financial support from the Scottish Government provided through Scottish Forestry's Timberlink programme.

21.7.Users of coniferous roundwood located outside the zone are expecting to source an increasing amount of the coniferous roundwood that they require within the Central Scotland zone with the total annual quantity amounting to almost 1.6 million tonnes per annum.

21.8.There are fewer large companies using coniferous roundwood in Central Scotland relative to South Scotland, for example. The forecast use by the forest industry and by energy users in the Central Scotland zone of the coniferous roundwood grown in woods in the zone is shown in chart 21.3.

Chart 21.3: Central Scotland: Planned Uses of GB Grown Coniferous Roundwood within the Central Scotland Zone 2022 – 2046

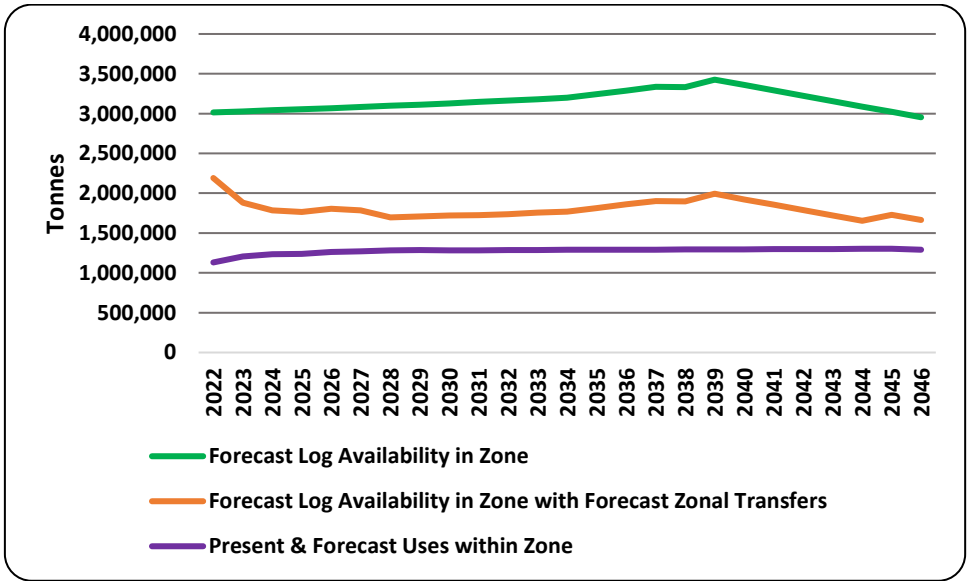


Source: Survey Data

21.9.The chart shows that that there will be a small growth in demand for coniferous roundwood over the next 5 years and then it will level out. Anticipated use by sawmills and other forest industry wood users is expected to be fairly steady for the next 25 years.

21.10.Chart 21.4 shows the potential availability of coniferous roundwood along with all the expected future demand for it in the Central Scotland zone.

Chart 21.4: Central Scotland: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046



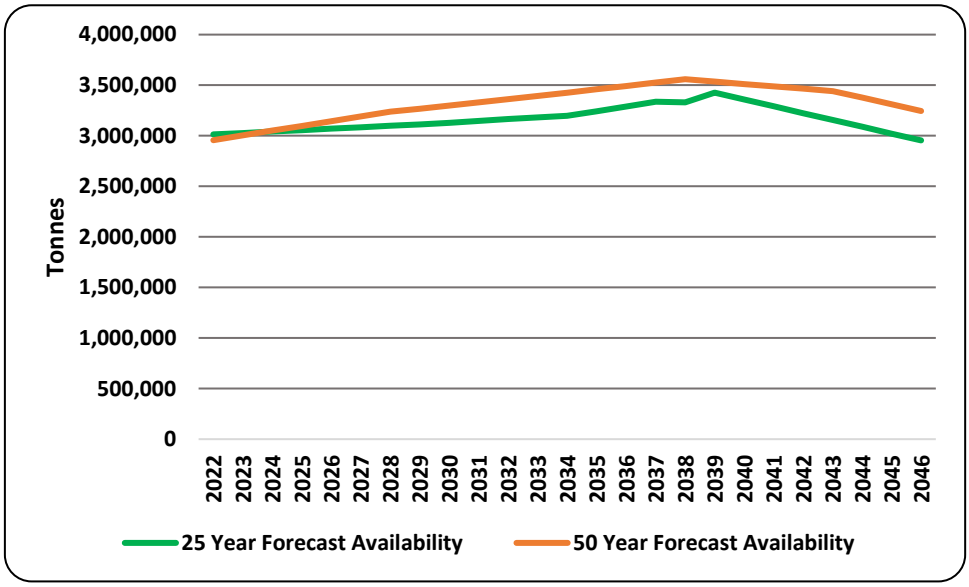
Source : Forest Research, 2022 & Survey Data
Footnote: Present and forecast uses includes exports

21.11.The chart shows that forecast potential availability for coniferous roundwood in the Central Scotland zone is in excess of potential demand at present, but the gap is expected to reduce fairly quickly over the next 5 years. Thereafter potential availability may exceed

forecast demand by up to 500,000 tonnes per annum. This gap between potential coniferous roundwood availability and demand in the Central Scotland zone may reflect location, terrain and transport infrastructure challenges associated with accessing the coniferous roundwood in this zone, as much of it is located in the West of Scotland.

21.12.A 50-year coniferous roundwood availability forecast has been made by the Forestry Commission using slightly different assumptions to the 25-year forecast (see section 18). Both 25-year and 50-year coniferous roundwood availability forecasts are given in chart 21.5.

Chart 21.5: Central Scotland: Forest Research 25 Year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research, 2016 & 2022

21.13.Both forecasts confirm a similar trend which is that the potential availability of coniferous roundwood will start to fall after about 2037, but will do so relatively gradually.

21.14.The potential availability of coniferous logs within the zone will still be significantly in excess of the requirements of companies presently operating in the zone and it should be able to continue to meet the forecast requirements of those companies outside the zone that draw logs from the zone for the next 25 years based on both availability forecast.

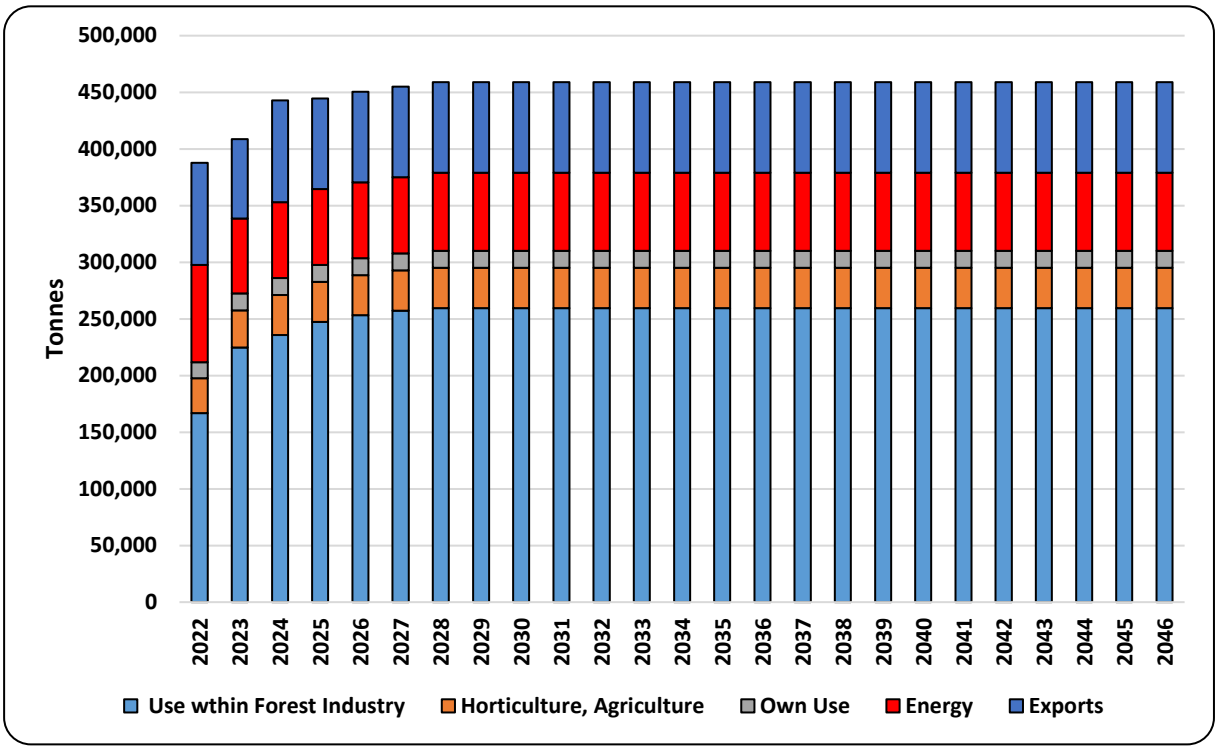
SAWMILL PRODUCTS

21.15.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

21.16.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the Central Scotland zone is sold into a variety of markets. The markets in the Central Scotland zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market at present for sawmill products is the panelboard industry.

21.17.The past and forecast future uses of sawmill products in the Central Scotland zone, based on information provided by sawmills in the Central Scotland zone, are shown in chart 21.6.

Chart 21.6: Forecast Future Production & Use of Sawmill Products Originating within the Central Scotland Zone 2022 – 2046



Source: Survey Data

21.18.The chart shows that about half the sawmill co-products are used by the forest industry. Significantly less of the co-products are going for energy production than previously predicted, but more are forecast to go for exports.

Zonal Roundwood Transfers

21.19.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

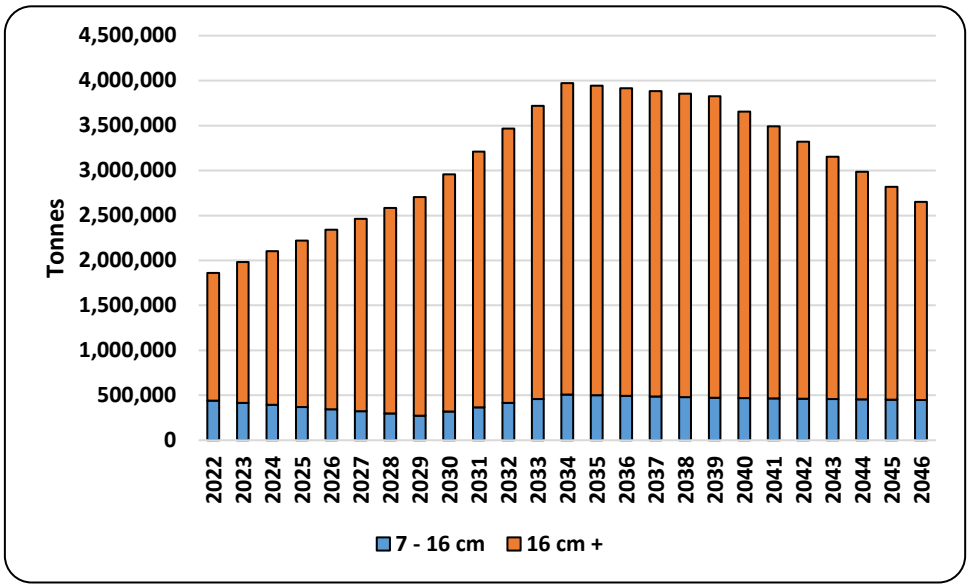
22. South Scotland Zone: Coniferous Roundwood & Sawmill Products Forecast Availability & Demand

22.1. The information given in this section is for the area defined as the South Scotland zone (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

22.2. The forecast potential annual availability of coniferous roundwood from the woods in the South Scotland zone over the next 24 years is shown in chart 22.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

Chart 22.1: South Scotland Zone: Forecast Potential Coniferous Roundwood Availability 2022 – 2046



22.3.The chart shows that the potential annual availability of coniferous roundwood from woods located in the South Scotland zone is forecast to double over the next 10 years with most of this increased potential availability coming from privately owned woods. Annual potential availability will then decline slightly until to 2039 after which potential availability of coniferous logs in the zone is forecast to fall quite steeply.

22.4.Almost all the changes in potential coniferous roundwood availability in the next 15 years or so are forecast to be as logs of 16cm or more t.e.d. The quantity of logs of less than 16 cm t.e.d, remains relatively constant at about 500,000 tonnes per annum.

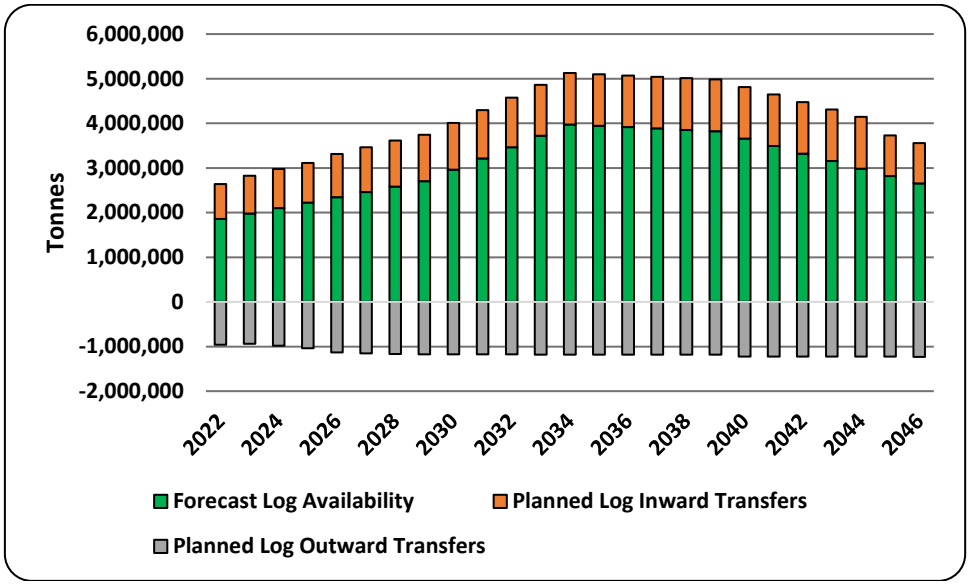
22.5.There are two major differences in the forecast of potential availability of coniferous roundwood compared with the forecast in 2016:

- The average annual potential availability of coniferous roundwood in the period 2022 - 26 is approximately 1.5 million less than forecast in 2016 for the same period, but by the 5 year period starting in 2027, there is little difference compared with the figures in the 2016 forecast in the average annual availability of coniferous roundwood in the South Scotland zone.

- The maximum potential availability of the zone is now expected to be some 500,000 tonnes per annum less, but the lower potential availability is now spread out over a 10 year period rather than peaking and then falling away which suggests that significantly more coniferous roundwood is now forecast to be potentially available in the South Scotland zone, but at a later date. This is likely to be as a result of faster growth rates being expected as a result of successful tree breeding programmes for Sitka spruce for many years.

22.6.The potential availability of coniferous roundwood for wood users in the Southern Scotland zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the zone. These anticipated movements of coniferous roundwood are shown in chart 22.2.

Chart 22.2: Forecast Potential Coniferous Roundwood Availability in the South Scotland Zone with Expected Zonal Log Movements 2022 – 2046



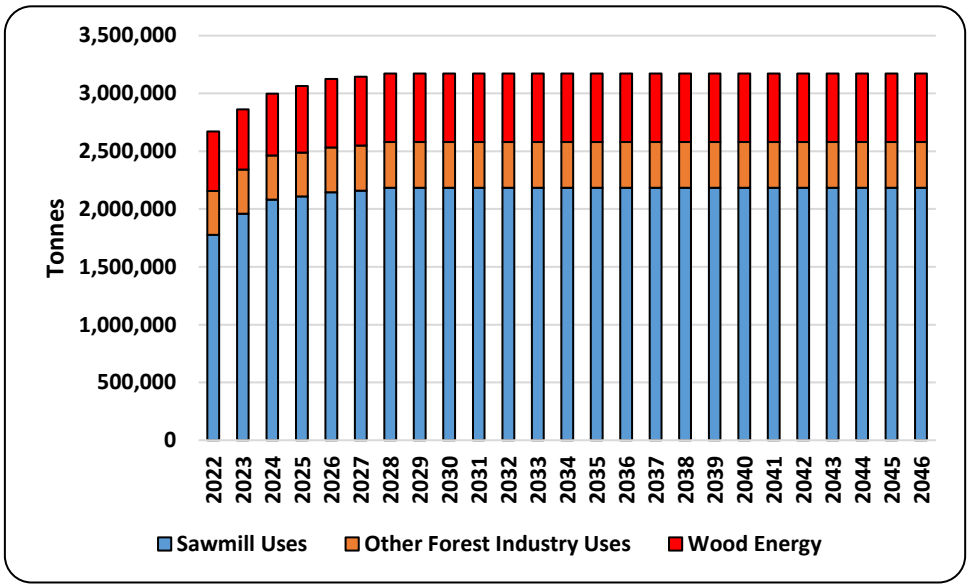
Source: FC, 2022 & Survey Data

22.7.This zone has more users of coniferous roundwood than either of the other two zones in Scotland. The movement of about 2 million tonnes per annum of coniferous roundwood both in and out of the zone almost certainly reflects the fact that there are a number of major roundwood users located in the North of England relatively close to the Border and also the potential availability of coniferous roundwood in the Central Scotland zone. The inwards and outward zonal transfers of coniferous roundwood almost balance up so overall they have little impact on the forecast potential availability of coniferous roundwood in the zone.

22.8.The planned movement of coniferous roundwood in and out of the zone remains relatively similar to 2016, but the potential average annual availability of coniferous roundwood overall in the zone is about 1.5 million tonnes per annum less than previously forecast in 2016 for the period 2022 – 26. The reasons for this are not known. Overall, total potential availability of coniferous round wood in South Scotland is forecast to be more than expected in 2016 for the 25 year period to 2046.

22.9.The forecast use by the forest industry and by energy users in the South Scotland zone of the coniferous roundwood grown in woods in the zone is shown in chart 22.3.

Chart 22.3: South Scotland: Planned Uses of GB Grown Coniferous Roundwood 2022 – 2046



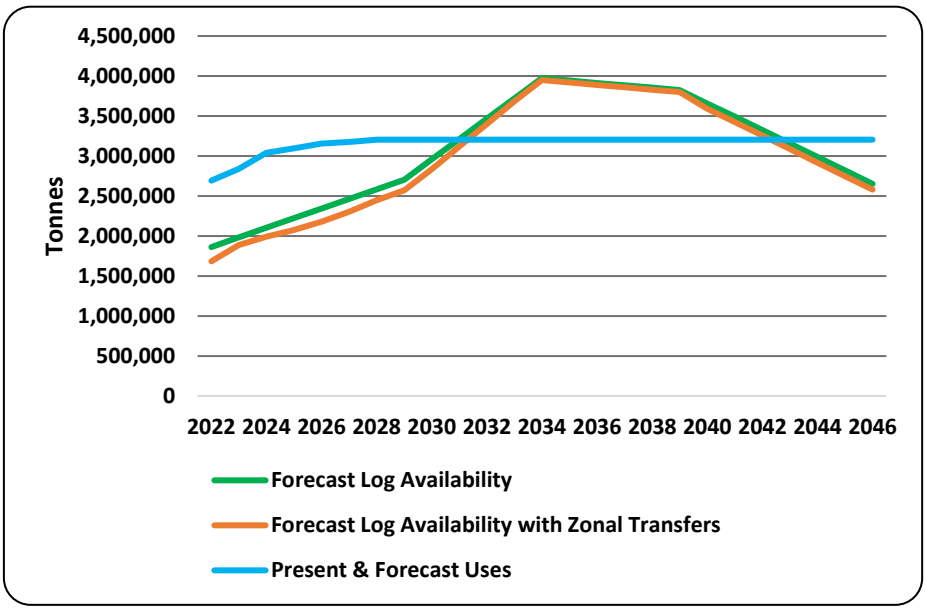
Source: Survey Data

22.10.The chart shows that anticipated use by sawmills and other forest industry wood users in this zone is expected to rise over the next 5 years, but then remain fairly steady. The amount of coniferous roundwood used for the larger scale energy generation is expected to increase slightly over the next two to three years and then to remain fairly constant under present energy policies. No exports of coniferous roundwood are planned.

22.11.Overall, the forecast annual use of coniferous roundwood is about 500,000 tonnes per annum less than anticipated in 2016, mainly within the sawmilling sector. The annual use of coniferous roundwood for energy generation annual is slightly higher than anticipated in 2016.

22.12.Chart 22.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in the South Scotland zone.

Chart 22.4: South Scotland: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

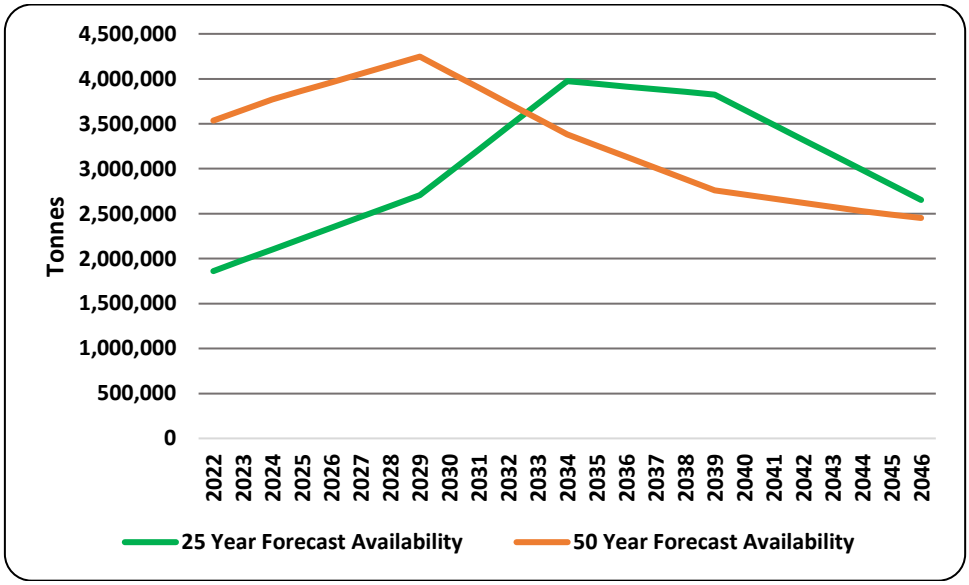


Source : Forest Research, 2022 & Survey Data

22.13.The chart shows that the use of / demand for coniferous roundwood presently exceeds the forecast potential availability of coniferous roundwood in the zone by over 1 million tonnes per annum, but this difference will have reduced by 2030 when potential availability of coniferous roundwood will then exceed demand. In 2016, forecast demand for, and potential availability of coniferous roundwood in South Scotland were forecast to be finely balanced in 2022, but the 2022 25 year forecast of roundwood availability now shows a significantly reduced potential availability of coniferous roundwood, while the forecast industry demand is little changed from that forecast in 2016 for 2023.

22.14.A 50-year coniferous roundwood availability forecast has been made by Forest Research using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 22.5 and confirm a similar trend.

Chart 22.5: South Scotland: Forest Research's 25 Year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research 2016 and 2022

22.15.The chart shows that the latest forecast of the potential annual availability of coniferous roundwood in South Scotland is presently approximately 1.5 million tonnes per annum less than indicated by the 50 year forecast. In 2016, the two forecast were expected to coincide in about 2022. The chart also shows how the latest 25 year forecast indicates increased potential availability after 2032 up to about 2040 after which potential availability starts to fall and the two forecast coincide again in about 2046.

22.16.This forecast reduction of coniferous roundwood availability from 2022 until 2030 will be of concern to those companies presently using coniferous roundwood sourced from the South Scotland zone. Identifying the reasons for the reduction in potential availability of coniferous roundwood in South Scotland over the next 10 years compared with the previous forecast, and more important the implications for businesses is beyond the remit of this piece of work . Looking longer term users of coniferous roundwood may gain some reassurance by the latest forecast of increased potential availability of coniferous roundwood after 2032 until about 2040.

SAWMILL PRODUCTS

22.17.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings,

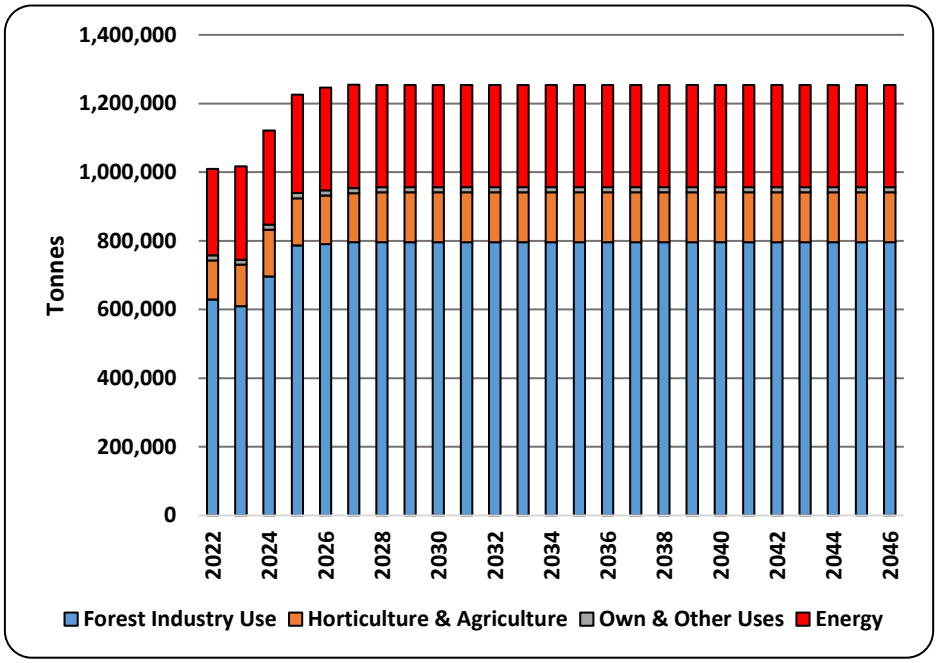
slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

22.18.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the South Scotland zone is sold into a variety of markets. The markets in the South Scotland zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market overall in Britain at present for sawmill products is the panelboard industry.

22.19.The past and forecast future uses of sawmill products in the South Scotland zone, based on information provided by sawmills in the South Scotland zone, are shown in chart 22.6.

Chart 22.6: Forecast Future Production & Use of Sawmill Products Originating within the South Scotland Zone 2022 – 2046



Source: Survey Data

22.20.The chart indicates the significant size and relative importance of the different markets for sawmill products produced within the South Scotland zone. Here the primary end use of sawmill products originating in the zone is with other parts of the forest industry itself.

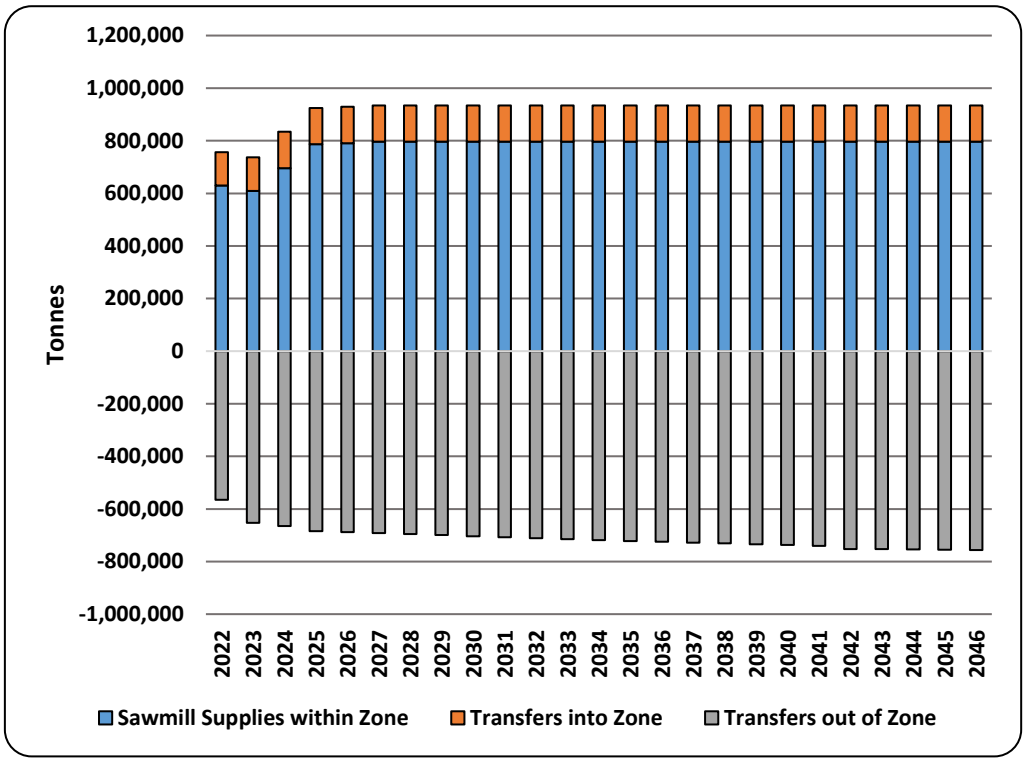
22.21.Compared with the previous forecast total production of sawmill co-products is forecast to be slightly lower overall. However, the proportion going for energy uses is slightly higher than forecast before.

Zonal Roundwood Transfers

22.22.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential. Some indication of the scale of the movements of wood chips and sawdust within, and in and out of the South

Scotland zone can be obtained from the survey data which is shown in chart 22.7.

Chart 22.7: Movements of Wood Chips and Sawdust within, and in and out of the South Scotland England Zone



Source: Survey data

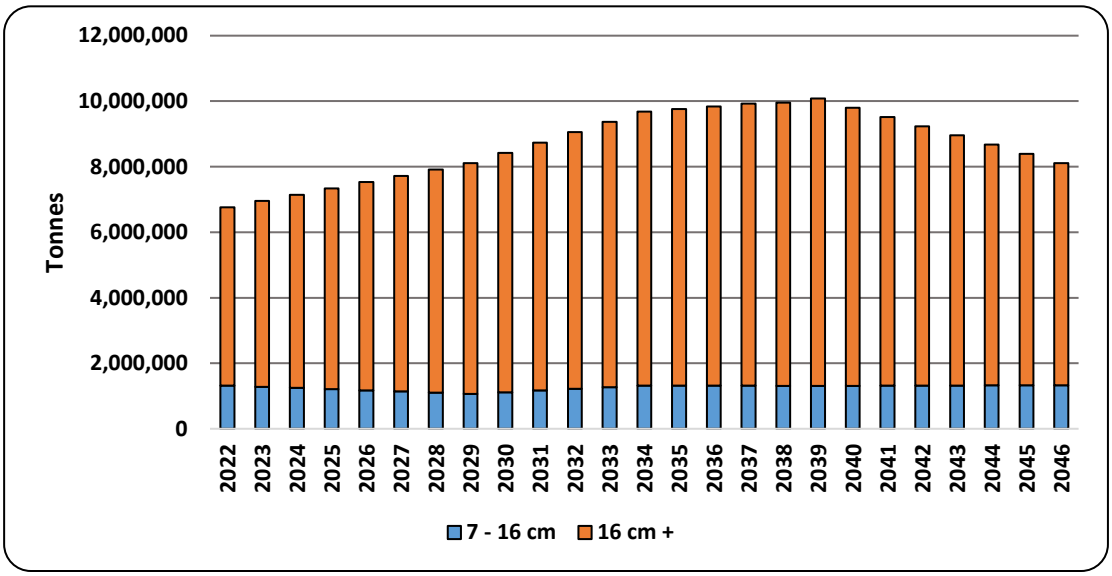
23. SCOTLAND : CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

23.1. The information given in this section is for the whole of Scotland (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

23.2. The forecast potential annual availability of coniferous roundwood from the woods in the Scotland over the next 24 years is shown in chart 23.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

Chart 23.1: Scotland : Forecast Potential Coniferous Roundwood Availability 2022 – 2046

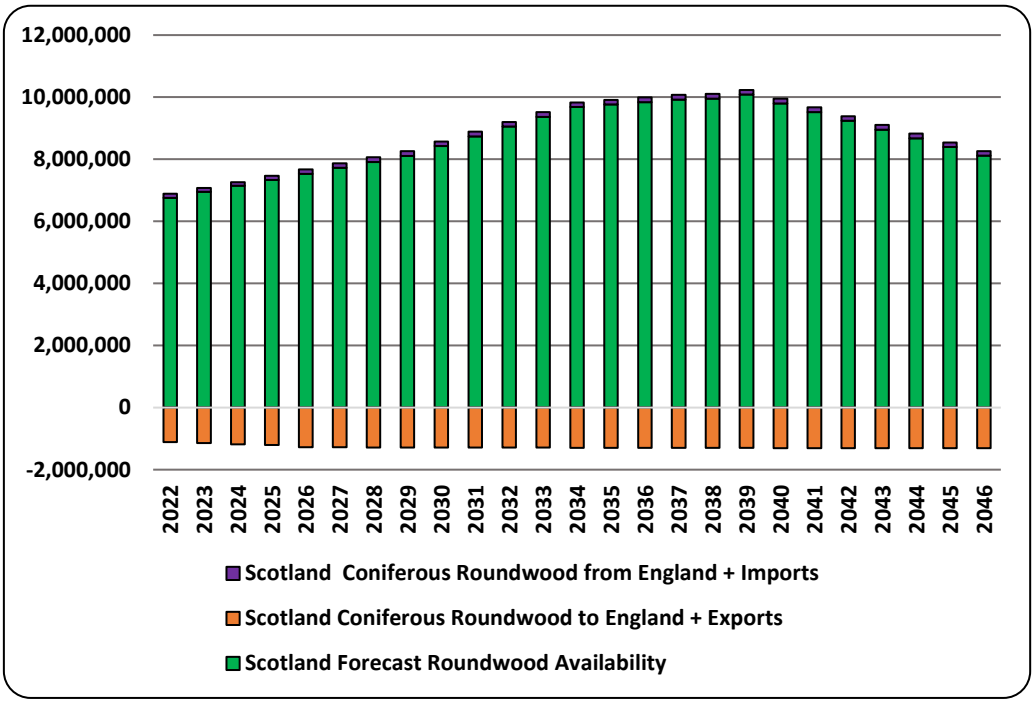


23.3.The chart shows that the potential annual availability of coniferous roundwood from woods located in Scotland is forecast to increase by just under 50% over the next 10 years with most of this increased potential availability coming from privately owned woods. Annual potential availability will then decline steadily until 2046.

23.4.Almost all the changes in potential coniferous roundwood availability in the next 15 years or so are forecast to be as logs of 16cm or more t.e.d. The quantity of logs of less than 16 cm t.e.d, remains relatively constant at about 1.2 million tonnes per annum.

23.5.The potential availability of coniferous roundwood for wood users in Scotland zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of Scotland. These anticipated movements of coniferous roundwood are shown in chart 23.2.

Chart 23.2: Forecast Potential Coniferous Roundwood Availability in Scotland with Expected Zonal Log Movements 2022 – 2046

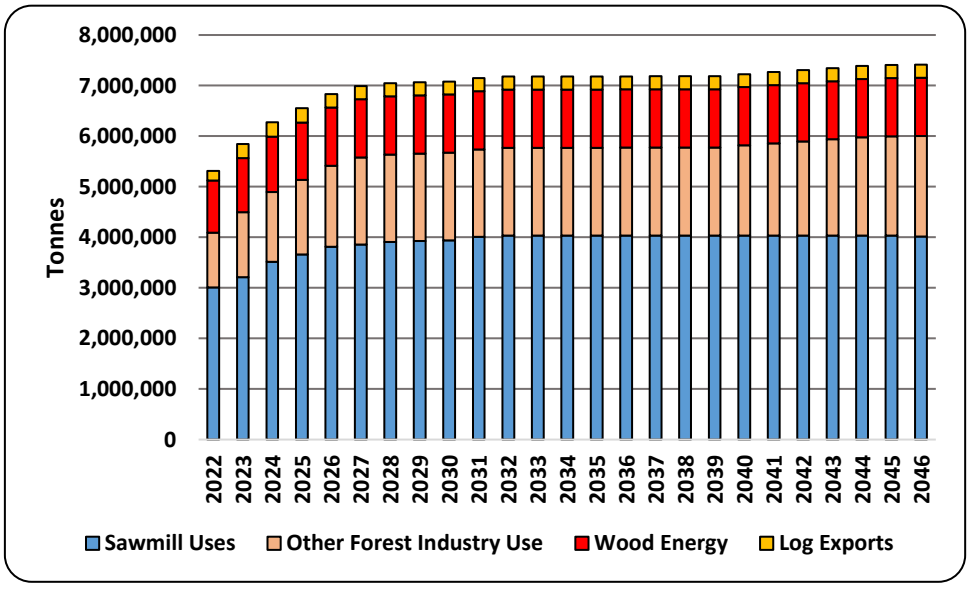


Source: FC, 2022 & Survey Data

23.6.The majority of the forecast outward transfers of coniferous roundwood from Scotland is to users in the North of England.

23.7.The forecast use by the forest industry and by energy users in the South Scotland zone of the coniferous roundwood grown in woods in the zone is shown in chart 23.3.

Chart 23.3: Scotland: Planned Uses of Coniferous Roundwood Grown in Scotland 2022 – 2046

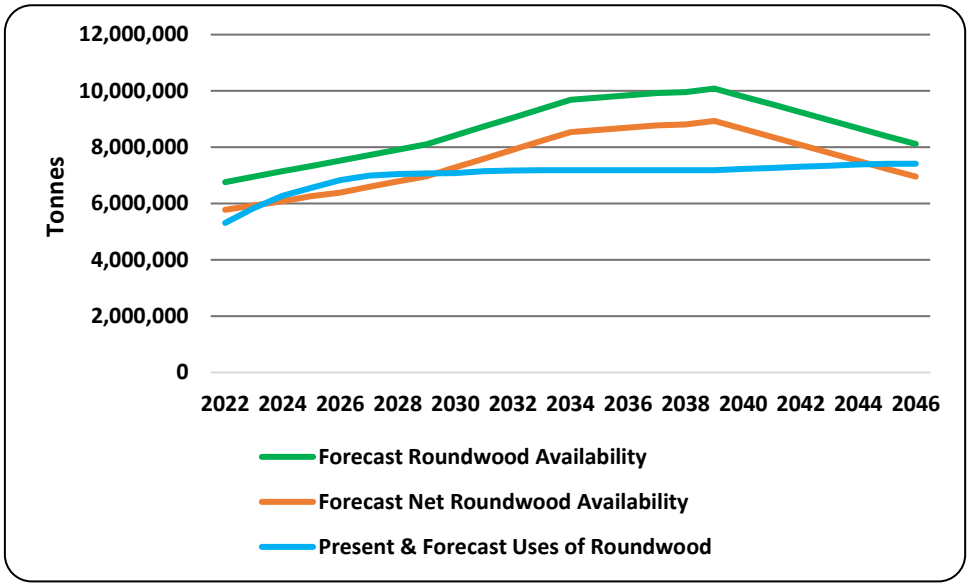


Source: Survey Data

23.8. The chart shows that anticipated use by sawmills and other forest industry wood users in this zone is expected to rise over the next 5 years, but then remain fairly steady. The amount of coniferous roundwood used for the larger scale energy generation is expected to increase slightly over the next two to three years and then to remain fairly constant under present energy policies.

23.9. Chart 23.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in Scotland.

Chart 23.4: Scotland: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

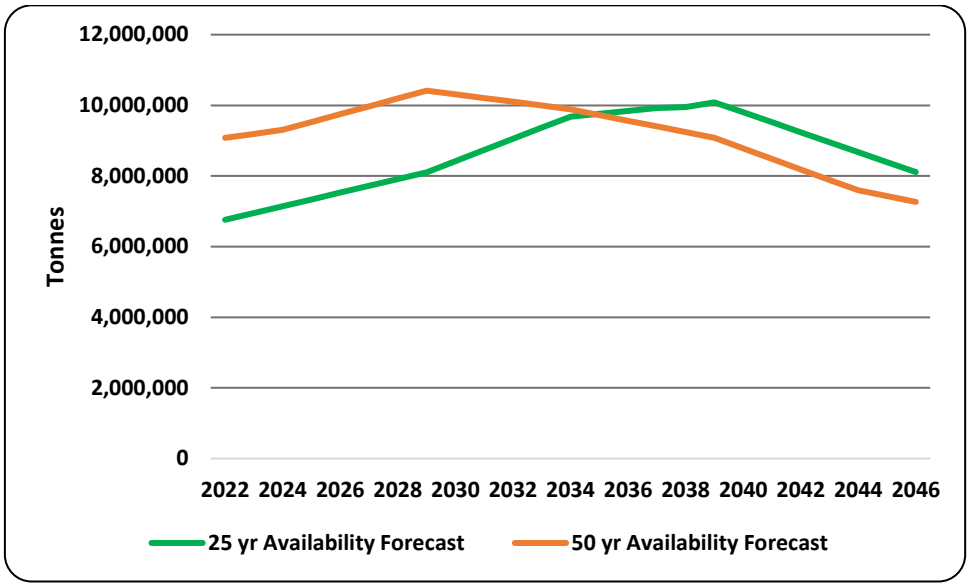


Source : Forest Research, 2022 & Survey Data

23.10.The chart shows that the potential availability of coniferous roundwood in Scotland presently exceeds the present and forecast uses of the potentially available coniferous roundwood in Scotland. However, almost 1 million tonnes per annum of coniferous roundwood is transferred from Scotland to users in the North of England and this is forecast to result in potential demand slightly exceeding the potential availability of coniferous roundwood in Scotland until about 2030. After that the potential availability of coniferous roundwood is forecast to exceed demand until about 2045.

23.11.A 50-year coniferous roundwood availability forecast has been made by Forest Research using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 23.5 and confirm a similar trend.

Chart 23.5: Scotland: Forestry Research's 25 Year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research 2016 and 2022

23.12.The chart shows that the latest forecast of the potential annual availability of coniferous roundwood in Scotland which is presently approximately 2.0 million tonnes per annum less than indicated by the 50 year forecast. The chart also shows how the latest 25 year forecast indicates increased potential availability after 2032 up to about 2040 after which potential availability indicated by both forecasts starts to fall.

SAWMILL PRODUCTS

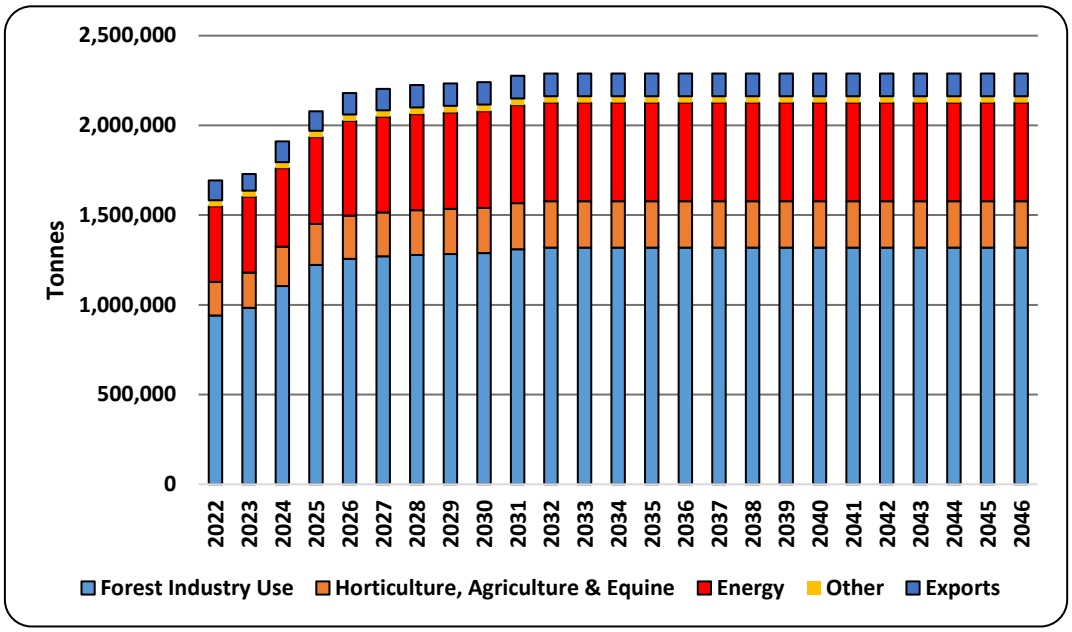
23.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

23.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in Scotland is sold into a variety of markets. The markets in Scotland can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market overall in Britain at present for sawmill products is the panelboard industry.

23.15.The past and forecast future uses of sawmill products in Scotland, based on information provided by sawmills in Scotland, are shown in chart 23.6.

Chart 23.6: Forecast Future Production & Use of Sawmill Products Originating within Scotland 2022 – 2046



Source: Survey Data

23.16.The chart indicates the significant size and relative importance of the different markets for sawmill products produced within Scotland. Here the primary end use of sawmill products originating in the zone is with other parts of the forest industry itself.

Zonal Roundwood Transfers

23.17.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

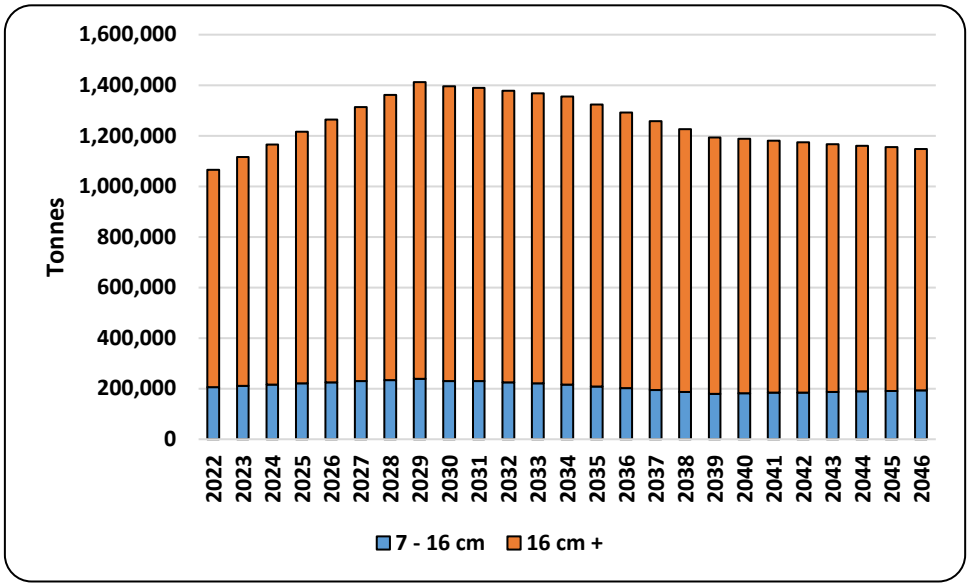
24. Northern England Zone: Coniferous Roundwood & Sawmill Products Forecast Availability & Demand

24.1.The information given in this section is for the area defined as the Northern England zone (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

24.2.The forecast potential annual availability of coniferous roundwood from the woods in the Northern England zone over the next 20 years is shown in chart 24.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

Chart 24.1: Northern England Zone: Forecast Potential Coniferous Roundwood Availability 2013 – 2035

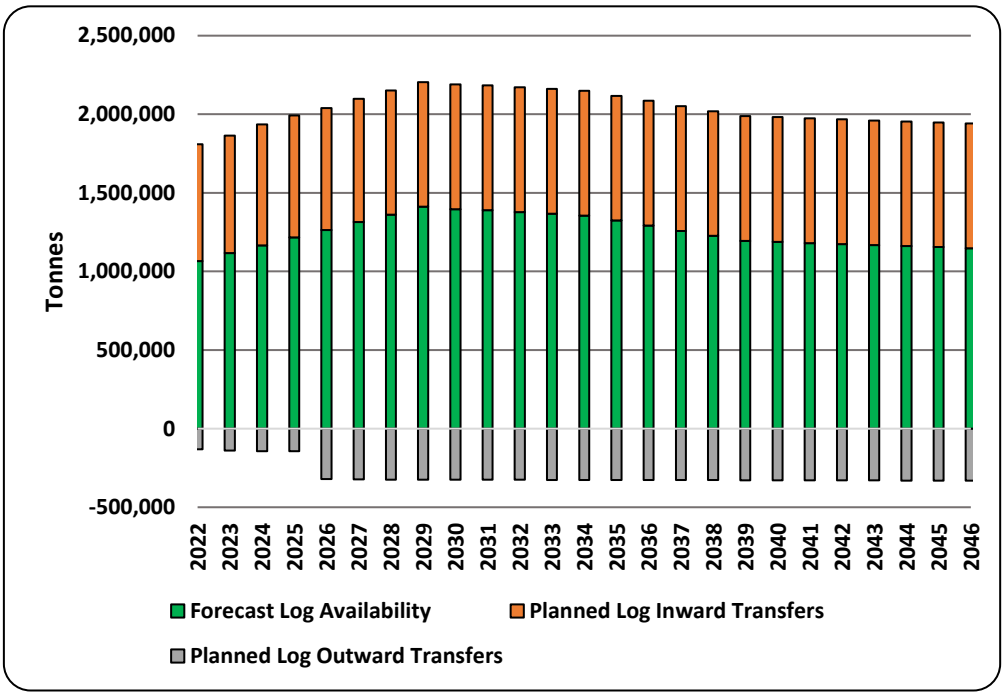


Source: Forest Research, 2022

24.3.The chart shows that the potential availability of coniferous roundwood from woods in the Northern England zone is forecast to rise over the next 8 years or so and then start falling after 2029. The quantity of logs under 16cm t.e.d is forecast to fluctuate slightly but remain at about 200,000 tonnes per annum. All the increase and decreases in potential availability of coniferous logs will be in those over 16 cm t.e.d.

24.4.The potential availability of coniferous roundwood for wood users in the Northern England zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also the planned movement of coniferous roundwood into and out of the zone. These anticipated movements of coniferous roundwood are shown in chart 24.2.

Chart 24.2: Forecast Potential Coniferous Roundwood Availability in the Northern England Zone with Expected Zonal Log Movements 2022 – 2046

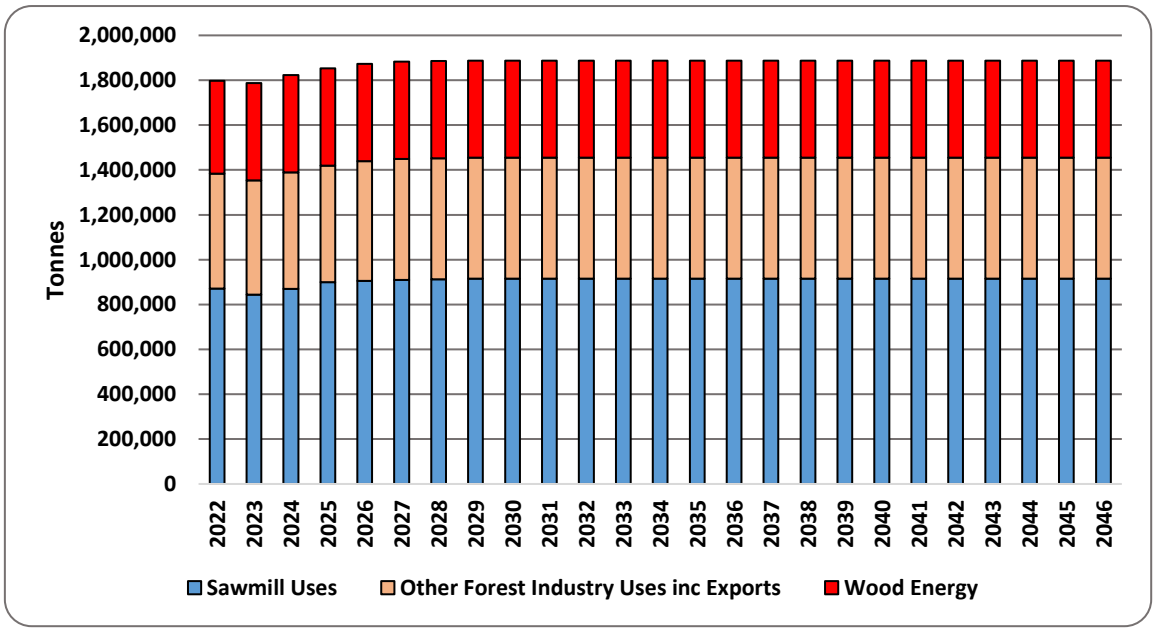


Source: Forest Research, 2022 & Survey Data

24.5.The chart shows that the zone draws in a significant quantity of coniferous roundwood and it is expected that the quantity will increase slightly in the future. This can be partly explained by the location of some users being close to the Scottish border and it is therefore logical to draw their supplies from South Scotland.

24.6.The forecast use by the forest industry and by energy users in the Northern England zone of the coniferous roundwood grown in woods in the zone is shown in chart 24.3.

Chart 24.3: Northern England: Planned Uses of GB Grown Coniferous Roundwood 2022 – 2046

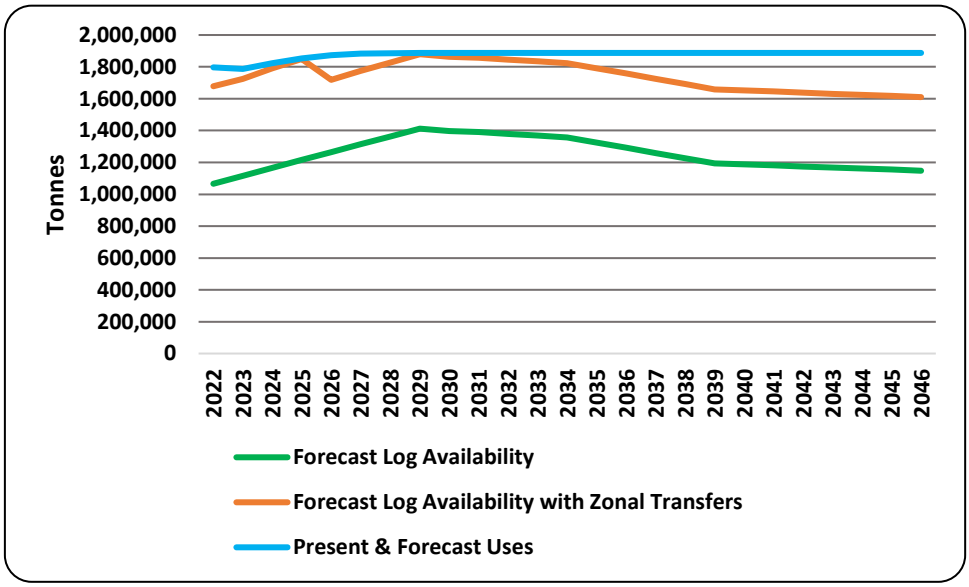


Source: Survey Data

24.7. The chart shows that some increase in the use of coniferous roundwood is expected to occur. Otherwise the anticipated use of coniferous roundwood by sawmills and other forest industry wood users is expected to remain fairly constant over the next 20 years. Compared with the previous forecast in 2016, overall demand is about 500,000 tonnes per annum lower; sawmill demand is slightly lower, but there is a noticeable drop in the size of the demand from biomass plants. Other forestry uses have increased slightly.

24.8.Chart 24.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in the Northern England zone.

Chart 24.4: Northern England: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

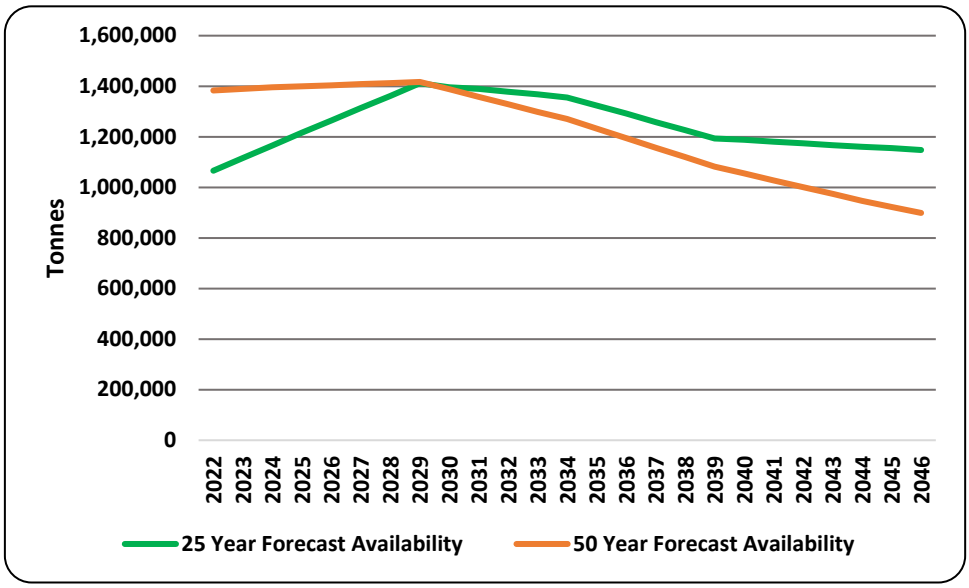


Source : Forest Research, 2022 & Survey Data

24.9.The chart shows that the present and expected uses of coniferous roundwood significantly exceed the forecast potential availability of coniferous roundwood from the woods within the Northern England zone. The requirements of wood users are therefore met through transporting coniferous roundwood in from other zones. This situation is expected to remain up until 2034 when demand is forecast to exceed potential availability and more coniferous roundwood will need to be transferred into the zone by the existing users to make up for a reduction in potential availability of coniferous roundwood sourced from woods in the zone.

24.10.A 50-year coniferous roundwood availability forecast has been made by the Forest Research using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25 year and 50-year coniferous roundwood availability forecasts are given in chart 24.5 and confirm a similar trend.

Chart 24.5: Northern England: Forest Research's 25-year and 50-year Forecasts of Potential Coniferous Roundwood Availability



Source: Forest Research, 2016 and 2022

24.11.The 50-year forecast indicates that there may be slightly more potential availability of coniferous roundwood in Northern England in the next 10 years, but the latest potential availability forecasts indicates that there will be less coniferous roundwood potentially available up to about 2029, but after that potentially slightly more available up to 2046.

24.12.This forecast reduction of coniferous roundwood availability after about 2039 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in the zone from the 1980s and changes in forestry practices such as planting more broadleaved trees and leaving larger areas unplanted for landscape reasons.

SAWMILL PRODUCTS

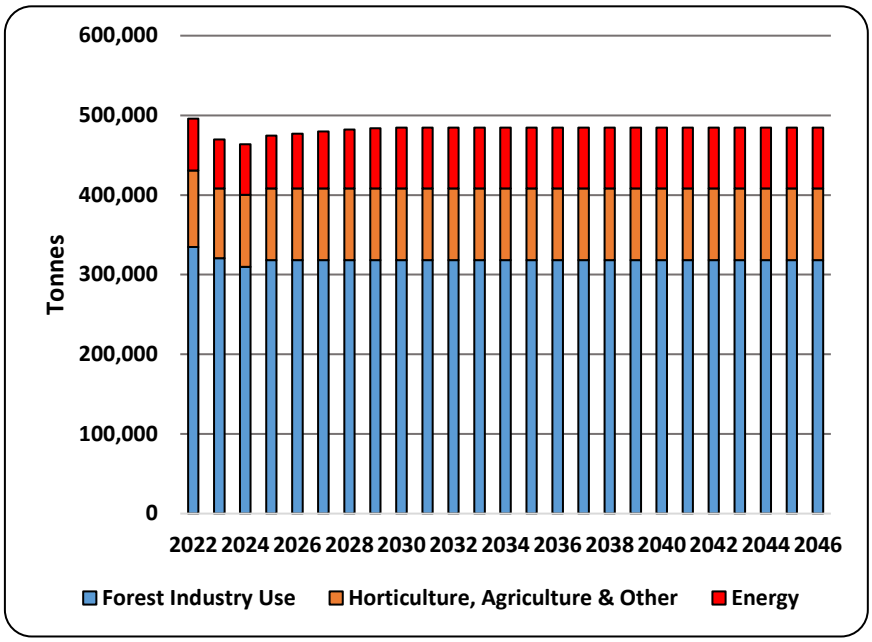
24.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

24.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the Northern England zone is sold into a variety of markets. The markets in the Northern England zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market overall in GB at present for sawmill products is the panelboard industry.

24.15.The past and forecast future uses of sawmill products in the Northern England zone, based on information provided by sawmills in the Northern England zone, are shown in chart 24.6.

Chart 24.6: Forecast Future Production & Use of Sawmill Products Produced within the Northern England Zone 2022 – 2046



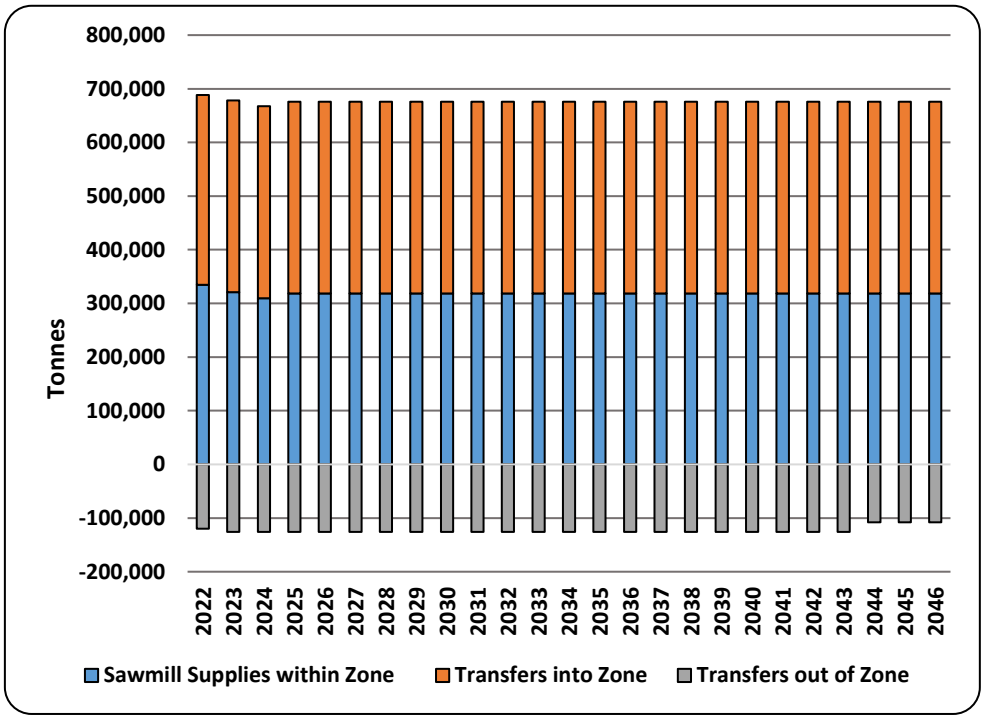
Source: Survey Data

24.16.The chart indicates the significant size and relative importance of the different markets for sawmill products produced within the Northern England zone. As in South Scotland the sawmill products originating in the zone are primarily used within the forest sector by the panelboard and pulp and paperboard sector.

Zonal Roundwood Transfers

24.17.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential. Some indication of the scale of the movements of wood chips and sawdust within, and in and out of the North England zone can be obtained from the survey data which is shown in chart 24.7.

Chart 24.7: Movements of Wood Chips and Sawdust within, and in and out of the North England Zone



Source: Survey Data

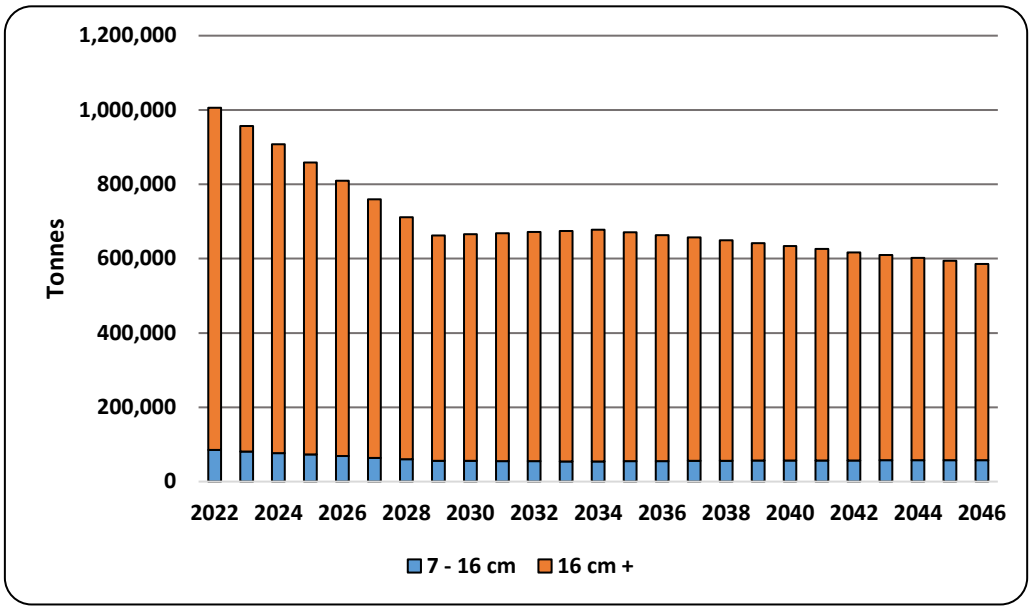
25. CENTRAL ENGLAND ZONE: CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

25.1. The information given in this section is for the area defined as the Central England zone (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

25.2. The forecast potential annual availability of coniferous roundwood from the woods in the Central England zone over the next 20 years is shown in chart 25.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

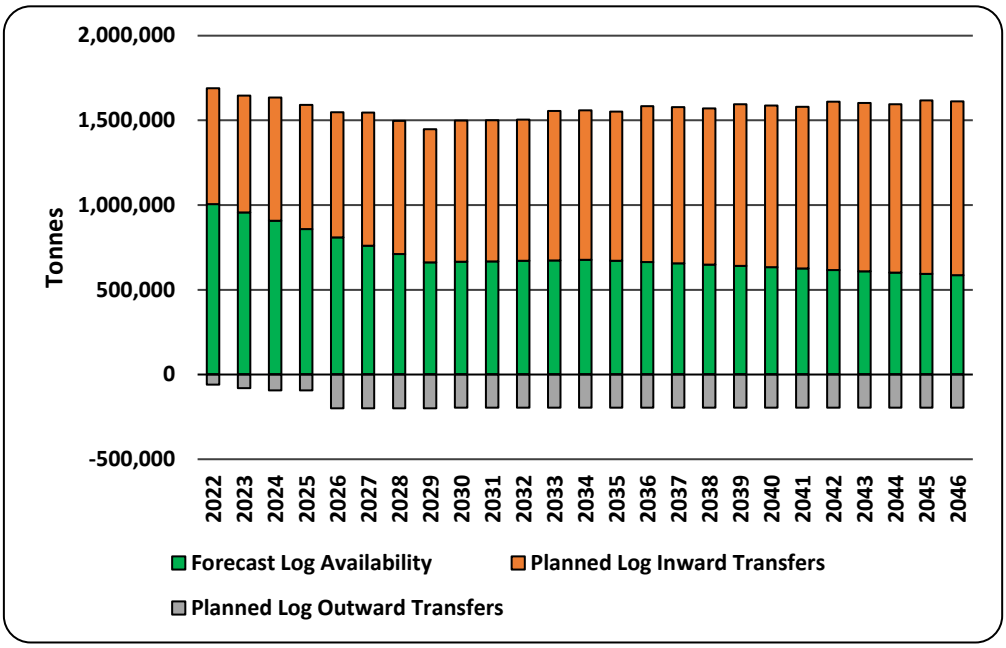
Chart 25.1: Central England: Forecast Potential Coniferous Roundwood Availability 2022 – 2046



25.3.The chart shows that the potential availability of coniferous roundwood from woods in the Central England zone is forecast to fall significantly over the next 5 years and then remain relatively steady up until 2046. All the changes in potential coniferous roundwood availability in the next 15 years are forecast to be as logs of 16 cm or more t.e.d and to take place in the private sector. This forecast differs from the one in 2016 which forecast that the potential availability of coniferous roundwood logs would steadily increase to 2035.

25.4.The potential availability of coniferous roundwood for wood users in the Central England zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the zone. These anticipated movements of coniferous roundwood are shown in chart 25.2.

Chart 25.2: Forecast Potential Coniferous Roundwood Availability in the Central England Zone with Expected Zonal Log Movements 2022 – 2046

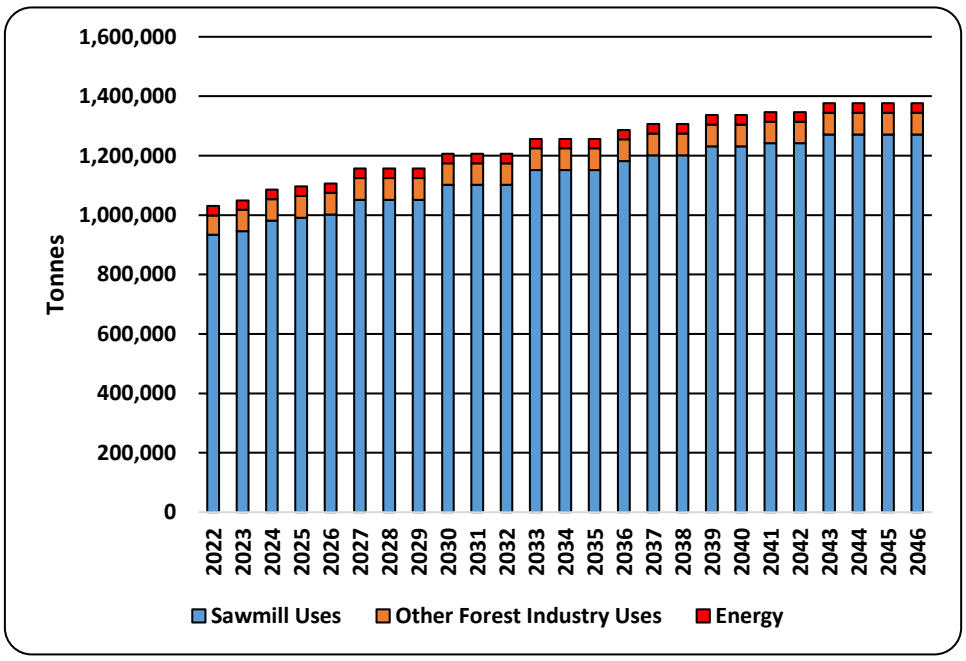


Source: Forest Research, 2022 & Survey Data

25.5.This chart shows that coniferous roundwood movements into the Central England zone are expected to increase around 2030 as the reduction in the potential availability of coniferous roundwood falls in about 5 years time. There is also a forecast increase in outward transfers of coniferous roundwood in 2026 and that quantity of outward transfers of logs is expected to continue thereafter.

25.6.The forecast use by the forest industry and by energy users in the Central England zone of the coniferous roundwood grown in woods in the zone is shown in chart 25.3.

Chart 25.3: Central England: Planned Uses of GB Grown Coniferous Roundwood 2022 – 2046

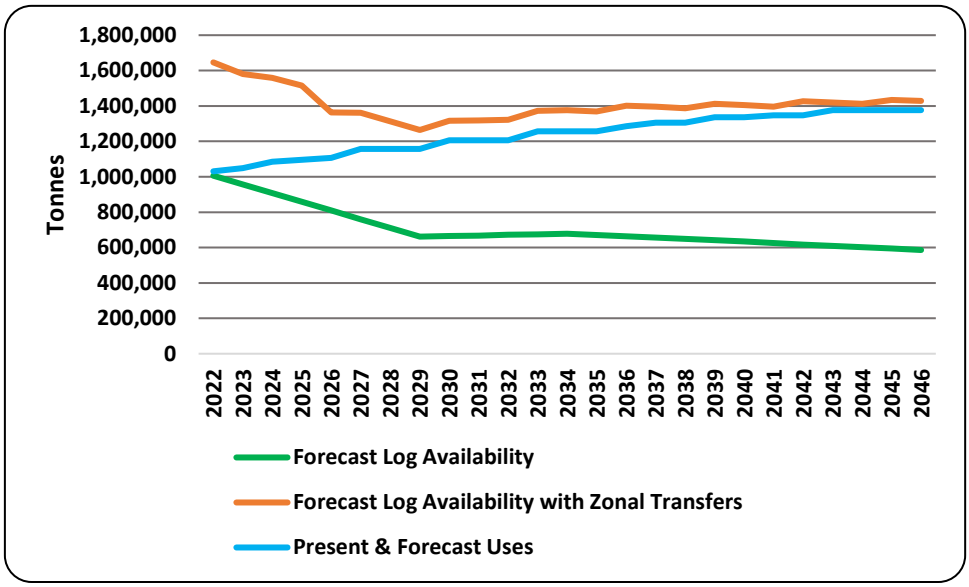


Source: Survey Data

25.7.The chart shows that the main demand for coniferous roundwood in Central England is the sawmilling sector and demand for coniferous roundwood logs from these companies is expected to gradually rise. Demand for coniferous roundwood for other uses and for energy is relatively small.

25.8.Chart 25.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in the Central England zone.

Chart 25.4: Central England: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

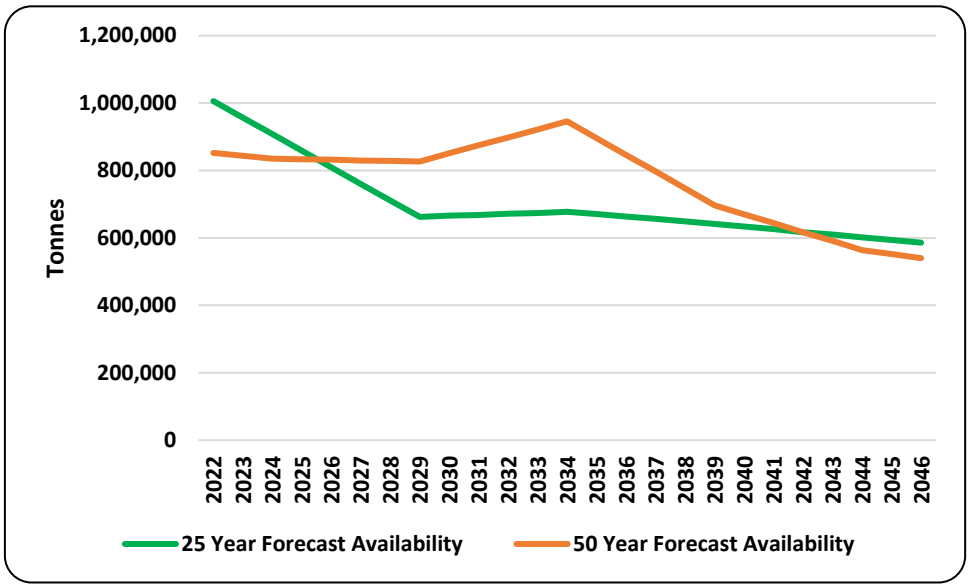


Source : Forest Research, 2022 & Survey Data

25.9.The chart shows that the anticipated demand for coniferous roundwood is just about in balance at present, but as the potential availability of coniferous woods in Central England starts to fall there is an ever widening gap as demand for sawlogs steadily increases. The gap is filled by bringing logs into the zone from other ones.

25.10.A 50-year coniferous roundwood availability forecast has been made by the Forestry Commission using slightly different assumptions to the 25-year forecast (see section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 25.5.

Chart 25.5: Central England: Forest Research's 25-year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022– 2046



Source: Forest Research, 2016 and 2022

25.11.The chart shows that the 50-year forecast of potential availability of coniferous roundwood is lower than the new 25 year potential availability forecast for the next 5 years but then indicates a potentially higher availability until about 2040 when the two forecasts coincide.

25.12.This forecast reduction of coniferous roundwood availability up to 2029 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in the zone from the 1980s and changes in forestry practices such as planting more broadleaved trees and leaving larger areas unplanted and using more broadleaves for landscape reasons.

SAWMILL PRODUCTS

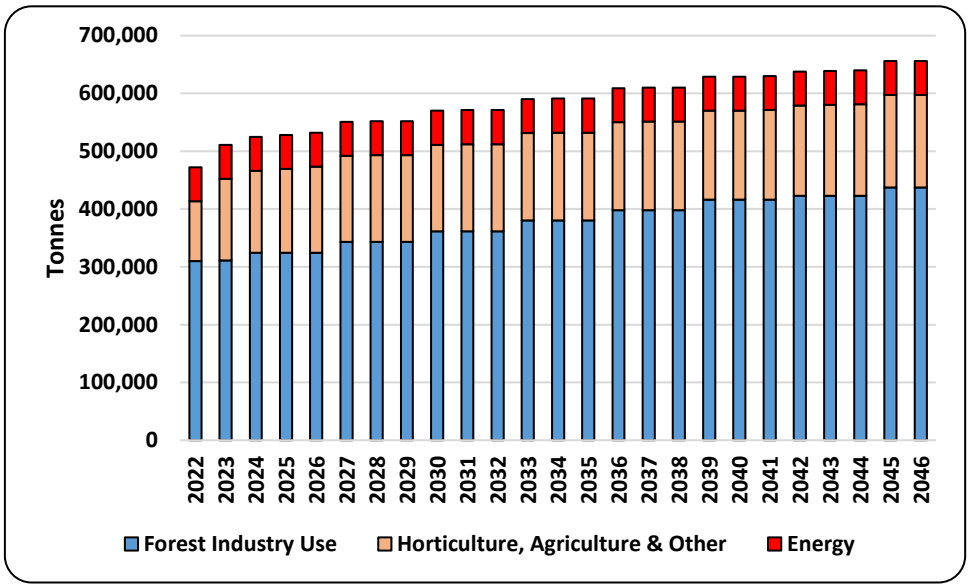
25.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

25.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the Central England zone is sold into a variety of markets. The markets in the Central England zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones. The quantity of chips that exported annually is very small. By far the largest market overall in GB at present for sawmill products is the panelboard industry.

25.15.The past and forecast future uses of sawmill products in the Central England zone, based on information provided by sawmills in the Central England zone, are shown in chart 25.6.

Chart 25.6: Forecast Future Production & Use of Sawmill Products Originating within the Central England Zone 2022 – 2046



Source: Survey Data

25.16.The chart shows that the production of co-products is forecast to steadily rise in line with increased coniferous roundwood use by the sawmilling sector. The most important end use for sawmill products is the forest sector, but the use of them for horticulture, agriculture and equestrian activities and other uses is the next most important market within the Central England zone.

Zonal Roundwood Transfers

25.17.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

25.18.Survey information suggests that two thirds or more of the sawmill co-products produced in the Central England zone will be transferred out of the zone for use elsewhere.

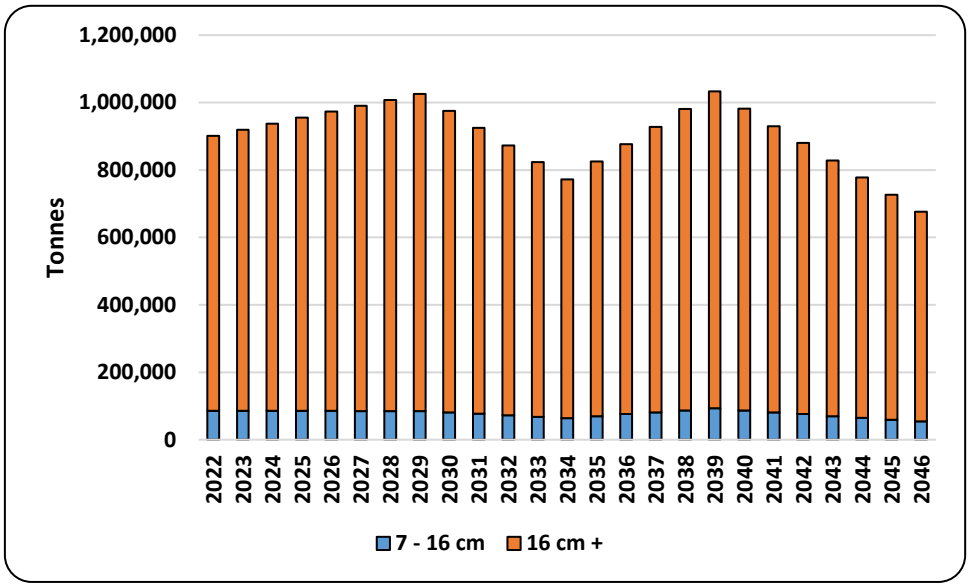
26. South England Zone: Coniferous Roundwood & Sawmill Products Forecast Availability & Demand

26.1. The information given in this section is for the area defined as the South England zone (see map 18.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

26.2.The forecast potential annual availability of coniferous roundwood from the woods in the South England zone over the next 20 years is shown in chart 26.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

Chart 26.1: South England: Forecast Potential Coniferous Roundwood Availability 2022 – 2046



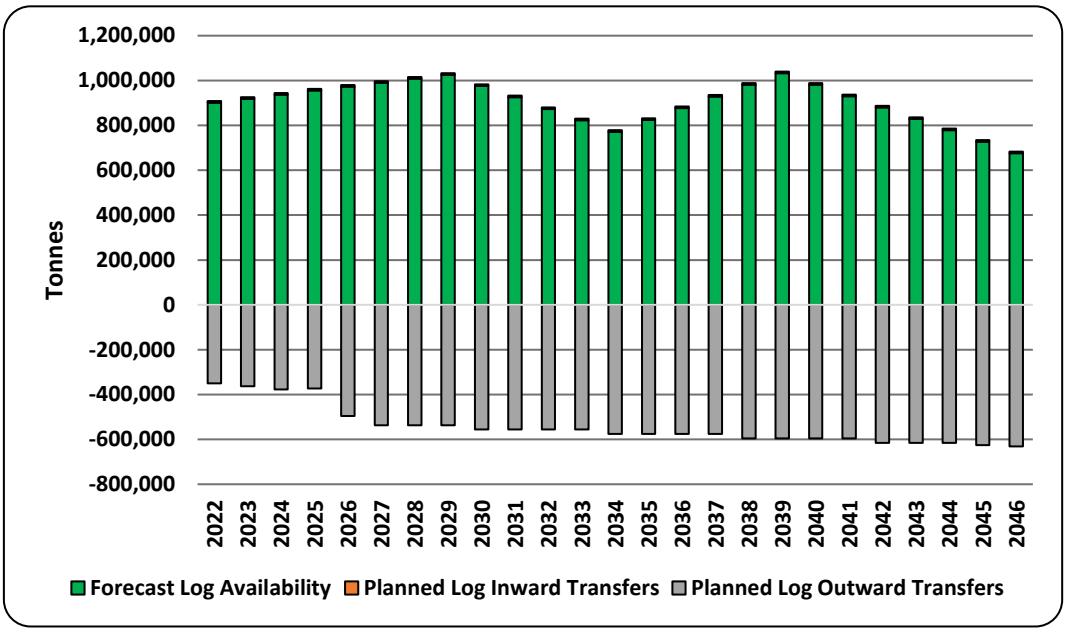
Source: Forest Research, 2022

26.3.The chart shows that the potential availability of coniferous roundwood from woods in the South England zone is forecast to rise slightly in the next eight years or so, but will then drop back before rising again in about 5 years' time after that. In about 18 years' time the potential availability of coniferous roundwood in the South England zone is forecast to start falling quite steeply. This fall is expected to occur almost entirely in logs with a diameter of 16 cm or more t.e.d.

26.4.Compared with the previous forecast, this forecast is some 100,000 to 200,000 tonnes per annum less.

26.5.The potential availability of coniferous roundwood for wood users in the Southern England zone is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the zone. These anticipated movements of coniferous roundwood are shown in chart 26.2.

Chart 26.2: Forecast Potential Coniferous Roundwood Availability in the South England Zone with Expected Zonal Log Transfers 2022 – 2046

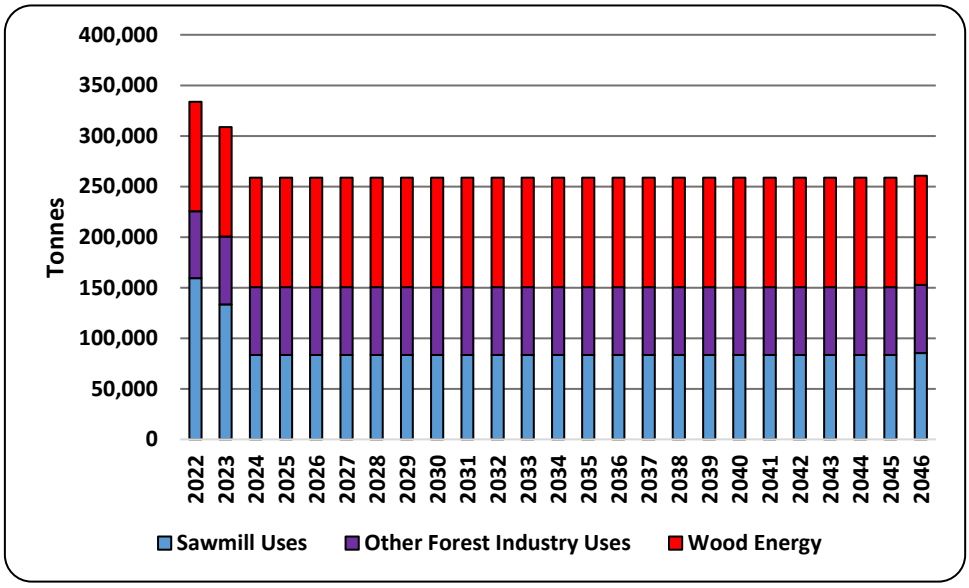


Source: Forest Research, 2022 & Survey Data

26.6. This chart shows that coniferous roundwood movements out of the South England zone are expected to continue at the present level until 2026 when the quantity is expected to increase and will then continue to gradually increase in spite of the fluctuations in potential coniferous roundwood availability. Compared with previous estimates outward transfer of coniferous logs are expected to almost triple.

26.7. The forecast use by the forest industry and by energy users in the South England zone of the coniferous roundwood grown in woods in the zone is shown in chart 26.3.

Chart 26.3: South England: Planned Uses of GB Grown Coniferous Roundwood 2013 – 2035



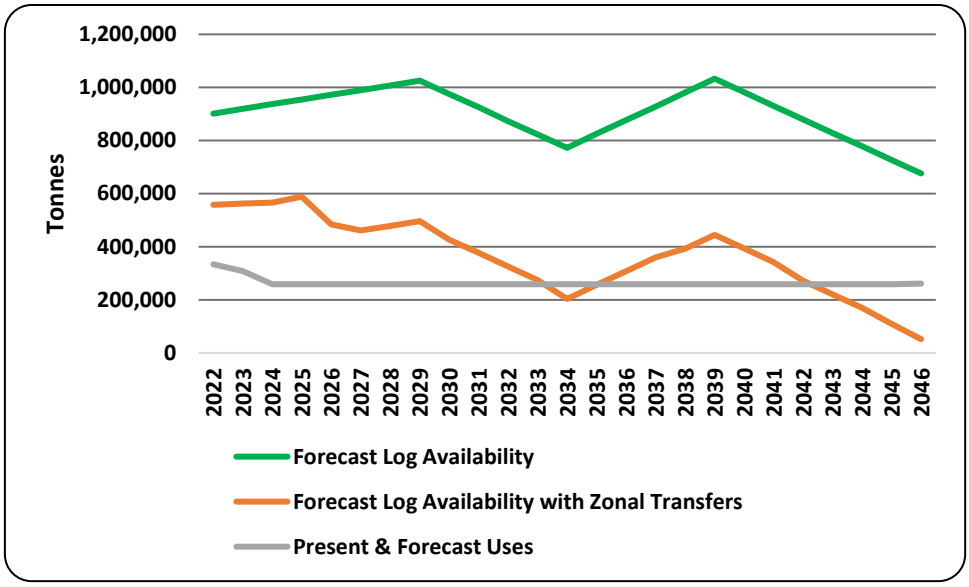
Source: Survey Data

26.8. The chart shows that the planned uses of coniferous roundwood in the South England zone is expected to fall in 2023 and then remain unchanged over the next 23 years. Overall

demand is down inn 2022/23 by about 150,000 tonnes per annum since the previous analysis. Compared with Central England the wood energy market is much more significant.

26.9.Chart 26.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in the South England zone.

Chart 26.4: South England: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

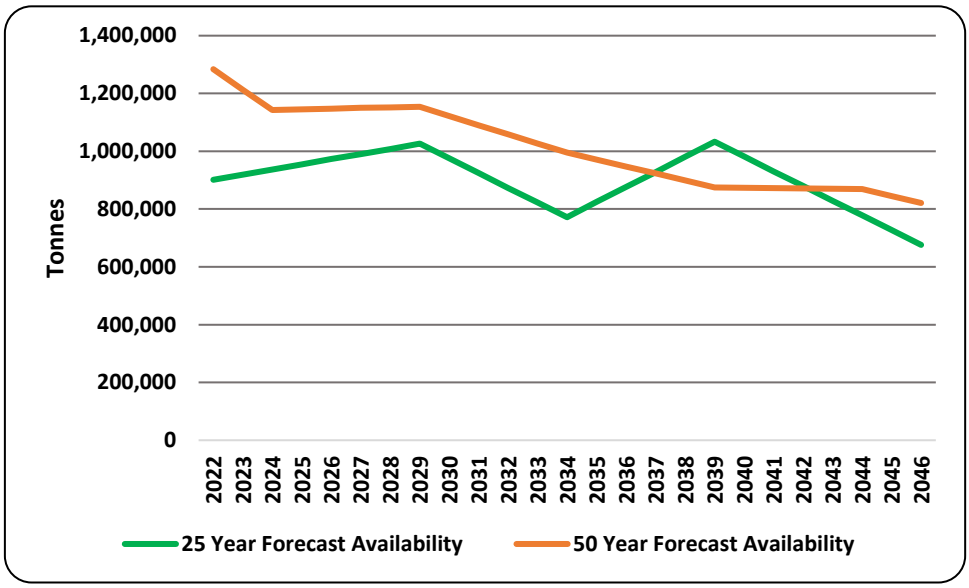


Source : Forest Research, 2022 & Survey Data

26.10.The chart shows that the potential availability of coniferous roundwood comfortably exceeds the anticipated demand for coniferous roundwood from companies located in South England. However, outward transfers from the zone reduces the potential availability of coniferous logs and by about 2032, net availability of coniferous roundwood appears to becomes very tight, but after that the situation fluctuates. This is a much tighter supply situation than was expected in the previous study.

26.11.A 50-year coniferous roundwood availability forecast has been made by the Forestry Commission using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 26.5 and confirm a similar trend.

Chart 26.5: South England: Forest Research's 25-year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research, 2016 and 2022

26.12.The chart shows that the 50-year forecast of potential availability of coniferous roundwood is higher over the next 15 years than the 25 year coniferous roundwood availability forecast, but then starts to fall with both forecasts turning down in about 15 years' time in 2030. This pattern has changed little from the earlier study apart from a slight increase in coniferous roundwood availability indicated by the new forecast around 2039.

26.13.This reduction of coniferous roundwood availability after about 2040 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in the zone from the 1980s and changes in forestry practices such as leaving larger areas unplanted and using more broadleaves for landscape reasons.

SAWMILL PRODUCTS

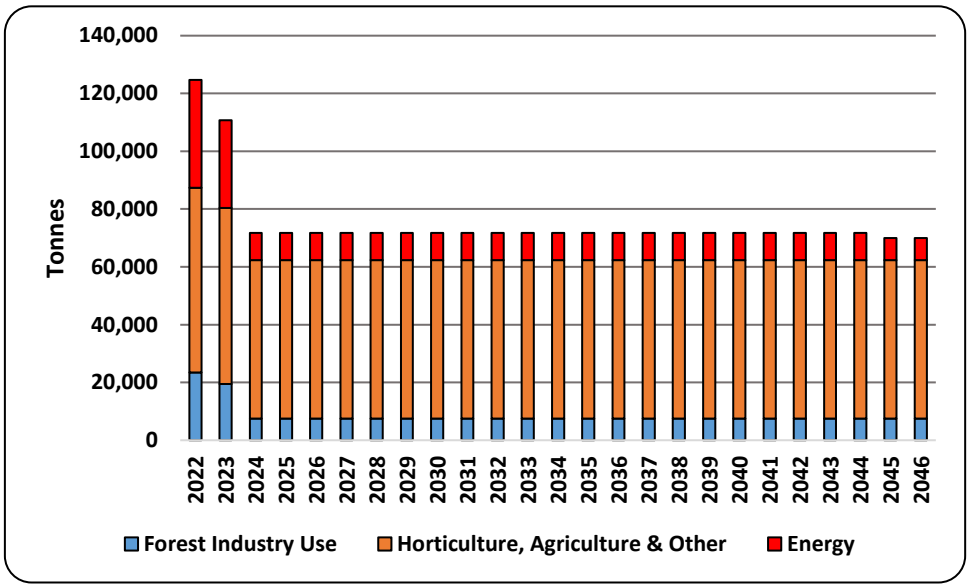
26.14.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

26.15.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in the South England zone is sold into a variety of markets. The markets in the South England zone can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets with a number of other small miscellaneous ones.

26.16.The past and forecast future uses of sawmill products in the South England zone, based on information provided by sawmills in the South England zone, are shown in chart 2.6.

Chart 26.6: Forecast Future Production & Use of Sawmill Products Originating within the South England Zone 2022 – 2046



Source: Survey Data

26.17.The chart shows that the total quantity of sawmill products produced in the South England zone is relatively small compared with other zones and that a large proportion of them is used in the agricultural and horticultural sectors, including equestrian activities. Only a small percentage gets used within the forest industry.

Zonal Roundwood Transfers

26.18.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

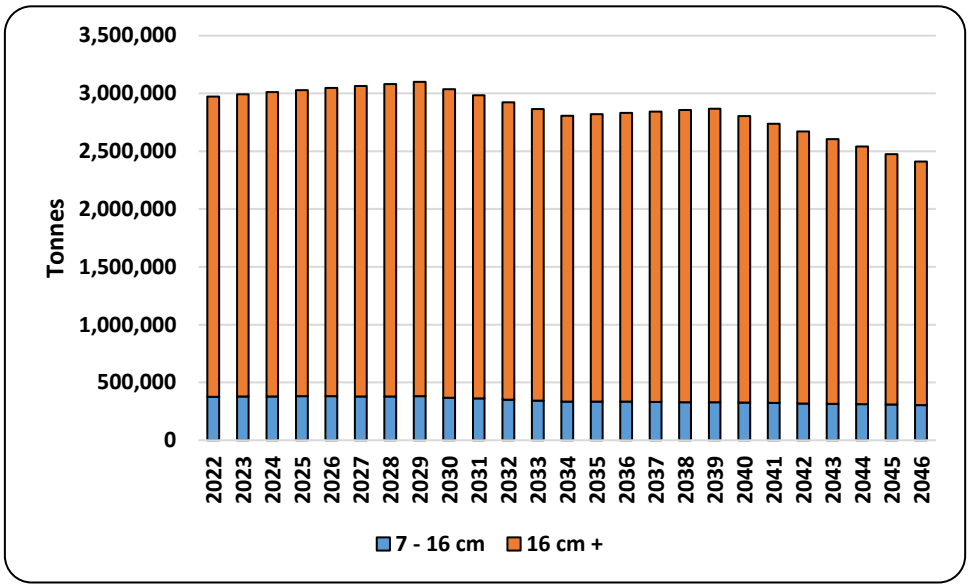
27. ENGLAND : CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

27.1.The information given in this section is for England and is the combined data for Northern, Central and South England zones (see map 17.1 and sections 24, 25 and 26). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

27.2.The forecast potential annual availability of coniferous roundwood from the woods in England over the next 20 years is shown in chart 27.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

Chart 27.1: England: Forecast Potential Coniferous Roundwood Availability 2022 – 2046

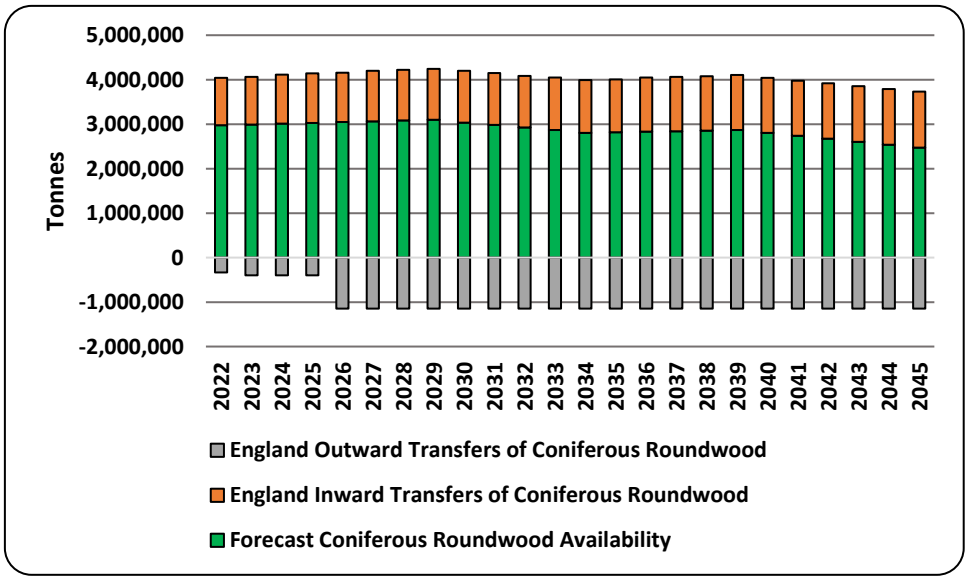


Source: Forest Research, 2022

27.3.The chart shows that the potential availability of coniferous roundwood from woods in England is forecast to rise very slightly until about 2029, but will then decrease before rising very slightly in about 2029 before declining further. The forecast changes in potential availability is expected to occur almost entirely in logs with a diameter of 16 cm or more t.e.d.

27.4.The potential availability of coniferous roundwood for wood users in England is not just the forecast potential availability of coniferous roundwood from woods in England, but also needs to take account of the planned movement of coniferous roundwood into and out of England. These anticipated movements of coniferous roundwood are shown in chart 27.2.

Chart 27.2: Forecast Potential Coniferous Roundwood Availability in England with Expected Zonal Log Transfers 2022 – 2046



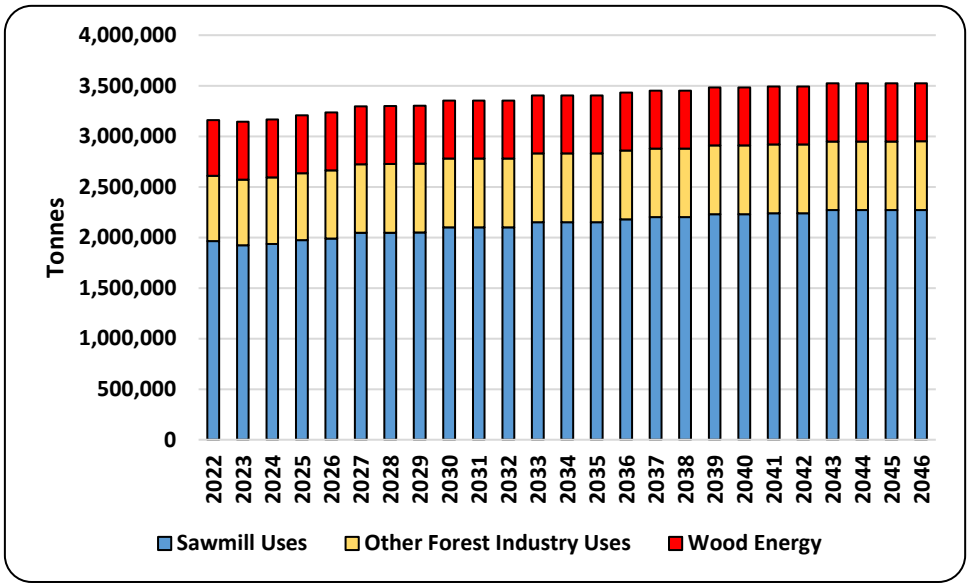
Source: Forest Research, 2022 & Survey Data

27.5.This chart shows that coniferous roundwood movements out of England are expected to

continue at about the present level and are then expected to increase significantly in 2026 and will remain at about that level. Inward movements of coniferous logs are expected to rise slightly up to 2028 and then fluctuate slightly before starting to decrease. Most of the movement of logs will occur into and out of South Scotland and Wales.

27.6.The forecast use by the forest industry and by energy users in England of the coniferous roundwood grown in woods in England is shown in chart 27.3.

Chart 27.3: England: Planned Uses of Coniferous Roundwood 2013 – 2035

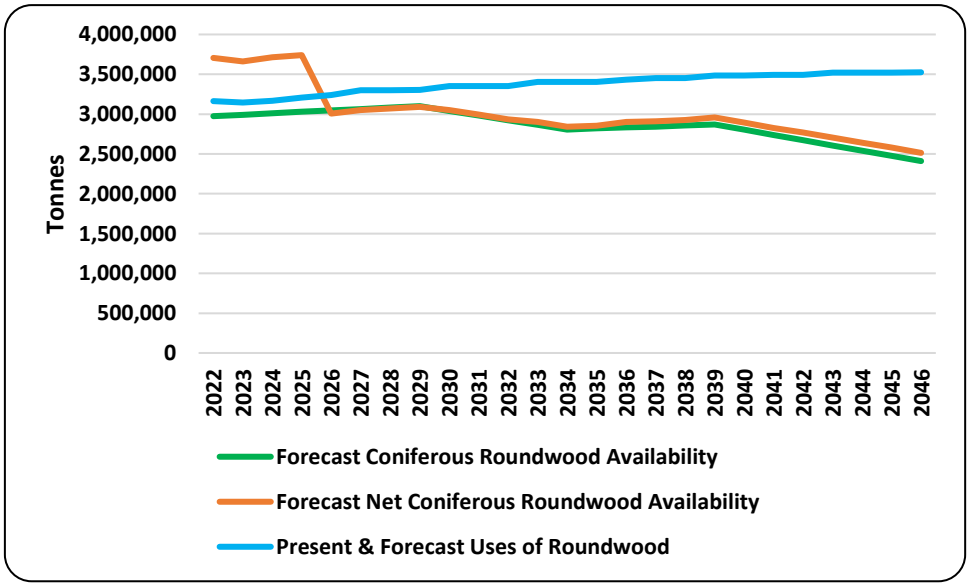


Source: Survey Data

27.7.The chart shows that the overall planned use of coniferous roundwood in England is expected to increase slightly over the next 23 years with most of this increase accounted for by a greater demand for coniferous roundwood by the sawmilling sector.

27.8.Chart 27.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in England.

Chart 27.4: England: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

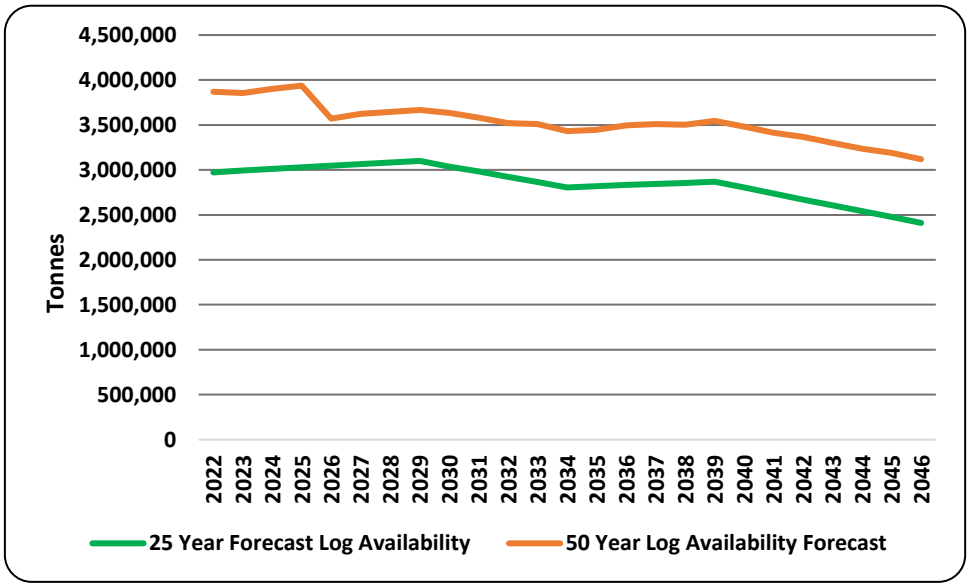


Source : Forest Research, 2022 & Survey Data

27.9. The chart shows that although coniferous roundwood availability in England is below anticipated demand, forecast net coniferous roundwood availability in England exceeds anticipated demand for coniferous roundwood in England up to about 2026. Coniferous roundwood availability will then fall short of potential demand in England after allowing for forecast movements of roundwood into and out of England, if demand increases in Britain as forecast, based on information collected by this survey.

27.10.A 50-year coniferous roundwood availability forecast has been made by the Forest Research using slightly different assumptions to the 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 27.5 and confirm a similar trend.

Chart 27.5: England: Forest Research's 25-year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research, 2016 and 2022

27.11.The chart shows that the 50-year forecast of potential availability of coniferous roundwood is significantly higher than the latest 25 year coniferous roundwood availability forecast, but both follow a similar pattern of gradually declining over time.

27.12.This reduction of coniferous roundwood availability after about 2040 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in the zone from the 1980s and changes in forestry practices such as leaving larger areas unplanted and using more broadleaves for landscape reasons.

SAWMILL PRODUCTS

27.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

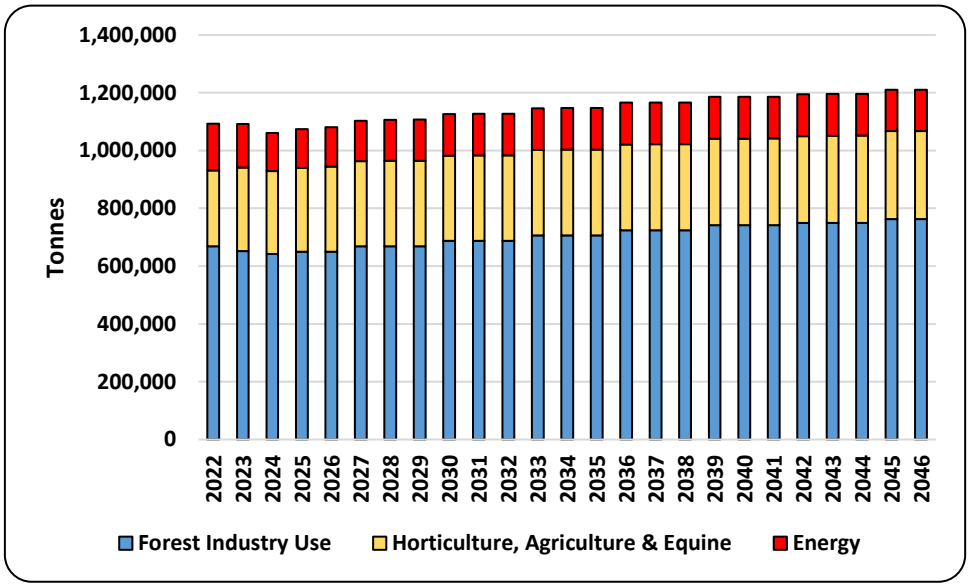
Uses

27.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in England is sold into a variety of markets. The markets in England can be broadly categorised as the panelboard mills, export, agriculture and horticultural markets

with a number of other small miscellaneous ones.

27.15.The past and forecast future uses of sawmill products in England, based on information provided by sawmills in England, are shown in chart 27.6.

Chart 27.6: Forecast Future Production & Use of Sawmill Products Originating within England 2022 – 2046



Source: Survey Data

27.16.The chart shows that the total quantity of sawmill products produced in England is expected to remain fairly steady with slightly over half being used by the forest industry. Agricultural, horticultural and equine uses are the second most important category of end use.

Zonal Roundwood Transfers

27.17.It is not possible to present any accurate data on sawmill product flows because many sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

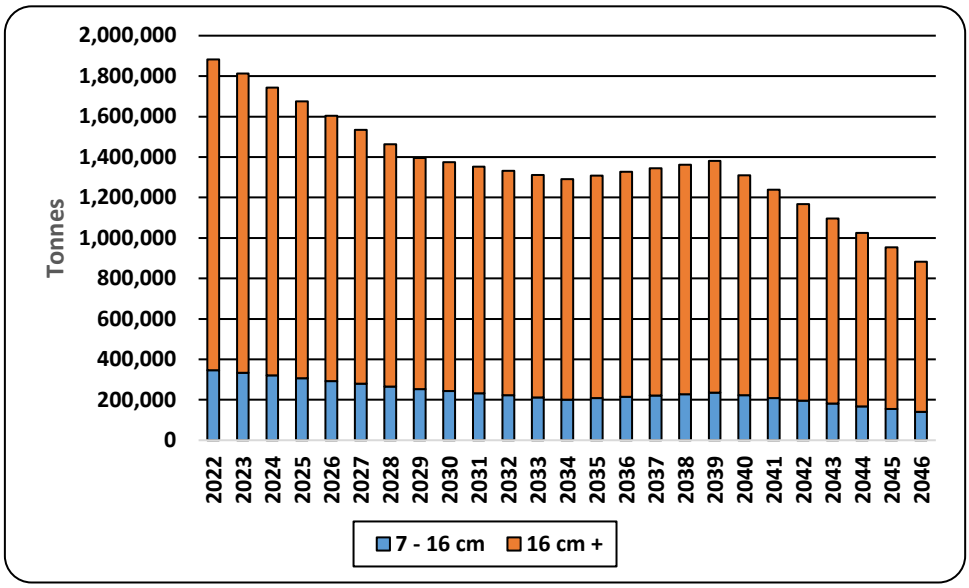
28. WALES: CONIFEROUS ROUNDWOOD & SAWMILL PRODUCTS FORECAST AVAILABILITY & DEMAND

28.1.The information given in this section is for Wales (see map 17.1). This section of the report has been divided into two parts. The first part presents the situation for coniferous roundwood and the second part presents the results for coniferous sawmill products.

CONIFEROUS ROUNDWOOD

28.2.The forecast potential annual availability of coniferous roundwood from the woods in the Wales over the next 20 years is shown in chart 28.1 for logs in the 7-16 cm and 16 cm + t.e.d size categories along with their combined total.

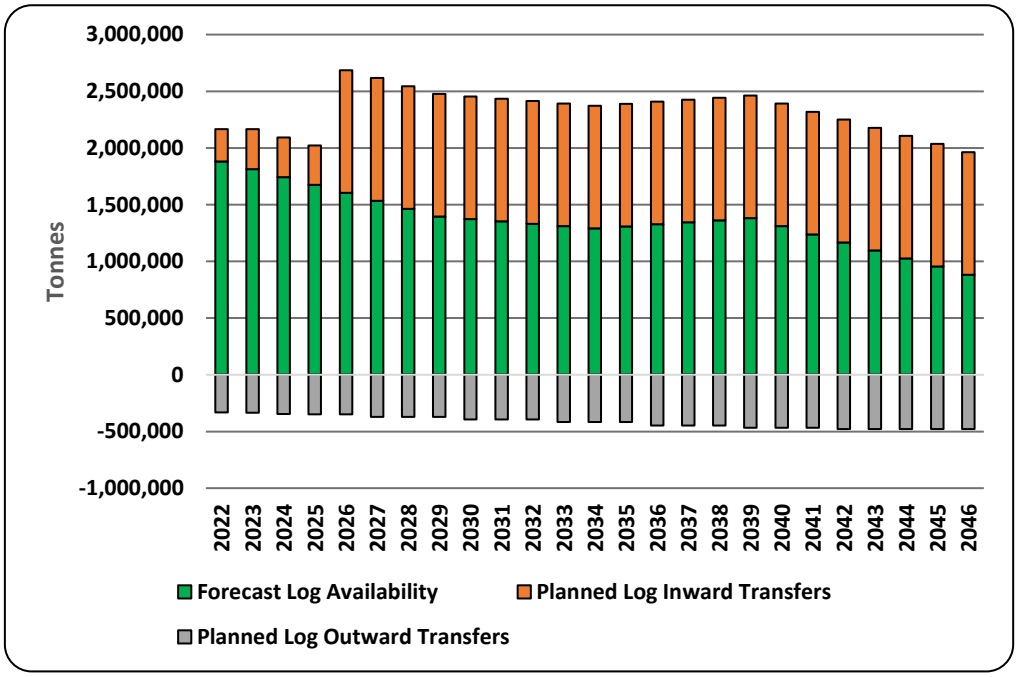
Chart 28.1: Wales: Forecast Potential Coniferous Roundwood Availability 2022 – 2046



28.3.The chart shows that the potential availability of coniferous roundwood from woods in Wales is forecast to fall quite significantly up to about 2030 after which it rises very slightly to 2039 before falling again.

28.4.The potential availability of coniferous roundwood for wood users in Wales is not just the forecast potential availability of coniferous roundwood from woods in the zone, but also needs to take account of the planned movement of coniferous roundwood into and out of the zone. These anticipated movements of coniferous roundwood are shown in chart 28.2.

Chart 28.2: Forecast Potential Coniferous Roundwood Availability in Wales with Expected Zonal Log Movements 2022 – 2046



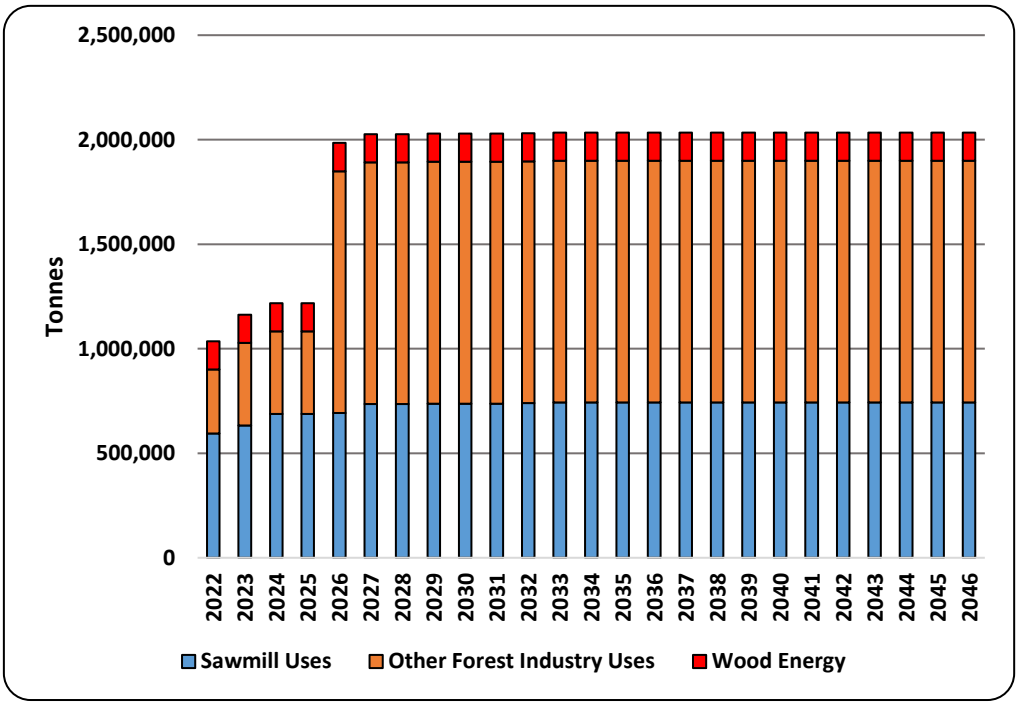
Source: Forest Research, 2022 & Survey Data

28.5.This chart shows that the overall shape of coniferous roundwood availability in Wales will

be determined to a large extent by the woods and owners of woods in Wales. Roundwood movements out of Wales are expected to remain fairly steady at their present level, but inward movements are forecast to increase very significantly in about 3 year's time, but after that remain fairly constant.

28.6.The forecast use by the forest industry and by energy users in Wales of the coniferous roundwood grown in woods in the zone is shown in chart 28.3.

Chart 28.3: Wales: Planned Uses of GB Grown Coniferous Roundwood 2022 – 2046

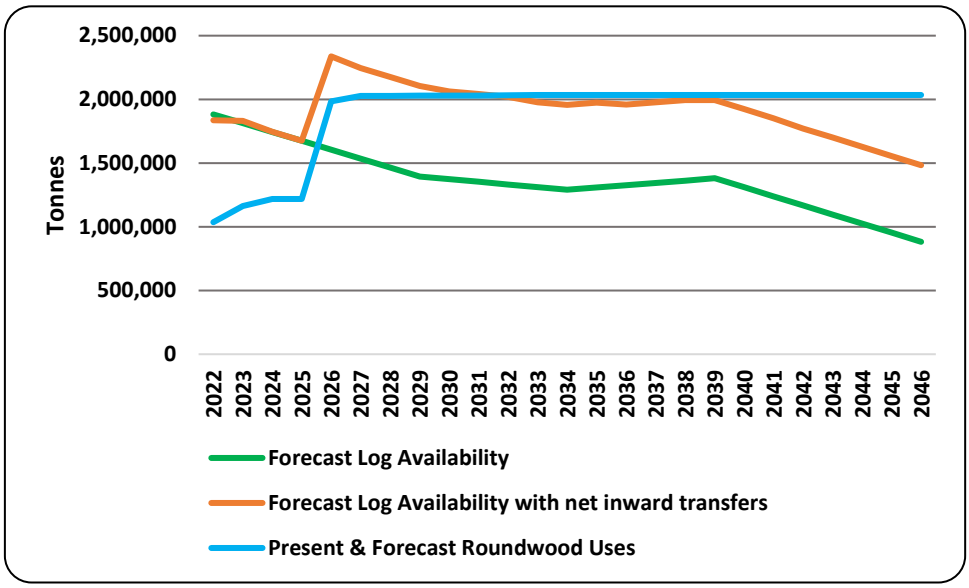


Source: Survey Data

28.7.The chart shows that some small increases in the use of coniferous roundwood by the sawmilling industry are planned but there are no planned increase for wood energy production. The major increase forecast is in the category of 'Other Forest Industry Uses' starting in about 2026. After that no further changes are foreseen at this stage.

28.8.Chart 28.4 shows the potential availability of coniferous roundwood along with all the expected future uses for it in Wales.

Chart 28.4: Wales: Comparison of Coniferous Roundwood Potential Availability & Demand 2022 – 2046

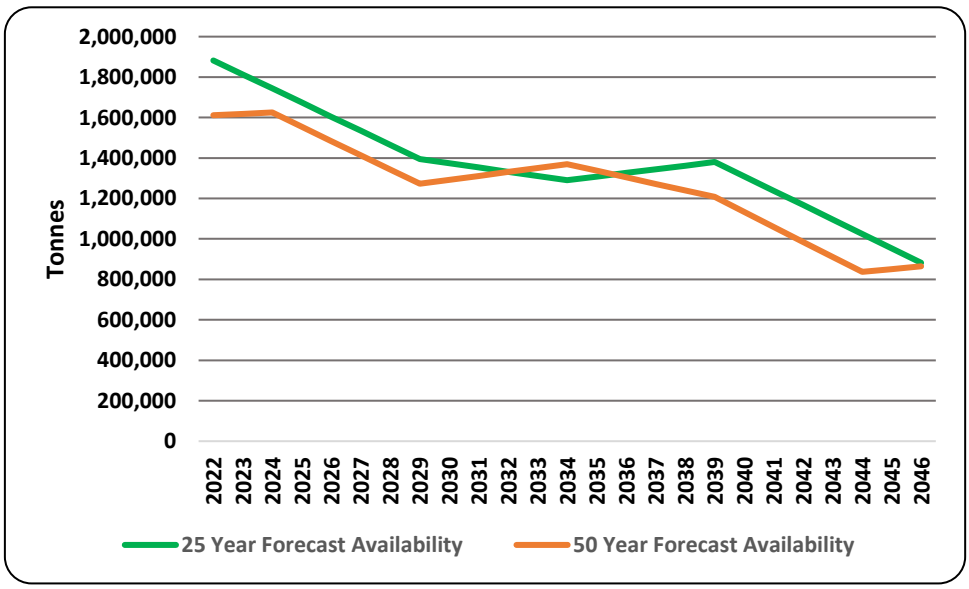


Source: Forest Research, 2022 & Survey Data

28.9.The chart shows that the potential availability of coniferous roundwood exceeds the anticipated demand for coniferous roundwood in Wales for the next 2 or 3 years and then the significantly increased demand will be met by inward transfer of coniferous roundwood. The situation only changes around 2039 when the potential log availability from woods in Wales starts to fall away.

28.10.The most recent 50-year coniferous roundwood availability forecast has been made by the Forest Research using slightly different assumptions to the most recent 25-year forecast (see annex section 18). Both the 25-year and 50-year coniferous roundwood availability forecasts are given in chart 28.5 and confirm a similar trend.

Chart 28.5: Wales: Forestry Commission 25-year and 50-year Forecasts of Potential Coniferous Roundwood Availability 2022 – 2046



Source: Forest Research, 2016 and 2022

28.11.The chart shows that the 25-year coniferous roundwood availability forecast follows a very similar pattern to the 50 year availability forecast which shows quite a steep decline to about 2029 and then the availability of roundwood is forecast to remain relatively unchanged until about 2039, after which it declines further until 2046.

28.12.This forecast long term reduction of coniferous roundwood availability after about 2038 reflects a number of issues which include slightly different forecast assumptions, but more significantly reduced areas of new planting in Wales from the 1980s and changes in forestry practices such as leaving larger areas unplanted and using more broadleaves for landscape reasons.

SAWMILL PRODUCTS

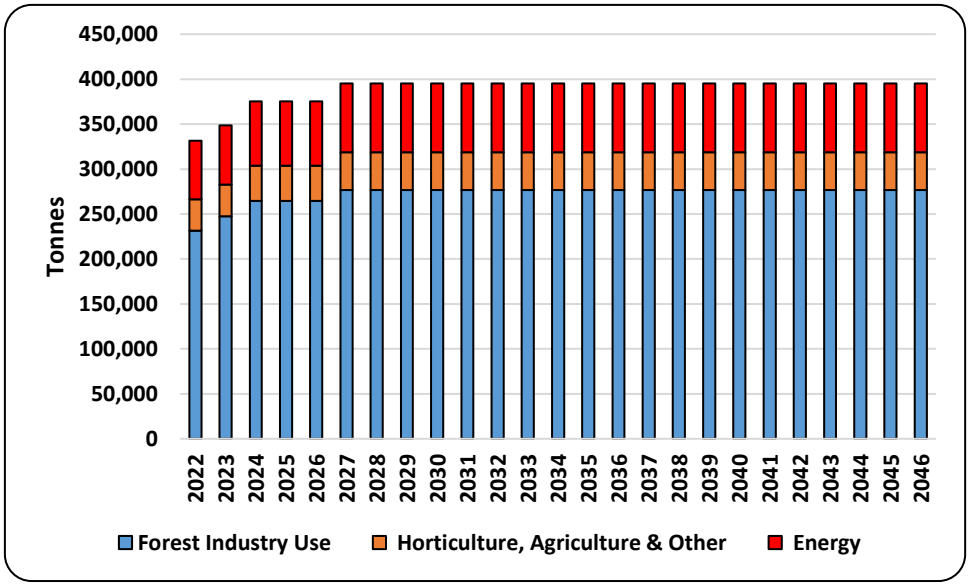
28.13.Coniferous sawmills produce sawn timber, wood chips, sawdust, pin chips, shavings, slab wood and bark. For the purposes of this report the term "coniferous sawmill products" or "sawmill products" relates to all the products *except* sawn timber.

Uses

28.14.The existing supply of sawmill products (chips, sawdust, slab wood and bark) produced by sawmills located in Wales zone is sold into a variety of markets. The markets in Wales can be broadly categorised as the panelboard mills, agriculture and horticultural markets with a number of other small miscellaneous ones. By far the largest market overall in Britain at present for sawmill products is the panelboard industry.

28.15.The past and forecast future uses of sawmill products in Wales, based on information provided by sawmills in Wales, are shown in chart 28.6.

Chart 28.6: Forecast Future Production & Use of Sawmill Products Produced within Wales 2022 – 2046



Source: Survey Data

28.16.The chart shows that the most important market for sawmill products in Wales is the forest industry.

Zonal Roundwood Transfers

28.17.It is not possible to present any accurate data on sawmill product flows because many

sawmills are uncertain for what purpose some of their sawmill products eventually get used. This is because the purchase and sale, and the logistics of moving most larger quantities of sawmill products between producers and purchasers is undertaken by a small number of specialist companies. These companies would consider providing detailed information on their sawmill product movements as being commercially confidential.

28.18.Survey data suggests that between 300,000 tonnes to 400,000 tonnes per annum of chips and wet sawdust may be required to be brought into the zone for use by the forest sector to add to production of these products within Wales.

John Clegg Consulting Ltd

May 2023

REFERENCES

Forestry Commission. (2003): Woodfuel Resource in Britain. Author H McKay.

www.eforestry.gov.uk/woodfuel.

Forestry Research: (2022): Wood Production & Trade Statistics

Forestry Research: (2022): NFI Interim Report - 25-year forecast of softwood timber availability

WRAP. (2009): Wood Waste Market in the UK. Summary Report.

WRAP. (Undated): Guide to Marketing Recycled Wood Products.