



# SolidStandards

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



**D3.2:**  
**Summary report on training events**



## 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 second **Deliverable 3.2** of the SolidStandards project. It is the summary report of 34 training events. This document was prepared in **October 2013** by:

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## Table of contents

<b>1. Introduction.....</b>	<b>4</b>
<b>2. Evaluation of training events .....</b>	<b>7</b>
<b>3. Results from different training events .....</b>	<b>8</b>
3.1. Wood chips training .....	8
3.2. Firewood training .....	12
3.3. Wood pellets training.....	14
3.4. Non-woody pellets training.....	19
3.5. General module training .....	21
3.6. Combined modules training .....	24
<b>4. Conclusions .....</b>	<b>26</b>
Appendix 1. Part 5 of feedback questionnaire – Questions about the quality of the training .....	28

## 1. Introduction

In the course of the project, 35 training events were planned to be organised in 11 countries. This report is a summary of 34 events organised from 1 April 2011 to September 2013. VTT organized three events instead of the two planned and ERATO two events less than the planned. Events are listed in Table 1 with participant information. Each partner made a short confidential report in English and a public report in national language. Reports are listed in the end of this report. Also evaluation of different type of participants was made (see Table 1, 2 and 3). Feedback on training quality (Appendix 1) and standards was collected during training events. Results of feedback on the quality of training events are reported in this report and proposals and feedback on standards are reported in national industry position papers and can be downloaded from the following link <http://www.solidstandards.eu/feedback/resulting-documents.html>.

The main target groups of the trainings were producers and end-users of various solid biofuels. The demand side was mainly represented in trainings by medium-scale biomass end-users (medium heat and CHP plants). Small-scale end-users (households) was represented through consumers' associations and other associations. Large-scale end-users (utilities) have less demand for training, but they also participated in the events. Other participants were actors involved in trade and logistics and actors involved in standardisation and certification.

All participants are listed in the separate training reports written also in national languages.

**Table 1. Events organised by SolidStandard project**

No	Date	Place	Module	Participants						
				Prod	Trade	End-user	Train.	Stand.	Other	Tot.
1	21.3.2012	Jyväskylä, Finland	General	6	6	3	1	3	6	15
2	22.3.2012	Jyväskylä, Finland	Firewood	5	4	11	1	9	22	40
3	8.5.2012	Randers, Denmark	Wood pellets	4	14	3	3	2	4	27
4	12.4.2012	Vienna, Austria	Wood chips	7	3	7	1	5	10	17
5	30.05.2012	Bydgoszcz, Poland	Non-woody pellets	19	8	1	1	1	2	26
6	31.05.2012	Bydgoszcz, Poland	Wood pellets	6	4	2	1	1	7	17
7	17.09.2012	Poznań, Poland	Briquettes, wood chips and firewood	10	1	4	1	1	4	16
8	31.05.2012	Most, Czech Republic	Wood chips	8	3	3	0	1	0	15
9	17.7.2012	Prague, Czech Republic	Firewood, wood pellets	10	3	7	0	1	0	21
10	20.6.2012	Zagreb, Croatia	Wood pellets	8	3	0	0	1	3	12
11	19.9.2012	Prague, Czech Republic	Non-woody pellets	11	4	3	0	2	0	20
12	7-8.6.2012	Utrecht, the Netherlands	General, sustainability, wood pellets	4	4	3		4	9	22
13	18.05.2012	Haskovo, Bulgaria	Wood pellets	12	4	4	2	1	1	24
14	12.05.2012	Leipzig, Germany	Wood pellets	3	9	0	0	2	5	19
15	27.06.2012	Haskovo, Bulgaria	Wood chips	18	4	9	1	1	3	36

No	Date	Place	Module	Participants						
				Prod	Trade	End-user	Train.	Stand	Other	Total
16	30.10.2012	Vilnius, Lithuania	Wood chips	8	3	0	0	1	10	22
17	29.11.2012	Leipzig, Germany	Non-woody pellets					1	12	13
18	20.11.2012	Rottenburg, Germany	Wood chips	9	3	6		4	6	31
19	23.11.2012	Poznań, Poland	Wood pellets and wood briquettes	12	1	4		1	6	23
20	26.11.2012	Vilnius, Lithuania	Wood pellets	19	1	1	0	1	13	35
21	20.12.2012	Vilnius, Lithuania	Non-woody pellets	10	2	0	0	0	4	16
22	16.1.2013	Zagreb, Croatia	Wood chips	33	9			1	2	45
23	14.2.2013	Padova/Legnaro, Italy	Wood pellets	19	17		1		9	44
24	5.3.2013	Sofia, Bulgaria	Firewood	31	3			2		36
25	4.6.2013	Rottenburg, Germany	Wood pellets	2	3	2	2	0	3	10
26	18.6.2013	Bydgoszcz, Poland	Wood and non-woody pellets	3	7	2	1	1	2	16
27	9 - 10.4.2013	Saarijärvi, Finland	Wood chips	4	1	23	10	2	42	82
28	11.4.2013	Gmunden, Austria	Wood chips	10	7	3	1	2	11	14
29	13.05.2013	Leipzig, Germany	Wood chips	3	2	1		2	6	13
30	14.5.2013	Bolzano, Italy	Wood chips	4	3	4	2		6	14
31	28.5.2013	Vratsa, Bulgaria	Wood pellets	23	6	2		1		32
32	3.6.2013	Utrecht, the Netherlands	General, sustainability, wood pellets	7	2	8	1	4	2	24
33	17.7.2013	Virovitica, Croatia	Firewood	3	0	0	0	0	20	23
34	20.8.2013	Ribe, Denmark	General, Wood pellets, Sustainability			5	3	4	24	33

**Table 2. Industrial participation in the events**

No	Date	Place	Remarks	Comp
1	21.3.2012	Jyväskylä, Finland	11 companies total, same companies represented two fields	11
2	22.3.2012	Jyväskylä, Finland	26 companies total, same companies presented several fields	26
3	8.5.2012	Randers, Denmark	18 companies in total, Very satisfactory 44%, good 56%	18
4	12.4.2012	Vienna, Austria	18 participants representing 17 companies	17
5	30.05.2012	Bydgoszcz, Poland	16 companies total, same companies represented several fields	16
6	31.05.2012	Bydgoszcz, Poland	15 companies total, same companies represented several fields	15
7	17.09.2012	Poznań, Poland	8 companies total, same companies represented several fields	8
8	31.05.2012	Most, Czech Republic	15 companies in total	15
9	17.7.2012	Prague, Czech Republic	15 companies in total	15
10	20.6.2012	Zagreb, Croatia	8 companies in total	15

No	Date	Place	Remarks	Comp
11	19.9.2012	Prague, Czech Republic	19 companies in total	15
12	7-8.6.2012	Utrecht, the Netherlands	2 participants represent both producer and trader (therefore sum is 24); totally, 20 organizations represented	20
13	18.05.2012	Haskovo, Bulgaria	14 companies total with 24 participants representing	14
14	12.05.2012	Leipzig, Germany	15 companies total with 36 participants representing	15
15	27.06.2012	Haskovo, Bulgaria	24 companies total with 36 participants representing	14
16	30.10.2012	Vilnius, Lithuania	8 producers, 3 traders and 9 other	21
17	29.11.2012	Leipzig, Germany	7 companies in total	7
18	20.11.2012	Rottenburg, Germany	23 companies in total	23
19	23.11.2012	Poznań, Poland	17 companies, 7 prod, 3 end-user, 1 trade	17
20	26.11.2012	Vilnius, Lithuania	18 producers, 1 traders, one end-user, 12 other	33
21	20.12.2012	Vilnius, Lithuania	10 producers, 2 traders and other 2	14
22	16.1.2013	Zagreb, Croatia	12 companies in total, 6 prod., 3 trade	12
23	14.2.2013	Bozan/Legnaro, Italy	44 participants, 39 companies, 18 prod, 15 traders	39
24	5.3.2013	Sofia, Bulgaria	22 companies	22
25	04.06.2013	Rottenburg, Germany	9 companies in total	9
26	18.6.2013	Bydgoszcz, Poland	11 companies, 3 prod, 2 end-user, 3 trade	11
27	9 - 10.4.2013	Saarijärvi, Finland	35 companies, of which 4 prod., 14 end-user, 1 trader, 20 students, 5 laboratory, forestry centres, measurement organisation	35
28	11.4.2013	Gmunden, Austria	14 participants presenting 10 companies, 6 prod, 3 end-users, 1 end-users	10
29	13.05.2013	Leipzig, Germany	12 companies in total	12
30	14.5.2013	Bolzano, Italy	14 participants presenting 12 companies, 4 prod, 3 end-user, 3 trade	12
31	28.5.2013	Vratsa, Bulgaria	29 companies, 23 prod., 4 trade, 1 end user	29
32	3.6.2013	Utrecht, the Netherlands	21 companies	21
33	17.7.2013	Virovitica, Croatia	10 companies, 3 producers	10
34	20.8.2013	Ribe, Denmark		22

**Table 3. Performance indicators for events**

Indicator	Producer	Trader	End-users	Training	Standardisation and certification	Other	Total	Companies
<b>Total, all 34 events</b>	<b>331</b>	<b>144</b>	<b>121</b>	<b>33</b>	<b>58</b>	<b>254</b>	<b>853</b>	<b>593</b>
<b>Realised %</b>	39	17	14	4	7	30	100	100
<b>Target %</b>	50	15	15	0	5	0	<b>100</b>	100
<b>Target, persons</b>	350	105	105	0	35	0	700	680

Tables 2 and 3 summarize the results of training events. The target for the number of companies was an average of 20 companies for each event and consequently for all 34 events the target was 680 companies (593 realised with an average of more than 17 companies per event, Table 2). For the number of participants, the target 700 was reached (853 realised). The target was to get at least 50% fuel producers (39% realised), 15% traders

(17% realised) and 15% end-users (14% realised) and at least one person from standardisation organisation, which means 35 persons (58 persons realised). There were no targets for training organisations and 33 persons participated. They were training organisations, which are planning to take standards as a part of their training programmes and to continue trainings after the project finalisation.

## 2. Evaluation of training events

Each SolidStandards project partner collected feedback on quality of the training event from participants during the training event (see in Appendix1). Participants evaluated the following issues:

- What did they learn during this training?
- Evaluate the items below at a scale of 1 to 5, of which the score of 5 is excellent and 1 inferior
  - Content of the training as a whole
  - General
- Has this training met your expectations?
- How did you know about the training?

This event quality questionnaire was part of a long questionnaire to collect also feedback on standards.

Figure 1 shows the results of 34 events organized by SolidStandards project. Figure 1 shows that participants have been very satisfied of the events, most of the events got score from 4.0 to 5 for the summarizing question “Has this training met your expectations?” Only 5 events got less than 4 score.

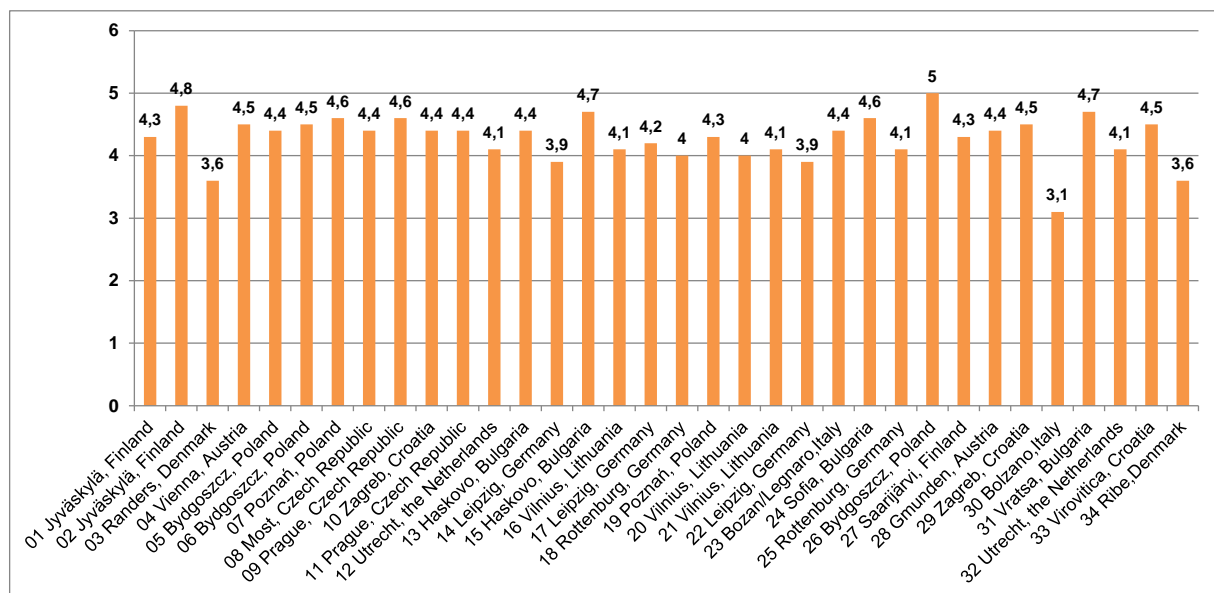


Figure 1. Scores given by participants for different events.

### 3. Outcomes of the different training events

Details on each training event including the programme and feedback are reported individually in a separate public document in national language which can be downloaded from SolidStandards website. The participant list is confidential and therefore it was included in the confidential reports which were also prepared for each event by the project partners.

#### 3.1. Wood chips training

Training of wood chips standards were organised in Austria (no 4 and 28), Czech Republic (no 8), Bulgaria (no 15), Lithuania (no 16), Germany (no 18 and 29), Croatia (no 22), Finland (no 27) and Italy (no 30).

**In Austria (no 4 and no 28)**, the first event was organized on 12 April 2012 in Vienna and 17 participants attended the event. The training event included presentations on general standardization process, on the wood chips standards for specification and quality assurance (EN 14961 and EN 15234 series) as well as the national amendment standard (ÖNORM C 4005) and a practical part with four different tasks. The training material of sustainability was handed out. In the end of the programme feedback and also discussion of first draft of EN ISO 17225-1 standard was introduced and discussed. Also possibility to one-to-one meetings was organized.

The event was successful and helped to bring an important part of the Austrian wood chip industry together for an update on European standardisation. The aim of this training was to get as much feedback as possible to our standard implementation concept for forest chips and to the proposal for an adapted particle size classification system for the ISO meeting in the beginning of May 2012. The practical part of the training was very much appreciated. Especially the samples of different forest chips invited to join the discussion. Most participants were not aware of how the particle size class was determined and why in many cases a classification was not possible. Problems, like how to detect the max. cross sectional area or length in a pile of forest chips, became evident. On the other hand people didn't have a lot to comment on the quality assurance system in theory. They were asked to suggest improvements for the examples of a checklist and a flowchart of a typical supply chain, but they didn't have any objections to the proposed version. At the end of the training all participants were rather exhausted, mainly due to the high amount of new information and the need to actively take part in the discussions and the training. It wouldn't make sense to plan a longer training duration. Hardly anybody was interested in one-to-one meetings, mainly because there still didn't exist a straight concept for the implementation of wood chips standards.

The second event "Quality management for forest chip supply – practical work with the new standards" was organized at FAST Ort, a forestry training centre, in Gmunden/Austria on 11 April, 2013. The programme included the same presentations as in the first event and in addition sampling and sustainability. The new draft of ISO 17225 standard was also presented. Four different exercises were prepared: particle size estimation, calculation of the net calorific value, identification of raw material and specification of wood chips using a checklist. In total 14 participants attended the event, of which 11 filled in the questionnaire regarding the solid biofuel standards and 9 regarding the quality of the training event. The training was planned as one-day event. One-to-one meetings were offered following the training. It was difficult to mobilize companies to attend this wood chip training. Possible reason for this could be that the main Austrian wood chip consumers already attended the previous training 2012 and they are aware that the wood chip standard is still a work in progress because of the activities in ISO/TC 238. The small wood chip consumers were invited, by sending out invitations to interest groups. But the response was low. Some people indicated interest but didn't sign up or they didn't show up at the training. Especially the last issue could be better avoided if the participants were charged a small fee for the training event. Concerning wood chip producer it is difficult to contact them directly, because they often are one-man-businesses; therefore the concept was to actively invite regional



cooperatives like “Maschinenring”, which organize the logistics of demand and supply of machinery, service and personnel leasing. The practical part was a good exercise for all participants to get used to the new specification and to practice the identification of raw material according to “origin and source” of the European standard. Nobody was interested in one-to-one meetings directly after the training. One company contacted HFA the week after the training to discuss the proper specification for their products – they intend to use the new specification according to European standards. The forestry training center “FAST Ort” is interested in continuing these trainings after the end of the project SolidStandards.



*Photos of wood chips classification and particle size analysis in Austria (no 28).*

***In Czech Republic (no 8)***, the training was organized in Most on 31 May 2012. The programme included presentations of wood chips standards, certification and sustainability issues. 15 participants attended the event. The training has received a positive feedback (4.4). The target of disseminating information about more standards and about their contents than most of the stakeholders were aware of was reached. SolidStandards project material was also translated to Czech language.

***In Bulgaria (no 15)*** the training event was organised on 27 June 2012 in Haskovo. The event included presentations of sustainability standards under development, wood chips standards and demonstration of wood chip production and quality analysis in the laboratory. Event for wood chips was successful, the target number of participants was achieved (36 realised). Definitely there was a necessity for this theoretical and practical training module. Only one company of the participants already used standards in their wood chips production. The other participants in the workshop would like to introduce quality standards in their facilities in the future. The participants were very glad about the possibilities to visit demonstration of wood chips production and solid biofuels quality measurements in the laboratory. B2B (1 to 1 meetings) confirmed that this approach is the successful practice for the implementation of individual positive approach and explanation of the specific issues to the stakeholders. Very competent participation during the training and common discussions was remarked by the representative from BDS –Bulgarian Standardization Institute. There is a necessity for large government policy and campaign in the field of quality and sustainability of the solid biofuels as well as standards and certification schemes.

***In Lithuania (no 16)*** wood chips event was organized by LITBIOMA in Vilnius on 30 October 2012. The programme included presentations on wood chip standards (EN 14961 series) and moisture content standard (EN 14774-2) and bulk density (EN 15103). LITBIOMA noticed that trainings about solid biofuels in general are very important and necessary due to the lack of available information regarding quality and sustainability standards and certification schemes. In general, there were no major shortcomings. However, it was noticed that participants` level of knowledge and interests is different. Therefore, in case of organising this kind of trainings in the future, making several groups of participants for the same solid biofuel type trainings would be planned. With a view to creating more favourable conditions for the development of renewable energy sources in the country, one cannot deny the importance of the standardisation and certification of one of the main RES in Lithuania – solid biofuels. Therefore, association LITBIOMA highly encourages gradual progress in belief that, with cooperation of the European Union and all in solid biofuels standardisation involved

countries, the uptake of standards and certification schemes will further accelerate the solid biofuels products safety, which in turn will lead to development of a healthier and more beneficial produce.

**In Germany (no 18 and no 29)**, DBFZ organised two wood chips events on 20 November 2013 and 13 May 2013. The programme included presentations of wood chip classification EN 14961-series, wood quality assurance (EN 15234-4) and practical example on how to apply EN 15234-4 wood chip quality assurance standard by Georg Krämer, Institute for firewood technology. Also practical exercise for assessing fuel quality according to EN 14961 was organised. In the end of programme there was time for filling in the feedback questionnaire. The first event had 31 participants and the second event 14 participants.

The audience in the first event was more interested in information about the current state of the standards than in participating in their further development. Their special interest was on the fuel requirements defined in EN 14961-4 and especially on the requirements defined in the current draft of ISO standard 17225-4 (wood chips) which will displace the respective European standard in 2014. Since the quality assurance standard for wood chips (EN 15234-4) could not be used in practice as it has been published, the audience was happy that feasible approaches for the implementation of a quality assurance scheme have been presented by Mr. Georg Krämer. Mr Georg Krämer has also actively participated in development of firewood quality and quality assurance standards. For second event the feedback of the participants was good. Most of the training contents seemed to match the expectations of the target group. With minor modifications according to the lessons learned and to the conditions in the respective countries the concept could be used by all project partners.

**In Croatia (no 22)**, Wood chip event was organised on 16 January 2013 in Zagreb. The programme included presentations of solid biofuel quality standards, standards for quality control and sustainability. 45 participants attended the event, which was definitely successful. There is a necessity for this type of theoretical and practical trainings. There are no certified wood chips producers in Croatia. The target number of participants was reached because of very high interest in training for wood chips. The participants were very glad about the possibilities to see demonstration of solid biofuels analysis in laboratory.

**In Finland (no 27)**, wood chip training event was organised on 9 – 10 April in 2013 in Saarijärvi, premises of JAMK University of Applied Sciences. This two days event was attended by 85 people, most of them representing end-users. The event in Finland included presentations of fuel classification standards (EN 14961-serie), quality assurance (EN 15234-series), sampling and sample preparation (EN 14778 and EN 14780), bulk density (EN 15103), moisture (EN 14772-2), net calorific value (EN 14918), and particle size distribution (EN 15149-1). The programme also included presentations of sustainability issues and case studies for sustainability (Kyyjärvi) and implementing fuel specification and quality assurance standards (Vakkalämpö Oy, MHY-Päijänne) by VTT and companies involved in these case studies. The first day morning session included presentations of wood chips fuel specification and quality assurance, sampling and sample reduction and most important physical properties. In the afternoon VTT organised in cooperation with JAMK University of Applied Sciences practical exercise for correct sampling in stockpile, analysis of bulk density, sample reduction for moisture content analysis sample by quartering and corning method and analysis of particle size distribution. There were also Senfit Oy presenting their sample crusher and an automatic moisture content analyser. JAMK students were assisting in each analysis point and they presented the results of analysis the next day in the end of the seminar. The event was successful, and apparently there was a need for this kind of training. Especially many energy utilities participated in the training event and found useful to learn about the standards. This will affect also fuel producers, if utilities request their fuel suppliers to implement standards in their production and fuel quality control. Lot of discussions were on sampling and sample dividing for moisture content analysis especially sampling place. Most of the participants already used standards in their operations, but more detailed analysis cannot be done based on the feedback written in the

questionnaire forms. The questionnaire form was much too detailed and many of the respondents did not bother to go through all questions. It was also proposed to make practical guidelines for wood fuel quality specification and analysis based on the standards. This idea was implemented later and VTT prepared in cooperation with Finnish association of Bioenergy, Association of Energy Utilities, Forest Industry Federation and Energy market Authority a wood fuel guidelines which will be published in end of November 2013. Also results of SolidStandards project was used in this guideline.



*VTT's staff showing bulk density analysis and corning and quartering for sample reduction in Saarijärvi. After sample reduction about 2 litre sample (> 300 g) were used for moisture content analysis. Photos of the training event 27 in Finland.*



*Particle size was analysis by an oscillating method. Results were compared to ISO 17225-1 standard requirements for wood chip and hog fuel particle size. Results of all analysis were presented in the end of the seminar by students. Photos from the training event 27 in Finland.*

**In Italy (30)**, the event was organized on 14 May 2013 in Bolzano by HFA in cooperation with TIS Innovation Park. The programme included presentations of wood chip fuel specification standards (EN 14961 series), quality assurance (EN 15234 series) and Austrian standards ÖNORM C 4005. Also new draft ISO 17225 standard was presented. Four different exercises were prepared: particle size estimation, calculation of the net calorific value, identification of raw material and specification of wood chips using a checklist.

Although one of the main businesses of TIS Innovation Park is to organize trainings and workshops, it was difficult to mobilize companies to attend this wood chips training. In total 14 attended the training event. The training was recommended and promoted by three

associations. In South Tyrol wood chips is limited to “white, high quality” far more than e.g. in Austria. During the practical part, participants stated that they would never use the “bad quality” material, shown in the training; material which is commonly used in Austria. Therefore they don’t have such a need to talk about quality. The evaluation of the questionnaires showed that practically nobody uses standards or intends to use standards in the future. The practical part showed that the knowledge on the correct specification of wood chips was limited; therefore it was a good exercise for all participants to get used to the new specification and to practice the identification of raw material according to “origin and source” of the European standard. The opportunity was given to have one-to-one meetings directly after the training on 14 of May 2013. In the end there was no one interested in a one-to-one meeting after the training but informal talks during lunch break and the practical part took place. TIS Innovation Park is interested in continuing these trainings after the end of the project SolidStandards. Their idea to attract more participants is to shorten the training to half a day, organize it on a Friday and charge a small fee for it.

### 3.2. Firewood training

Training of firewood standards were organized in Finland (no 2), Czech Republic (no 9), Bulgaria (no 24) and Croatia (no 33).

***In Finland (no 2)*** firewood event was organised on 22 March 2012. The programme included presentations on firewood classification and quality assurance standards (EN 14961-5 and EN 15234-5), results of VTT’s latest research on firewood quality and presentations from firewood producer applying standards in their business. In the end of the programme there was practical work analysing moisture content of firewood in VTT’s laboratory by rapid moisture meter and oven dry method (EN 14772-2). Results of oven dry method was sent to participants next day by email.

The event was attended by 18 persons and 11 of them were firewood producers. The questionnaire included also a possibility to give free comments on the event. Based on the given feedback, the training gave a good overview on the topic. However, the contents of different standards were not possible to be treated in detail during one day. Especially the moisture content analyses in practice were considered useful – things are easier to remember when you have had a possibility to hands-on training. The event was successful, and apparently there was a need for this kind of training. Only one third of the participants already used standards in their operations, but almost all were going to introduce them in the future. The participants were especially glad about the hands-on training at the VTT lab, so this kind of exercise can be recommended to be included in future training events whenever possible. Also presentation of firewood producer, who had tested the standard and also VTT’s tool to calculate energy content of firewood, was found very useful. Training included also the newest results of VTT’s firewood research especially how production methods etc. influenced on firewood quality. Some of the companies which has already tested standards are providing product declaration based on EN 15234-5 standard and EN 14961-5.



*In Finland, participants of firewood training measured the moisture content by rapid moisture meter at VTT's laboratory. VTT made simultaneously moisture analysis by EN 14774-2 method. Results were distributed to partners next day. Photos of event no 2.*

**In Czech Republic (no 9)**, the workshop was organised on 17 July 2012 in Prague. Training event was attended by 21 participants. The event included presentations on pellets and firewood and certification. The event has been successful and all the stakeholder groups have been represented. The training has been evaluated by the stakeholders and it was very positive. We have been able to disseminate information about more standards and about their contents than most of the stakeholders were aware of.

**In Bulgaria (no 24)** the event was organised in Sofia on 5 March 2013. The training event included presentations on solid biofuels quality standards and sustainability, and how to implement firewood quality standards. The programme also included demonstration on

firewood production. The event was attended by 36 participants and 19 firewood companies. The feedback was very similar as for wood chips event (no 15). Companies participated in the training did not have experience about standards but they are planning to use them in the future. Also practical part of the training event and visit to firewood production site was useful.



*Firewood production as a part of firewood standards training in Bulgaria (no 24).*

**In Croatia (no 33)** the training event was organised on 17 July 2013 in Virovitica. The programme included presentations on solid biofuel standards and certifications and standards for firewood quality control and assurance. The event also included presentation on biomass heating contracting. The event was successful, in the sense that in total there were 23 participants. No company or entrepreneur producing firewood present at the training currently uses standards in their production. The topic on firewood standardisation is not very interesting for Croatian firewood producers. The training was advertised and invitations were sent to a large group of producers however in the end only three producers attended the training. The main reason for the low interest from firewood producers is mainly due to the fact that firewood is mostly not exported (which is the case for pellets and wood chips) but is sold on the local level. Thus the current situation on the Croatian market for firewood is such that firewood producers would not get any benefits or added value from following any standard.

### 3.3. Wood pellets training

Training of wood pellets standards were organised in Denmark (no 3 and no 34), Poland (no 6, no 19), Croatia (no 10), Bulgaria (no 13 and no 31), Germany (no 14 and no 25), Lithuania (no 20) and Italy (no 23).

**In Denmark (no 3 and no 34)** two wood pellet events were organized on 5 August 2012 in Ribe and 20 August 2013 in Randers. The programme for first event included presentations of wood pellet quality standards (EN 14961-2 and EN 15234-2) and visit to Verdo plant. The first event was attended by 23 participants. The Second event included same topics and site

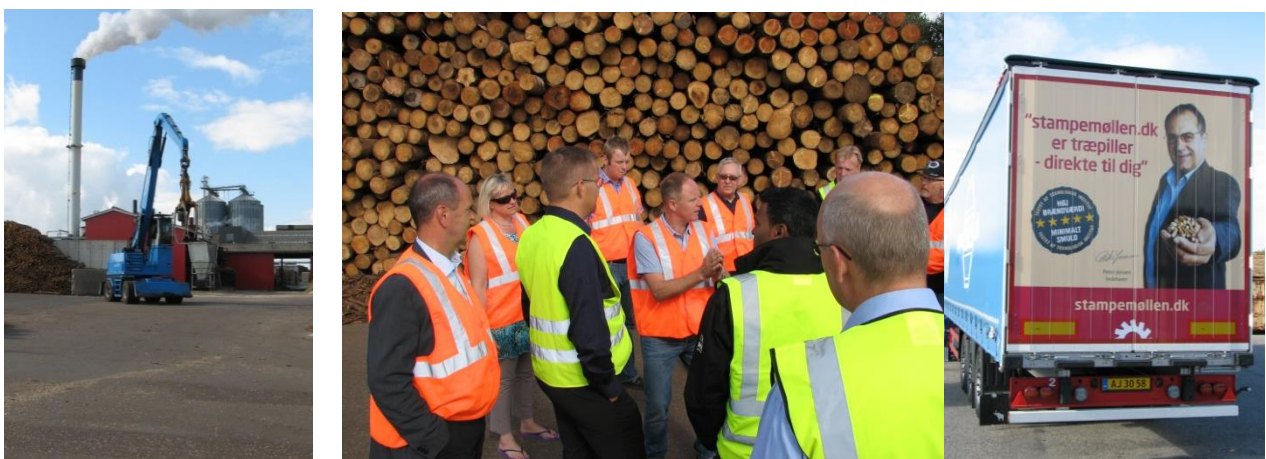
visit was organized to Dansk Træemballage company (saw mill and wood pellet production company). The second event was attended by 33 participants.

It seems to be a need for this type of courses and the participation was satisfactory. The idea of combining the course and the Danish Wood Pellet Conferences in 2012 and 2013, and including an excursion and networking options was approved by the participants. This is probably a good idea in a small market such as the Danish. In relation to the target group which had a large share of representatives from persons with practical experience, the training material seems to be quite heavy and academically based. We could consider reducing the amount prior to the event but there is room for further tailoring. There is room for improvement in terms of assignments, exercises, breaks etc. in order to promote digestion of the subjects. It has turned out that teaching in subjects that are rapidly changing - development of standards, development of sustainability criteria - demands a larger effort on updating the training material than it was planned in the project.



*Training event (no 3) of wood pellets in Denmark in Ribe.*

One-to-one meetings were offered during second event (34) and scheduled to take place in the afternoon and evening of the 20 of August and during the 21 of August 2013 or later if demanded. None of the participants requested a one-to-one meeting. After the event, FORCE Technology has actively been promoting the possibility of training colleagues of the participants in standards and other biomass related subjects such as pellet combustion.



*Site visit at Dansk Træemballage in Denmark (no 34).*

**In Poland (no 6 and no 19)** the first training event was organized on 31 May 2012 in Budgoszcz and attended by 17 participants. The duration of the training (from 9.30 – 16.00) was too long. Participants did not stay focused and asking them to fill in a long and too detailed feedback questionnaire resulted in poor quality answers. Participants who decided

to fill in the questionnaire mostly ignored part 2 and 3. In general participants do not apply any standards mentioned in Part 2 of the questionnaire. Only 1 producer stated that EN 14961-1 is applied at the company, however the answer is difficult to rely on as the company does not apply any other standards (e.g. regarding analyses).

Most of the training participants are not aware of certification systems on pellet transport and storage mentioned in questions 3.2, 3.4, 3.6 and 3.8. However they think that similar initiatives are needed, mostly for wood briquettes (8) and firewood (4). 90% of participants agreed that there should be standards on health and security aspects for pellet storage at the end-users. However 1 person pointed out that such standards are not economically reasonable to individual users. Only 2 solid biofuel producers and 1 solid biofuel trader expressed their intention to implement standards in the future.

The second training event in Poland was organised on 23 November 2012 in Poznan and the event was attended by 23 participants. The programme included presentations of wood pellet (EN 14961-2 & EN 15234-2) and wood briquette standards (EN 14961-3 & EN 15234-3), sampling and sample preparation and fuel properties analysis. The event was held at the premises of Poznań International Fair as an accompanying event to the 24th edition of the International Trade Fair of Environmental Protection. It is very difficult to gather the required number of companies. Even though the training is for free and information about the trainings and invitations are sent by many channels. The Polish market is relatively young, struggling with many problems, mainly economical. The implementation of a quality assurance system may be associated with another requirement that small companies will not be able to meet (also due to “bureaucracy” connected with introduction of quality standards). However, taking into account that (in most cases) quality assurance systems are little known in Poland and few producers implement them, it is necessary to continue promoting measures for consistent improvement as in the near future it may occur that it is the quality that will be a crucial element for the survival of the company on the market. Conducting more detailed practical exercises would be too difficult and time consuming. However visiting a laboratory site (in addition to exercises) seems to be interesting for the participants and therefore was taken into account during organisation of the next training. The questionnaire took a lot of time to fill in and attendants complained about it and were not willing to complete it at all or they complete it only partially. Even provision of issuing training certificates only when the feedback questionnaire is delivered did not motivate the participants.

***In Croatia (no 10)*** the training event was organized on 20 June 2012 in Zagreb attended by 12 participants. The programme included presentations of Croatian Standardisation Institute, ministry of Agriculture and Croatian Association of pellet, briquette and wood biomass producers. CZBIOM presented solid biofuel standards for quality control and quality assurance and certification. In the end of the programme also a visit to the testing laboratory of the Faculty of Forestry was organized.

The event in Croatia definitely was successful, and there is a necessity for this type of theoretical and practical trainings. Only two companies of the participants already use standards in their wood pellets production, but are not certified. The rest of the participants would like to introduce standards in their facilities in the future. The target number of participants was not reached because of low number of stakeholders in Croatia. In particular, the market for wood pellets is practically non-existent and Croatian producers export approximately 99% of their production. It was therefore not possible to have a relevant representative of pellet users at the training. The participants were very glad about the possibilities to see demonstration of solid biofuels analysis in laboratory.

***In Bulgaria (13 and 31)*** two events were organized on 18 May 2012 in Haskovo and 28 May 2013 in Vratsa. First event was attended by 24 participants and second event by 32 participants. The training events definitely were successful, and there was a necessity for this type of theoretical and practical trainings. Only two companies of the participants already used standards in their wood pellets production. The rest of the participants would like to introduce standards in their facilities in the future. The participants were very glad about the possibilities to visit demonstration of wood pellets production and testing of solid biofuels in



laboratory. Face to face meetings are right formula for the implementation of individual positive approach and explanation of the specific issues to the stakeholders.



*Production of wood pellets – part of wood pellets standards training in Bulgaria (no 31)*

**In Germany (no 14 and no 25)** the first training event in Leipzig on 15 May 2012 gathered 19 participants. The event included presentations on wood fuel specification and quality assurance standards (EN 14961-2 and EN 15234-2). The programme also included presentation on safety issues in pellet storage and existing guidelines. In the end of the programme also practical exercise on measurement of properties was organized. The participants of the workshop were highly interested in the safety and health aspects. Slides on this subject should be elaborated within the SolidStandards project. Most of the participants came from the near surrounding of Leipzig what shows that interested stakeholders are not willing to spend one day of travelling for the trainings. For that reason DBFZ's second workshop on wood pellets took place in the south-west of Germany in order to reach additional participants. In order to avoid that the participants leave the training before the official end, training events should end earlier in the future. There should be more time right after the several parts of the training to enable extend discussion on the respective subjects in order to get more input from the participants. The quality assurance exercise should take place right after the respective part of the training to get more input for the further development of EN 15234.

In order to improve and to customize the training material, additional slides have been added for the second training session (no 25), taking into account the lessons learned from the previous workshop. The second event was organised in Rottenburg on 4 June 2013 and attended by 10 participants. Information about the SolidStandards project and outcomes the participants might be interested in. Sources of supply for standards and equipment for the analyses should also be included. Information about plans to certify the whole state forest in two German federal states according to the sustainability scheme FSC is needed. Since the

scheme does not allow the use of whole tree and forest residues, this would cause a significant reduction of the available potential for the energetic use. Information about sustainability aspects in German solid biofuel certification and information about German quality certification schemes is needed. Most of the participants see the need of well-educated heating engineers in order to reduce malfunctions of the combustion equipment. These actors might be a potential target group for further training workshops. On the other hand the number of participants on the workshops for heating engineers including information on the fuel quality aspects organised by the German Pellet association is constantly decreasing.



*Left photo: A DBFZ expert for solid biofuel assessment explains analysis methods to the participants. Right photo: equipment for analysis of solid biofuel properties. Photos from first event in Germany (no 14).*

The audience in Germany seemed to be more interested in information about the current state of the standards than in participating in their further development. Their special interest was on the fuel requirements defined in EN 14961-2 as well as on the safety and health aspects. The feedback of the participants was rather good. Most of the training contents seemed to match the expectations of the target group. With minor modifications according to the lessons learned and to the conditions in the respective countries the concept could be used by all project partners.

#### ***In Lithuania (no 20),***

***In Italy (no 23),*** HFA organized a wood pellet training event on 14 February 2013 in Legnaro/Padova in cooperation with AIEL. The event was attended by 37 participants. The programme included presentation on pellets specification and quality standards (EN 14961-2 & EN 15234-2), ENplus certification and CO<sub>2</sub> calculator and practical part (e.g. inspection of pellet silo truck, sample preparation and internal quality control e.g. mechanical durability of pellets). The feedback from the participants was very positive. After the training, most of the participants were aware of many more standards than before the training. This result reflects that there is a clear need for training on standards among the operators of the wood pellet supply chain. The practical part of the training was also highly appreciated. At the time of the

training event there existed only two pellet plants in Italy, which have already implemented the new European standards. The recent publication of the decree on incentives helps to raise interest in the pellet sector for the use of standards and the implementation of certification systems. The training helped to inform a considerable part of the Italian wood pellet industry on European standardization and make them familiar with internal quality control.

### 3.4. Non-woody pellets training

Training of non-woody pellet standards were organized in Poland (no 5 and no 26) Czech Republic (no 11), Germany (no 17) and Lithuania (no 21).

**In Poland (no 5 and no 26),** the first event on non-woody pellets were organized on 30 May 2012 in Bydgoszcz. The event was attended by 23 participants. The programme included presentations on fuel specification and quality assurance standards (EN 14961-6 and EN 15234-6), analysis of fuel properties and sustainability issues. Most of the respondents think that there should be standards on health and security aspects for pellet storage at the end-users. There was low feedback on fuel specific questions (only 7 persons answered the questions) most probably due to the too detailed questionnaire in previous parts. Nevertheless, responders were almost unanimous in their answers in Part 4 what can be considered as valuable information from the Polish non-woody pellet market. It is difficult to assess how many participants from one company filled in the questionnaire. Therefore it is impossible to assess what is the actual number of companies willing to implement the standards. In order to be able to do this, questionnaires should have been non-anonymous (and that would probably cause even less responders in practice). Regardless, 4 participants (out of 26) willing to introduce standards is a low number. This might be due to the fact that the certification in question is voluntary and the market is still characterised with low awareness. Moreover, some of the participants underlined that these standards, as materials for common use should be widely promoted and available free of charge to all interested market actors.



*Participants in non-woody pellets event in Poland on 30 May 2012 (no 15).*

The second event in Poland was organized on 18 June 2013 also in Bydgoszcz with 16 participants. The programme included both woody and non-woody pellets and the structure of the programme was same as in first event. The training was held at the premises of Pomorze & Kujawy Fair Centre as an accompanying event to the 11<sup>th</sup> edition of the International Fair of Devices and Technologies for Pellet and Briquette Industry “PELLETS-EXPO & BRIQUETTES-EXPO”.

In general participants do not apply any standards. There was only one participant applying DIN Plus, however in this case the company was partially operating on German market. Most of the training participants are not aware of certification systems on pellet transport and storage mentioned in questions 3.2, 3.4, 3.6 and 3.8. However they think that similar initiatives are needed, mostly for wood briquettes (8) and firewood (4). Most of participants agreed that there should be standards on health and security aspects for pellet storage at the end-users. However 1 person pointed out that such standards are not economically reasonable to individual users. Even though participants stated that introducing standards results in better and stable fuel quality - none of them expressed their intention to implement standards in the future. This might be due to the fact that this certification is voluntary and the market is still characterised with low awareness. The situation on the Polish market is unstable; therefore pellet producers are not willing to incur additional costs for standards implementation.

It was very difficult to gather the required number of companies. Even though the training was for free and information about the trainings and invitations were send by many channels. Taking into account that (in most cases) biomass quality assurance systems are little known in Poland and few producers implement them, it is necessary to continue promoting measures for consistent improvement as in the near future it may occur that it is the quality that will be a crucial element for the survival of the company on the market.

The questionnaire takes a lot of time to fill in and attendants complain about it and are not willing to complete it at all or they complete it only partially. During this training most of the participants filled in answers in part 4a concerning wood pellets. All of participants agreed that fuel specifications according to EN 14961-2 match the needs of the market and they also agreed with the requirements (threshold values) defined in EN 14961-2. Everyone agreed that three quality classes for wood pellets are enough except one person who stated that there are too few classes. Participants indicated that standard EN 14961-2 is the most important out of standards given and the least important appeared to be ÖNORM M 7135. All participants who filled in the questionnaire unanimously agreed that fuel quality assurance according to EN 15234-2 is realizable and integrated quality assurance system for production, trade and delivery of pellets is necessary and useful.



*Participants of wood pellets and non-woody pellets event in Poland (no 26).*

***In the Czech Republic (no 11)*** event was organized on 19 September 2012 in Prague with 20 participants. The event included presentations on wood and non-woody pellets and briquettes standards and ENplus certification system and sustainability issues. As the non-woody pellets topic is not well developed, the scope of the training had to be enlarged. This had however a minor influence on the choice of subjects and order of subjects, which were in comparison to previous workshops evaluated less positively. The workshop on non-woody pellets has been successful. All the stakeholder groups have been represented. The training has been evaluated by the stakeholders to be very positive. We have been able to disseminate information about more standards and about their contents than most of the stakeholders were aware of. The general and overall evaluation of the training has been as well very positive.

***In Germany (no 17)*** the training event was organized on 29 November 2012 in Leipzig with 13 participants. The aim of the workshop was to give a comprehensive overview about institutions and procedures for the development of standards and recent standardisation activities to the participants: quality specifications according to EN 14961-1 and EN14961-6, quality assurance according to EN 15234-1 and EN 15234-6, approaches for certification schemes implementing the requirements formulated in the above mentioned standards. Furthermore, sustainability issues, that are not already in the scope of the European standardisation committee CEN/TC 335 but which are widely discussed to be included in the future, were presented to the audience: idea and definition; plans of the EC for the implementation of a respective legislation regarding solid biofuels; approaches for sustainability certification of agro-pellets. The sector is currently not established in Germany because of administrative and economic obstacles. The audience seemed to be more interested in information about the current state of the standards than in participating in their further development. Their special interest was on the fuel requirements defined in EN 14961-6. Since most of the participants have to do with other solid biofuels as well they were interested in learning more about the parts of EN 14961, too. The fact that no producers, traders and users of non-woody pellets participated in the workshop shows that the subject has no practical relevance in Germany so far. The existence of quality standards for non-woody offers the possibility for a fast development of the sector as far as administrative and economic obstacles are removed. The feedback of the participants was rather good. Most of the training contents seemed to match the expectations of the target group. With minor modifications according to the lessons learned and to the conditions in the respective countries the concept could be used by all project partners.

***In Lithuania (no 21)*** non-woody pellets event was organized on 20 December 2012 in Vilnius and attended by 16 participants. The programme included presentations on fuel specification and quality assurance standards (EN 14961-6 & EN 15234-6). Non-woody pellets are relatively newer solid biofuels type used in Lithuania and therefore there was a lack of information about it, this training was very useful and helpful. The only disadvantage was the lack of participants, representing solid biofuels end-users. Thus, in case of organising this kind of trainings in the future, more attention should be paid to gathering these participants. Even if non-woody pellets usage in Lithuania is less popular than other solid biofuels types, its producers and traders are interested in its standardisation. They seem to understand that all parties benefit from standardisation through increased product quality as well as lower transactions costs and prices. However, despite the understanding of the standardisation and certification importance, it seems that most producers and suppliers still use locally agreed standards which are widely accepted in the “local” markets.

### **3.5. General module training**

Training events on general standards modules were organized in Finland (no 1) and the Netherlands (no 12 and 32). In the Netherlands event also included wood pellets standards. Also sustainability standards were trained in Austria, Italy, the Netherlands and Finland during wood chips training event. In Poland general standards training event (no 7) included wood briquettes, wood chips and firewood..

***In Finland (no 1)*** the general training event was organized on 21 March 2012 with 40 participants. The programme included presentations on fuel specification, quality assurance, sampling, physical and mechanical properties, because this kind of training was requested in first stakeholder consultation. Also main chemical analysis was presented and visit to ENAS Oy, fuel laboratory was organised. In Finland the group of 40 participants was divided into two groups in the end of the programme. Half of the group visited laboratory and half of the group filled the questionnaire and could also ask specific questions. In Finland all participants received training certificates after filling the questionnaire. This motivated the participants, but most of the respondents complained that questionnaire is too long. VTT made shorter version for the firewood training. VTT also made additional training material of sampling and physical methods

Most of the participants already used some standards in their operations, but more detailed analysis cannot be done based on the questionnaire. The questionnaire form was much too detailed and many of the respondents did not bother to go through all questions.. Consequently, no frequencies can be calculated from the answers and it is impossible to make any reliable conclusions regarding the current or future use of any individual standard. Only some general assumptions of trends can be made. Also the questions regarding the awareness about different European standards (e.g. ÖNORM) were clearly irritating. “Are you aware of...? No, because...” time after time provoked frustrated answers, and it seemed that many of the respondents lost their interest in replying at this phase – if not already during the questions about the use of standards. Also for this part of the questionnaire, the conclusions to be drawn may be unreliable.

Regarding the quality of the event, the participants were especially glad about the possibility to see ENAS Oy’s analysis laboratory, so this kind of visit can be recommended to be included in future training events whenever possible.

The total target number of participants was reached, but the separate targets for solid biofuel producers and traders were not achieved. It needs to be noticed, however, that the classification of different companies is partly based on assumptions. The type of organisation was asked in the questionnaire, but as the responses were anonymous, it is impossible to determine for sure, how many companies there were representing each organisation type – there was no way to recognise which responses were from the same company. Therefore, either the targets for participation should be based on number of persons and not companies, or the questionnaire should be filled only once per company. Or, the name of the company could be asked as well, but losing the anonymity may impact on the answers.



*In Finland training of different standards (general part, no 1) attached 40 participants from all target groups. Programme included also tailor-made slides on sampling, sample preparation, most important physical properties and chemical analysis methods.*



*Most of the events included also visits to analysis laboratory. Finnish participants are visiting analysis laboratory of ENAS Oy, which is situating in same facilities as VTT. Photos of event no 1.*

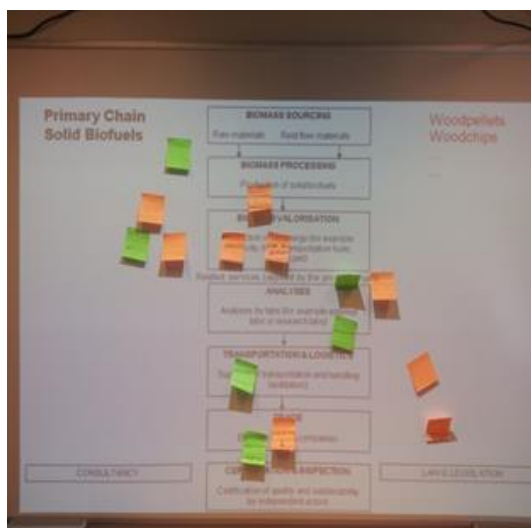
### 3.6. Combined modules training

Trainings combining 2 or more modules were implemented in the Netherlands (no 12 and no 32) where the event included the general, sustainability and wood pellets modules and Poland (no 7) where the training included wood briquettes, wood chips and firewood.

***In the Netherlands (no 12 and no 32)*** the first training event was organized on 7 – 8 June 2012 in Utrecht with 22 participants. Event included presentations of wood pellets, general module and sustainability. In general the training materials were satisfactory for the purpose they have been developed. This also appears from the evaluation by the participants. The time schedule of the programme rather corresponds with the actual timeframe applied during the training event. So, this schedule can be adopted for the next training event. The total sustainability module is (too) long. There was no time to discuss the additional slides. The graphs provided in the main part of the slides were not clear. The teacher had therefore to hide the slides concerned, but based on the hand-outs, some questions were asked. Also questions were asked about the GHG calculations of the examples provided in the supply chain. So, this part of the training materials needs clarification/adjustments. The programme that was offered on the second day was additional to the SolidStandards training materials. Although it was questionable whether participants would invest two working days in training, the programme of the second day was well attended and well received and can be applied again. It is important to anticipate on the background and interest of the participants. The training event was rather theoretic. Next time, samples of all kind of biomass sources can be used to do some exercises (as presented in Vienna meeting by HFA). However, the participants did not mention that they had missed exercises or cases.

The second training event in the Netherlands was organised on 3 June 2013 and consisted of an interactive session, based on good experience with it during the first training event. Event was attended by 22 participants. The aim was to discuss both the matters that were already well-organized/regulated (written by participants on green sticky notes) and the possible bottlenecks and solutions for the further development of the Dutch solid biofuels market (written by participants on orange sticky notes). The focus of the interactive part was not only on wood pellets and sustainability, but also on other topics, brought up and clarified by participants themselves, followed by a group discussion. In general, the training materials were satisfactory for the purpose they have been developed. It appeared that there is a lot of interest in solid biofuels in relation to standardisation, and also in such training events. This also appears from the evaluation by the participants. Some participants indicated that training material was quite extensive (both in a positive and negative way) and rather theoretic. Sometimes some slides contained too much text/information. It was suggested to integrate a practical case in the training (for example a specific company case). This could help to further introduce the standards during the training. The time schedule and duration (one day) met the participants' needs. Practical exercises (for example sampling or quality testing) were not part of the training session, but were also not missed by the participants.





*Interactive session – discussion with sticky notes in second training event in the Netherlands (no 32).*

**In Poland (no 7)** training event was organized on 17 September 2012 in Poznan and included presentations of wood briquettes, wood chips and firewood in the same event. The event included presentations on fuel specification standards (EN 14961 part 1, 3, 4 and 5) and quality assurance (EN 15234 series). Also visit to analysis laboratory was organized. The event was attended by 16 participants.

Only 3 of the questionnaire deliverers were involved in the CEN standardization process. 6 respondents were dealing with wood chips, 7 with wood briquettes and none of them was dealing with firewood (excluding one working at the laboratory at the Wood technology Institute). What is interesting is that 11 of them were dealing with wood pellets (beside other biofuels or pellets only). These numbers suggest that few companies in Poland are interested in standardisation of biofuels that the training was aimed at (firewood, wood chips and wood briquettes). Also the small number of participants (even though training was widely announced, i.a. via the Polish Economic Chamber of Wood Industry and Institute of Wood Technology) indicates low interest in these issues on the Polish market. Less than half of the respondents answered some of the specific questions in Part 4 of the questionnaire. Most of them responded to specific questions concerning wood pellets and wood briquettes.

In some cases in question 2.2 it is difficult to interpret answers. Some respondents mark only the standards they are going to implement additionally in the future (and therefore they do not mark the standards they had already marked in question 2.1). Therefore it is unclear if they are going to keep on using standards from question 2.1. In some cases responses were ambiguous.

It is difficult to assess how many participants from one company filled in the questionnaire. Therefore it is impossible to assess what is the actual number of companies willing to implement the standards. In order to be able to do that questionnaire would have to be non-anonymous (and that would probably cause even less responders in practise, if any). Regardless, 2 producers willing to introduce standards is a low number. This might be due to the fact that the certification in question is voluntary and the market is still characterised with low awareness. Moreover, the quality of biomass utilized in co-firing with coal is not important. In order to change this situation it is the end-users who should require better biofuel quality from the solid biofuel producers.

Duration of the training (from 9.30 until 15.00) including the visit in the testing laboratory seems to be right. Conducting more detailed practical exercises would be too difficult for the participants and too time consuming.

## 4. Conclusions

Training events were successful. The total participant's number was reached and in most of the events also the number of different stakeholder target groups was reached. Also the feedback was very positive usually 4.1 to 5. Only five events got less than 4 scores.

There's definitely a need for this kind of training. Implementing standards in companies needs examples from different biomass fuel sectors, and experts to explain how to use them in real biomass trade.

Practical parts (e.g. visit to analysis laboratory, testing moisture content, how to do correct sampling and sample reduction, bulk density of wood chips, study tours, visit to pellet plant, demonstration of firewood production) were found very useful and interesting.

Training concepts should include also presentations from the industry, which is using already standards. This was not possible for all events organized in 2012, because some of the standards were published in June 2012. In 2013 events included also practical part in the programme.

The whole feedback questionnaire was found too long and too many questions. Most of the participant's didn't fill the whole questionnaire. Because answers were anonymous, it was difficult to recognize the different target groups.

Training material was found useful and some comments were given by participants how to improve material during the first training events in 2012. Comments were taken into account during training events organized in 2013.

More practical information like fuel examples of HFA would help in implementing standards. Also practical demonstrations how to do main fuel analysis were found useful.

Full day event, if it includes only lectures is too long. In the future it might be more useful to have only ½ lecturers and ½ practical works. This model was tested in several events in 2013 and found successful. If more than one day event is organised, there should be some study tour or practical work, in which participants can see in practice e.g. fuel sampling at a plant or other fuel quality control.

Training concepts could be more tailored according to the target audience and the target country. This could be done by improving existing modules. Some partners already made tailored material in their own languages.

There were no many requests for face-to-face meeting and in 2013 this was not anymore part of the training events. Some participants contacted the partners after the seminar by email or phone (hotline work) asking some specific questions.

Training concepts are well-working and practical exercise or visit to analysis laboratory should be organised. Training concepts should also include in the experiences from companies participating in WP4 (Implementing standards). This has been used e.g. in Finland in wood chip training event.

Training material will need to be updated after the new EN ISO standards are published, because they will supersede existing fuel specification, sampling and fuel property analysis standards during 2014 and 2015.

Organising training events for fuel quality issues and quality control could also be a good business for some organisations, which have experienced staff on these issues. On the other hand this could limit number and type of participants, because then only large companies can finance this kind of training events.

It is also recommended that universities and universities of applied sciences take into account the standards of solid biomass as a part of their bioenergy training.

## List of training reports

1. VTT – Training report: General training on standards, 21.3.2012, Jyväskylä, Finland
2. VTT – Training report: Training of firewood, 22.3.2012, Jyväskylä, Finland
3. FORCE – Training report: Training of wood pellets, 8.5.2012, Randers, Denmark
4. HFA – Training report: Training of wood chips, 12.4.2012, Vienna, Austria
5. BAPE – Training report: Training of non-woody pellets, 30.5.2012, Bygoszcz, Poland
6. BAPE – Training report: Training of wood pellets, 31.5.2012, Bygoszcz, Poland
7. BAPE – Training report: Training of wood briquettes, wood chips and firewood, Poznan, Poland
8. CZBIOM – Training report: Training of wood chips, 31.5.2012, Most, Czech Republic
9. CZBIOM – Training report: Training of firewood, 17.7.2012, Prague, Czech Republic
10. REGEA – Training report: Training of wood pellets, 20.6.2012, Zagreb, Croatia
11. CZBIOM – Training report: Training on non-woody pellets, 19.9.2012, Prague, Czech Republic
12. NEN – Training report: Training on wood pellets, 7 – 8.6.2012, Utrecht, the Netherlands
13. ERATO – Training report: Training of wood pellets, 18.5.2012, Haskovo, Bulgaria
14. DBFZ – Training report: Training of wood pellets standards, 12.5.2012, Leipzig, Germany
15. ERATO – Training report: Training of wood chips, 27.6.2012, Haskovo, Bulgaria
16. LITBIOM – Training report: Training of wood chips, 30.10.2012, Vilnius, Lithuania
17. DBFZ – Training report: Training of non-woody pellet, 29.11.2012, Leipzig, Germany
18. DBFZ – Training report: Training of wood chips, 20.11.2012, Rottenburg, Germany
19. BAPE – Training report: Training of wood pellets and wood briquettes, Poznan, Poland
20. LITBIOM – Training report: Training of wood pellets, 26.11.2012, Vilnius, Lithuania
21. LITBIOM – Training report: Training of non-woody pellets, 20.12.2012, Vilnius, Lithuania
22. REGEA – Training report: Training of wood chips, 16.1.2013, Zagreb, Croatia
23. HFA – Training report: Training of wood pellets, 14.2.2013, Padova/Legnaro, Italy
24. ERATO- Training report: Training of firewood, 5.3.2013, Sofia, Bulgaria
25. DBFZ – Training report: Training of wood pellets, 4.6.2013, Rottenburg, Germany
26. BAPE – Training report: Training of wood and non-woody pellets, 18.6.2013, Bydgoszcz, Poland
27. VTT – Training report: Training of wood chips, 9 – 10.4.2013, Saarijärvi, Finland
28. HFA – Training report: Training of wood chips, 11.4.2013, Gmunden, Austria
29. DBFZ – Training report: Training of wood chips, 13.5.2013, Leipzig, Germany
30. HFA – Training report: Training of wood chips, 14.5.2013, Bolzano, Italy
31. ERATO – Training report; Training of wood pellets, 28.5.2013, Vratsa, Bulgaria
32. NEN – Training report: Training of general, sustainability, wood pellets, 3.6.2013, Utrecht, the Netherlands
33. REGEA – Training report: Training of firewood, 17.7.2013, Virovitica, Croatia
34. FORCE – Training report: Training of wood pellets, 20.8.2013, Ribe, Denmark

## Appendix 1. Part 5 of feedback questionnaire – Questions about the quality of the training

5.1 What did you learn during this training?

- I am aware of the existence of many more standards for biomass, than I already knew
- I am aware of the existence of a few more standards, than I already knew
- I was aware of the existence of all treated standards, but I learned more about the content
- I learned very much about the content of the standards
- I learned much about the content of the standards
- I learned a little bit about the content of the standards

5.2 Could you please evaluate the items below at a scale of 1 to 5, of which the score of 5 is excellent and 1 inferior

### Content of the training as a whole

- |                            |                          |   |                          |   |                          |   |                          |   |                          |   |
|----------------------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
| Choice of subjects         | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Order of subjects          | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Quality of the material    | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Structure of presentations | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |

### General

- |  |                          |   |                          |   |                          |   |                          |   |                          |   |
|--|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
| Presentation                             | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Organization                             | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Readiness to help                        | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Training location                        | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Catering                                 | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |
| Has this training met your expectations? | <input type="checkbox"/> | 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 |

5.3 Please specify for each question asked, especially if scored 1 or 2?

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5.4 How did you know about the training?