RASLRES: Local Resources - Local Energy - Local Solutions - Local Jobs

Regional Wood Fuel Resources

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Introduction

The following desk top study provides:

- regional and county based forecasts of the potential wood fuel resource for the period 2010 to 2028 based on the structure of and yield from the forest estate within the remit area of the Western Development Commission (WDC)
- a review of the existing pulpwood and biomass markets within the WDC region and
- an assessment of the potential for the regional wood energy market.

The data presented has been drawn from the following sources:

- National Forest Inventory (NFI) Forest Service 2007
- Roundwood Production from Private Sector Forests (CoFORD '09) COFORD 2009
- The Timber Growers Yearbooks 2009 and 2010 (ITGA Yearbook) and
- Forecast 2006 Timber Production Forecast 2006 – 2010 (Coillte '06) Coillte 2006.

The Forest Estate

Size

The total national forest estate in 2009 is 730,500ha which is approximately 10.6% of the country's area. The net forest area (excluding unplanted, areas temporarily without forest cover) is approximately 715,000ha.

The western regions (Clare, Donegal, Galway, Leitrim, Mayo, Roscommon and Sligo) forest estate in 2009 is 290,00ha, approximately 10.6% of the region's total land mass. The net forest estate for the region is estimated to be 260,000ha, which represents 36.4% of the national estate.

Distribution

Figure 1 illustrates the distribution of forests within the WDC region.

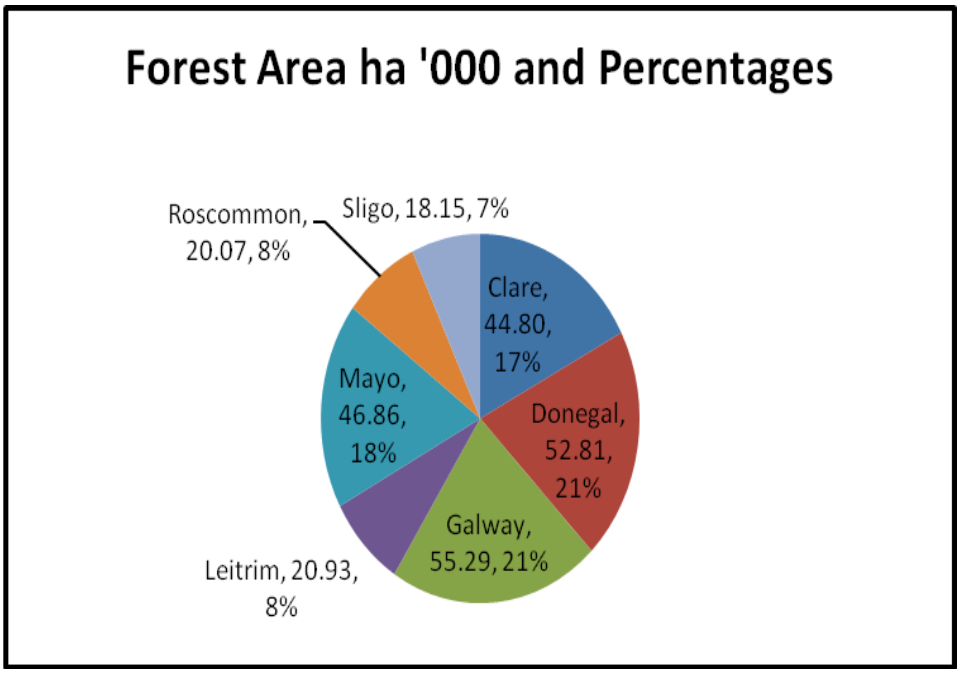
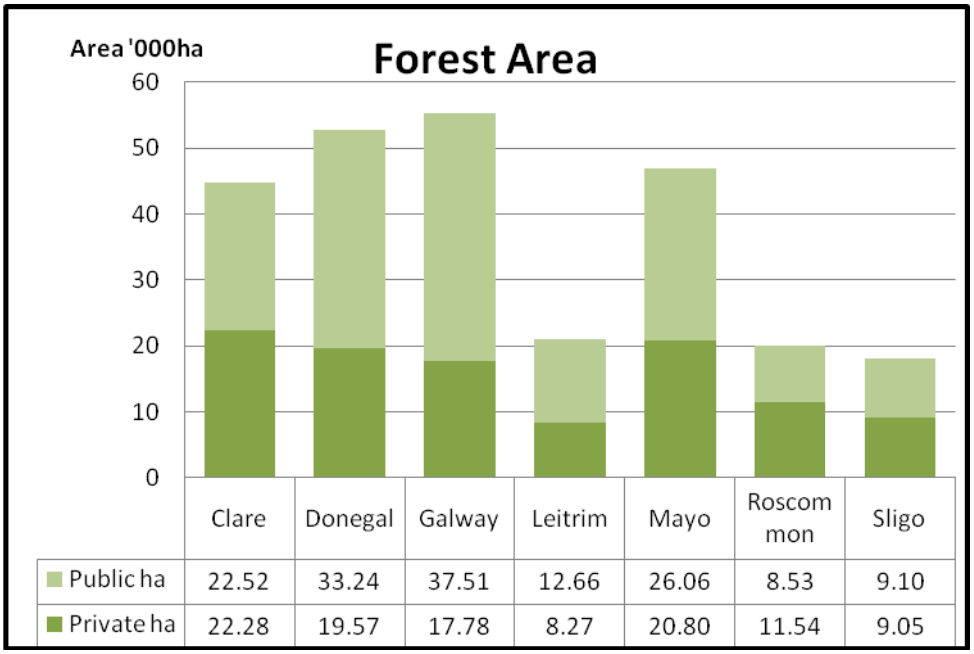


Figure 1 – Distribution of the Regions Forests - Source: NFI and ITGA Yearbook

Annual planting for both 2007 and 2008 for the region accounted for 35% or 4,650ha of the total national plantings of 13,200ha.

Ownership

Figure 2 illustrates ownership of the forest estate within the WDC region. Private ownership accounts for 110,000ha (net area) or 42.7% of the net total area, which is slightly below the national figure for private ownership. Galway County has the smallest percentage of privately owned woodlands in the region at 32% or 18,000ha. Roscommon has the highest percentage of private ownership at 57.5% or 11,550ha.

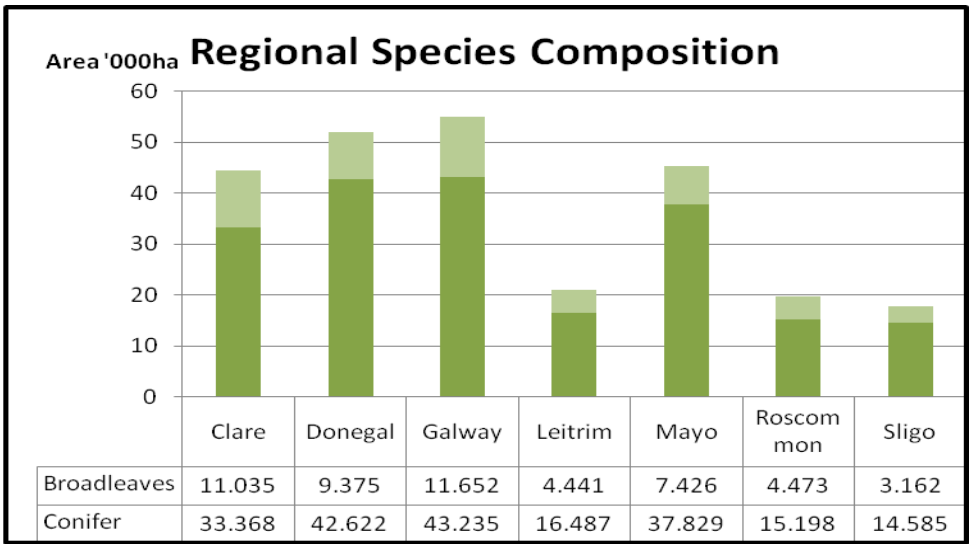


	Clare	Donegal	Galway	Leitrim	Mayo	Roscommon	Sligo
Public ha	22.52	33.24	37.51	12.66	26.06	8.53	9.10
Private ha	22.28	19.57	17.78	8.27	20.80	11.54	9.05

Figure 2 – Public and Private Ownership – Source NFI and ITGA Yearbook

Species Composition

Figure 3 illustrates the species composition of the forests in terms of conifers and broadleaves. Broadleaved species comprise 20% (51,500ha) of the total forest area in the region. This quantity of broadleaves would suggest that specialised markets will need to be developed.



	Clare	Donegal	Galway	Leitrim	Mayo	Roscommon	Sligo
Broadleaves	11.035	9.375	11.652	4.441	7.426	4.473	3.162
Conifer	33.368	42.622	43.235	16.487	37.829	15.198	14.585

Figure 3 – Species Composition – Source NFI and ITGA Yearbook

Age Profile

The age profile of the private estate is one of the key factors in determining it's sustainability for timber production. Figure 4 illustrates the age profile of the private estate in the region.

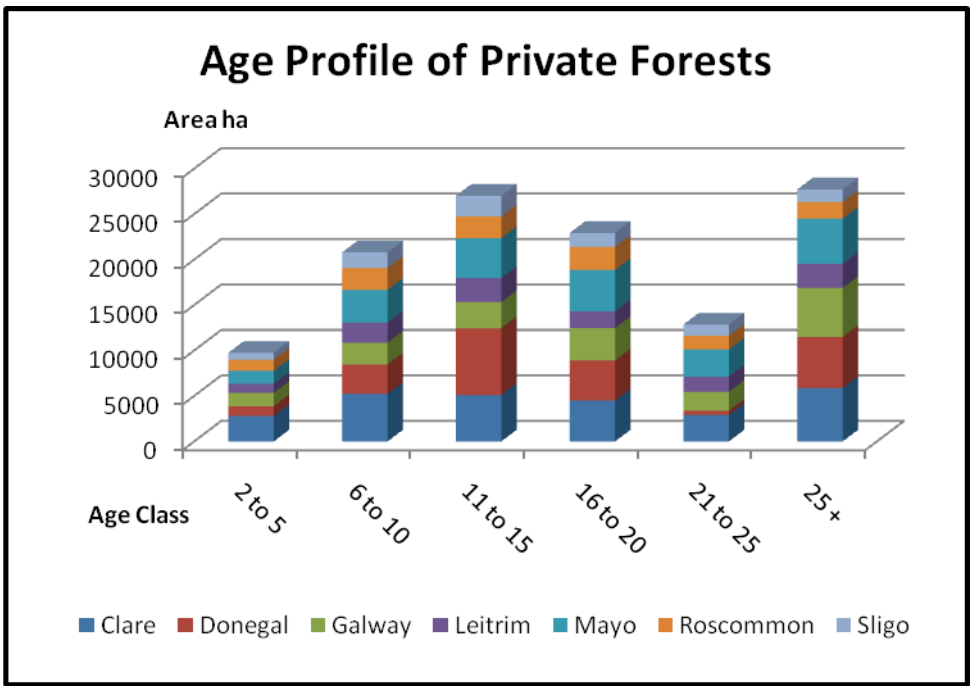


Figure 4 – Age Profile Private Estate – Source Forest Service and ITGA Yearbook

The age groups of most interest are the 11 to 15 and 16 to 20, comprising approximately 45,000ha, as these forests are currently at or rapidly approaching the age of first thinning. (Thinning is the removal of a portion of the crop at a rate which does not reduce the overall production of the site and it is therefore considered to be sustainable). This harvest product will be new to the market and will substantially increase the volumes of available timber over the next 10 years. Plantations in the 21 to 25 and 25+ groups, if not already thinned are unlikely to be thinned in the future as they will be past the recommended age of first thinning.

The age profiles shown above vary from county to county. The variation reflects changes to the Forest Service Afforestation Grant schemes over the years. Such fluctuations would result in huge variations in annual yield, if age were the only factor considered in deciding when thinning should commence. The other factors considered when deciding whether or not to thin and the thinning cycle include – soil type, exposure and the site yield class (the productive capacity).

Potential Yield

Forecast for the Private Sector

'*Roundwood Production from Private Sector Forests 2009 – 2028*' CoFORD 2009 provides a forecast for the potential yield from the private sector, based on the National Forest Inventory and the Forest Service's data sets. For the purposes of this forecast:

- Irish yield models are used where possible, where such models do not exist the Forestry Commission yield models are used.
- Further adjustments were applied to allow for stocking, attrition losses (windblow, disease) and harvesting losses. These adjustments amount to an average loss of 28%.
- Coillte's management regime is used to infer a likely regime for the private sector, as there is little available information regarding the actual and planned management regime for the private sector. The inferred regime is used to determine rotation length, local yield classes and whether thinning is to be undertaken.

- CoFORD's forecast assumes three harvest options for thinnings:

1. Standard thinning – thinning in accordance with the yield models on regular cycles.
2. Reduced thinning – crops will receive two thinnings.
3. No-thinning, due to elevation, poor soils and low yield classes. Under such circumstances the only harvesting intervention will clearfelling.

Table 1 presents the harvestable area and Management regime for the private estate in the western region.

Regime	% of Total Area	Area ha
Standard	50%	60,525
Reduced	20%	24,200
No-Thin	30%	36,315

Table 1 – Management Regime for Western Region – Source CoFORD 2009

Based on the above the estimated area of the private sector woodlands suitable for thinning within the region will be approximately 85,000ha (2009-2028). The realisation of this forecast is dependent on a number of factors the most influential of which will be market demand and price. Where market demand is low or prices fail to meet the owners expectations the area left unthinned will be much greater.

Figure 5 gives the annual thinning for each county for the period 2009 to 2028. The estimated area for thinning in 2010 is 4,800ha. This increases year on year to 2020 when 12,335ha are scheduled for thinning. After 2020 the annual thinning rate varies between 9,500ha and 12,935ha with an average of 11,160ha.

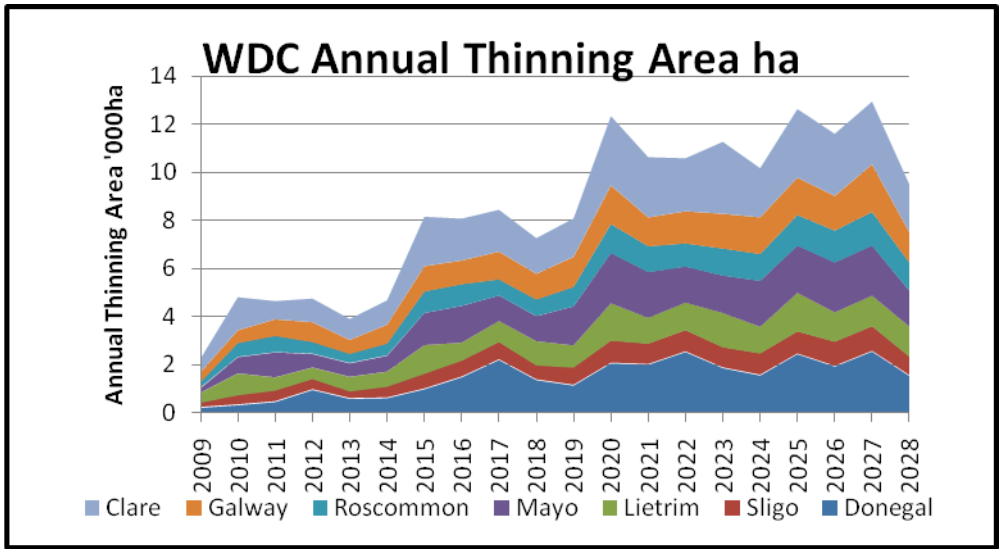


Figure 4 – Regional Thinning County by County 2009 to 2028 – Source CoFORD 2009

Traditionally, timber products have been broken into three categories depending on the diameter of the logs

- commercial >20cm,
- palletwood 14cm to 20cm and
- pulpwood 7cm to 14cm.

CoFORD's forecast includes a fourth category, energy wood equivalent, which includes the pulpwood class and the remainder of the log to the tip (excluding branchwood). This adds approximately 15% additional volume to the harvest.

Figure 5 shows the forecast for energy wood equivalent production in the form of round logs for the period 2009 to 2028. The potential yield for 2010 is 164,500m³ and by 2020 increasing to 384,285m³. Between 2020 and 2028 the volume fluctuates between 203,000m³ and 302,000m³, averaging 275,000m³ per annum.

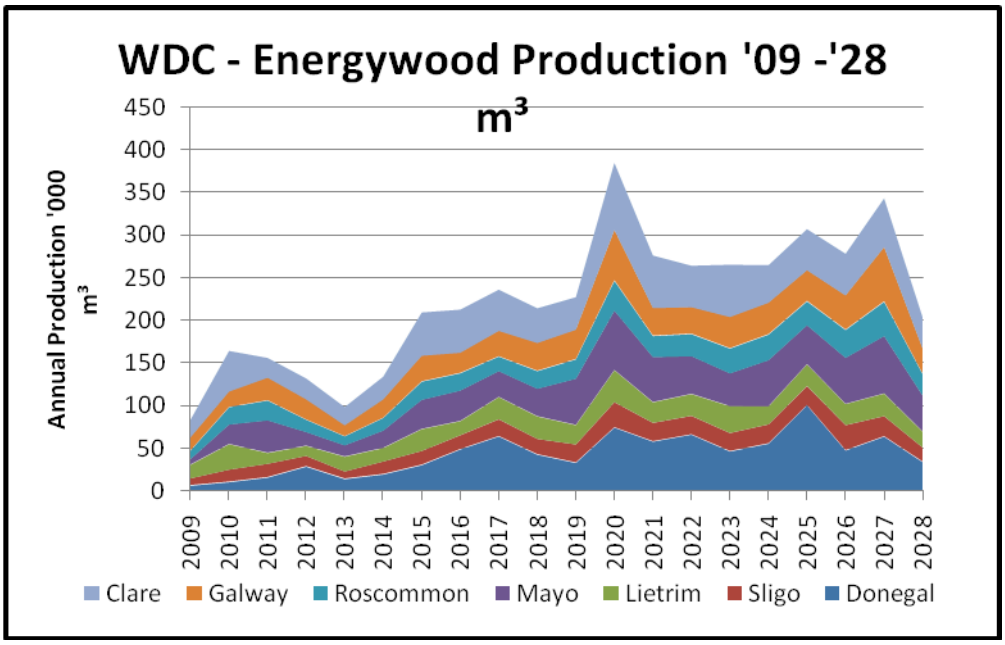


Figure 5 – Annual Production of Energy Wood (Round Logs) '09 to '28 – Source CoFORD 2009

A second source of material suitable as a woodfuel is the co-product derived from the sawmilling sector i.e. woodchips, sawdust and bark produced while processing round logs into finished timbers. The volume of co-product generated depends on a number of factors but 50% of round log volume is a reasonable average to expect. Co-product is already widely used to fuel kilns and boilers in the timber processing sector and as a raw material for composting, animal bedding and the board milling industry. However, as stated above the timber referred to in this forecast is new to the market and therefore the associated co-product will significantly increase the availability for biomass.

The production of co-product associated with the private sector for 2010 is potentially 49,500m³, increasing to 246,000m³ by 2020 and averaging 337,000m³ per annum between 2021 and 2028. The combined output of round wood and co-product for 2010 is estimated to be 214,000m³ and 630,000m³ by 2020. Figure 6 illustrates the potential of the combined roundwood and co-product sources.

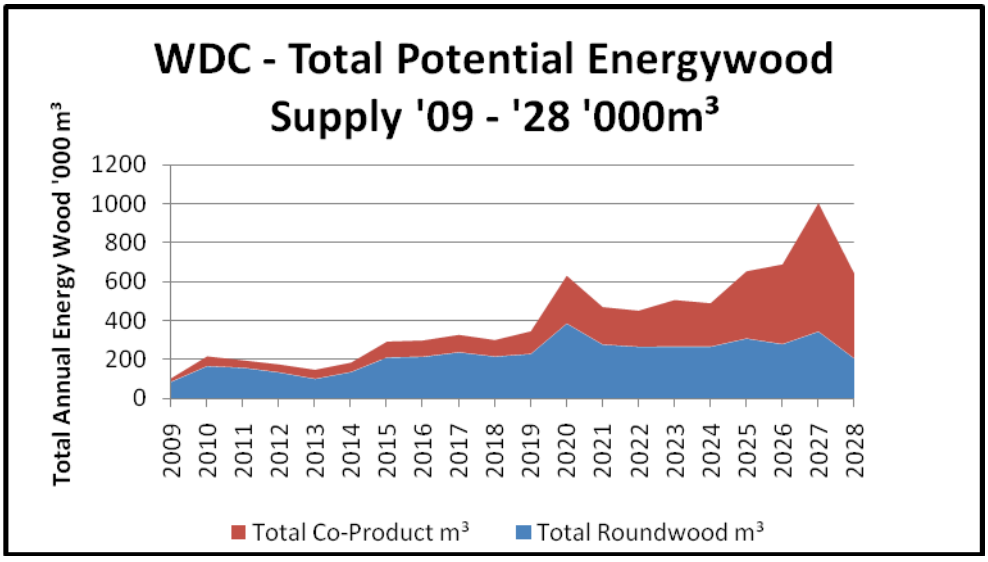


Figure 6– Combined Round wood and Co-product – CoFORD 2009 and DARE Ltd

The above table shows a levelling off of roundwood production in 2021, but from this point onwards the volume of co-product increases significantly. This increase in co-product will arise from the increased volumes of palletwood and commercial being processed by sawmills as the private estate matures.

Public Sector Estate

The Coillte forecast for 2006 to 2020 uses the same assumptions as the CoFORD forecast. The Coillte forecast gives annual figures up to 2015 and an estimated average annual figure to 2020. At present Coillte retain most of the pulpwood produced to supply the existing boardmills. Therefore, it is not correct to assume that any or all of this timber will be available to the wood energy sector. However, it is important to include Coillte's estimate so that the full extent of the wood fuel and co-product market can be assessed. Figure 7 is the current Coillte forecast for pulpwood production for the western region.

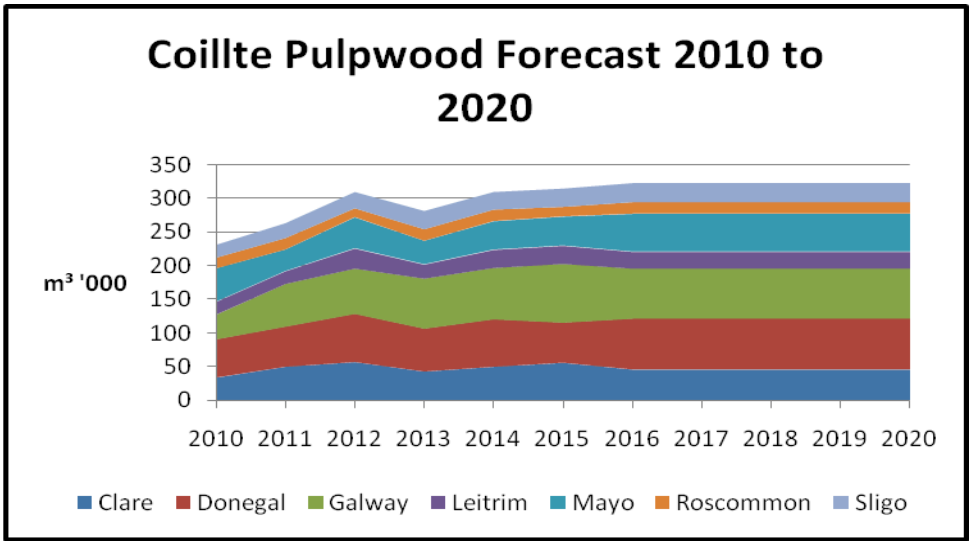


Figure 7 – Coillte's pulpwood forecast 2010 to 2020 – Source Coillte 2006

Given that Coillte's plantations have a relative even age structure the production of pulpwood is expected to be in the region of 300,000m³ per annum up to 2020.

Co-product derived from Coillte harvest of palletwood and commercial timber is illustrated in Figure 8. Again, because of the age and management of the Coillte's plantations the volume of co-product is constant 450,000m³ to 500,000m³ per annum. Much of this material is currently used as a source of biomass or sold to the boardmills.

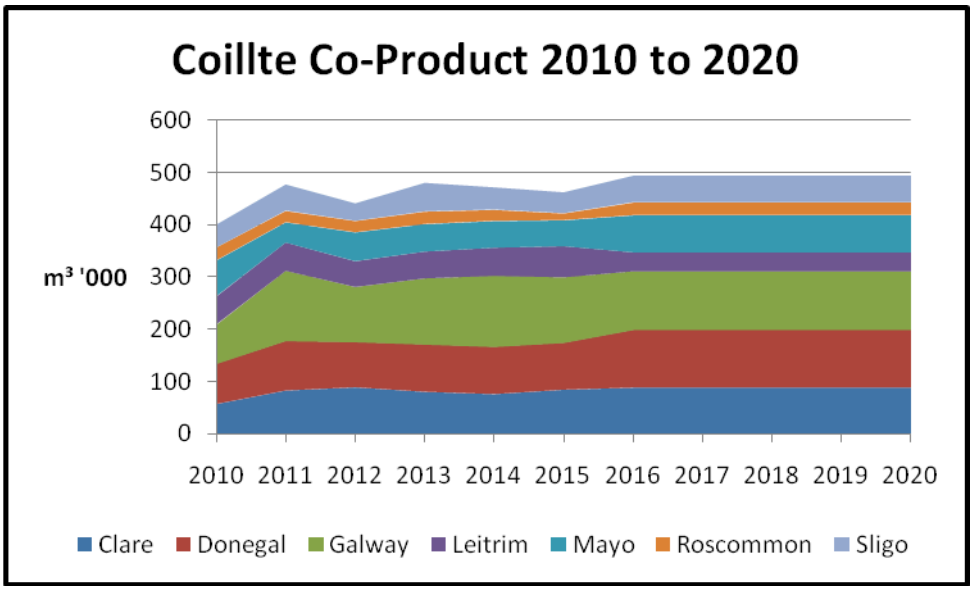


Figure 8 – Co-product dervived from Coillte's Estate – Source Coillte 2006

Figure 9 presents the total supply of pulwood in the western region for the period 2010 to 2020, it does not suggest that all of this timber is available to the wood energy market. The potential production of round wood in 2010 is estimated to be 365,000m³ and for 2020 – 678,000m³. The increase is as a result of the increasing supply from the private sector.

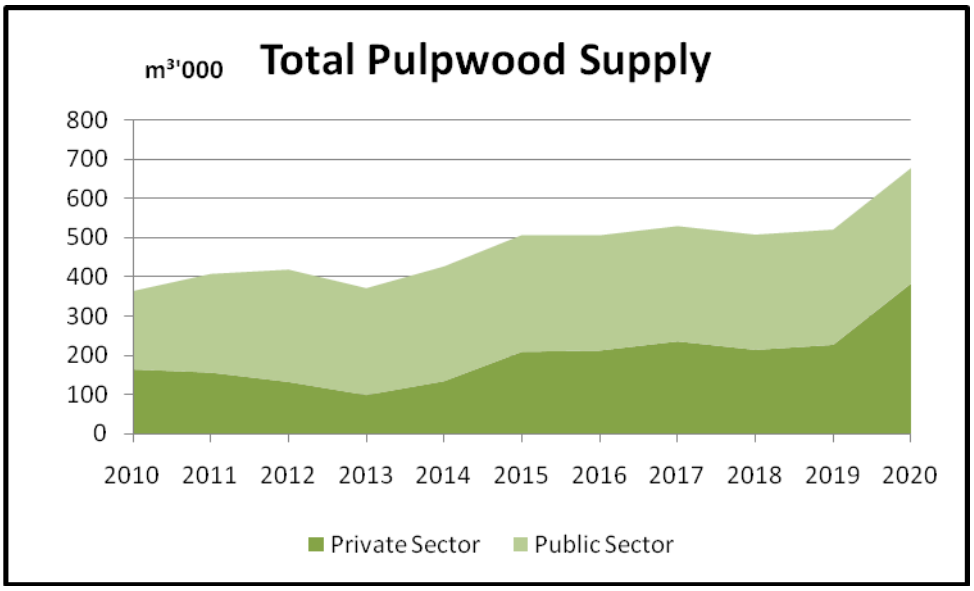


Figure 9 – Total Pulpwood Production – Source CoFORD 2009 and Coillte 2006

The total volume of co-product for the same period is

- 450,000m³ in 2010 and
- 740,000m³ in 2020.

The total estimate for the pulpwood (including energy wood equivalent) and co-product for the region is

- 613,000m³ in 2010 and
- 1,123,000m³ in 2020

Recycled Wood

The EPA estimates that approximately 71,774t of recycled wood are used annually as a fuel source. The data in its current format is not collated on a county by county basis. Using a population proxy of 17.98%, the quantity for the region is 12,900t. The amount of recycled available is largely dependent on the level of economic activity. Evidence from recyclers would suggest that this market has contracted significantly over the last two years.

Barriers to Market Development

There are a number of factors which act as barriers to the development of the wood energy in the private sector woodlands.

(1)Lack of awareness and understanding of process

A lack of awareness and understanding of the processes involved in bring timber to the market among private forest owners may account for the low rate of thinnings noted in the NFI. Only 25% of the plantations ready for thinning have been thinned. In recent years the development of producer groups has sought to address this information deficit. There are a number of producer groups scattered throughout the region at various stages of development.

(2) Size of plantations

The privately owned plantations within the region have an average size of 9ha with a median of 5.5ha, making it difficult to achieve any economies of scale in terms of roading and harvesting.

(3) Roading

A critical issue over the coming years will be the construction of forest roads. At present funding is limited. Approvals issue to plantations which are within two years of thinning. Evidence from the Cork and Galway Forest Producers Group Project suggests that many plantations suitable for thinning will remain unthinned because of the cost of roading to the current standard (Teagasc Sept 2008). If this issue is not resolved many owners will leave their plantations unthinned, thereby reducing the supply of wood.

Figure 10 presents a summary of the required level of investment and amount of road to be constructed using the current scheme rates of 25 linear meters per ha and a maximum rate of 1,125 euro per ha. The cost for the period 2007 to 2026 would be approximately €71.6m and the length of road required would amount to 1,375km servicing an area of 55,000ha scheduled for first thinning. Further roading will be required to services areas schedule for clearfelling. The figure assumes that roads are constructed two years in advance of thinnings.

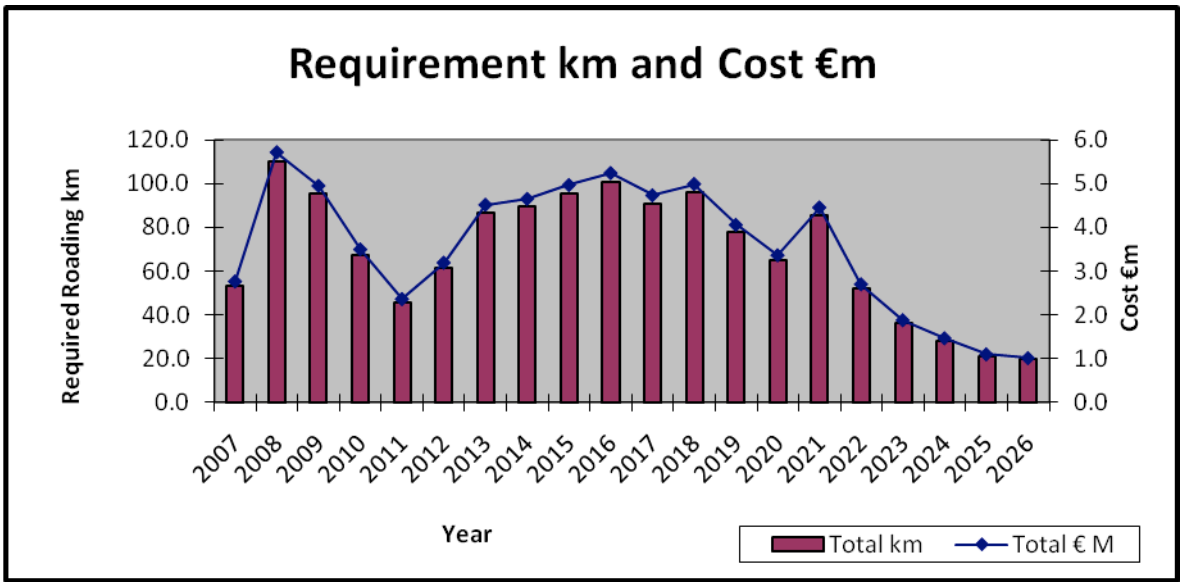


Figure 10 – Roading requirement areas scheduled for first thinning – Source CoFORD 2009

(4) Rate of Deployment of Boilers and CHP

The rate at which new boilers and CHP plant are deployed will determine the rate at which demand for wood fuel increases. A low rate of deployment will result in a low demand for woodfuel. The impact of this would be a reduction in the thinning rate resulting in fewer privately owned plantation being thinned. This would have a long term negative impact on the potential supply as thinnings are cyclical. First thinnings must be carried out within a specified timescale – there is a window of opportunity of approximately four years. If the thinnings are delayed beyond this the risk of windthrow increases dramatically which results in the plantations being left unthinned. Therefore, it is critical that the demand for woodfuel keeps pace with the supply potential (in the form of firewood logs, woodchip or as a raw material for distillation plants or pellet mills).

Current Market

Given the commercially sensitive nature of supply contracts it is difficult to get detailed information regarding the source of and supply to timber processors at a regional or county level. The national market for roundwood in 2008 was 2,272,000m³, 90% of this was supplied by Coillte with the balance being supplied by the private sector 5% and net imports

5%. Pulpwood and stakewood combined amounted to 817,000m³, palletwood and commercial logs amounted to 1,455,000m³. The total market for wood fibre amounted to 3,344,000m³. The difference between supply and demand results from the addition of post consumer recovered wood and the sawmill co-product. Table 2 presents the various uses for wood fibre.

Use of Wood Fibre	Volume '000m³
Sawmilling	1,455
Boardmills	1,406
Round Stakes	56
Horticulture	50
Exported Residues	30
Wood biomass timber processors and Co-firing	317
Commercial Wood Chips	30

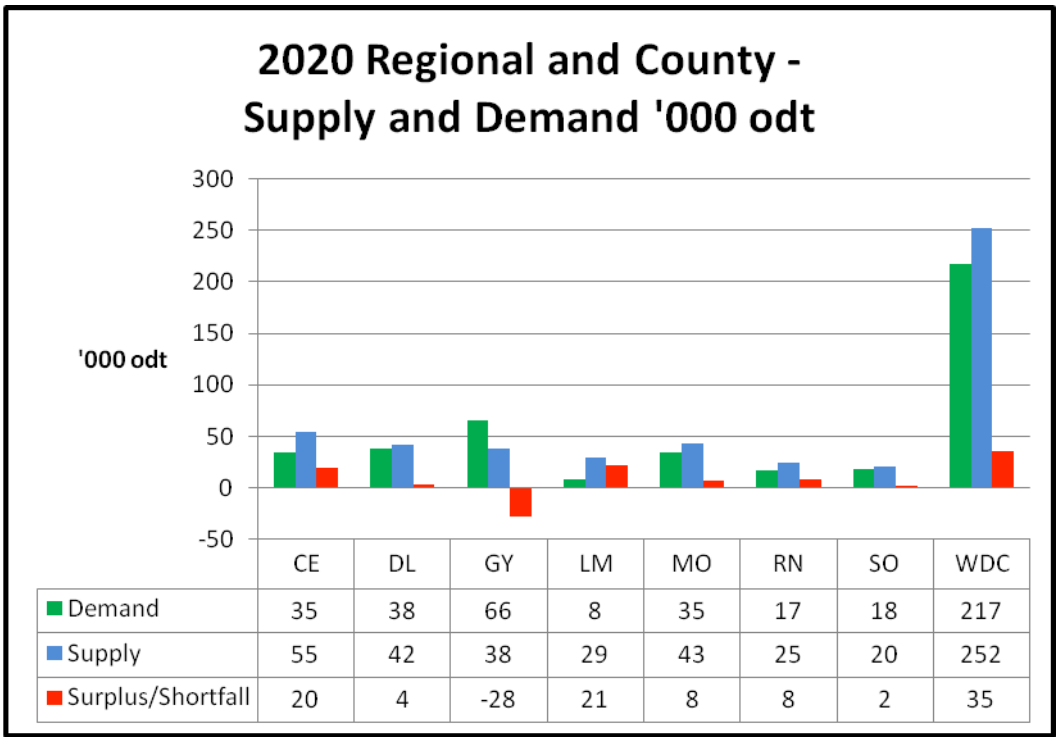
Table 2 – Uses of Wood Fibre – Source ITGA CoFORD 2009

The regional demand for wood biomass is approximately 62,000t annually; most of this is used by the timber processing sector.

At present the timber market is very finely balanced. Given that Coillte's supplies are forecast to remain at current levels or to decline slightly over the medium term and the demand from existing markets remains the same, the only scope for expansion in supply is from the private sector.

The impact of the national co-firing targets due to come into force in 2015 will require in the region of 950,000m³ for the midland power stations. The amount supplied by the private sector to this market will be solely dependant on the gate price for timber. The cost of road transport will be a key factor, given the distances to be travelled.

Figure 11 sets out the position in terms of supply and demand as set out in the Regional Energy Balance and Heating Demand Estimates for 2020. Total demand within the region is estimated to be 217,000 odt. Figure 6 above indicates that the combined output of roundwood and co-product derived from private sector forests is estimated to be 630,000m³ this is equivalent to 252,000odt, leaving a potential surplus or 35,000odt. The only county to experience a shortfall would be Galway; with an estimated shortfall of 28,000odt.



	CE	DL	GY	LM	MO	RN	SO	WDC
Demand	35	38	66	8	35	17	18	217
Supply	55	42	38	29	43	25	20	252
Surplus/Shortfall	20	4	-28	21	8	8	2	35

Figure 11 - Regional Energy Balance and Heating Demand Estimates for 2020 – Source DARE Ltd.

Pricing

Forestry resources
The price of forestry produced wood fuel is built up by a series of costs. These comprise the costs of harvesting, chipping, haulage and the need for the forest owners and the contractors involved in harvesting and chipping to secure a reasonable profit.

Based upon interviews with forestry contractors, the following range of prices (for pulpwood) will allow the first thinning to be undertaken on a commercially attractive basis[1] in the region:

Price to grower	= €2.5 to €5 per tonne
Harvesting costs	= €26 to €34 per tonne
Haulage to wood fuel process depot	= €6 to €8 per tonne
Chipping into energy fuel	= €7 to €10 per tonne
Haulage to boiler	= €6 to €8 per tonne
Overheads and admin costs	= €8 to €10 per tonne
Total	**= €55.50 to €75**

This report concludes that a price for delivered forestry produced wood fuel in the range €55.5 to €75 per tonne (at 50% moisture content) should make it commercially viable for all those involved in the supply chain.

Timber sourced from the Public Sector will be sold via an "on-line" auction, however it is expected that the forest gate prices will be in the region of €26 - €30 per tonnes and that similar chipping and haulage charges will apply to those in the private sector.

At present there is no data available for fibre logs because this type of harvesting is still at a research stage. Coillte are scheduled to undertake this research during the summer of 2009.

[1] All figures are shown at 50% moisture content

Wood processing co-products

Prices for woodchips and sawdust at 45% moisture content to boardmills are between €32 and €38 per tonne delivered.

Post consumer wood waste

This material is either supplied to large scale biomass boilers or it is used to produce briquettes – either in pure timber briquettes or a mixed with other fuels such as miscanthus to produce briquettes. Prices quoted €15/t .