# Description of Joint pilot applications 5:

# Support system for assurance of quality wood fuel

## to be implemented in

## Slovenia, Slovakia and Greece

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## Pilot factsheet

| Pilot title: Support system for assurance of Quality wood fuels | | Acronym: S4Q (Support for quality) |
|---|---|---|
| Lead Partner:<br><br>SFI – Slovenian Forestry Institute | Other partners: National Forest Centre Slovakia (NFC), Centre for Research & Technology Hellas (CERTH) | Area of intervention:<br><br>Slovenia |
| Pilot focus (service, resource etc.): service | Start of implementation:<br><br>02/2012 | Pilot duration:<br><br>02/2012 – 11 / 2014 |
| Budget: | Target group:<br><br>Forest owners, sawmills, wood chips producers, pellets producers, biomass logistic centres, wood fuel sellers, biomass consumers; | |

## Executive summary

On the Slovenian market micro and small producers of pellets and wood chips prevail. Most of them doesn't dispose with research and development (R&D) team for quality assurance and quality control (QA/QC) of production. At the moment there are already recognised certification schemes on the market. For example well known application of QA/QC system for pellet producers are the EU certification schemes EnPlus and DINPlus (based on EN 14961 series), which are often too expensive and complex for smaller producers (with yearly production less than 10.000 t). The aim of the pilot application is to develop a support **system for assurance of quality wood fuels (S4Q)** that would actively help to establish a QA/QC system through the whole supply chain (from the origin to the delivery of the solid biofuel) and provide adequate confidence to end users. Proper quality assurance procedure and consistent indication of origin and source of raw material during whole production chain can reduce the extent of analysis needed to properly define the fuel quality (and consequently the costs of laboratory work).

S4Q support system is necessary as effort of micro or small manufactures to enter the market where quality products are the only way to success. In addition, the system can be helpful for micro and small companies as a guideline to apply for the above mentioned certification schemes in a more efficient way.

The S4Q would be based on EU CEN standards, taking in to account a simplified QA/QC system. It would have its own logo and clear rules for the use. The idea in this pilot application is not to develop a trademark but to develop and implement cost effectively

QA/QC system that would help smaller producers to enter the market. The S4Q support system would indirectly serve also to local community; E.g. consumers' confidence into a local products will increase, since the producers will be able to prove that a specified quality level of wood fuels was reached.

*Key words: quality, assurance system, pellets, woodchips, producers, certification*

## Objectives

The main objective of this pilot application is to develop and test simplified QA/QC system that would help smaller producers to assure quality wood fuels to end users. Developed support **system for assurance of quality wood fuels (S4Q)** will actively help to establish a QA/QC system through the whole supply chain, from the origin to the delivery of the solid biofuels and provide adequate confidence to end users.

## Description of pilot application

### Description of core application and country/region specific extension

#### Introduction to Quality Assurance and Quality Control system

The bases for the developed support system are current versions of CEN standards and technical reports listed below:

- EN 14588:2010, Solid biofuels – Terminology, definitions and descriptions
- EN 14961-1:2010, Solid biofuels – Fuel specification and classes – Part 1: General requirements
- EN 14961-2:2011 Solid biofuels – Fuel specification and classes – Part 2: Wood
- pellets for non-industrial use
- EN 14961-4:2011 Solid biofuels – Fuel specification and classes – Part 4: Wood
- chips for non-industrial use
- EN 15234-1:2011, Solid biofuels – Fuel quality assurance – Part 1: General requirements
- EN 15234-2:2012, Solid biofuels - Fuel quality assurance - Part 2: Wood pellets for non-industrial use
- EN 15234-4:2012, Solid biofuels - Fuel quality assurance - Part 4: Wood chips for non-industrial use
- CEN/TR 15569:2009 – Solid biofuels – A guide for a quality assurance system
- EN 14780:2011, Solid biofuels - Sample preparation
- EN 14774-1:2010, Solid biofuels - Methods for determination of moisture content - Oven dry method - Part 1: Total moisture - Reference method
- EN 14774-2:2010, Solid biofuels - Methods for the determination of moisture content - Oven dry method - Part 2: Total moisture - Simplified method
- EN 14774-3:2010, Solid biofuels - Methods for the determination of moisture content - Oven dry method - Part 3: Moisture in general analysis sample
- EN 15149-2:2011, Solid biofuels - Determination of particle size distribution - Part 2: Vibrating screen method using sieve apertures of 3,15 mm and below

- EN 14918:2010, Solid Biofuels - Method for the determination of calorific value
- EN 14775:2010, Solid biofuels - Method for the determination of ash content
- EN 15103:2010, Solid biofuels - Methods for the determination of bulk density
- EN 15104:2011, Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods
- EN 15210-1:2010, Solid biofuels - Methods for the determination of mechanical durability of pellets and briquettes - Part 1: Pellets
- EN 15289:2011, Solid biofuels - Determination of total content of sulfur and chlorine

The promotion and implementation of EU standards is necessary in order to create sustainable EU market for solid biofuels. According to the terminology of the ISO 9001 a Quality Management (QM) system generally consists of Quality Planning (QP), Quality Control (QC), Quality Assurance (QA) and Quality Improvement (QI). The QA/QC system must take part in whole supply chain from raw material to the point where product is taken out of warehouse and transported to end-user (consumer).

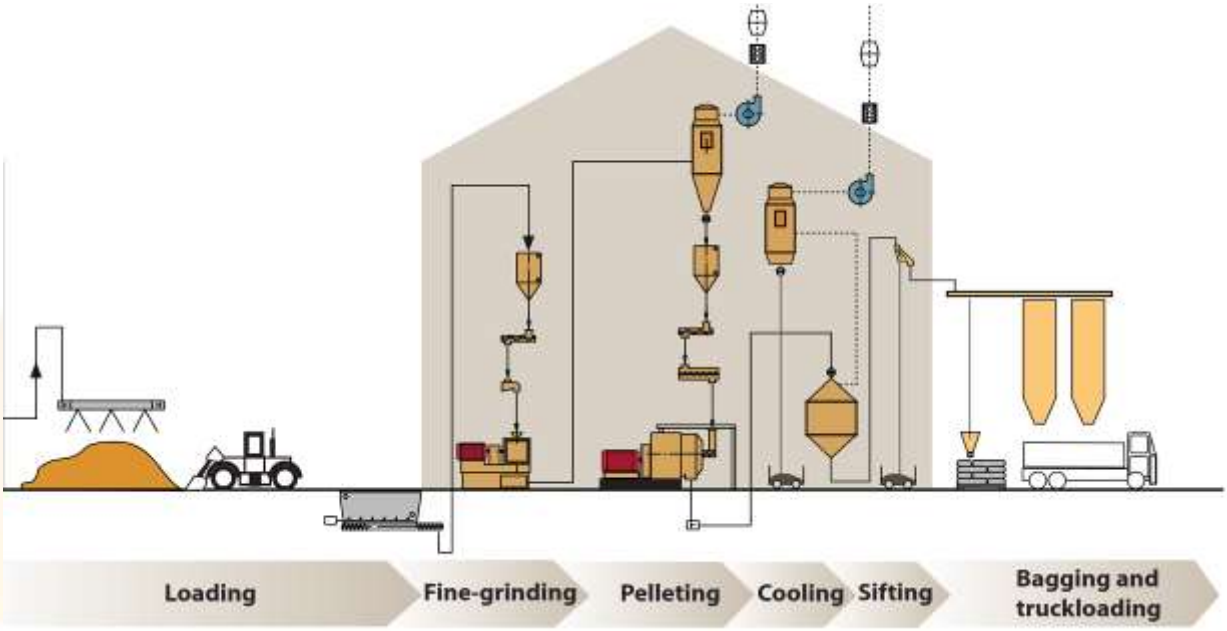


Figure 1: Pellets production chain (source: www.andritz.com)

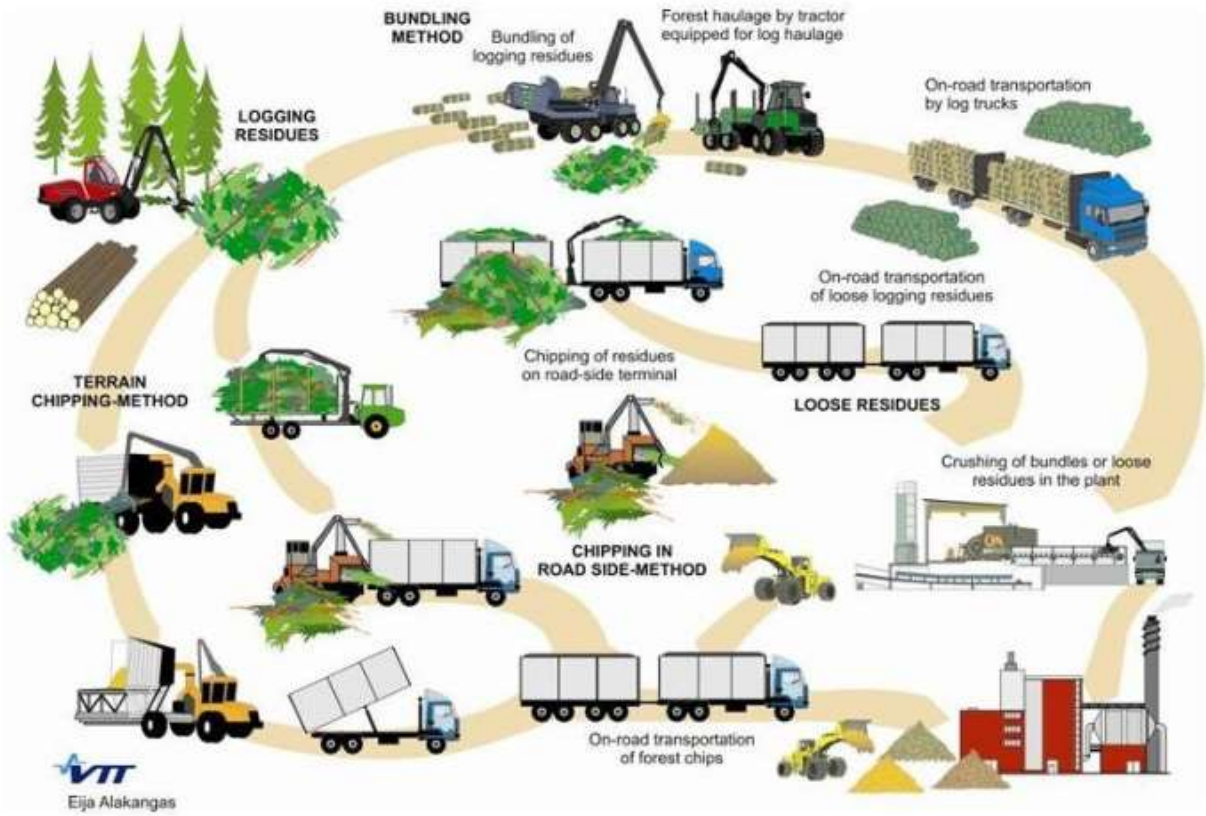


Figure 2: Woodchips supply chain (source: Elija Alakangas (VTT))

Definitions of QA and QC according to EN 15234-1:2011; page 10.
"Quality Control is fundamentally about controlling the quality of a product or process to enable the delivery of the product or service within agreed parameters in the most efficient and cost effective way.

Quality assurance in the other hand, is about reviewing the products and processes, primarily through data provided from quality control records and using this data:

a) To provide confidence that products are produced within the required specification and processes are operated as they should be, and
b) To assure that over a longer term either consistency is being maintained (stability in the process results) or that quality improvements are making the intended impact."

### Support system (S4Q)

S4Q support system will monitor and consult the whole supply chain in order to reach (QC) and assure (QA) the specified level of quality. It is foreseen that applicants (wood fuel producers) will plan/determine the quality (QP) of the produced wood fuels by themselves according to needs and abilities. In association with applicant, S4Q consulting institution can also take part in activities related to QI as an advisor. The applicant and S4Q consulting institution have to agree on terms of collaboration before the process starts. After collaboration terms between applicant and consulting institution (S4Q) are met and the

collaboration contract is signed different actions are foreseen with clear goals (i.e. reaching and assuring planned/foreseen product quality level).

## Actions within S4Q support system

### #1 Preparation of action plan and definition of QA/QC measures

Fuel quality issues should be part of an action plan. Therefor in the first phase draft action plan for implementation of QA/QC system has to be prepared by consulting institution. Preparation of action plan starts with collection of information (interviews, study tour, etc.) regarding general issues of existing supply chain:

- Establishment of a long-term vision with clear objectives.
- Defining measures and policies to implement this action plan.
- Suggesting cost effective supply chains and business models for forest and road-side wood harvesting, transportation and storage.

The main activates covered by the consulting institution, cover areas of traceability, production requirements and product declaration. The quality assurance system should be simple, causing minimal additional bureaucracy and support regimes for costs reductions.

### #2 Implementation of QA/QC system

**Traceability - Origin of raw material**

According to EU regulation No. 995/2010 of European Parliament and of the Council of 20 October 2010 it is prohibited to place illegally harvested timber and/or products originating from such timber on market. Part of the system is also a general obligation for Due Dilligence system (DSS) for traceability of wood products to their origin when first placed on the EU 27 market. The proposed "DSS" will base on three key elements:
- information about raw material,
- risk assessment of illegal timber and
- risk mitigation by requiring addition information and verifications from the supplier of raw material.

In general all operators in the supply chain are responsible for ensuring traceability of the origin and source of the material delivered to them. Therefore **S4Q will implement a simple monitoring system** for producers who are responsible of keeping the records on the origin of wood used for solid biofuel production. Using the proposed structure and methodology of QA/QC assures the existence of traceability.

At the end of this phase applicant will be able to cost effectively manage record on information of:

- supplier of raw material,
- source of raw material (forest wood, logging residues, landscape management residues, sawmill residues etc.),

- type of raw material (woodchips, sawdust, fuel wood…),
- main tree species (spruce, beech, broadleaf trees ets.) and
- bark content.

**ORIGIN AND SOURCE OF RAW MATERIAL**

**1 – Date of delivery**

**2 – Name or number of the supplier**

**3 – Origin and source of raw material**

- ○ 1.1 Forest, plantation and other virgin wood (round wood, forest residues, etc.)
- ○ 1.2 By-products and residues from wood processing industry (sawdust, wood residues, chips etc.)
- ○ 1.3 Used wood (used pallets, used construction wood etc.)
- ○ 1.4 Blends and mixtures

**3.1 – Precisely specify raw material from forest, plantation and other virgin wood:**

- ○ 1.1.1 Whole trees
- ○ 1.1.2 Whole trees with roots
- ○ 1.1.3 Stemwood
- ○ 1.1.4 Logging residues (branches, leafs, needles)
- ○ 1.1.5 Stumps/roots
- ○ 1.1.6 Bark (from forestry operations)
- ○ 1.1.7 Segregated wood from gardens, parks, roadside maintenance, vineyards and fruit orchards
- ○ 1.1.8 Blends and mixtures

**3.2 - Precisely specify by-products and residues from wood processing industry:**

- ○ 1.2.1 Chemically untreated wood residues (sawdust from sawmills, wood dust, wood residues etc.)
- ○ 1.2.2 Chemically treated wood residues fibres and wood (impregnated wood, coated wood, etc.)
- ○ 1.2.3 Blends and mixtures

**3.3 - Precisely specify used wood:**

- ○ 1.3.1 Chemically untreated wood
- ○ 1.3.2 Chemically treated wood
- ○ 1.3.3 Blends and mixtures

Figure 3: Simplified questioner based on EN 149611:2010 about the origin and source of raw material (supposed as an online questionnaire).

**Production requirements and alteration in the production**

Actions in production chain are divided into several phases which should run as listed below:

Phase 1: Specification of the biofuel.

Solid biofuels are defined in EU standards. In accordance with standards solid biofuel are classified into different quality classes.

In case of pellets for example, class A1 and A2 represent pellets made from forest biomass, short rotation plantations or chemically untreated wood residues. Class A1 is represents a fuel with a low ash content and nitrogen, while the A2 class allows a slightly exalted

proportion of ash, nitrogen and chlorine. Class B permits also the use of chemically treated industrial wood. Class B is barley used for individual boilers as is considered as inadequate for modern pellet boilers.

Different actions are necessary for different solid biofuels as well as for different quality classes. To ensure (i) the appropriate use of raw material as well as (ii) the accuracy of the statements on the declarations, it is necessary to select proper measures (Phase 5). The quality of solid biofuels should be specified and indicated in the product declaration or the packaging. It is the producers or suppliers responsibility to provide correct and accurate information.

Phase 2: Documentation of production steps.

Quality assurance is about reviewing the products and processes in production chain. S4Q support system will monitor whole supply chain and prepare documentation for each step in production chain.

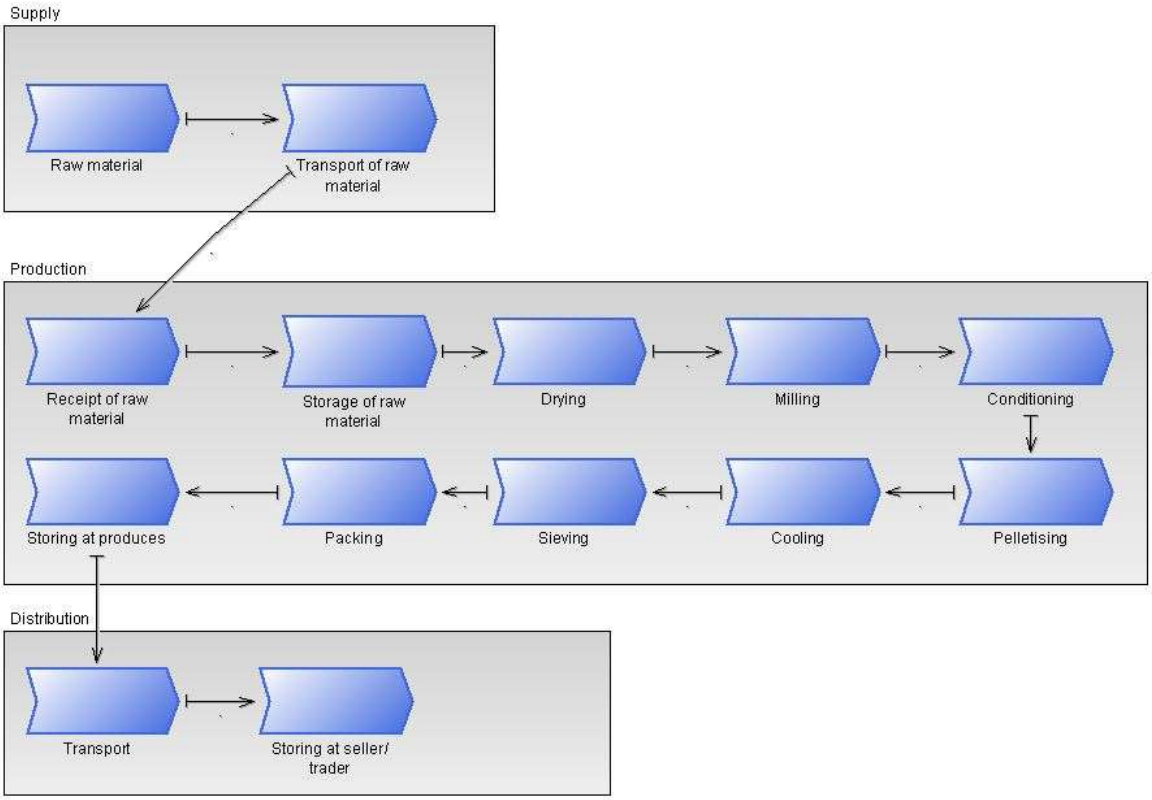


Figure 4: Example of examined supply chain in the company EnergijaNarave d.o.o.

Phase 3: Analysis of factors influencing fuel quality and company performance.

The applicant must record all the factors that affect the production process, starting with acceptance of raw material (in case of own transport) to transport of final product to end consumer. According to documentation gained through Phase 2 analysis of factors

influencing fuel quality and companies performance will be executed. Different possible causes of deviations from specified quality classes would be investigated.

Note:
Applicant must assure proper overview (to consulting institution) over factors that influence fuel quality. The applicant is obligated to notify consulting institution of all alterations to the product without delay. Consulting institution is responsible to test new product and prepare the demands and recommendations for improvements regarding results of test.

Phase 4: Identification and documentation of Critical Control Points.

After investigation of factors influencing fuel quality identification of Critical Control Points (CCP) will be prepared as a base document for selection of proper measures. Critical control points are places/points during the production process, where monitoring of product characteristics is crucial for further production steps. Consequent monitoring and collection of information at CCP can clarify which part of the production process can be optimized and thus helps to solve quality issues and in addition to improve the quality.

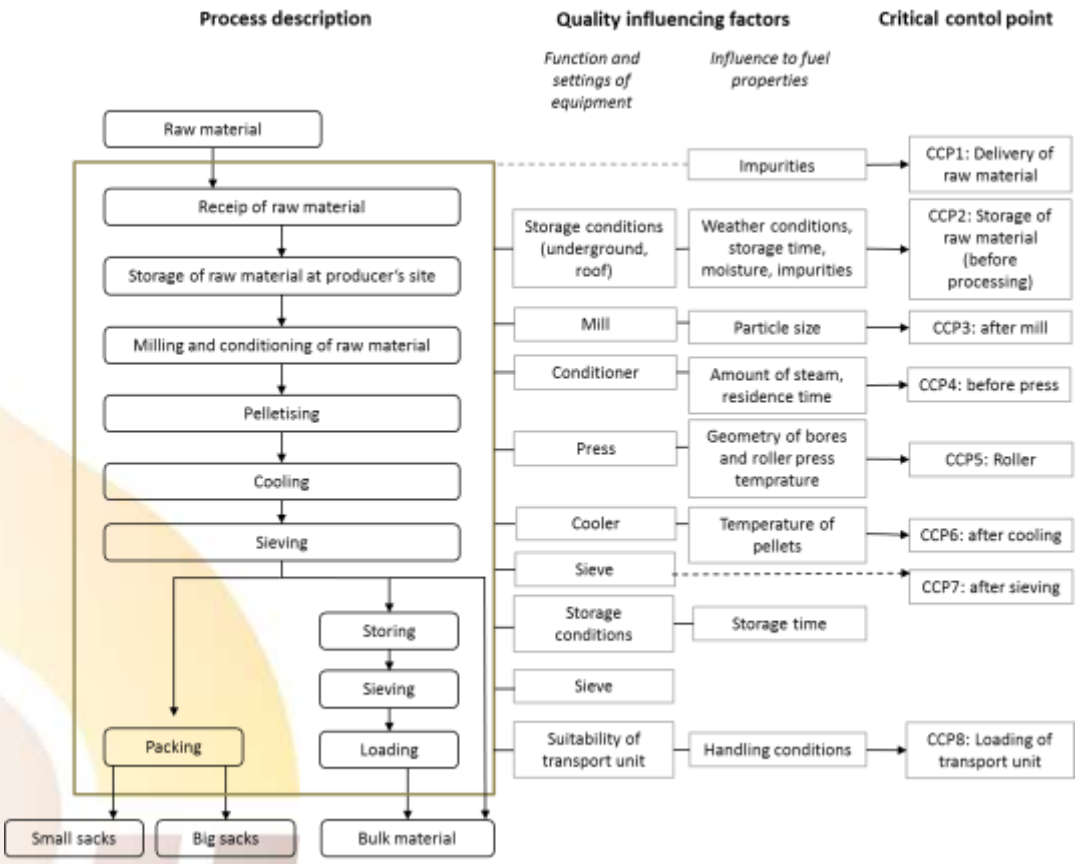


Figure 5: Identification of critical control point according to documented steps in production chain (Phase 2) and investigation on quality influencing factors (Phase 3) in company Energija Narave d.o.o.

Phase 5: Selection of proper measures.

Control measures differ from company to company and depend on the identified critical control points (CCP). For every CCP in supply chain detailed control measure will be defined. In addition to the CCP control it is important that applicant and S4Q define/set:

- responsibility of employees,
- training of employees,
- work instructions,
- establishment of quality control criteria and
- a procedures for dealing with complains (Costumer support service).

Phase 6: Establishment and documentation for separate handling of nonconforming materials and solid biofuels.

In case the product (chips or pellets) is not fulfilling the requirement specified in phase 1, the producer and the consulting institution should develop a plan (based on possibilities and requirements) how to handle with such a material, such product should be stored separately from the products that meet the requirements for defined quality. Depending on the issue different actions will be proposed:

- Additional processing in order to achieve required conditions (e.g. screening, drying…).
- Recommendation for documentation of noncompliance.
- Recommendation to agreement with end user about consequences as action of inadequate supply.

**S4Q Testing**

An authorized person usually performs sampling and testing. Authorized person can be trained by S4Q staff or can be one of the S4Q staff members. Only relevant test laboratories should perform testing of products. S4Q consulting institution recognizes relevant test procedures that can be done by trained personnel. The authorized person supplies S4Q laboratory with the samples that are examined free of charge by S4Q laboratory during the whole agreed support period. Applicants must provide appropriate help with sampling (preparation at least 10kg of each sample). All the samples must be marked with declaration and specification of raw material should be enclosed. Tests are conducted repeatedly at determined intervals and serve for final evaluation of both QA/QC system and consequently S4Q support system. After the several complete tests the applicant receives a report, which is based on the parameters described on the label. The critical deviations are marked and guidance to avoid such deviations is prepared. S4Q support system reserves the right to unannounced inspection in the production line to examine whether product meet the requirement of the EU Standards and to examine the correctness of samples provided by producers.

Testing procedures are performed in accordance with the relevant EU standards, listed below:

| Wood pellets | Wood chips |
|---|---|
| - **Diameter and length** are determined according to EN 16127:2012<br>- **Amount of fines** are determined according to 15210-1<br>- **Bulk density** according to EN 15103<br>- **Moisture content** according to EN 14774-1, EN 14774-2<br>- **Ash content** according to EN 14775<br>- **Calorific value** according to EN 14718<br>- **Mechanical durability** according to EN 15210-1 | - **Particle size** according to EN 14149-1<br>- **Moisture content** according to EN 14774-1, EN 14774-2<br>- **Ash content** according to EN 14775<br>- **Calorific value** according to EN 14718<br>- **Bulk density** according to EN 15103 |

**Self surveillance**

The success of collaboration is dependent on the surveillance. Therefore surveillance should be constant during the entire duration of collaboration. The applicant must ensure control of quality parameters proposed by consulting institution. The monitoring of product must be performed by trained or qualified personnel at least once per shift (either visually or with appropriate equipment). Regarding daily tests reference sample of at least 1.5kg must be taken at least once a day. Reference sample must be labelled with date of production, source of raw material and other relevant technical parameters. The samples with preliminary test results have to be delivered to consulting institution. As a result of inspection document should be prepared and all mismatches in quality has to be reported and discussed with consulting institution. **The product that fails the test should NOT be labelled with S4Q promotion logotype** and should be handled as non-confirming material (defined in phase 6).

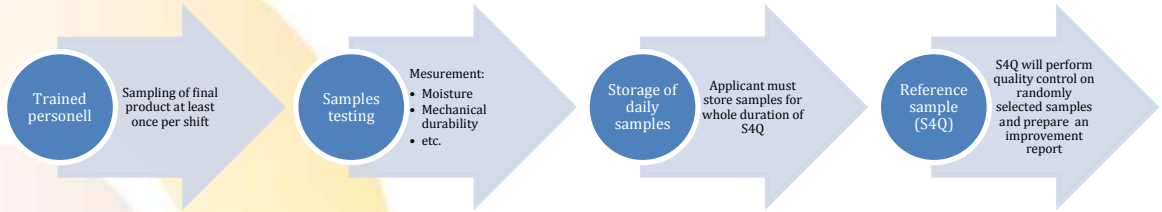


Figure 6: S4Q surveillance procedure

Consulting institution and applicant has to define an inspection body, which is authorized to visit the production line and storage facilities of the applicant at any time during operating hours unannounced with the purpose to perform the sampling of product and to evaluate the applicant's progress with implementation of quality assurance system. Consulting institution documents all the noticed facts and prepares a report with recommendations for improvements for applicant.

The report must contain following information:

- data about raw material (origin and source, species, information about the supplier))
- data about the product (declared/predicted quality)
- storage and delivery (silo, hall, direct delivery to customers)
- results of the analysis (moisture content, mechanical durability, bulk density, ash content, calorific value etc.)
- description of differences between declared and measured quality parameters (description of non-conformities – whether there are minor or major non-conformities)

Regarding the report the applicant and consulting institution has to meet the mutual agreement about the deadline in which applicant will fix the issues discovered with inspection.

**#4 Product declaration and labelling recommendations**

The S4Q support system will provide minimal requirements for product declaration and will prepare labelling recommendations for applicant. The system will follow the basic requirements for environmental claims (Green Claims – Practical Guidance (DEFRA 2003)). Three main elements will be taken into account. These relate to the quality of the actual information being communicated, the way in which the information is presented, and finally, the steps and methods taken to verify its accuracy. The main emphasis will be on ensuring accuracy of information related to product, in our case pellets. Information presented on packaging or on declaration will be based on verified methods defined in EN 14961 standards.

The applicant has to be aware that product declaration is manufacturers statement about quality characters of final product that meet requirements according to EU standards (EN 14961-2, etc.). It is the whole responsibility of the applicant/producer in case of disputes with costumers. The declaration should be issued for all kinds of solid biofuels. For the packed products the declaration should be installed on the package. Applicant must date and archive all relevant information for a minimum period of one year from delivery.

Table shows the example of a simple declaration for pellets.

| PRODUCT DECLARATION BASED ON EN 14961-2 | |
|---|---|
| Supplier | Name, contact details<br>Number of contract |
| Quantity | Agreed delivered quantity - volume or number of bags (supplier and the end user should agree on the method of weighing and determining the volume). |
| Origin | Base on standard EN 14961-1:2010 |
| Country | Country name (or in case of agreement exact location) |
| Chem. processed raw material | NO☐ YES, class B ☐ |
| Diameter | D06☐ D08 ☐ |
| Type | Pellets |
| Quality class | A1 / A2 / B |

**The International Standards Organisation (ISO) has developed standards for environmental product claim. The market situation will be analysed and stakeholder's opinion will be investigated regarding the need for environmental claims. Collected information and ISO 14021 will be base for preparation of claims and strategies for self-declaration by producers or retailers. #5 Staff training**

The S4Q support system efforts to train applicants staff for future self-assurance and development of companies QA/QC system. The training will take place during the whole duration.

### Promotion logo

During the course of QA/QC support system producers is allowed to use support system logo (In association with consulting institution) for marketing of products.

### Cancellation of collaboration between consulting institution and applicant

The support system expires after one year. If it is not successful but it shows encouraging results can, it can be extended for another year. Either party can do cancelation at any time. As a consequence to cancelation applicant has to remove the logo "In association with consulting institution".

Furthermore, the collaboration can also be cancelled if:

- The applicant is misusing the consulting institution results.
- The collaboration fee is not paid.
- The applicant is not adhering to instructions of consulting institution.
- If the applicant doesn't meet deadline for technical improvements proposed by consulting institution.

### Innovative capacity

The QA/QC support system is designed for micro and small-scale biomass producers, because it may not be possible, practical or realistic for mentioned companies to implement a full-scale QA'QC system. Proposed system is based on the relevant parts of the CEN standards (EN) and technical reports (CEN/TR), but don't cause high cost of laboratory testing and auditing.

### Involved parties

Support system is involving:

- independent consultancy institution with a relevant biomass laboratory,
- biomass producers,
- sawmills,
- forest enterprise,
- organizations specialized in the wood-chipping (including contractors),
- biomass trade centres,
- and in case of interest also biomass sellers.

### Time schedule

| *Task description* | *Who is involved* | *Month (1-12)* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Introduction of QA/QC system and handover of relevant documentation* | *I/A** | | | | | | | | | | | | |
| *Investigation of production requirements* | *I* | | | | | | | | | | | | |
| *Preparation of action plan* | *I/A* | | | | | | | | | | | | |
| *Implementation of QA/QC* | *A* | | | | | | | | | | | | |
| *Staff training* | *I/A* | | | | | | | | | | | | |
| *Surveillance* | *I/A* | | | | | | | | | | | | |
| *Mid-term progress report* | *I* | | | | | | | | | | | | |
| *Final report* | *I* | | | | | | | | | | | | |

** I = Consulting institution, A = Applicant*

### Financial scheme

Financial scheme for application to S4Q support system:

| | Costs (€) |
|---|---|
| **Initial fees** | **520** |
| On-site inspection of the production process and first sampling | 70 |
| Laboratory work (Moisture content, Bulk density and mechanical durability, ash content and calorific value) | 350 |
| Preparation of the on-site-inspection report (description of the current situation, suggestion of measures for implementation of the QA/QC system, description of critical control points and presentation of the results from laboratory analysis). | 20 |
| Preparation of the action plan | 80 |
| **Implementation of QA/QC** | **1040** |
| Surveillance (on-site inspection and sampling) | 40 |
| Bi-weekly sampling and laboratory work (moisture content, bulk density, mechanical durability and ash content) for three subsequent months | 900 |
| Stuff training (one day training) | 50 |
| Preparation of final report | 50 |

Rough estimation of PA implementation costs:

| Factor | Cost [€/year] |
|---|---|
| Personnel (one full time for technician and approx. 100 working hours for senior researcher) | 25.000 € / year |
| Equipment (amortization period is 5 years) | 20.000 €/year (investment in first year of run – 100.000€/5 years). |

## Expected outcomes and impact

With support QA/QC system we expect positive **influence to the market** of wood fuels. The main idea is to transfer the Know-How from science to micro and small manufactures, who doesn't have the budget to found own research and development team with relevant laboratory. It's a fact that quality mark creates customer confidence, but it also creates costs for producers. With "In association with" logo we also expect to impact the customers decision. Therefore costumers can be assured that consulting institution is taking care for implementation of quality control and labelled parameters are not just promotional information, but are facts with surveillance system in behind.

We expect to have impact on **local producers** that are at the moment not part of any certification program.

S4Q support system will have **global impact according to EU** Timer regulation No 995/2010 of the European Parliament and of the Council of Europe, which is laying down the obligations of operators who place timber and timber products on the market. As it is explained in objectives the S4Q support system will clearly define the procedures to keep under surveillance the source of raw material and will partly help to implement also the "Due Diligence system" for minimising the risk of placing illegally harvested timber, or timber products containing illegally harvested timber, on the EU market.

S4Q support system will have also **global impact** as it will indirectly improve sustainable energy network through the promotion of solid biofuels and will build trust among end consumers. It will also promote sustainable forest management with recommendations for environmental claims according to ISO standards.

## Communication and dissemination plan

At first stage communication and dissemination activities will be addressed to promotion of S4Q support system among wood fuel producers (potential applicants). Before the implementation all potential applicants will be informed about S4Q costs and benefits.

In second stage, during the implementation of PA, communication and dissemination activities will be addressed to wood fuel users with different activities in order to reach all relevant stakeholders (e.g. S4Q webpage, promotional press releases, brochures, newsletters, participation on fairs etc. )