Regional grass and biogas production

Grass residue production and iogas potential Flanders

The grass residue production in Flanders was calculated per stakeholder and afterwards linked to the municipalities (if possible) by using ArcGis 10. In Table 0-1 and Table 0-2 the results of the Inventory can be seen, and by the colour the reliability of the data can be determined. From the line shape elements there are not areas displayed in the table. Calculated with an average production of 272.82 Nm^3 biogas per ton grass residue, Flanders is good for an annual production of 16,202,490 Nm^3 biogas.

Table 0-1. Grass residue quantities orginating from natural grasslands in Flanders, green are reliable data, orange quite reliable and red are less reliable.

Grasslands		
Manager	**Area (ha)**	**Residue (ton/dm/year)**
ANB Limburg	340.63	1,286.68*
ANB Antwerpen	315.69	1,157.67*
ANB Vlaams-Brabant	520.22	1,599.22*
ANB Oost-Vlaanderen	61.49	239.67*
ANB West-Vlaanderen	408.36	1,591.56*
Natuurpunt	2,529.06	7,974.55*
Erkende terrein beherende instanties	191.68	662.17*
Airports	759.68	3,188.73*
Harbours	497.24	751.0*
Golf courses	763.25	3,053.00*
LNE Limburg (erosion prevention)	281.02	1,686.13*
LNE Vlaams-Brabant (erosion prevention)	438.24	2,629.44*
LNE Oost-Vlaanderen (erosion prevention)	73.79	442.75*
LNE West-Vlaanderen (erosion prevention)	48.62	291.72*
Total	**7,228.97**	**26,554.29**

**Average theoretical residue production, **Real amount of removed grass residue, converted to 27% dry matter*

Table 0-2. Residue quantities orginating from roadsides and the banks of waterways in Flanders.

Roadsides	
Manager	**Residue ton/dm/year (27% ds)**
Navigable waterways Limburg	291.23**
Navigable waterways Antwerpen	788.64**
Navigable waterways Vlaams-Brabant	309.51**
Navigable waterways Oost-Vlaanderen	660.18**
Navigable waterways West-Vlaanderen	503.78**
Municipal roadsides Limburg	2,286.42**
Municipal roadsides Antwerpen	7,868.05**
Municipal roadsides Vlaams-Brabant	3,895.98**
Municipal roadsides Oost-Vlaanderen	3,393.07**
Municipal roadsides West-Vlaanderen	2,606.58**
Railways	2,900*
AWV (High- and motor highways) Limburg	1,090.76**
AWV (High- and motor highways) Antwerpen	1,231.94**
AWV (High- and motor highways) Vlaams-Brabant	1,888.04**
AWV (High- and motor highways) Oost-Vlaanderen	2,817.68**
AWV (High- and motor highways) West-Vlaanderen	2,352.33**
Total	**32,834.65**

**Average theoretical residue production, **Real amount of removed grass residue, converted to 27% dry matter*

Grass residue production and biogas potential Denmark

Table 0-3 presents the results in terms of total annual potential in Denmark, for each grass category covered. To keep the estimate of the overall "realistic potential" conservative, there has been calculated with 50% of the residual grass potential presented in Table 0-1. If calculated with 515,000 t DM/y Denmark is good for an annual production of 201,334,100 Nm^3 biogas.

Table 0-3. Annual potential for the grass categories covered, Denmark

Grass category	Grass type	Grass type area (ha)	Yield (t DM/ha)	Total (t DM/y)
1. Nature	Dry Hill	28,715[a]	2[d]	57,430
	Freshwater Meadow	95,415[a]	3.5[d]	333,953
	Saltwater Meadow	43,966[a]	2[d]	87,932
	Swamp	95,141[a]	0.5[d]	47,750
2. Agricultural	Buffer Zones	105,521[b]	3[e]	316,563
3. Sports	Sport Court	4,958[c]	2.5[e]	12,396
4. Park & Garden	Household Garden			95,157[f]
	Parks & Public gardens			74,713[f]
5. Others	Airport		2.0[e]	1,023
Total of inventoried grass potential (note that roadside grass is missing, as well as military areas, among others)				***1,026,917***

Grass residue production and biogas potential Veneto

In the Veneto region there is 67,477 ton grass residue available for fermentation. Multiplied with the indicated production of 700 Nm^3 biogas per ton dry matter, this is good for an annual production of 47,233,900 Nm^3 biogas.

Grass residue production and biogas potential Saarland

The Saarland is good for an annual production of 24,005 t grass residue. This corresponds with an annual production of 4,801,000 Nm^3 biogas.

Grass residue production and biogas potential Lisbon

The municipalities in the Lisbon region produce an estimated 14,305 t grass residue. Calculated with an average biogas production of 221,64 Nm^3 per ton try matter, this residue amount is good for a total biogas production of 3,169,500 Nm^3.

National grass and biogas production

Grass residue production and biogas potential Belgium

To be able to estimate the total grass residue amount available in Belgium, the available grass residue amount in Flanders is extrapolated. In this scenario the total amount of grass available in Wallonia is approximately 71,800 tons dry mater. For Belgium this makes a total amount 128,000 tons dry matter a year. Which is good for an annual production of 34,921,000 Nm^3 biogas.

Grass residue production and biogas potential Denmark

Within this project Denmark was seen as a region, so the inventory was carried out in whole Denmark. Denmark is good for an annual production of 201,334,100 Nm^3 biogas.

Grass residue production and biogas potential Italy

According the extrapolations Italy is good for annual production of 1,113,000 ton grass residue. This residue amount is good for an annual production of 779,311,900 Nm^3 biogas.

Grass residue production and biogas potential Germany

According the extrapolations there is 3,336,116 ton dry matter annually available in Germany. This amount is good for a yearly production of 667,223,178 Nm^3 biogas.

Grass residue production and biogas potential Portugal

To be able to calculate the residue production and the biogas potential for Portugal, the residue production in the Lisbon region was extrapoled. As a result of this extrapolation there is 2,200,340 t grass residue available in Portugal. This corresponds with a biogas production of 487,690,834 Nm^3.

European biogas production

The European union has a total area of 4,381,376 km^2. On landscape and climatic level, there are big differences within and between countries. Nevertheless other factors like infrastructure, population density and dispersion should not be forgotten. Unfortunately, in this study the differences between northern and southern countries can't be directly related to climate, landscape or factors like population density and dispersion. De data composition and availability seems to have a bigger impact.
Within the GR3 dataset, the data from Saarland and Flanders seem to be the most reliable data regarding grass residues that are available for fermentation and not only potentially available. The reason for this is that in the datasets of these two regions the number of estimates is limited compared to the datasets of other regions. As a result of this, the calculation of the potential biogas production within the EU, will be based on the figures of these two regions.
Based on Saarland and Flanders the average residue production per km^2 is 6,85 t. Calculated with an biogas potential of 236,41 Nm^3/t, the European Union has a biogas potential of 7;095,237,536 Nm^3.

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