



# UK use of biomass for electricity and CHP

- OFGEM sustainability data 2013/14
- Woodfuel Disclosure Survey 2015



# Background and data sources

The Government wishes to monitor the use of wood for fuel by UK large-scale electricity generators to determine its current or potential future impact on other UK wood users.

This document draws conclusions from two sources of information:

## **OFGEM sustainability data for the 2013/14 financial year**

The primary means of monitoring biomass use in power generation is through mandatory reporting of sustainability information to OFGEM through the Renewables Obligation (RO).

## **Woodfuel Disclosure Survey**

A voluntary questionnaire distributed to large-scale (>50 MW) biomass electricity users on biomass sourcing plans over the next five years. First administered in 2013\*, the 2015 Woodfuel Disclosure Survey asked new questions about the sustainability of wood use in 2013/14.



# Summary of findings

The two sources of evidence agree that:

- domestic demand is expected to remain steady (at around 1.4 million oven dried tonnes) to 2020;
- the increase in biomass generation has been met through imports. The majority of woody biomass has been sourced from North America, primarily from existing forestry and processing practices. This trend is expected to continue to 2020.

Other data sources, including DECC's Energy Trends publication\*, corroborate these results.

There is no indication that use of UK-sourced biomass for electricity is causing resource constraints for other UK wood users.



# Report coverage

Period covered: 1 April 2013 to 31 March 2014.

This report covers renewable-fuelled combustion technologies:

- biomass conversion;
- biomass co-firing;
- biomass CHP;
- dedicated biomass generators; and
- using woody biomass and energy crop feedstocks.

It does not cover :

- energy from municipal solid waste; and
- biogas technologies (incl. anaerobic digestion or alternative combustion technologies, sewage gas, and landfill gas).



# Methodology notes

Tables and charts in Section 1 are based on OFGEM's profiling, land criteria and greenhouse gas data.

All solid biomass is shown in million oven dried tonnes (modt) based on typical moisture contents for each biomass type:

- 10% for pellets;
- 15% for agri-residue;
- 30% for chips; and
- 50% for "green wood".

Standardisation was necessary for comparability, but comparisons with other data sets should be made with care.

Approximations were made to determine the amount of waste and residue used and to disaggregate data into feedstock types. Where possible, figures were verified against GHG data and individual company reports.



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# Section 1: OFGEM sustainability data 2013/2014

# Reporting requirements to Ofgem

## Profiling data

RO generators using biomass to generate electricity must provide 'profiling data' about their fuel, including

- country of origin;
- biomass source;
- biomass type;
- form; and
- quantity.

For more information on the reporting requirements see Ofgem website\*.

Ofgem publish guidance on reporting sustainability information\*\*.

Ofgem also publish an RO annual report\*\*\*.

\*<https://www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro/information-generators/biomass-sustainability>

7 \*\*<https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-sustainability-criteria-guidance-0>

\*\*\*<https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-ro-annual-report-2013-14>

# Reporting requirements (cont'd)

## Sustainability data

Biomass generating stations over 50 kW capacity are required to report sustainability information to OFGEM.

*(Exemptions apply for sewage gas, landfill gas and municipal waste)*

This includes compliance with the land criteria and greenhouse gas (GHG) criteria each month as part of each ROC claim.

Solid biomass or biogas generating stations must have emissions equal to or lower than 79.2 gCO<sub>2</sub>eq/MJ of electricity.

As reporting against all the criteria was not mandatory in the 2013/14 there are gaps in the data. This makes it difficult to draw firm conclusions about the amounts and types of biomass used. However, a summary of the available data is presented here from which trends can usefully be drawn.



# Ofgem data: technology, reporting

Technology Type	Number of facilities reporting Profiling Data	Number of facilities reporting Land Criteria & GHG emissions	Number of facilities reporting feedstock volume as “not measured”
Biomass Combustion*	22	35	4 (1 x exempt, 1 x unknown, 2 x GHGs reported)
Anaerobic Digestion	23	53	38 (20 x exempt, 18 x unknown)
Gasification/Pyrolysis	2	3	2 (2 x exempt)

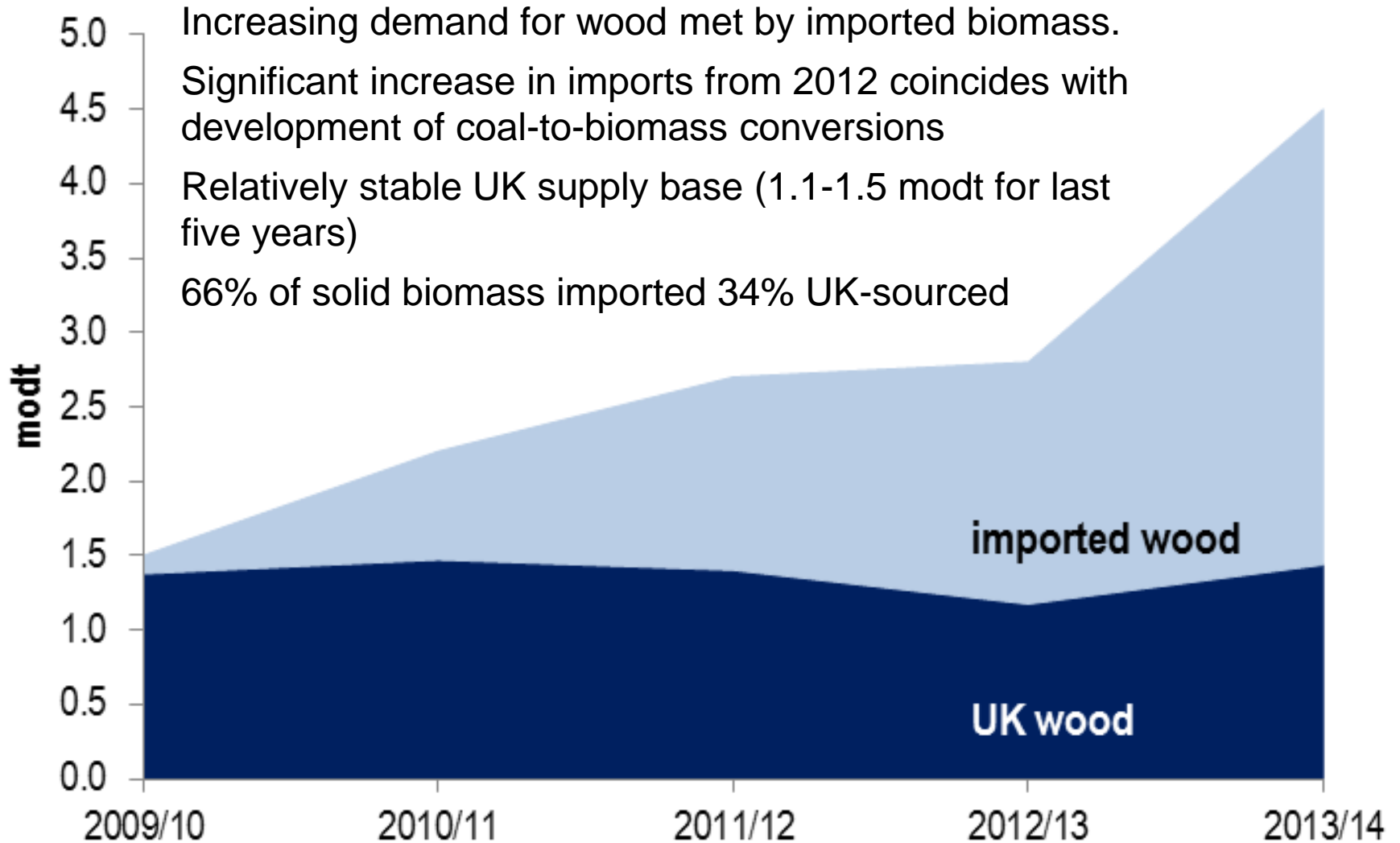
RO requires all facilities to report on land criteria and GHG emissions, even when exempt, but profiling information is only required for non-waste materials.

Land criteria and GHG information is available on 1.5m tonnes of additional biomass for which profiling data is not available. Less than 15% of this difference is thought to be woody biomass, the remainder being blended material (predominantly poultry litter), sludge and meat & bone meal (MBM).

A number of facilities provided incomplete returns, either reporting volumes of feedstock used or gas generated as “not measured” or reporting GHG emissions as “Unknown”. Where facilities have reported GHG emissions to be “unknown” it appears they are still developing a robust data gathering procedure and methodology. We expect to see improved reporting in the following years.

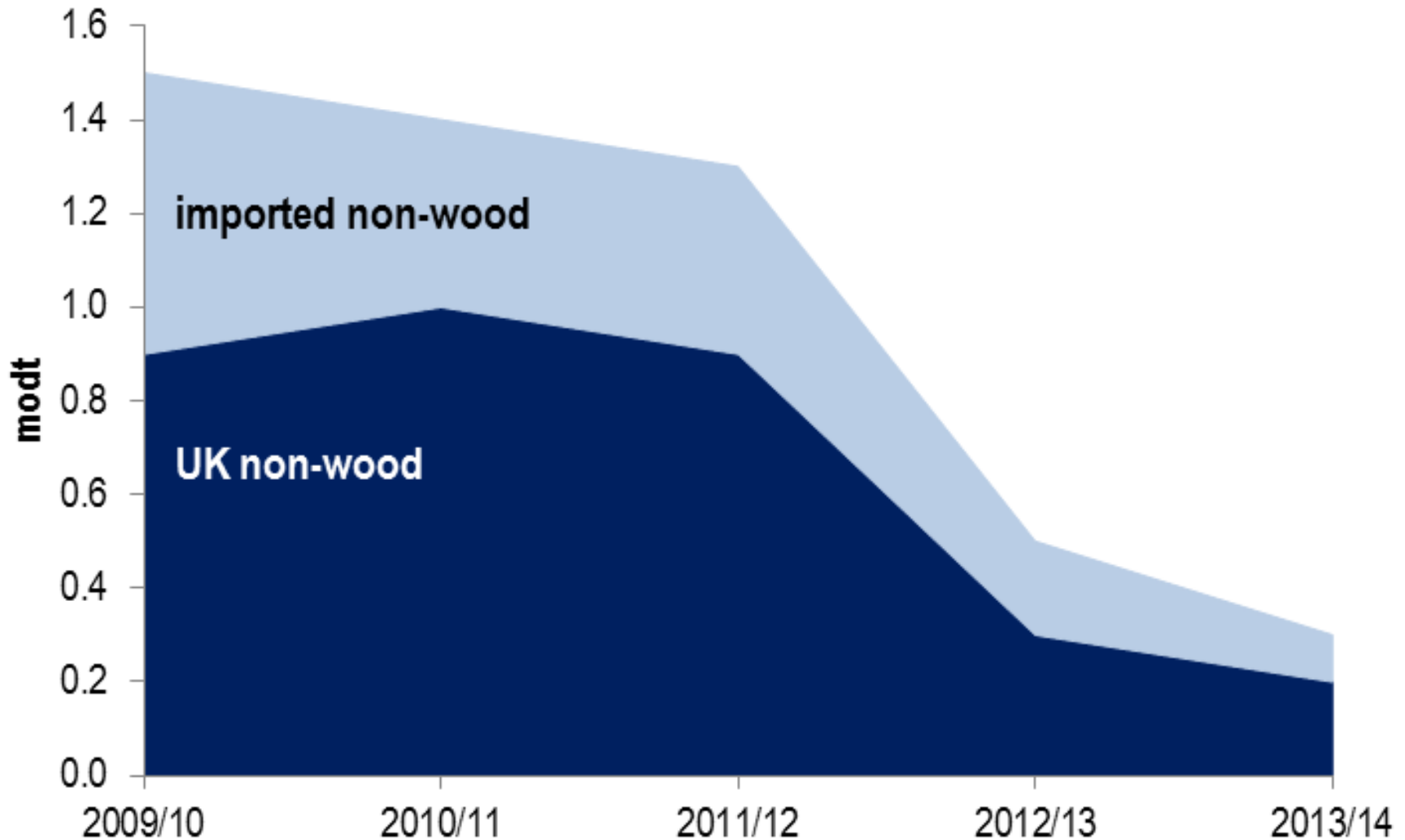


# Wood use in the RO





# Non-wood use in the RO



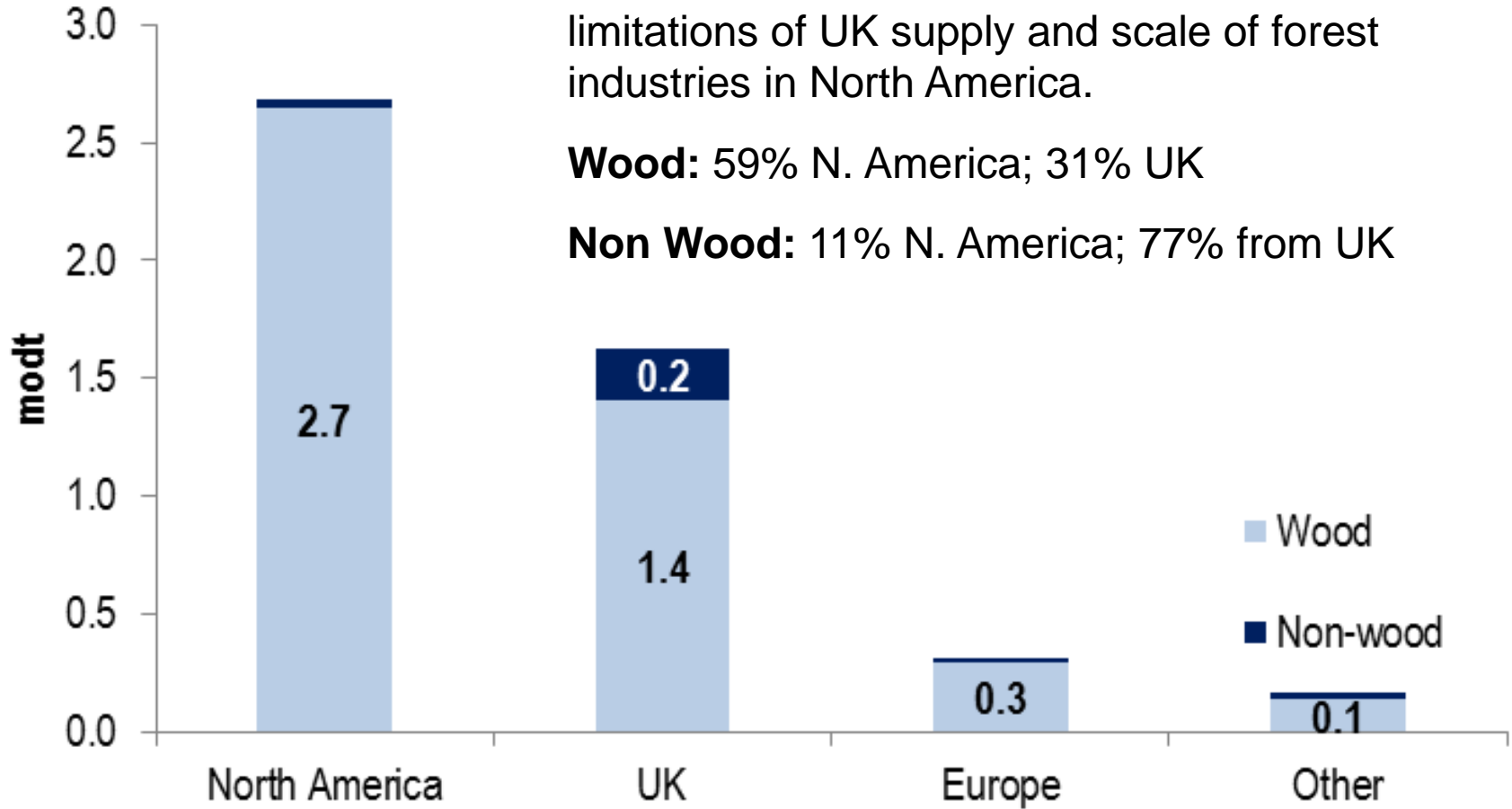


# Feedstock country of origin

Predominance of North American wood reflects limitations of UK supply and scale of forest industries in North America.

**Wood:** 59% N. America; 31% UK

**Non Wood:** 11% N. America; 77% from UK

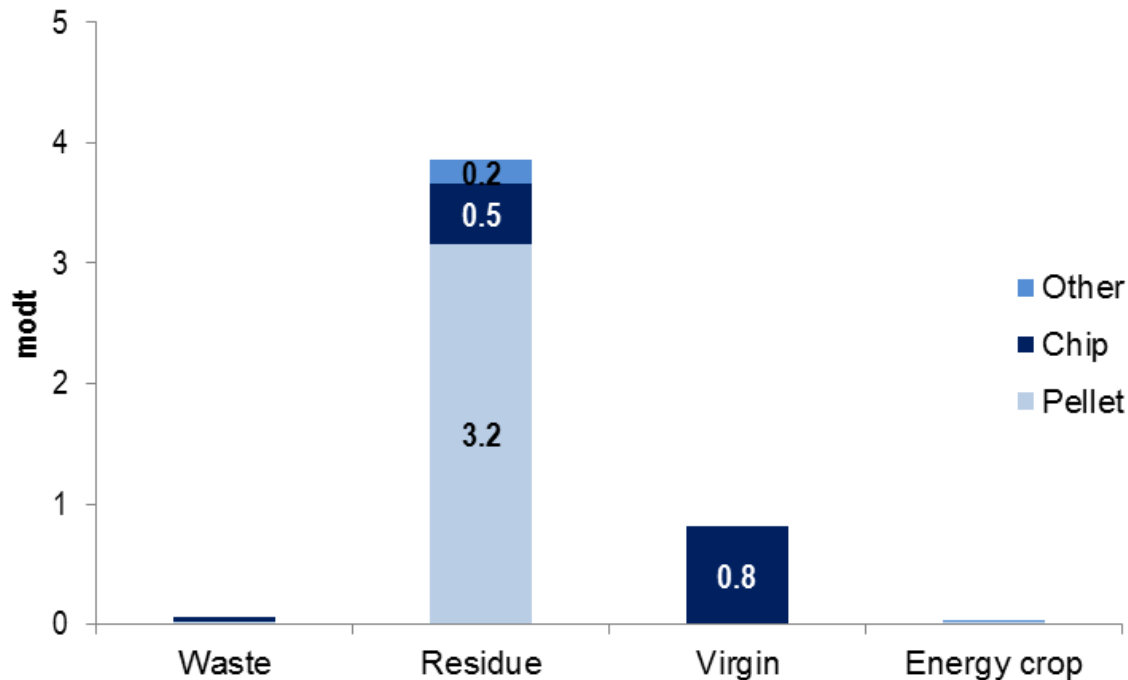




# Wood form

Wood pellets (primarily residues) dominate. Wood pellets are typically sourced from operational saw mills in North America or existing forestry industries in the Baltic States.

All wood reported as 'virgin wood' is sourced from the UK. It is likely this wood is linked to existing forestry operations and wood processing facilities.



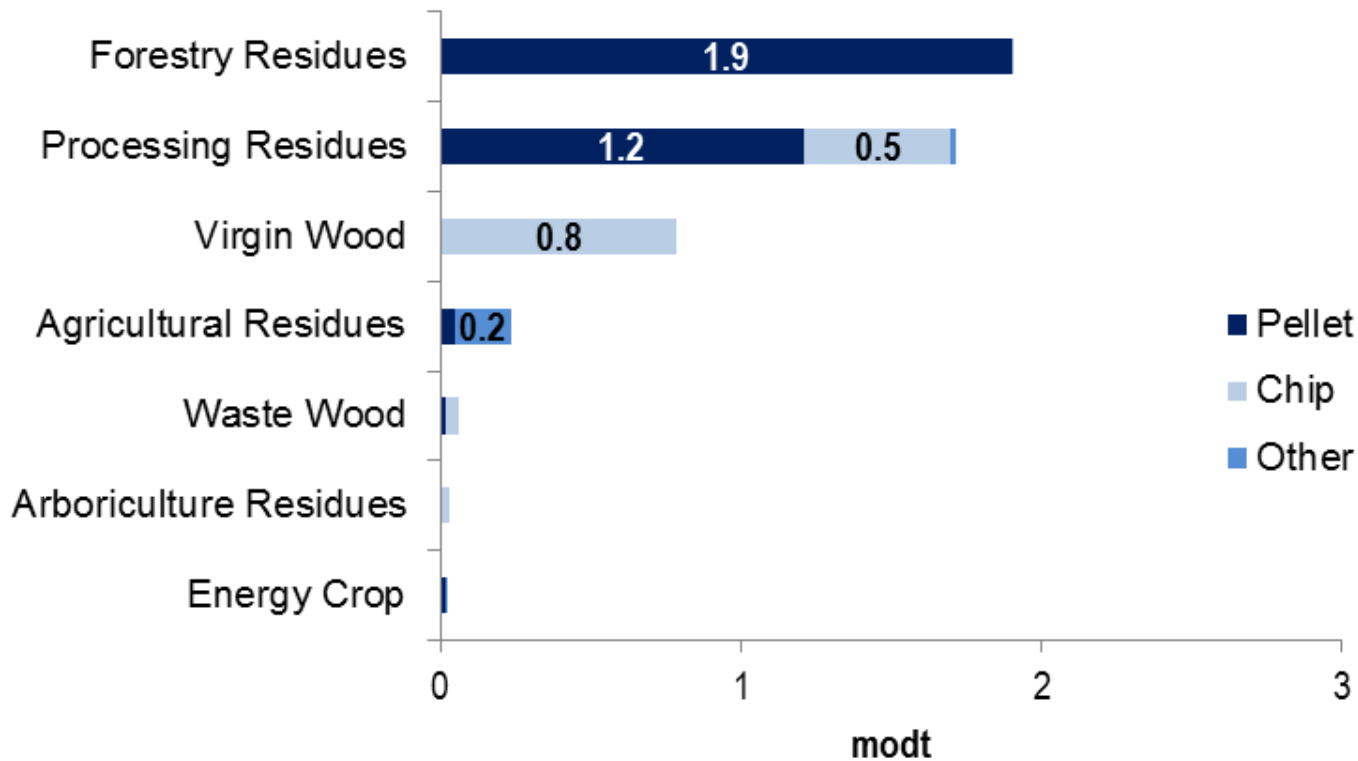


# Feedstock type

Large volumes of forestry and processing residues, mostly from North America

Virgin and processing residue woodchip almost entirely UK feedstock

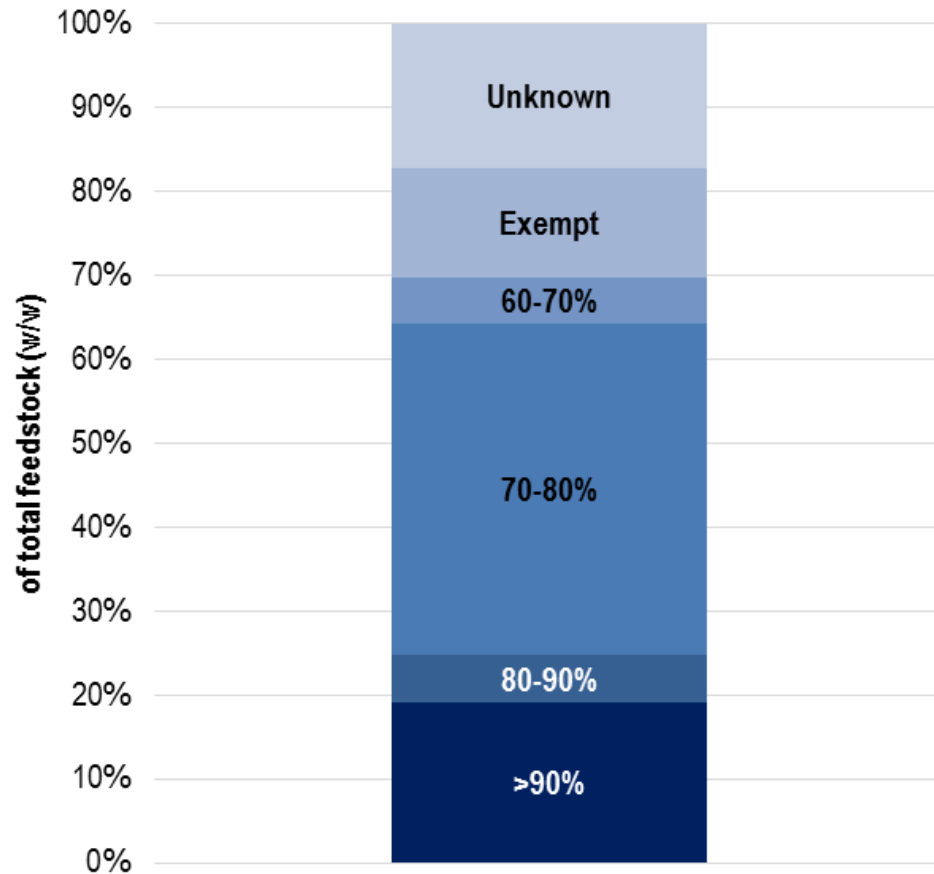
Very low waste wood





# Meeting the GHG criterion

## Carbon saving against EU comparator (198 gCO<sub>2</sub>eq/MJ)



All solid biomass fuels that reported emissions had better savings than the 60% threshold\*.

High proportion of biomass already meeting the 72% GHG savings required from April 2020.

Less than 15% of unknown is thought to be woody biomass. Exempt fuels were wastes.

\*Greenhouse gas emissions are based on a 'lifecycle analysis' (LCA) which sums all the emissions of a biomass feedstock, from forest to furnace, including all steps in the supply chain, such as: cultivation, processing, drying, transportation etc. The total emission savings are then compared against the EU grid average figure of 198gCO<sub>2</sub>eq/MJ. From 2015 savings must be at least 60% less than this.

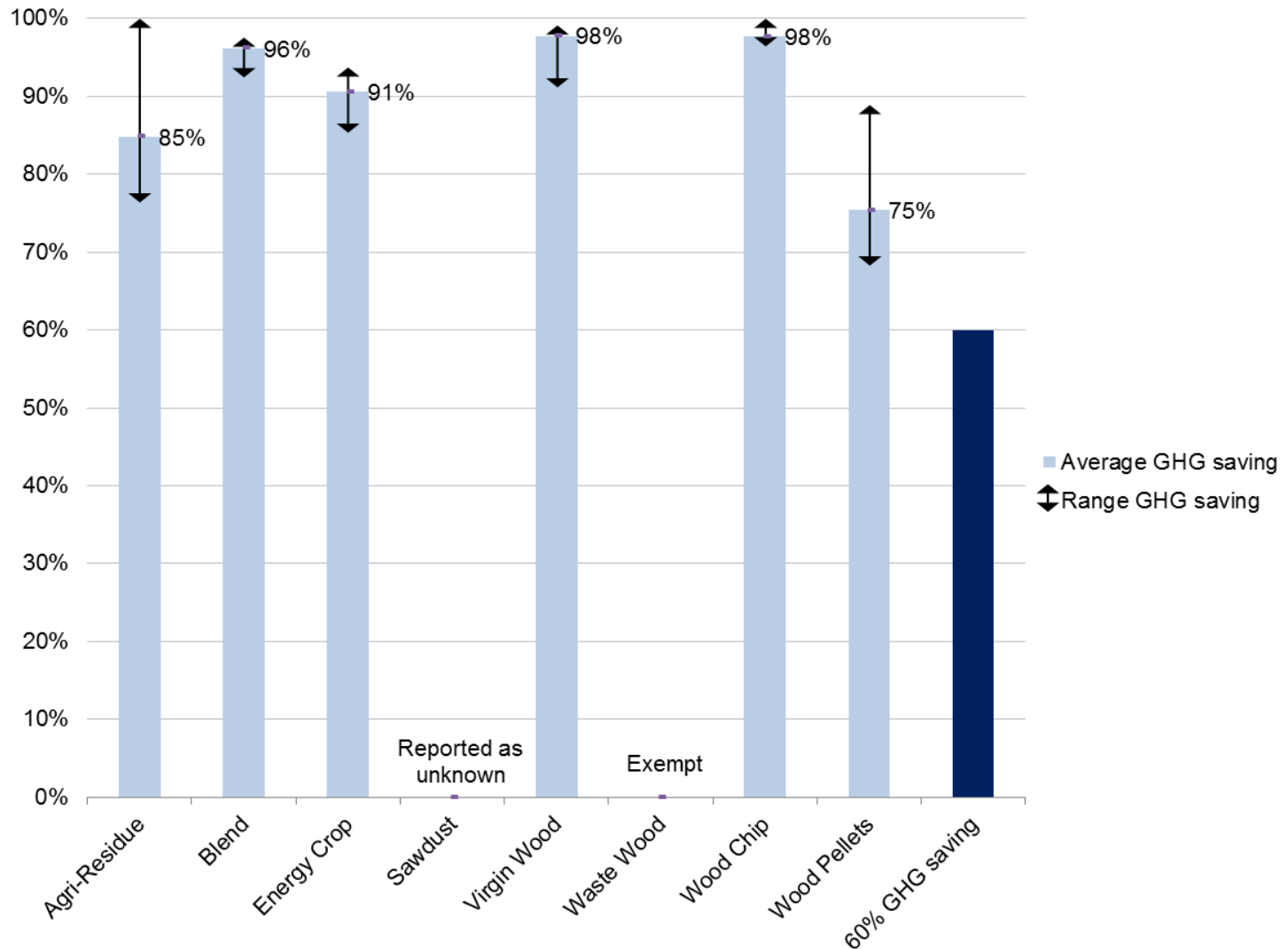


# Meeting the GHG criterion

Wood pellets (most reported fuel type) average 75.4% savings

Other wood types >85% savings – woodchip in particular has high savings

GHG emissions of sawdust not reported – this will be mandatory under ROO 2015

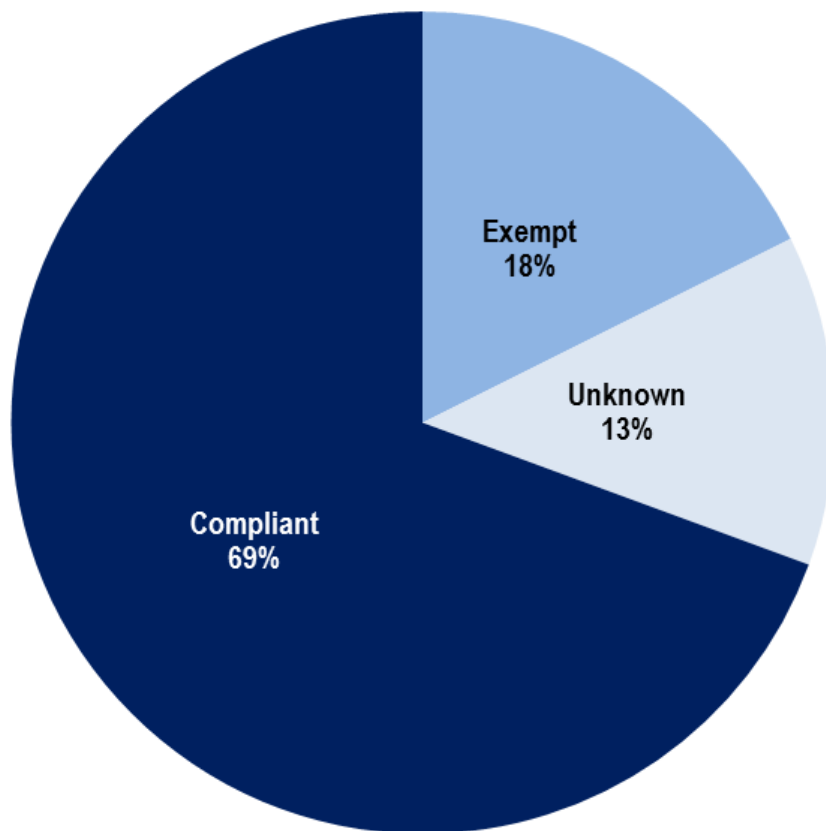






# Meeting the land criteria

All solid fuel types that reported met the criteria in 2013/14 even though compliance will only become a prerequisite of receiving subsidies in 2015.



Compliance with an environmental quality assurance scheme\*:

- 82% of all solid biomass;
- 96% of North American and European biomass;
- 51% of UK biomass

Less than 15% of unknown is thought to be woody biomass. All fuels will have to report compliance with sustainability criteria under ROO 2015.

Exempt fuels were wastes.

# Conclusions – OFGEM data

Increase in imported biomass, coinciding with the development of coal to biomass conversions.

Relatively stable UK supply base, biomass not taking increasing UK feedstock.

UK wood taken for electricity and CHP generation fairly constant → no indication of developing resource constraints issues.

66% of solid biomass imported:

- 59% of wood from North America, 31% from UK;
- 11% of non-wood biomass from North America, 77% from UK.

Large volumes of forestry and processing residues, mostly from North America.

Very low waste wood use.

All solid fuels reported achieve the 60% GHG saving target (79.2 gCO<sub>2</sub>/MJ).

All solid fuels reported achieved the land criterion, 82% use an environmental quality assurance scheme.



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# Section 2: WOODFUEL DISCLOSURE SURVEY

## PART A – future use of biomass

# Woodfuel Disclosure Survey 2015

Earlier this year DECC issued the Woodfuel Disclosure Survey to large-scale (>50 MW) biomass electricity generators to inform us of their planned use of UK sources of wood over the coming five years, whether they would be using imported or UK wood, recovered or virgin wood.

This makes up Part A of the survey and repeats an exercise carried out in 2013, the results of which were published [here](#). However, this time all generators over 50 MW were included, not just biomass conversions, so **figures are not comparable with the previous survey**.

This year further sustainability information was requested beyond the RO profiling data requirement which Ofgem collects, e.g. on the type of wood used in 2013/14, where it came from and what emissions were associated with it. This forms Part B of the survey.

All 13 large generators responded to the survey. All completed Part A; only those that generated electricity from biomass in 2013/14 (7 respondents) completed Part B.

The survey covers over 3.2 Mtoe of biomass, comparable to the amount reported in the RO sustainability data, suggesting that the survey is a representative indication of the expected use of biomass over the next five years.

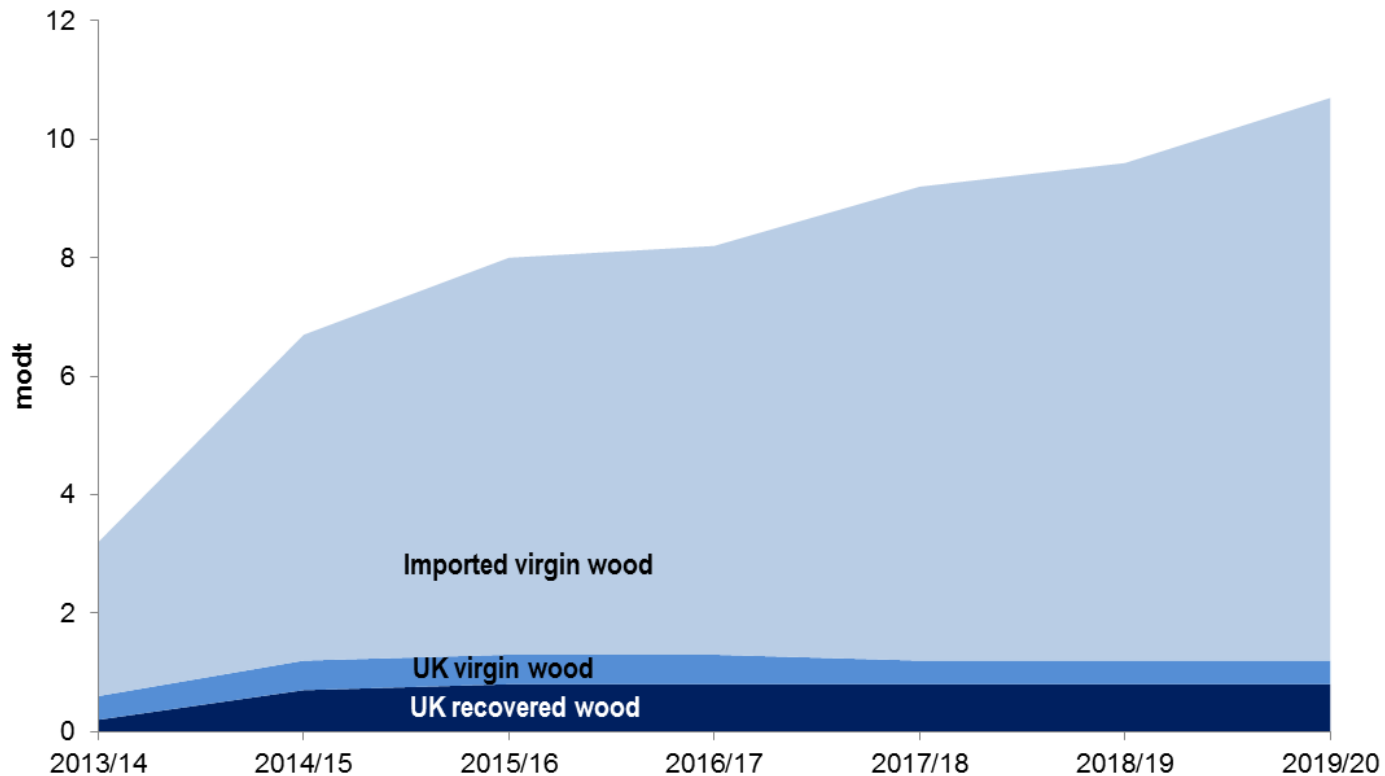


# Large generators' wood demand to be met from imports

Increase in demand for wood to continue to be met by imported wood

Demand for UK wood remains level

Demand for UK recovered wood 7% of all wood used in 2019/20. Demand levels out from 2015/16 onwards



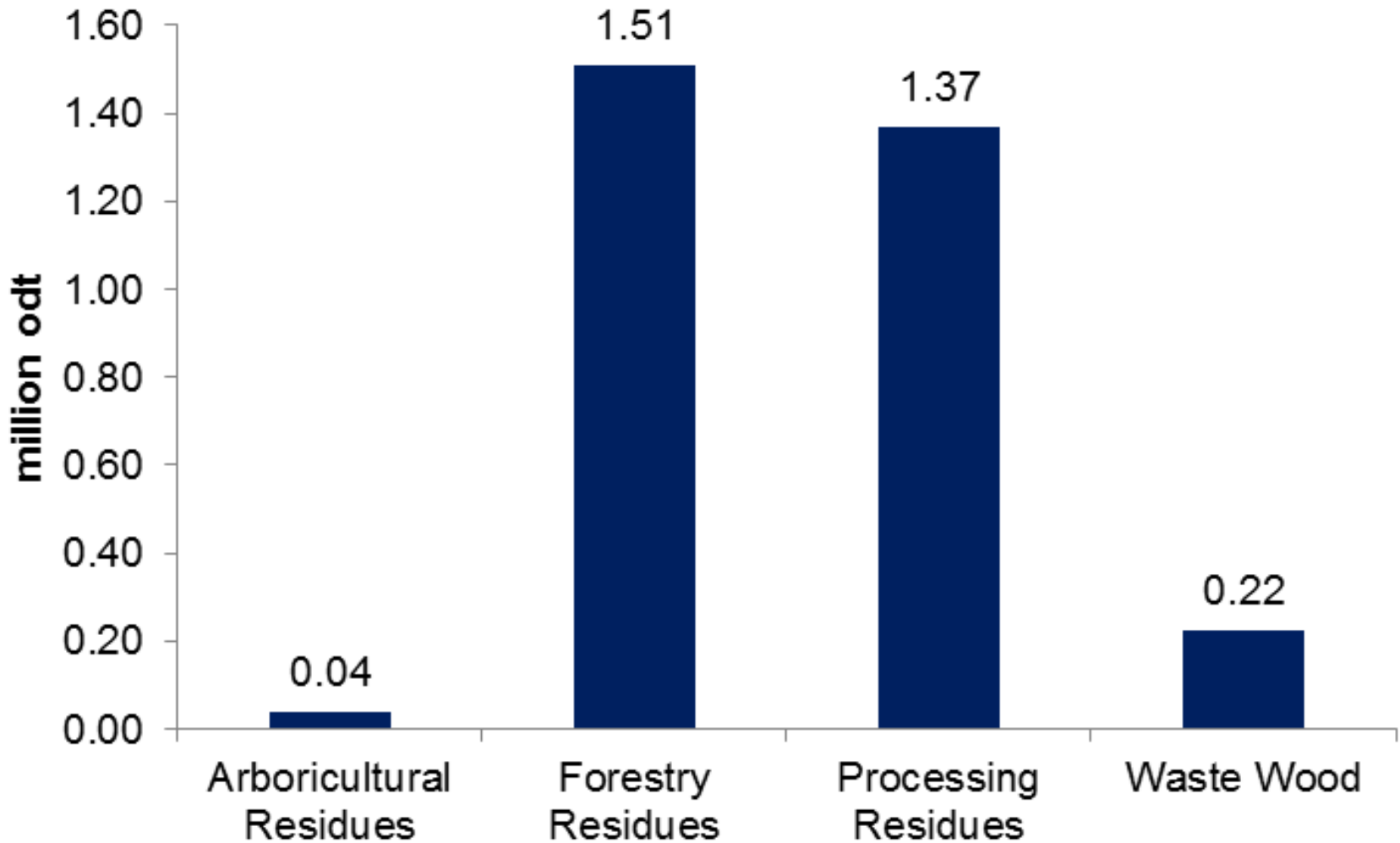


# Section 2: WOODFUEL DISCLOSURE SURVEY

## PART 2 – 2013/14 biomass use

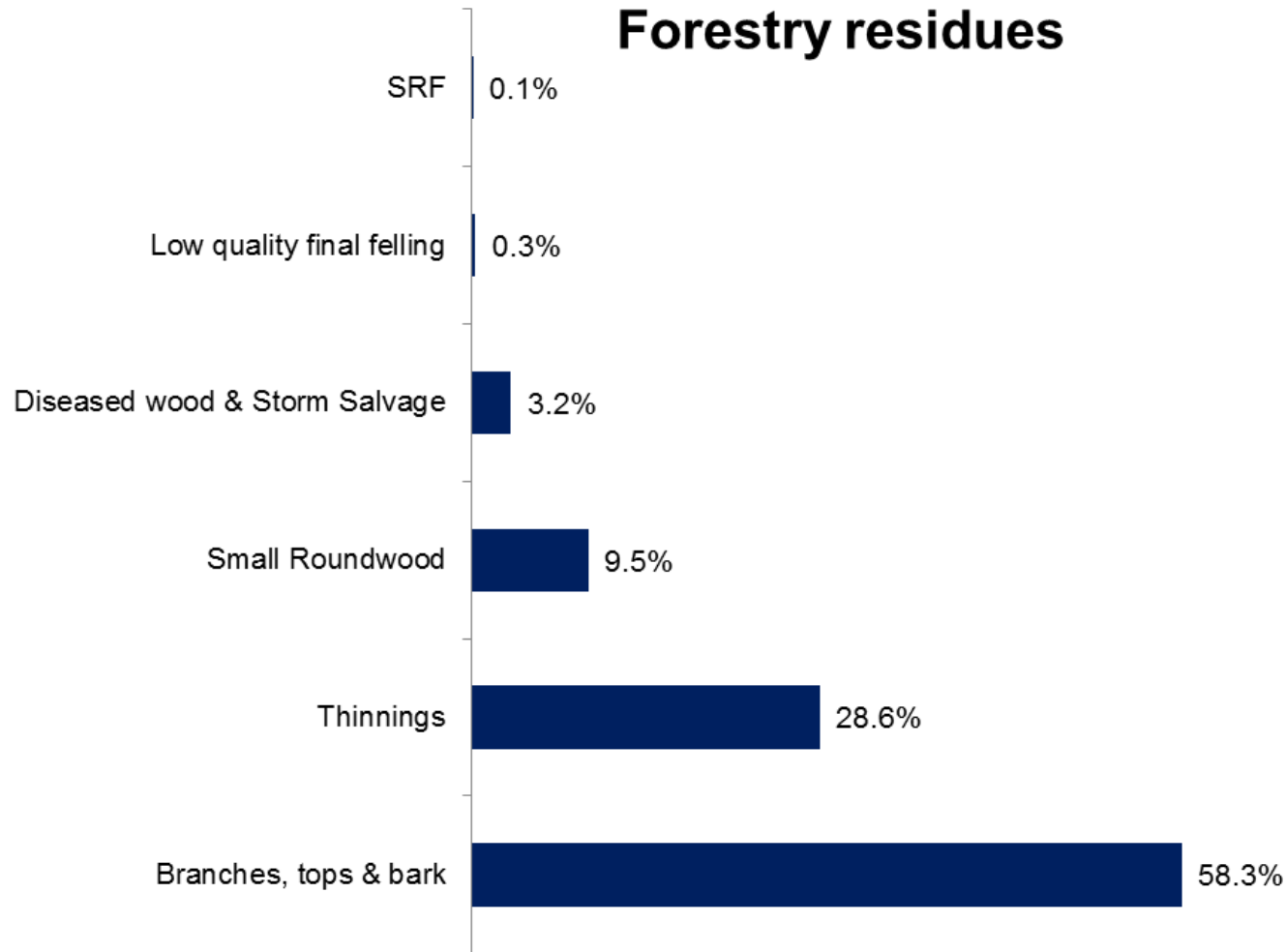


# Sources of wood used in 2013/14





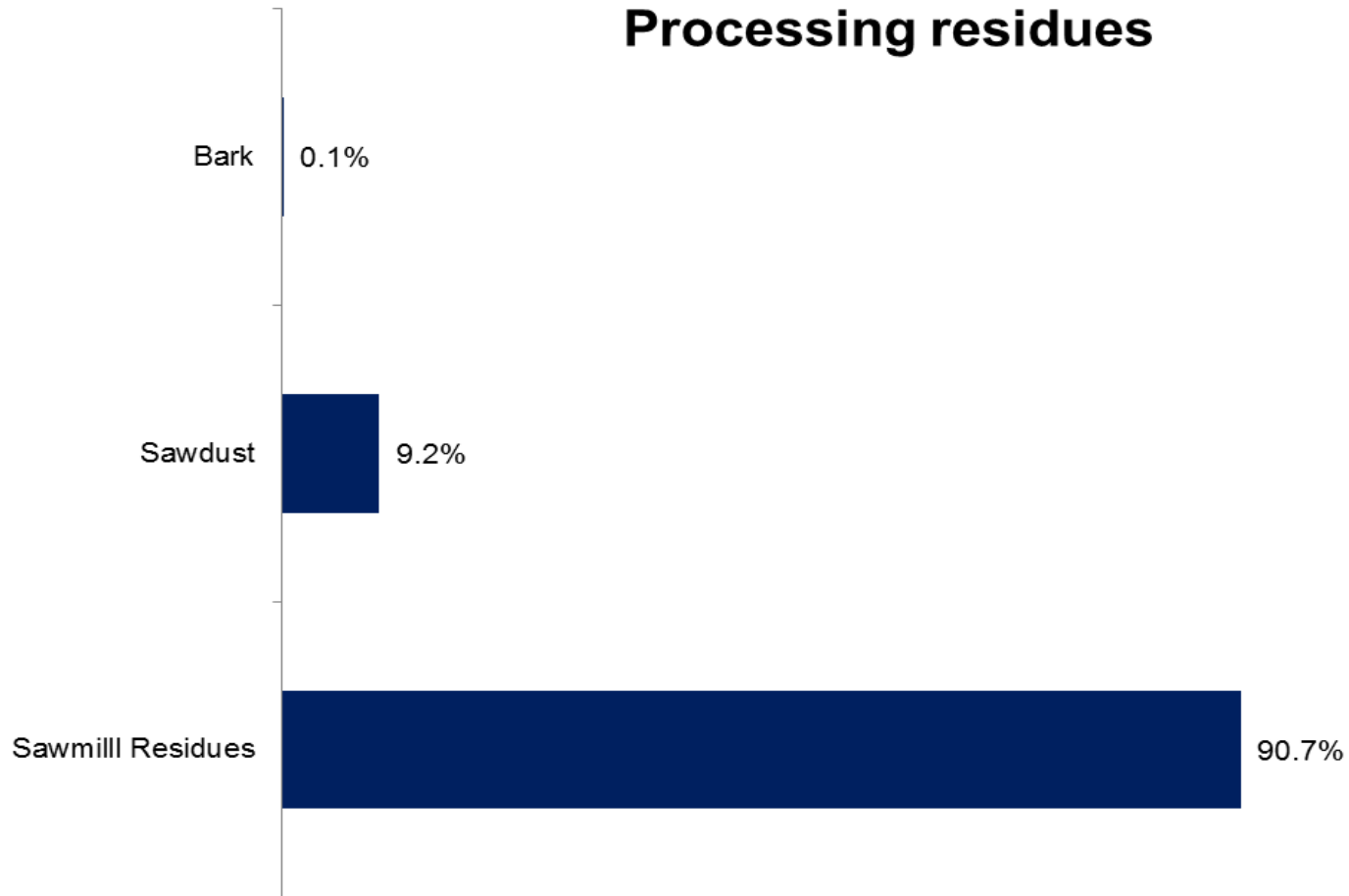
# Breakdown of forestry residues







# Breakdown of processing residues





# Country of origin and GHG saving

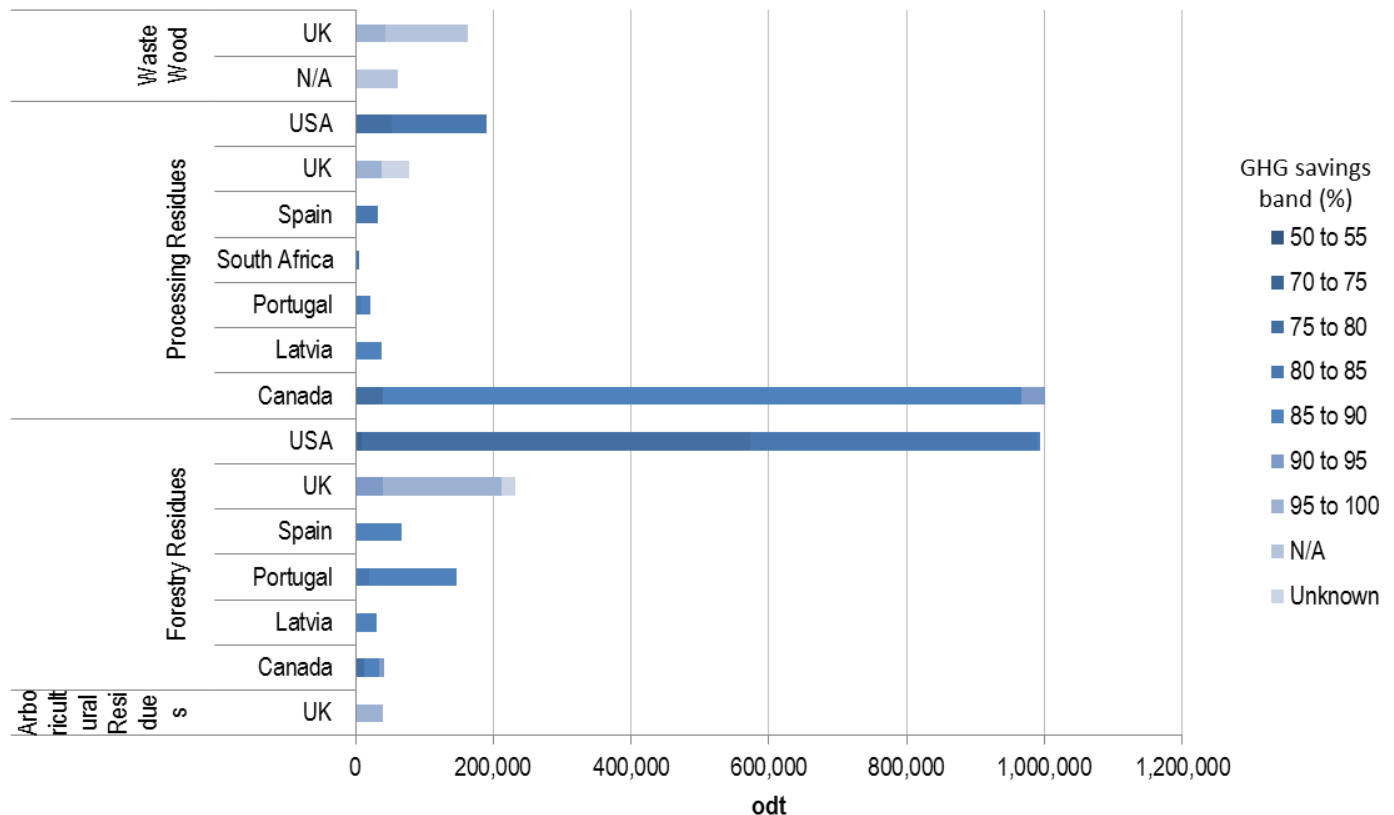
71% of wood from Canada or USA, 16% from UK

Highest GHG savings UK wood, followed by Canadian and European, USA lowest (but all greater than 70% saving)

50 tonnes UK processing residues (<0.01% of total wood used) within 50-55% GHG savings band. This feedstock will not be permitted in the 2015/16 period.

2% of emissions reported 'unknown'

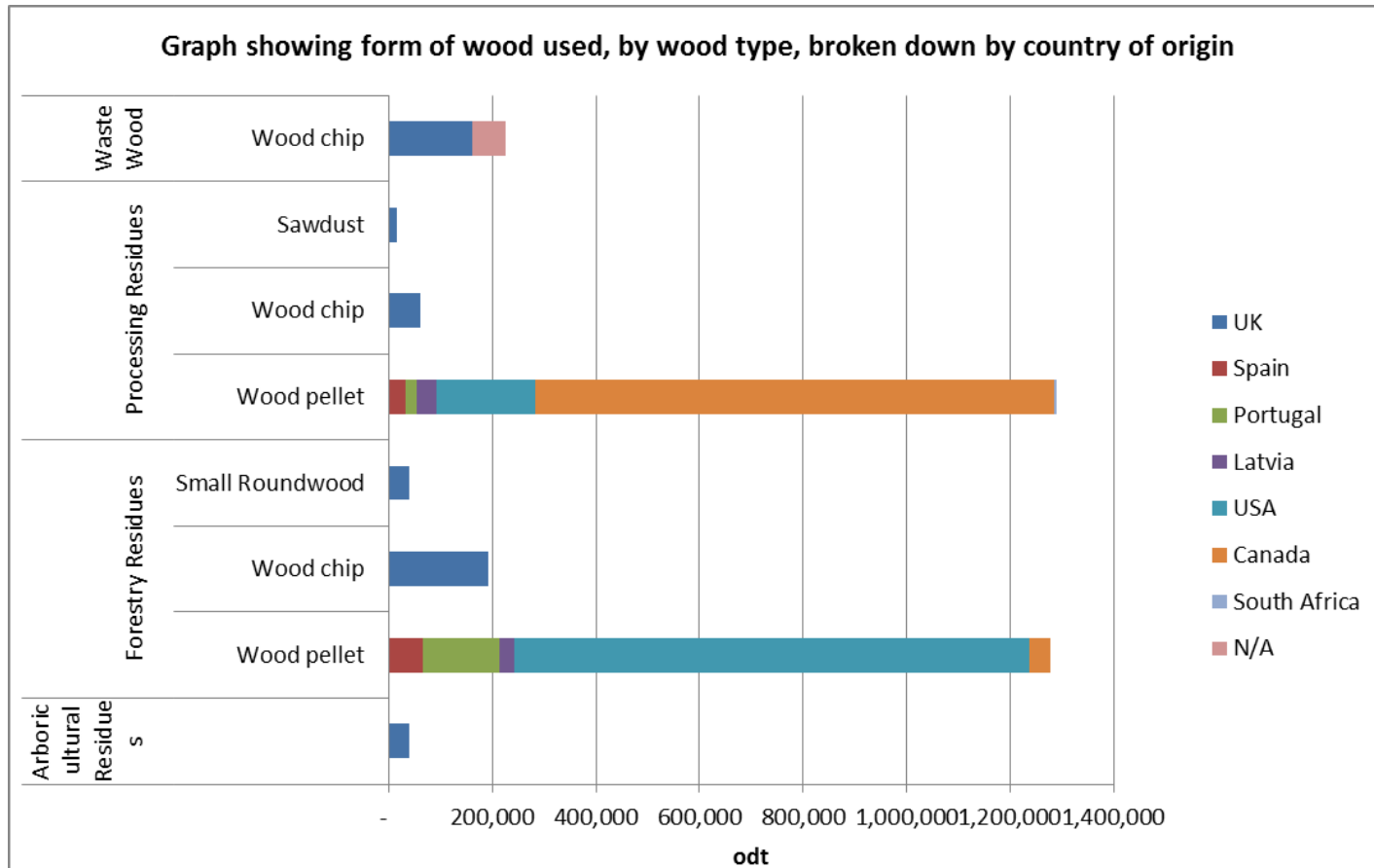
All other feedstocks meet GHG savings requirement.





# Wood type by country of origin

Wood pellets dominant form of wood used by UK generators  
82% wood pellets; 15% wood chip, 1% small round wood, 1% sawdust  
Majority of UK wood came in woodchip form



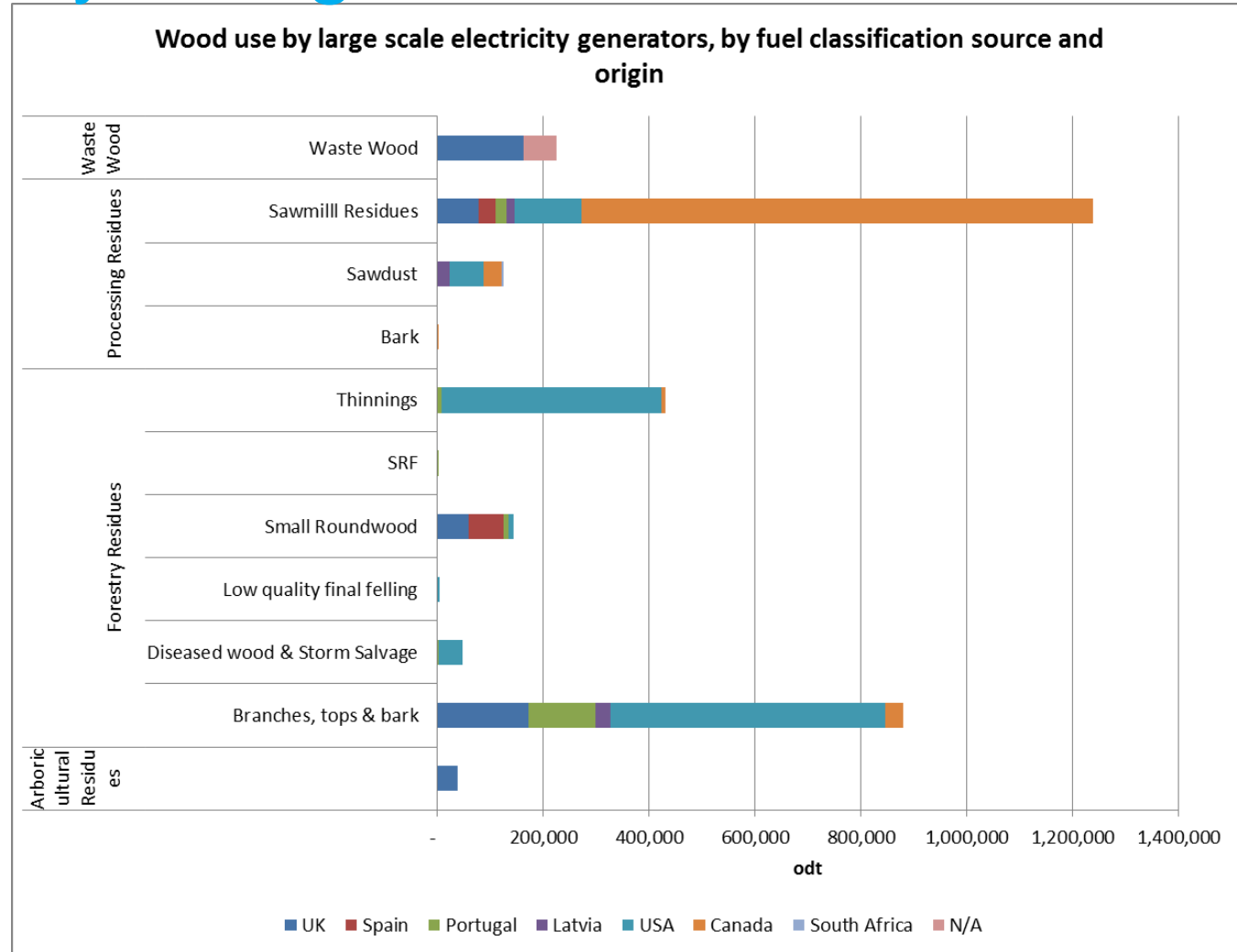


# Wood type, feedstock, and country of origin

Canadian wood mostly processing sawmill residues. Smaller amount of sawdust, branches/tops/bark and thinnings.

American wood mostly forestry residues: thinnings, branches/tops/bark, some sawmill residues and sawdust

UK wood mostly woodchip from waste wood and branches/tops/bark. Some sawmill residues, arboricultural residues and roundwood



# Other trends from the Woodfuel Disclosure Survey

**Wood use:** 45% of wood used by large scale generators is softwood; 50% mixed hard/soft wood and 5% not disclosed (waste).

**Transportation:** 74% reported 'unknown' for 'radius wood collection point from aggregator/sawmill' (including waste). 21% from less than 150 miles; 4% from within 250. All UK wood supplied in range between 50-130 miles.

**Sustainable:** Two generators did not report the % sustainability of their wood. All other non-waste woody biomass was reported as 100% sustainable.

**Location:** All wood sourced from USA and Canada was attributed to specific states. The majority of wood sourced from outside of the USA and Canada (excl. one generator) did not report Region or County of origin.

**County/Forest Level:** No information was provided by any generator on specific sawmill, aggregator or forest from which their feedstock originated.



# Woodfuel Disclosure Survey in conclusion

## **Woody biomass over the next five years**

A good response to the Woodfuel Disclosure Survey 2015

Biomass demand rises and begins to level off from 2017/18 as biomass conversions and new builds come on stream

Demand for UK virgin wood remains constant between 0.4-0.5modt

Demand for UK recovered wood reaches 0.8modt in 2015/16 before levelling out

Increase in demand for biomass by large generators met primarily by imports.

## **In 2013/14**

93% of wood sourced from residues and 7% from wastes

82% pellets; 15% wood chip, 1% small round wood, 1% sawdust

American and Canadian woody biomass dominates biomass market

- Canadian wood primarily processing residues from sawmills. Smaller amount of sawdust, branches/tops/bark and thinnings
- American wood primarily forestry residues, making use of thinnings, branches/tops/bark, with smaller proportion from sawmill residues and sawdust

UK wood primarily woodchip and made up of waste wood and branches/tops/bark

Some sawmill residues, arboricultural residues and roundwood reported.



# Glossary

Term	Definition
<b>Accounting period 2013/14</b>	The accounting period lasts from the beginning of April through to the end of the following March. 2013/14 is the period between 1 <sup>st</sup> April 2013 and 31 <sup>st</sup> March 2014.
<b>Category A evidence</b>	Evidence provided by approved schemes which have been benchmarked against the woodfuel land criteria in the RO and RHI Orders and CFD contracts (see ‘approved schemes’).
<b>Category B evidence</b>	All forms of credible evidence (other than from approved schemes) that indicate that the forest source meets the woodfuel land criteria as set out in the RO and RHI Orders and CFD contracts.
<b>CHP</b>	Combined Heat and Power
<b>FSC</b>	Forest Stewardship Council; is a voluntary, international forest certification scheme who sets standards for sustainable forest management.
<b>Modt</b>	Million oven dried tonnes – a measurement of weight of wood, converted to remove moisture content.
<b>Office of Gas and Electricity Markets (OFGEM)</b>	a non-ministerial government department and an independent National Regulatory Authority that regulates all gas and electricity markets in the UK.
<b>OFGEM returns</b>	Sustainability data reported to OFGEM as required by the Renewables Obligation Order .
<b>PEFC</b>	Programme for the Endorsement of Forestry Certification is a voluntary, international forest certification scheme who sets standards for sustainable forest management. It is an umbrella scheme and other schemes come under PEFC, including SFI.
<b>Recovered Wood</b>	Wood which has been used before being used for biomass.
<b>RO</b>	Renewable Obligation.
<b>ROC</b>	Renewable Obligation Credits.
<b>Virgin Wood</b>	In the Woodfuel Disclosure Survey this is taken to mean wood which has not previously had a use. This can include residues from processing and forestry practices as well as wood cut down for the purpose of biomass. Ofgem guidance* has a different definition: wood from whole trees and the woody parts of trees including branches and bark derived from forestry works, woodland management, tree surgery and other similar operations but excludes residues.
<b>Waste Wood</b>	Wood at the end of its life. See Ofgem Guidance* for further information on waste wood.
<b>“Wood” and “non-wood”</b>	‘Wood’ includes virgin and recycled wood, short rotation coppice and products which are interpreted as wood such as dust, briquettes, pellets, cubes and granules. ‘Non-wood’ biomass includes straw and other agricultural residues.

\* Ofgem guidance: <https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-sustainability-criteria-guidance-0>