

# **A Regional Renewable Energy Analysis**



Western Development Commission  
April 2018

## **Using Biomass to Contribute to the National Renewable Heat Target**

## Foreword

The WDC promotes Renewable Energy (RE) in the Western Region market place. This builds on our portfolio of Renewable Energy EU funded programmes of work since 2007. These programmes have informed our knowledge, our experience and our capacity for investment in regional Renewable Energy. The WDC encourages RE consumption in business, in communities, and in the public sector, as we work across stakeholders to progress towards all of the 2020 and 2030 national energy targets.

In 2018, as we launch our regional Renewable Energy Analysis, along with a 2 year Action Programme, the WDC is setting out a regional position with the national Energy targets in sight. This study has enabled us to shine a light on this topic across regional and national stakeholder groups. The proposed 2018 – 2020 Action Programme will enable regional & national interests to lead and participate in many parts of the programme, with a view to seeing performance improvement.

This report shows the vibrancy, opportunity, challenges that we have to address, alongside a raft of talent, experience, knowledge and appetite, on which we can build and drive forward, in a collaborative and open way. This reflects the WDC's ambition to drive forward & accelerate the transition to a low carbon energy future.

The 2018 – 2020 Action Programme provides a roadmap to stretch the ambition, and to grow in partnership with our national & regional RE stakeholders. It will enable the public, private and communities to work in tandem towards an energy future, which is fuelled by innovation, driven by excellence and which will continue to present strategic opportunities.

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## Executive Summary

The renewable energy market has the potential to create considerable levels of employment across the Western Region, as well as looking to widen the use of bioenergy and at the same time raising awareness of the associated opportunities. The WDC has been awarded European Union funding to develop and to stimulate growth in the regional renewable biomass sector. The WDC has developed partnerships with unique and innovative EU programmes, in order to achieve a Renewable Energy transition in this region. Our Renewable Energy project heritage is shown below.

- GREBE [www.grebeproject.eu](http://www.grebeproject.eu)
- RE-DIRECT <http://re-direct-nwe.eu/>
- FREED [www.freedproject.eu](http://www.freedproject.eu)
- Raslres [www.raslres.eu](http://www.raslres.eu)
- BioPad [www.biopad.eu](http://www.biopad.eu)
- Rokwood [www.rokwood.eu/](http://www.rokwood.eu/)

Ireland is expected to miss its renewable energy target, in particular in the deployment of renewable heat which was only at 6.5% by 2015 while the 2020 target is 12%. In order to address this, the Government is introducing a Support Scheme for Renewable Heat (SSRH) which is designed to kick start growth in renewable heat deployment by offering 15 year payments for renewable heat outputs.

This study considers the use of biomass use in the WDC region (Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway and Clare), along with an assessment of the potential contribution to the national renewable heat target (RHT). Between September and December 2017, a survey of biomass deployment in the WDC region was undertaken which found, 7 large industrial biomass schemes using 110,000 tonnes of wood fuels a year. The installed capacity of these schemes ranges from 2,000kW to 22,000kW. The survey also found 43 smaller non-domestic biomass installations with installed capacities ranging from 50kW to 550kW. Only 24 of these are known to be operational, representing 6,600kW of installed capacity using 6,269 tonnes of wood fuel a year.

### In summary

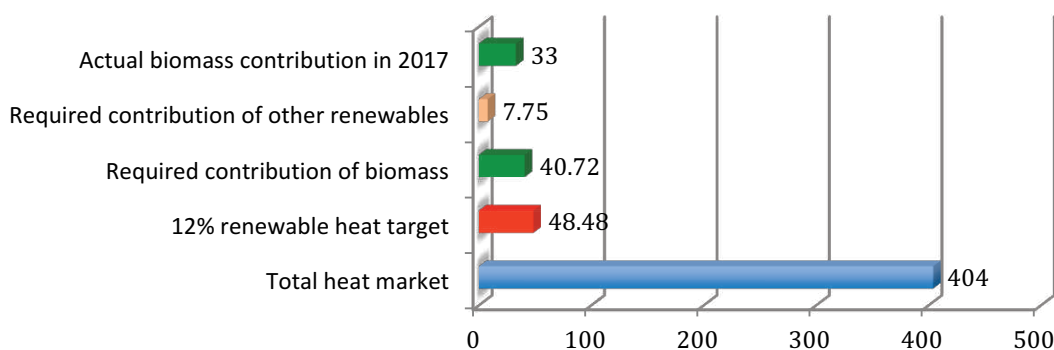
- The industrial biomass market is comprised of 7 large investments totalling deployment equal to 31.2 Kilotonne of Oil Equivalent (ktoe).
- The non-domestic biomass market comprises 24 small investments totalling deployment equal to 1.74 ktoe.

In the WDC region, total biomass deployment is equal to 32.94 ktoe. This represents 8.1% of the Western heat market.

## Towards the national Biomass 2020 target

Biomass heat needs to amount to 40.72 ktoe of the Western regions heat use by 2020 if the national 12% RHT is to be met in the region. These assumptions are illustrated in Figure 1 below.

### Heat use in the WDC region in Ktoe



**FIGURE 1: HEAT USE IN THE WDC REGION IN KTOE**

Taking into account the already installed biomass, this means 7.78 ktoe of new biomass deployment must be achieved by 2020 to help deliver the 2020 RHT on a regional basis, meaning:

- A use of 27,901 tonnes a year of wood fuel at 35% moisture content
- Delivering 90,000MWh of heat a year
- 35 MWs of new installed biomass capacity

Over 2½ years this would require €35 million of capital investment and would create 70 new full time jobs and save 28,000 tonnes of CO<sub>2</sub>. The potential total market is estimated to be 275MW, suggesting that 35MW of new capacity is a viable aspiration. Furthermore, if the rates of growth experienced in Scotland following the introduction of its RHI were repeated in the region for the next 2½ years then 35MW of new installed capacity would be achievable. 35MW of biomass requires 46,290m<sup>3</sup> of wood fibre a year. The annual unused fibre resource is forecast to rise from 50,000m<sup>3</sup> to over 300,000m<sup>3</sup> in 2025. This rise is associated with when the trees mature and become ready for thinning or felling. It is unlikely there will be constraints associated with availability of biomass fuel supply in meeting 35MW target.

The Support Scheme Renewable Heat (SSRH) offers a key incentive to make Biomass a financially attractive option. However a range of other barriers remain, that are associated with the relative complexity of a Biomass investment including:

- A lack of awareness about biomass and the SSRH
- Poor technical and commercial knowledge that prevents planning a project
- A lack of confidence in biomass due to seeing poorly executed projects
- A focus 'on the day job,' with limited resources to plan and deliver a biomass scheme

- Problems in finding technical help or good quality suppliers and installers
- An absence of impartial information and advice to help plan projects

Our proposed 2018 – 2020 Action Programme will consider how some of these barriers can be overcome & the growth of Biomass could be achieved in the WDC western region. The best market opportunities in the WDC region may include applications such as leisure centres, hospitals, hotels, schools and care homes where it is possible to provide 1,000MWh of heat covered by the two highest tariffs and make best use of the capital invested through running installations of around 300kW to 400kW at about 3,000 full load hours. Installations such as this could secure the €38,000 annually offered by the two highest tariffs, at the lowest capital cost of investment.

# 1. Background and Purpose

## The context and scope of this report

The Action Plan for Jobs<sup>1</sup> is a whole-of-Government initiative under which all Government Departments and Agencies work together to deliver on the agreed action points for each year. In the APJ West 2016, the WDC along with SEAI, were tasked with Action 134<sup>2</sup>: ‘Complete a regional renewable energy analysis on the use of biomass as a local contribution to the national renewable heat target and develop a range of actions to support the development of renewable energy in the region’. Recent modelling undertaken<sup>3</sup> by SEAI indicates that renewable heat will account for 7-11% of total heat by 2020, across a range of deployment scenarios. Even with high levels of penetration, this work suggests that Ireland will fall short of the 12% target. The use of Biomass for heat generation is likely to have the greatest potential for the West Region in the immediate future in achieving the renewables heat target and reducing carbon emissions. While the county level Renewable Energy Strategy (RES) contains reference to biomass, more detail is required to analyse further potential to contribute to the RES-H target with development of the biomass market in the West, as well as other Renewable Energy (RE) types, and develop a regional action plan to collate and deliver these strategies.

Western Development Commission (WDC) along with SEAI, were tasked with Action 134 from the whole-of-Government initiative Action Plan for Jobs to undertake a:

*‘Regional renewable energy analysis on the use of biomass as a local contribution to the national renewable heat target (RHT) and develop a range of actions to support the development of renewable energy in the region’.*

[1] <https://www.djei.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-2016-Fourth-Progress-Report.pdf>

[2] <https://djei.ie/en/Publications/Publication-files/West-APJ-First-Progress-Report.pdf>

[3] [https://www.seai.ie/Publications/Statistics\\_Publications/Energy\\_Modelling\\_Group\\_Publications/Ireland%E2%80%99s-Energy-Targets-Progress-Ambition-and-Impacts.pdf](https://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Ireland%E2%80%99s-Energy-Targets-Progress-Ambition-and-Impacts.pdf)



Ireland is one of only four countries<sup>4</sup> in Europe expected to miss its renewable energy target. This target is supposed to be achieved in 2020 by contributions from renewable energy in the electricity, transport and heat (and cooling) sectors. Heat is the largest of these three sectors and as part of Government's strategy, with a target that 12% of final heating demand be derived from renewable sources by 2020. To help address this, the Government is introducing a Support Scheme for Renewable Heat (SSRH). The SSRH is designed to kick start growth in biomass deployment by offering 15 year payments for renewable heat outputs.

Against this backdrop, in Autumn 2017, this study undertook:

- A survey of the biomass sector to help define biomass use and the size of the heat and renewable heat market in the WDC region
- An assessment of the current gap between renewable heat deployed and the 2020 RHT.
- An assessment of the biomass feedstock supply available to the region
- Recommendations for the development of biomass heat in the region
- Suggested actions to support biomass deployment

Our analysis focused on 'solid biomass' – that is forest derived wood fuels used for energy production. There is a modest percentage of non-solid biomass used to generate renewable energy, and this has been commented upon where appropriate.

## 2. Policy Context

### Renewable Energy Directive

The 2009 EU Renewable Energy Directive (RED 2009/28/EC) sets out the legal framework for binding renewable energy targets for each member state and is the overarching policy objective for Renewable Energy in the EU. Under the RED, Ireland's renewable energy target requires 16% of gross final energy consumption to come from renewable sources by 2020.

National sub-targets for electricity (40%), transport (10%) and heat (12%) have been set by Ireland to achieve this overall target. A shortfall will require Ireland to purchase renewable energy compliance from other member states that exceed their target. As heat accounts for 45% of all energy use in Ireland, a shortfall in this will have significant impact on whether RED is met.

In May 2015, SEAI published: 'Renewable Heat in Ireland to 2020: Achieving Ireland's 2020 renewable heat target: Analysis of policy options'. They stated: *'Policies and measures are in place to deliver on the transport and electricity goals. Heat policy is less developed, and projections from the latest SEAI energy forecast for the 2020 energy system show that, even under optimistic assumptions about the impact of current heat policies and measures, the 12% target is unlikely to be delivered.'*

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[4] The other countries set to fall short are Luxembourg, the Netherlands and the UK.

Deployment of renewable heating had progressed to 6.5% of heat demand by 2015 and SEAI states that under current policies (i.e. without an SSRH) there will be an estimated shortfall of approximately 1,200 GWh by 2020.

To help address this Government is introducing a Support Scheme for Renewable Heat (SSRH). The SSRH is designed to financially support the replacement of fossil fuel heating systems with renewable energy for 'large heat demand non-domestic users.' This typically includes commercial, industrial, agricultural, district heating, public sector and other non-domestic businesses and sectors. Large industrial users in the Emissions Trading Scheme cannot participate in the SSRH.

In December 2017, Minister for Communications, Climate Action and Environment, Denis Naughten commented: *"The Support Scheme for Renewable Heat is a tangible and viable measure that will kick-start the biomass and biogas sectors. Crucially it will provide the basis to create new commercial opportunities for farmers in heat technologies including biomass boiler installations and new opportunities for foresters. It will also contribute to meeting Ireland's 2020 renewable energy and emission reduction targets"*

The SSRH will be an on-going operational support (paid for a period up to 15 years) for new installations or installations that currently use a fossil fuel heating system and convert to using biomass heating systems (or anaerobic digestion heating systems). The tariffs paid will reduce with increasing output, reflecting the economy of scale associated with larger systems.

There will be eligibility criteria that projects must conform to over the period of support payments. These criteria will ensure that heat generated under the Scheme is applied to useful purposes only. In addition, there will be a number of budgetary controls in order to control overall costs including project budget caps, a scheme budget cap and periodic reviews to prevent windfall gains.

SEAI will administer the Support Scheme for Renewable Heat (SSRH) with the development of detailed terms and conditions, including eligibility and sustainability criteria, which then will be approved by the Minister for Communications, Climate Action and Environment.

The proposed tariffs for the Scheme are:

Tier	Lower Limit (MWh/yr)	Upper Limit (MWh/yr)	Biomass Systems Tariff (c/kWh)	Heating
1	0	300	5.66	
2	300	1,000	3.02	
3	1,000	2,400	0.50	
4	2,400	10,000	0.50	
5	10,000	50,000	0.37	
6	50,000	N/A	0.00	

**FIGURE 2: SSRH TARIFFS**



State Aid clearance from the European Commission will be required before the scheme can commence operation. Subject to this approval, it is expected that the scheme will commence operation in 2018. The tariff level for a particular project will generally be fixed for the period of support. Tariff levels will not be linked to indexation.

This study recognises that the design is different from the GB and Northern Irish RHI schemes as there is no incentive to over or under size systems, nor does it contain ‘sweet spots’ that have incentivised 199kW and 999kW systems irrespective of their suitability for the heat load. In the proposed SSRH, the size of systems will be dependent upon the heat load and its profile: the lessons from the GB and Northern Ireland schemes have been learnt.

The best market opportunities in the region will include applications such as leisure centres, hospitals, hotels, schools and care homes where it is possible to provide 1,000MWh of heat covered by the two highest tariffs and make best use of the capital invested through running installations of around 300kW to 400kW at about 3,000 full load hours. Installations such as this can secure the €38,000 annually offered by the two highest tariffs, at the lowest capital cost of investment.

The proposed SSRH should help drive sensible design and investment choices and maximise the cost effective replacement of fossil fuel heat in the non-domestic biomass sector. Based upon the UK experience of an RHI, other support measures are likely to be required to see effective and sustainable market growth. This is dealt with in Section 7.

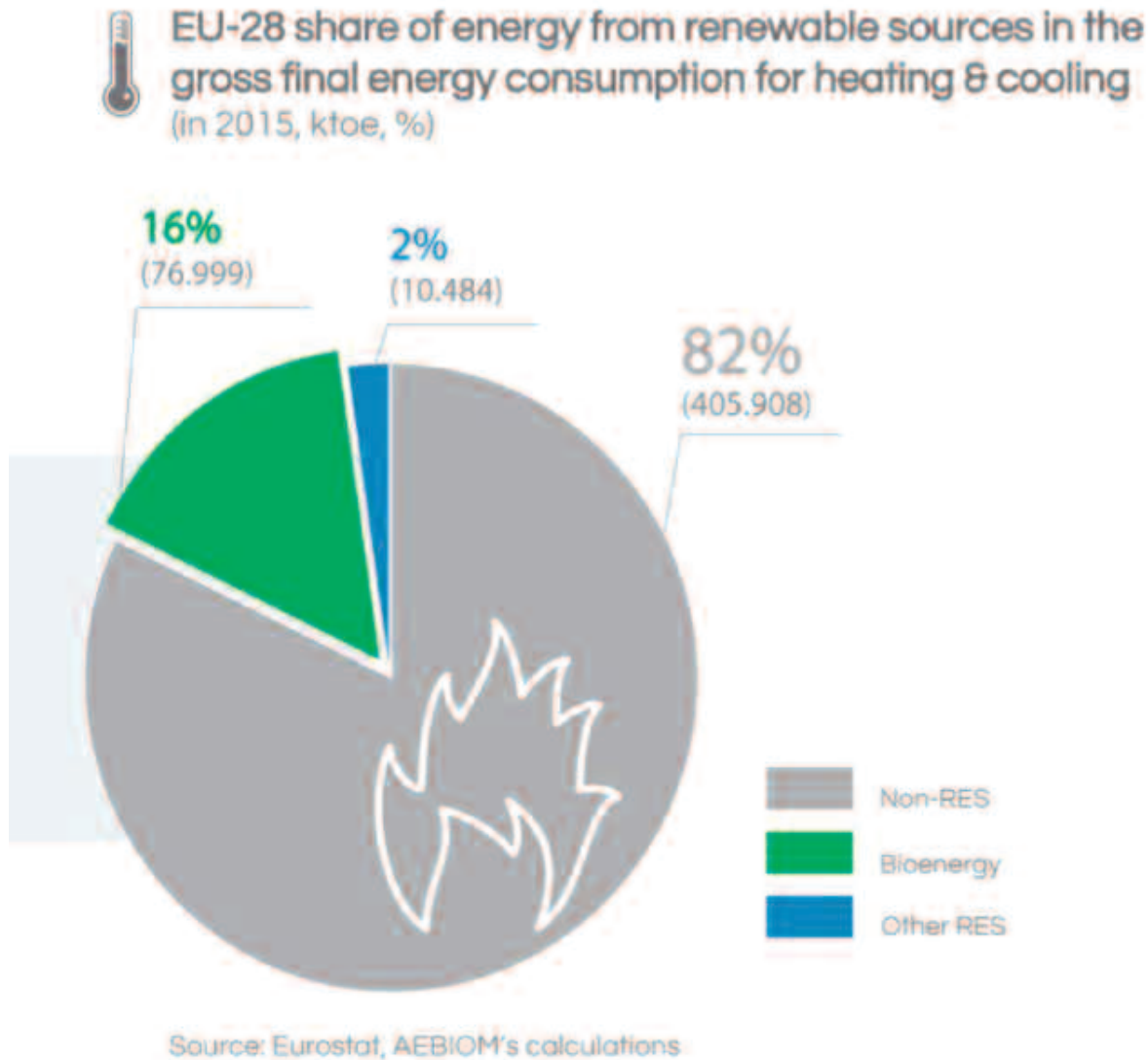
## 3. The Biomass Sector

### Biomass Usage

Biomass provides 61% of the EU’s renewable energy<sup>5</sup>, providing important contributions to renewable heat production, in electricity generation and renewable transport. Specifically, in the heating sector, biomass provides 90% of the EU’s renewable heat, and 16% of all its heat. The European Biomass Association AEBIOM, produced the following chart detailing the role of biomass.

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[5] Aebiom 2016 – data for 2014.

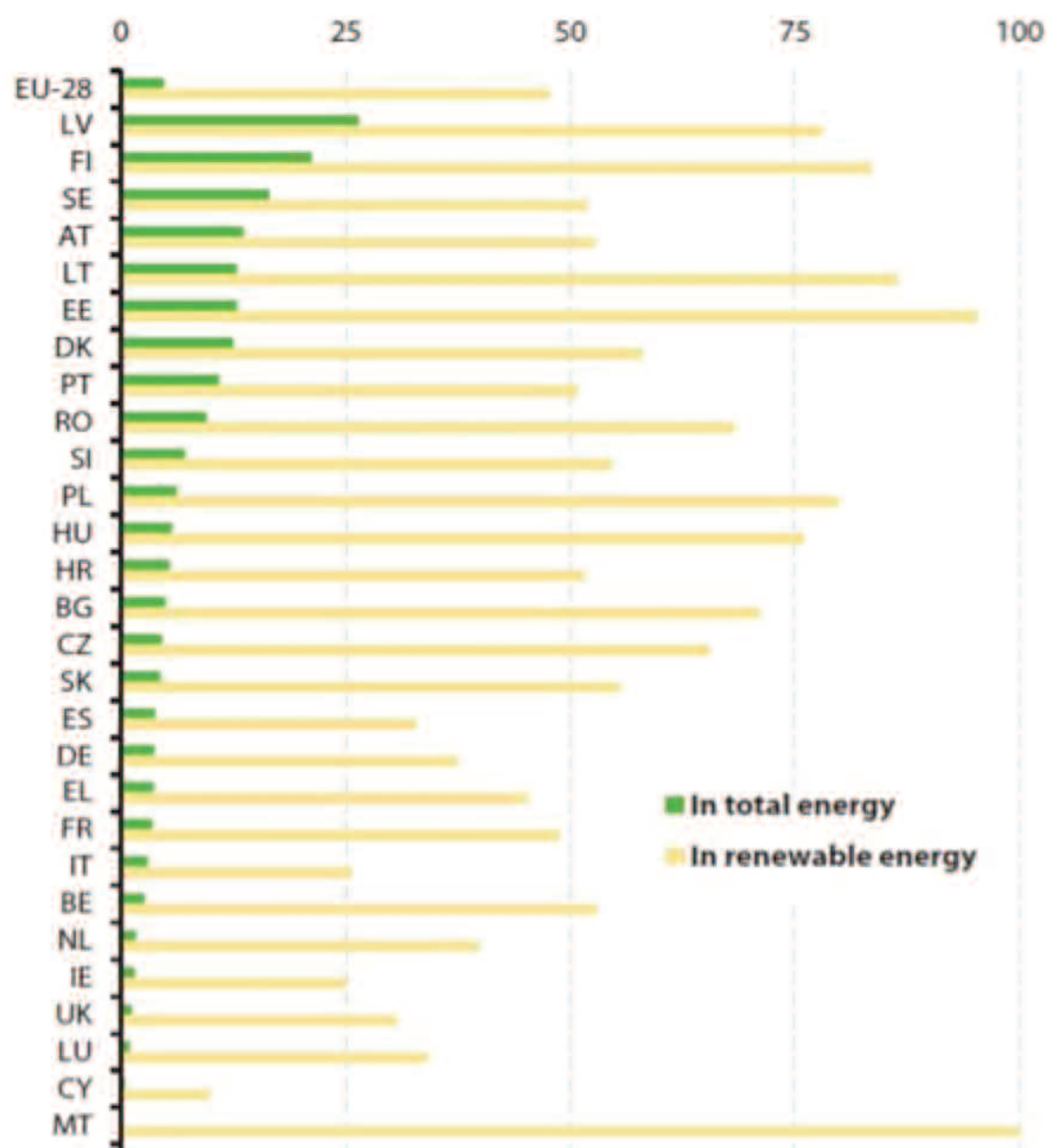


**FIGURE 3: ROLE OF BIOMASS IN HEATING**

Municipal solid waste, industrial waste, agricultural crops and residues, oil bearing plants (oilseed rape for example) and animal products are all feed stocks variously used to generate renewable heat and power, but by far the most important source of biomass is wood fibre (solid biomass).

Wood fuels account for 69% of the EU's biomass supply.<sup>6</sup> Figure 4 illustrates how important wood fuels are as sources of renewable energy in the EU member states and in Ireland.

[6] Eurostat 2013

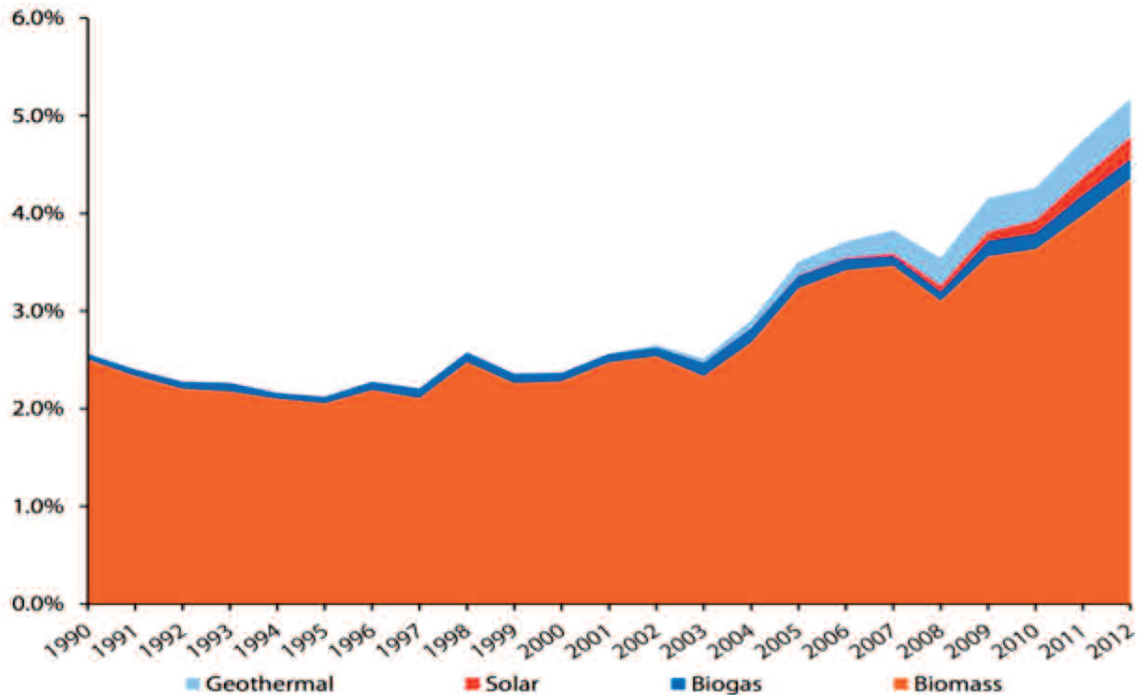


Source: Eurostat 2013

FIGURE 4: ROLE OF WOOD FUELS IN RENEWABLE ENERGY (% SHARE)

## Renewable Heat Sources in Ireland

Renewable heat in Ireland is mostly provided by biomass, as is the case in all other EU member states.



**FIGURE 5: SOURCES OF RENEWABLE HEAT IN IRELAND**

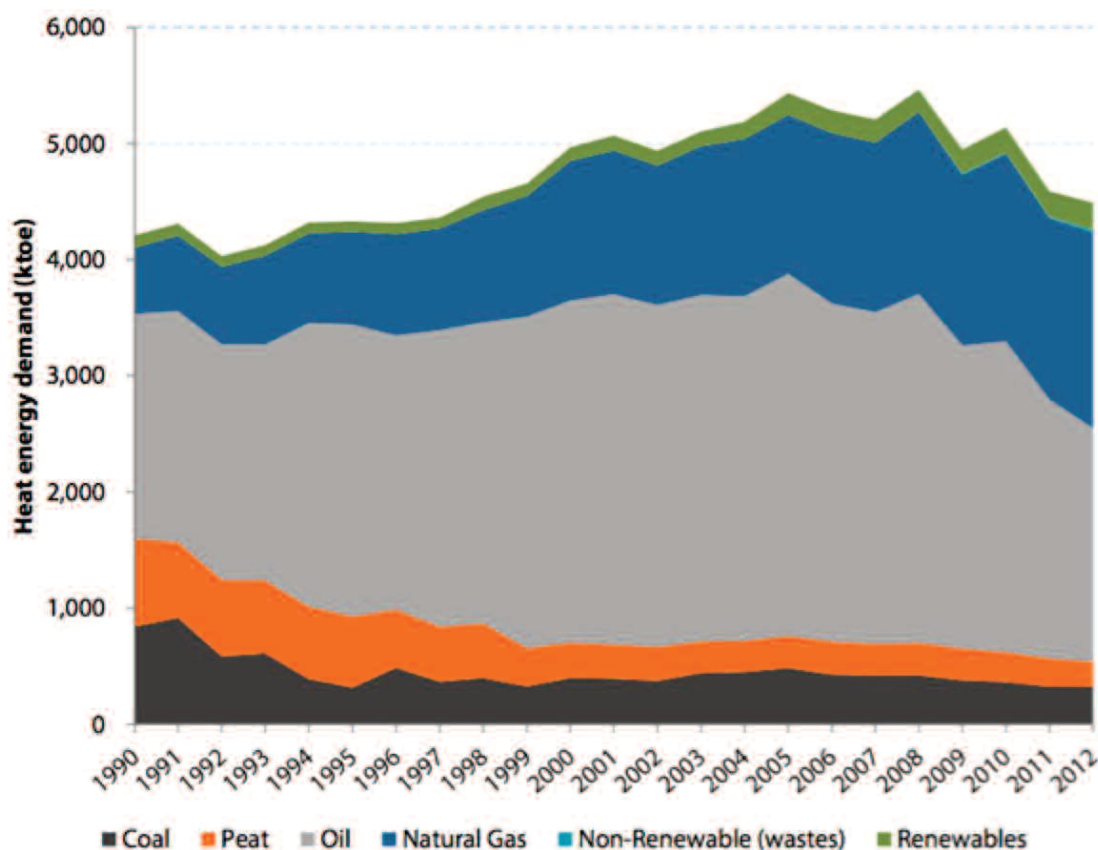
As Figure 5 above shows, 84% of Ireland's renewable heat was supplied by biomass (2012).<sup>7</sup>

Wood fuel is the largest and best-established renewable energy sector in the EU and it is mostly used to generate heat (which is the largest energy market). This situation is replicated in Ireland.

## Heat Use in the WDC Region

To calculate the contribution that biomass can make to national Renewable Heat Target(RHT), it is necessary to know the total size of the heat market in the WDC region. There is no exact figure for the size the heat market in seven counties, but there is useful data on the total Irish heat market. For example

[7] EPSSU (2013). Energy in Ireland 1990 – 2012. 2013 Report. Available at: [http://www.seai.ie/Publications/Statistics\\_Publications/Energy\\_in\\_Ireland/Energy\\_in\\_Ireland\\_1990\\_-\\_2012\\_Report.pdf](http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy_in_Ireland_1990_-_2012_Report.pdf)



**FIGURE 6: TOTAL IRISH HEAT<sup>8</sup>**

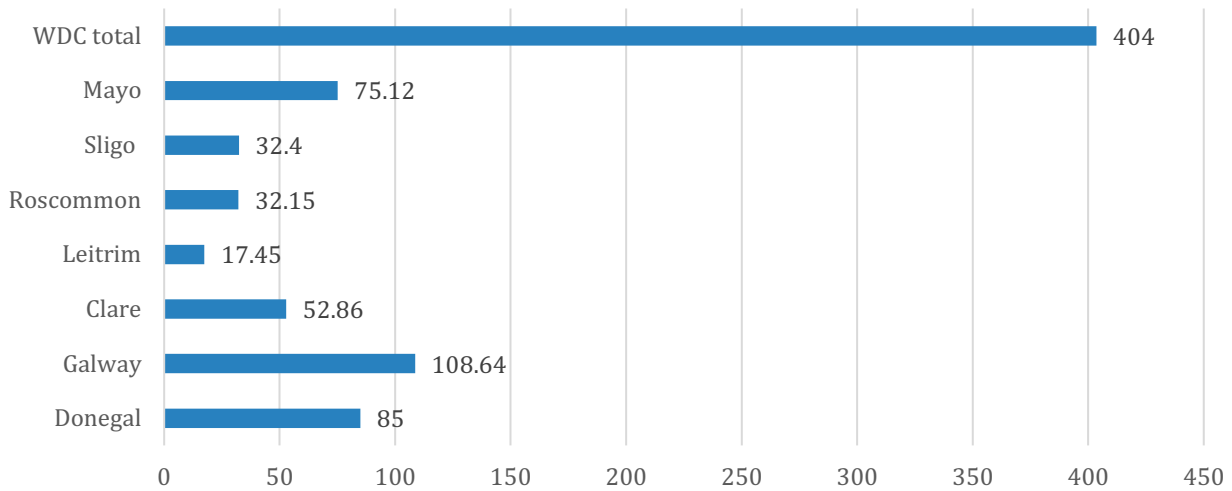
This data suggests that currently the total size of the Irish heat market is in the region of 4,500 ktoe.

By reference to the SEAI GIS heat map<sup>9</sup> it has been possible to state the heat market size in the region. The GIS based heat map contains county by county downloadable CSV file data on the estimated heat demand in 2015. Using this data source, the total size of the WDC heat market is 404 ktoe. This is broken down by County in Figure 7.

[8] Renewable Heat in Ireland to 2020: Achieving Ireland's 2020 renewable heat target: Analysis of policy options.

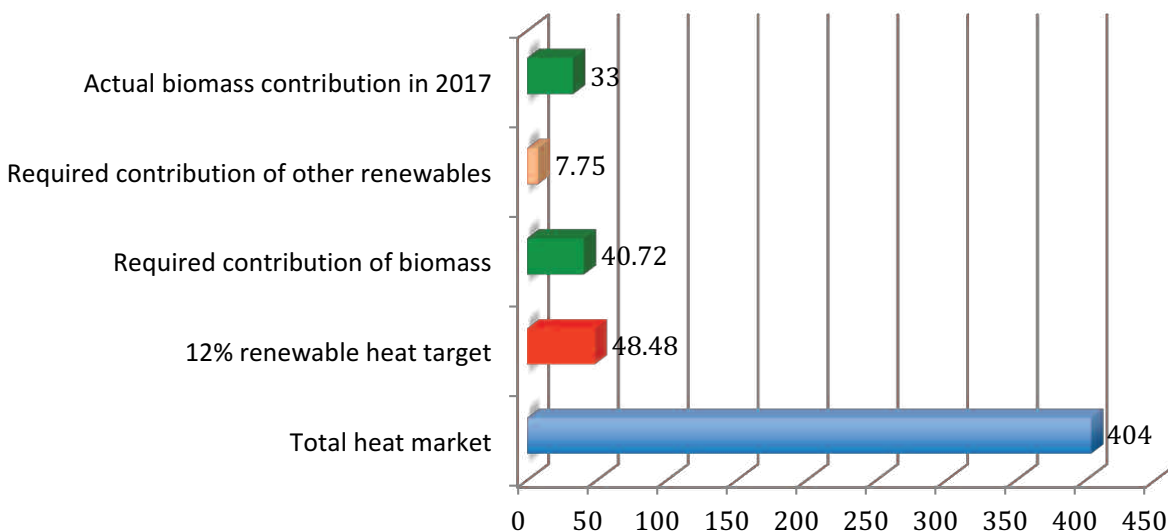
[9] <http://maps.seai.ie/giswiki/maps/heat-map/>

## 2015 total heat: Ktoe

**FIGURE 7: WDC REGION HEAT MARKET - KTOE**

The national RHT is 12% by 2020. Regionally therefore 12% of 404 ktoe is 48.48 ktoe, of which biomass will need to make up 84% to be in line with the national situation<sup>10</sup>. It seems reasonable to conclude that biomass heat needs to amount to 40.72 ktoe of the regions heat use by 2020 if the national RHT is to be met. These assumptions are illustrated in Figure 8 below.

## WDC Region Ktoe

**FIGURE 8: WDC REGION HEAT DATA**

[10] Assumption that the national split of renewable heat (84% biomass and 16% from other forms of renewable energy) also applies in the WDC region.



## 4. Mapping the Biomass Heat Sector in Western Ireland

### Scope of survey

As part of our analysis, a survey was undertaken of the biomass heat sector in Western Ireland (the 7 counties of Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway and Clare) in 2017, with the aim of calculating the total amount of energy being used to generate heat from biomass sources. Individual wood fuel use has not been published, as this is often deemed commercial in confidence.

The survey involved contacting all the known biomass users and suppliers in the region and collecting information about the biomass installations, covering their size and biomass use. From this it was determined that it is possible to distinguish biomass into two market sectors:

- Larger scale industrial biomass use driven by wood processing and ‘process heat’ using industries
- Non-domestic biomass heat use driven by the need for space heating and hot water in buildings

These sectors are sufficiently different in scale and character to warrant being in different categories.

### The industrial biomass market

There are 7 large industrial biomass schemes in the WDC region. Collectively they use approximately 110,000 tonnes of (35% moisture content) wood fuels a year. These biomass users mostly self-supply, using the wood dust, wood shavings and wood co-products of the timber they buy. Collectively this is a big, stable and long established market sector.

The following table lists these sites and presents total biomass use in tonnes to GWh and ktoe of energy.

Industrial biomass heat generation	Location	Eqv tonnes of wood fuel at 35% per annum
ECC sawmills (9MW)	Cornamona Co. Galway	Commercial in confidence
Murray Sawmills	Ballygar, Co. Galway	Commercial in confidence
Currans Sawmills	Corrindulla, Co. Galway	Commercial in confidence
Crowes Sawmills	Mohill Co. Leitrim	Commercial in confidence
Sherrans Sawmills	Ballinrobe, Co. Mayo	Commercial in confidence
Masonite	Carrick-on-Shannon	Commercial in confidence
Aurivo Dairy Ingredients Plant (ADIP) 22MW	Ballaghaderreen	Commercial in confidence
<b>Total tonnes at 35% MC</b>		<b>110,000 tonnes at 35% MC</b>
<b>GWh</b>		<b>363 GWh</b>
<b>Ktoe</b>		<b>31.2 Ktoe</b>

**FIGURE 9: INDUSTRIAL BIOMASS USERS IN WESTERN REGION**

Inevitably these figures are a snapshot, as the use of biomass will vary year by year. For example, the Aurivo Dairy Ingredients Plant biomass installation produces around 5.15 Ktoe (60 GWh) of renewable heat a year at the moment, but it has the possibility of greatly increasing that, or even reducing it.



**FIGURE 10: ADIP VIEW**



**FIGURE 11: ADIP BIOMASS SILO**

The rated output of these installations ranges from 2MW to 22MW, and each installation is a bespoke scheme costing multi million euros to design and build. The fuel stores for some of these installations can hold hundreds of tonnes of fuel in large storage bunkers.

### Non-domestic biomass heat market

The non-domestic heat market and the industrial biomass market have developed separately with no known ownership overlap in either the installation or fuel supply chains. The non-domestic biomass installations range in size from ~50kW to about 550kW. These installations cost under a few hundred thousand euro each and are supplied by companies who supply standard boiler models produced on factory production lines. The fuel store for a non-domestic installation is typically designed to hold 7 to 10 tonnes of fuel that is tipped or blown into a hopper. Unlike the bespoke, high capital spend industrial market, the non-domestic biomass heat market tends to be supplied with fuel by small wood fuel supply businesses that only use local forestry or imported wood pellets.

The reason for this separation is that the production and delivery of dry wood chips (or pellets) to a school or hospital requires specialist processing and specialist vehicles that are not owned or needed by industrial biomass users with wholly different fuel standards and fuel handling requirements.

A survey of the non-domestic market has found there are only 24 operational installations in the region as shown in Figure 12.

Operational schemes	Town	Est. Size kW	Est. use of wood fuel @ 35%/t
Aragorn Services	Ennis	85	Commercial in confidence
Beckman Coulter	O Callaghan's Mills	320	Commercial in confidence
Clare County Council	Ennis	540	Commercial in confidence
Torpey Wood Products	Sixmilebridge	120	Commercial in confidence
Quilty Cottages	Quilty	85	Commercial in confidence
Ballynahinch Castle	Connemara	300	Commercial in confidence
Matt Lohan & Sons Ltd	Oranmore	580	Commercial in confidence
Teagasc Athenry	Athenry	300	Commercial in confidence
Udaras na Gaeltachta	Furbo	300	Commercial in confidence
Ballina Swimming Pool	Ballina	150	Commercial in confidence
Westport Woods Hotel	Westport	220	Commercial in confidence
Westport Woods Hotel	Westport	150	Commercial in confidence
Kilronan Castle	Ballyfarnon	540	Commercial in confidence
Aura Leisure Centre Pool	Carrick-on-Shannon	400	Commercial in confidence
Cherrymore Wholesale Kitchens	Donegal Town	349	Commercial in confidence
Gartan Outdoor Education Centre	Churchill	80	Commercial in confidence
Great Northern Hotel	Bundoran	330	Commercial in confidence
Innishowen Gateway Hotel	Inishowen	500	Commercial in confidence
Jacksons Hotel	Ballybofey	500	Commercial in confidence
Lough Eske Castle	Donegal Town	360	Commercial in confidence
Udaras na Gaeltachta	Gweedore	300	Commercial in confidence
Kilmaley Village	Kilmaley	250	Commercial in confidence
Convent NS	Boyle	145	Commercial in confidence
Radio Na Gaeltachta	Connemara	110	Commercial in confidence
<b>Total tonnes at 35% MC</b>			<b>6,269 tonnes</b>
<b>GWhs</b>			<b>20.69 GWhs</b>
<b>ktoe</b>			<b>1.74 ktoe</b>

FIGURE 12: NON-DOMESTIC OPERATIONAL INSTALLATIONS

The survey also found that there are 9 known installations whose operational status is currently unknown. These schemes are listed below:

Unknown status schemes	Town	Est. Size kW	Est. use of wood fuel @ 35%/t
Gardenfield Mushrooms	Hollymount	150	Commercial in confidence
Eda Cox Construction Ltd	Rooskey	200	Commercial in confidence
Abbey Vocational School	Donegal Town	220	Commercial in confidence
Mevagh Dive Centre	Carrigart	60	Commercial in confidence
Mount Errigal Hotel	Letterkenny	500	Commercial in confidence
Radisson SAS Hotel	Letterkenny	300	Commercial in confidence
Regional Cultural Centre	Letterkenny	250	Commercial in confidence
St Colmcille National School	Inishowen	90	Commercial in confidence
Villa Rose Hotel	Ballybofey	220	Commercial in confidence
<b>Total tonnes at 35% MC</b>			<b>1,990 tonnes</b>
<b>GWhs</b>			<b>7 GWhs</b>
<b>ktoe</b>			<b>0.6 ktoe</b>

**FIGURE 13: NON-DOMESTIC UNKNOWN STATUS INSTALLATIONS**

Finally, the survey found that there are 10 installations that we understand have been permanently turned off by their owners. These schemes are listed below:

			fuel @ 35%/t
Ennistymon VEC	Ennistymon	85	Commercial in confidence
Dromoland Castle	Newmarket-On-Fergus	540	Commercial in confidence
Cahercalla Nursing Home	Ennis	300	Commercial in confidence
St. Brigid's Hospital	Ballinasloe	160	Commercial in confidence
St. Francis Nursing Home	Galway City	100	Commercial in confidence
Zetland Country House Hotel	Connemara	100	Commercial in confidence
CBS Roscommon	Roscommon Town	200	Commercial in confidence
Abbey Manor Hotel	Dromahair	150	Commercial in confidence
Arus Breffini Nursing Unit	Manorhamilton	300	Commercial in confidence
Aura Leisure Centre	Letterkenny	500	Commercial in confidence
<b>Total tonnes at 35% MC</b>			<b>2,435 tonnes</b>
<b>GWhs</b>			<b>8 GWhs</b>
<b>ktoe</b>			<b>0.7 ktoe</b>

**FIGURE 14: NON-DOMESTIC NON-OPERATIONAL INSTALLATIONS**

Of the 24 operational biomass heat installations in the WDC region it was concluded that this represents:

- 6.6MW of installed capacity
- Using an estimated 6,269 tonnes of wood fuel a year
- With supplied wood fuel at say €110/t, that fuel supply market has an annual value of €689,590
- Most of these end users are purchasing dried wood chips or wood pellets on a commercial basis from a small handful of specialist wood fuel suppliers or as pellets from Leinster Pellets, Laois Sawmills and Balcas.
- A handful of installations that are also self-suppliers (they use wood fuel that they have produced in house).

In summary, the market is in its infancy and characterised by being small, contracting, and dating back to about 2007.

### Total size of the existing biomass heat market in the WDC region

The table below sums the non-domestic and industrial biomass markets to show the current estimated contribution of biomass to the regions heat market.

Biomass use in WDC	Totals (using different measures)
<b>Total tonnes at 35% MC</b>	<b>110,000 tonnes + 6,269 tonnes = 116,269 at 35% MC</b>
<b>Ktoe</b>	<b>31.2 ktoe + 1.74 ktoe = 32.94 ktoe</b>

**FIGURE 15: SUMMARY OF WDC REGION BIOMASS USE**

The industrial biomass market is characterised by a small number of large investments totaling 31.2 ktoe at present. The non-domestic biomass market is characterised by a large number of small investments totaling 1.74 ktoe at present. Neither part of the market is currently growing. Biomass generation in total is 32.94 ktoe in the WDC region – which is 8.1% of the total heat market.

## 5. Towards a 2020 Regional Target for Biomass Heat

Biomass generation currently totals 32.94 ktoe in the WDC region and this is almost entirely due to the industrial biomass users. Based upon the data in this report, if the WDC region is to meet its share of the national RHT then by 2020 then 40.72 ktoe of biomass heat must be generated. Therefore 7.78 ktoe of new biomass must be added by 2020 to help deliver the 2020 RHT on a regional basis.

### The split between industrial and non-domestic biomass heat

One question that arises in thinking about this shortfall is how that splits out between the non-domestic and industrial markets.

There are several points that can be made about the industrial market. The addition of even one new industrial biomass user in the region by 2020 appears unlikely, irrespective of policy,



subsidy and market changes. That is due to the fact that a new project would take several years to plan and build and such a proposal has yet to be identified within the region.

Industrial biomass users are not likely to benefit from the SSRH and the objectives of the SSRH are to support the non-domestic biomass heat market.

Industrial biomass use dominates renewable heat deployment in the Western region, but this is not typical when comparing WDC to other regions and countries. For example, in Scotland, 53% of its renewable heat comes from the non-domestic biomass sector (called 'biomass' below), with only 36% from biomass CHP (being the broad equivalent of industrial biomass in the WDC region).

Technology	Renewable heat capacity (GW)	% Renewable heat capacity	Annual output (GWh)	% Annual output
<b>Biomass</b>	0.901	60%	2,203	53%
<b>Biomass CHP</b>	0.391	26%	1,517	36%
<b>Energy from waste</b>	0.052	3%	192	5%
<b>Heat pump</b>	0.126	8%	236	6%
<b>Solar thermal</b>	0.033	2%	17	<1%
<b>Total</b>	1.504	100%	4,165	100%

**FIGURE 16: SCOTTISH RENEWABLE HEAT PROVISION**

New renewable heat output therefore seems most likely to be delivered by non-domestic biomass as that will be quicker to deliver, is more typical in other markets and has the greater scope for growth driven by the SSRH.

### Growth in the non-domestic biomass market

The practical implications of 7.78 ktoe of non-domestic biomass heat being provided by 2020 are:

- A use of 27,901 tonnes of wood fuel at 35% moisture content a year
- Delivering 90,000MWh of heat a year

To meet this target, around 35 MWs of new installed biomass capacity would be needed. This means €35 million of capital investment would be required, 70 new full time jobs would be created and 28,000 tonnes of CO2 would be saved regionally.

The non-domestic biomass market is comprised of 24 small investments totaling 1.74 ktoe at present (delivered over 11 years). Adding 7.78 ktoe of output by 2020 is a challenging aspiration – but WDC and its public sector partners could exert some practical influence and offer some useful support to this market sector. Furthermore, as the projects are smaller in scale, they can be planned and delivered in the next 2½ years. Finally, the SSRH is specifically designed and intended to help this market grow.

The Support Scheme for Renewable Heat forecasts on renewable energy growth and the growth rates experienced in Scotland are examined below in order to consider how 7.78 ktoe compares to these examples and forecasts.

## Scotland: A Biomass case study

It is reasonable to consider if other regions have achieved similar amounts of biomass heat in similar timescales. Scotland is a good example as its Renewable Heat Incentive was announced in 2009 and opened in 2011.

The population of Scotland is 5.3 million; the population of Ireland is 4.76 million. These are fairly similar. A further comparison is that Scotland and Ireland have large rural hinterlands, with communities that rely heavily on oil for heating (not mains gas). It is possible suggest that Ireland is in a similar position to Scotland in 2009/11, when it had its RHI introduced.

The actual biomass growth rates in Scotland between 2010 and 2015 inclusive (6 years) were that the RHI delivered 6,000 installations (at 175kW average size). Notionally, that's 1,000 schemes a year<sup>11</sup> at 175kW, which equals 175MW installed per year across the whole of Scotland.

The Irish heat market is 4,500 ktoe – the Western region is 404 ktoe – so it represents 9% of the total heat market.

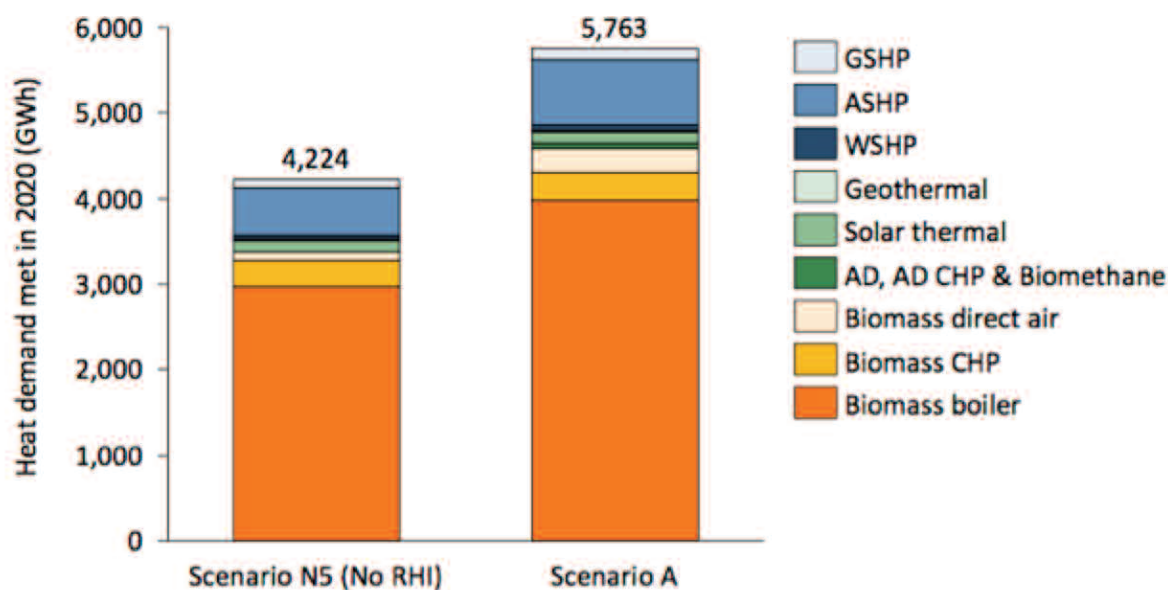
Talking this 9% and applying it to the 175MW (of biomass delivered in Scotland each year) results in an assumption that 15.75MW per year could be delivered in the WDC region. With around 2½ years to the end of 2020 this data suggests 39.38MW of new installed capacity could be achieved if the Scottish rates of growth were repeated in the region.

## An economic analysis for Renewable Heat Incentive in Ireland

In December 2017, SEAI and DCCAE commissioned Element Energy to undertake 'An economic analysis for the Renewable Heat Incentive in Ireland'. This report evaluated the likely heat demand resulting from the proposed SSRH. Under 'Scenario A5' (the recommended scenario) the role that biomass is forecast to play is shown in Figure 17.

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[11] In practice growth was in an S curve



**FIGURE 17: SSRH GROWTH FORECAST FOR RENEWABLE HEAT IN 2020**

This shows that the SSRH is forecast to deliver 3,310,000MWh of new biomass heat output (ex CHP) by 2020. The WDC share of this - at 9% - would be 297,900MWh. The current installed capacity (of non-domestic biomass heat) in the WDC region is equal to 20,242MWh and so the 'shortfall' on the basis of this calculation is 277,657MWh.

This method of thinking about the target for biomass deployment suggests that 277,657MWh is required by 2020, rather than the 90,000MWh implied by the SEAI GIS heat map data. It might be necessary to consider if a higher biomass deployment target is set, however as neither methodology is perfect and given that the lower number is closer to the real world growth experience in Scotland and appears to meet the 2020 RHT, (using the SEIA GIS heat map data as the source) this report examines the implications of the delivery of 35MW of new biomass capacity by 2020.

## 6. Availability of Biomass Supply

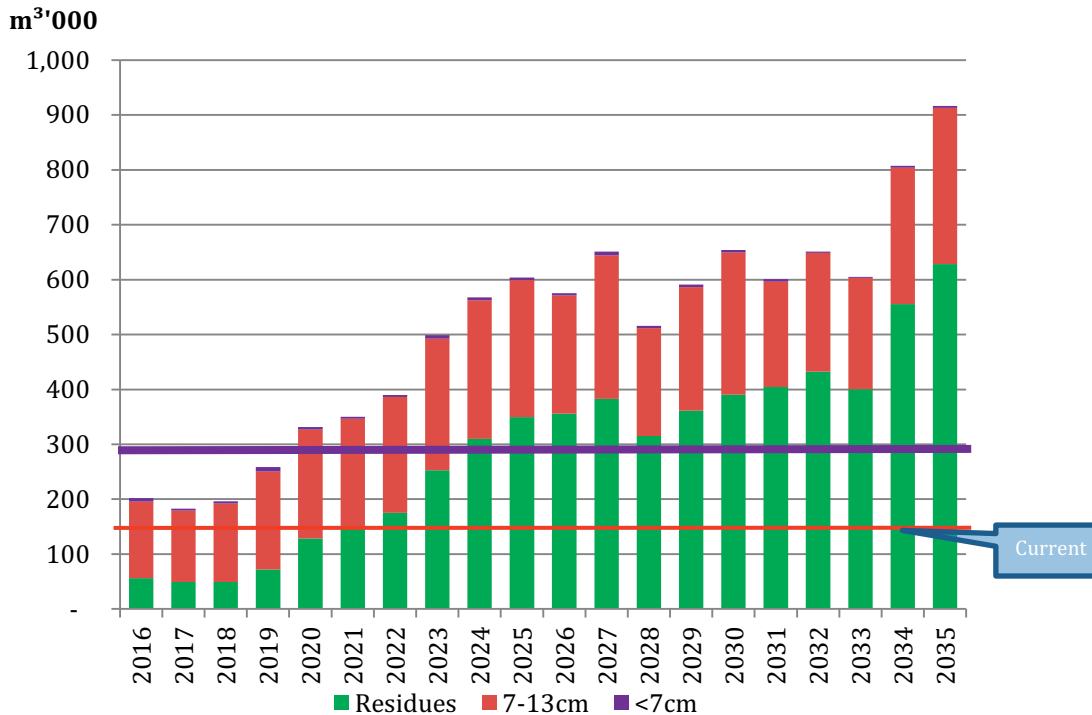
### Wood demand and fiber availability

The non-domestic biomass market requires 27,901 tonnes of wood fuel a year if an additional 7.78 ktoe of biomass is to be provided. Biomass is mostly produced from forestry and this will be the case for the non-domestic biomass sector in the Western region.

This means approximately 46,290m<sup>3</sup> per annum of wood fibre is needed by 2020 to produce 27,901 tonnes of biomass, and, that same amount will be needed each year thereafter. The wood fibre for producing biomass can be sourced from inside the region, or imported from other Irish regions, or even supplied from abroad. It would be most sustainable if the fibre came from forestry growing in the region. About half of the Western regions forests are owned and managed by Coillte and the fibre produced goes to serve board mills. It is assumed this situation will not change. This means that the 46,290m<sup>3</sup> of wood fibre would need to be sourced from private sector forests in the region.

## Biomass availability forecast

### WDC Area Resource Private '16 - '35



**FIGURE 18: Wood availability in the WDC region**

Figure 18 above forecasts annual timber output ( $m^3$ ) from privately owned forests in the Western region from 2016 to 2035. This shows that total annual output is currently  $200,000m^3$ , with current demand at  $150,000m^3$  (the red line on the graph).

This suggests there potentially would be  $50,000m^3$  available for biomass use given that it has no current market. That available resource is forecast to rise significantly from now to 2025 (to over  $300,000m^3$ ) and then rise again by 2035 to  $900,000m^3$ .

This forecast rise is associated with age structure of forestry and when the trees mature and are ready for thinning or felling. The amount of actual thinning and felling that liberates this resource depends upon the demand for timber and the attitude of the owners of this forestry to when they wish to sell. However, in general if the demand for timber rises then the amount of thinning and felling will rise. There is room for demand to rise immediately by  $50,000m^3$ . By 2020, the room for demand to rise increases to  $170,000m^3$ . By 2025, the room for demand to rise increases to  $450,000m^3$ .

This shows there will be no constraints associated with availability of biomass supply. However, it is worth noting that Bord na Móna is a well-established existing biomass user, using 320,000 tonnes of biomass at its Edenderry Power Station. Plans to increase biomass use by Bord na Móna could affect this to some extent.

## 7. Recommendations for the development of Biomass Heat

The introduction of the SSRH offers the prospect of biomass growth in the non-domestic sector and this analysis shows that a contribution of 7.78 ktoe towards the RHT is likely to be possible by 2020, via 35MW of new capacity.

### The market for biomass growth in the WDC region

The key market for biomass growth will be retrofitting biomass installations into existing large buildings that are currently heated with oil and LPG. The proposed SSRH will offer heat users spending at least €25,000/yr (on oil/LPG) the best return on investment as this represents the ideal amount of fossil fuel heat to replace with biomass under the SSRH tariff structure.

Based upon the outcome of the biomass survey, and, combined with knowledge of the heat market in the region, a list of potential projects that may meet these criteria has been developed.

The list provides an estimate of the likely number of buildings under each heading, the likely size of the required biomass installation and therefore the total potential of installed capacity of biomass. A field based assessment would be required to verify these estimates.

Potential projects	No.	Installed capacity per site	Total installed capacity
Hotels	110	0.5	55
Higher Education	15	3	45
HSE hospitals	7	1.7	12
Care Homes	60	0.75	45
Secondary Schools	30	0.75	22.5
Large civic offices	7	0.5	3.5
Leisure centers with pools	7	0.75	5.25
Prisons	3	1.5	4.5
New district heating	5	2	10
Private offices	25	0.5	12.5
Big box retail	30	1	30
Fish processing	10	1.5	15
Food processing	10	1.5	15
<b>Totals</b>	<b>309</b>		<b>275.15MW</b>

**FIGURE 19: POTENTIAL FOR BIOMASS IN THE WDC REGION**

This shows a potential market amounting to 275.15MW, compared to an objective of 35MW. The fact that there are 275MW of possible biomass projects does not mean that all these buildings will or can convert to biomass. In some sites there will a lack of space, poor access or simply owners who are not interested or in a position to consider investment.

## The need for support programmes

The SSRH offers a key incentive that makes biomass a financially attractive option. However there are a range of barriers that are associated with the relative complexity of a biomass investment. For example, compared to an oil boiler installation, a biomass installation is usually a far more technically complicated and larger construction project that requires a new fuel supply chain (and service back-up).

Some of main barriers include:

- A lack of awareness about biomass and the RHI
- Poor technical and commercial knowledge that prevents planning a project
- A lack of confidence in biomass due to seeing poorly executed projects
- A focus 'on the day job,' with limited resources to plan and deliver a biomass scheme
- Problems in finding technical help or good quality suppliers and installers
- An absence of impartial information and advice to help plan projects

In the UK, the RHI was accompanied by a range of soft support that was designed to address some of these barriers. Whilst there is no direct evidence of the relative impact of the RHI and these soft support measures, it is possible to observe that both an RHI and soft support have combined to help grow biomass deployment in the UK.

It has been suggested that the RHI creates initial interest in biomass investment, but that in many instances that it has required soft support to move from an idea to an operational scheme. Many potential end users could only progress a scheme when they secured some impartial technical or commercial help, without which they may have not progressed at all.

Another aspect of soft support in UK has been its role in addressing quality standards and the avoidance of poorly designed and inefficient schemes. End users that seek some impartial technical or commercial help are better equipped to specify and procure appropriate solutions and not just the solution that their suppliers wish to sell at the highest profit margin.

In 2014, the UK Government commissioned research into the performance and installation practices of the UK biomass sector. One of the main findings of this report was:

*'...a 10% and 20% under-performance (in UK biomass systems), which affects the economics of the schemes and increases emissions. This appears to be compounded by a widespread perception that schemes should achieve efficiencies of above 85% when in fact they can only achieve levels around 76% (on average).'*<sup>12</sup>

The finding that the RHI had driven growth in biomass systems (measured nationally) that are working between 10% and 20% less efficiently than they should, was a surprise to Government and served to highlight that the spread of good practice and soft support had not been fully successful in the UK some 4 years after the start of the RHI.

[12] Performance and Installation Practices of Biomass Boilers – by Steve Luker Associates and Reheat Ltd.



Examples of soft support include the Scottish Government funded 'Wood Fuel Support Service':



**FIGURE 20: SCOTTISH WOOD FUEL SUPPORT SERVICE**

Over the last 6 years the service has offered on-line, impartial technical and commercial help via a dedicated website. It runs an enquiry service and it manages lists of suppliers and installers. It issues a regular newsletter about the biomass industry and holds industry meetings.

Another English example of a support programme was the NEWheat programme delivered in the North East of England:



**FIGURE 21: NEWHEAT SUPPORT PROGRAMME**

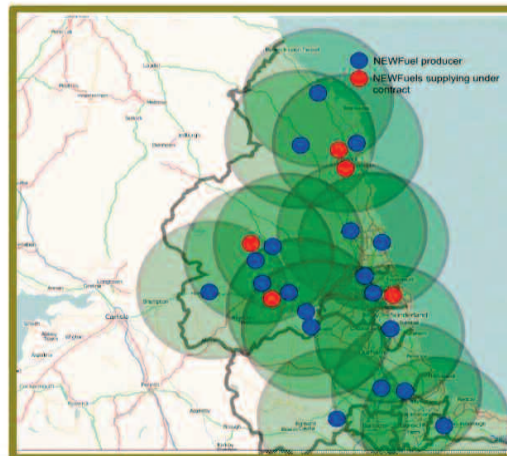
NEWheat provided free technical help to potential biomass end users. It offered a free short report that provided costed solutions and the business case. For some biomass users it then offered greater support in the planning and procurement stages of a project. Several hundred biomass users were provided this support.

A further example was NEWFuels, which created a wood fuel producer group so that 22 fuel suppliers could cooperate and share equipment and commercial opportunities for the wider benefit of market development and their customers.

## NEWFuels

- Members co-op company limited by guarantee
- Formed with assistance from DEFRA BEIS
- 22 members across NE, serving the whole region
- Essential component to starting biomass network
- Gives confidence about installing boilers
- Very hard to make money out of a producer group!!

**NEWFuels**  
supplying natural energy



**FIGURE 22: NEWFUELS SUPPORT SERVICE**

## Proposed 2018 - 2020 Action Programme

In building upon the experiences of RHI driven growth in the UK, this report indicates how the growth of biomass in the WDC region could be supported by a range of actions. These actions can help achieve the deployment targets of the RHT and also ensure the market develops to appropriate performance and efficiency standards.

### **Action 1: Raise awareness of biomass & the Support Scheme for Renewable Heat (SSRH)**

Draft a short report about how the SSRH works and what type of end users may most benefit in the WDC region.

- A graphically interesting 3 to 4 page PDF.
- It should include a financial model and details of the scheme and its operation.
- Circulate the report via email mailshot to a suitable regional database.

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### **Action 2: Complete an Action Plan**

Draft an Action Plan that covers the objectives, benefits and actions of the WDC biomass agenda and could incorporate a vision of what a functioning biomass sector in the WDC region may look like in 'x' number of years and steps towards achieving this vision, including:

- Identify how each of the actions selected can contribute to the vision and where efforts should be focused.
- Identify the key priorities to focus WDC efforts towards achieving the desired vision and steer future efforts and actions.

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### **Action 3: Hold regional biomass workshops**

Hold at least 3 regional SSRH and biomass workshops:

- Present the Action Plan and SSRH workings report
- Highlight the opportunities and technical challenges

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### **Action 4: Support selected early win projects to kick start the market**

Using the workshops and other networks and contacts a group of circa 10 potential projects should be identified. These projects are 'low hanging fruit'. Once identified the project sponsor could be offered technical, commercial and contractual support to enable a scheme to develop and made ready for SSRHI applications. Criteria for such 'free' support can be drafted and 'bids' obtained and then resources and technical support allocated under the direction of WDC. The scope of support can be tailored to each project sponsor but may include:

- Development of the business case/financial model.
- Design of a bespoke technical solution.
- Development of suitable tender documents to help procure a biomass installation and secure a firm quote from suppliers/installers.
- Assistance with an RHI application.

**Action 5: Fix underperforming, broken or off-line schemes**

Using database of 43 projects we know have been installed, make direct contact with each site and offer a technical support visit. This would allow an evaluation of the scheme and to determine if it could be improved, fixed or be the subject of an upgrade so it can secure SSRH payments. We assume 15 of the 43 sites take up the offer and places could be limited to this.

**Action 6: Organise study tours**

Offer a selected group of interested end users, biomass installers and fuel suppliers the opportunity to attend a 3-day study tour of a typical UK market area like Western Scotland.

**Action 7: Offer technical training to installers, specifiers and fuel suppliers.**

Offer a selected group of interested biomass installers, specifiers and fuel suppliers the opportunity to secure technical training. All groups will be interested in the design and operation of the SSRH and how biomass schemes should be designed to comply with the rules. In addition for each group there can be bespoke training on:

- Biomass installers: 1 day workshop on boiler sizing, silo design etc.
- Specifiers (who will be M&E consultants, engineers, architects etc.): 1 day workshop on overall planning and design and procurement issues
- Fuel suppliers: 1 day workshop on BSL, fuel quality and chip production

The technical content of the training can be made available as standalone publications as well.

**Action 8: Publish standard procurement contracts**

Draft standard contract terms and conditions for end users so they can procure installations, fuel or heat, covering:

- Design and installation of biomass systems
- Wood fuel supply
- Service contracts
- Heat supply contracts

**Action 9: Publish case studies**

Publish circa 5 case studies.



## Conclusion

This Regional Renewable Energy Analysis is shining a spotlight on the opportunities that are available for Biomass in the Western region. This report benchmarks the current state of play and validates the opportunities that are available. It is timely to consider how we leverage the existing experience, expertise, while growing a network to prepare for growth in the Biomass market place. In progressing through this journey, we undertook to learn, not only from the UK experience, but from expertise available across our own national landscape. The approach used in this study has enabled us to view the market opportunity from multiple perspectives.

The Western Development Commission believes that we have an opportunity create considerable levels of employment across the Western Region, while progressing towards our national and European National Heat Targets. It behoves us to progress the discussion and focus on how we can drive key market opportunities for biomass growth forward. The combination of a rising market, with an abundant available resource within the region, supported by the Support Scheme for Renewable Heat policy instrument, and an ambition as set out in this report, points to an alignment that needs to be pursued in a strategic way. In the interim the 2018 – 2020 Action Programme will address the opportunity to support the growth of Biomass.

Where we are to achieve our ambition to unlock 7.78 ktOE of new biomass deployment by 2020 this will require the support of a partnership approach to pursue this opportunity. While the opportunity and the challenge are significant, we are now preparing to meet that ambition. ‘Ní neart go cur le chéile’.

**Authored by Steve Luker**

**Edited by Clodagh Barry & Stephen Mc Cormack (WDC)**

## Acknowledgements

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We are grateful for the generosity & openness of contributions from regional stakeholders, biomass producers and organisations with biomass installations in the region.



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## Notes

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