EUBIONET 3

Solutions for biomass fuel market barriers and raw material availability - IEE/07/777/SI2.499477

WP2 – Biomass fuel trade in Europe

Country report: Austria

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Content

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. EUBIONETII is coordinated by VTT and 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). EUBIONET III project will run 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 country report was written within the frame of the EUBIONET III project. It contains a description of the biomass fuel trade situation in Austria. Furthermore an overview of relevant statistical data should be a general basis to identify trend of bioenergy use and new application areas in industry beside the traditional sectors like saw mill, pulp and paper and chipboard industry.

The information about opportunities and barriers for trade and application as energy carrier in industry are partly based on interviews. Therefore biofuels traders and representatives of the brick making and the cement industry were interviewed.

1 Introduction

The aims of the country report are:

(1) To identify ‘new industries’ where biomass is used as an ‘energy carrier’, or has the potential to be used in the future, and to describe which drivers, bottlenecks and opportunities these sectors see for the (increased) use of biomass;

(2) To analyse bioenergy trends and reasons for change in Austria and to point out barriers & opportunities for trade,

By ‘new industries’ we mean industries which are normally not directly associated with bioenergy. Examples of ‘new industries are: metal (e.g. steel, silicon carbide), cement, food processing and construction (brick producing) industries. The forestry, pulp & paper and the energy sectors should be excluded –they are ‘classic’ bioenergy users, and will be covered in WP 7. Also, the agricultural production sector (including farmers, pig & poultry producers, greenhouse cultivation, and aviculture as suggested by EUBIONETIII partners) are excluded, as they overlap strongly with WP5. However, use of biomass in the food-processing industries (e.g. processing table olives, cocoa, coffee, meat) are included.

By ‘energy carrier’ we mean that the biomass should be used for energy purposes. e.g. to produce electricity, and/or heat/steam. Examples could be the cement industry (co-firing biomass wastes to produce heat), or the food processing industry (e.g. fermenting their biomass residues to produce heat and electricity). What we are not looking for are industries using biomass to produce biomaterials (e.g. bioplastics) – unless they (also) use biomass to meet their energy requirements. A borderline case is the production of silicon or iron using wood chips or charcoal as reducing agent. In these examples the role of biomass is twofold: it produces the necessary heat for the process (so it’s an energy carrier, that’s what we are looking for), but it also is actual part of the chemical reaction (getting the oxygen out of the ore, producing pure iron/silicon).

2 Biomass use in Austria

2.1 General overview

Table 1 gives an overview of the industrial categories investigated in EUBIONET III and their presence in Austria. The Statistik Austria, the former central bureau of statistics, is publishing every ten years a census of work places in Austria. The following data are from the year 2001.

Table 1.selected industries, description.

NACE Industry	Description
C10 Manufacture of food products	The food production is, with nearly 71.000 employees and 4.200 companies, one of the major industrial sector in Austria. These companies are producing food products at 6.000 work places. There are 10 companies with more than 500 employees, nearly 220 companies between 50 – 499 employees and 4.000 companies with less than 50 employees.
C11 Manufacture of beverages	Approximately 330 companies with 10.000 employees are producing beverages in Austria. There are 3 companies with more then 500 employees and the major player in this sector are among others the Brau Union AG and Pfanner Getränke GmbH. Furthermore there are 25 companies between 500 and 50 and 302 companies with less then 50 employees, which producing beverages in the year 2001.
C19 Manufacture of coke and refined petroleum products	Altogether 9 companies are producing coke and refined petroleum products Austria. The major player in this sector is the OMV AG with nearly 90 % of all employees in this sector.
C20 Manufacture of chemicals and chemical products	In Austria 350 companies are producing chemicals and chemical products and nearly 17.000 people are employed. There are 5 companies with more then 500 employees among others DSM Fine Chemicals Austria GmbH and Agrolinz Melamin GmbH.
C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	Nearly 100 companies are producing pharmaceutical products in 2001 in Austria. The major producers are Pfizer Corporation Austria Ges.m.b.H. and Baxter AG.
C23 Manufacture of other non-metallic mineral products	With nearly 1500 companies and about 40.000 employees, the manufacture of other non-metallic mineral products is another important industry sector in Austria. Five companies with more than 500 employees, 125 between 20 and 499 employees and 1324 companies between 50 and 0 employees show, that this

	industry sector is very small structured. Main producers are among others the Lafarge Perlmooser AG and Wienerberger Baustoff AG…
C23.3 Manufacture of clay building materials	Several smaller companies are producing clay building materials in Austria. In 2001 30 companies with nearly 1500 employees were producing clay building materials. Some of the main producers in Austria are Wienerberger Ziegelindustrie GmbH, TONDACH Gleinstätten AG and EDER GmbH & Co.KG.
C23.5.1 + C23.5.2 Manufacture of cement, lime and plaster	In Austria, 13 companies are manufacturing cement, lime and plaster with nearly 1.500 employees at 30 work places. There are 6 companies between 500 and 50 employees and several smaller ones. Some of the major producers are Lafarge Perlmooser AG, Wietersdorfer & Peggauer Zementwerke GmbH, Schretter & Cie GmbH & Co KG.
C23.6 Manufacture of articles of concrete, cement and plaster	About 365 companies are producing articles of concrete, cement and plaster in Austria in the year 2001 and nearly 13.000 people are employed. The major companies are Röfix AG, Asamer Hufnagel GmbH,
C24 Manufacture of basic metals	In Austria the production of basic metals is a very traditional and important industry sector. In the year 2001 there were nearly 170 companies with 35.500 employees at 205 working places. 15 companies with more than 500 employees, 85 between 499 and 50 and 67 companies between 49 and 0 employees. The major producers are Voestalpine AG, BÖHLER Edelstahl GmbH & Co KG,
Other specify code	
Other, specify code	

Source of information: Buder E., Sekerka K.: Arbeitsstättenzählung Hauptergebnisse Österreich, Wien 2004, Statistik Austria, (data of 2001)

An overview of the primary energy use (in PJ) of the selected industry categories is listed in table 2. Furthermore, table 2 shows which and how much biomass is used by each industry category in the year 2006. From table 2 follows, that biomass and renewable energy are unimportant and less used energy sources in this selected industry categories. The largest energy consumer is C19 ‘Manufacture of coke and refined petroleum products’ with nearly 497 PJ and uses less than 1 percent of its energy demand by renewable energy. With 92 PJ, the second largest energy consuming category is C24 ‘manufacture basic metals’. In this sector, there is hardly any biomass used in 2006.

Table 2. Primary energy use in selected industrial sectors in 2006.

Industry	Primary Energy use (PJ) in 2006	Of which biomass (PJ)			
		RES (renewable energy)	firewood	Combustable waste	Biogenic combustibles and fuels
C10 Manufacture of food products	25,62	0,246	0,038	0	0,207
C11 Manufacture of beverages					
C19 Manufacture of coke and refined petroleum products	496,86	3,616	0	0	3,616
C20 Manufacture of chemicals and chemical products	41,23	9,631	0	6,666	2,555
C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations					
C23 Manufacture of other non-metallic mineral products	40,19	5,621	0,017	5,021	0,274
C23.3 Manufacture of clay building materials					
C23.5.1+23.5.2) Manufacture of cement, lime and plaster					
C23.6 Manufacture of articles of concrete, cement and plaster					
C24 Manufacture of basic metals	92,32	0,009	0	0	0,009
C16	30,95	16,314	1,596	0,429	11,556
C17	79,51	35,242	0	3,079	34,420

Source of information: http://www.statistik.at/web_de/static/energiegesamtrechnung_1999_bis_2007_detailinformation_036361.xls (09-04-29)

To see the importance of the industry and to draw a comparison with other sectors, table 3 shows the total energy consumption (in PJ) and the changes of all sectors in 2006 and 2007.

Table 3. Total energy consumption by sector (PJ).

	2006	**2007**
Industry	309,80	314,12
Transport	372,44	378,69
Residential sector	291,33	262,64
Energy production	218,54	216,33
Others sectors	271,84	249,25
Total	1.463,95	1.421,03

Source of information: www.statistik.at/web_at/static/gesamtenergiebilnaz/022710.xls (09.02.24)

Table 4. National requirements, voluntary agreements etc. for different sectors.

Country	Target of national action plan in general based on RED	Targets for industry in national action plan	Remarks
Austria	One of the most important challenges for the Austrian Government is the securing of a sustainable energy supply. Therefore the following targets were specified: • Increasing of the renewable energy percentage by 2010 up to 25 % and by 2020 up to 45 % of the total energy consumption. • Increasing of the renewable energy generation by 2010 up to 80 % and by 2020 up to 85 %. • Increasing of alternative fuels up to 10 % by 2010 and 20 % by 2020. • Creating a kind of methane-fuels with a content of at least 20 % bio-methane and a comprehensive net of E85 and methane gas stations up to 2010. • Conversion to renewable energy of at least 100.00 households by 2010 and 400.000 by 2020.	The NAP II (National Allocation Plan) for Austria pursuant to Sec. 11 of the Austrian Emission Allowances Trading Act (EZG) for the period 2008-2012. Emissions trading: On 16th March 2009, the first auction within the scope of the EU-Emission Trading was realized. 300.000 emissions certificates got auctioned. Further there are several voluntary agreements and projects to upgrade the energy efficient and to reduce the CO_2 emission in Austrian Industry.	The overall aim is the provision of reasonable energy for consumers and economy by domestic energy production, security of supply and extension of the European Competition.

2.2 Biomass as energy carrier in the new industries

To get an overview about the advantages/ disadvantages and about the future potential of biomass as energy carrier for the Austrian industries, several interviews were done. These interviews were done via phone call based on a structured questionnaire. The interview partners were company representatives from the brick making industry, cement industries and basic metal industries.

The main statement of all interviewees is that biomass as energy carrier is not a topic at the moment for the asked companies. In the cement industry, animal meal is the only biomass which is used beside refuse derived fuels. In addition, scarp tire, or rather the caoutchouc (natural rubber) of the tire is also counted as biomass. In the brick making industry, the only biomass, which is used, is saw dust and paper fibre for creating the brick porosity, not for energy supply. Therefore the biomass is mixed with the clay and cause small hollow space after burning. These hollow spaces are responsible for a good porosity and insulation. For the basic metal industry, biomass is no option, because of the low energy density compared to other conventional fuels, like coal and gas.

As most important advantages of the biomass use the reduction of Green House Gases was mentioned. For the cement industry, it is also an important way to discard any organic waste products. Further the independence from fossil fuels was mentioned as an advantage of biomass use.

As barriers for increased biomass use the high biomass procurement costs and the high investment costs for biomass conversion installations were mentioned. Further problems are, that the availability of the feedstock and the security of supply are not guaranteed. The unsteady quality of biomass and the insufficient or non-existing biomass supply infrastructure were also named as disadvantages.

Reasons for not using are the high biomass procurement cost and the impossibility to find a reliable biomass provider. In their opinion biomass to energy conversion is presently not reliable. Because of the huge energy demand the use of biomass would cause storage problems too.

There are only a few projects were some companies try do replace part of their energy resource by biomass, but there is currently no information available. Either they are kept secret or there is still no information existing. All asked companies were not willing to give some information about actual projects.

3 Current potential and use of solid biomass

The use and development of the additional biomass-potential is of major strategic importance for the future energy-supply of Austria. There is a big technological variety for using biomass. Regarding the supply of primary biomass resources there is a wide diversity of solid biomass sources (forests, thinning, wood residues, waste wood, straw…). The demand side of biomass energy services refers to electricity and heat of very different scale, in different sectors (dwellings, industry …) and different type of applications (CHP, small pellet heating systems…). The manner of combining these types of biomass systems results into a certain biomass mix, which can have big influence on the ecological, energetic and economic efficiency.

Nearly 47% of the area of Austria are forest. The annual increment of wood in the Austrian forests is more than 31.3 million solid cubic metres, but only about 70% are harvested. According to prognoses, approximately 85% of the annual increment of wood in forest could be effectively used because of not usable hillside situations and protection forests without cultivation. Nearly 80 % of the forest in Austria is privately owned with more than 170.000 forest owner. The whole value chain wood generates an export surplus of more than 3.31 billion dollar.

Table 5a Forest, plantation and other virgin wood: 2006.

FOREST, PLANTATION AND OTHER VIRGIN WOOD	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**	**Amount**	**Amount**	**Remarks**
					PJ	**tons****	
Forest area			3980000 [1)]	hectares			
Annual increment of wood in forests	50	9	31300000 [1)]	m^3 (solid)	234,5		wood density (wf): 555 kg/m³ (beech and spruce),
Annual final fellings (average)	50	9	18800000 [1)]	m^3 (solid)	140,9		
Annual thinnings (average)	50	9	2240000 [1)]	m^3 (solid)	16,8		
Annual resources of forest residues (theoretical)			n.a.	m^3 (solid)			
Forest residue potential for energy use (technological)	50	9	1.000.000 [2)]	m^3 (solid)	7,5		
Short rotation coppice (woody, poplar, willow etc.)	50	7,5	115 [3)]	ha	0,019	2610,5	(15 atro t/ha)
Other forest wood for energy use (e.g. wood from gardens, parks, landscape management, vineycards etc.			n.a.	m^3 (solid)			

1)Österreichische Wald Inventur (http://web.bfw.ac.at/i7/oewi.oewi0002
2) Liebel G.u.a. (2008): EE 2020 Potenziale in Österreich Schlussfolgerungen der Task Force EE; Wien BMLFUW, S. 89
3)http://www.ama.at/Portal.Node/ama/public?gentics.rm=PCP&gentics.pm=gti_full&p.contentid=10008.67786&EPF_Bundesl_08.pd

Table 5 b shows the current use of firewood in Austria, which is amounting to 4.7 million cubic metres or 41.4 PJ, according to the Austrian Agricultural chamber. The estimate of the domestic firewood use is very uncertain, because most of the firewood is produced and sold private.

Table 5b. Domestic (residential firewood)

DOMESTIC (RESIDENTIAL) FIREWOOD	Av. moisture %	Av. net calorific value as received (MJ/kg)	Amount	Unit	Amount	Remarks
					PJ	
Firewood (logs usually 1 meter long)				m^3 (solid)		
Chopped and splitted firewood (oven ready logs for stoves and fireplaces)				m^3 (solid)		
Total*	20	14,311	4.700.000 1)	m^3 (solid)	41,4	density: 626 kg/m^3

1)http://www.agrarnet.info/netautor/napro4/appl/na_professional/index.php?id=2500%2C1405056%2C%2C, 090513, 14:18

More than 50 % or 11 million cubic metres of the harvested timber stocks were used for saw mill industries in 2005. Thereby 2.2 million tonnes or 18.2 PJ bark, 2.24 million tonnes or 37.4 PJ sawdust and 620.000 or 10.3 PJ other sawmill by-products accrue.

Table 5 c. By-products and residues from wood processing industry

BY-PRODUCTS AND RESIDUES FROM WOOD PROCESSING INDUSTRY	Av. moisture %	Av. net calorific value as received (MJ/kg)	Amount	Unit	Amount	Amount	Remarks
					PJ	tons	
Chemically untreated (sum of the rows below)				m^3 (solid)	65,9	5.060.000	
Sawdust (for pellet production and also direct combustion)	15	16,7		m^3 (solid)	37,4	2.240.000 1)	
Bark	50	8,277		m^3 (solid)	18,2	2.200.000 1)	
Chips, shavings and other chemically treated industrial residues (e.g. from sawmill for energy use)	15	16,7		m^3 (solid)	10,3	620.000 1)	
Chemically treated (sum of the rows below)				m^3 (solid)	31,7	505.860	
Plywood, particle board or other solid biomass residues	15	16,7		m^3 (solid)	5,3	318.360 1)	
Spent liquors (e.g. black liquors)				tonnes	23,8		
Paper and board residues	5	14,1 2)	187.500	tonnes	2,6	187.500	Residues from the whole pulp and paper and board production and processing industry
Total*				specify unit	97,6	5.565.860	

1)www.bundesabfallwirtschaftsplan.at/filemanager/download/43020, 16.05.2009, 15:25; "Die Bestandsaufnahme der Abfallwirtschaft in Österreich - Statusbericht 2008", Umweltbundesamt GmbH Abteilung Abfallwirtschaft
2) A. Heintz, G. Reinhardt: Chemie und Umwelt, vieweg Verlag, S.29

Used wood is defined in Austria as wood, which arises after a specific usage and which the owner wants to dispose of, has disposed or the storage, transportation and treatment as a refuse is matter of public concern.
In Austria about 5.6 million tons of waste wood were generated every year. The biggest part of the used wood amount in Austria represents chemically untreated wood with more than 5.0 million tones or 86,4 PJ in 2007. Chemically treated wood accumulates nearly 550.000 tonnes or 9.32 PJ in 2007 as it is shown in table 5 d.

Table 5 d. Used wood

USED WOOD	**Av. moisture**	**Av. net calorific**	**Amount**	**Unit**	**Amount PJ**	**Remarks**
Chemically untreated (e.g. pallets, wood packages etc.)	15	17 [1)]	5.060.000 [2)]	**tonnes**	65,9	
Chemically treated (painted wood, plywood residues from society, used furniture)	15	17 [1)]	405.060 [2)]	tonnes	6,89	
Total	15	17 [1)]	5.565.860	tonnes	72,79	

1)http://www.parlament.gv.at/PG/DE/XXI/AB/AB_03909/daten_000000.doc, 25.04.2009, 11:45
2) www.bundesabfallwirtschaftsplan.at/filemanager/download/43020, 16.05.2009, 15:25; "Die Bestandsaufnahme der Abfallwirtschaft in Österreich - Statusbericht 2008", Umweltbundesamt GmbH Abteilung Abfallwirtschaft

The only energy grass, which is cultivated in Austria, is miscanthus. In the year 2007 miscanthus was cultivated on 785 ha, which is equivalent to 2.5 PJ. The total land area for energy crops was in the 2007 20.802 ha according to AMA (Agrarmarkt Austria).

In 2008 nearly 2.2 million tonnes of straw were harvested. Currently straw is not an important combustible, despite the yearly amount. Because of bad emission values, low energy density and low ash melting temperature, straw is not in a great demand for combustible. In Austria straw is basically used as animal feed and litter or is left on the field as fertilizer.

Table 5 e. Herbaceous and fruit biomass resources and other resources

HERBACEOUS AND FRUIT BIOMASS RESOURCES AND OTHER RESOURCES	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**	**Amount PJ**	**Remarks**
Energy grasses (reed canary grass, miscanthus, etc; specify) for energy use	15	16,28	785 ha [1)]	ha	2,5	In Austria Miscanthus is the only energy grass which is cultivated for energy use. Source AMA
Land area for energy crops (wood, herbaceous, fruit)			20.802	ha		source AMA
Straw (potential)	15	13,68	2.167.000	tons	29,64	total harvested amount 2008, under the assumption, that all straw is used for energy production
Olive residues (potential)			0	tons		
Olive production area			0	ha		
Peat				tons		
Other resources (specify, add extra rows if needed)			0	tons		

1) Statistik Austria: Anbau auf dem Ackerland 2008, www.statistik.at/web_de/static/anbau_auf_dem_ackerland_2008_036140.pdf

The demand for wood pellets was exploding within the last years. In 2006 the amount of pellets production met the production capacity at 617.000 tonnes or 11 PJ. In 2007 the

production capacity increased up to 750.000 t. For wood briquettes no actual data were available.

Table 5 f. Production of refined wood fuels

REFINED WOOD FUELS Production in 2006	Av. moisture %	Av. net calorific value as received (MJ/kg)	Amount of production	Production capacity	Unit	PJ	Remarks
Pellets	10	17,20	617.000	617.000 [1)]	tons	11	source Propellets Austria, increase in production capazity (2007 appr. 750.00t)
Briquettes	10	17,20	n.a.		tons		
Other refined wood fuels (specify)	10	17,20	n.a.				

1) source: Interview with Mag. Schlagitweit, propellets Austria

Table 5 g. National use of refined wood fuels

REFINED WOOD FUELS National use in 2006	Av. moisture	Av. net calorific	Amount of use	Unit	PJ	Remarks
Pellets	10,00	17,20	400.000 [2)]	tons	7	
Briquettes	10,00	17,20	n.a.	tons		
Other refined wood fuels (specify)	10,00	17,20				

2) http://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0165.pdf

Table 6. Summary table of resources – techno-economical potential

PJ/a	Forest residues	Solid ind. wood residues	Firewood	Used wood	Herbaceous & fruit biomass	Spent liquors	Peat	Other biomass	Total potential	Production of refined biomass fuels***
Austria	7,5	97,6	41,4	95,7	32,14[1)]	23,8	0	14,1	302,2	11 [2)]

1) Liebel G.u.a. (2008): EE 2020 Potenziale in Österreich Schlussfolgerungen der Task Force EE; Wien BMLFUW, S. 16
2) Kranzl L., Haas R. (2008): Strategien zur optimalen Erschließung der Biomassepotenziale in Österreich bis zum Jahr 2050 mit dem Ziel einer maximalen Reduktion an Treibhausgasemissionen. Endbericht TU Wien, Energy Economics Group,

Table 7. Summary table of energy use. Year: 2006

PJ/a	Forest residues	Solid ind. wood residues	Fire-wood	Used wood	Herbac. & fruit biomass	Spent liquors	Peat	Other biomass	Use of refined biomass	Total
Austria	n.a.	33,1[1)]	64,8[1)]	6 [2)]	0,2[1)]	23,8[1)]	0,004[3)]	20,3 [1)4)]	7 [1)]	163,8

1) Liebel G.u.a. (2008): EE 2020 Potenziale in Österreich Schlussfolgerungen der Task Force EE; Wien BMLFUW, S. 16
2) Kranzl L., Haas R. (2008): Strategien zur optimalen Erschließung der Biomassepotenziale in Österreich bis zum Jahr 2050 mit dem Ziel einer maximalen Reduktion an Treibhausgasemissionen. Endbericht TU Wien, Energy Economics Group,
3) http://statistik.at/web_de/static/gesamtenergiebilanz_022710.xls (09-04-23)
4) biogas, landfill gas, biofuels, burnable waste

4 International and national bioenergy trade

4.1 General overview

As it was pointed out already in this report, Austria is a major exporter of wood products with an export surplus of more than 3.31 billion dollar. Table 8 a) and table 8 b) show the export and import data of refined wood fuels in the year 2007 and 2008. In the year 2007 the Austrian wood pellets producer exported 316.000 tonnes, while only 35.000 tonnes were imported. The major export land for Austrian wood pellets is Italy, with nearly 100 %. The wood pellets are exported in large parts by trucks and preferably in bagged cargo. Bagged pellets are preferred, because later they could be delivered with any truck to the consumer.

The amount of wood pellets, which are exported into other countries is marginal. In 2008 the export of wood pellets decreased over 10.000 tonnes to an export volume of 306.000 tonnes, while the import in 2008 has exploded up to 135.000 tonnes.

In 2008 Austria imported 100.000 tonnes wood pellets more than in 2007. Most of them were imported from Germany, where the production capacity was expanded. The major wood pellets import countries for Austria are the Czech Republic, Romania and since 2008 also Germany.

Unfortunately there were no data for the export or import of wood briquettes available.

Table 8 a. Exporting of refined biomass

REFINED WOOD FUELS Export	**Pellets, tons**	**Pellets, PJ**	**Briquettes, tons**	**Briquettes, PJ**	**Remarks**
Italy	285000 (2006)				
Italy	316.000[1)] (2007)	5,44			
Italy	306.000[1)] (2008)	5,26			

1) source: Interview with Mag. Schlagitweit, propellets Austria

Table 8 b. Importing of refined biomass

REFINED WOOD FUELS Import	**Pellets, tons**	**Pellets, PJ**	**Briquettes, tons**	**Briquettes, PJ**	**Remarks**
Czech Republic, Romania	60.000 (2006)				
Czech Republic, Romania	35.000[1)] (2007)	0,6			
Czech Republic, Romania, Germany	135.000[1)] (2008)	2,32			

1) source: Interview with Mag. Schlagitweit, propellets Austria

4.2 Barriers and opportunities for bioenergy trade

The following statements were based on interviews, which were held with Austrian bioenergy traders. The interviews were conducted via telephone with wood chips and wood pellets traders, the two most important combustibles for solid bioenergy trade.

Firewood is also a very important combustible for the domestic heat supply, but it is mostly produced and sold by small and local producers like farmers and other forest owners. There are mostly no data available but rather estimates. The trading with firewood doesn't bear a meaning for the international bioenergy trade.

Based on the interviews, the following barriers were identified.

The logistic doesn't pose a problem. A major barrier, which is preventing an increase of production, is the lacking supply of the raw material. The raw material for wood pellets and briquettes production is a by-product of the sawmill industry. Sawdust is a limited material and is getting more and more in demand. For this reason the price is continuously increasing.

The pellet boilers are strongly promoted and the exchange of old oil heating is state-aided. But nobody considers the availability of the combustibles and that's the reason why prices will continue to rise.

The largest barrier preventing increasing production is the instability of the market. The sales market as well as the raw material market. The raw material market is directly depending on the sawmill industry. The saw dust is a by-product of the sawmill industry. During the last years the sawmill industry is constantly decreasing the production capacity and so the amount of raw material for wood pellets and wood briquettes are also decreasing.

Another barrier, which affects the export, is the influence of the foreign distributors. They try to lower the prices to the level of the production costs. The pressure on the part of the foreign traders and distributers causes the wood pellet producers and exporters to look for new distribution channels.

Strict regulations and additional requirements for the pellets production in Austria are barriers preventing an increasing production and in further consequence the export of wood pellets and briquettes. More and stricter requirements in Austria make it harder for especially smaller wood pellets producer. It could be possible that wood pellet producers have to publish data of emissions or install a bio filter for their production.

The price is one of the most influencing factors for production, export/import and the consumption of biomass.

The availability of raw material depends on the actual wood price. If the price is high, it is profitable even for small forest owners to lumber or deforest and the supply of raw material for the wood chips production is increasing. Another barrier which is preventing increasing production is that the forest in Austria is very small structured and owned by countless private persons.

The supply of raw material for the wood chips production is also depending on the demand of the saw mill industry, but not as strong as at other combustibles like pellets and briquettes.

The production of wood chips is decentralised and the chippers are run by diesel, so the diesel price influences the price of the wood chips and the big industrial consumers are not willing to pay the high price.

The export of wood chips is currently no issue.

<u>Proposals to overcome these barriers:</u>

The objectivity must be enhanced. That means the cost saving should not be the mean argument for the decision between a pellet boiler and a new and modern oil heating. The ecological and environmental issue should be fore grounded.

Another way, how this barriers could be overcome is to create specific biomass aid packages.

One solution for these barriers is direct selling. The producer is also the distributer and could so avoid the market power of traders. We are expanding this form of direct selling since 2004 and we will do more like this in future. As producer we are delivering the wood pellets directly to the end user and so we are skipping the traders in the supply chain.

One point is a higher wood price. If the wood price is increasing, the supply of raw material is also rising.

Because of a wind blow last year, the supply of raw material was quit good. Also natural phenomena are influencing the market.

There is no great potential for changes regarding regulations and political frameworks.

Advantages:

A big advantage of the biomass is the independence from foreign energy sources. In Austria there is basically enough biomass, but to face the challenges of the future we will need an energy mix. Energy mix means a combined energy supply by all renewable sources like solar energy, community heating, wind energy, biomass and also fossil fuels and including all energy-saving measures.

The opportunities are very limited because of the strong connection to the sawmill industry. The raw material has to be bought for the wood pellet and briquettes production. Some of the pellets producers do not have their own raw material. Because of the current economic situation the supply of sawdust is decreasing and the price has doubled since last year.

In view of the pellets production and trade, the opportunities depend on the development of the sawmill industry.

A future opportunity is the extension of combined heat and power plants. We are still delivering to some cogeneration plants. There are plans of the government to advance the combined heat and power stations.

Opportunities regarding to the raw material market is strongly connected with the pulp and paper industry. There is a competition for raw material and the pulp and paper industry is dictating the price.

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Cement industry
Perlmooser Lafarge Mannerdorf, Austria

The cement mill in Mannersdorf is one of the two Austrian cement mills of the Lafarge Perlmooser GmbH. With an annual production capacity of 1.4 million tonnes, it is the largest cement mill in Austria. The cement mill in Mannerdorf was founded in 1894 and since 1997 it is part of the International Lafarge Group. The Lafarge group was foundet 1833 in France and is today located in more than 70 countries all over the world. With 71.000 employees and an annual turnover of 17 billion dollar, the Lafarge Group is a large international producer for building materials.

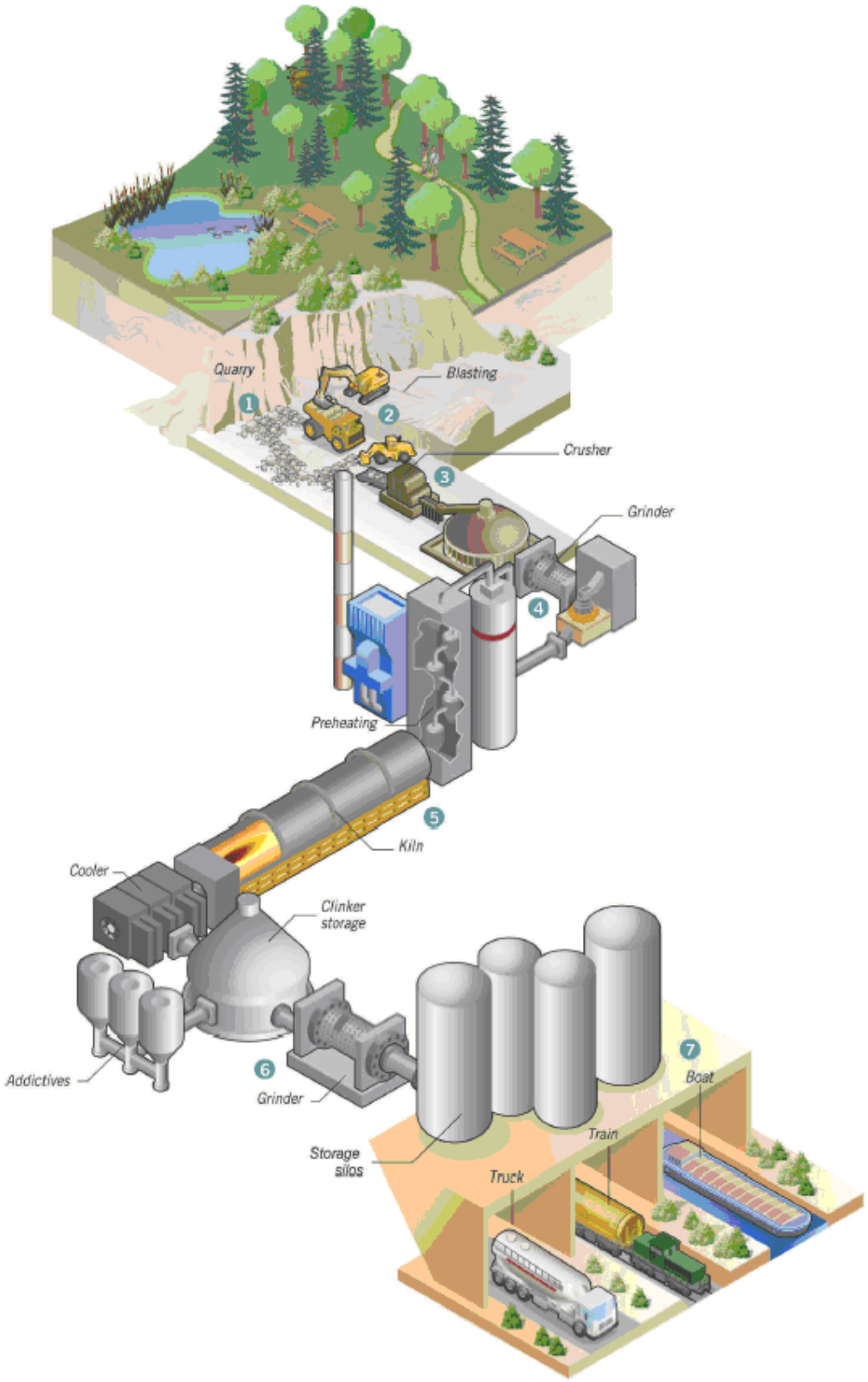
In 1996, Lafagre Perlmooser GmbH began to use refuse derived fuels at the cement mill in Mannersdorf and since 2000, they have started to intensify their environmental protection activities and cooperations with WWF for several projects. With the new special equipment to reduce the nitrogen oxides and modern filter systems, they could reach the compliance of current emission regulations.

Energy consuming production process

The raw materials, mainly limestone and clay, are extracted from quarries by blasting (1) and transferred in a dumper (2) and truck to the crusher. In the crusher (3) the raw materials get grinded and homogenised. After crushing, they are transported to the plant by conveyor belt where they are stored.

From the storage, the raw materials get into the grinder, where very fine grinding produces raw meal (4). This fine raw meal is preheated and then fed into a rotary kiln (5). In the rotary kiln, a flame of 2000°C heats the material to 1500°C before it is cooled by bursts of air. The hot flue gases from the kiln are used for preheating the fine grinded raw materials before they are fed into the kiln. After the heating in the kiln, clinker is obtained. The clinker is stored before he is finely

ground with gypsum (6) to obtain “pure cement”. Additives can be added to obtain blended cements. All components are ground to a fine and homogenous powder in a ball mill. The final product, called cement, is stocked in silos before being shipped in bags or in bulks to the sites where it will be used.



Process diagram of the cement production

Energy and raw material demand

For the production of 1.4 million tonnes cement in Mannersdorf, they use 1.4 million tonnes raw material for the kiln and about 0.3 million tonnes additives. These additives could be sand, flue ash, slag or slag sand.

The energy input for the rotation kiln is about 833.000 GWh and approximately 33 % are from refuse derived fuels.

Current and planed demand of resources

[1.000 t]	*current*	*planed*
limestone	*1.160*	*1.089*
Alternative raw materials	*125*	*325*
coal	*70*	*30*
refuse derived fuels	*52*	*132*
additives	*325*	*525*

Electricity

The cement mill in Mannersdorf uses also an amount of electricity. Most electricity is used in the grinders and the ball mills, for powdering the clinker, for flue gas blowers and the clinker cooler as well as for different conveyers during the whole production chain.

NO_x - Emissions

For maximum reduction of NO_x emissions, Lafarge Perlmooser installed new innovative equipment, called SCR (selective catalytic reduction). With this new equipment, they could improof the NO_x limit in emissions from 0.5 to 0.2 g/m³ exhaust or 60 %.

CO_2 - Emissions

One way to lower the CO_2 emissions is to reduce the clinker content in the cement. The clinker is responsible for fast and good curing process and is also responsible for the bulk of CO_2 emissions during the production process. To lower the content of clinker in the cement, without loss of quality, means to lower the CO_2 emissions.

Because of upgrading of plant components, the efficiency is increasing and the energy demand and subsequently the CO_2 emissions. Therefore a new ball mill is installed.

Another way to reduce the CO_2 emissions is to replace fossil fuels through refuse derived fuels and biomass.

Alternative fuels

The use of by-products from other activities turns waste products into resources. Due to residues-free production, no disposal material accumulates. The ashes of the different refuse derived fuels are used in the production process of the cement mill. There is beside the thermal recycling also a material recycling. Because of the high temperature burning over 1400°C and the resident time of more than one hour in the rotation kiln, all organic substances are destroyed. Following refused derived fuels were used for the cement production:

- Used tyres
- Plastic waste
- Used oil
- Dissolver
- Paper fibre residues
- Meat and bone meal
- Animal fat

Investment costs

The investment costs for achieving the aim of the company, like the reduction of the energy and raw material demand and the reduction of the emissions, amount to more than 10 million Euros.

Additional information

http://www.lafarge.at/

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