Country Report AUSTRIA
Standardisation of Solid Biofuels

FAIR-Projekt "Standardization of Solid Biofuels in Europe"
(FAIR-CT98-3952; DG 12-SSMI)

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0. INTRODUCTION AND OBJECTIVES

Standardisation used as the “once adopted solution of a recurring task” only makes sense if the task has to be fulfilled with sufficient frequency. It has to be taken into consideration that the drafting of standards requires consent on a relatively broad basis. The time and personnel needed to complete a standard is not be underestimated. When deciding whether a standardisation shall be completed it has to be recommended to juxtapose the attainable profit to the required expense.

The national report, which is part of the FAIR project "Standardization of Solid Biofuels in Europe" (FAIR-CT98-3952; DG 12-SSMI), describes the situation of solid biofuels in Austria. Some standards available on biomass are older than ten years, some of them were revised and published in a revised edition last year. The second source used for this report are the results of a survey on the standardisation of solid biofuels. The survey and its evaluation were carried out under them supervision of Dr. Eva Waginger, University of Economics and Business Administration Vienna, Department of Technology and Merchandising.

In Austria the most important biogenic fuels are wood and side products of the sawmill industry due the high percentage of forests in Austria. Thus, the existing standards mostly refer to natural wood and natural side products. Peat is not used for fuelling purposes in Austria and is therefore not included in this report.

1. SOLID BIOFUELS AS A SOURCE OF ENERGY

Bioenergy: Current Situation

Austria has a total area of 83,880 square kilometres (8.388 Mio ha). 46.2 % or 38,780 square kilometres (3.878 Mio ha) of the total area are covered with forests. The annual increment of these forests amounts 31.4 Mio m^3 of wood. The annual felling comes only to 19.8 Mio m^3 wood. That means that under consideration of a sustainable forestry and without enlargement of the forest area some more 5 to 6 Mio m^3 of wood per year can be harvested.

Austria has 1.404 Mio ha arable land and 1.940 Mio ha of grassland. As potential area for energy crops (e.g. rape, sunflower, energy grain, miscanthus, hemp,..) and short rotation forestry in a long-term consideration approximately 300,000 ha can be used.

Due to the huge forest area the heating of living spaces with biomass (wood) has a very long tradition.

In the big cities biogenous energy is more and more replaced by fossil energy like natural gas, oil and district heating gained from incinerating plants. However biogenous energy is still very important in rural areas where "local energy" is used by means of the latest technique, from single heaters to central heating systems to district heating plants with some MW thermal power.

The Austrian energy requirements of 1286 petajoule (PJ) were covered in 1995 in the following way:

- 829 PJ from imports (64.4 %)
- 427 PJ from national raw material (33.2 %)
- 30 PJ from stored supply (2.3 %)

56.0 % of the energy imports were oil and oil products, 27.6 % gas, 12.9 % coal, 3.2 % electric energy and 0.3 % biomass.

The most important factor of the domestically produced energy was hydro-power (40.5 %) followed by biomass (fire wood, combustible waste, biogenous fuels) with 33.0 %. 10.7 % were obtained by oil, 12.5 % by gas and 3.3 % by coal.

Biogenous energy is the local energy, the energy of smaller units, due to its properties. It helps to create and preserve jobs, to secure the value of rural areas and to preserve land developed and cultivated by man. In Austria 143 PJ renewable energy sources are provided every year for the energy supply.

The biggest part are provided by fire wood, chipped wood and bark.

Austria is a federal state with nine provinces. The provinces focus on energy policy using successfully the bottom-up principal in connection with experts.

Bioenergy Policies and Programmes in Austria

In Austria you find a variety of campaigns / concepts / programmes / supportive measures which constitute together the "bioenergy programme Austria".

National and Regional Policies

The energy concept of the Federal Government

Renewable energy like sun-ray, water-power, biomass, wind, geothermal energy and ambient heat shall constitute in the longer term the basic elements of energy supply. The principal shall be a lasting development. One of the most important examples is that biomass is increasingly extending throughout the market. The Federal Government holds the opinion that especially an increased use of biomass, but also other forms and technologies in the field of renewable energy, have very good possibilities of realisation. The potential of biomass promises a considerable increase in the contribution to the supply of energy. Nevertheless the Government perfectly realises that it is not one source of energy alone which is able to contribute decisively to the supply of energy, but only the sum total of all potential possibilities. At the moment some technologies for the use of renewable energies have reached the threshold to economy. Above all it holds true for the generation of heat by means of biomass and direct sun-ray, as well as for heat pumps. Because of general conditions on the world energy market renewable energy and technologies are not competitive.

National environmental plan (Nationaler Umweltplan NUP)

Seven groups of experts worked out the national environmental plan on behalf of the Federal Government. The fundamental aims are:

* Operationalisation and implementation of the principal of a lasting development
* Working out integrated concepts for the environmental precaution and their establishment in the politic public
* integration of matters of concern of environmental policy in all the fields of politics (industry, traffic, energy, agriculture, health, research, technology and education)

Energy Concept of Upper Austria

In the energy concept of Upper Austria the following four fields are established as guidelines for the energy policy: 1. improvement in saving energy; 2. the increased use of renewable energy (biomass, solar energy,...); 3. use of water-power until ecological defined limits are reached; 4. minimisation of fossil energy by an optimisation of points 1 to 3.

The target is to increase the contribution of renewable energy to the energy supply of the country to at least 33 % in the year 2000. Above all this target shall be reached by doubling the contribution of biogenous energy, apart from the use of water-power, in seven years (1991: 5 % - 2000: 10 %) and to raise the use of solar energy by collectors and ambient heat (Umgebungswärme) up to 2 %.

The targets mentioned above are completed by a detailed catalogue of measures, which shall be reached within a certain time limit.

Guidelines of the energy policy of the province of Lower Austria

The guidelines formulate the essential targets of the energy policy of the province. They present a catalogue, differentiated as regards content and special policies, which is based on the general principles of the regional policy and current regional, economic and ecological trends.

The most important motive to work out this regional programme was to show the appearance and use of biomass in a differentiation for the whole province. At the same time a co-ordination with competing energy sources (above all natural gas) shall be reached.

65 targets show a variety of measures, which shall be explained in detail. The guidelines for the energy policy end with a recommendation for further proceedings.

Energy guidelines for the province of Salzburg

The aims of the first continuation of the energy guidelines are:
- to check and evaluate the energy policy of the province practised until today
- to work out a new energy balance
- to show relevant energy potentials (saving energy, biomass, solar energy)
- to estimate the presumed development of the energy consumption and
- to determine measures for the next 15 years which are relevant in the field of energy and for the environment and their economic and ecological effects.

It will be necessary to work out reports about municipalities and regions, above all in connection with the target mentioned last. Realistic estimations about the energy consumption, the possibilities to save energy and the biomass potential as well as the possibilities to use biomass shall be secured.

Styria

In the energy plan of the province it is determined to raise the contribution of biomass to the energy supply of the province from 14 % in 1994 to 20 % in the year 2000. In order to reach the target the establishment of biomass district heating plants as well as the generation of power and process heat (Prozeßwärme) by biomass shall be promoted. [18]

The law concerning the agriculture of Styria [19] determines the following targets:

- § 7: In order to provide the rural area sufficiently with facilities of the infrastructure the extension of the energy supply, especially the use of renewable energy sources like biomass and solar energy, shall be promoted.

- § 10: As a matter of co-operation not on a company level the establishment and management of communities for the generation of energy shall be considered. Furthermore the establishment and management of communities for the generation of energy from renewable raw materials shall be promoted.

Bioenergy Programmes

The production of biomass on set-aside land is being promoted by the European Union. In Austria these aid programmes are carried out by Agrar-Markt-Austria (AMA).

The Ministry for Agriculture and Forestry supports - with regard to the production - the plantation of short rotation forestry. With regard to the use of biogenous energy sources the establishment of rural district heating plants as well as the purchase of biomass heating systems for the supply of single agricultural businesses are promoted.

In every province you find different sorts of sponsorship (investment aid, loans, credits) for the establishment of biomass district heating plants, for the connection to such plants as well as for the installation of boilers for biogenous energy sources (sponsoring district heating and residential building).

Representation of Biomass Interests

The Austrian Biomass Association (Österreichischer Biomasseverband) assumed the responsibility to shape the national and international public opinion in a positive way about environmental and energy policy and to inform decision makers in politics and in the economy about the possibilities and the advantages of biomass.

Österreichischer Biomasseverband, Franz Josefs-Kai 13, A-1010 Wien
Tel.: ++43 1 533 07 97, Fax: ++43 1 533 07 97-90; Dr Heinrich Kopetz, Dkfm Ernst Scheiber

Laws and Technical Regulations

The implementation of biomass is essentially influenced by laws and technical regulations. Laws and standards may impede development, but they may also lead to an improvement.

In the Federal Law the targets of environmental planning are determined which shall be formulated in detail and carried out by the provinces and municipalities.

The minimal efficiency as well as the emission limitations for manual and automatic residential heating systems up to a heating power of 350 kW are obligatory determined in agreements between the Federal State and the provinces under the regulations article 15a in the law of the Federal Constitution of Austria (Bundesverfassungsgesetz).

The standardisation of fuels is one requirement for the establishment of a market as well as for the conception of boilers and heating systems. The Austrian fuel standards include details about sampling, physical data (density, size, etc.) and average figures about the carbon content, the hydrogen content and the oxygen content. The emission standards determine the measuring method and the limits for air pollutants. These standards are presented in detail in the following chapters.

Technical Planning

A well done planning is the precondition and the foundation for the success of energy concepts and biomass projects. Austrian enterprises have made essential experience for decades.

Research Programmes

In Austria research programmes concerning questions of biomass production, the use of biomass and questions relevant for the environment are promoted publicly by different ministries. Projects which emphasise on research of some provinces are sponsored co-operatively by the state and the provinces.

Below the addresses of the most important ministries are listed.

* Federal Ministry for Science and Traffic, Minoritenplatz 5, A- 1014 Wien;
  Tel.: ++43 / 1 / 53120-0; Fax: +43 / 1 / 53120-6480; Dipl.-Ing. Michael Paula, Dipl.- Ing. Brigitte Weiß.

* Federal Ministry for the Environment, Stubenbastei 5, A-1010 Wien;
  Tel.:++43 / 1 / 51522-1315; Fax: +43 / 1 / 51522-7626; Dipl.-Ing. Dr. Wolfgang Jank.

* Federal Ministry for Agriculture and Forestry, Stubenring 1, A-1012 Wien;
  Tel.:++43 / 1 / 71100-0; Dipl.-Ing. Elfriede Fuhrmann, Dipl.-Ing. Angelika Steger.

The working group 'renewable raw materials' of the Ministry of agriculture and forestry, under the management of Dipl.-Ing. Manfred Wörgetter, BLT Wieselburg, is in charge of the co-ordination of research in the respective field. Targets and problems shall be dealt with interdisciplinary and the results shall be presented to the public.

Existing and Potential Market Size / Bioenergy 1994 and Development until 2010

Fire wood, chipped wood and by-products of wood processing are established on the national energy market. About 80% of renewable energy sources are apportioned to those types of biomass.

In the table below biogenous energy sources which are important in Austria are listed. It outlines which are of a future interest and therefore looked at in greater detail by the national working group of the network.

Trial plots (1000 ha) short rotation forestry have examined different types of trees with regard to their yield potential, cultivation and harvesting techniques as well as ecological effects on the ground, on flora and fauna.

The forest sector and the use of fire wood have a long tradition. Chipped wood and by-products of wood processing (e.g. bark, sawdust) are used in partly or fully automised heating plants or they are compressed to briquettes and used in fireplaces and tiled stoves.

During the last years straw as a by-product of cereal production has been rediscovered for biomass district heating plants. The thermal power of the ten straw district heating plants which are in operation in 1995 is 20.4 MW. The small residential heating plants of the 80ies have not been further developed due to severe conditions concerning emissions. Other by-products of plant processing like sunflower husks or flax shaves are used in chipped wood heating systems.

The pruning of park trees and fruit trees and of the vines is only sometimes used for the energy supply. However the potential should not be underestimated because of the area. In

Lower Austria 18 out of 66 services in charge of the preservation and renewal of streets and motorways (4.8 MW thermal power) are supplied with bioenergy.

In the field of non-woody, annual and perennial plantations different types of plants are under discussion in Austria. The use of cereal plants, cultivated on set aside areas, in straw fired district heating plants is realised quickly and is now tested in practical trials. The cultivation of miscanthus is tested in different areas and under likely conditions. There is a need of research and development with harvesting techniques and logistics (transport, drying, storing). Test experiments are being made with hemp, an old cultivated plant, in order to find types suitable for Austria and to clarify the energetic possibilities of the whole plant or parts of the plant.

Quite a number of potential estimations have been made, which show different results according to the different conditions under which they took place. It is rather difficult to make a prospective potential estimation for biogenous energy sources as the actually used potential depends on different conditions. In Austria only 2/3 of the annual increase in wood are currently used because of unfavourable economic conditions. The table below shows the estimations for 1999 for the technical usable potential, which could be reached under favourable conditions (a committed energy policy).

1 PJ = 1.000,000 GJ = 23,810 tonnes oil equivalent = 23.8 ktoe
1 tonne oil equivalent (toe) = 42 GJ = 0.000042 PJ

Table **Fehler! Unbekanntes Schalterargument.**: Technical usable potential of biogenous energy sources of Austria which have been considered in the AFB-net

		technical usable potential [PJ/a] [*toe*]		
		1994 made use of	1994 usable	2010 usable
Short rotation forestry	Short rotation forestry with different cutting cycles	0.0 *0.0*	0.12 *2,860*	6 *143,000*
Forestry	Fire wood, chipped wood, by-products of wood processing	115 *2.740,000*	135 *3.210,000*	150 *3.570,000*
Agricultural residues	Straw, residues of plant processing	1.17 *27,900*	11.8 *281,000*	16.4 *390,000*
Arboricultural residues	Pruning of park trees and fruit trees, vegetation next to roads, pruning of the vines	0.07 *1,670*	2.37 *56,400*	2.6 *61,900*
Non wood North	Cereals (whole plant), miscanthus, hemp	0,02 *476*	17 *405,000*	25 *595,000*
	Sum total	**116,26** ***2.768,000***	**166,29** ***3.959,000***	**200** ***4.762,000***

In table 2 some more renewable energy sources are listed than in table 1. Some of the figures in the table are estimations.

As the portion of renewable energy sources of about 12 % of the gross domestic national energy consumption (without hydropower) is relatively high a doubling until 2010 under the present framework is unrealistic. The other component is the market price of the different energy sources. The higher the level of the prices for energy the more of the theoretical potential will be utilized.

Especially in the sector of the energy crops the assessment of "feasible without problems" are depending very much on the level of the subsidies for the farmers.

Plastics are not included in this table.

Table **Fehler! Unbekanntes Schalterargument.**: Renewable biogenous energy sources

	Current contribution [*toe*] / [%] 100 % = 1235 PJ	Potential [*toe*] / [%] 100 % = 1235 PJ	Doubling until 2010 assessment	ambitious but realistic until 2010 [*toe*] / [%] 100 % = 1235 PJ
1. Forestry incl. bark, saw dust	*2.740,000* 9.3	*4.170,000* 14.2	impossible	*3.570,000* 12.1
2. Agricultural Residues incl. arboricultural residues	*29,500* 0.10	*452,000* 1.54	feasible without problems	*226,000* 0.77
3. Black liquor	*443,000* 1.51	*443,000* 1.51	impossible (already all used)	*443,000* 1.51
4. Demolition wood	*17,100* 0.058	*171,000* 0.58	feasible without problems	*85,500* 0.29
5. energy crops (e.g. rape, sunflower, energy grain)	*30,500* 0.10	*595,000* 2.02	feasible without problems	*100,000* 0.34
6. Short Rotation Forestry	*0.0* 0.0	*143,000* 0.49	feasible without problems	*17,100* 0.058
7. Peat	---	---	---	---
8. Animal excrements	*3,000* 0.010	*386,000* 1.31	feasible without problems	*10,000* 0.034
9. Municipal Solid Wastes	*154,000* 0.52	*250,000 (??)* 0.85	impossible	*200,000* 0.68
10. Organic residues of the industry	*10,000* 0.034	*571,000* 1.94	feasible without problems	*120,000* 0.41
11. Sewage sludge	*10,500* 0.036	*46,300* 0.16	feasible without problems	*23,000* 0.078
12. others	---	---	---	---
sum total	***3.437,600*** **11.7**	***7.227,300*** **24.6**	**---**	***4.794,600*** **16.3**

Within the last 15 years more than 22,000 plants with a total power of about 2,200 MW were installed. During the last two years the portion of small scale pellet furnaces is increasing. More than 1,700 pellet furnaces have been installed within this time.

Table **Fehler! Unbekanntes Schalterargument.**: Development of automatically stoked chipped wood and bark incineration plants

Year Category	1984-91	1992	1993	1994	1995	1996	1997	1998	sum total	total power MW
Small scale plants (up to 100 kW)	9185	1501	1443	1479	1579	2280	2452 *(425)**	3236 *(1323)**	23155	964
Medium scale plants (from 100 to 1000 kW)	1259	150	134	151	172	214	256	280	2616	754
Large plants (more than 1 MW)	163	14	15	20	23	34	45	50	364	766
Total number	10607	1665	1592	1650	1774	2528	2753	3566	**26135**	2484

(* = Pellet furnaces) Source: Jonas, A.; Haneder, H.: LLWK NÖ; 1999

Market assessment compressed wood

In Austria sales figures of small furnaces for compressed wood, especially for wood pellets, are rising significantly. In order to provide an overview of the market situation a producer, a trade organisation and an interest group were interviewed about the market opportunities of compressed wood. Table 4 and 5 display these figures for briquettes and for pellets, respectively.

Table 4: Development of the briquettes market in Austria - estimate, entries in 1000 t

[1000 t]		1996	1997	1998	1999	2000	2010*)
producer	Production	100	100	100	105	110	130
	Imports	50	50	47	62	75	110
	Exports	5	5	7	8	15	20
	Supplied to Austrian consumers	145	145	140	159	170	220
	Used in small plants**)	145	145	140	159	170	210
	Used in large plants***)	---	---	---	---	---	10
trader	Production	100	105	105	105	110	
	Imports	50	50	50	60	70	
	Exports	5	5	5	5	10	
	Supplied to Austrian consumers	145	150	150	160	170	

*) estimating the development during the period of time determined by the White Paper “Energy for the Future: Renewable Sources of Energy” by the European Commission;
) domestic plants up to a maximum of 100 kW; *) plants exceeding 100 kW

Table 5: Development of the pellets market in Austria - estimate, entries in 1000 t

[1000 t]		1996	1997	1998	1999	2000	2010*)
producer	production	15	20	30	35	45	200
	imports	---	---	1	1	5	20
	exports	1	1	2	2	5	20
	supplied to Austrian consumers	14	19	29	34	45	200
	used in small plants**)	13	18	28	33	44	190
	used in large plants***)	1	1	1	1	1	10
Trader #)	supplied to Austrian consumers	15	20	30	35	45	
Interest group ##)	supplied to Austrian consumers		3	20	35	52	210 to 315

*) estimating the development during the period of time determined by the White Paper "Energy for the Future: Renewable Sources of Energy" by the European Commission;
) domestic plants up to a maximum of 100 kW; *) plants exceeding 100 kW
#) Imports and exports are currently rather insignificant and compensating each other (ca. 1000 t); approx. 1000 t were burnt in large plants during the previous years.
##) The estimates are based on the figures of sold pellets furnaces. It results rather difficult to estimate the influence of chipped wood furnaces fuelled with pellets on the number of tons consumed. The forecast for 2010 is influenced by the following parameters: amount of the financial support by the provinces, market tendencies, technological development of pellets furnaces, price development of the fuel sector and of furnaces, prices of fossil fuels,...

Estimates of the sales figures of these fuels, which are closely defined concerning their characteristics, lead to the following result: in 2010: 420.000 to 530.000 t per year, which corresponds to an energy amount of 7.1 to 9.0 PJ.

Reasons for National Interest in Bio-energy

Following few reasons for the national interest in Bio-energy in Austria are listed.

- Nearly the half area of Austria is woodland
- Rural employment
- Environmental benefits
- Biomass production on set aside land
- Import substitution
- Sustainability
- Income for Agriculture and Forestry

Survey results

Asked about the main barriers concerning an increased use of solid biofuels the interviewees were offered the following choices (multiple answers were admissible).

- ❍ Comfort and operating comfort
- ❍ Prices of competing energy carriers
- ❍ Lack of information provided to the consumers
- ❍ Insufficient technological know-how
- ❍ Investment costs for biomass technology
- ❍ Environmental requirements
- ❍ Miscellaneous

Apparently an increase in the consumption of solid biofuels is primarily hindered by economical reasons. Most interviewees assessed the high price of solid biofuels as the main barrier, a majority also referred to the high investment costs. Approximately every second interviewee considered lacking comfort and operating comfort as well as insufficient information as barriers; insufficient technical know-how, miscellaneous reasons or environmental requirements are rated as negligible barriers.

Table 6: Assessment of barriers concerning an increased consumption of solid biofuels.

Barrier	Absolute Frequency	Frequency %
Price	32	86
Investment costs	22	59
Comfort and operating comfort	18	49
Insufficient information	16	43
Technological know-how	6	16
Miscellaneous reasons	6	16
Environmental conditions	1	3

The producers generally agree that the price, followed by insufficient information, is to be considered as the main barrier. The plant manufacturers rate the price, investment costs and lacking comfort and operating comfort first in the list of the main barriers, while hardly any importance is attributed to insufficient information. Interviewees working in other sectors (in the table classified as “other activities”) as well as planners and experts apparently share this assessment.

2. DEFINITIONS AND CLASSIFICATIONS

The following Austrian Standards (ÖNORM) contain general definitions and explications.

- ***ÖNORM M 7101: Concepts of Energy Economy - General terms with definitions (1996 01 01)***
  (Begriffe der Energiewirtschaft - Allgemeine Begriffsbestimmungen)

This standard contains general definitions of the power-producing industry, which are generally co-ordinated with the terminology of the World Energy Council *(WEC). If definitions had to be changed due to long-term experience, Austrian definitions were given priority.*

Biomass is defined as organic substances which are biogenic and non-fossil; e.g. forestry and agricultural biomass.

Annex 1 of the standard is an index of headings, which lists terms of the energy-producing industry taken from 14 Austrian standards and their sources. Annex 2 contains economic terms.

- ***ÖNORM M 7104:*** **Concepts of energy economy - Mining and processing of solid fuels *(1996 01 01)***

(Begriffe der Energiewirtschaft - Gewinnung und Verarbeitung fester Brennstoffe)

In the first section, dealing with the different types of solid fuels, definitions of wood, bark, raw wood, softwood and hardwood are included and typical Austrian terms and Austrian Standards are listed.

Wood consists of organic cellular tissue, which is produced by higher plants (trees, bushes) on the inner side of the accretion zone (cambium) in form of branches, trunks and roots.

Biomass is defined as organic substances which are biogenic and non-fossil.

In the second section preparation and processing products are listed and explained. The significant distinguishing features are size and dimensions. The products are categorised as firewood, chipped wood, sawmill waste or compressed wood, bark and straw and are partly divided into sub-categories.

The sixth section defines some analysis parameters (water content, ash content, volatile components, crucible coke, net and cross calorific value). The listed standards, though, mainly refer to fossil solid fuels.

- **ÖNORM M 7111: Concepts of energy economy - Energy of biomass, organic waste, wind and geothermal energy (1996 01 01)**
  (Grundbegriffe der Energiewirtschaft - Energie aus Biomasse, organischen Abfällen, Wind und Geothermie)

In order to standardise the terminology a series of standards was published. The terms and definitions of the concrete standard are based on the documents and papers of the World Energy Conference and other technical literature. The definitions have been adjusted as closely as possible. Terms which are characteristic of Austria have been marked. The standard influences the terminology of specific standards.

Biomass is defined as organic substances which are biogenic, and non-fossil. In the following paragraph the terms *primary biomass, secondary biomass, forestry biomass, agricultural biomass and organic waste* are described.

After presenting *processes and institutions of energetic use of biomass and organic waste*, *products made of biomass and organic waste* are defined. Among the solid energy carriers such products are *firewood, chipped wood used for energetic purposes, side products of the sawmill industry, compressed wood and chopped straw.*

Survey results

- Asked about their ways of classification of solid biofuels approx. 46% of the interviewees stated that they exclusively used Austrian Standards, 13.5% additionally used German Industrial Standards (DIN Normen) and 27% additionally used other means of classification; about 8% said that they used all three methods of classification. Hence, approx. 95% of the interviewees work with Austrian Standards and more than 20% with German Standards.

Table 7: Methods of classification used for solid biofuels.

Which methods of classification do you use?	entries	frequency %
ÖNORM	17	45.9%
ÖNORM + other	10	27.0%
ÖNORM + DIN	5	13.5%
ÖNORM + DIN + other	3	8.1%

- Asked about their experience with Austrian Standards and German Standards more than half of the interviewees rated the Austrian Standards as useful, still more than 25% rated them as hardly useful or even useless. DIN Standards are predominantly assessed as useful.

Table 8: Experience concerning the use of classification methods for solid biofuels according to Austrian and German Standards

Experience	ÖNORM	DIN
	Frequency %	Frequency %
Useless	5.4	
Hardly useful	21.6	5.4
Useful	51.4	16.2
Close to practical use	2.7	2.7
Optimal	2.7	

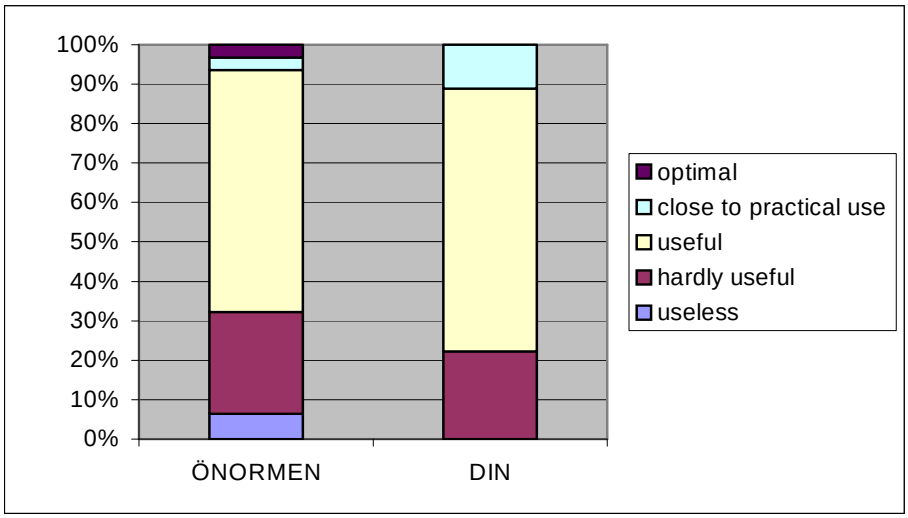

Diagram 1: Experience with Austrian Standards (ÖNORM) and DIN Standards

The effects of this classification on the solid biofuel markets were on the average graded "satisfactory" (2.9 on a scale ranging from 1-5, 1 being "excellent", 5 being "insufficient"). A large amount of 37% of the interviewees grades the effects of the classification on the market situation "good", however 13-18 % respectively are of the opinion that the effects are only "satisfactory" to "insufficient". Only a minority grades the effects "excellent".

Table 9: Assessment of the effects of the classification on the markets.

Assessment of the effects	Frequency %
Excellent	5.4
Good	37.8
Satisfactory	18.9
Sufficient	16.2
Insufficient	13.5
no answer	8.1

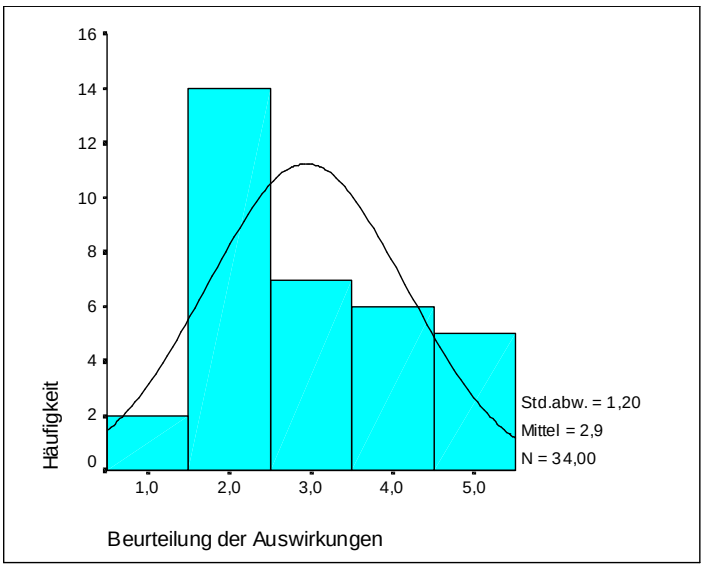

Diagram 2: Average assessment of the effects of the classification on the markets

3. EXISTING STANDARDS, GUIDELINES AND/OR MANUALS

The standards dealt with in this chapter are classified in two groups. The first group presents Austrian Standards which describe the practical interface between fuel producers and plant producers and plant operators. The second group summarises Austrian Standards which contain information on biogenic fuels used as test fuels.

3.1 Biogenic fuels used for energy purposes:

- **ÖNORM M 7132: Energy-economical utilisation of wood and bark as fuel - Definitions and properties (1998 07 01)**
  (Energiewirtschaftliche Nutzung von Holz und Rinde als Brennstoff - Begriffsbestimmungen und Merkmale)

The initiative for establishing this standard was taken by the forestry industry. *The most important terms and characteristics for energy-economical utilisation are determined in the standard. When determining the standard traditional terms of the forestry and wood industry, especially those traditionally used in Austrian wood trade, were used.* The terms are crucial for the economic exchange between producers, traders and consumers. The standard includes wood with and without bark used as raw material and side products of the wood processing industry without binding agents or coatings.

The standard represents a link between the wood industry and the manufacturers of biomass boilers. A fact which has contributed decisively to the positive development of energy produced of wood. The terminology of the forestry and wood industry is made available to the plant manufacturers. The description of the technological characteristics of the fuel facilitates the development of plants.

The section “Terminology” provides definitions of various terms. The subsequent chapter includes information on the elementary analysis (C, H, O), the share of volatile components, the ash content, the ash fusibility and the net and cross calorific value. Furthermore, data on the mean density of the anhydrous substance of different types of wood are provided. By means of using the solid content of typical types of wood (i.e. the number of cubic meters in a solid wood body) a conversion of the density of the wood body to the storage density is feasible. Additionally, the standard contains data on analysis methods and reference standards.

Since its publishing the standard has contributed to the dissemination of knowledge, a standardisation of terminology and the imparting of extensive knowledge and therefore also to the development of an energetic use of wood.

- **ÖNORM M 7133: Chipped wood for energetic purposes - requirements and test specifications (1998 02 01)**
  (Holzhackgut für energetische Zwecke - Anforderungen und Prüfbestimmungen)

Again the standard was initiated by the forest industry. Standardised fuels which may be transported on conveyor belts like chipped wood used for energetic purposes render an automatic fuel supply feasible. The standard is aimed at avoiding insufficiencies concerning

the quality of the fuel. The standard classifies chipped wood with or without bark in different classes and determines requirements and test specifications.
The classification is carried out according to the following parameters: water content, size, bulk density and ash content. Water content classes are determined according to the following scheme: up to 20 % (air-seasoned), up to 30 % (resistant in storage), up to 35 % (limited resistance in storage), up to 40 % (moist) and up to 50 % (moist content at harvest time).

The classification according to sizes, including the respective shares in coarse, main and fine material, is displayed in the following Table 10.

Table 10: Chipped Wood - Classification

Total mass 100 %		chipped wood-size classes		
		G 30 fine	G 50 medium	G 100 coarse
coarse material max. 20 %	cross-section max. cm²	3	5	10
	length max. cm	8.5	12	25
	coarse sieve-nominal mash width mm	16	31.5	63
main material 60 % to 100 %	medium sieve-nominal mash width mm	2.8	5.6	11.2
fine material (incl. very fine material) max. 20%	fine sieve-nominal mash width mm	1	1	1

Bulk density categories are determined according to the bulk density in an anhydrous state. *Low bulk density* (up to 160 kg/m³) includes e.g. chipped wood of poplar, willow or fir, *medium bulk density* (160 to 200 kg/m³) chipped wood of pine, larch, birch, alder. Hardwood like beech, oak and robinia belongs to the category high bulk density (more than 200 kg/m³).

Concerning the ash content two different classes are distinguished. Chipped wood with a low bark content displays an ash content of up to 0.5%. Chipped wood with a higher bark content displays an ash content of 0.5 to 2.0%.

Coarse impurities and other foreign substances must not be added. A standard terminology renders a short description of chipped wood possible.

Already in the initial stages of its elaboration the standard has contributed decisively to a simplification and improvement of equipment and devices for the production process, the automatic transport and the incineration. The standard is especially significant for the manufactures of chopping machines and furnaces with a low output (less than 1MW). The determination of size categories allows for a mutual adjustment of the equipment for the production process and the utilisation. A classification according to the water content and the ash content facilitates the assessment of the fuel value.

- **ÖNORM M 7135: Compressed wood and compressed bark in natural state - Pellets and briquettes - Requirements and test specifications (1998 02 01)**
  (Preßlinge aus naturbelassenem Holz und naturbelassener Rinde - Pellets und Briketts - Anforderungen und Prüfbestimmungen)

The standard was initiated by the sawmill industry and the wood-processing industry. Compressed wood consisting of forestry biomass is of particular interest to the industry, as it implies the marketing of side products. The standard allows for trading the product as it provides the necessary prerequisites for a professional combustion which is compatible to

environmental standards. The standard contains requirements and methods for testing processes and addresses fuel producers and fuel traders as well as manufacturers, builders and operators of plants used for energetic purposes. The standardised compressed wood consists of natural biomass without any binding agents.

Fuel engineering requirements for pellets and briquettes are summarised in Table 11.

Table 11: Fuel engineering requirements for compressed wood

Parameter	Pellets	Briquettes
cross section mm	$4 \leq x \leq 20$	$20 \leq x \leq 120$
length mm	≤ 100	≤ 400
wood density kg/dm³	≥ 1	≥ 1
water content %		
• compressed wood	≤ 12	≤ 12
• compressed bark	≤ 18	≤ 18
ash content % of the dry matter		
• compressed wood	≤ 0.5	≤ 0.5
• compressed bark	≤ 6.0	≤ 6.0
net calorific value MJ/kg		
• compressed wood	≥ 18.0	≥ 18.0
• compressed bark	≥ 18.0	≥ 18.0
sulphur content % of the dry matter		
• compressed wood	≤ 0.04	≤ 0.04
• compressed bark	≤ 0.08	≤ 0.08
nitrogen content % of the dry matter		
• compressed wood	≤ 0.30	≤ 0.30
• compressed bark	≤ 0.60	≤ 0.60
chlorine content % of the dry matter		
• compressed wood	≤ 0.02	≤ 0.02
• compressed bark	≤ 0.04	≤ 0.04

Compressed wood or compressed bark may only be produced from natural wood or bark.

In the subsequent section methods for the determination of the required parameters are listed. Since the revision of the standard in 1998 a standard label may be fixed to products complying with the respective parameters. Tests concerning the standard compliance of the compressed wood and bark include an initial test, tests carried out by the producers and periodic tests in fixed intervals.

The standard has proven to be very sufficient and has contributed decisively to the introduction of high-grade briquettes and pellets.

- **ÖNORM M 9465 Part 1: Emission limits for air contaminants of straw incinerating plants up to a rated heat output of 75 kW; requirements and testing on the site (1985 10 01)**
  (Emissionsbegrenzung für luftverunreinigende Stoffe aus Strohheizungsanlagen bis zu eine Brennstoff-Wärmeleistung von 75 kW - Anforderungen und Überprüfung am Aufstellungsort)

Straw used as a fuel is available in different forms depending on the harvesting and the processing method. It may be used for energetic purposes in the form of loose straw, chopped straw, straw in form of bales, straw briquettes and straw pellets.

The characteristics listed in the standard (net calorific value, water content, ash content, fusibility, content of volatile components) and data on the size and density of the substances are taken from the doctoral thesis by Eugen M. Hofstetter, Munich 1978.

3.2 Biogenic types of test fuels:

- **ÖNORM M 7510-4: Checking of heating systems for solid fuels with nominal heat output up to 300 kW (1997 05 01)**
  Überprüfung von Heizanlagen für feste Brennstoffe, mit einer Nennwärmeleistung bis 300 kW (1997 05 01)

In section 1 of this standard some characteristics of those biofuels which can be used for the testing of heating systems are listed. Biogenic fuels in this standard are the following types of firewood in natural form:

A Log wood with a water content of w ≤ 25 % following ÖNORM M 7132
B1 Chipped wood following ÖNORM M 7133, but with a water content from 15 % < w ≤ 35 %
B2 Chipped wood as under B1, except w > 35 %
C Compressed wood following ÖNORM M 7135
D Sawdust following ÖNORM M 7132

- **ÖNORM M 9465-2: Emission limits for air contaminants of straw incinerating plants up to a rated heat output of 75 kW; requirements and testing on the test bench (1985 10 01)**
  Emissionsbegrenzung für luftverunreinigende Stoffe aus Strohheizungsanlagen bis zu einer Brennstoff-Wärmeleistung von 75 kW; Anforderungen und Überprüfung auf dem Prüfstand (1985 10 01)

Depending on how it is harvested or processed, straw can be used as a fuel in different forms: loose, chopped, in form of bales, briquettes or pellets.

Wheat straw (spring or winter wheat, harvested in a dry state and stored in a dry place for not more than a year, free of degradation by microbes) is to be used as a test fuel.

The following characteristics, which should be accurately determined, apply to this test fuel:

Calorific value $H_{uTS} = 17$ *MJ/kg*
$H_u = 17 - 0.194\ w$ *MJ/kg*
w = water content of the fuel in % of the mass applied to the total mass

Elementary analysis of the dry substances:

carbon content	*49%*
oxygen content	*39 %*
hydrogen content	*5.5 %*
ash content	*6.5 %*

Maximum CO_2 content in stoichiometric incineration, referring to dry combustion gas: 20 %.

The other characteristics of the fuel given in the standard (calorific value, water content, ash content and ash fusibility, proportion of volatile components) and details on size and density are taken from Eugen M. Hofstetter's PhD thesis, Munich 1978.

- **ÖNORM M 9466: Emission limits for air contaminants of wood incinerating plants of a nominal heat output from 50 kW onwards - Requirements and testing on the site (1998 06 01)**
  Emissionsbegrenzung für luftverunreinigende Stoffe aus Feuerungsanlagen für Holzbrennstoffe mit einer Nennwärmeleitung ab 50 kW - Anforderungen und Prüfungen am Aufstellungsort (1998 06 01)

Wood fuels in this standard are different types of *natural wood (e. g. pieces, logs, chipped wood, compressed wood and sawdust), natural bark, twigs, cones, remnants of building and furniture components containing binding agents, hardening agents, coatings and wood preservating agents which are free of heavy metals and halogenous compounds*.

The appendix comprises a list of "A range of traditionally used wood fuels - characteristics and conversion tables", among "energy wood from forestry" log wood and chipped wood in different sizes are listed. As regards "energy wood from wood-processing industry" details on wood shuttering panels, chipped wood from sawmill industry, sawdust, bark, shavings and compressed wood are given. Apart from size and classifications of water content, mean calorific values and conversion factors (e. g. bulk cubic metre to cubic metre) are listed.

- **ÖNORM EN 303-5: Heating boilers - Part 5: Heating boilers for soild fuels, hand and automatically stoked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking (1999 07 01*)***
  Heizkessel - Teil 5: Heizkessel für feste Brennstoffe, hand- und automatisch beschickte Feuerungen, Nenn-Wärmeleistung bis 300 kW - Begriffe, Anforderungen, Prüfungen und Kennzeichnungen (1999 07 01)

Biogenic fuels in this standard are:

Wood in natural state in form of:

A	*Log wood with a water content of w ≤ 25 %*
B1	*Chipped wood (wood chipped by machine with and without bark, usually up to a maximum length of 15 cm). water content from w > 15 % to < 35 %*
B2	*Chipped wood as under B1, except w > 35 %*
C	*Compressed wood (briquettes and pellets without binding agents, made of wood and/or other bark particles; permitted are natural binding agents such as molasses, vegetable paraffins and starch)*
D	*Sawdust w >20 % to < 50 %;*

Page 30 of EN 303-5 specifies the characteristics of the test fuels. Table 12 summarises the figures for biogenic test fuels:

Table 12: Biogenic test fuels

	Log wood		Chipped wood		Compressed wood	Sawdust
	Softwood A1	Hardwood A2	B1	B2	C	D
Water content (as fired basis)	12 % to 20 %	12 % to 20 %	20 % to 30 %	40 % to 50 %	≤ 12 %	35 % to 50 %
Ash content (as fired basis)	≤ 0.4 %	≤ 0.4 %	≤ 0.4 %	≤ 0.4 %	≤ 0.5 %	≤ 0.5 %
Net calorific value H_{uwf} (waterfree)	19000 kJ/kg ± 5 %	18000 kJ/kg ± 5 %	18000 kJ/kg ± 5 %	18000 kJ/kg ± 5 %	18000 kJ/kg ± 5 %	18000 kJ/kg ± 5 %

Water content and calorific value are to be determined. The other combustion values can also be calculated from the elementary analysis of the fuel.

Results of the survey:

- When asked which standards, guidelines or agreements they consulted when dealing with their business partners most of those interviewed said ÖNORM (the Austrian standard). 60% said ÖNORM was the only standard they used, 13.5% also applied DIN (the German Industrial Standard) and other standards respectively.

Table 13: Standards used with business partners

Standards used with business partners	Frequency %
ÖNORM	59.5 %
ÖNORM + DIN	13.5 %
ÖNORM + others	13.5 %
Others	5.4 %

- Among the characteristics given in those standards and guidelines water content and size were regarded as most important, followed by calorific value and ash content, density, bulk volume, general impurities and bark content. Water content, size, calorific value and ash content were considered most significant by each of the groups interviewed in this survey, particularly - as it was to be expected - by producers and manufacturers.

Table 14: The most important characteristics of biofuels

Characteristics	Frequency %
Water content	94.6 %
Size	89.2 %
Calorific value	59.5 %
Ash content	45.9 %
Other characteristics	24.3 %
Density	13.5
Bulk volume	8.1
Impurities	8.1
Bark content	5.4

- Interviewees were asked to grade how those standards affect their business (using grades from 1= excellent to 5 = insufficient). The average grade given was 2.4. Some of the manufacturers, of those in service companies or with a different field of activity in this

branch seem to be critical of how standards affect their business. None of the producers chose a grade below 2. Diagram 3 gives a graphic representation of the assessment.

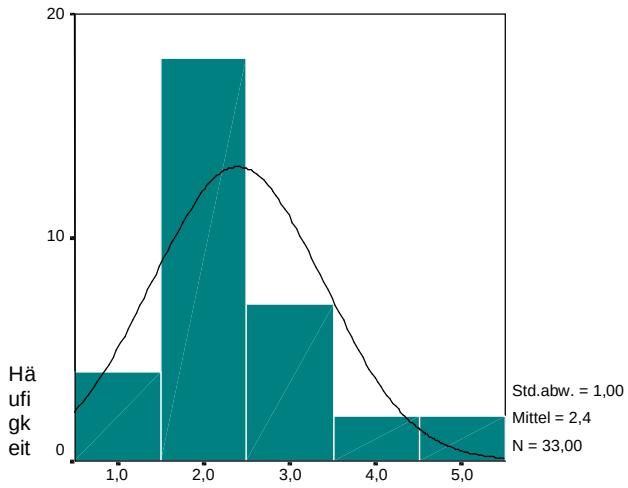

Diagram 3: Assessment of standards regarding business

- About 84 % of those asked said that the application of the Austrian standards (ÖNORM) was not restricted by legal or other regulations, 10 % (producers and traders) said it was.

- In order to check if the requirements of standards and other guidelines were met most of those interviewed said they applied visual inspection (46%), followed by permanent take-over and delivery checks and spot checks (about 38 % each). Most of the permanent take-over and delivery checks are performed by the company itself (37.8 %), 13.5 % (also) have the fuel checked by external experts. 13.5 % rely on certifications (in addition to the existing checks) and another 13.5 % do not run any checks at all (e. g. producers and those involved in promotion and research). Permanent take-over and delivery checks are run mainly by producers, but also by those working in service industry and by planners. Those with other fields of activity in this branch mainly carry out spot checks or visual inspections. If manufacturers check the fuel at all, they rely on spot checks or visual inspection and/or certifications.

Table 15: Checks if standards and legal requirements are met

Types of checks	Frequency %
Visual inspection	45.9%
Permanent take-over and delivery checks	40.5%
Spot checks	37.8%
Certifications	13.5%
No checks at all	13.5%

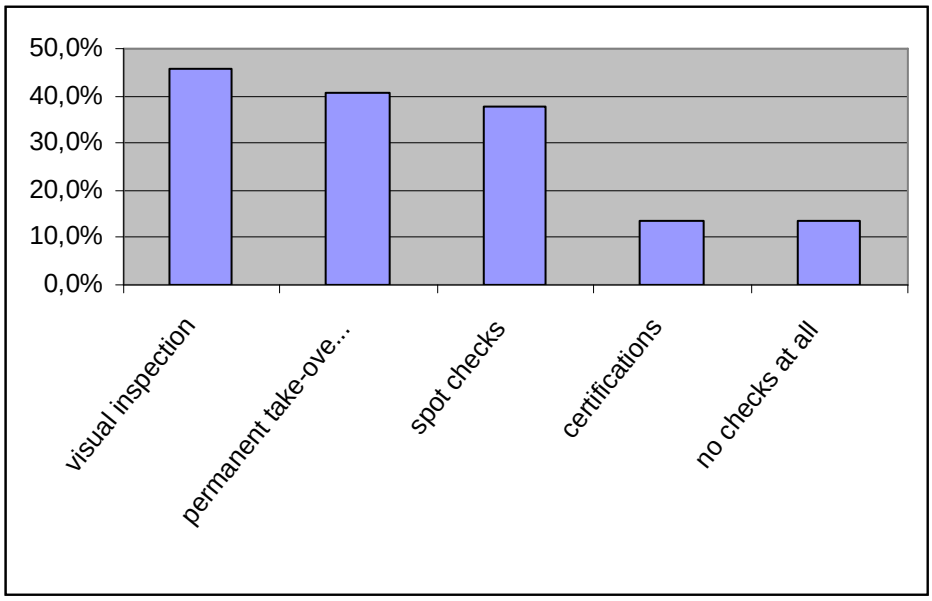

Diagram 4: Types of checks carried out

4. SAMPLING, SAMPLE PREPARATION AND ANALYTICAL METHODS

- **ÖNORM M 7133: Chipped wood for energetic purposes - requirements and test specifications (1998 02 01)**
  Holzhackgut für energetische Zwecke - Anforderungen und Prüfbestimmungen (1998 02 01)

This standard contains details on sampling from piles, low heaps and transport vehicles, on how samples and sub-samples are taken and on how its characteristics are determined. These characteristics are water content, bulk density, ash content, the determination of size categories and the energy content.

- **ÖNORM M 7135: Compressed wood and compressed bark in natural state - Pellets and briquettes - Requirements and test specifications (1998 02 01)**
  Preßlinge aus naturbelassenem Holz und naturbelassener Rinde - Pellets und Briketts - Anforderungen und Prüfbestimmungen (1998 02 01)

There are two ways of sampling:

Sampling from conveyor belt: The required samples (at least 5 individual samples with a minimum mass of 0.5 kg each) are to be taken from a "stream of material". The individual samples are staggered so that a minimum of 10 times the mass of an individual sample passes the conveyor belt.

Static sampling: The required samples (at least 5 individual samples with a minimum mass of 0.5 kg each) are to be taken from the storage room, the transport vehicle or from the pallet, the container etc. About the same amount of material should be taken from each of the sources.

Results of the survey

- Interviewees were asked which method of sampling they (or their business partners) used, how they prepared and analysed the sample. About one quarter of those interviewed said they followed given standards, nearly one quarter did not answer this question and about 10 % said they did not carry out sampling themselves. Weight, ash content, water content, residues and density are used as characteristic features. Moreover visual checks and scratch tests were mentioned by one person each. A small number of people said they would not need any of those methods but would rely on experience and would consider the application of those methods for the future only.

- Among the essential characteristics of solid biofuels water content was considered most important, followed by calorific value and ash content. The following features were also regarded as important: density (5 entries), resistance to abrasion (4 entries), bulk volume, dust content and nitrogen content (3 entries each). Two people considered weight, foreign substances, ash fusibility and the determination of chlorine and sulphur content important. Moreover the natural state of the fuel, its composition, volume, fuel analysis, eluate determination, hardness and heavy metal content were mentioned as additional features.

Table 16: Knowledge of the essential characteristics of solid biofuels

Characteristic features	Frequency %
Water content	86 %
Calorific value	68 %
Other features	57 %
Ash content	41 %
Size	24 %

- Asked how quality control was organised, 43 % of those interviewed said that they do it themselves, 35 % said they would also have some external expert carry it out, 3 % would only have external experts. About one fifth does not have quality control or does not give any details.

Table 17: Organisation of quality control

Form of quality control	Frequency %
By company	43 %
By company and external experts	35 %
By external experts	3 %
No details given	19 %

- Interviewees were asked to grade the standardised methods of sampling, preparation of samples and analysis (using grades from 1= excellent to 5 = insufficient). The average grade given was 2.3. More than 50 % of those asked chose “good” (2). About one fifth considered the methods only “satisfactory” (3), 5 % graded them “excellent” or “sufficient”.

Table 18: Assessment of the standardised methods of sampling, preparation of samples and analysis

Assessment	Frequency	%
excellent	2	5.4 %
good	19	51.4 %
satisfactory	8	21.6 %
sufficient	2	5.4 %

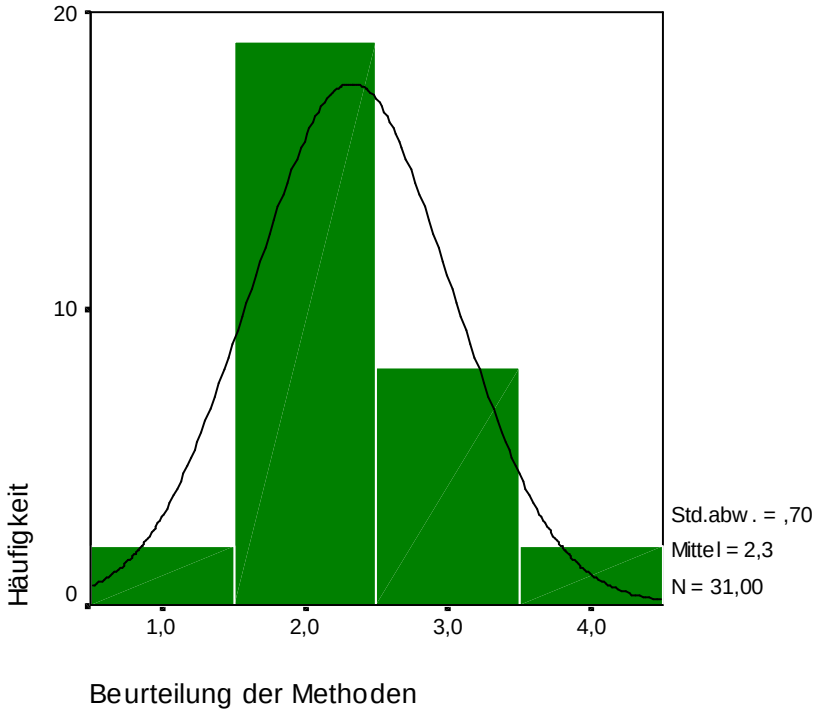

Diagram 5: Average assessment of the standardised methods of sampling, preparation of samples and analysis

- Asked if the methods were sufficiently accurate for their purposes 73 % said “yes”. Only one producer answered with “no”.

- When asked if they applied statistical methods to check the results of quality control, 30 % said they would employ such methods, 59 % stated they did not.

Analytical methods

Table 19: Austrian Standards (ÖNORMEN) and referring standards of several parameters

Parameter	ON M 7132	ON M 7133	ON M 7135	ON M 9465-1	ON M 7510-4	ON M 9465-2	ON M 9466	ON M 7104	ON M 7101	ON M 7111	
Holzarten	ON B 3012										
Begriffsbe-stimmungen		ON M 7132	ON M 7132		ON M 7132 OM M 7104			ON M 7101 ON M 7111 ON M 7132	ON M 7104 ON M 7111	ON M 7101 ON M 7104 ON M 7132	
Holzhackgut					ON M 7133		ON M 7133				
Preßlinge					ON M 7135		ON M 7135	ON M 7135			
Aschegehalt	DIN 51719	DIN 51719	DIN 51719		ON G 1074	DIN 51719		ON G 1074			
Flüchtige Bestandteile	DIN 51720				ON G 1074			ON G 1074			
C- u. H-Gehalt	DIN 51721										
N-Gehalt	DIN 51722-1		DIN 51722-1								
S-Gehalt	DIN 51724-1		DIN 51724-1								
Ascheschmelz verhalten	DIN 51730										
Brenn-, Heizwert	DIN 51900 Teil 1, 2, 3	DIN 51900 Teil 1, 2, 3	DIN 51900 Teil 1, 2, 3								
Feuchtigkeit	DIN 52183		DIN 52183		DIN 52183						
Analysensiebe		DIN ISO 3310									
Partikelgrößen analyse		DIN 66165 Teil 1, 2									
Cl-Gehalt			DIN 51727								
Schüttdichte		DIN 51705									
Rohdichte			DIN 52182								
Wassergehalt				DIN 51718	ON G 1074 DIN 51718	DIN 51718		ON G 1074			

- ON M 7101 Begriffe der Energiewírtschaft - Allgemeine Begriffe
- ON M 7104: Begriffe der Energiewírtschaft - Gewinnung und Verarbeitung fester Brennstoffe
- ON M 7111 Begriffe der Energiewírtschaft - Energie aus Biomasse, organischen Abfällen, Wind und Geothermie
- ON M 7132: Energiewirtschaftliche Nutzung von Holz und Rinde als Brennstoff - Begriffsbestimmungen und Merkmale
- ÖNORM B 3012: Holzarten - Benennungen, Kurzzeichen und Kennwerte
- DIN 51705: Prüfung fester Brennstoffe - Bestimmung der Schüttdichte
- DIN 51718: Feste Brennstoffe; Bestimmung des Wassergehaltes
- DIN 51719: Prüfung fester Brennstoffe - Bestimmung des Aschegehaltes
- DIN 51720: Prüfung fester Brennstoffe - Bestimmung des Gehaltes an Flüchtigen Bestandteilen
- DIN 51721: Feste Brennstoffe - Bestimmung des Gehaltes an Kohlenstoff und Wasserstoff
- DIN 51722-1: Prüfung fester Brennstoffe - Bestimmung des Stickstoffgehaltes - Halbmikro-Kjeldahl-Verfahren
- DIN 51724-1: Prüfung fester Brennstoffe - Bestimmung des Schwefelgehaltes - Gesamtschwefel
- DIN 51727: Prüfung fester Brennstoffe - Bestimmung des Chlorgehaltes
- DIN 51730: Prüfung fester Brennstoffe - Bestimmung des Asche-Schmelzverhaltens
- DIN 51900-1: Prüfung fester und flüssiger Brennstoffe - Bestimmung des Brennwertes mit dem Bombenkalorimeter und Berechnung des Heizwertes - Allgemeine Angaben, Grundgeräte, Grundverfahren
- DIN 51900-2: Prüfung fester und flüssiger Brennstoffe - Bestimmung des Brennwertes mit dem Bombenkalorimeter und Berechnung des Heizwertes - Verfahren mit isothermem Wassermantel
- DIN 51900-3: Prüfung fester und flüssiger Brennstoffe - Bestimmung des Brennwertes mit dem Bombenkalorimeter und Berechnung des Heizwertes - Verfahren mit adiabatischem Mantel
- DIN 52182: Prüfung von Holz - Bestimmung der Rohdichte
- DIN 52183: Prüfung von Holz - Bestimmung des Feuchtigkeitsgehaltes
- DIN ISO 3310: Analysensiebe - Anforderungen und Prüfung - Analysensiebe mit Metalldrahtgewebe
- DIN 66165-1: Partikelgrößenanalyse - Siebanalyse - Grundlagen
- DIN 66165-1: Partikelgrößenanalyse - Siebanalyse - Durchführung
- ON G 1074: Prüfung fester Brennstoffe - Bestimmung des Gehaltes an Wasser, Asche und flüchtigen Bestandteilen (Normentwurf)

5. NEED FOR ADDITIONAL STANDARDS

This section is based on a survey in which people involved in the field of biofuels in Austria were interviewed.

- As far as the need for additional standards is concerned, the survey showed a complex pattern. While 46 % thought that standards for heating fuels were needed on a European level, only 30 % said that additional national standards were required. More than 50 % expected that standardisation would result in reflation.

Table 20: Need for additional standards

	Yes	No	No details
European standards	45.9	40.5	13.5
National standards	29.7	59.5	10.8
Reflation	51.4	40.5	8.1

Diagram 6 gives a graphic representation of the results.

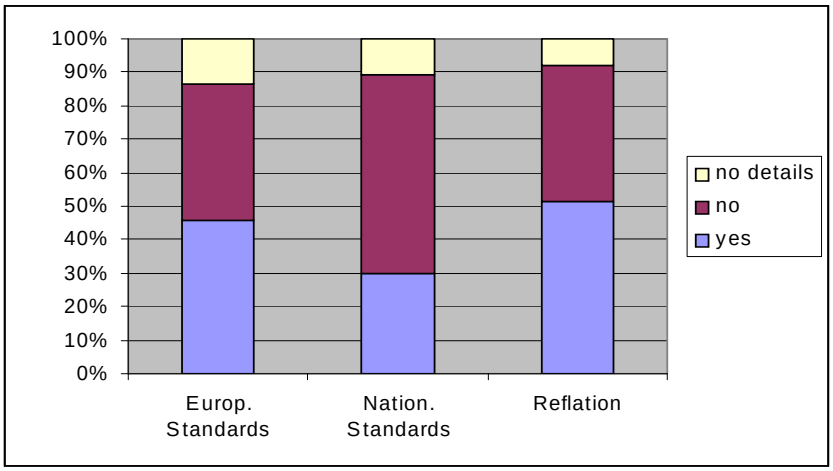

Diagram 6: Need for additional standards

- When asked how urgent the standardisation of different types of fuels was, most people said that the standardisation of used wood was most urgent. Pellets came second. Being a kind of refined biofuel, pellets are increasingly traded on international markets. The standardisation of log wood and chipped wood is of average importance while that of briquettes, straw, bark and other fuels is comparatively urgent or not urgent at all. In the analysis of the results the different shares of valid answers have to be considered.

Table 21: Urgency of standardisation. Biofuels

Urgency of standardisation	Mean value	Valid answers
Used wood	1.7	51.4%
Pellets	1.8	67.6%
Log wood	2.1	67.6%
Chipped wood	2.3	70.3%
Briquettes	2.4	54.1%
Straw	2.4	45.9%
Bark	2.5	56.8%
Agricultural fuels	2.6	40.5%
Side products	2.6	40.5%
Other fuels	3.0	2.7 %
1 = very urgent	2 = comparatively urgent	3 = not urgent

- Asked for which plant sizes or technologies new standards should be developed, interviewees gave more heterogeneous answers than in the pervious question even though there was a high percentage of valid answers. The need for standardisation seems to decrease with plant size. There is no urgent need for new standards for any of the plants.

Table 22: Urgency of standardisation: Technologies and plant size

	Mean value	% Valid answers
Small-scale plants	1.7	83.8%
Thermal use	1.8	67.6%
Storing	1.8	67.6%
Transport	1.8	64.9%
Medium-scale plants	2.0	73.0%
Harvesting	2.1	56.8%
Large-scale plants	2.4	75.7%
1= very urgent	2 = comparatively urgent	3 = not urgent

- As regards the standardisation of sampling methods, preparation of samples and analysis, the mean values were around 2.3, i. e. standardisation was not considered to be of great urgency.

Table 23: Urgency of standardisation: sampling, preparation of samples, analysis

Further standardisation of	Mean value	% Valid answers
Preparation of samples	2.3	64.9%
Sampling	2.3	67.6%
Analysis	2.3	64.9%
1 = very urgent	2 = comparatively urgent	3 = not urgent

- Interviewees were asked which measures should be taken to promote a prompt acceptance and implementation of standards for solid biofuels on a European level. The answers were very heterogeneous and were therefore divided into different classes. The ***creation of practicable standards*** is regarded as the most important measure.

Table 24: Measures to promote the acceptance and implementation of standards

Support measures	Estimate
Creation of practicable standards	35%
No details given	27%
Marketing measures	24%
Support actions (concerning tax and political economy)	16%
Technological improvements	16%
Improvement of the information level	8%
Legal security	5%
Formation of EU working groups	5 %
Checks within the EU	5 %
Environmental compatibility tests	3 %

6. SUMMARY AND RECOMMENDATION

The more general part of the report discusses the Austrian situation in the field of biogenic fuels. An estimate of the overall potential available showed the future development possible in this branch.

Three different groups of standards are covered in this Austrian report. The first section discusses the terminology of the power-producing industry with a special emphasis on solid biofuels. The terminology and the definitions are laid down comprehensively in the Austrian standards (ÖNORM). The second group of standards focuses on biofuels used for energy purposes. Existing Austrian standards are available for the most important biofuels (wood in general, chipped wood, compressed wood). The standards of the third group cover the use of standardised solid biofuels as a test fuel.

The analytical methods of the different fuel parameters are closely related to those laid down in the German Industrial Standard (DIN).

Although the Austrian standards for biofuels were elaborated and published more than 10 years ago, other countries considered them only to a small extent when working out their own standards, guidelines or recommendations. One important barrier may have been that the Austrian standards are only available in German.

The people interviewed in the survey generally approve of the standardisation of biofuels. There seems to be a greater need of standards on a European than on a national level. The creation of practicable standards is regarded as an essential measure to improve the acceptance and implementation of biofuels. A simple terminology helps those who want to join the market.

The use of standards is only partly acknowledged and honoured. The transmission of information is to be improved and a wider distribution of information has to be achieved.

The most important recommendations of the authors are:

- The European standards for solid biofuels should be harmonised.
- A standard has to have a clear structure in order to be accepted and used in practice.
- The standards should be easy to understand and to handle, following the motto “as easy as possible and as complex as required”. This applies to their language as well as to the number of standardised fuel parameters.

Standardisation should cover the full range of solid biofuels including polluted fuels. What is urgent is the definition of fuel quality. High-quality fuels can be used with cheap furnaces, bad-quality fuels can be fired in appropriate plants without breaking environmental standards.

7. LITERATURE

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ANNEX A: TERMINOLOGY GLOSSARY

Terminology glossary with generally accepted defintions of solid biofuel terms used for the communication between producers/suppliers and customers/ purchasers

See Chapter 2: Definitions and classifications and Chapter 3: Existing standards, guidelines and/or manuals

ANNEX B: STATISTICS AND PROFILE OF THE PEOPLE AND ORGANISATIONS CONTACTED IN THE SURVEY

Altogether the questionnaires of 37 people were evaluated.

The people interviewed had to choose their field of business among the following (multiple answers were admissible):

- Producer of solid biofuels
- Trader of solid biofuels
- Company, using biofuels
- Manufacturer of plants (fuel production, means of transport, incineration plants),
- Service company in this field
- Planner/expert on the construction or operation of incineration plants
- Promoter of biofuels
- Research or test institutes
- Different field of activity?

Table B**Fehler! Unbekanntes Schalterargument.**: Interviewee's fields of activity

Fields of activity	Frequency	%
(multiple answers were not considered)		
Manufacturer of plants	8	21.62
Different field of activity	7	18.92
Producer of solid biofuels	4	10.81
Planner, expert	3	8.11
Service company, promoter	2	5.41
Service company, research	2	5.41
Promoter	2	5.41
Producer, trader, user, promoter	1	2.70
Producer, service company, other field of activity	1	2.70
Trader of solid biofuels	1	2.70
User of biofuels	1	2.70
Manufacturer, planner of plants	1	2.70
Service company	1	2.70
Service company, planner, promoter	1	2.70
Service company, planner, research	1	2.70
Research	1	2.70
Total	37	100.00

Among the interviewees the plant manufacturers presented the largest group (22%), followed by a group that did not fit into that scheme (public authorities) and by the producers of solid biofuels which are also involved in other fields of activity. This is also true for those offering services, i. e. for promoters and experts. There were only small groups of traders, companies using biofuels and research and test institutes. The involvement of public authorities and its staff has to be stressed. Nearly 90 % of the authorities contacted in this survey returned the questionnaires.

The following table presents the different fields of activity including multiple answers. It shows that most of the people interviewed work in plant manufacturing, service, planning and expert assessment, promotion and production.

Table B**Fehler! Unbekanntes Schalterargument.**: Interviewee's fields of activity (including multiple answers)

Fields of activity	Frequency in absolute figures	Frequency in %
Plant manufacturer	9	31%
Service company	8	15.38%
Different field of activity	8	15.38%
Planner, experts	7	13.46%
Promoter	6	11.54%
Producer of biofuels	6	11.54%
Research, test institute	4	7.69%
Companies – user	2	3.85%
Trader	2	3.85%
Total	52	100.00%

ANNEX C: REFERENCE LIST OF EXISITING STANDARDS, GUIDELINES AND/OR MANUALS

Norm	Titel	Datum
ÖNORM M 7101	Begriffe der Energiewirtschaft - Allgemeine Begriffbestimmungen (Concepts of energy economy - General terms with definitions)	1996 01 01
ÖNORM M 7104	Begriffe der Energiewirtschaft - Gewinnung und Verarbeitung fester Brennstoffe (Concepts of energy economy - Mining and processing of solid fuels)	1996 01 01
ÖNORM M 7111	Grundbegriffe der Energiewirtschaft - Energie aus Biomasse, organischen Abfällen, Wind und Geothermie (Concepts of energy economy -Energy from biomass, organic waste, wind and geothermal energy)	1996 01 01
ÖNORM M 7132	Energiewirtschaftliche Nutzung von Holz und Rinde als Brennstoff - Begriffsbestimmungen und Merkmale (Energy-economical utilization of wood and bark as fuel - Definitions and properties)	1998 07 01
ÖNORM M 7133	Holzhackgut für energetische Zwecke - Anforderungen und Prüfbestimmungen (Chipped wood for energetic purposes - Requirements and test specifications)	1998 02 01
ÖNORM M 7135	Preßlinge aus naturbelassenem Holz und naturbelassener Rinde - Pellets und Briketts - Anforderungen und Prüfbestimmungen (Compressed wood and compressed bark in natural state - Pellets and Briquettes - Requirements and test specifications)	1998 02 01
ÖNORM M 7510-4	Überprüfung von Heizanlagen für feste Brennstoffe, mit einer Nennwärmeleistung bis 300 kW (Checking of heating systems for solid fuels with nominal heat output up to 300 kW)	1997 05 01
ÖNORM M 9465-1	Emissionsbegrenzung für luftverunreinigende Stoffe aus Strohheizungsanlagen bis zu einer Brennstoff-Wärmeleistung von 75 kW; Anforderungen und Überprüfung am Aufstellungsort (Emission limits for air contaminants of straw incinerating plants up to a rated heat output of 75 kW; requirements and testing on the site)	1985 10 01
ÖNORM M 9465-2	Emissionsbegrenzung für luftverunreinigende Stoffe aus Strohheizungsanlagen bis zu einer Brennstoff-Wärmeleistung von 75 kW; Anforderungen und Überprüfung auf dem Prüfstand (Emission limits for air contaminants of straw incinerating plants up to a rated heat output of 75 kW; requirements and testing on the test bench)	1985 10 01
ÖNORM M 9466	Emissionsbegrenzung für luftverunreinigende Stoffe aus Feuerungsanlagen für Holzbrennstoffe mit einer Nennwärmeleistung ab 50 kW - Anforderungen und Prüfungen am Aufstellungsort (Emission limits for air contaminants of wood incineration plants of a nominal fuel heat output from 50 kW onwards - Requirements and testing on the site)	1998 06 01
ÖNORM EN 303-5	Heizkessel - Teil 5: Heizkessel für feste Brennstoffe, hand- und automatisch beschickte Feuerungen, Nenn-Wärmeleistung bis 300 kW - Begriffe, Anforderungen, Prüfungen und Kennzeichnung (Heating boilers - Part 5: heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking)	1999 07 01

ANNEX D: QUESTIONNAIRE (GERMAN)

Fragebogen

Standardisierung von festen Biomassebrennstoffen

Name
Unternehmen/Institution
Adresse
Telephon/Faxnummer

0. Angaben zum Unternehmen

a) Sind Sie:

- ❍ **Produzent** von festen Biomassebrennstoffen
- ❍ **Händler** von festen Biomassebrennstoffen
- ❍ **Unternehmer,** der Biomassebrennstoffe nutzt
- ❍ **Anlagenhersteller** (Brennstofferzeugung, Transportmittel, Verbrennungsanlagen),
- ❍ ein **Dienstleistungsbetrieb** in diesem Geschäftsfeld
- ❍ **Planer / Gutachter** für Bau oder Betrieb von Feuerungsanlagen
- ❍ **Promotor** von Biomassebrennstoffen
- ❍ **Forschungs- oder Prüfinstitut**
- ❍ **Anderweitig** in diesem Geschäftsfeld tätig?

b) Mit welchen festen Biomassebrennstoffen sind Sie befaßt?

Naturbelassene Holzbrennstoffe:

- ❍ Scheitholz
- ❍ Holzhackgut
- ❍ Rinde
- ❍ Briketts
- ❍ Pellets

Sonstige Biomassebrennstoffe

- ❍ Stroh
- ❍ Landwirtschaftliche Brennstoffe wie z.B. Miscanthus, Hanf, Getreideganzpflanzen, ...
- ❍ Holzbrennstoffe auf Altholzbasis
- ❍ Nebenprodukte aus der Verarbeitung landwirtschaftlicher Rohstoffe wie z.B. Sonnenblumenschalen

Weitere:

- ❍ .....

1. Feste Biomassebrennstoffe zur Energieerzeugung

a) Wie schätzen Sie die mittelfristigen Marktaussichten ein? (Schulnoten)

Biomassebrennstoffe	❶	❷	❸	❹	❺
Ernte-, Aufbereitungs- und Transporteinrichtungen	❶	❷	❸	❹	❺
Feuerungsanlagen	❶	❷	❸	❹	❺

b) Welches sind die hauptsächlichen Hindernisse bei der Steigerung des Verbrauchs von festen Biomassebrennstoffen ?

- ❍ Komfort und Bedienungsfreundlichkeit
- ❍ Preise der Konkurrenzenergieträger
- ❍ Informationsmangel beim Konsumenten
- ❍ Unzureichender Stand der Technik
- ❍ Investitionskosten für Biomasse-Technologie
- ❍ Umweltauflagen
- ❍ Sonstige

2. Klassifizierung von Biomassebrennstoffen

a) Mit welchen Klassifizierungen arbeiten Sie?

❍ ÖNORMEN

Bitte Normnummer angeben:

.....

.....

.....

❍ DIN

.....

.....

.....

❍ Sonstige (Kurzbezeichnung, z.B. Lieferveträge)

.....

.....

.....

b) Welche Erfahrungen haben Sie dabei mit der Verwendung der ÖNORMEN gemacht?

- ❍ Zu kompliziert, daher ungeeignet
- ❍ Wenig praktikabel, Änderungen erforderlich
- ❍ Brauchbar
- ❍ Praxisnah
- ❍ Optimal

c) Welche Erfahrungen haben Sie dabei mit der Verwendung der DIN-Normen gemacht?

- ❍ Zu kompliziert, daher ungeeignet
- ❍ Wenig praktikabel, Änderungen erforderlich
- ❍ Brauchbar
- ❍ Praxisnah
- ❍ Optimal

d) Wie beurteilen Sie die Auswirkungen dieser Klassifizierungen auf den Märkten für feste Biomassebrennstoffe? (Schulnotensystem)

❶ ❷ ❸ ❹ ❺

3. Biomasse-Brennstoffe

a) Welche Standards, Richtlinien oder Vereinbarungen verwenden Sie im Verkehr mit Ihren Geschäftspartnern?

- ❍ ÖNORMEN (Bitte Normnummer angeben)

  .....
  .....
  .....

- ❍ DIN (Bitte Normnummer angeben)

  .....
  .....
  .....

- ❍ Sonstige

  Bitte um eine Kurzbezeichnung: (z.B. Liefervereinbarungen)

  .....
  .....

b)Welche sind die wichtigsten Kenngrößen dieser Standards und Richtlinien?

- ❍ Größe
- ❍ Wassergehalt
- ❍ Heizwert
- ❍ Aschengehalt
- ❍ sonstige

d) Wie beurteilen Sie die Auswirkungen dieser Standards auf ihre Geschäftstätigkeit (Schulnoten)

❶ ❷ ❸ ❹ ❺

e) Wird die Verwendung der ÖNORMEN durch gesetzliche oder andere Regelungen eingeschränkt?

- ❍ ja
- ❍ nein
- ❍ Wenn ja, welche?

.....
.....

f) Wie kontrollieren Sie, daß die Anforderungen der Standards und Richtlinien auch erfüllt werden?

- ❍ Brennstoffzertifizierung bzw. Verwendung zertifizierter Brennstoffe
- ❍ Ständige Übernahme- bzw. Übergabekontrolle
  - ❍ Eigenkontrolle
  - ❍ Fremdkontrolle
- ❍ Stichprobenkontrolle
- ❍ Augenschein
- ❍ Keine Kontrolle

4. Probenahme, Probenvorbereitung und analytische Methoden

a) Welche Methode der Probenahme, der Probenvorbereitung und welche Analysenmethoden wenden Sie / ihr Partner? (Bitte geben Sie die Nummer der Norm, die Sie verwenden, an; z.B. ÖNORM M 7133)

Probennahme	Probenvorbereitung	Analyse

b) Welche Eigenschaften und Merkmale von festen Biomassebrennstoffen müssen Sie wissen ?

- ❍ Wassergehalt
- ❍ Heizwert
- ❍ Aschengehalt
- ❍ .....
- ❍ .....
- ❍ .....

c) Wie haben Sie die Qualitätskontrolle organisiert?

❍ Eigenkontrolle

❍ Fremdkontrolle

d) Wie beurteilen Sie die genormten Methoden? (Schulnotensystem)

❶ ❷ ❸ ❹ ❺

e) Ist die Genauigkeit der Methoden für Ihren Zweck ausreichend?

❍ Ja

❍ Nein

❍ Kann ich nicht beurteilen

f) Verwenden Sie statistische Kontrollen für die Ergebnisse dieser Untersuchungen?

❍ Ja

❍ Nein

5. Bedarf an zusätzlichen Normen für Probenahme, Probenaufbereitung, Analysen

a) Gibt es im allgemeinen einen Bedarf an zusätzlichen Normen, Richtlinien oder Vorschriften auf europäischer und/oder nationaler Ebene?

	Europäisch	National
Ja		
Nein		

b) Könnten diese den Markt anregen?

❍ ja

❍ nein

c) Welche festen biogenen Brennstoffe sollten durch neue Normen definiert werden? Bitte geben Sie die Dringlichkeitsstufe an (1 = vordringlich, 2 = mittlere Dringlichkeit, 3 = geringe Dringlichkeit)

Naturbelassene Holzbrennstoffe:

❍ Scheitholz	❶	❷	❸
❍ Holzhackgut	❶	❷	❸
❍ Rinde	❶	❷	❸
❍ Briketts	❶	❷	❸
❍ Pellets	❶	❷	❸

Sonstige Biomassebrennstoffe

- ❍ Stroh ❶ ❷ ❸
- ❍ Landwirtschaftliche Brennstoffe wie z.B. Miscanthus, Hanf, Getreideganzpflanzen, ... ❶ ❷ ❸
- ❍ Holzbrennstoffe auf Altholzbasis ❶ ❷ ❸
- ❍ Nebenprodukte aus der Verarbeitung landwirtschaftlicher Rohstoffe wie z.B. Sonnenblumenschalen ❶ ❷ ❸
- ❍ Weitere:..... ❶ ❷ ❸
- ❍

d) Welche Eigenschaften von festen biogenen Brennstoffen sollten durch neue Normen abgedeckt werden

.....
.....

e) Für welche Anlagengrößen bzw. Technologien sollen Normen ent-wickelt werden? Wie dringlich sind diese?(1 = vordringlich, 2 = mittlere Dringlichkeit, 3 = geringe Dringlichkeit)

Anlagengröße	Dringlichkeit
Kleinanlagen	❶ ❷ ❸
Mittelanlagen	❶ ❷ ❸
Großanlagen	❶ ❷ ❸
Technologie	Dringlichkeit
Ernte	❶ ❷ ❸
Lagerung	❶ ❷ ❸
Transport	❶ ❷ ❸
Thermische Nutzung	❶ ❷ ❸

f) Werden zusätzlichen Methoden benötigt? Bitte geben Sie die Dringlichkeit an (1 = vordringlich, 2 = mittlere Dringlichkeit, 3 = geringe Dringlichkeit)

Probenahme	Probenaufbereitung	Bestimmung
❶ ❷ ❸	❶ ❷ ❸	❶ ❷ ❸

g) Welche Maßnahmen sollten getroffen werden, um eine schnelle Akzeptanz und Umsetzung von Normen für feste biogene Brennstoffe auf europäischem Niveau zu fördern?

.....
.....
.....
.....

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