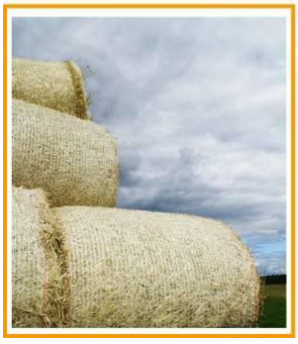





SolidStandards

Enhancing the implementation of quality and sustainability standards and certification schemes for solid biofuels (EIE/11/218)



D6.1b
National Industry Position Paper
Finland

Co-funded by the Intelligent Energy Europe Programme of the European Union

The SolidStandards project

The SolidStandards project addresses ongoing and recent developments related to solid biofuel quality and sustainability issues, in particular the development of related standards and certification systems. In the SolidStandards project, solid biofuel industry players will be informed and trained in the field of standards and certification and their feedback will be collected and provided to the related standardization committees and policy makers.

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About this document

This document is part of **Deliverable 6.1** of the SolidStandards project. It is the National position paper of Finland. This document was prepared in **October 2013** by:

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Intelligent Energy Europe

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Foreword

CEN, the European Committee for Standardisation, represented in this consortium by NEN, is interested in gathering the opinions of industry representatives for the development of new standards, the revision of existing standards, and the representation of European interests within international standardisation (ISO) procedures. The SolidStandards project offers an excellent opportunity to collect a large number of viewpoints through direct contact with industry representatives. In addition, a broader, public approach has been applied to collect feedback from industry players other than those participating in trainings. Furthermore, experience gained through the project has been used to provide recommendations to CEN and the solid biofuel community how to cope with new developments on solid biofuel markets.

The findings of this task under WP 6 of the SolidStandards project will be summarised in a final European industry position paper on international standards for solid biofuels.

This report contains the feedback collection and analysis from Finland. VTT is represented in CEN/TC 335 and ISO/TC 238 committees as a convenor in WG2s (Fuel specifications and classes, fuel quality assurance).

This national report of Finland includes the following:

1. Description of national biofuel markets based on **available data**
2. Description of standardisation activities
3. Description of certification activities
4. Overview of standardisation and certification needs
5. Results of discussion with national mirror committee
6. Summary of national industry needs

The objectives are:

- To explain the industry points of view to standardisation committees
- To initiate and support the development of additional standards (e.g. on biomass storage)
- To increase the practical applicability of standards under development
- To bring European industry viewpoints into on-going CEN and ISO standardisation processes
- To provide the necessary feedback on existing standards in order to facilitate their revision in the future

VTT will discuss this national industry paper with the national mirror committee of SFS (represented by Kemesta ry) in Finland.

NEN will consolidate all national papers to one, overall European industry position paper about international standards for solid biofuels. The final European industry position paper will be presented to CEN/TC 335 and/or ISO/TC 238 and distributed among the members of these technical committees.

Eija Alakangas

Jyväskylä 6 November 2013

1. Description of the national solid biofuels market of Finland

1.1. General description of the market

Sustainability and predictability are characteristic of energy policy objectives. In recent decades, Finland has been among the leading industrialised countries to use renewable energy, bioenergy in particular. Meanwhile, for over twenty years, we have aimed to produce as much electricity as possible through combined heat and power plants (CHP). In this, Finland ranks among the top nations internationally.

Finland has also managed to establish an exceptionally decentralised and versatile energy system, based on both large and small energy production plants and diverse energy sources. At the same time, Finland has created a strong energy technology cluster, or energy cluster, which is growing in importance. We have thus created the preconditions for internationalisation and greater efficiency among Finnish energy companies.

Finnish energy policy rests on three fundamentals: energy, economy and the environment. Securing energy supply, competitive energy prices and meeting the EU's common energy and climate goals are core elements. Another key principle is the integration of other forms of sustainable development, and environmental goals, with the energy economy. In addition, energy policy is affected by the prospective price and availability of imported energy and the greater frequency with which decisions are taken at international level.

The National Energy and Climate Strategy, approved by the Government in March 2013, and the programmes supplementing the previous 2008 strategy determine the energy policy lines to be followed. On the other hand, while drafting the Energy and Climate Strategy, account was taken of the principles underlying energy policy. Research results, and statistical sources at international and national level, are used in strategic planning and the sketching of scenarios. The EU's role in steering energy policy has increased in recent years. The core framework of Europe's Energy and Climate Policy is based on decisions taken in December 2008. These include reducing greenhouse gas emissions by 20%, raising the share of renewable energy to an average of one fifth of total consumption (38% for Finland), while improving energy efficiency by 20% by 2020. Biomass resources in Finland mostly originate from forest operations, either forest residue from thinning or logging, or by-products of wood processing industry.

Finland is one of the world's leading users of renewable sources of energy, especially bioenergy. Total energy consumption in 2012 was 1 367 PJ. Renewable energy sources provide one fourth of Finland's total energy consumption (30% and 413 PJ in 2012) and account for about one third of its power generation (32% and 27.2 TWh). The country's most important renewable sources of energy include bioenergy – wood and wood-based fuels (325 PJ in 2012) in particular – hydropower, wind power, ground heat and solar energy. Finland uses most of its biomass in industry and industrial CHP plants.

The objective of the national energy and climate strategy is to increase the use of renewable sources of energy and their share of energy consumption. In addition to energy conservation, this is one of the most significant means by which Finland's climate targets can be achieved. In use, renewable energy sources do not increase carbon dioxide emissions, while promoting employment and regional policy goals and enhancing security of supply. The strategy also supports technology exports for the industry, which are already becoming an important part

of Finnish exports. In Finland there were more than 900 companies employing almost 6,600 persons in renewable energy sector. Value of the business is €905 million[1].

1.2. General figures of the solid biofuel market

In Finland solid biomass fuels are wood fuels from logging residues, small-size trees (thinnings) and stumps and industrial by-products from forest industry (e.g. bark, sawdust, chips), firewood, wood pellets and briquettes. Use of solid wood fuels in industry and energy production plants were 119.8 PJ (2.8 Mtoe) and in addition to these also black liquor is used in forest industry plants. Use of black liquor was 136.6 PJ (3.2 Mtoe) in 2012. Use of wood fuels in small-scale was 62.3 PJ (1.5 Mtoe). Use of firewood (log wood, 2.9 million stoves and fireplaces) is 90% of the total small-scale use, pellets 2% (about 15,000 units) and forest chips 8% (about 60,000 units). Total use of wood fuels was 318.7 PJ (7.8 Mtoe), which is 23% of total energy consumption in Finland in 2012. In Finland there are almost 1,000 places for bioenergy business, of which SMEs are 580. Annual turnover of the bioenergy sector is about €790 million and bioenergy employs 4 300 persons[2]. There are some larger organisations like L&T Biowatti Oy, Hakevuori Oy and Vapo Oy, which are providing solid biofuels in many places in Finland.

Figure 1 shows the location and use of forest chips in heating and CHP plants in Finland in 1999 and 2011. More than 80% of solid wood fuels are used in plants with boiler output more than 20 MW_{th} (Table 1, 2 and 3). Forest chips include chips from thinnings, roundwood, logging residues and stumps. In Finland small-scale use means biomass use in households and farms, usually with boiler output less than 50 kW_{th}. Plants less than 1 MW_{th} are usually small-district heating systems or heating of one public or industrial building. Figures 2 – 5 show the use of wood fuels from 2000 to 2011. Figures 6, 7 and 8 show the production and use of pellets and location of pellet plants in Finland.

Table 1. Number and output (boiler output) of different size of plants in Finland using woody biomass (excluding small scale use in stoves and boilers). Source: VTT.

Plant size category	Total output (MW_{th})	Number of plants	Average output of plant, MW_{th}	Use of solid wood fuels in 2012**		
				GWh	ktoe	%
< 2.5 MW	405	615	0.7	2 180	187.4	6
2.5-< 20 MW_{th}	1 400	220	6.4	4 850	417	14
>20 MW_{th}*	10 200	80	127.5	26 650	2 292	79
Total	12 050	915	13.2	33 680	2 896	100.0

* plants are usually multifuel CHP-plants producing heat and power. ** wood fuels include forest chips and by-products and residues from forest industry used for energy production.

[1] Uusiutuvan toimialaraportti [Renewable energy sector report] Ministry of Employment and the Economy, report 4/2012. www.toimialaraportit.fi

[2] Bioenergia-toimialaraportti [Bioenergy – sector report] 8/2011, Ministry of Employment and the Economy.

Table 2. Use of forest chips and industrial by-products and residues from forest industry in different size of plants. Source VTT

	Less than 2.5 MW				2.5 – 20 MW*				> 20 MW*			
	GWh (TJ)	No plants	Share of plants, %	Share of Energy %	GWh (TJ)	No plants	Share of plants, %	Share of Energy, %	GWh (TJ)	No of plants	Share of plants %	Share of energy
Forest chips	1 900 (6 840)	610	71%	13%	1 850 (6 660)	180	21%	12%	11 450 (41 220)	70	8%	75%
Residues and by-products	280 (1 008)	65	22%	2%	3 000 (10 800)	170	57%	16%	15 200 (54 720)	60	22%	82%
Total	2 180 (7 848)				4 850 (17 460)				26 650 (95 940)			

* plants are usually multifuel CHP-plants producing heat and power. Some plants are using both forest chips and industrial wood residues.

Use of forest chips at heating and power plants in 1999 and 2011

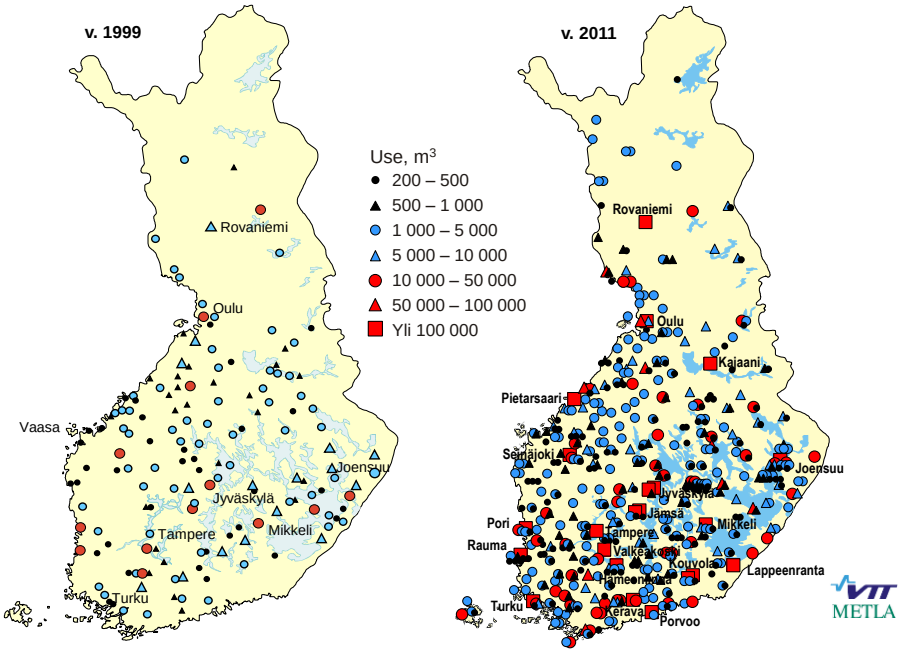


Figure 1. Use of forest chips in Finland in 1999 and 2012.

Table 3. All CHP plants using forest chips and industrial by-products and residues from forest industry. Source VTT

CHP	Forest chips	By-products	Total		Average use
	GWh (TJ)	GWh (TJ)	GWh (TJ)	No	GWh/a (TJ)
CHP- District	6 900 (24 840)	2 500 (9 000)	9 400 (33 840)	40	235 (846)
CHP- Industry	5 650 (20 340)	11 300 (40 680)	16 950 (61 020)	40	424 (1 526.4)
Total	12 550 (45 180)	13 800 (49 680)	26 350 (94 860)	80	329 (1 184.4)

1 GWh= 3.6 TJ = 86 toe

Table 4. Prognosis of new wood fuel plant investments until year 2020 (Source: TEM report 66/2010[3])

Plant type	Number of plants	Electricity output, MW_e	Heat output, MW_{th}	Fuel output, MW_f
Municipal heat plants	36	0	150	180
Municipal CHP plants	14	610	1 120	1 940
Industrial heating plants	11	0	130	150
Industrial CHP plants	19	500	1 390	2 170
Condensing plants	0	0	0	0
Total	80	1 110	2 790	4 440

Largest biomass users are pulp&paper industry plants like: Alholmens Kraft, Kaukaan Voima, StoraEnso, Imatra, Oulu and Varkaus, Rauman Voima, Kymin Voima, M-Board Kemi and Äänevoima. Municipal energy utilities like Oulun Energia, Etelä-Savon Energia, Jyväskylän Energia and Tampereen Sähkölaitos are also major bioenergy users in Finland.

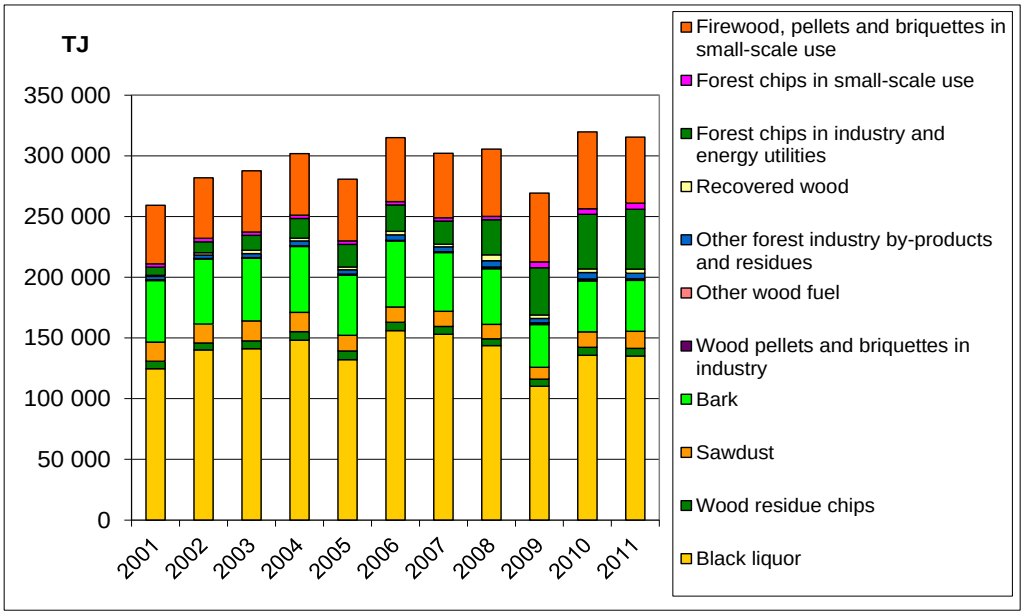


Figure 2. Use of wood fuels in Finland, TJ.

[3] *Kärhä, K. Räisänen, T., Keskinen, S., Strandström, M., Pajuoja, H., Elo, J., Lahtinen, P., Saijonmaa, P. & Heiskanen, H.*, Kiinteiden puupolttoaineiden saatavuus ja käyttö Suomessa 2020 [Availability and use of solid wood fuels in 2020], Energy and the Climate 66/2010. 68 p.

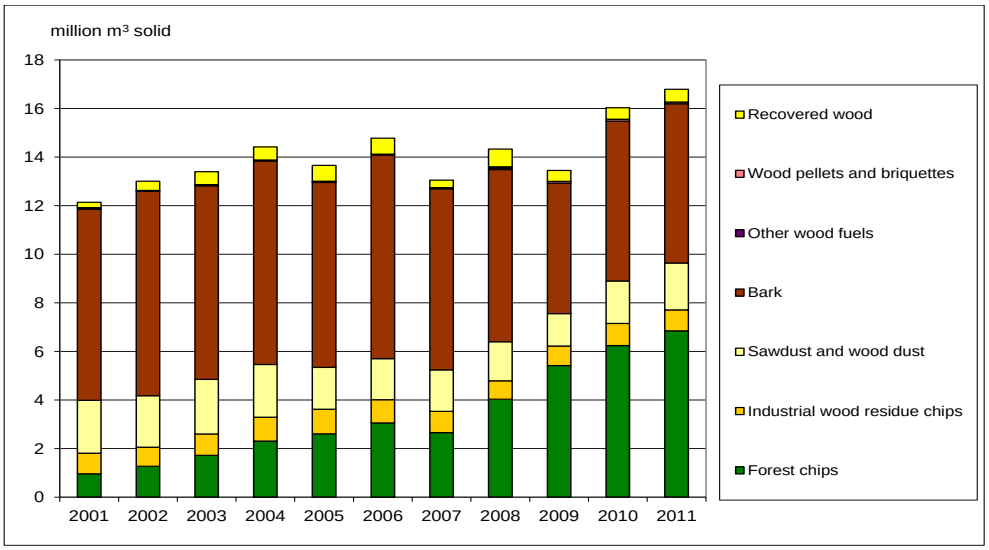


Figure 3. Use of wood fuel in million m^3 solid.

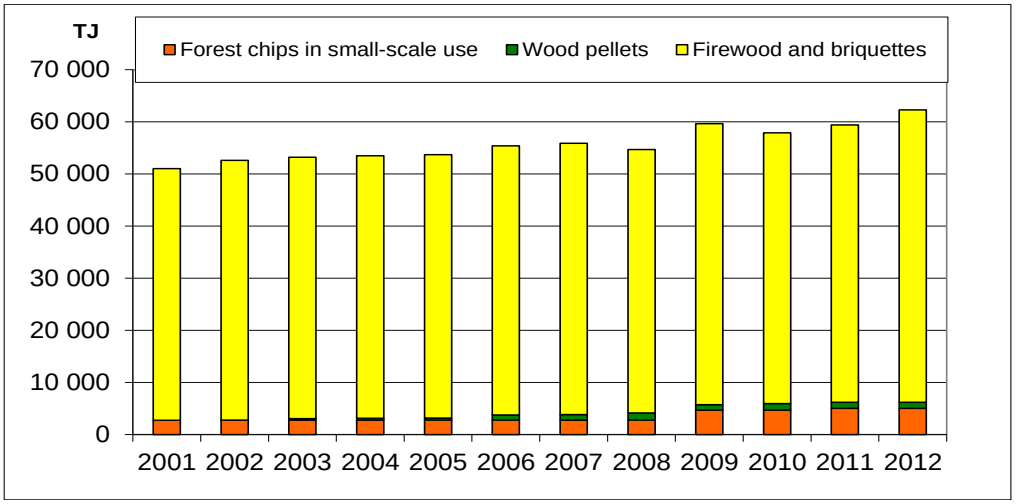


Figure 4. Use of wood fuels in small-scale appliances

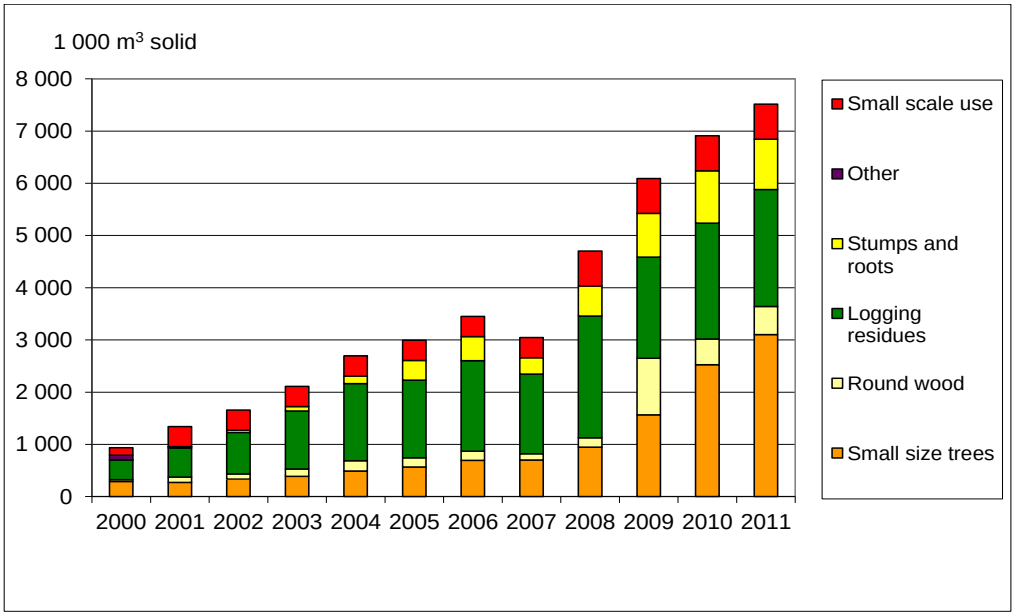


Figure 5. Use wood fuels by source in Finland during 2000 – 2011, 1 000 m^3 (≈ 2 GWh=7.2 TJ)

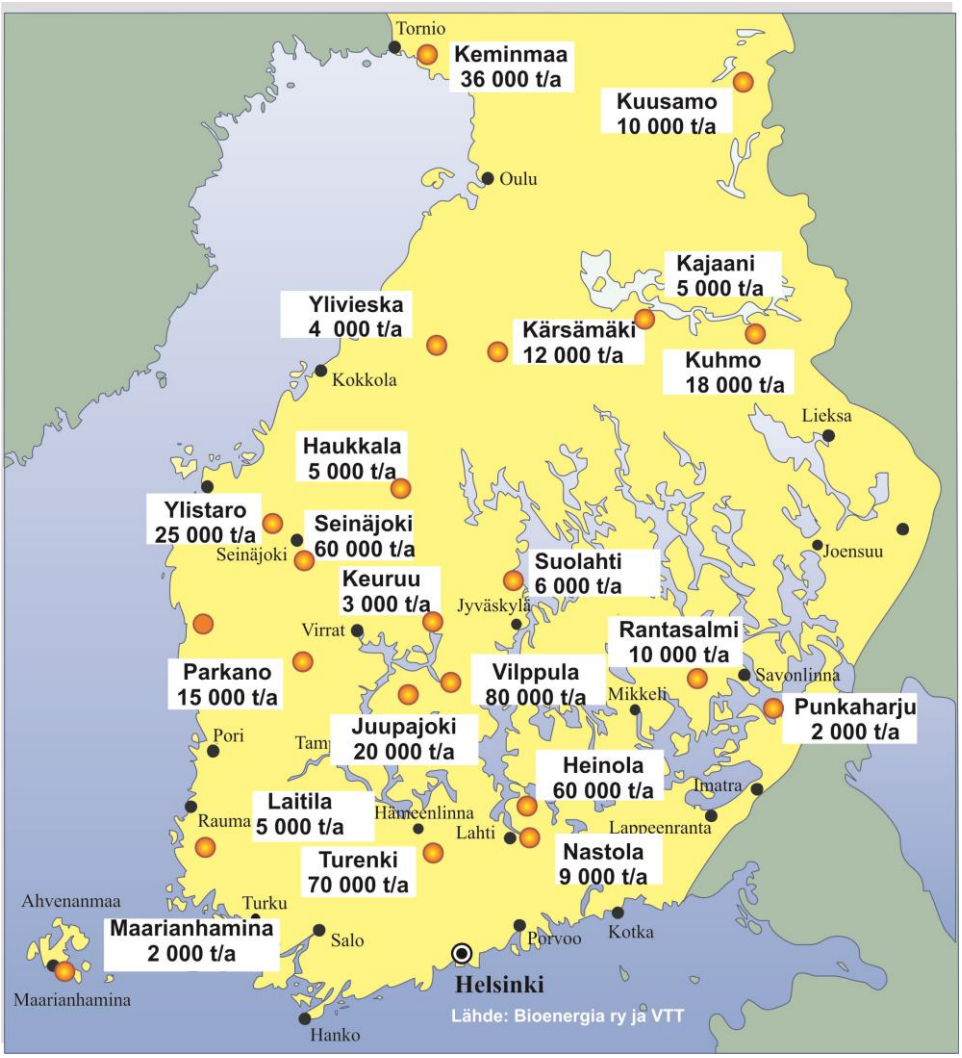


Figure 6. Locations and capacities of pellet plants in Finland. Source VTT and Bioenergia.

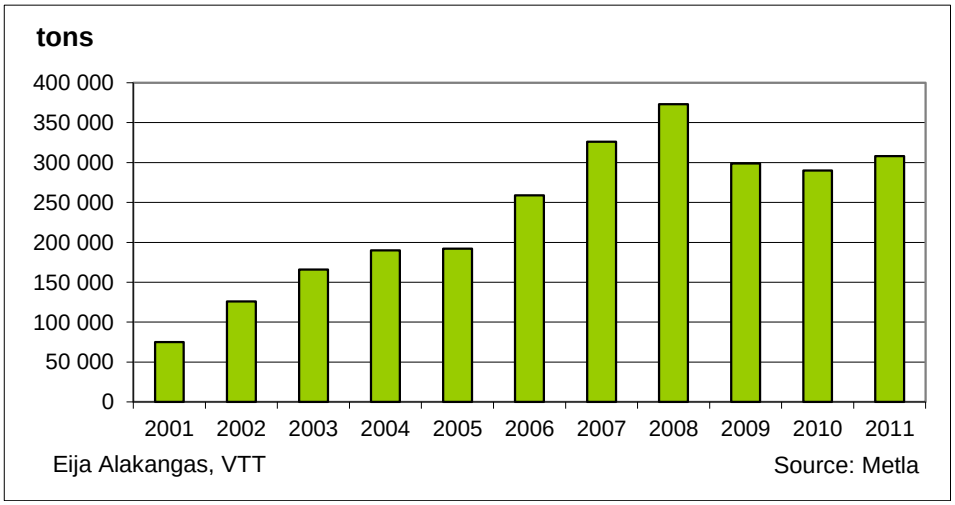


Figure 7. Pellet production in Finland in 2001 to 2011. Source Metla.

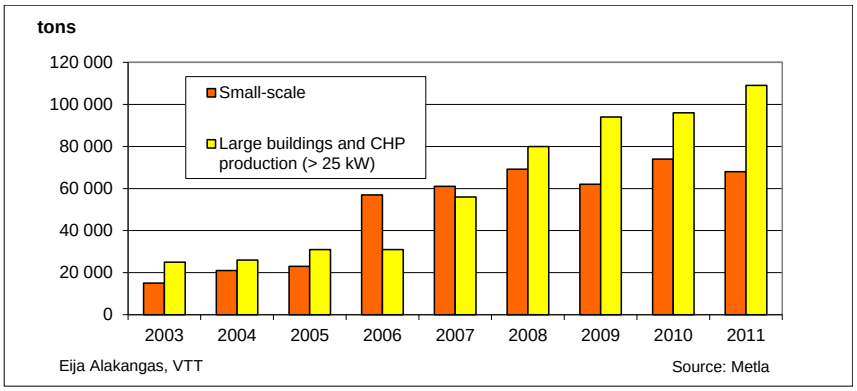
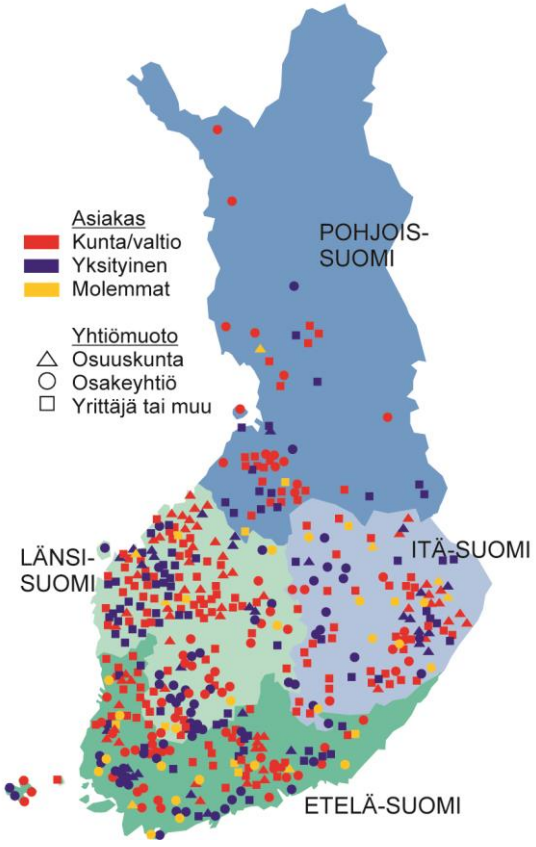


Figure 8. Pellet use in Finland in 2001 to 2011. Source Metla.

In Finland pellets are mainly used in large building like airports, public and industrial buildings and tourist centres. Use of wood pellets is increasing in CHP plants in cofiring with coal in Helsinki. MW Power has supplied a pellet-fired heating plant to Tampereen Energiantuotanto Oy in Tampere, Finland. The new 33 MW is a peak load and backup district heating boiler for their network in city of Tampere. The plant replaced some of the capacity of the existing oil- and gas-fuelled boiler plants.

One of the newest investments on biomass plants in Finland is the biggest biomass gasification plant in the world in the city of Vaasa, Finland. The CFB gasifier for Vaskiluodon Voima Oy was built in 2012 in response to the critical need to reduce the environmental load of traditional coal-fired power plant. This 140 MW biomass gasifier is adjoined to existing coal-fired 560 MW power boiler. Gasifier replaces up to 40% of coal by woody biomass.



Translations:

Asiakas = client

Kunta/valtio = municipality/state

Yksityinen = private

Molemmat = both

Yhtiömuoto = company form

Osuuskunta = cooperative

Figure 9. Small-scale biomass plants managed by heating entrepreneurs. Most of the plants are less than 1 MW. Source TTS Institute.

2. Standardisation activities

2.1. National standardisation activities

This chapter gives a comprehensive overview of standardisation activities and the adoption of standards in Finland, especially standards on biomass fuels.

2.2. National standards

There are no separate national standards of solid biofuels in Finland. Finnish Bioenergy association (FINBIO) has published in 1998 guidelines for wood fuels[4]. These guidelines include fuel classification, sampling and sample reduction and gives instructions for main fuel analysis methods. Currently these guidelines are updated by VTT in cooperation with a committee including representatives of Finnish Forest Industry Federation, Finnish Association of Energy Industries and the Finnish Association of Bioenergy. These new guidelines will be based on CEN/TC 335 and ISO/TC 238 Solid biofuels standards, training material of SolidStandards project and experiences of wood fuel quality issues from participating industry. Around 90% of Finnish wood fuel market will follow this guideline.

The Finnish Standards Association (SFS) is the central standardization organization that controls and co-ordinates national standardization work in Finland. In Finland, standardization activities have been distributed among the 12 affiliates of SFS, and, as the central organization, SFS supports their standardization work. SFS and its affiliates co-ordinate the participation of Finnish stakeholders in the European and international standardization work. Standardisation of solid biofuels has been the responsibility of Finnish Forest Industry Federation during 2000 to 2012. Since 2013 responsibility has been moved to Kemesta ry, which is a new standardisation association carrying out standardisation work on the fields of e.g.: solid biofuels, biobased products, biotechnology, sustainability criteria for bioenergy, transportable gas cylinders, paints and varnishes, plastics, explosives, furniture, and paper, board and pulps.

VTT has also developed together with Nordic peat countries and Russia, Nordtest guidelines for fuel peat NT ENVIR 009:2005: “Quality guidelines for fuel peat: Fuel classification and quality assurance, sampling and analysis of properties”, which is published in English, Swedish and Finnish.

Tapio and Metla have also developed Finnish measurement guidelines for energy wood[5].

The Finnish Mirror committee of Solid biofuels has participated actively in CEN/TC 335 and ISO/TC 238 standardisation work. Finland through SFS is leading working group 2 in CEN/TC 335 (Fuel specifications and classes, fuel quality assurance) and working group 2 also in ISO/TC 238 (Fuel specifications and classes). The members of Finnish mirror committees have participated in working group meetings and commented draft standards.

New themes and needs

The pellet and small-scale use committee of the Finnish Association of Bioenergy has proposed to SFS a new work item for national or international standardisation on pellet storage for small scale use including safety issues. Based of that work could be Motiva Oy's published guidelines for small-scale pellet storage building. There have been two fatal accidents in pellet storage in Finland, and therefore this kind of standard is urgently needed. European Pellet Council (EPC) has also discussed the safety issues in pellet production and

[4] *Puupolttoaineiden laatuohje 1998. FINBIO, Julkaisu 5. 33 s.[Wood fuel quality guidelines]*

[5] *Lindblad, J., Äijälä, O. & Koistinen, A.* 2010. Energiapuun mittaus [Guidelines for energy wood measurement]. Tapio & Metla. 31 s.

storage and there was last year an international seminar on this issue (http://www.pelletcouncil.eu/en/safety-workshop/). There is need for national implementation of safety issues, because building codes differ in different countries. Finland has experience of this field and has also been very active in developing Nordtest methods (www.nordicinnovation.org). VTT led a group, which developed Nordtest method 10: NT ENVIR 010:2008-10: "Guidelines for storing and handling of solid biofuels", which include storage of wood chips, straw and pellets mainly in large scale. Domestic sector was excluded.

2.3. Uptake of European standards

The Finnish national mirror committee of Solid biofuels has translated most important standards into Finnish and published these as two handbooks including English and Finnish texts. In Annex 1 translated standards are listed in Finnish and they are published as SFS-EN standards. Some larger companies are already adopting EN-standards in their fuel supplies or sales. Especially pellet importing companies are using standards in there trade. Also analysis and sampling standards are used in major analysis laboratories in Finland.

Based on the feedback from training, a part of the participants who were unfamiliar with the standards before, attended in the training session, and are now considering using the standards in the future, especially standards for fuel specifications and classes.

VTT had a special project on how to use sampling standards in Finnish conditions for forest chips. VTT published a guideline[6] for this, but the problem is that most of the plants are multifuel plants using also fuel peat. In peat guidelines sampling amounts are different from those in the EN-standard. These plants are large plants, which have several hundreds of loads of fuels and with tens of suppliers. In current Finnish system each load is sampled and 6 one litre samples are taken from full truck load[7].

VTT has also developed own guidelines for used wood[8]. This guideline includes classification of used wood, which can be used as solid biofuels or recovered fuels (C class). Guidelines include also case studies for different kinds of used wood with photos and classification recommendations. Used wood is divided into two classes: A and B, and they are covered by the standard EN 14961-1 and the Waste Incineration Decree does not apply to them. Class C includes wood waste, which contains organic halogenated compounds and heavy metals more than virgin wood, but no wood preservatives (pressure treatment), it belongs to recycled fuels (EN 15359) and the provisions of Waste Incineration Decree apply. Class D wood is treated with wood preservatives and is hazardous waste.

In addition to solid biofuel standardisation Finland is active also in the following related standardisation work[9]:

- CEN/TC 383 Sustainably produced biomass for energy applications (Kemesta ry and Finnish Petroleum Federation are in charge of the work)
- ISO/PC 248 Sustainability criteria for bioenergy (Kemesta ry and Finnish Petroleum Federation)

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[6] *Järvinen, T. & Impola, R*. Näytteenottostandardin soveltamisohje – Näytteenotto- ja näyt-teenkäsittelystandardien (SFS-EN 14778: 2012 ja SFS-EN 14780: 2012) soveltamisohje metsäpolttoaineille Suomessa, Ohje koekäyttöön, VTT-R-03522-12. [Guidelines for implementing SFS-EN 14778 and SFS-EN 14780 standards for forest fuels. Guideline for test use]

[7] *Alakangas, E.* Properties of wood fuels used in Finland, Technical Research Centre of Finland, VTT Processes, Project report PRO2/P2030/05 (Project C5SU00800), Jyväskylä 2005, 89 p. + app. 10 p.

[8] *Alakangas, E. & Wiik*, C. 2008. Käytöstä poistetun puun luokittelu ja hyvien käytäntöjen kuvaus.[Classification of used wood and description of best practices] VTT report, VTT-R-04989-08, Jyväskylä 2008

[9] *Valtanen, J.* Kestävän kehityksen standardit ja kriteerit kiinteille biopolttoaineille [Standards for sustainaible produced biomass and criteria for solid biofuels], SolidStandards – Wood chip training event, 9 – 4 April, Saarijärvi, Finland, presentation in Finnish.

- CEN/TC 411 Bio-based products (Kemesta ry)

Sustainability standardisation is responsibility of Kemesta ry and Finnish Petroleum Federation in turn of 2 year periods.

Table 5 summaries the results of the questionnaires on current use of EN-standards in Finland. Also aim to use in future is stated.

Table 5. Use of European standards in Finland. Feedback from training events (95 responses)

Standard		Current use	Aim to use in future
Terminology			
EN 14588	Solid biofuels – Terminology, definitions and descriptions	29	40
Fuel specifications and classes			
EN 14961-1:	Solid biofuels – Fuel specifications and classes – Part 1: General requirements	35	46
EN 14961-2:	Solid biofuels – Fuel specifications and classes – Part 2: Wood pellets for non-industrial use	18	25
EN 14961-3:	Solid biofuels – Fuel specifications and classes – Part 3: Wood briquettes for non-industrial use	16	23
EN 14961-4:	Solid biofuels – Fuel specifications and classes – Part 4: Wood chips for non-industrial use	22	34
EN 14961-5:	Solid biofuels – Fuel specifications and classes – Part 5: Firewood for non-industrial use	22	28
EN 14961-6	Solid biofuels – Fuel specifications and classes – Part 6: Non-woody pellets for non-industrial use	16	22

Standard		Current use	Aim to use in future
Quality assurance			
EN 15234-1:	Solid biofuels – Fuel quality assurance – Part 1: General requirements	26	36
EN 15234-2:	Solid biofuels – Fuel quality assurance – Part 2: Wood pellets for non-industrial use	15	19
EN 15234-3:	Solid biofuels – Fuel quality assurance – Part 3: Wood briquettes for non-industrial use	13	17
EN 15234-4:	Solid biofuels – Fuel quality assurance – Part 4: Wood chips for non-industrial use	15	20
EN 15234-5:	Solid biofuels – Fuel quality assurance – Part 5: Firewood for non-industrial use	16	25
EN 15234-6	Solid biofuels – Fuel quality assurance – Part 6: Non-woody pellets for non-industrial use	14	17
Sampling and sample preparation			
EN 14778:	Solid biofuels – Sampling	39	50
EN 14780:	Solid biofuels – Sample preparation	33	46
Physical and mechanical properties			
EN 14774-1:	Solid biofuels – Determination of moisture content – Oven dry method – Part 1: Total moisture – Reference method	27	29
EN 14774-2:	Solid biofuels – Determination of moisture content – Oven dry method – Part 2: Total moisture – Simplified method	32	38
EN 14774-3:	Solid biofuels – Determination of moisture content – Oven dry method – Part 3: Moisture in general analysis sample	22	26
EN 14775:	Solid biofuels – Determination of ash content	24	24
EN 14918:	Solid biofuels – Determination of calorific value	21	25
EN 15103:	Solid biofuels – Determination of bulk density	19	23
EN 15148:	Solid biofuels – Determination of the content of volatile matter	20	22
EN 15149-1:	Solid biofuels – Determination of particle size distribution – Part 1: Oscillating screen method using sieve apertures of 1 mm and above	13	17
EN 15149-2:	Solid biofuels – Determination of particle size distribution – Part 2: Vibrating screen method using sieve apertures of 3,15 mm and below	14	17
CEN/TS 15149-3:	Solid Biofuels – Methods for the determination of particle size distribution – Part 3: Rotary screen method	14	13
EN 15150:	Solid biofuels – Determination of particle density	13	14
EN 15210-1:	Solid biofuels – Determination of mechanical durability of pellets and briquettes – Part 1: Pellets	15	17
EN 15210-2:	Solid biofuels – Determination of mechanical durability of pellets and briquettes – Part 2: Briquettes	14	16
EN 16126:	Solid biofuels – Determination of particle size distribution of disintegrated pellets	13	14
EN 16127:	Solid biofuels – Determination of length and diameter for pellets and cylindrical briquettes	13	16
Chemical properties			
EN 15104:	Solid biofuels – Determination of total content of carbon, hydrogen and nitrogen – Instrumental methods	18	16
EN 15105:	Solid biofuels – Determination of the water soluble chloride, sodium and potassium content	18	16
EN 15289:	Solid biofuels – Determination of total content of sulfur and chlorine	17	15
EN 15290:	Solid biofuels – Determination of major elements – Al, Ca, Fe, Mg, P, K, Si, Na and Ti	17	16
EN 15296:	Solid biofuels – Conversion of analytical results from one basis to another	18	17
EN 15297:	Solid biofuels – Determination of minor elements – As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn	17	15

Fuel producers and users usually use terminology, fuel specifications and classes, sampling and moisture content standards. About 35% of respondents already use these standards. Fuel analysis laboratories determinate physical and mechanical, and chemical properties and they use these standards mainly. These standards are widely used in Finnish laboratories.

When new Wood fuel guidelines is published about 90% of solid biofuel market in Finland will use EN-standards and later EN ISO –standards, because these guidelines are based on solid biofuel standards for terminology, fuel specifications and classes and major fuel analysis methods.

3. Certification activities

Finland don´t have any special certification for solid biofuels. Biomass fuel suppliers usually use ISO 9000 series for the certification of biomass fuel production.

Finland has a long history in applying a forest certification system. Approximately 95% of Finnish production forests are certified under the Finnish PEFC system. The Finnish system was endorsed for membership of PEFC in the year 2000. The Finnish PEFC system is maintained and developed by PEFC Finland – Finnish Forest Certification Council. The PEFC system includes requirements for forest management and use, verification of origin of wood raw material, as well as for the independence and competence of the auditors. The regulations regarding management and use are revised at five-year intervals. The Finnish PEFC standards are under a revision at the moment [10].

Of all the forest certification systems, PEFC is the best adapted to the Finnish forestry environment, based on family ownership; in addition to individual forest owner certification PEFC also offers group certification, keeping costs reasonable even when the participating forests are small scale. Larger areas of forest owned by more than one owner mean that the group certification actions for environmental protection, for example, can be concentrated where they are most efficient. PEFC certification[11] in Finland is carried out as regional group certification. “Regional” means that the geographical operating area of a Regional Forestry Centre defines a maximum coverage of one PEFC forest management certificate in Finland. On each of the thirteen Forestry Centre areas the “group” means that all forest owners (owners of private family forests, company, municipality and parish owned forests as well as state owned forests) have access to the certification group.

The Finnish certification system (PEFC) includes also criteria for energy wood, which is applying also Tapio´s guidelines for energy wood[12].

Finland has also launched FSC forest certification system[13] (Forest Stewardship Council) in 2012. Many Finnish companies are also applying this forest certification system, too.

4. Standardisation and certification needs

4.1. Information on respondents

VTT distributed the SolidStandards questionnaire in three training events: general on 21 March 2012, firewood on 22 March 2012 and wood chips on 9-10 April 2013. During training events there was reserved time to fill in the questionnaire in the end of the programmes. All those, who filled in the questionnaires, also received a training certificate from VTT. In total 95 responses were received and the results were filled into the QuestBack internet system planned by NEN.

Not all questions were answered by the respondents. In this chapter only responses, which were answered were listed.

[10] http://www.pefc.fi/pages/en/about-pefc/pefc-in-finland.php

[11] *Alakangas, E. & Kaivola, A*. 2010, Country report of different criteria for sustainability and certification of biomass and solid, liquid and gaseous biofuels – Finland, Work package 4.3, EUBIONET III, 56 p. (www.eubionet.net).

[12] *Äijälä, O., Kuusinen, M. & Koistinen, A*. (eds.) 2010. Hyvän metsänhoidon suositukset energiapuun korjuuseen ja kasvatukseen [Good forest management recommendations for energy wood growing and harvesting]. Metsätalouden kehittämiskeskus, Tapion julkaisuja. English version www.afo.eu.fi

[13] Forest Stewardship Council, http://fi.fsc.org

Respondents represented the following types of organisations (total 95):

- 16 Solid biofuel producers
- 11 Solid biofuel trader and/or logistics providers
- 33: Solid biofuel users: large scale (> 1 MW)
- 7 Solid biofuel users: small-medium sized (< 1 MW)
- 0 Consumer association
- 2 Industrial associations
- 0 Combustion, gasification or fuel production equipment manufacturer
- 4 Certification, inspection or testing bodies
- 22 Other (education, research organizations, education, advisory organisation, consulting, measurement equipment suppliers)

1.2 In which country has your company been settled?

- 89 only in Finland and 6 companies also in Denmark, France, Sweden, Norway, Estonia, Latvia, Lithuania, Poland, UK and Russia

1.3 Are you already involved in the CEN standardization process

- 6 yes answers

1.4 Would you like to get involved in the CEN standardization process?

- 6 yes answers

1.5: In which solid biomass you are working with

- 41 Wood pellets
- 22 Wood briquettes
- 79 Wood chips
- 37 Firewood
- 9 Non-woody pellets (agro pellets, mixed pellets)
- 17 Straw (wheat and energy crops)
- 15 Other biomass fuels, like 5 peat, 4 bark, 2 black liquor, biowaste, SRF, grain residues, other industrial residues

2.3 Which of the current standards are very important to the biomass market in your opinion and why?

- Fuel quality requirements and classes
- Sampling
- Moisture content
- Measurement of calorific value
- Ash content
- Particle size
- Bulk density

There were not any comments on special standards only for wood chips and firewood. Most of the respondents answered special questions for wood chips or hog fuel (EN 14961-1 and 4). Also 9 answers were received for firewood (EN 14961-1 and 5). Most of the respondents complained that the questionnaire is too long. Answers for special standards are listed in chapter 4.3.

4.2. Feedback collection about standards for transport/storage

3.1 Quality issues during transport and logistics are mainly relevant for pellets. Do you think that quality issues in pellet transport and logistics are sufficiently addressed in EN 15234?

- It does not need to go to details.
- 8 yes answers
- A lot of pellets are imported outside EU so verifying is difficult.
- Guidelines for quality of work of the driver/sampler

3.2 Are you aware of the Austrian standard ÖNORM M 7136 on pellet transport and storage?

- One yes answer

3.3 *Do you think that this kind of standard is also needed in your country or at EU level?*

- One yes answer

3.6 Are you aware of the Austrian standard ÖNORM M 7137 on pellet storage silos and storage rooms for small end-users?

- 21 no answers

3.7 Do you think that this kind of standard is also needed in your country or at EU level?

- No answers received

The following answers were received for special needs for standardisation

- Dust explosion 18
- Off gassing 14
- Self-ignition 13
- Fungi spore 15
- Other 2 (carbon monoxide, common occupational safety, soil content of stumps (ash))

4.3. Feedback collection per type of biomass and standard

4C.2 The future ISO 17225-1 includes only one property table for wood chips and hog fuel. Do you agree with the proposed combination in one table, with stating only the traded form separately: wood chips (produced with sharp tools) or hog fuel (crushed by blunt tools)?

- 36 yes answers. Quality is much the same. Differences in fluidity and therefore in usability, and that is why the titles should be different. Crushing is not possible in every plant, but still it does not need the standard of its own.
- 17 no answers. They behave differently in storage for example when self-ignition is in question.

4C.3 Do you agree with the following proposed particle sizes for inclusion in the future ISO 17225-1 standard on fuel specifications of wood chips: P16, P31, P45, P63, P100 and P300

- 20 yes answers and one comment: It is too complicated

4C.4 Should there be separate particle size requirements for forest chips (needles, increased amount of fines), stem wood or industrial wood residues and used wood?

- 8 Yes and 18 no answers

4C.5 Do you think a specific maximum length of particles can be produced and guaranteed with the raw material "forest residues" and "whole trees"?

- 22 yes and 18 no answers and one proposal: P45

4C.6 Do we need the property class for fines like F25+, ≥ 25 % fines (< 3,15 mm), to be able to classify e.g., forest residues?

- 32 yes and 14 no answers

4C.7 How large should the main fraction be: 75%, 60% or a different amount? Please specify your proposal.

- 90% or 95% nominal top size, and then addition to this also selection of threshold values for fines and oversized particles.
- one answer for 80%, 21 for 75%, one for 70%, 6 for 60% and one for 50%

4C.8 Do we need a maximum cross sectional area in EN 14961-1?

- 21 yes and 29 no answers

4C.9 Do we need a maximum cross sectional area in EN 14961-4?

- 23 yes and 27 no answers

4C.10 Do we need to have net calorific value as received as a normative property?

- 40 yes and 18 no answers

4D.1 Can you specify your product according to EN 14961-1 or EN 14961-4?

- 7 informed that they can specify according to EN 14961-4 and one according to EN 14961-1

4D.1 Can you specify your product according to EN 14961-1 or EN 14961-5?

- 9 no answers and comments: No, the product standard EN 14961-5 for oven ready firewood is enough

4.4. Feedback collection about quality certification

3.4 Are you aware of certification systems (e.g., offered by German DINCERTCO or EN plus) for pellet logistics and transport companies?

- 4 yes answers

3.5 Do you think that this kind of certification would also be helpful in your country or at EU level?

- 9 Yes answers

3.6 Are you aware of the Austrian standard ÖNORM M 7137 on pellet storage silos and storage rooms for small end-users?

- 21 no

3.7 Do you think that this kind of standard is also needed in your country or at EU level?

- 0 answers received

3.8 Are you aware of certification systems (e.g. offered by German DINCERTCO) for pellet storage rooms and silos for small end-users?

- 20 no and 2 yes answers

3.9 Do you think that this kind of certification would also be helpful in your country or at EU level?

- 3 yes answers

4.5. Other standardisation and certification needs

2.4 Are there in your opinion solid biofuel subjects that need to be standardized?

- Torrefied products
- Sampling of peat and wood, harmonization/standardization of quality assurance and sampling handling
- Usage of stumps, traceability
- Standardization of manual sampling method for different kind of unloading methods.
- guidelines for quality of work of the driver/sampler*

* in Finland sampling of wood chips or hog fuel is carried out by truck drivers and there is need for simplified guidelines for this.

5. Results of discussion of feedback collection with national mirror committee

Table 5. Members of Finnish Mirror Committee (November 2013)

Organisation	Type of organisation
VTT (chair)	research and development
Vapo Oy	biomass fuel supplier, heat and power production
Andritz	manufacturers of biomass handling and combustion equipment
Labtium Oy	testing laboratory
Finnish Forest Industry Federation	association for forest industry
Foster Wheeler	manufacturer of combustion plants
Finnish Energy Industries	association of energy utilities
Metso	manufacturer of combustion plants
The Trade Association of Finnish Forestry and Earth Moving Contractors	association for fuel production contractors
Kemesta ry (secretary)	new standardisation association

During 2000-2012 also the following organisations have participated in the Finnish Mirror Committee: Association of Finnish Bioenergy, Vaisala Oy, Biowatti Oy, Karelia Upofloor, Versowood, StoraEnso and Finnish Ministry of Employment and the Economy.

The draft report, which was sent to the Mirror Committee members in August 2013, was discussed in the meeting on 5 November 2013 in Helsinki. This was the second meeting organised by Kemesta ry, which is a new standardisation organisation in Finland and now responsible for solid biofuel standardisation.

The Mirror Committee members have already commented SolidStandards material and standards during 2 stakeholder consultation and during SolidStandards training events. These comments were already included in the previous parts of this report.

Additional comments were received for Table 1 and 2 that data should be presented so that also $\leq$ 2.5 MW_{th} plants could be calculated. Also in the conclusions chapter torrefied biomass standardisation should have a broader scope including also steam exploded biomass and hydro carbonisation and proposed standardisation item should be: thermally treated biomass fuels.

Also map of small-scale plants managed by heating entrepreneurs should be added (see Figure 9).

6. Summary of national industry needs

Bioenergy is an important energy source in Finland and huge amounts of solid biofuels are traded in Finland. Finnish industry decided in beginning of 2000 to join the CEN/TC 335 – Solid Biofuels and CEN/TC 343 – Solid recovered fuels committees and participate in the work actively. Finland is leading WG2 (Fuel specifications and classes, Fuel quality assurance) of CEN/TC 335 and SFS is a secretariat for CEN/TC 343. When work of international standards of Solid biofuels (ISO/TC 238) started Finland was selected to lead WG2 (Fuel specifications and classes) and this work is now in final stage. Finnish Mirror Committee members have participated in working groups and also provided several comments and additional input to drafts of standards in CEN/TC 335. The Mirror Committee also decided to translate the most important standards into Finnish and two handbooks were published by SFS.

According to the feedback from training events there were not very many comments on existing standards. During discussion in the training events the classification of particle size distribution for wood chips and hog fuel was found out to be too complicated. In Finland the current system has threshold values for nominal top size (95% has to pass this), and then in addition to this also selection of threshold values for fines and oversized particles.

New items proposed from Finland are the following:

- thermally treated biomass fuels
- simplified sampling standards or guidelines for samplers
- safety related standards (off-gassing, fungi, self-ignition etc.)

The pellet council of the Finnish Association of Bioenergy has proposed to develop a standard for domestic pellet storage including safety issues.

It is also important to guide stakeholders on how to use standards. Associations of Finnish Bioenergy, Forest Industry Federation and Finnish energy industries have also proposed that wood fuel guidelines need to be updated based on EN-standards for solid biofuels.

Standards for measurement of mechanical, physical and chemical properties of solid biofuels are already used in some Finnish analysis laboratories and some universities and universities of applied sciences. National guidelines for wood fuel production, sampling and quality control are widely used both in large and smaller companies.

Certification of solid biofuels production and transportation is applied only in large companies. Certification of origin and source for wood biomass is widely used in Finland and 95% of forests are certified according to Finnish PEFC system, which also includes criteria for energy wood. Some of the respondents find it important to use certification for wood pellets.

Annex 1. List of CEN/TC 335 Solid Biofuels – standards SFS handbook 35 (language Finnish/English) – names in Finnish (pages)

Käsikirja1. Terminologia, luokitusjärjestelmät ja laadunvarmistus sekä tulosten muuntaminen Handbook 1-Terminology, fuel specifications and classes, fuel quality assurance and calculation of analysis to different basis	
SFS-EN 14588:2011	*Kiinteät biopolttoaineet. Terminologia, määritelmät ja kuvaukset (68 sivua)*
SFS-EN 14961-1:2010	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 1: Yleiset vaatimukset (100 sivua)*
SFS-EN 14961-2:2011	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 2: Puupelletit ei-teollisuuskäyttöön (25 sivua)*
SFS-EN 14961-3:2011	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 3: Puubriketit ei-teollisuuskäyttöön (23 sivua)*
SFS-EN 14961-4:2011	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 4: Puuhake ei-teollisuuskäyttöön (25 sivua)*
SFS-EN 14961-5:2011	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 5: Polttopuu ei-teollisuuskäyttöön (22 sivua)*
SFS-EN 14961-6:2012	*Kiinteät biopolttoaineet. Polttoaineen laatuvaatimukset ja -luokat. Osa 6: Ei-puupohjaiset pelletit ei-teollisuuskäyttöön (24 sivua)*
SFS-EN 15234-1:2011	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 1: Yleiset vaatimukset (39 sivua)*
SFS-EN 15234-2:2012	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 2: Puupelletit ei-teollisuuskäyttöön (31 sivua)*
SFS-EN 15234-3:2012	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 3: Puubriketit ei-teollisuuskäyttöön (31 sivua)*
SFS-EN 15234-4:2012	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 4: Puuhake ei-teollisuuskäyttöön (27 sivua)*
SFS-EN 15234-5:2012	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 5: Polttopuu ei-teollisuuskäyttöön (27 sivua)*
SFS-EN 15234-6:2012	*Kiinteät biopolttoaineet. Laadunvarmistus. Osa 6: Ei-puupohjaiset pelletit ei-teollisuuskäyttöön (31 sivua)*
SFS-EN 15296:2011	*Kiinteät biopolttoaineet. Analyysitulosten muuntaminen eri ilmoittamisperustoille (26 sivua)*

Käsikirja 2. Terminologia, näytteenotto ja käsittely, fysikaaliset ja mekaaniset testimenetelmät sekä tulosten muuntaminen ***Handbook 2. Terminology, sampling and sample preparation, determination of physical and mechnical properties and calculation of analysis to different basis***	
SFS-EN 14588:2011	*Kiinteät biopolttoaineet. Terminologia, määritelmät ja kuvaukset (68 sivua)*
SFS-EN 14778:2011	*Kiinteät biopolttoaineet. Näytteenotto (103 sivua)*
SFS-EN 14780:2011	*Kiinteät biopolttoaineet. Näytteen käsittely (41 sivua)*
SFS-EN 14774-1:2010	*Kiinteät biopolttoaineet. Kosteuspitoisuuden määritys. Uunikuivausmenetelmä. Osa 1: Kokonaiskosteus. Vertailumenetelmä (13 sivua)*
SFS-EN 14774-2:2010	*Kiinteät biopolttoaineet. Kosteuspitoisuuden määritys. Uunikuivausmenetelmä. Osa 2: Kokonaiskosteus. Yksinkertaistettu menetelmä (13 sivua)*
SFS-EN 14774-3:2010	*Kiinteät biopolttoaineet. Kosteuspitoisuuden määritys. Uunikuivausmenetelmä. Osa 3: Yleisen analyysinäytteen kosteus (13 sivua)*
SFS-EN 14775:2010	*Kiinteät biopolttoaineet. Tuhkapitoisuuden määritys (15 sivua)*
SFS-EN 15103:2010	*Kiinteät biopolttoaineet. Irtotiheyden määritys (21 sivua)*
SFS-EN 15149-1:2011	*Kiinteät biopolttoaineet – Palakokojakauman määritys – Osa 1: Täryseula-menetelmä (oskilloiva) käyttäen 1 mm ja sen yli meneviä seulan aukkoja (23 sivua)*
SFS-EN 15149-2:2011	*Kiinteät biopolttoaineet – Palakokojakauman määritys – Osa 2: Täryseula-menetelmä (värähtelevä) käyttäen 3,15 mm ja sen alle meneviä seulan aukkoja (23 sivua)*
SFS-EN 15210-1:2010	*Kiinteät biopolttoaineet. Pellettien ja brikettien mekaanisen kestävyyden määritys. Osa 1: Pelletit (17 sivua)*
SFS-EN 15210-2:2011	*Kiinteät biopolttoaineet. Pellettien ja brikettien mekaanisen kestävyyden määritys. Osa 2: Briketit (15 sivua)*
SFS-EN 16127:2012	*Kiinteät biopolttoaineet. Pellettien pituuden ja halkaisija määritys (17 sivua)*
SFS-EN 15296:2011	*Kiinteät biopolttoaineet. Analyysitulosten muuntaminen eri ilmoittamisperustoille (26 sivua)*