WP3 – Wood fuel price statistics in Europe – D 3.1

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Preface

This publication is part of the EUBIONET III Project (Solutions for biomass fuel market barriers and raw material availability - IEE/07/777/SI2.499477, www.eubionet.net) funded by the European Union’s Intelligent Energy Programme. EUBIONET III is coordinated by VTT and the other partners are Danish Technological Institute, DTI (Denmark), Energy Centre Bratislava, ECB (Slovakia), Ekodoma (Latvia), Fachagentur Nachwachsende Rohstoffe e.V., FNR (Germany), Swedish University of Agricultural Sciences, SLU (Sweden), Brno University of Technology, UPEI VUT (Czech), Norwegian University of Life Sciences, UMB (Norway), Centre Wallon de Recherches Agronomiques, CRA-W (Belgium), BLT-HBLuFA Francisco Josephinum, FJ-BLT (Austria), European Biomass Association, AEBIOM (Belgium), Centre for Renewable Energy Sources, CRES (Greece), Utrecht University, UU (Netherlands), University of Florence, UNIFI (Italy), Lithuanian Energy Institute, LEI (Lithuania), Imperial College of Science, Imperial (UK), Centro da Biomassa para a Energia, CBE (Portugal), Energy Restructuring Agency, ApE (Slovenia), Andalusian Energy Agency, AAE (Spain). The EUBIONET III project runs 2008 – 2011.

The main objective of the project is to increase the use of biomass based fuels in the EU by finding ways to overcome the market barriers. The purpose is to promote international trade of biomass fuels to help demand and supply meet each other, while at the same time the availability of industrial raw material is to be secured at reasonable price. The EUBIONET III project will in the long run boost sustainable, transparent international biomass fuel trade, secure the most cost efficient and value-adding use of biomass for energy and industry, boost the investments on best practice technologies and new services on biomass heat sector and enhance sustainable and fair international trade of biomass fuels.

This working paper, which is part of EUBIONET III’s Work Package (WP) 3 entitled “Price Mechanisms for Wood Fuels”, will present the results from a survey among the EUBIONET III partners of wood fuel prices in the respective countries. The working paper is part of the reporting for task 3.1, “Collection of price statistics” of WP3.

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1 Introduction and background

The lack of market information has in studies (see e.g. Dahl 2005; Plieninger et al. 2009) been pointed out as an important barrier to further development of the trade in biomass for energy. If there is no readily available information on available quantities, trade flows and price levels, this presents a major obstacle to market actors aiming to trade the commodity in question. Important strategic decisions may have to be taken without sufficient knowledge of market conditions. In order to avoid this, large amounts of financial and human capital need to be invested in acquiring market information for specific business transactions. Neither of these options represents an effective means of business conduct. Furthermore, “[market] transparency is the enemy of trading margins” (Roeber 1993, p.77) and increased availability of market information is a vital step on the path towards a fair, competitive and efficient market.

The aim of the work leading up to this working paper has been to use the network of partners participating in the EUBIONET III project to compile a database of price statistics on wood fuels from as many European countries as possible. By making up-to-date as well as historical wood fuel prices available to a broader audience, this work will hopefully make a contribution towards increasing the level of transparency in the European bioenergy market.

Besides presenting the collected price statistics, this working paper will also briefly discuss the level of availability and quality of wood fuel price statistics in the EUBIONET III partner countries. Needless to say, there are great differences in how much statistics is available and whether these are compiled in an orderly and standardized manner or not. By raising this issue, we hope that statistics agencies on a national and European level, as well as bioenergy business organizations, are made aware of possible flaws in the price statistics and encouraged to contribute to increase the quality. This is crucial for the future development of the European bioenergy market.
2 Methodology

This working paper is based on information collected in two steps by the EUBIONET III partners.

The first step was carried out in the spring of 2009 when the partners were asked to make a preliminary survey of the availability and quality of wood fuel price statistics in their respective countries. If price statistics were difficult to find and/or of inferior quality, the partners were also asked to discuss and give reasonable explanations for this. The main goal with this initial survey was to obtain an overview of the general state of wood fuel price statistics in the partner countries, thus providing a base for how the subsequent price collection questionnaire was to be designed.

The second step was the design of the actual price collection questionnaire. A first draft - based on the initial survey - was constructed and distributed to the partners in the fall of 2009. The partners were asked to give feedback on the draft questionnaire and propose changes which might improve the quality of the questionnaire. However, this process proved to be something of a dilemma as the large differences in the availability and quality of wood fuel prices in the partner countries meant that the feedback from the partners was heterogeneous and to some extent contradictory. Since it was rather awkward to carry out these discussions via e-mail, it was decided that the discussion on the construction of the price statistics questionnaire would instead be finalized at the EUBIONET III meeting in Verona in Italy in February, 2010. At the meeting, some final discussions on the questionnaire took place and a consensus could ultimately be reached.

The filled-in price collection questionnaires were submitted by most of the partners in the weeks following the meeting in Verona and were compiled by the Work Package leaders at the Department of Energy & Technology at the Swedish University of Agricultural Sciences in Uppsala, Sweden. Herein, prices are reported in €/GJ, for pellets also in €/ton and for others in €/MWh or €/m³, but since the national price statistics were given in a variety of different units and currencies, conversions had to be made. In some cases, there were uncertainties about e.g. the moisture content of the fuel in question, which means that the converted price levels only may be seen as estimations.

Price statistics were initially to be collected for five fuel categories: wood pellets, wood briquettes, wood chips, firewood and sawmill by-products. However, there are wide varieties within these groups depending on issues such as the nature of the consumer or the form of delivery. For this reason, the price categories were further widened so that prices are reported both for industrial and residential customers. Also, for wood pellets, prices are reported both for delivery in bulk and in small bags.
3 Availability of wood fuel price statistics in Europe

As was discussed in the above methodology section, the first step of the work was to obtain an overview of the availability of wood fuel price statistics in the partner countries. Perhaps not surprisingly, there are large variations between European countries, to a large degree depending on the level of development of biomass energy in the respective countries.

Below is a review of the situation in the partner countries who responded to the initial survey, based on the contributions from the country representatives.

3.1 Austria

In Austria, price statistics for a rather wide variety of wood fuels are collected and reported by agencies on both state and federal levels.

- Prices for wood are collected monthly, sorted per province and type of wood and published in the reports of Land- und forstwirtschaftliche Erzeugerpreise (“Producer prices for agricultural and forestry products”). Prices for wood briquettes are collected monthly within the “consumer price index” compilation.

- In the programme Mikrozensus Sonderprogramm Energieeinsatz der Haushalte (“Microcensus special programme about the use of energy in households”) information about the usage of firewood, wood briquettes, wood pellets and wood chips in households are collected every two years.

- The Chamber of Agriculture in Lower Austria\(^1\) is publishing the Energieholzpreisindex (“price index for energy wood”), which is often used as part of the price index for heat of biomass district heating plants. The basis for this index is wood price data from Statistics Austria and own sources.

- The wood pellet business organisation proPellets Austria - Netzwerk zur Förderung der Verbreitung von Pelletsheizungen publishes the monthly price for wood pellets for end consumers.

3.2 Belgium

In Belgium, the situation varies somewhat between the regions of the country. For Wallonia, pellets price statistics for small bags or bulk carrier have been collected monthly since 2007. Prices are collected by the Wallon Agricultural Research Centre (CRA-W).

For log wood, there is an ongoing project aiming to develop a price collection procedure, but the methodology needs to be decided. This has proved quite difficult because prices depend on the geographic area, the log size, the amount, the humidity level, the transport and the species.

\(^1\) One of the Austrian länder, located in the Eastern part of the country.
3.3 Czech Republic

In the Czech Republic, the Czech Statistical Office is generally responsible for statistics, but there are currently no official price statistics for wood fuels and/or biomass. The reasons for this lack of statistics are difficult to discern. One of the possible reasons is that there are no price regulation mechanisms for wood fuels and biomass to date. In contrast, the Ministry of Finance applies officially agreed maximum prices for natural gas and electricity. An "objective guided price" is applied for the heat energy. The objective guided price from a producer or a distributor includes economically eligible costs, an adequate profit and taxes.

3.4 Denmark

In Denmark, the Danish District Heating Association every third month issues prices for heat from their member plants from different fuels, including wood pellets and wood chips. However, an obstacle to a further development of Danish wood fuel price statistics is that the large consumers are not interested in publishing the prices.

3.5 Finland

The consulting company Pöyry is collecting wood chips statistics directly from the end-users and pellet prices are collected by Finnish Pellet Energy Association. These statistics are published in the journal BioEnergia six times per annum. Prices are also published on internet at www.puunhinta.fi. Statistics Finland is officially responsible for publishing wood fuel prices, so information from Pöyry and the Finnish Pellet Energy Association is passed to Statistics Finland. They publish these statistics four times per annum in the Energiakatsaus journal. Furthermore, a pellet consumer price index that will be published monthly is being developed together with the Finnish Pellet Energy Association. It will now be part of the official Finnish statistics. Until recently, the industry has not been willing to publish pellet price information but this situation seems now to be changing. Industrial pellet price index is published by Foex Indexes (see 3.8.3) and it is published also in BioEnergia journal. Price of firewood is published by regional different internet services e.g. www.mottinetti.com and www.halkoliiteri.fi.

3.6 Germany

For Germany, there are statistics available from C.A.R.M.E.N, the Bavarian Coordinating Office for Renewable Raw Materials, on prices of both wood pellets and wood chips. German Energy Wood and Pellet Association (DEPV) publish statistics on price of pellets.

The German Federal Statistical Office (2010) has started to publish a new price index for wood for energy production. It considers wood chips, wood pellets and briquettes, and industrial wood. The basic year for the index is 2005 (2005 = 100) and it contains no absolute prices, only the price development as an index. The first publication of the index was in February 2010.
3.7 Greece

In Greece, the General Secretariat for the National Statistical Services does not hold any data about prices of wood fuels. Regarding the prices of wood fuels, delivered at the forests roadside (wholesale prices), the General Division of Forests holds a survey list and real prices in € per m$^3$ are recorded. The list is classified based on the administration units of the Division of Forests (Forest Districts). The retail prices are not surveyed by national authorities. Regarding refined wood fuels (pellets), there is not any survey about the price of such fuels, so the information is not available by national authorities.

3.8 Italy

ISTAT is the official Italian Statistics Agency (www.istat.it) but no data related to prices of wood fuels (neither wood logs nor pellet) is presently available.

For wood fuels there are presently two main sources of information:

- AIEL (Italian Association of Energy from Wood - www.aiel.cia.it). These statistics are based on a national level. Statistics are available for free for AIEL members, except for statistics on pellet available from the web site of Pellet Gold (www.pelletgold.it).

- FIPER (Italian Federation of Renewable Energy Producers - http://www.fiper.it) in collaboration with the Trade Chamber of Milan has established a price observatory for solid biofuels pilot project since September 2009. Pellet, wood chips, briquette and wood are quoted on the Merchandise Stock Exchange. Price commission is summoned every year the last Wednesday of March and September. Commission publicizes minimum and maximal price for the product trade in the stock exchange list. The data are disseminated on www.piuprezzi.it, on www.agrimercati.it and on the paper survey “Wholesale price Survey Milan”. These statistics are based on a Northern Italy level.

Information, neither elaborated on a statistical base nor official, on prices for wood fuels (pellet, chips, briquettes etc.) is available through web sites related to the biomass to energy topics (as a matter of example www.pelletitalia.org presents data on prices for wood chips, pellets and wood logs).

3.9 Latvia

The most common used price statistics on wood fuel is obtained from the Central Statistical Bureau of Latvia. The Bureau collects data about price changes for sawdust, firewood, pellets, briquettes, and wood processing residues from year 2006 for each half-year. The data are however not available for free on homepages or other resources. A fee is charged in exchange for access to the data. Additionally, there is Latvian biomass association (LATBIONRG) that collects data on wood fuel (woodchips, pellets, briquettes) prices. The data will be published on 10 November 2010 and will be available in the webpage of association for free.
3.10 Lithuania

The National Control Commission for Prices and Energy has collected average wood fuel market prices for the period 1996-2008. These prices are compared with the prices of other fuels, including pellets as well as chips, sawdust and firewood (as one group). Furthermore, the Department of Statistics to the Government of the Republic of Lithuania calculates price indices for the estimation of production amounts and sends these data to Eurostat.

3.11 The Netherlands

The Dutch statistical office does not collect any data on wood fuel prices. The Copernicus Institute at Utrecht University collected price data for wood pellets both for large scale consumers and for small scale end-consumers as part of the Pellets@las project, which was finalized by the end of 2009. Furthermore, since the end of last year, a company called Endex has started to publish prices for wood pellets. Incidentally, reports are published (e.g. IEA Bioenergy Task 40 country reports, reports by ECN) in which prices of various biomass streams are reported or estimated, but not on a regular basis. The main reasons for the lack of official statistics are a) no/limited use of unrefined wood fuels like wood chips, and b) no HS code for wood pellets (up until recently) to use for official statistics.

3.12 Norway

The Norwegian Bioenergy Association (NOBIO) collects prices for wood pellets and wood briquettes and publishes annual reports on price levels.

3.13 Portugal

In Portugal, there are currently no available statistics on wood fuel prices, primarily because of the immaturity of the Portuguese bioenergy market. This means that the market is not very well organized.

3.1 Slovakia

In the Slovak Republic, the Slovak Statistical Office is generally responsible for statistics, except for fire wood (broadleaf and coniferous). There are currently no official price statistics for wood fuels and/or biomass. However, they collect data on prices for fossil fuels (coal, oil, natural gas etc.). Most of the wood fuels are sold directly from producer to user. The market with bioenergy in Slovakia is still immaturity. Export of wood fuels is about 50 %.

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2 EU contract no EIE/06/020/SI2.448557
3.2 Slovenia

There are currently no price statistics on different wood fuels available in Slovenia, as the wood fuel market is not organized. Most of the wood fuels are sold directly from producer to user. The Statistical Office of the Republic of Slovenia is responsible for statistics in this country; they collect data on prices for fuels such as coal, oil and wood fuels. Data on the purchase of wood are collected by the monthly survey on the purchase of agricultural products and timber. The value of purchased wood is calculated value of the acquire at the buying price of wood on the truck road. Costs related to the delivery, transport to warehouse, storage or placing in storage do not fall in the value of purchased goods. From 2004 there is an online biomass exchange - the Borzen OVE portal - operating but they are just offering a free trade tool and do not collect price statistics.

3.3 Spain

There is no official information or statistics about prices of wood pellets and briquettes. This is because pellets and briquettes don’t constitute a representative resource of energy in Spain. There are several independent organizations related to the wood sector (e.g. Confemadera, Cismadera, Cesefor) that handle internal data about prices but these statistics are not available for all stakeholders but only for organization members and people registered on the webpage.

3.4 Sweden

Several different organizations, public as well as private, publish price statistics on bioenergy.

- The Swedish Energy Agency has since 1993 been collecting price statistics on bioenergy consumed in district heating as well as in industry. These statistics are published in a quarterly publication entitled Prisblad för biobränslen, torv mm. (“Price sheet for biofuels, peat, etc.”)

- The Swedish Association of Pellet Producers (PiR) has since August 2006 published a monthly price index on wood pellets for bulk delivery to residential customers.

- The bioenergy consulting Firm ÄFAB has been publishing monthly price statistics for wood pellets since January 2004 for North, Central and Southern Sweden.

- Since 2010, PiR and ÄFAB have together published a price index which compares the development of wood pellet prices to the prices of competing fuels.

Aside from these organized prices statistic resources, there are several consumer-initiated online price comparison tools where residential wood pellet consumers report how much they have paid for their pellets.
3.5 UK

The wood price statistics in the UK are published in an annual report (also available from the web) and the responsible body is the Forestry Commission. As of yet however, the commission does not publish statistics specifically for wood fuels.

3.6 Price statistics in countries not part of EUBIONET III

3.6.1 Switzerland

- The renewable energy information company Transan publishes an online monthly wood pellet price index based on information from Swiss wood pellet producers.

- Waldwirtschaft Schweiz (The Swiss Forestry Association) publishes statistics of wood price levels – including different assortments of wood fuels – in its journal Wald und Holz ("Forest and wood")

3.6.2 Estonia

Metla (The Finnish Forest Research Institute) collects statistics on prices for fuel wood from state-owned Estonian forests. The prices are published through Metla's online service MetInfo.

3.6.3 France

CEEB, the Centre d'Etudes de l'Economie du Bois (Center for Studies of Wood Economics) publishes price statistics for different forms of wood fuels, including sawmill residues, wood chips, wood briquettes and wood pellets.

3.7 Pellets@las

The Pellets@las project was an Intelligent Energy for Europe (IEE) project that ran from 2007 to 2009 with the aim to "...develop and promote transparency on the European fuel pellet market" (Pellets@las 2009). An important part of the project was the dissemination of wood pellet price information through the Pellets@las website. Price data on different assortments of wood pellets were collected from the participating countries, compiled into a database and made available online for market actors to access.

3.8 Commercial wood fuel price statistics

Since a few years back, a number of companies providing market information have moved into the field of bioenergy.

3.8.1 Argus

Argus Media Ltd. is a company based in the United Kingdom. The company has provided different kinds of energy information on a commercial basis since 1970. Until 1995, the company only focused on the oil market, but that year the company initiated coverage of natural gas markets and Argus has since expanded to cover market developments in coal, electricity, emission rights and many other energy-
related topics. In spring 2009, Argus launched Argus Biomass Markets, a weekly publication that reports and analyzes developments in the biomass-for-energy markets, with focus primarily on wood pellet market developments. The report includes a price index on wood pellets, based on a survey of market actors of current price levels as well as on information on actual trades that has taken place during the week in question. (Argus Media 2009)

3.8.2 Endex

Endex is an energy exchange based in the Netherlands. The company was founded in 2002 and is wholly owned by the APX group. The company provides price information and offers over-the-counter and derivatives trading in natural gas and electricity. After realizing that there was demand for increased information about developments in the bioenergy markets, Endex began publishing a weekly price index for industrial-grade wood pellets in November, 2008. The price index is based upon information from market actors and is given for wood pellets delivered CIF Rotterdam. (Endex 2009)

3.8.3 FOEX

FOEX Indexes Ltd. is a Finland-based company which specializes in providing price indexes for a range of different pulp & paper products. Beginning in late 2009, FOEX publishes a monthly price index for industrial wood pellets on the Nordic market, called PIX Pellet-Nordic Industrial. The price index is based on information from both producers and consumers of wood pellets and is given for delivery CIF Baltic Sea/North Sea ports. According to the company, the industrial wood pellet price index is only the first bioenergy price index to be published by FOEX. Indices for Continental and North American wood pellet deliveries, as well as an index for Baltic Sea delivery of unrefined wood fuels are also being planned. (Teräsv & Sihvonen 2009).

In October 2010 FOEX and WRI have agreed to partner in the launching of global wood chip price indices. As for all price benchmarks in FOEX's PIX-index family, the indices will be based on a large number of actual trades and the data will be collected from both sellers and buyers of wood chips. The combined efforts of FOEX and WRI, and the PIX-index system, will ensure that the indices, whose launch is planned for early 2011, will be statistically reliable and thus well suited for numerous market participants. These include forest and energy companies who can use price indices for benchmarking, as well as the financial community, which can use the Indices as price risk management tools.
4 European wood fuel prices

During spring 2010, prices of different assortments of wood fuels in the countries participating in EUBIONET III were collected from the respective partners. The instructions for the partners stated that ideally, time series of prices stretching from the second half of 2006 – the time of the last price collections of the EUBIONET II project – to early 2010, were to be collected. As it proved impossible to obtain time series for all wood fuel assortments in all countries, the partners were instructed to – as a "second best" option – focus on actual price levels at the time of the price collection, i.e. early 2010.

In this section, the results from the price collection will be presented. For each fuel category, price levels at approximately the turn of the year 2009/10 are given for each country. Additionally, time series for the price development between 2006 and 2010 are presented for the countries in which such series were available.

4.1 Wood pellets (residential market)

Since the form of delivery is a vital factor influencing the price of wood pellets for the residential market, the statistics presented is divided into three sections.

4.1.1 Bulk delivery, €/GJ and €/ton
4.1.2 Delivery in small ($\approx 15$ kg) bags, €/GJ and €/ton

4.1.3 Unspecified delivery, €/GJ and €/ton
4.2 Wood pellets (industrial market), €/GJ and €/ton

4.3 Wood briquettes (residential market), €/GJ and €/ton
4.4 Wood briquettes (industrial market), €/GJ and €/ton

4.5 Wood chips (residential market), €/GJ and €/MWh
4.6 Wood chips (industrial market), €/GJ and €/MWh

4.7 Firewood (residential market)

4.7.1 Broadleaved, €/GJ
4.7.2 Coniferous, €/GJ and €/stacked m³

4.8 Sawmill by-products (industrial market), €/GJ and €/MWh
5 References


Appendix A: Conversion factors

Since prices are reported in different units in the participating countries, the data reported from the partners has been converted to a common unit, €/GJ, €/ton or €/MWh in order for the prices to be comparable. This section presents the energy conversion factors used.

General notes:

- Currency exchange rates have been collected from Eurostat.
- If a price range (e.g. “250-270 €/ton” has been reported) the average of the minimum and the maximum is shown in the graphs.

A 1 Wood pellets

Unless specific figures for the energy content of the wood pellets, the energy content has been assumed to be 4.7 MWh/metric ton (=17.2 GJ/ton).

A 1.1 VAT for wood pellets (res, bulk)

Austria: 10% VAT
Belgium: 6% VAT
Denmark: 25% VAT
Finland: 22% VAT
Germany: 7% VAT
Lithuania: 21% VAT
Slovakia: 19% VAT
Sweden: 25% VAT, currency converted
UK: 5% VAT

A 1.2 Wood pellets (res, small bags)

Austria: 10% VAT
Belgium: 6% VAT
Czech Republic: 19% VAT (August 2006-July 2007), 5% VAT (August 2007-December 2007), 9% VAT (January 2008-), currency converted
Italy: Price reported excl. VAT
Netherlands: 19% VAT
Portugal: 20% VAT
Slovenia: Prices reported excl. VAT
Sweden: 25% VAT, currency converted. Price is averaged from the reported three regional series (North, Central and South Sweden)

A 1.3 Wood pellets (res, mixed or unspecified delivery)
Latvia: 10% VAT, currency converted
Norway: 25% VAT

A 1.4 Wood pellets (industrial)
Latvia: currency converted
Sweden: currency converted

A 2 Wood briquettes
The energy content of wood briquettes is assumed to be 4.7 MWh/ metric ton (17.2 GJ/ton)

A 2.1 Wood briquettes (residential)
Austria: 10% VAT
Czech Republic: 19% VAT (August 2006-July 2007), 5% VAT (August 2007-December 2007), 9% VAT (January 2008-), currency converted
Denmark: 25% VAT
Finland: 22% VAT
Italy: 10% VAT
Latvia: 5% VAT, currency converted
Lithuania: 21% VAT (18% VAT (2006Q3-2009Q2), 21% VAT (2009Q3-)
Norway: 25% VAT
Portugal: 20% VAT, Prices given in range (average value used)
Slovakia: 19% VAT
Slovenia: 20% VAT

Sweden: 25% VAT, currency converted

UK: Three prices reported for three different delivered amounts. Range between 15.6€/GJ for 1000 kg delivery and 26.8€/GJ for 250 kg delivery.

A 2.2 Wood briquettes (industrial)

Latvia: Currency converted

Portugal: VAT 20%

Sweden: Currency converted (same price series as industrial wood pellets)

A 3 Wood chips

In the cases when the wood chip prices have been reported by the project partners in non-energy units, the prices have been converted to €/GJ using conversion factors depending on tree species and moisture content.

A 3.1 Wood chips (residential)

Belgium: 6% VAT, 30-60% moisture content, converted to energy unit using data from Ringman (1995)

Czech Republic: 19% VAT (August 2006-July 2007), 5% VAT (August 2007-December 2007), 9% VAT (January 2008-), currency converted, moisture content 12-15%, assumed 17 GJ/ton

Germany: 7% or 19 % VAT\(^3\), 35% moisture content gives 12.5 GJ/ton

Italy: 10% VAT, 50% moisture content, poplar gives 8 GJ/ton

Portugal: 20% VAT, “20-40% moisture content”, assumed 30% moisture content - >13.6 GJ/ton

Slovenia: 20% VAT

A 3.2 Wood chips (industrial)

Austria: Prices given in €/cubic meter with no data on moisture content. Assumed moisture content to be 30%, which gives 2.7 GJ/m\(^3\). (Ringman, 1995)

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\(^3\) The normal VAT-level in Germany is 19%. The reduced tax rate (7%) applies for some products, which are listed in the German "VAT-law" (Umsatzsteuergesetz, UStG). For wood chips from raw wood the VAT-level is 19%, but if the chips are made from waste wood, wood residues or by-products, the VAT-level is 7%.
Latvia: Prices given in LVL/cubic meter. Moisture content reported as “40-55%”. Using the average value, i.e. 47.5%, gives 1.91 GJ/m³.

Portugal: “20-40% moisture content”, assumed moisture content 30% -> 13.6 GJ/ton

UK: 24% moisture content -> 14.76 GJ/ton

**A 4 Firewood (residential)**

**A 4.1 Firewood (broadleaf)**

Austria: Prices reported in €/stacked m³. Assumed 25% moisture content and birch -> 6.3 GJ/m³

Belgium: Prices reported in €/stere. 20% moisture content gives 6.6 GJ/stere

Czech Republic: Prices reported in Kc/stacked m³, 20% moisture content, species: beech, oak & birch -> 7 GJ/stacked m³

Finland: 20% moisture content, bulk delivery -> 5 GJ/m³

Germany: Beech 3000 kWh/m³f & 690 kg/m³f -> 4.3 MWh/ton dry -> 15.5 GJ/ton

Latvia: Moisture content reported as “15-55%” -> 3.85-8.25 GJ/m³, currency converted

Lithuania: 18% VAT (2006Q3-2009Q2), 21% VAT (2009Q3-), currency converted

Netherlands: 19% VAT

Norway: 25% VAT

Slovakia: 19% VAT

**A 4.2 Firewood (coniferous)**

Austria: Prices reported in €/stacked cubic meter. Assumed spruce & 25% moisture content -> 4.68 GJ/solid m³

Slovakia: 19% VAT

**A 5 Sawmill by-products**

Austria: Assumed sawdust of 40% moisture content -> 3.8 GJ/solid m³

Belgium: Assumed sawdust of 40% moisture content -> 3.8 GJ/solid m³

Germany: Assumed sawdust of 40% moisture content -> 3.8 GJ/solid m³

Latvia: Assumed sawdust of 40% moisture content -> 3.8 GJ/solid m³

Portugal: Assumed sawdust of 40% moisture content -> 3.8 GJ/solid m³