SolidStandards

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

D 4.4

Recommendation Paper on the development of certification systems

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The SolidStandards project

The SolidStandards project addresses on-going 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

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1. Introduction

This report gives a summarizing overview about what certification schemes for solid biomass should contain and be structured and what approaches for currently schemes other than wood pellets exist. The outcome is based on the expierence gained during the work for workpackage 4 and 6.

1.1. General introduction

A standard (French: Norme, German: Norm) is a technical document designed to be used as a rule, guideline or definition. It is a consensus-built, repeatable way of doing something. Standards should be based on the consolidated results of science, technology and experience.

Standards are created by bringing together all interested parties such as manufacturers, consumers and regulators of a particular material, product, process or service. All parties benefit from standardization through increased product safety and quality as well as lower transaction costs and prices[1] and bring as a result technological, economic and societal benefits. Standards help to harmonize technical specifications of products and services, support to make industry more efficient and break down barriers to international trade. A European Standard (EN) automatically becomes a national standard in all National Members. International standards (ISO) will come to EN ISO standards, if the Vienna agreements are applied. This is case of Solid biofuels standards.

Conformity to (international) standards helps reassure consumers that products are safe, efficient and good for the environment. International standards represent the consensus view of the leading experts in industry sectors ranging from energy utilities and energy efficiency to transportation, management systems, climate change, healthcare, safety and information and communication technology (ICT). Having a neutral and independent confirmation of the application of the standard by a certification body, the customer receives a certain level of credibility and trust, whether the product characteristics that have assured him of certified companies are respected. Certification is based on the justified confidence that a product, service, process, system or person complies with an (internationally) agreed standard. Certification marks are earned by businesses whose products and practices consistently prove conformity to relevant standards. These marks are easily recognizable and act as labels of quality, safety and performance. Most of the times the certification process is carried out by a third party conformity assessment body, because they have an independent point of view[2].Further, an objective evaluation of the effectiveness of the quality system, the customer receives a degree of certainty as to the consistency of the quality level. The company receives simultaneously via an external expert feedback on the effectiveness of the quality system. Quality assurance always includes the requirement of continuous improvement of product quality. Due to the mandatory continues control optimization potentials can be made more visible. Through follow-up on corrective actions to continuously improve the quality management system is being driven and the company imposed a certain external pressure for continuation of the quality system and its continuous improvement. By having a further product feature (the certificate) certified companies have an additional competitive advantage over non-certified companies. This is all the more important, the more approximate the product characteristics of competing companies. The voluntariness of certification scheme is a good indicator on what measurements and requirements are possible within the branch - in case the required effort is too much or the rules are to strict no company will join the system.

[1] http://www.cen.eu/cen/NTS/What/Pages/default.aspx sited 18.02.2014
[2] www.solidstandards.eu/images/Standardisation/ General_Information_module sited 28.02.2014

The certification for solid biofuels consist the production according to EN 14961 together with the internal quality assurance according to EN 15234 plus an external control according to a certification scheme, which is based on the named standards and may have additional requirements. These may be in the future the inclusion of sustainability requirements which means sustainability of feedstock material resources. The most common forest certification schemes FSC and PEFC be named here, but also the declaration of carbon footprint for production and transport or the requirements on the drying of raw material could be taken into account in the future because the discussion about these sustainable aspects are already mandatory for other (liquid) biofuels.

When implementing a certification for a solid biofuel, which is at the moment only available for wood pellets, the configuration of a certification scheme depends on many different parameters, especially regarding the requirements on internal and external control. Structural, economic, ecological and raw material-specific requirements have to be taken into account:

- Target groups (producers, traders, users)
- Target area (countries, regions)
- Supply chains (including share of import & export)
- Economic size and importance of the sector
- Professional status of the sector
- Average size of involved market players
- International and national laws and legal regulations

For a rapid and sustainable implementation of certification schemes on the market the rules and requirements must be plausible.

Because of the rising demand and the worldwide request of biomass for energy purposes, especially as co-firing material, the product and quality standards had to be developed for a worldwide level. Based on the EN 14961 series the “International Standardisation Organisation” (ISO) enhanced the standards. Thereby weak points within the existing European Standards, as the size distribution for wood chips was seen in practice, could be corrected. The new ISO standards will be published in 2014. The quality assurance standards of the EN 15234 series will not be available on ISO level.

1.2. Best practice example - ENplus for pellets

ENplus certification scheme for wood pellets is currently the only scheme based on the European Standards EN 14961-2:2012 **and** EN 15234-2:2012 which therefore shows the applicability of the new standards.

Goal of the certification for wood pellets according to ENplus is to secure a clearly defined and constant quality of the fuel along the supply chain for heating and combined heat and power plants (CHP) up to 1 MW power in residential, commercial or public buildings. Guaranteeing a constant high quality makes it necessary to control the production, logistics and delivery procedures. As a result aspects of a product certification are combined to those of a system certification.

The ownership of the ENplus trade mark stays with the European Biomass Association AEBIOM. The right to award the license to use the ENplus brand to qualifying companies is passed on from AEBIOM to national pellet associations that apply. The ENplus for pellets certificate was introduced in Germany in 2010 and has spread quickly all over Europe since then. By the end of 2012 pellet producers from Austria, Belgium, Canada, Croatia, Czech Republic, Denmark, France, Germany, Italy, Lithuania, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Switzerland, the Netherlands, United Kingdom and even the US are

producing ENplus pellets (around 3.2 million tons of ENplus production in 2012[3]). Already 90% of produced pellets in Austria and Germany are ENplus certified. The quality seal ENplus includes the whole supply chain for wood pellets – from production till delivery to the final customer, therefore ensuring high quality as well as transparency.

The European standard includes quality classes A1 and A2 that are also implemented via ENplus. Class A1 is the premium quality mainly used in private household boilers or stoves. A1 pellets produce the least amount of ash and fulfill the highest requirements. Class A2 is mainly used in larger installations and produces more ash. Industrial pellets are not called "ENplus", but can be certified as "EN B".

The ENplus "Handbook for Certification of Wood Pellets for Heating Purposes" version 2.0 from April 2013 published by the European Pellet Council distinguishes the requirements in three main parts: general description, pellet producers and pellet traders in the supply chain.

Essential points in the certification system are requirements for:

- Wood pellet production and quality assurance
- The product (EN 14961-2)
- Labelling, logistics and intermediate storage
- The delivery to end consumer

Specifications for internal quality control management guarantee that the product requirements are maintained. Requirements for technical facilities, operational procedures and documentation are defined, which make the operation processes transparent and should lead to a rapid tracking and solving the problems. These specifications are based on the standards ISO 9001 and EN 15234-2:2012 but differ in some points and require additional documentation from a producer of pellets. The ENplus scheme necessitates from the applicant to:

- Sign a declaration of sustainability
- Document in what amount and where the certified wood (FSC/PEFC) comes from
- State the $CO_{2\text{-eq}}$ emitted per metric ton of pellets
- Document extensive repair and maintenance work that may lead to impairment of the pellet quality
- Measure the ash melting behaviour by 815°C instead of the in the standard 14961-2 required measuring temperature of 550°C
- Document in more detail the responsibility of each individual employee

2. Development of a certification scheme

The certification scheme for quality standards meets several other superordinate requirements for the involved institutions and organisations. These organisations are the certification scheme itself, its' associated inspection bodies and if analysing is needed, for example like physical parameters as ash melting behaviour, also the testing institute has to meet specific requirements.

Already during the development of a potential certification system all interested parties should be involved on early stage. Strong partners such as industry associations and key-actors such as major producers or distributors of biofuels play the decisive role. Even actors with direct reference to the theme such as nature conservation organizations, NGOs',

[3] http://www.aebiom.org/blog/category/publications/aebiom_reports/ EPC AEBIOM Annual Report 2012

certification and auditing companies as well as manufacturers of incinerators should be consulted at an early stage. The legal aspects of a certification system should be coordinated in advance with lawyers and public officials. The early involvement of all interested parties reduces the risk of consuming and expensive rework and creates by the introduction of complex interests a solid foundation of trust for future certificate.

2.1. General requirements for implementing certification systems

General requirements about implementing a certification system according to a product standard are described in the standard: ISO/IEC 17065:2012: “Conformity assessment - Requirements for bodies certifying products, processes and services”. This standard describes the process of certification of products, processes or services is a means of providing assurance that they comply with specified requirements in standards and other normative documents. Some certification schemes may include initial testing or assessment of its supplier’s quality management systems, followed by surveillance that takes into account the quality management system. Other schemes rely on initial testing and surveillance testing, while still others comprise type testing only.

The overall aim of certifying products, processes or services is to give confidence to all interested that the product will fulfil specified requirements. The value of certification therefore is the degree of confidence and trust that is established by a third party which acts as a competent demonstration of fulfilment.

This International Standard specifies requirements; the observance of which is intended to ensure that certification bodies operate certification schemes in a competent, consistent and impartial manner. As a result, this facilitates the recognition of such bodies and the acceptance of certified products, processes and services on a national and international basis thus furthering international trade.

The standard can be used as a criteria document for accreditation or peer assessment or designation by governmental authorities, scheme owners and others[4].

2.2. Requirements for testing organizations

The requirements for laboratories which are needed to analyze as third party the quality of specific quality measures of the product or the raw material need a certification according to the international standard ISO/IEC 17025:2005 “General requirements for the competence of testing and calibration laboratories”. This standard looks at all the requirements testing and calibration laboratories and testing organizations have to meet to prove that they operate a quality system, are technically competent and can generate technically valid results. This standard applies to everything from test equipment to data sampling and sets out valid specifications to improve an organization’s quality assurance systems and as a result, their quality control. Key topics include testing and calibrations using standard, non-standard and laboratory-developed methods.

The requirements set out in ISO/IEC 17025 help laboratories with the development of their quality, administrative and technical operations management systems. Laboratory customers, regulatory authorities and accreditation bodies may also use this standard to confirm or recognize the technical competence of laboratories.

[4] http://shop.bsigroup.com/ProductDetail/?pid=000000000030260760 sited 10.03.2014

2.3. Requirements for inspection bodies

The international standard ISO 17020:2012 "General Criteria for the Operation of Various Types of Bodies Performing Inspection" is an internationally recognized standard for the competence of inspection bodies. ISO 17020 should not be confused with ISO 9001:2008, which is specific to quality management systems. ISO 9001 does not require evaluation of the technical competence of an inspection body and it should not be regarded as an 'acceptable' alternative to ISO 17020.

This International Standard specifies general criteria for the competence of impartial bodies performing inspection irrespective of the sector involved. It also specifies independence criteria. This standard is intended for the use of inspection bodies and their accreditation bodies as well as other bodies concerned with recognizing the competence of inspection bodies

2.4. Procedure

The following described procedure follows general requirements known from other certification schemes. Text comes partly from the ENplus handbook for pellets and from the draft handbook for the certification of agro and mixed biopellets" [5] for non-woody pellets from VTT within the IEE project MixBioPells[6].

2.4.1. Overview

The essential components of certification programmes are:

- Inspection and verification of the conformance of the fuel to European standards, as well as the logistics system up to the end-use
- Specifications for the in-house quality management (certificate holder facilities and processes, production monitoring employee qualifications, documentation duties, internal quality control).
- The execution of certification and external controls, license issuing and revoking, handling of complaints and traceability.

2.4.2. Mandate for production control

The interested party enters into an inspection contract with an inspection body listed by weather the European Pellet Council or other qualified body and commissions it with the initial inspection of its production facilities.

2.4.3. Initial inspection of production

The inspection body conducts an initial inspection of the production site(s) of the interested party. The **auditor** is to be given access to all parts of the plant and all relevant documentation. Following points have to be examined:

- Raw material: Classification of the origin and sources of solid biofuels in accordance with EN 14961-1:2010 (detailed description of raw material classification in Table 1).

[5] Alakangas, E., Handbook for the certification of agro and mixed biopellets based on EN 14961-6, IEE MixBioPells Project, 10.02.2012
[6] http://www.mixbiopells.eu/en/home.html

- Type, exact description and quantity of additives (e.g. pressing aids, slagging inhibitors), if they are used.
- Type and suitability of the raw material storage.
- Production plant: Suitability of the technical facilities in order to be able to produce solid biofuel according to the EN standard 14961.
- Management of not suitable raw material and products.
- Quality management system: in-house manual and/or operating instructions, training records (external and internal), handling of claims and complaints, etc.
- Self-monitoring of production, suitability and condition of the testing devices, reference sample management.
- Product declaration to EN standards and regulations.

At the initial inspection, the following tasks are to be carried out by the **site auditor(s)**:

- Sampling from production/storage, description and documentation of the sampling points. The sampling has to be carried out in accordance with EN 14778:2012.
- Inspection of the plant's own sampling for internal quality testing. Test procedure for self-monitoring is to be determined.
- Examination of the production process and quality management documentation.

The initial inspection report (including the laboratory results) is to be forwarded to the applicant and, in copy form, to the certification body.

If minor non-conformities are found during the inspection or laboratory test, the inspection body sets an appropriate deadline for corrective measures. The applicant has to prove that adequate corrective measures have been taken within the deadline.

When major non-conformities have occurred, a completely new audit has to be conducted after the defects have been corrected. Major non-conformities that can influence the production quality on a sustained basis are e.g. inappropriate raw material or defective production and storage facilities.

2.4.4. Surveillance inspections

Each production facility is to be inspected annually by the inspection body. The monitoring inspection can be carried out unannounced. Improvements and changes in the certification system (for standards, quality management, etc.) are to be brought to the attention of the person responsible for quality management in the pelletizing plant by the supplier of the license (national association or EPC).

When defects in or deviations from regulations are found in the plant or in the laboratory test during the periodic inspection, the accredited testing center has to immediately inform the certificate holder. When minor deviations occur, the accredited testing center can set a reasonable grace period, in which the certificate holder has to verify that corrective measures have been taken. The certification body does not need to be informed.

When major defects have occurred, the certification body has to be immediately informed by the testing center. The certification body is entitled to order a completely new monitoring inspection after the defects have been corrected. Major defects that can influence the production quality on a sustained basis are especially considered to be inappropriate raw material or defective production and storage facilities.

2.4.5. Issuing of the certificate

On the basis of the information in the approval application the certification body examines the conformance to the certification guidelines. If the application is approved, the applicant is informed. As soon as the proof of the down payment of the license fee to the national association or EPC has been received and the signed license contract has been returned, certification is carried out by sending the certification document with the identification number and the validity period of the certificate. In addition, the certificate holder will be entered into a register with all the other certificate holders, which will be published on the Internet site of EPC and the national association (if applicable).

2.4.6. Objection proceedings

Applicants and certificate holders can file a written objection to the certification body against the following decisions:

- Refusal of the requested certification
- Ordering of new monitoring inspections
- Ordering of extraordinary inspections
- Ordering of more frequent inspections in the scope of internal controls
- Suspension and cancellation of the certificate / the license
- Public mentioning of grievances

The objection is only permissible when the applicant or certificate holder proves that the affected decision violates his/her own rights. A written decision on the objection will be made within two weeks by an objection committee to be set up by the national association / EPC. No persons who have definitively been affected by the objection decision can participate in the decision-making process.

2.4.7. Validity of the certificate

The national association / EPC and the responsible certification body determine the duration of the validity of the certificate. Recommended duration is 3 years including an annual inspection.

When conscious violations of the regulations of this certification system occur or when noticed non-conformities continue despite repeated demands to remedy these, the national association / EPC have to suspend the license to use the trademark for a limited period or terminate the seal usage contract and request the certification body to revoke the certificate. If the certificate holder has several locations, the license can be suspended for the location where the defects have been assessed until they have been corrected.

In the case that the license and the certificate is revoked, the former license holder can re-apply for certification and license after being verified by the certification body to be adequate and sufficient.

In addition, the national association / EPC is authorized to publicize the grievances on the Internet in an appropriate manner and to name the affected certificate holder.

2.4.8. Use of the certificate seal

When the certificate is issued, the certificate holder acquires the right to use the certification seal for the corresponding quality class to label his/her products and to use for advertising purposes. The seal may be exclusively used in direct connection with the certified product,

respectively, the certified service (transport, storage). Certificate holders, who manufacture certified and non-certified goods, have to avoid the impression that the complete production and trade quantities are certified. The certification seal may only appear on invoices when these invoices are issued for certified goods.

The certification seal will be linked to the identification number of the certificate holder. Use of the seal without the combination with the identification number is only possible with the permission of the national association / EPC.

2.4.9. Labelling

Each sales unit of the biofuel certified according to this system has to be labelled with the following specifications:

- The corresponding quality class
- Certificate identification number
- Mass (in kg or ton)
- Note: Store in dry conditions
- Note: Use only in approved and appropriate firing units according to manufacturer´s information and national regulations.

2.4.10. Interfaces

Every actor in the production and supply chain guarantees the certified quality in his/her area of responsibility. When service providers are engaged, the contracting entity is responsible for adhering to the regulations of this certification scheme.

2.4.11. Traceability

The tracking system serves as a self-control and quality assurance aid to find out where the failures in the supply chain occurred and to identify, which batches are out of specification. Through the identification number and the analysis of the internal documentation of the involved actors, possible sources of quality defects can be traced through the supply chain. If necessary, the archived reference samples from the producer/supplier are to be analyzed by a testing body and, where appropriate, are to be compared with a sample taken at the complainant’s.

2.4.12. Identification number

Through a system of unique identification numbers, each delivery should be able to be traced back from the end customer, through the various links in the logistics chain back to the producer. When applying for certification, the certificate holder agrees to the participation in this system. If a manufacturer operates several production facilities or if a dealer purchases pellets from multiple dealers or producers, the respective company can request a general number. This means that certified pellets from different sources can be mixed. However the internal documentation system should allow traceability of deliveries with quality problems and to identify the source of a problem by archived reference samples.

Non-certified dealers without their own storage capacities and transport vehicles have to work together with service providers certified according to this system.

If a delivery is made, the identification number of all companies active in the supply chain of this delivery is set together to a delivery identification number. This number will be indicated

on the delivery note to retrace the route of the delivery if necessary. If a batch-pure storage of consignments from different origins is not possible, the complete identification number of the batch begins with the number of the dealer who mixed first.

Each identification number has characters, which specify whether the respective certificate holder is a dealer or a producer, and which country he/she comes from.

2.4.13. Reference samples

With each delivery to the end user the certificate holder has to take a reference sample at the last possible location for an eventual later inspection. The date, quality, size of the batch and license plate number of the delivery vehicle are to be documented. The samples have to be archived for at least 6 months under proper conditions.

2.4.14. Complaint procedure

When customers or subordinate actors make complaints, the certification body or the national association will pursue these on the basis of the supply chain documented by the identification number. The complaints will be handled by national rules and the in-house documentation of the involved actors will be inspected by certification body.

2.4.15. Schedule of fees

The fees for using the brand are determined by the national associations. The fees may consist of: enlisting fee, fee per produced / traded amount of tons/cubic meter/energy units, marketing fee or other justification.

In addition there will be costs for auditing and testing, which are settled directly between the inspection / testing body and the certificate holder.

2.5. Introduction of sustainability criteria

In the past decade the use of biomass for energy purposes has increased significantly. This implements also the question of possible sustainability criteria. The European Commission (EC) has not yet made any decision on sustainability criteria for solid biofuels, but recommended in its report of February 2010 to use the same criteria for biofuels and bio liquids with some amendments. In August 2013, an unofficial proposal from EC on sustainability criteria for solid and gaseous biomass used in electricity and/or heating and cooling was published. This proposal includes the GHG reduction requirement and calculation methodology, the establishment of land criteria and sustainable forest management requirements. According to the proposal, to avoid undue administrative burden, the EC recommended binding criteria only for larger energy producers of 2.5 MW thermal or 1 MW electrical.

Within the Solidstandards project, work package 5 “Sustainability certification” aims to monitor and evaluate the development of voluntary (and possibly in the future mandatory) sustainability criteria and standards for solid biomass. Within this work package Task 5.1 gives an “Overview and analysis of sustainability certification initiatives” and consists of an updated overview of sustainability certification initiatives for solid biomass, both existing and in preparation in the EU 27 (now EU 28). The final report of this sub-task includes current status and developments of certification systems, and contextual review of sustainability criteria. It analyses systems that have the potential to be used to evaluate energy use of biomass. One important aspect within this analysis is the different types of possible supply chains. The voluntary initiatives are developed specifically for certain supply chains, with

different priorities. The content of the initiatives is depending on the interest and motivation of the actors involved their values and the underlying factors that shape the markets. Adapting and developing sustainable bioenergy supply chain has become a strategy in many utilities to maintain profitability and enhance long term value. Numerous voluntary certification schemes have been developed to promote good practices throughout the supply chain. Many schemes designed for woody solid biofuels are developed based on existing forest management schemes such as Forest Stewardship Council (FSC) and The Programme for the Endorsement of Forest Certification (PEFC). Similar to national regulations and policies, due to the distinction in the nature of supply chains, these schemes present different approaches and different levels of environmental stringency. In some cases, they may go beyond national obligations. These initiatives can be categorized in two main settings:

I. International (long distance) trade for (manly) use in large electric power plants

II. Domestic (regional) trade for (mainly) use in domestic and small-scale heat and electricity production

The deliverable 5.4 analyses in different categories these trends. The divergence is primarily demonstrated in four aspects:

- Governance structure
- Environmental criteria
- Technical and operational barriers
- Economic feasibility

The authors conclude that it is also important to accommodate conditions in different settings. Proliferation of sustainability initiatives by different parties from different countries / regions can lead to a fragmentation of efforts. The current discussions about harmonization surround topics like land use criteria, threshold of plant scale to be included, national sovereignty over forests, authority in standards setting, and biomass end uses coverage.

It seems that the Type I market has developed progressive international collaboration and harmonization of sustainability standards, i.e. the Sustainable Biomass Partnership (SBP), formerly known as the Initiative Wood Pellet Buyers (IWPB), mainly pushed by the policy development (legislation in the UK, and possibly in the Netherlands and the EU).

Meanwhile the Type II market does not show any sign of joining in this progress, except for the household pellets scheme, the ENplus system which actively participates in the SBP sounding board.

3. Approaches

The complexity and the structure of the bioenergy sector make it difficult to have a clear overview of the sector of solid biomass for energy and its dynamics. The use of solid biomass for energy in Europe and the world is not the same and difficult to compare with each other due to the different user behavior. Assessing the market for biomass official statistic data are often missing and does in the assortments for wood chips and logging residues not differentiate between energetic use and material use. Besides it does not break down data to individual assortments. Only pellets, with its characteristically industrial production structure, are an exception.

As described above different utilization pathways exist: an international market with long trade ways for the mass use in large power plants and a regional / local market for use in small-scale heating systems. The international market prefers the use of wood pellets with its energy dens form. Firefood and forest wood chips are typically used regional around the production place.

Analyzing the answers from the feedback questionnaire during the trainings also show that the willingness and acceptance to adopt a quality assurance or certification scheme for biofuels and to bear the cost is not assigned at all user-groups or less pronounced. In heating systems that provide certain technical requirements for the fuel, as it is the case for pellets, the acceptance and approval of certification systems is much higher than for systems that provide a lower fuel requirement profile, as for example is the case of fire wood.

Other factors such as the number of different parties in a supply chain or the cost of alternative raw materials play an important role here as well.

3.1. Certification approaches wood briquettes

Wood briquettes are made from pressed wood chips similar to pellets, but have a much larger diameter. The low water content and energy value are also comparable with pellets. They are used in domestic household fireplaces as kitchen heating stoves, tile stoves and fireplaces. Because these ovens are usually fed by hand, play briquettes as fuel in central heating systems hardly any role. In addition to pure wood briquettes, there are also bark briquettes, which give due to their fire behavior long-lasting glow and heat.

Europe / Germany “ENplus for briquettes”

The German Pellet and Wood Energy Association (DEPV) currently develop a certification scheme for wood briquettes which will probably be launched in summer 2014.

Since 2013 a draft of an ENplus certification for briquettes is available, till now only published in German language. It is based on the EU standard for wood briquettes EN 14961-3:2012 and 15234-3:2012 and is strongly influenced by the system for pellets. Wood briquettes with the ENplus seals are a standardized product of uniform quality. The classes ENplus briquettes A1 and A2 ENplus briquettes define two product qualities for wood briquettes that correspond to the requirements of the European standard and in some cases go beyond that. For both classes only chemically untreated wood can be used.

The quality is ensured by following process steps:

- The entire supply chain is monitored by the producer to the point of sale for ENplus briquettes
- Certified organizations are committed to a practical internal quality management.
- The product quality is checked by regular sampling from the producers or merchants.
- Certified products can be traced through the ID numbers on the packaging.

This ID numbers on the package allows at any time to be able to trace the origin and source of the briquette. This identification code must be printed on an insert of the package and is composed of the country code from country of origin, an identification number and the year of production.

As described in the draft-handbook the three digits after the country code are the number of the certificate holder in the country. The numbers 001-300 are applied to manufacturing companies with annual audit (per production facility a number), the numbers 301-999 to companies that have opted for the variant sampling in trade, but that an additional code of the production site has to be given.

Certified production sites are visited once a year by an accredited third party certification company. Also random samples are taken from traders who deliver briquettes to private households.

Austria "ÖNorm C 4006" – Forest chips

ÖNORM C 4006 "Wood briquettes for non-industrial use – Requirements and test methods – National supplement to ÖNORM EN 14961-3:2011 and ÖNORM EN 15234-3:2012"

The standard followed the outdated ÖNorm standard ÖNORM M 7135 which was based only on national standards. It provides a certification system for wood briquette quality including an external inspection at the production site, sampling and tests of the briquette quality.

The aim of this ÖNORM is to define for wood briquettes Class A1 complementary according to EN 14961-3 ÖNORM properties and set rules for conformity assessment. Goal of compliance with this standard, the marking of conforming products with "ÖNORM C 4006 geprüft" (ÖNORM C 4006 tested) or "C 4006 geprüft" (C 4006 tested). This ÖNORM considered as a complement to national ÖNORM EN 14961-3 and EN 15234-3 ÖNORM and specifies requirements for the product itself as well as to the conformity assessment which means testing, monitoring and certification. Till now there are 5 tested companies.

3.2. Certification approaches for wood chips

Wood chips are produced directly out of energy wood or out of wood by-products and residues from the wood processing industry. Even the wood from short rotation coppice is mainly processed into wood chips. For the production of forest chips especially the weak assortments, the crown and branch material and poor quality pieces of wood (e.g. with rot or high curvature) are used. In addition to winning the chips for thermal recovery also forest protection (defense against bark beetles) plays an important role.

For the production of wood chips in the forest road side or in end-user facilities if they have stationary chippers, there are several deployment methods that are recommended for a variety of situations depending on the raw material, the degree of mechanization and the costs. Technically wood chips are defined as chopped biomass in the form of pieces with a defined particle size produced by mechanical treatment with sharp tools (e.g. knives)[7]. Also the terms hog fuel and crushed wood are often associated with energetic use of biomass. These assortments are made with blunt tools (e.g. hammers). Thus, the particle size is less uniform, typical values are shown in EN 14961-1 on table 6. The technique is used when very heterogeneous sources of raw materials are processed and/or the heating system is able to work with a wider spread in the requirements towards the biofuel. Quality and storability are close connected to the moisture content of the wood chips. Quality influencing factor are proper air seasoning and storage of the chips. Optimum drying can avoid natural occuring degradation processes and decay.

Use to find the chips mostly in central heating systems as combined heat and power plants (CHP). Better qualities so called pulp chips (chips without bark) are used in the pulp and wood producing industry. Commercially wood chips (standards - chips) are offered. Before use moisture content below 40 w-% is highly recommended for smaller installations. Larger CHP plants can use up to 50 w-% moisture content wood chips or hog fuel.

Austria "ÖNORM C 4005"

Wooden chips and hog fuel for energetic use in heating appliances with a thermal output over 500 kW - Requirements and test methods - National supplements to ÖNORM EN 14961-1 and ÖNORM EN 15234-1

[7] EN 14961-4:2011 Part 3

This standard facilitates the declaration of wood chip quality for “forest chips” through reduction of quality classes and a suggestion of typical values for A, F, N and Cl for certain raw material groups (compared to EN 14961-1). Only raw material of the class “1.1 forest-, plantation- and other virgin wood” according to EN 14961-1 is within the scope of this standard. This ÖNORM shall be used together with ÖNORM EN 14961-1. At the moment it is not planned to develop a certification system for forest chips because the mostly bilateral trade of this product doesn´t afford one.

Germany “Blauer Engel / RAL UZ 153“

The eco-label UZ 153 for technically dried wood chips and wood pellets was developed by the German Institutes IFEU and Ökoinstitut[8] and has been introduced into the market in the beginning of 2011. The scheme combines quality requirements according to EN 14961-4:2012 (class A1) with several sustainability requirements.

The scheme of “Blauer Engel” is described in SolidStandard deliverable 6.1[9] in detail. The main focus lies on a high energy efficiency and a low carbon footprint. Product standards are according to EN 14961 but quality assurance according to EN 15234 is not implemented in this scheme. The requirements for labelling are for pellets and for wood chips the same.

Due to a technical drying the net calorific value of the fuel as received is increased considerably and particle emissions during combustion are reduced. The heat for drying must be provided either through renewable energy sources or from industrial waste heat and used efficiently. The costs incurred in the production of particulate matter emissions must meet strict limits. Only wood from sustainable forests and chemically untreated wood residues may be used for the production of wood chips and wood pellets. To map the origin of the woods with their long transport routes and their environmental impacts over local wood, the transportation costs for the delivery of the wood raw materials must be specified[10].

Each certificate holder must hand in a report to RAL every second year in order to proof that the requirements of the scheme are met. An independent expert has to certify the accuracy of the report. The accurate product quality can be verified by submitting a DINplus or an ENplus certificate (quality class ENplus A1) or an external experts' inspection report. No independent controls of production facilities or management procedures are recommended.

Germany BBE “HolzWärme-Plus”

The German biomass association “Bundesverband Bioenergie” (BBE) founded the network “HolzWärme-Plus” in 2012 to evaluate and set the foundations for an effective quality management. Till now there is no existing certification scheme. It is an alliance of companies and institutions that should pursue the use of wood chips for the use in heating systems greater than 100 kW. The goal is to develop a competitive solution for a bioenergy heat supply in the (sub) urban area. The network companies and institutions involved can each be assigned to one or two clusters. The main three objectives are:

- Fuel quality / Fuel preparation
- Logistics of supply and disposal
- Burner Management & Control.

The network focusses on the use of wood chips with focus on following aspects:

[8] Vogt, R. et al (2001): Technisch getrocknete Holzhackschnitzel / Holzpellets - Entwicklung der Vergabekriterien für ein klimaschutzbezogenes Umweltzeichen
[9] http://www.solidstandards.eu/images/Feedback/3-SolidStandards_National_Position_Paper_DE.pdf
[10] http://www.blauer-engel.de/de/produkte_marken/produktsuche/produkttyp.php?id=572

- Innovations and quality standards should optimize "heat / wood gas" on the basis of wood chips the efficiency of the entire value chain.
- Fighting the lack of acceptance in public. Public representatives are often concerned about particulate matter, depletion of natural resources and increased traffic congestion. Reliable industry standards, new technical solutions and effective public relations should answer to these concerns.
- Enhancing competitiveness. Through quality standards, new technical solutions and marketing wood chips to be better position, thus strengthening confidence in the security of supply
- All participants in the supply chain should and coordinate standards.

Finland VTT "Päijänteen metsänhoitoyhdistys – MHY Päijänne"

In Finland VTT authored a quality assurance handbook in Finnish for wood chip production and use which was published in autumn 2013. The outcome is close connected to the Solidstandards project and describes quality measuring and quality assurance along the whole supply chain for small scale heating plants. The product quality is described according to the upcoming ISO standard EN ISO 17225-1 for wood chips because the former EN standard was not suitable for the particle size distribution. Based on general guidelines by TAPIO for energy wood harvesting, storage and supplying guidelines, and following legislations and/or best practice guidelines only few changes had to be done to implement the quality assurance according to the European EN 15234-4. Main quality control measure is volume, moisture content and bulk density analysis of each delivery at plant site and visual checking of wood chips quality. Main quality criteria is to use only delimbed stem wood for wood chips raw material and using enough time for seasoning stems in 5-6 high piles neare roadside in appropriate storage place. Till now a certification scheme is not implemented and foreseen but the handbook provides the complete background of converting it into a complete scheme for the use of wood chips in heating applications according to the standards. MHY Päijänne is only applying Finnish forest certification system PEFC and important is that raw material for wood chips can be track back to origin.

3.3. Certification approaches for firewood

Traditional firewood in form of logs, round and split, mainly for heat and hot water production in private households is still the most important sector for wood consumption for energy purposes in Europe. Firewood is widely used in rural areas and comes mostly from local forests or field shrubs. While it is used for wood chips usually weaker material such as branches and summit logs is made from stronger -sized branch and stem pieces. At the low-value logs wood assortments (e.g. small timber and inferior qualities) are processed mainly, because these assortments are otherwise difficult to market. But in small and private forests also higher-value timber for the self-supply of firewood are used. Depending on the amount and the technical equipment of the forest owner, there are several methods of provisioning for logs and firewood. The provision of firewood consists the steps of harvesting, transport from the forest to firewood processing, storage and transportation to the customer.

Fresh firewood from the forest has a moisture content of 50-60 w-%. Proper storage of logs and firewood is crucial to dry the logs or firewood in a short time on the necessary for optimal, low-emission combustion moisture content of 20 w-% or 25 w-% in Northern part of Europe.

Firewood which goes on sale has standards according to EN 14961-5 and EN 15234-5. Even though, a National- or European wide certification scheme which is using these standards doesn't exist. Several institutions and associations provide only general advices for the correct handling and use of firewood, for e.g. The German Firewood Association

(Bundesverband Brennholzhandel und Brennholzproduktion e.V.) provides on its webpage[11]. Independent of the type of wood and the degree of drying Firewood should be:

- Externally dry and clean
- Free of vermin and not definable deposits or discoloration
- In a batch of a single species of pure wood a mixing timber share of less than 10%
- Smell neutral
- Correspond to the quantity and quality of the description (e.g. invoice or the offer)

As air dry goods offered should have an average moisture content of 15 w-% to 25 w-% maximum. Deviations within a billet or a batch, as well as different wood moisture distribution between the outer and inner areas or weather-related water vapor absorption by the wood, the dealer has to point out and explain it to the customer on request.

VTT has developed a special calculation tool, which make firewood producer to quantee quality of oven-ready firewood. Tool is based on measurement moisture content of batch by analysis moisture from sawdust when cutting logs, weight of batch before dryin and then Excel tool calculate what weight of a batch should be after drying based on target moisture content e.g. 20 w-%.

3.4. Certification approaches for non-woody pellets

Non-woody pellets are a relative new traded form of solid biofuels. The raw material originates mainly from agricultural residues from harvesting and processing of non-woody biomass from the food industry and can be herbaceous biomass, fruit biomass, or biomass blends and mixtures including also woody biomass. They are usually manufactured in a die with total moisture content usually less than 15 w-% of their mass. They are used mainly as co-firing material in bigger power plants but depending on their quality also the use in smaller furnaces is possible, if the boiler is designed for using such pellets.

A complete developed draft-handbook regarding the certification of agro- and non-woody mixed biopellets based on the EN 15234-6 was published during the IEE MixBioPellts project. [12] By using the ENplus Handbook as a template the complete possible certification process is described in ten chapters. Essential points of the certification system are:

- Requirements for pellet production and quality assurance EN 15234-6:2012
- Requirements for the product EN 14961-6:2012
- Requirements for labelling, logistics and intermediate storage
- Requirements for the delivery to the end consumer

4. Summary and conclusions

Europe has legally binding targets for renewable energy by 2020 and a considerable amount of this energy will be from biomass, parts of it imported. Therefore, the importance of solid biomass is increasing. Especially for the forestry sector new important opportunities arise to increase sales, especially to difficult marketable assortments.

Besides its importance as a fuel for the heating sector in the big-scale use and as well in the small scale use an important advantage of wood and biomass is generally the function as baseload in electricity production: while other renewable energies can be expected with strong fluctuations in the generation, such as wind energy, biomass can ensure a minimum

[11] http://www.bundesverband-brennholz.de/?page_id=2690
[12] http://www.mixbiopells.eu/

level of energy available at any time. It is therefore an important part of the energy mix in the future.

However, for solid biomass and wood the growth of this sector is limited by the scarcity of the natural resource. In order to achieve in the future an increased use for energy purposes and improve of the marketability by considering sustainability, product- and quality-assurance standards and thereon based certification schemes are a suitable approach.

For the quality control and certification the internal and external quality control and monitoring by an independent party is of particular importance. The best practice example of ENplus for pellets shows how such certification scheme works. This extend to other assortments of biomass is the goal for the future. The SolidStandards project has promoted the still relatively new standards in the entire branch in Europe through training and workshops. In addition to product-specific and system-specific properties, the issue of sustainability is important in the development of future certification systems. As already common for liquid and gaseous fuels from biomass, it is expected to have mandatory compliance with sustainability criteria in the near future. Currently, there are no binding requirements for the design of these sustainability criteria by the European Commission for this purpose. It has to be kept in mind that the application in this cases are not referred on industry-like structures, it is often applied to small-scale economy with strong regional focus.
The great heterogeneity of the raw material is a challenge for fulfilling standards and certification. This had been shown in particular for wood chips from forest residues.

In Europe are several approaches to certify other assortments as wood pellets. However, currently none has been brought to market maturity. The most advanced is currently in the field of wood briquettes, which have a comparable process and supply chain as pellets. There are made large efforts by bioenergy associations and certification companies to achieve a system for wood chips because this plays an important role in the regional energy production of heat and / or electricity in many European countries.