

UK Dedicated Biomass Statistics - 2017



July 2018

INTRODUCTION

This is Tolvik’s first annual report on the UK “dedicated” biomass sector and builds upon our popular annual report on the Energy from Waste (“EfW”) sector. The aim of this report is to bring together data on the UK biomass sector from a range of different sources into a single document.

A key factor influencing the biomass sector is the availability of biomass as a fuel. The main focus of this report is upon solid-fuelled, dedicated biomass facilities (including those which are Combined Heat and Power (“CHP”)) of at least 2.5MW capacity. It also considers biomass sourced from the UK and Ireland and consumed by biomass conversions at coal fired power stations and co-incineration at cement kilns. The report specifically excludes imported fuel consumed by Drax – the tonnages of which are of a similar scale to the total market demand for UK biomass for combustion. The report excludes anaerobic digestion and EfW facilities designed to accept municipal waste.

Given recent market developments, there is a particular focus on facilities designed for the processing of Waste Wood.

Our analysis focusses on a mix of 2016-17 data (the reporting period for subsidies and biomass sustainability) and the 2017 calendar year - the period over which facilities are generally required to submit Annual Performance Reports (“APR”) to the regulator (the Environment Agency or their devolved equivalents).

We would very much welcome feedback (particularly suggestions for improvement) on this first report.

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Front Cover Image: Lisahally, Northern Ireland Courtesy: Evermore Energy

1. BIOMASS MARKETS

This report considers the markets for the combustion of the biomass fuels originating in the UK as set out in Figure 1.

Energy Crops	<i>Purpose grown crop for energy production – e.g. Miscanthus and Willow</i>
Virgin Wood	<i>Eg. Small Roundwood, brash, residues, sawdust by-product from timber production</i>
Grade A Recycled Wood	<i>Clean wood – eg from packaging, pallets and manufacturing</i>
Grades B-C Recycled Wood	<i>Non hazardous wood from construction and demolition through to municipal sources</i>
Straw	<i>Either purpose grown or by-product</i>
Poultry Litter	<i>Mix of poultry excreta, feathers and bedding material</i>
Meat and Bone Meal	<i>By product of animal rendering industry</i>
Sewage Sludge	<i>From waste water treatment operations</i>
Process Residues	<i>Any other biomass source – kernels, chaff etc</i>

Figure 1: Biomass Fuels

Biomass as a Fuel

According to the Ofgem 2016-17 Biomass Sustainability report⁽¹⁾ adjusted to reflect specific data omissions, and other data sources, in 2016-17 the total consumption of biomass by dedicated biomass facilities and cement kilns in the UK (**excluding** imports) was **5.81** Million tonnes (“Mt”). All tonnages in this report relate to “wet” tonnes or “green” tonnes.

Facility Type	2016-17 Mt	2015-16 Mt	Change
Dedicated Biomass Facilities >2.5MW Capacity	5.49	5.16	+6.7%
Other Reported Dedicated Biomass <2.5MW	0.05	0.01	+251%
Biomass Co-Incineration – excluding Drax	0.18	0.19	-4.9%
Ofgem Reported Sub-Total	5.73	5.36	+6.9%
Biomass Co-Incineration – Cement Kilns	0.08		
Total	5.81		

Figure 2: Biomass Consumption 2016-17 Source: Ofgem, Tolvik analysis

In 2016-17 there were 39 operational Biomass facilities each with a reported installed capacity in excess of 2.5 Mega Watts (“MW”). Overall these processed 6.9% more UK biomass than in the previous year.

Biomass Source (Mt)	2016-17	2015-16
Energy Crops	0.08	0.05
Virgin Wood	2.28	2.37
Recycled Wood	1.63	1.38
Straw	0.71	0.56
Poultry Litter	0.66	0.67
MBM	0.18	0.18
Sewage Sludge	0.10	0.10
Residues	0.09	0.08
Total	5.73	5.36

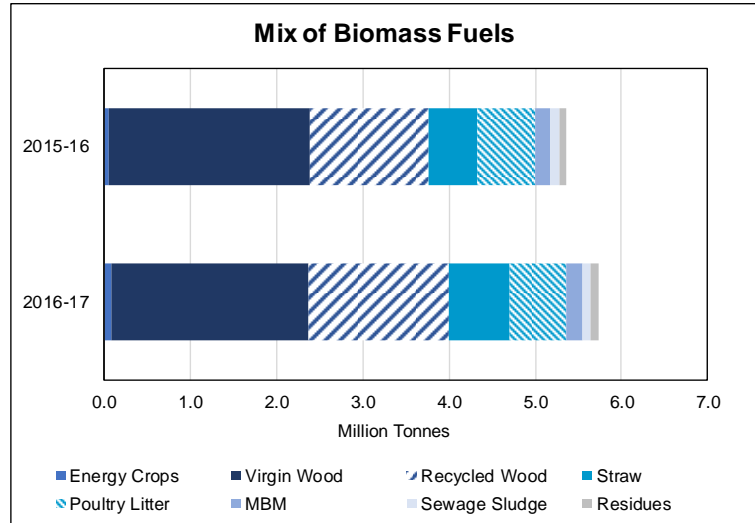


Figure 3: Biomass Consumption 2016-17 Source: Ofgem, Tolvik analysis

As figure 3 illustrates, whilst in 2016-17 the tonnage of Virgin Wood biomass remained relatively static, the volumes of Recycled Wood and Straw processed at biomass facilities each grew by at least 20% on the previous year.

Biomass Power Generation

The power generation performance of biomass facilities (measured per tonne of biomass input) varies greatly, dependent on the fuel type, moisture content, the scale of the facility and the extent to which the facility is configured to maximise heat or power offtake. Using Ofgem data for 2016-17, and where necessary, other data (e.g. from APRs submitted to regulators), we have sought to estimate the total subsidy eligible power generated by UK dedicated biomass facilities in 2016-17.

Biomass Source	Tonnage Mt	Weighted Average MWh/t of fuel input	Power Generated GWh
Energy Crops	0.08	1.10	92
Virgin Wood	2.28	0.62	1,424
Recycled Wood	1.63	0.78	1,273
Straw	0.71	1.20	850
Poultry Litter	0.66	0.57	375
MBM	0.18	0.79	145
Sewage Sludge	0.10	0.23	23
Residues	0.09	0.50	45
Total	5.73	0.74	4,226

Figure 4: Estimated Domestic Power Generation from Biomass 2016-17 Source: Ofgem, Tolvik analysis

As Figure 4 shows, it is estimated that, excluding imported fuel by Drax (which at 6.8Mt in 2017 contributed to significantly greater than half of all UK biomass power generation), the combustion of biomass in the UK generated around 4,226GWh of power in 2016-17 or around 1.3% of the total UK power generation.

Subsidy Support

Figure 5 shows the level of subsidy support under the Renewables Obligation (“RO”) scheme for the 825.6MW of dedicated biomass operational in 2016-17.

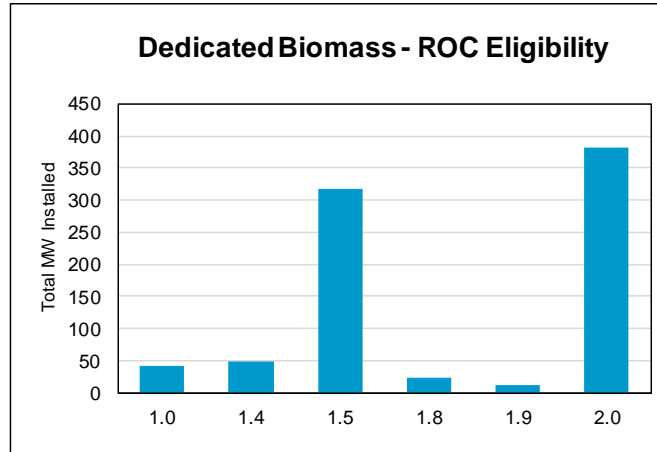


Figure 5: ROC Eligibility 2016-17 Operational Biomass Facilities Source: Ofgem, Tolvik analysis

In 2016-17 most operational biomass facilities were eligible for 1.5 or 2.0 ROCs per MWh generated. Facilities commissioning after April 2017 under the RO “Grace Period” arrangements – as identified in Figure 17 – will be eligible for the lower levels of support relating to the 2016-17 period.

Facility Type	2013-14	2014-15	2015-16	2016-17
Dedicated Biomass	1.5	1.5	1.5	1.4
Dedicated Biomass with CHP	2.0	2.0	1.9	1.8
Advanced Conversion Technology	2.0	2.0	1.9	1.8

Figure 6: ROCs Banding for Dedicated Biomass Source: Renewable Energy Foundation

Load Factor/Availability

Across the 15 dedicated biomass facilities for which we have data and which were operational for the full 12 month period, the average availability (in terms of operating hours) for 2016/17 was **77.1%**. This is broadly in line with the average load factor for 2016 for dedicated plant biomass facilities as calculated in the Digest of UK Energy Statistics (“DUKES”)⁽²⁾ of **78.9%**.

2. VIRGIN WOOD (INCLUDING ENERGY CROPS)

Virgin Wood Supply

In 2016, according to Forestry Commission data⁽³⁾ 10.7Mt of softwood was harvested in Great Britain. Softwood production levels have been generally flat since 2013.

The Forestry Commission also estimated that of this, around 1.6Mt (15%) of the total was directly used by the UK biomass sector – generally in the form of small roundwood.

Including modest imports, in 2016 UK sawmills consumed around 6.7Mt of softwood. Assuming around 45% softwood inputs into sawmills were converted into sawn wood production, around 55% (circa 3.7Mt) was therefore converted into “other products”.

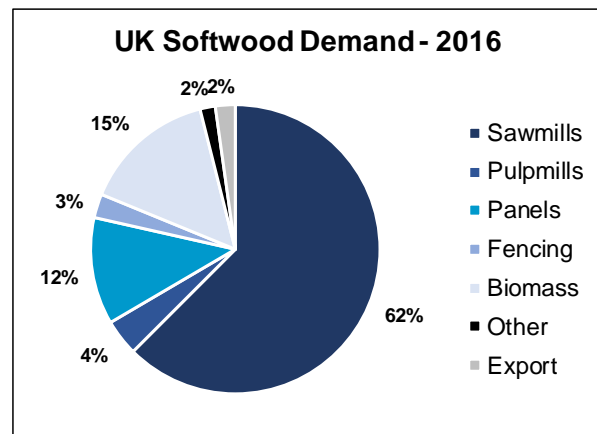


Figure 7: UK Softwood Demand 2016 Source: Forestry Commission

Of these “other products”, the Forestry Commission estimated that circa 0.8Mt of softwood was sent to the bioenergy sector – either directly or via pellet manufacturers. When this is combined with reject streams from other softwood markets – at say 15% of inputs (the equivalent to 0.4Mt), the data suggests an estimated 2.8Mt of softwood was supplied to the UK biomass sector in 2016. In 2016 the Forestry Commission also estimated a further 0.4Mt of hardwood (out of a total 0.6Mt harvested) was used as a biomass fuel. Combining these various sources, it is estimated that the total tonnage of UK Virgin Wood sent for energy recovery in 2016 was **3.2Mt**.

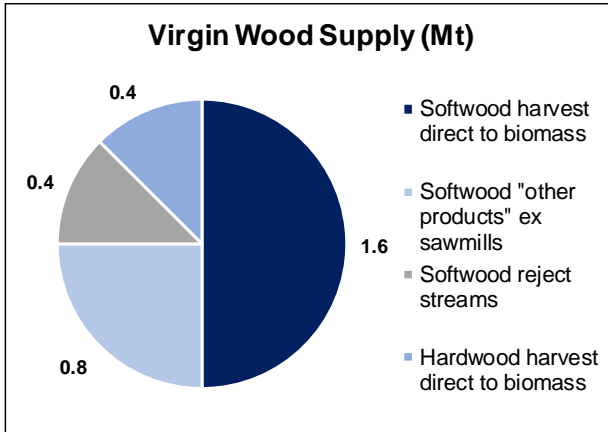


Figure 8: Virgin Wood Supply 2016
Source: Forestry Commission

Whilst estimates vary, in 2016 around 80% of the UK’s potential available supply of softwood was harvested – suggesting that a further 2.0Mt of softwood could be harvested annually in the UK.

The actual volume of softwood which is harvested, particularly from the private sector (which in 2016 account for just over 50% of the harvest) is dependent on a number of complex factors – not least the need for economic conditions to be sufficiently favourable to support profitable harvesting.

Virgin Wood Demand

As set out in Figure 3, in 2016-17 the total demand for Virgin Wood from the RO supported biomass facilities identified in Appendix 1 was **2.3Mt**.

In addition to RO-supported facilities, as at December 2016, according to Ofgem data, there was an estimated 2,900MW of installed biomass capacity supported by the Renewable Heat Incentive (“RHI”). Using Ofgem’s assumption of an average 18.5% load factor it is estimated that the RHI driven demand for Virgin Wood was around **1.0Mt**.

Demand (Mt)	2016/17	Projected
RO-supported	2.28	2.77
RHI-supported	1.00	1.22
Total	3.28	3.99

Figure 9: Virgin Wood - Biomass Demand
Source: Tolvik analysis

The total demand for Virgin Wood biomass as a fuel in 2016 is therefore estimated to have been **3.3Mt**. Given the underlying assumptions, this is consistent with the fuel supply estimate of **3.2Mt**.

Based on the RO-supported Virgin Wood fuelled facilities under construction identified in Figure 17, demand for Virgin Wood biomass as a fuel by 2019 is projected to increase by 0.5Mt whilst the continued growth in RHI is expected to increase demand for Virgin Wood by a further 0.2Mt. Overall this would require an increase in Virgin Wood supply of **0.7Mt**.

It is noted that such an increase is less than the year-to-year fluctuations in softwood harvesting seen over the last 3-4 years, but, as ever, any long-term increase in demand in Virgin Wood as a fuel will only be able to be met by the UK supply market if there is sufficient economic incentive on the private sector to harvest adequate volumes of softwood.

Energy Crops

In 2016/17 circa 80ktpa of Energy Crops (Miscanthus, Short Rotation Coppice such as Willow) were sent as fuel to biomass facilities. This was up from the 2015/16 figure – the first annual increase seen since 2012/13 when the Renewables Obligation Amendment Order introduced a number of changes that reduced the incentive for biomass facilities to use energy crops. In 2016/17 Energy Crops represented less than 2% of the overall biomass fuel market.

3. RECYCLED WOOD

This report considers Grades A-C of Recycled Wood as defined in the Wood Recyclers’ Association (“WRA”) Grading Structure⁽⁴⁾. Recycled Wood is generally regarded as a “waste” under UK waste management regulations and its combustion as biomass is subject to the requirements of Chapter 4 of the Industrial Emissions Directive (“IED”); the exception is Recycled Wood which does not contain “*halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating*” (i.e. Grade A Recycled Wood) which may be co-incinerated alongside non-waste biomass – e.g. Virgin Wood.

Recycled Wood Supply

A comprehensive review of the UK Recycled Wood market was released by Anthesis in early 2017⁽⁵⁾ and they estimated that in 2014/15, across all grades, the total tonnage of Wood Waste (i.e. the waste arising before processing into Recycled Wood) was around **5.7Mtpa**. This is above Tolvik’s own most recent estimate (and that of the WRA) of circa **5.0Mt**, but the Tolvik estimate may exclude some sources of Grade A material.

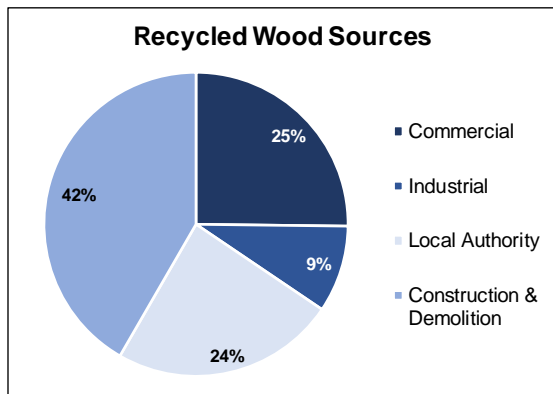


Figure 10: Sources of Waste Wood
Source: Tolvik analysis

It is generally acknowledged that the tonnage of Recycled Wood is most heavily influenced by the level of activity in the construction sector – and both Tolvik and Anthesis estimate the tonnage of Waste Wood from the construction sector contributed around 40% of the total Waste Wood arisings. Other major sources are commercial packaging waste and the tonnages of Waste Wood delivered by the public to local authority Civic Amenity sites.

It is to be noted that until recently there has been an oversupply of Recycled Wood and economics have not always been favourable. This has led to some Recycled Wood being used in “informal” markets where tonnages are not recorded under waste management regulations, making estimating actual gross tonnages available for supply challenging.

Recycled Wood Demand

The WRA have estimated⁽⁶⁾ that in 2016, **1.6Mt** of Recycled Wood was sent to UK biomass, **1.4Mt** was recycled (for panelboard, animal bedding and agricultural/mulch markets) and 0.6Mt was exported – a total of 3.6Mt of Recycled Wood. The WRA figures infer that the remaining 1.4Mt either remained within the Residual Waste stream or was used in “informal” markets, suggesting that in 2016 circa 72% of Waste Wood arisings were “recovered”.

Demand (Mt)	2016/17	Data Source
RO-supported	1.63	Figure 3
RHI-supported	0.06	Est. 6% of RHI
Panelboard	0.83	WPIF
Animal Bedding	0.28	WRA adjusted
Other Recycling	0.35	WRA adjusted
Export	0.50	Tolvik estimate
Total	3.65	

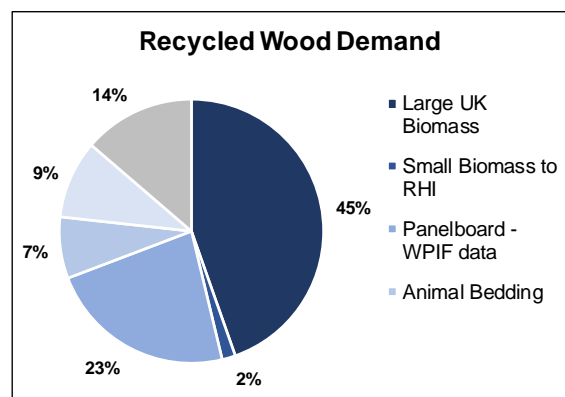


Figure 11: Demand for Recycled Wood – 2016/17

WRA have also released figures for 2017 which suggest a modest rise in the recovery rate for Recycled Wood and an increased demand from UK sources – with only 0.3Mt of Recycled Wood being exported. Tolvik’s own estimates are shown in Figure 11 – which are broadly in line with those of WRA.

Figure 12 shows the projected balance between supply and demand for Recycled Wood through to 2022. Tolvik’s projections assume (a) growth in Waste Wood arisings as modelled in the Anthesis report (b) all the biomass capacity for Recycled Wood identified in Figure 17 is developed and operates to its projected capacity (i.e. a total demand of 3.2Mtpa) and (c) in response to improving market conditions the “recovery rate” for Recycled Wood rises from 72% to 80%.

Figure 12 also assumes that, in response to rising domestic biomass demand, exports cease and that demand from those markets which value Recycled Wood less than biomass (e.g. mulches) will reduce as more economic substitutes are found.

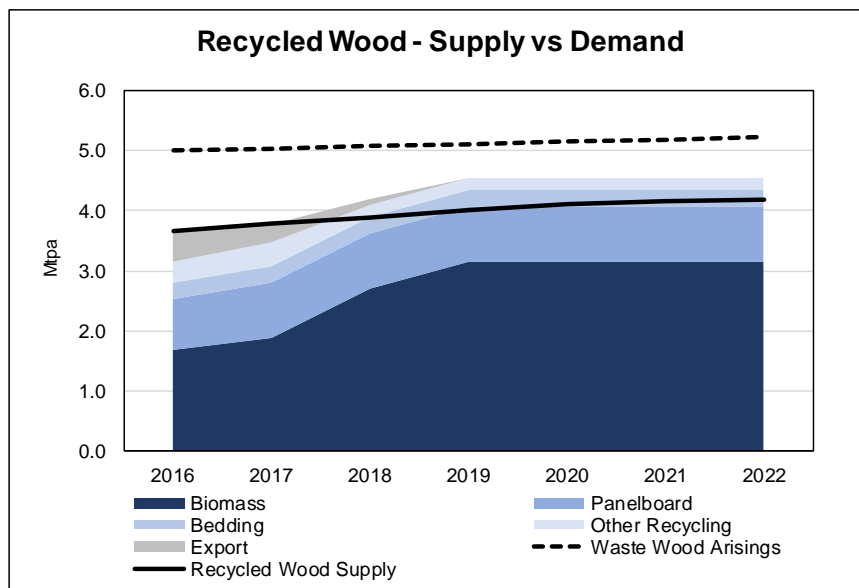


Figure 12: Projected Recycled Wood Supply vs Demand Source: Tolvik analysis

Tolvik’s analysis suggests that unless tonnages of Recycled Wood are imported, it is likely that at a national level there will be a shortfall in Recycled Wood – which, given the uneven geographical distribution of Recycled Wood fuelled biomass facilities, will be exacerbated at a regional level. This is consistent with WRA’s own projections as reported in June 2018.

4. STRAW

In the context of this report, Straw refers to both crops purpose grown as a biomass fuel and the by-product from cereal production. It is a regional market, with a clear focus of supply in the east of England.

Straw Supply

Estimates of Straw production vary. According to DEFRA data⁽⁷⁾, cereal straw availability in the UK is generally around 9-10Mtpa, although past estimates from the Agriculture and Horticulture Development Board estimated that the figure, including small tonnage of straw from non-cereal sources, was nearer 12 Mtpa. In estimating the size of the market, the challenge is that if alternative markets are uneconomic, stubble is ploughed back into soil – and it is generally agreed that this can be as much as 30% of total potential production. Tolvik’s estimate is that the overall “available” Straw market is therefore around 9 Mtpa.

Straw Demand

The animal bedding/animal feed markets remain the dominant sources of demand for Straw – and, according to recent surveys, account for around 80% (7.5Mtpa) of total supply.

With other Straw markets (carrot protection, mushroom growing and export) estimated by various third parties to account for around 0.5Mtpa, this suggests around 1.0Mtpa available to the biomass sector.

As Figure 13 shows, the biomass demand has grown over recent years, with three relatively newly constructed facilities (Brigg, Sleaford and Snetterton) and by 2018 it is expected that all three will be operating at full capacity.

Based on the available data, subject to typical weather conditions, it is reasonable to assume that nationally there will be a sufficient supply of Straw for the market to be able to accommodate the increase in demand for Straw as a biomass fuel.

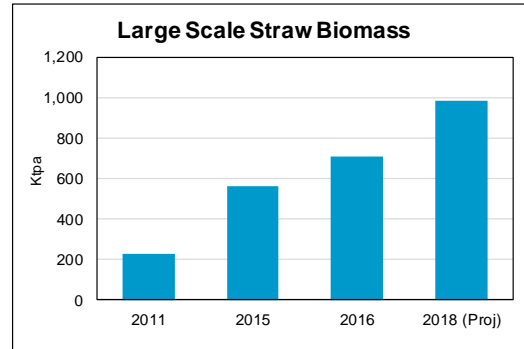


Figure 13: Biomass demand for straw
Source: Tolvik analysis

5. POULTRY LITTER

Poultry Litter is a by-product of the UK poultry industry and comprises excreta, spoiled feed, feathers and bedding material. Unlike “pure” poultry manure, it is readily combustible.

The poultry industry is regionally distributed, with particular concentrations in Northern Ireland, the East of England, Welsh borders and, to a lesser extent, the east central belt of Scotland.

Poultry Litter Supply

It is estimated, based on a range of data sources, that around 2.0Mt of Poultry Litter is produced in the UK each year. The total tonnage of Poultry Litter generated is fundamentally a function of demand for poultry (which has been rising at least as fast as the UK population) but it is noted that changes in waste management methods and regulation can also have an impact on the availability of Poultry Litter in the market.

Poultry Litter Demand

In the UK Poultry Litter is generally sent to anaerobic digestion, biomass and fertiliser markets. The anaerobic digestion market is relatively nascent, with only a limited number of plants dedicated to the (technically complex) digestion of Poultry Litter. However, a number of anaerobic digestion facilities in the UK accept modest tonnages of Poultry Litter alongside a range of other (typically agricultural) feedstocks. Overall it is estimated that in 2016-17 no more than 0.15Mt of Poultry Litter was processed in anaerobic digestion facilities.

In 2016-17, 0.65Mt of Poultry Litter was sent to the three large-scale biomass facilities – Thetford, Eye and Westfield and it is understood that the remaining tonnage (c. 1.2Mt) was used in agriculture as a fertiliser. Tolvik is not aware of any further planned UK biomass capacity for the processing of Poultry Litter.

6. MEAT AND BONE MEAL (“MBM”)

MBM is a by-product of the rendering industry, and under the Animal By-Product Regulations Category 1 MBM can only be disposed of by incineration. Category 2 can be disposed of by pressure rendering and then used at an approved composting/anaerobic digestion facility whilst Category 3 can be used in the production of pet food and organic fertilisers and soil improvers.

At present the economics are such that very little Category 2 material is processed separately from Category 1 material. The focus of the analysis is therefore on Category 1 MBM.

MBM Supply

According to Foodchain and Biomass Renewables Association (“FABRA”) the main industry body, in 2012 Category 1 MBM arisings in the UK were estimated to have been 236ktpa. Recently UK tonnages have been boosted by supply of MBM from the Republic of Ireland – in 2016/17 the total tonnage imported figure was around 20ktpa. Overall, the limited data available suggests a relatively small market generating around **0.2-0.3Mt** each year of MBM for combustion as biomass.

MBM Demand

In 2016/17 around 0.18Mt of MBM was combusted at three dedicated biomass facilities (Glanford, Eye and Widnes) with a further 0.03Mt processed as an alternative fuel at cement kilns. The JG Pears facility (designed primarily to combust MBM, see Figure 17), will provide additional treatment capacity in the market, but overall the market is expected to remain in balance.

7. SEWAGE SLUDGE

In 2010, according to Ofwat⁽⁸⁾, 0.26Mt of sewage sludge was incinerated in the UK (18% of the total) but since then the number of facilities incinerating sewage sludge in the UK has been in decline.

In 2016 just three facilities (two in London and one near Merseyside) incinerated a total of 0.10Mt of sewage sludge. A small tonnage of sewage sludge was also pelletised and used in a cement kiln as an alternative fuel.

The trend in the sector is increasingly to use advanced anaerobic digestion processes to extract energy from the biogas generated, with the product ultimately being applied to land for agricultural benefit.

8. FUTURE DEVELOPMENTS IN THE BIOMASS SECTOR

Demand for biomass as a fuel for combustion in the UK has primarily been driven by subsidy support, for larger scale facilities this was by way of the RO scheme and for smaller scale facilities via the RHI.

Over the last few years the sector has gone through a significant transition, with application of a 400MW cap on subsidy eligibility for non-CHP biomass projects, the cessation of the RO scheme to support the development of new larger scale biomass and the introduction of the Contract for Difference (“CfD”) mechanism.

For dedicated biomass projects falling within the 400MW cap, the “grace period” for RO accreditation expires on 30 September 2018 and facilities still in construction need to have been commissioned by this date if they are to secure RO support.

Facility	Main Feedstock(s)	MW	Status as at 30 June 2018
Snetterton	Straw	45.0	Operational
Margam	Recycled	40.0	In construction
Tilbury	Recycled	44.0	In construction
Holbrook	Recycled	5.9	Operational
Sherwood	Recycled	5.7	Operational
Brigg	Straw	43.0	Operational
Templeborough	Recycled	45.0	In Construction
<i>Wrexham</i>	<i>Recycled</i>	<i>4.3</i>	<i>Construction abandoned</i>
<i>Eastleigh</i>	<i>Recycled</i>	<i>12.0</i>	<i>Construction not started</i>
Tansterne	Recycled	21.0	Operational
<i>Derwentaugh</i>	<i>Recycled</i>	<i>13.0</i>	<i>Construction not started</i>
Total		278.9	

Figure 14: Facilities within the 400MW Biomass Cap Source: BEIS

Of the 15 dedicated biomass facilities identified in Figure 17 as being in construction as at April 2017, according to the latest Ofgem data⁽⁹⁾ (accessed on 28 June 2018), only 4 had been fully accredited. Whilst additional facilities will no doubt be accredited prior to 30 September 2018, a failure to secure RO accreditation is likely to seriously prejudice a facility’s ability to commercially operate in line with a business case that assumed RO accreditation. This is likely to lead to either mothballing or an exploration of the facility’s ability to switch to a fee-paying fuel such as Refuse Derived Fuel (“RDF”).

With respect to the CfD process, no dedicated biomass facilities secured CfD support in round 1 (February 2015) whilst in round 2 (September 2017) two facilities secured support, the 85MW Grangemouth project and a very small (0.64MW) facility. All of the 11 Advanced Conversion Technology projects awarded a CfD under rounds 1 and 2 are understood to be proposing to use RDF as a feedstock rather than biomass.

In Tolvik’s opinion, without new sources of subsidy support, significant further growth in UK biomass capacity therefore seems very unlikely.

APPENDIX 1: BIOMASS FACILITIES INCLUDED IN THE REPORT

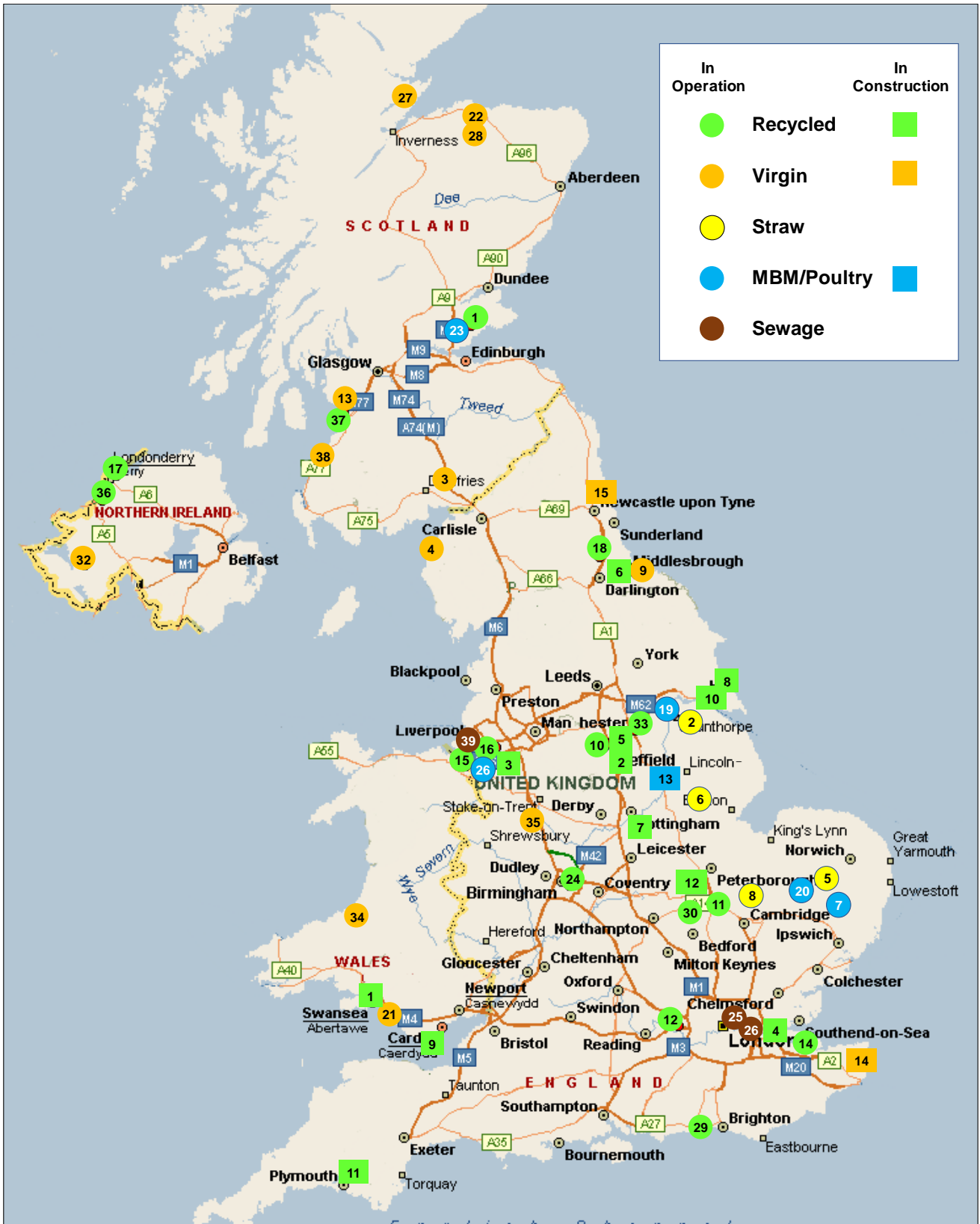


Figure 15: Location of Biomass Facilities. For further details see Figure 16 and Figure 17

Operational Biomass Facilities in 2016-17

	Ofgem Generation Station	Known As	Main Feedstock(s)	Operator	Installed Capacity MW	2016/17 Input (Ktpa)	2015/16 Input (Ktpa)
1	Markinch CHP	Markinch	Recycled/Virgin	RWE	61.6	373	325
2	Brigg REP	Brigg	Straw	BWSC	54.6	230	72
3	Stevens Croft - A,B,C,D,E (01/06/07)	Stevens Croft	Virgin/Recycled	EOn	50.7	393	407
4	Iggesund Paperboard Biomass CHP	Iggesund	Virgin	Iggesund	50.0	637	584
5	Snetterton Renewable Energy Plant	Snetterton	Straw	BWSC	49.5	27	0
6	Sleaford REP	Sleaford	Straw	BWSC	45.0	248	222
7	Thetford Power Station (RA)-A B	Thetford	Poultry Litter	MRE	44.2	482	475
8	Elean Business Park	Ely	Straw	MRE	43.3	221	232
9	Wilton 10 Biomass Gen Station (RA) - A	Wilton 10	Virgin/Recycled	Sembcorp Utilities	35.2	243	293
10	Blackburn Meadows Renewable Energy Plant	Blackburn Meadows	Recycled	EOn	34.0	189	227
11	Goosey Lodge Power Plant - A, C, D	Goosey Lodge	Recycled/MBM	Ancillary Comp	33.0	92	89
12	FibrePower (Slough)	Slough	Recycled	SSE	28.0	116	102
13	Caledonian CHP 1	Caledonian	Virgin	UPM	26.0	313	320
14	Ridham Dock biomass CHP facility	Ridham Dock	Recycled	MVV	25.0	140	106
15	UPM Shotton boiler 7	Shotton	Recycled	UPM	24.8	342	445
16	Mersey Bioenergy Widnes Biomass CHP	Mersey	Recycled	BWSC	22.8	7	0
17	Lisahally Power Station	Lisahally	Recycled	BWSC	18.8	116	53
18	Bio Power One	Chilton	Recycled	Veolia	17.5	98	77
19	Glanford Power Station (Fibrogen) - A,B	Glanford	MBM	MRE	16.7	92	94
20	Eye Power Station (Fibropower) - A,B,C	Eye	Poultry Litter	MRE	16.5	143	158
21	Western Wood Energy Plant A	Western Wood	Virgin	Western Wood	16.4	143	147
22	Speyside	Speyside	Virgin	BWSC	15.0	90	0
23	Westfield Biomass Plant - A,C	Westfield	Poultry Litter	MRE	12.5	116	118
24	Birmingham Biopower	Birmingham Bio	Recycled	Cogen	11.8	45	0
25	Beckton STW Sludge Powered Generator	Beckton	Sewage	Thames Water	11.4	48	52
26	PDM Group Widnes - A,B,C	Widnes	MBM	Secanim	11.3	46	46
27	Balcas Biomass CHP Power Station	Balcas Scotland	Virgin	Balcas	9.6	69	78
28	CoRDe	CoRDe	Virgin	CoRDe	8.6	77	79
29	Enviropower Ltd	Enviropower	Recycled	Enviropower	5.1	64	65
30	Twinwoods Heat and Power	Twinwoods	Recycled	Twinwoods	3.6	10	13
31	Crossness STW Sludge Powered Generator	Crossness	Sewage	Thames Water	3.5	23	25
32	Balcas Timber - C,D	Balcas Timber	Virgin	Balcas	3.0	99	103
33	Trackwork Ltd	Trackwork	Recycled	Trackwork	3.0	10	7
34	Volac Renewable Energy Plant	Volac	Virgin	Volax	3.0	29	1
35	Eccleshall Biomass - A(01/08/07)	Eccleshall	Recycled	Eccleshall	2.8	38	40
36	Tyrone Energy 1	Tyrone Energy	Recycled	Tyrone Energy	2.7	26	27
37	Adam Wilson & Sons 1	Troon	Recycled	Adam Wilson	2.6	1	0
38	Land Energy (Girvan Site)	Girvan	Virgin	Land Energy	2.5	40	47
39		Mersey Valley	Sewage	United Utilities		26	26
				Other		232	206
				Totals	825.6	5,733	5,155

Figure 16: Operational Biomass Facilities in 2016-17 Source: Various

Biomass Facilities In Construction

	Name	Known As	Main Feedstock(s)	Operator	Installed Capacity MW	Installed Capacity Ktpa
1	Margam Green Energy Plant	Margam	Recycled	BWV	40.0	250
2	Holbrook Community Renewable Energy Centre	Holbrook	Recycled	Veolia	6.5	50
3	Ince Biomass Plant	Ince	Recycled	Stantec	21.5	140
4	Tilbury Green Power	Tilbury	Recycled	BWSC	40.0	270
5	Templeborough	Templeborough	Recycled	BWV	41.0	260
6	Teesside Renewable Energy Plant	Port Clarence	Recycled	BWV	40.0	250
7	Sherwood	Sherwood	Recycled	Veolia	5.8	60
8	Hull Dock - Biomass No.1	Hull Docks	Recycled		10.0	85
9	Barry Dock - Biomass No.2	Barry	Recycled		10.0	85
10	Biomass 21 Tansterne	Tansterne	Recycled		22.0	150
11	Dartmoor Biopower	Dartmoor	Recycled	Cogen	3.5	40
12	Welland Biopower	Welland	Recycled	Cogen	10.3	60
13	JG Pears CHP	Newark	MBM	JG Pears	12.0	85
14	Sandwich Biomass	Sandwich	Virgin	BWSC	27.0	244
15	Cramlington Biomass CHP	Cramlington	Virgin	BWSC	27.0	244
Totals					316.6	2,273

Figure 17: Biomass Facilities In Construction as at April 2017 Source: Tolvik analysis
Those accredited by Ofgem under the RO scheme, as at June 2018, are highlighted

APPENDIX 2: DATA SOURCES

- (1) <https://www.ofgem.gov.uk/publications-and-updates/biomass-sustainability-dataset-2016-17>
- (2) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/643414/DUKES_2017.pdf
- (3) <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics-and-forestry-facts-and-figures/>
- (4) https://consult.environment-agency.gov.uk/psc/hr2-9jd-ec-drummond-agriculture-limited/supporting_documents/5.%20Additional%20Information%20Wood%20Waste.pdf
- (5) https://anthesisgroup.com/wp-content/uploads/2017/02/Anthesis_Wood-Waste-to-Energy-Report_February-2017.pdf
- (6) <https://woodrecyclers.org/exports-waste-wood-products-decrease-uk-markets-grow/>
- (7) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664991/nonfood-statsnotice2016-6dec17b.pdf
- (8) https://www.ofwat.gov.uk/wp-content/uploads/2015/12/pap_tec20151210water2020app1.pdf
- (9) <https://www.renewablesandchp.ofgem.gov.uk/Public/ReportManager.aspx?ReportVisibility=1&ReportCategory=0>

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APPENDIX 3: GLOSSARY

ACT	Advanced Conversion Technology (i.e. gasification/pyrolysis)
APR	Annual Performance Reports
CfD	Contract for Difference
CHP	Combined Heat and Power
DUKES	Digest of United Kingdom Energy Statistics
EA	Environment Agency
EfW	Energy from Waste
IED	Industrial Emissions Directive
Kt (pa)	'000s tonnes (per annum)
MBM	Meat and Bone Meal
Mt (pa)	Million tonnes (per annum)
MW(h)	Mega Watts (Hours)
RDF	Refuse Derived Fuel
RHI	Renewable Heat Incentive
RO(Cs)	Renewables Obligation Certificates
SEPA	Scottish Environmental Protection Agency
WRA	Wood Recyclers Association



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