



FACTSHEET OF SOLID BIOMASS FOR SMALL-SCALE HEATING APPLICATIONS

Summary of the factsheet

Bioenergy – energy produced from biomass – is the most widely used renewable energy source in Europe as well as the most versatile, being able to provide heat, electricity or fuels for transport. The current factsheet focuses on the use of biomass as a solid biomass fuel, especially targeting small-scale heating applications.

KEYWORDS:

Biomass
Types of Biomass
Biofuel Characteristics
Certification of biomass

Types of biomass:

The following main types of biomass can be discerned depending on the activity which produces them.

- **Agricultural biomass:** usually, the term refers to crops residues that are generated after the harvesting of the main product (e.g. straw) or from regular prunings of permanent crops (e.g. olive trees, vineyards, orchards), etc. The term can also apply to dedicated, non-food plant species, such as miscanthus, willow, poplar, etc. that are cultivated with the intend of being used as feedstock for energy purposes.
- **Forestry biomass:** a wide range of materials that derive from the sustainable management activities of forests (firewood, forest residues, etc.) and from the forest wood processing sector (sawdust, wood shavings, etc.). Most of the bioenergy in Europe is coming from forest biomass, especially in heating applications.
- **Agro-industrial biomass:** residues that are generated after processing a main agricultural crop in an agro-industry. They include olive stones, exhausted olive cake, almond shells, sunflower husks and others. Since they are generated in a specific point, they do not require harvesting operations and are thus a very cost-competitive option for energy generation.
- **Biomass from urban parks and gardens:** often referred to as “green waste”, it mostly consists of tree prunings and other cuttings that are generated in an urban setting. They are typically handled in the framework of municipal waste management schemes.

Tradeable Forms of Biomass:



Bales



Firewood



Chips or hog fuel
(mixed shavings)



Granular
material



Pellets



Briquettes



Indicative fuel properties of various solid biofuels									
Property	Units	Wood Pellets A1	Vineyard pruning pellets	Sunflower husk pellets	Olive tree pruning (hog fuel)	Wheat Straw	Olive Stones	Almond shells	Miscanthus
Moisture content	w-%, a.r.	≤10	10	10	27	15	15	11	15
Ash content	w-%, d.b.	≤0.7	4.5	4.0	4.2	5.0	1.2	1.6	4.0
LHV	MJ/kg, a.r.	≥16.5	15.7	15.7	12.9	14.6	15.8	16.1	14.7
Bulk Density	kg/m ³ , a.r.	600≤BD ≤750	710	550	230	200 (bales)/ 85 (chopped)	730	410	130 (chopped)
Nitrogen, N	w-%, d.b.	≤0.3	0.81	0.8	0.93	0.5	0.3	0.4	0.7
Sulphur, S	w-%, d.b.	≤0.04	0.07	0.1	0.08	0.1	0.02	0.01	0.2
Chlorine, Cl	w-%, d.b.	≤0.02	0.02	0.06	0.04	0.4	0.1	0.02	0.2

a.r.: as received; d.b.: dry basis; LHV: Low Heating Value; More information on biomass properties on D3.2 of the Biomass Plus project and Annex B, EN ISO 17225-1; Solid biofuel composition can vary significantly. The given values are only indicative of typical values.

Biomass Fuel Quality Certification Schemes:

A biomass fuel quality certification scheme is meant to provide assurances to small-scale, i.e. domestic, biomass end-users that the fuel they purchase does indeed comply with specific quality parameters. Such schemes require that biofuel producers adopt specific quality control measures, which is then certified through third-party audits. The most widespread quality certification scheme is **ENplus®** for wood pellets. Other schemes, such as **BIOmasud®** allow for certification for more assortments, such as olive stones and nut shells.

What makes a solid biofuel suitable for small-scale heating applications?

Generally, all types of biomass can be converted to energy with the use of appropriate technology. However, in small-scale heating applications there are several technical and other limitations that influence the choice of the appropriate fuel. Some of the most important ones are:

- ✓ **Low moisture content:** increases the energy received from the fuel and helps maintain a clean and efficient combustion.
- ✓ **Low ash content:** reduces emissions of dust, while also minimizing the cleaning intervals.
- ✓ **Homogeneous / consistent particle size:** helps to avoid issues in the fuel feeding system.
- ✓ **High energy density:** minimizes storage requirements and transportation costs.

Ultimately, a consumer should never forget that in order to be **effective** and **low-emissions**, bio-heat should be produced in **properly installed and well-maintained** appliances and using the **appropriate fuel assortments!**

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