Education and Culture DG
Lifelong Learning Programme
Leonardo da Vinci

Programa de aprendizaje permanente

# PILOT COURSE EVALUATION

# GENERAL REPORT

## BIOTRANSF PROJECT

## 2010-1-ES1-LEO05-21204

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## 1. Introduction: Biotransf project as framework for the development of the pilot course.

One of the objectives of the BIOTRANSF project is the promotion of informal e-learning in the field of renewable energy, in detail in the subarea of bio-mass production and use. Jay Cross (2006) argues that "formal training and workshops only account for 10%-20% of what people learn at work, and that 80% - 90% of our learning takes place outside formal settings. Most corporations over invest in formal training while leaving the more natural, simple ways we learn to chance."

In the most European countries there have been some moves to recognise informal learning. Most efforts have been expended on trying to assess and certify informal learning. There is growing interest in informal learning from the corporate world, driven by the desire to capitalise on the intellectual assets of the workforce, to manage organisational knowledge and in recognition that informal learning may prove a cost effective way of developing competences.

The BIOTRANSF project is the result of a research developed in 2008 by APROEMA. The research was called "Evaluation 360º: professional training for human resources working in environmental management sector". This research was part of a wider strategy for the internal training in environmental companies. The aim of the research was to assess the degree of implementation, quality, appropriateness and level of participation in continuing vocational training of environmental management professionals belonging to APROEMA.

The general objective of BIOTRANSF project is to enhance and innovate the lifelong training of professionals working in the environmental sector, by transferring the experience developed by the project promoter in Spain to other European countries.

The specific aim of the project is to transfer the results and innovations of the e-learning course on biomass production developed by the Spanish promoter APROEMA to the other European partners and develop a new training tool to be implemented in the countries involved in the project.

**2. Context of the course: brief description of renewal energy sector in each country**

The **Polish biomass** market is a currently developing and it concerns mainly forest biomass, which in the future will be replaced by agricultural biomass and waste. Under the current national rules participants on this market can be farmers, agricultural producers, and companies buying and processing biomass and registered in the Agricultural Market Agency.

Currently in Poland, the majority of biomass is used by the individual users who heat their houses -about 1 million houses. Unfortunately, in the light of the applicable regulations, the consumption can not be credited for reducing national greenhouse gas pollution.

The only way to fulfill these obligations is to use the appropriate amount of biomass in power industry. In 2020 share of energy from biomass should be 15% and in 2030 - 20%, compared to the energy contained in coal.

Investments in renewable energy sources are considered to have the lowest degree of investment risk in the long run. Renewable energy sources can be an important part in the energy balance of individual municipalities or even the Polish provinces. It may contribute to increased energy security of the regions, particularly to improve energy supply in areas with poorly developed energy infrastructure.

Probably the biggest recipient of energy from renewable sources will be agriculture and building sector. In regions affected by unemployment, renewable energy sources will create new possibilities for the employment. While, agricultural lands, which, due to heavy contamination of soils are not suitable for growing edible plants can be used for energy crops - for biofuels production.

**In Portugal**, the biomass is the alternative in the immediate future in the sector of renewable energies, since biomass accounts for 12% of the electricity produced by renewable energies in the Portuguese territory. This is like that because the strategic lines for the revision of the 'National Renewable Energy Action Plan' (PNAER) confirms the blow to the policy of the sector carried out by the previous Portuguese Executive. However, while it is true that new investments in renewable have been suspended, the biomass emerges in this scenario as the least affected segment.

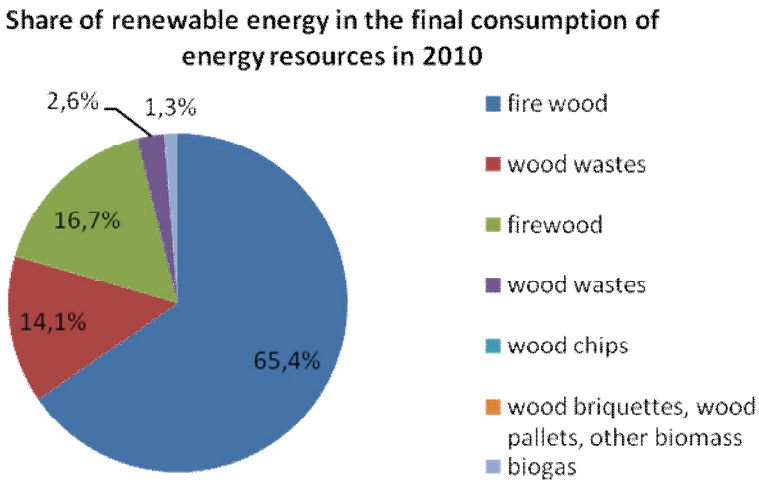
The new guidelines from the Government aimed at the promotion of the production of biofuels and the incentive to energy crops. Even so, the targets for the year 2020 have been revised, from a minimum of 250 MW to 200 MW. On the basis of the 117 MW installed in 2011, the maximum of 200 MW must be reached in the year 2016, without expectations to increase this figure up to the year 2020.

In the scenarios presented in the 'Action Plan', biomass represents a 7 per cent share in the distribution of electricity produced from renewable sources within eight years. The estimations suggest also that renewable energy will be 58% of the total national electricity production in Portugal.

According to the Portuguese Directorate General for energy and Geology (DGEG), with and without cogeneration, biomass - represents around 12% of the electricity produced by renewable energy. The information, published on May 25 this year reinforces the weight of biomass as the third item with higher gross within the set of renewable production, surpassed only by water and wind.

**In Latvia,** Renewable energy comes from natural resources such as sunlight, wind, rain, tides. These resources make Latvia one of the leading countries in terms of specialization across Europe - Latvia has one of the highest shares of energy consumption from renewable sources. According to the data of the Central Statistical Bureau, in 2010 there was a rapid growth in the share of renewable energy in the total energy balance.

Figure 1
Source: Central Statistic Bureau of Latvia




As shown above, the share of renewable energy in the final consumption of energy resources in Latvia in 2010 was 31.7%. It is evident that renewable energy sources take an important place in Latvian energy balance. According to the chart below, the main types of renewable energy in Latvia are biomass (wood) and hydro resources, less than that – wind power, biogas, straw and other kinds of biomass (source: Central Statistic Bureau of Latvia).

Figure 2 and 3 illustrate that share of selected renewable energy sources in total renewable energy sources consumption in Latvia for years 2010 and 2011 changed only slightly. The data of year 2011 are not available yet, but understood from latest researches the volume of the produced renewable energy is continuously increasing. The Ministry of Economics is the one who supervises the energy sector and elaborates the energy policy which aims to ensure energy security through the promotion of renewable energies, increased interconnections and energy efficiency.

EnerCEE.net (energy in Central and Eastern Europe) provides information, shown in Figure 4 below, that in Latvia primary energy production consisted mostly of biomass followed by electricity. Hard coal and lignite make out less than a percentage point of the energy production in the country.

Figure 2
Source: Central Statistic Bureau of Latvia

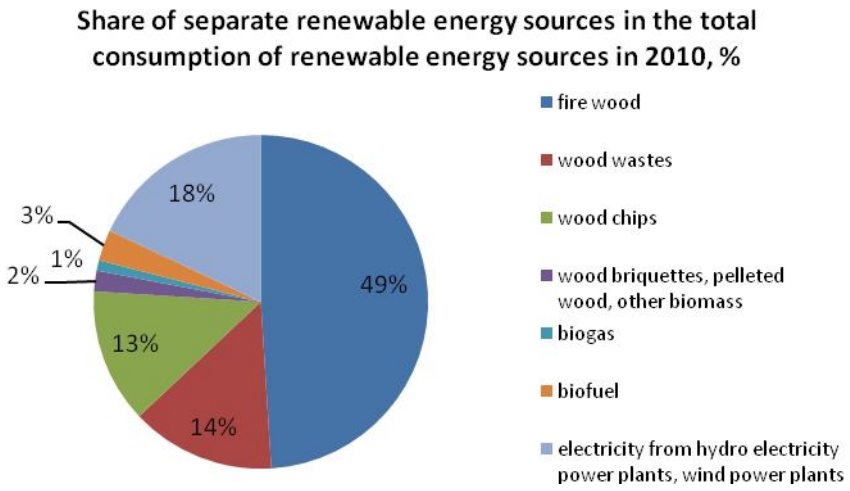



Figure 3
Source: Central Statistic Bureau of Latvia

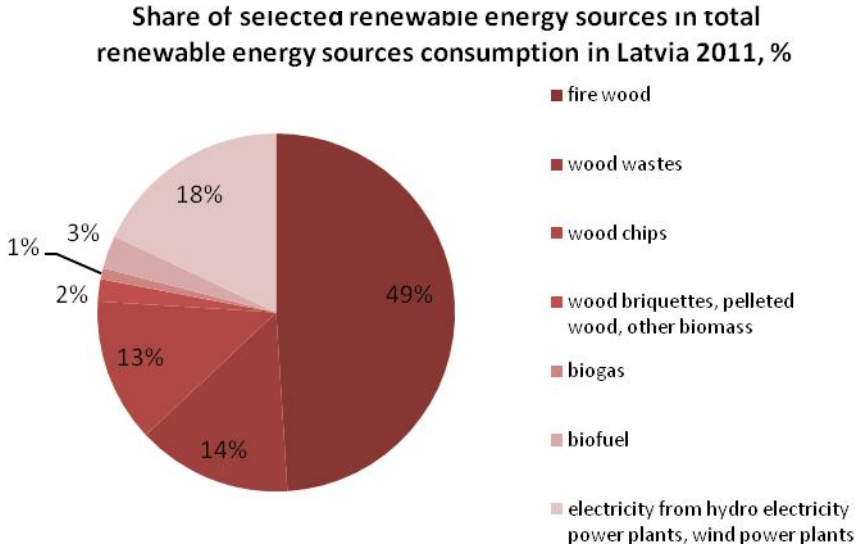
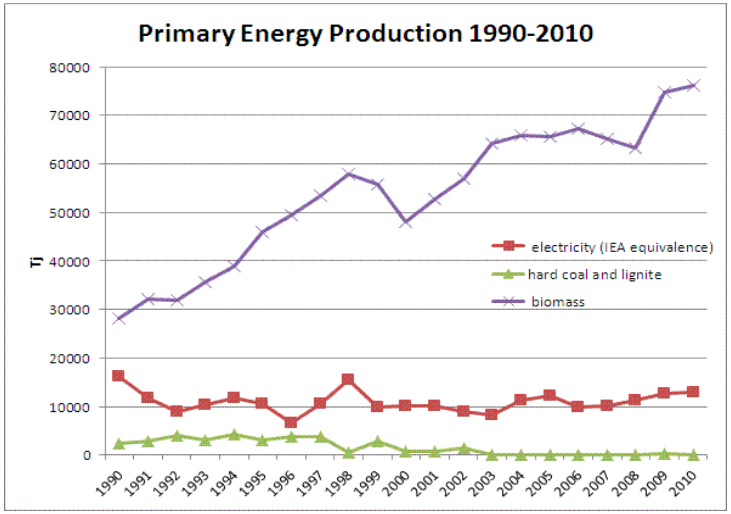



Figure 4 Source: Central Statistic Bureau of Latvia



Biomass is an organic substance from living organisms, possible to turn into energy. It is the most important source of renewable energy so far. However, biomass can be categorized into two groups. Biomass can be processed either into heat and electricity (mostly wood and biogas), or into liquid biofuel. These are different technologies and have different economic characteristic. For instance, liquid biomass is mostly associated with transportation industry and solid biomass with district heating and electricity production. Wood fuel or solid biomass, in particular in the form of wood, is the main renewable energy source available in Latvia - field crop residues, forest residues, wood processing side-products (chips, dusts).

Latvia has long standing traditions in utilization of solid biomass for energy, as it is one of the largest renewable sources in Latvia. 54 % of the territory is forests and 34% - agriculture land. There is a still land area that has not been fully managed and can be used for biomass production, because it includes grains, animal manures and residues and crop residues derived primarily from corn and small grains. Also forest historically has played important role in national economy as it covers more than half of Latvia`s territory and is main solid biomass source in Latvia. 40% low value products such as round wood, woodchip and pulpwood are being exported. (Source: Biomass in Latvia and Perspectives, Department of forest ministry of agriculture, 2001).

The target proposed by European Commission for Latvia is to increase share of renewable energy to 40% by 2020, while in the rest of the Europe this target is only 20%. However this goal can be achieved due to Latvia`s strengths in this sector:

- Huge consumption of renewable energy sources
- Highest electricity consumption from renewable energy sources
- Lowest energy intensity
- Competitive position to export wood pellets
- Highly environmentally clean country

Taking into account all the information given above, researches have shown that Latvia has potential of increased production of biomass. Moreover Latvia can really benefit of biomass use on a national level:

1) Effective utilization of unused land brings possibility to provide employment in rural areas ( up to 10 – 20 000 jobs)
2) Technology and innovation development that can have an influence on whole national economy
3) Less tariffs for energy
4) Reduction of dependence from fossil energy import (lacking fossil resources, Latvia has a high level of import dependency mainly from Russia).

Even though the role and significance of renewable sources in Latvia is increasing becoming the basis for sustainable development of the country, there is still lack of information about the biomass and benefits it can provide. Latvia is a beautiful, green land with clean air, water and soil and many experts have approved it to be a huge nature park, but at the same time relevant sources of literature and information to gain more understanding of its advantages are missing and society are not well-informed about

environmental and economic returns. For this and many other reasons there were several institutions established in Latvia:
Latvian biomass association LATbio *(source: www.latbionrg.lv)* – established in year 2008 as a non-profit organization which aims to:

- popularize usage of local renewable energy recourses in energy production, to achieve higher economical and energetically independence of Latvia;
- spread in public space objective information about availability of local renewable energy sources and usage aspects;
- promote development of scientific works in direction renewable energy and research of optimal harvest technologies.

Latvian Biogas association (LBA) – founded in 1994, it is one of the oldest NGO (nongovernmental organization) which acts in Latvia energy sector and aims to:

- promote society`s comprehension and realize educational events related to alternative energy sector
- take part in development of state policy and regulations regarding renewable energy sector.

Latvian Bioenergy association which aims to:

- popularize the usage of local renewable energy recourses in energy production, to achieve higher economical and energetic independence of Latvia
- to promote the development of scientific works in the field of renewable energies.

To summarize, it is important to highlight that sustainable energy vision for Latvia envisages gradual phase-out of fossil fuels and ensure full switch to renewable energy sources, as well as become CO2 – neutral country. This strategy relies on increase in energy efficiency and on using local available energy sources thus decreasing energy imports (source: "Latvian sustainable energy vision 2050", Latvian Green Movement).

In **Slovenia's** forecast renewable energy meet ca 40% of the country's electricity consumption in 2020. Slovenia is the EU country with the smallest forecast penetration of wind power in 2020: 1.3% of electricity consumption, while the Irish action plan shows wind meeting over 36% of the country's electricity demand. Slovenia has intention to cover its EU renewable energy obligations 6.1TWh (2020) mainly with hydro power 5.1 TWh and biomass 0.7 TWh. According to EWEA's calculations by 2020 wind could cover 6% - 9% of electricity demand. The newly adopted feed-in tariff limiting support to projects of 5 MW and under may be hindering perspectives for wind power development.

## 3. Methodology of the evaluation: quantitative and qualitative analysis and used techniques

General aim of the evaluation of the pilot course was to gather all relevant information about the pilot course to be analyzed in order to asses the achievement of the objectives and outcomes established in the formulation of the project BIOTRANSF.
Specific objectives of the evaluation of the pilot course:

1. To identify the main strengths and weaknesses of the biomass course in order to promote the strengths and improve the weaknesses.
2. To propose useful elements and recommendations to improve development of the activities, contents and the overall quality of the Biomass course.

The methodology for the assessment of the pilot course combined quantitative and qualitative methods.

The quantitative method to evaluate the fulfilment of initial objectives was questionnaire distributed to he participants at the end of the pilot course where they were asked the key aspects of the pilot course.

The qualitative method to evaluate aspects of the pilot course nor collected in the quantitative evaluation was discussion group. Polish trainer had organized three face to face discussions groups (according to participant's availability) whose main aim was to identify strengths and weaknesses of the pilot course. The rest of the partners have developed in deep interviews with participants.

## 4. Description of the course

### 4.0. Content of the course

The Biomass course was divided into two modules which were translated into each language's partners and then adapted to each country participant's profiles by adding information about biomass in Poland, Portugal, Slovenia and Latvia, including examples concerning the legislation from each country. Additionally, the course included literature, links and contacts to portals and institutions involved in biomass production and use.

As concerns usage of the e-platform and online learning tool, practical usage of it was presented and discussed via e-mails, as most of our respondents were from country side and Riga is not easy reachable for them. Our evaluators understood the functions of the e-learning tool very fast and therefore found it convenient to work with. They appreciated simplicity of the online course. They valued the usefulness of our support and immediately turned to us for help if something unclear and confusing occurred.

The structure of the two modules looks as follow:

*Module I – Biomass as a renewable energy source.*

1. Introduction to ecosystems and energy.

2. History of biomass and the use of waste as biomass source.

3. Biomass types and its classification. Waste and biomass source.

4. Biomass characteristics: composition, energy content etc.

5. Biomass and biomass waste exploitation.

6. Environmental aspects about biomass exploitation: waste use, forest sustainable use, etc.

7. Legal aspects about use and exploitation of biomass, specific aspects of biomass waste.

*Module II – Biomass energy exploitation technologies*

1. Introduction

2. Physical aspects.

3. Microbiological processes

4. Thermo chemical processes.

5. Chemical processes.

6. Electricity generation from forest biomass.

**4.1. Number of participants.**

In Slovenia, at the beginning of the course there were 17 participants registered, but just 9 of them have successfully completed the course. The same in Poland where 16 participants has started, finishing the curse just 9.

By country and sex, the number of participants was the following:

| | POLAND | LATVIA | SLOVENIA | PORTUGAL |
|---|---|---|---|---|
| **Women** | 6 | 3 | 5 | 10 |
| **Men** | 3 | 2 | 4 | 9 |
| **TOTAL** | 9 | 5 | 9 | 19 |

By country and level of studies were the following:

| | POLAND | LATVIA | SLOVENIA | PORTUGAL |
|---|---|---|---|---|
| **Master level** | 6 | | | 9 |
| **University Degree** | | 3 | 5 | 10 |
| **Secondary / Professional Education** | 3 | 2 | 4 | |
| **Primary education** | | | | |
| **TOTAL** | 9 | 5 | 9 | 19 |

### 4.2. Duration of the Course.

The duration of the course was of 60 hours and the pilot course was developed between March and June 2012.

### 4.3. Methodology used.

E-learning is primarily a means for distance learning or virtual, where the student can interact with their teachers via the Internet. Also allowing design a schedule of work fully adapted to the student learning which enhances their autonomy. The contents were implemented for the course of biomass on a moodle-based training platform.

Inside remote mode, E-learning is one of the options that currently most often used to meet the need for permanent or continuing education. The generation of non-regulated training programmes is because growing that there is recognition that workers be trained and are adapted to production requirements.

In this pilot course, in addition, to five sessions were scheduled through virtual classroom in Portugal to promote the interaction of the participants of the course and the discussion of doubts, as well as the exchange of ideas.

In a virtual learning environment to not raise a methodology differentiated between theoretical training and practical training.

In this way, the digital content of the course of biomass are designed and developed with the aim of promoting the interaction of students with them, on the basis of the principle of "learning by doing".

The student approaching the syllabus of the course through a series of textual, graphical, animated, audiovisual elements, etc. presented in attractive and intuitive way.

Along with the agenda - that the student may access sequenced or free - includes a number of additional resources for download (articles, videos, literature, documents, etc.) that will serve as additional material to expand the contents treated.

The e-learning mode offers advantages such as allowing a flexible training, adapted to the pace of learning and students available times, being able to perform in from anywhere and at any time.

However, in the case of individual and autonomous learning students need continuous, support and motivation to reduce the feeling of loneliness, address possible learning difficulties and prevent the abandonment of the training action.

Therefore, as a key element of the e-learning methodology, pilot counted on the advice of an expert in the field and in the tutoring staff on-line, guided and encouraged in the learning process from the beginning and until the end of the training to participate actively in the virtual classroom action.

## 5. Results of the course. Analysis of evaluation indicators.

### 5.1. Quantitative approach

From the 42 participants, the results of quantitative approach were the following:

| 1. Organization of the course |
|---|

1.1. The duration of the course was correct.

97,6% of the participants agree with the duration of the course, there were 60 hours of course, it was just one participant that disagree with the duration of the course, considering that it should last more hours.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 27 | 14 | 1 | 0 |

1.2. The course was well organized in advance

All the participants have agreed with the organization of the course and consider that the pilot course was well organized in advance.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 25 | 17 | 0 | 0 |

1.3. The tutor hours were adequate for me.

All participants except agreed with the tutor hours, the tutors were available for participants at any time to solve all the questions.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 23 | 18 | 1 | 0 |

1.4. The dissemination of the course was good.

All participants consider that the dissemination was good, the most part of participants have celebrated meetings and dissemination events with local stakeholders and public authorities before the beginning of the course, for that reason the dissemination has produced a good result.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 19 | 23 | 0 | 0 |

1.5. The way to participate was easy.

Almost all the partners (95,23%) think that the way to participate was easy, all the partners has relation with local stakeholders, so, it was through local stakeholders were they recruit the participants. They use also the website and the meetings, but mainly, it was the focus on local stakeholders.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 27 | 13 | 2 | 0 |

1.6. It was easy to solve administration or coordination questions.

All the participants agreed in the fact that was easy to solve administration or coordination questions in relation to the administration or coordination of the pilot course.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 30 | 12 | 0 | 0 |

1.7. The course was, in general, well organized.
All the participants have considered that the pilot course was in general well organized

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 23 | 14 | 0 | 0 |

| 2. Objectives of the course |
|---|

2.1. The objectives of the course were clear from the beginning.
Just one participant do not agree with the clearly of the course objectives, the rest considered that the objectives of the course were clear from the beginning.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 27 | 14 | 1 | 0 |

2.2. The initially objectives of the course were achieved.

76,20% of the participants considered that the initial objectives of the course were fulfilled but there is a 23,8% of the participants that not considered the achievement of the objectives, in this sense, the qualitative analysis will make clear the reasons why they did not achieve the foreseen objectives. One of the reasons may be because the lack of adaptation to some participants profile.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 21 | 11 | 9 | 1 |

| 3. Contents /methodology of the course. |
|---|

3.1. The contents are adapted to the participant's profile.

26,19% of participants consider that the contents of the course are not adapted to participant's profile, this is the case of some participants from Latvia, coming from the farm's sector, and the contents are not really adapted to this sector.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 14 | 17 | 10 | 1 |

3.2. The contents of the course are developed in deep.

In participant's opinion the contents of the course were developed in deep, in case any participant wants to improve the knowledge, there are links and other documents to do it.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 21 | 20 | 1 | 0 |

3.3. The didactic methodology promotes the active involvement of the participants.

The majority of the participants think that the didactic methodology promotes its active involvement, only three persons disagree with this issue.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 16 | 23 | 3 | 0 |

3.4. The annexes of the course helped to improve the knowledge about the subject.

Almost all the participants agree with the usefulness of the annexes to go deeper under the subject of the course.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 19 | 22 | 1 | 0 |

3.5. The access to e-learning platform was very simple.
The platform is based on a mooddle e-learning platform, so it use to bee very easy the access and the navigation in it, only two participants consider that the access is not very simple.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 29 | 11 | 2 | 0 |

3.6. The e-learning methodology is correct to learn this type of subject.
The e-learning methodology has been tested with different subjects, so, in this case, the majority of the participants consider that the e-learning is suitable for this type of subject.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 21 | 20 | 1 | 0 |

3.7. The presentation of the contents has a good quality.
About the quality of the contents there are different opinions, 80,95% of the participants think that the presentation has good quality, but there is nearly 20% of the participants that consider that the presentation of the contents do not have good quality, in this sense, it is clear that the quality of the content presentation should be improved.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 15 | 19 | 7 | 1 |

3.8. The graphics helped to understand the contents of the course.
The 80,95% of participants think that the graphics helped to understand the content, the rest, 19,05%, do not think that the graphics are useful, in this sense, the graphics will be kept in the tool, as they are useful for the majority of the participants.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 21 | 13 | 8 | 0 |

3.9. The contents were adapted to the training needs of the participants.
19,05% of the participants do not think that the contents are adapted to the training needs of the participants, in this case, it can be due to the heterogeneity of participants, from different sector, for that reason it is very important to select participants from the environmental sector.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 9 | 25 | 8 | 0 |

3.10. I would recommend the course.
Despite some issues that can be improved in the framework of the pilot course, all the participants agreed in the recommendation of the course.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 13 | 29 | 0 | 0 |

4. Direction / Coordination of the course.

4.1. The coordination of the course was correct.

All the participants consider that the coordination of the course was right.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 23 | 19 | 0 | 0 |

4.2. The tutor facilitated the learning.

The most part of participants consider that the tutors facilitate the learning, in this case it is important the commitment of the tutors to make easier the development of the course by the participants.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 21 | 20 | 1 | 0 |

## 5. Overall opinion about the course

5.1. The course will contribute to improve my employment.

This was a very personal question, in which the 85,7% of the participants consider that the course will be useful to improve their employment. We should consider that some of the participants are students that do not have employment in the environmental sector.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 13 | 23 | 6 | 0 |

5.2. With the course I learned new skills and aptitudes.
95,23% of the participants have learned new skills and aptitudes, only 2 persons declare not to learn new skills or aptitudes.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 15 | 25 | 2 | 0 |

5.3. I extended my knowledge with the course in the field of biomass that can improve my career.

As the last question asked, the extension of knowledge to improve the career, 95,23% consider that the knowledge they have obtained can improve their career, only two people consider that the course will not improve their career.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 14 | 26 | 2 | 0 |

5.4. The course will favour my personal development. Almost all the participants (95,23%) think that the course will favour their personal development.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 19 | 21 | 2 | 0 |

## 6. Overall satisfaction degree.

The overall satisfaction degree is considerably high, representing the 92,86% of the participants.

| I completely agree. | I agree | I disagree | I completely disagree |
|---|---|---|---|
| 26 | 13 | 3 | 0 |

### 5.2. Qualitative approach

The qualitative approach in Portugal, gave the following results:

The first approach to the evaluation of the students on the course was qualitative, through the talks that took place in the subsequent interviews to the completion of the course and of the informal talks prior to the beginning of the face-to-face sessions. In these interviews, always promote communication and establish a dialogue about expectations and impressions that the students had during the pilot test was sought informal and open character.

In general, the result of interviews is very positive, the course participants are the subject of very interesting in bioenergy and with enormous economic potential, some of them aware of the situation in Portugal was more accurate on this matter. Thus, the assessment on the importance and need for this type of training was unanimous and even expressed their interest in continuing to work with future proposals on renewable energy.

Another issue that was addressed in interviews is that they seemed to them the contents of the course, and once again they agreed on the quality and relevance of the same, the contents are treated in a clear way and with sufficient depth and, in addition, to providing other materials and links to continue learning.

Also asked about the e-learning training model and on the work of trainers/tutors, in what the views varied, but always in a positive scale relevant to an edition of the face-to-face mode and the positive side of the e-learning training course on. About tutors all opinions agreed that their profiles were most suitable for this kind of training.

In relation to the presentation of contents, there were fewer consensuses, since while some students expressed the need to improve further in the use of some tools or integrate the exercises; others were very satisfied of the result. Although, in general, all agreed to recommend more durability for the course.

During these interviews were obtained information about the backing e-learning material, and virtual support classes, since all pilot students actively participated in them and very positively assessed them.

It is noted that there was a general interest in the international dimension of the project and they cast missing interaction with students from other countries. In this sense, it should be explored how to take advantage of the participation of students of different nationalities and how to make them collaborate with each other.

Another aspect to enhance is the course activities such as visits or talks with professionals who are involved in the theme of renewable energies.

In Slovenia, by analyzing the qualitative questionnaires, we found that the participants of the on-line course were satisfied. According to the answers the biggest advantage in the process of the course had been its flexibility as that the participants could access to the on-line platform for the implementation of the course regardless of the time of day. With the course the participants have gained the new skills and specific information for efficient use of biomass in the future. Some of the participants will use the new knowledge on biomass even in their professional life. Many of them have started the think of the new way for the future, for example: woodstove, pellet stove, and even wood-burning cooker. Some of them will use the new knowledge for the professional purpose and in order to apply for the different calls for proposals on the Green energy topics.

Strengths:

- Flexibility of the course

- Course free of charge
- Unlimited number of participants
- Quick transfer of information

Weaknesses:

- participation on the course only in case of interest in this specific topic
- no personal contact between participants and tutor
- lack of examples (for example: presentation of the pellet stove, etc.).

The answers given to the qualitative questionnaire were the following:

| QUESTION | OPINIONS OF PARTICIPANTS |
|---|---|
| **1. Did you something miss, during the implementation of the course (practical themes, different topics)?** | 8 participants didn't miss nothing, 1 participants missed more practical cases. |
| **2. Witch part of the course was more interesting and less interesting for you? Why?** | - for 2 participants the best were good practises<br>- for 3 participants agree that the most interesting part was the lecture<br>- for 1 participant the most interesting part were practical cases<br>- for 1 participant the most interesting part was topic<br>- for 1 participant the most interesting part were topic and practical cases<br>- for 1 participant found everything interesting |
| **3. Did you missed something in the on-line course? Did you have a problems with a communication?** | All participants agreed, that they didn't miss anything. |
| **4. How do you intend to use the knowledge about the biomass in your career?** | - 5 participants don't know jet<br>- 3 participant will use the knowledge, for organisation of workshops for entrepreneurs<br>- 1 participant will use the new knowledge for implementation of the project ideas |
| **5. How could you transfer the receive knowledge into a practice in your local area?** | - 1 participants don't know jet<br>- 4 participants will use the received knowledge in their home: one will use wood stove, second will use pellet stove, third will use wood and pellet stove<br>- 2 participants will transfer the received knowledge |

| | |
|---|---|
| | to a neighbours<br><br>- 1 participants will transfer the received knowledge to a colleague |
| **6. What kind of topics are you interesting in, regarding the biomass?** | - 2 participants don't know<br><br>- 1 participant get enough information's during the on-line course<br><br>- 2 participants are infesting in wind energy<br><br>- 1 participants is interested in small hydro power plants<br><br>- 2 participants are interested in production of energy with using pressure of the people walking on the carpet (special designed) for electrify, producing by force of the people walking on it |

In Latvia, the first question inquired what was missing in the biomass course - exercise, subject, content, topics, etc. One respondent stated that the layout of the e-learning course was not clear; meaning that in order to read the whole text it requires rolling the screen. More examples of Latvian experience would be necessary, for example, what is present situation in biomass area in Latvia, how and how much biomass is used in Latvia and what produces it. Also the respondent suggested that it would be nice if material can be available to print, because sometimes it is easier to read long texts in printed version than hold attention to the screen. Other respondent agreed that more practical examples would be necessary, for example how biomass is used in various areas, etc. However, another respondent stated that course is appropriate and do not miss anything. For example, one respondent who is an expert in this field and has an experience in this field considered the material too theoretical without practical information about current processes and development. He/she suggested hiring the expert of the field to audit the material before publication and to improve translation quality of the text. Another respondent who claimed not be an expert in biomass field stated that examples of Latvian experience and general characteristics was missing in the course materials.

Concerning the most interesting part of the course that fulfilled expectations of the respondents and the least interesting part of the course, the answers varied. One respondent liked mostly how biomass types and their characteristics and environmental aspects of biomass utilization – waste treatment, the use of sustainable forests, etc. were described. These things appealed to respondent because they are related to his/her work. Another respondent considered the introductory part of the course as the most interesting one, because all the used notions were plainly explained. Other respondent viewed that examples and animated man who showed the way how to move slides were the most interesting. Concerning the least interesting part of the course, one respondent considered the introduction as the least interesting part due to the number of long texts. Another respondent has a different view – he/she stated that the least interesting part of the course was legal aspects of the use of biomass, whereas another respondent considered chemical formulae as the least interesting part of the course. The respondent who is an expert in this field considered the material interesting, despite the lack of systematic layout and expert point of

view. Another respondent said that too much and too detailed chemical compositions were not necessary and tiring for adopting the information.

The third question inquired what was missing in the communication forum and which difficulties respondents faced. There is impossible to collect data because all the respondents did not use the communication forum.

The next question dealt with future plans of the respondents - How are you going to use the knowledge of the course in your professional life\ career? For one respondent to some extent job is related to this field and during the course he/she got acquainted with things with which he/she had not dealt before. Another respondent stated that he/she will not use the knowledge because his/her job is not related with biology and chemistry. Other respondent stated that he/she will use this knowledge while working in agriculture and in wood. The respondent – expert stated that there was nothing new in the materials, except information about the situation and current problems in Spain. Another respondent considered that he/she does not plan to invent new activities in ones farm.

The next question dealt with suggestions for implementation acquired knowledge in community in terms of energy efficiency/use of clean energy like biomass. One respondent stated that this course was very interesting for people who are biologists and think about nature protection and 'green life'. Another respondent also suggested this course for persons who are interested in this field.

The last question was opened for suggestions – what other topics respondents would like to develop related to renewal energies. One respondent suggested adding materials about the use of biomass residues. More specifically, about burned ash wood chips, what to do with them next, where you can still use them. Other respondents had no suggestions. The respondent – expert would like to have information about modern technologies and practical solutions included in the material. He/she suggested including less theory in the material. Another respondent was interested in learning materials for children in order to make them to think 'green' and to take care about future.

In Poland, the results of the qualitative assesment were the following:

| **QUESTION** | **OPINIONS OF PARTICIPANTS** |
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| In your opinion, what was missing in biomass course (exercise, subject, content, topics, etc.)? | Generally, speaking course suit me very much and met my expectations on this issue, but I lacked a general introduction to the subject and its use in everyday life and the need for wider dissemination of this knowledge in society because I think that this is the future in the use of these resources. Also could enrich and diversify course by lab exercises or quizzes.<br>I think the proposed course met my expectations in terms of the use of biomass as an alternative energy source.<br>Course met my expectations and requirements and in my opinion there is not anything missing, the issues, content are very important and interesting, presented in a clear and |

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| | understandable form.<br><br>In my opinion proposed course was very well organized, the only thing that I missed was more practice or exercise.While the substantive content and the subject really suit me and that I was able to attend classes when I had free time.<br><br>The course included a lot of useful information and links. I would like to learn more about situation in other countries as we are interested in international cooperation.<br><br>I would include more interactive exercises. The topic was well described.<br><br>In my opinion, the course was extensive concerning biomass issues with a lot of links and related websites and I recommended to my colleagues at work. I would be also very happy to participate in other online courses with related topics-renewable energies.<br><br>I would prefer less text on a page so it would be easier to read.<br><br>I think the subject of biomass was very well covered in this course. I missed more examples of biomass use and production. Good examples from other countries can be transferred to Poland. |
| In your opinion, what was the most interesting part of the course that fulfill your expectations? Why? What was the least interesting part of the course for you? Why? | Types of biomass and its classification. Waste as a source of biomass – in my opinion was most interesting part of course , as it gave me necessary knowledge in this subject and related issues. As we all know the traditional resources are limited and in the future we will have to consider the green energy as a normal and as popular and common as traditional energy is right now. What is more important should be increased efforts to popularize and disseminate knowledge on renewable energy sources because it has a positive impact on the environment.<br><br>The course was designed so that each part resulted from the previous one and constituted compact unit.<br>For me most interesting part of the course , according my opinion, was topics relating to legal aspects of the use and exploitation of Biomass and Specific aspects of biomass waste, because I could use them at work and of course will improve and facilitate my work.<br><br>The course was designed so that I have not found in any part could be considered unnecessary or redundant. The proposed structure and content of the course were all concise and fully |

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| | satisfied my expectations.<br><br>I think the course and every section are closely linked and are mutually supporting, so each part included in the whole curriculum, and relating subjects were needed and fully discussed.<br><br>I personally liked the most part on the environmental aspects of biomass exploitation, as in the future I want to work and deal with issues relating to a wide range of environmental protection.<br><br>For me as a student, the most interesting part was environmental aspects of exploitable biomass: waste management, sustainable use of forest resources, and other related topics included in the whole course, because I will use this during my study at University and what is more important personally for me, participation in the course expanded my knowledge and expertise in this area and has increased my awareness of the possibilities offered by our application and use of renewable sources of energy for the whole economy and the environment.<br><br>I think the course was well designed and fully corresponds to my needs and expectations, at this stage of my professional career. I do not have the impression that it was lacking something or was dropped.<br><br>The course was interesting and thanks to elearning idea I could study anytime I wanted. I admit I have omitted some parts which were not interesting to me, like legislation. |
| What was missing in the communication forum? Which difficulties did you have to communicate? | I did not have any problems with communication.<br>I have no objections in terms of communication, everything worked perfectly during the entire course.<br><br>Communication worked very effectively, and easily.<br><br>For me , valuable benefit of the proposed course, was its form, I mean e-learning, and use of the materials whenever you want. I had no problems with communication or with access to the platform.<br><br>I did not have any difficulties in communication with the trainer or accessing the course. It was very easy to navigate.<br><br>No problems.<br><br>I had no problems with communication or navigation thru the course. |

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| | I did not noticed any problems with forum.<br><br>No problems. |
| How are you going to use the knowledge of the course in your professional life\ career? | This knowledge will be an excellent addition to my already existing knowledge, broaden my horizons with new concerns and let me know what is the situation in other countries in the use of renewable energy. as a consequence provides tangible help to my work and the satisfaction of customers using our services.<br>Knowledge gained on the course I could greatly use at work, in particular topics relating to regulations in the European Union regarding the possibility of using, in the member countries, renewable energy sources and related topics.<br><br>Still not working( third-year student), but certainly the knowledge gained during the course will be useful the future and especially in applying for a job.<br><br>Currently still studying, but in the future, certainly the knowledge and skills gained during the course will positive influence on my work and increase my chances for employment.<br><br>I am not sure how I am going to use the knowledge at work but it will be very good for my resume. Every experience like this is excellent for my future professional life.<br><br>I work as an expert in this field so this course was interesting as additional material. I can recommend it to my employee. It always good idea to broaden our knowledge.<br><br>I am not sure yet.<br><br>I do not know. I would say practice is everything. But it was useful as I am interested in reading professional material.<br><br>Difficult question. I already have a lot of experience in this field but I can always use more theoretical knowledge. Good examples are always interesting to me. |
| What do you suggest to implement your knowledge in your community in terms of energy efficiency \ use of clean energy like biomass? | In the future I want to change the way of heating my home with the traditional use of wood and coal fuel to the possibility offered by the application and use of biomass energy.<br>The scope of my duties included the knowledge of the regulation and tracking of innovations in the energy market to be a competent and professional way advisor to recommend the best |

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| | solutions to our customers.<br><br>I am very keen on all matters relating to the protection of the environment and definitely will use the knowledge acquired during the course in a practical manner by changing some habits and customs, and promoting and instigating people in my surroundings the use of renewable energy sources that can contribute significantly the expenditure savings consumed energy.<br><br>Currently very popular is the use of renewable energy sources and use them as alternatives to conventional sources of energy, with which I completely agree, because has a positive effect on the environment in which we live and improve our living conditions and the ability to make choices and savings in payments for consumed electricity.<br><br>Alternative energy sources are must have in the near future to save our planet. I am sure I will use renewable energy solutions while building my house.<br><br>As an expert in renewable energy systems in building sector I always try to convince my clients into using renewable energy to safe the envoronment and money.<br><br>Since I am a student working in environmental sector I am sure I can use this knowledge how to replace existing traditional fuels with renewable energy systems.<br><br>I already use renewable energy solutions in my house and courses like this can give me beeter idea what else to change in order to safe environment and living conditions.<br><br>I do not know yet how I will use this knowledge learned in this course. |
| What other topics would you like to develop related to renewal energies? | I think that any other related topics would be very beneficial and interesting especially those relating to the improvement of everyday life and environmental protection.<br>For me as an advisor any additional knowledge and skills related to renewable energy would be greatly appreciated. But in my private life I might also deepen my knowledge about topics related to biofuels and their use on a large scale as an alternative to very expensive liquid fuels.<br><br>For me, key importance, have all issues relating to new and innovative energy sources and in particular their use in large-scale in heavy industry because it is a huge contributor to |

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| | pollution and environmental contamination. I would gladly take part and deepened my understanding of the practical use of solar energy (solar panels) and wind power and water.<br><br>Looking at the overall situation in the market of fuels and energy sources and levels of consumption in developed countries, it seems reasonable to promoting and publicizing all matters related to the widespread use by the public of renewable energy resources.<br><br>I am interested in renewable technologies like wind turbines and solar PV and heat pumps for farms and large houses. I think we have a good market for it in Poland.<br><br>Designing renewable energy systems, energy analysis, equipment specification.<br><br>I am interested in learning more about installation of the renewable energy systems so it is safe.<br><br>For me, it is interesting to learn more about benefits of solar thermal systems as one of the cheapest renewable energy.<br><br>Renewable energy solution for houses and businesses like solar photovoltaic panels, solar thermal panels, air source heat pumps, etc. |

## 6. Conclusions and lessons learned

Biomass systems can reduce waste energy from 66% to 25% compared to traditional fossil fuels meaning a significantly smaller amount of input material (biomass) is used, therefore having a positive effect on the global environment and use of fuel. In addition, modern biomass systems utilise biomass sources such as energy crops with a 1 year lifecycle, meaning that (carbon) emissions are able to be recycled within 1 year following their emission – considerably better than the millions of years needed to recycle coal or nuclear materials. The same modern biomass systems use filters. These filters capture carbon and other pollutants before they enter the atmosphere. Thus in the biomass lifecycle, the pollutants are captured by trees and crops, they are burnt, pollutants are captured and less are released back into the environment. Any pollutants released are then re-absored by trees and plants. Consequently, each burning cycle can significantly lower the amount of pollutants in the atmosphere and the biomass unit acts like a large cleaning unit for the planet.

According to the analysis of the post training questionnaires, the main conclusions are:

1. The overall quality of the pilot course met the expectations of the participants. All participants agree that the main objectives of the pilot course were achieved. All participants would recommend this course to others renewable energy experts or students.
2. The quality of elearning platform and access to the course as well as tutor work were evaluated positively by the participants. All participants indicated their positive overall satisfaction from the participation in the course.
3. Almost all participants indicated that they would like the course to be more interactive.

In what concerns the program content we underline two dimensions:

1. All participants strongly agree that the pilot course provides useful information, which is relevant to their needs. This point is extremely important since the interest on the pilot course is directly related to the participant's job. Finally, there is a strong link between professional activity and daily work routine of respondents.
2. Majority of participants indicated that they would like to learn other topics on renewable energy, especially those linked with practical use.

## 7. Recommendations for the improvement of the Biomass Course.

Pilot participants who studied the course in depth were encouraged to submit their ideas how to improve this course. We received some useful feedback, as respondents followed the course attentively and with interest and shared their comments and thoughts about the online learning material openly. One respondent directly related to renewable energy sector, recommended upgrading the online learning material, stating than he/she came upon lack of accuracy when terminology of this field was used. Other respondent mentioned that according to his/hers experience it was hard to receive all the information fully, as relation between theoretical and practical information was not of equal value and mostly theory instead of practical information was provided in the material. This pilot participant also notified that he/she would much rather gain significantly higher practical knowledge due to participating in the course. However another respondent suggested adding materials about the use of biomass residues. More specifically, about burned ash wood chips, what to do with them next, where you can still use them. The respondent – expert would like to have information about modern technologies and practical solutions included in the material. Another respondent was interested in learning materials for children in order to make them to think 'green' and to take care about future.

But if to analyse the quantitative questionnaire that was filled by our pilot participants, some suggestions can be found, judging from their answers:

- Materials should focus on all people who are interested in nature protection and 'green life', instead of just professionals
- The content has to fulfil the training needs of the participants – deeper research of needs
- Respondent suggested that it would be nice if material can be available to print while long text is not convenient to read from computer's screen
- Add more practical information about current processes and development of renewable energy sector to the materials provided in *Biotransf's* e-platform
- The graphics should attract people to pay attention to presented materials

To sum up, evaluators found online learning course on biomass production very useful and were thankful for the possibility to participate in such innovative project. Surely, there is always room for improvement regarding various needs of people interested in the subject of Biotransf project; nevertheless overall satisfaction degree among our pilot participants was high.

It is impossible to evaluate online learning in an unequivocal way. It has both advantages and disadvantages. It is most important to balance traditional methods and the more modern options, and learn to benefit from both of them.

Based on the questionnaires here are the recommendations from the Polish evaluations:

1. The e-learning course should be more interactive to keep the participants interested; participants indicated that they would like more good examples, exercises, quizzes, practical examples, etc.
2. The graphic layout should promote less text on a single page so it is easier to read; While creating an on-line course particular attention should be paid to its syllabus and the contents of

materials included in it, as an overloaded syllabus and excessively elaborate course materials provided to course participants may discourage them at the very start from further participation and from taking a closer look at the suggested issues and course modules.

3. Most materials were presented in a concise, clear and easy to understand manner. Based on factual knowledge, they were divided into adequate subject sections, supported with interesting examples, and presented by means of interesting graphic layout;
4. Participants stated their interests in participation in other e-learning courses concerning renewable energies and their use.