Executive summary:

1. Executive summary

BIOCLUS objective was to boost the regional competitiveness and growth in five European cluster regions: Central Finland, Navarre (Spain), Western Macedonia (Greece), Slovakia and Wielkopolska (Poland). The BIOCLUS clusters locate in the rural regions and all possess great biomass resources such as forests, agriculture, industrial and agricultural by-products as well as municipal waste. Therefore, the regional research driven clusters aim to improve the RTD activities and innovation systems. Furthermore, the biomass resources offer great possibility to BIOCLUS regions in economic and social terms.

The project promoted collaboration and integration of cluster regions and strengthened the innovation environment by improving research potential and innovation management. Besides, the project supported sustainable development by improving the use of biomass resources. The development was achieved by

- Promoting scientific, strategic and business competence at cluster and consortium level
- Developing collaboration capabilities in the clusters and consortium level
- Improving innovation to business environment by mutual learning and by mentoring

In BIOCLUS project the cluster regions carried out strategic work in the regional research driven clusters with the focus of sustainable use of biomass. It consisted four major phases:

Production of the Strategic Regional Research Agendas (SRAs) (WP2)

SRAs were produced in cooperation with the regional cluster members including research entities, business entities, authorities and other entities. The focus was in biomass related research activities. The cluster region provided also following background work for SRA production

- Analysis of biomass production and use
- Analysis of biomass potential
- Analysis of biomass related research resources, facilities and education
- Analysis of regional innovation management
- Mapping of regional environment; legislation, strategies and policies (energy, environment, land use, sustainability)
- Analysis of business potential; Research and business point of views (2 SWOT analyses)

Production of Joint Action Plans at cluster and consortium level (JAPs) (WP3)
The cluster regions produced the Regional Joint Action Plan to provide a road map for the cluster development the strategic target by 2020. The consortium level JAP recognized the research related actions of the Regional Joint Action Plans that were common at least for two cluster regions.

Cluster capacity building and networking (WP4)

The JAP has been facilitated by capacity building activities. The clusters have strengthened their expertise and competence and improved their regional and transnational collaboration. The project has introduced to the key-stakeholders new co-operational models and practices. Besides, the clusters have supported mutual learning and exchanges of experience and best practices between regional actors.

Innovation environment development (WP5)
The cluster regions analysed their existing innovation systems and identified the improvement needs. Some regions focused in the general innovation system development and some regions in research related innovation system development. The regions had great opportunity to improve their system by learning by benchmarking visits and by promoting and learning best practices and by mentoring process.

Project Context and Objectives:

2. A summary description of project context and objectives

BIOCLUS objective was to boost the regional competitiveness and growth in five European cluster regions: Central Finland, Navarre (Spain), Western Macedonia (Greece), Slovakia and Wielkopolska (Poland).

The project has promoted collaboration and integration of cluster regions and strengthened the innovation environment by improving research potential and innovation management. Besides, the project has supported sustainable development by improving the use of biomass resources. The development was achieved by:

- Promoting scientific, strategic and business competence at cluster and consortium level
- Developing collaboration capabilities in the clusters and consortium level
- Improving innovation to business environment by mutual learning and by mentoring

The BIOCLUS research driven clusters locate in the rural regions and all possess great biomass resources such as forests, agriculture, industrial and agricultural by-products as well as municipal waste. In general, biomasses are challenging raw material. The utilization chains require special technical and practical competence as well as applications. The global trend is that renewable resources are replacing non-renewable resources. However, the use of resources should be efficient and sustainable. Therefore, the regional research driven clusters aim to improve the RTD activities and innovation systems. Furthermore, the biomass resources offer great possibility to BIOCLUS regions in economic and social terms.

The biomass related businesses have great influence in the regional economies in the cluster regions of BIOCLUS project. Every region has unique operational environment but the challenges are common.

Before the project the regions had recognized following development needs:

- To promote the co-operation between the regional actors
- To create the regional level strategy for sustainable biomass use
- To improve the research environment & activities in regional and international level
- To develop the innovation related activities by benchmarking and mentoring partner regions

All clusters have strong research, development and training resources and tradition. However, in the future all human and natural resources should be used more efficiently and in as sustainable way as possible. This offered possibilities and challenges to BIOCLUS consortium.

BIOCLUS provides regional benefits in environmental, economic and social terms. It develops the innovation system and increases the competitiveness of the BIOCLUS regions. It supports the European research area (ERA) and creation of European research networks in the field of biomass resources related sciences and supports sustainable and multi-functional use of biomasses. BIOCLUS enhances the comprehensive

understanding of regional biomass resources and promotes development, co-operation and integration of BIOCLUS cluster regions in the field of biomass resource related activities and innovation commercialization.

The biomasses are regional resources. Typically growing, harvesting and processing are regional activities and provide employment. The biomass related industries and small and medium-sized entreprises (SME) have favourable development drive due to improved innovation platform. The links between the regional authorities, RTD entities and regional businesses are strengthened and the creation of European research network facilitated. The collaboration is utilized in development of the regional level strategic research and development agendas (SRA) that support sustainable and multi-functional use of biomasses. That promotes the ecological, economic and social development in biomass resource utilization.

BIOCLUS measures

The starting point for Regional Strategic Research Agenda (SRA) process was the comprehensive understanding of regional biomass resources and operational environment.

Therefore the following analyses were produced at regional level:

- Analysis of existing innovation environment including financial opportunities
- Analysis of the business potential in the field of sustainable use of biomass resources
- Analysis of biomass production, processing, logistics and use
- Analysis of regional biomass potential
- Analysis of existing research and development resources and activities
- Mapping the operational context, e.g. regional, national and European legislation and initiatives
- SWOT analysis from the perspectives of RTD and the regional economy

The SRAs support expertise development and cooperation in the regional research-driven cluster. They identify the future regional research focuses and support the authorities in directing the use of human and financial resources.

These strategic research areas are defined in terms of concrete steps, priorities and development action in the Regional Joint (Research) Action Plans.

The Joint Action Plan 2020 defines how to support regional development, co-operation and integration of the research-driven cluster in the field of sustainable use of biomass resources. Regional research and development organizations in cooperation with the regional authorities and companies have selected the development priorities. The starting point has been to identify the means how to create higher export earnings for companies as well as support regional business development and thereby increase the competitiveness and well-being of the whole region. Companies in Central Finland consider that the selected development priorities will generate business value-added in global markets.

The SRA development and the production and implementation of JAPs offer new opportunities for the regions involved. They strengthen their regional research-driven clusters by increasing the expertise, helping

the clusters to apply EU research funding, and by offering a channel to actively participate in regional, national, and European networks.

Regional Strategic Research agendas support regional research related capacity building and improve cooperation at regional and European level. The regional biomass related research focus of BIOCLUS regions by 2020 are introduced in the following:

Central Finland
- Biomass combustion
- Biomass supply chains
- Biomass refinery
- Sustainability assessment
- Product and service development

Wielkopolska
- Biogas technologies
- elaboration for small size units
- Region accommodation to climate changes (drying)
- Biomass yield increase
- investigation with LCA use

Western Macedonia
- Development of Knowledge Based Economy
- Investigation of Combustion processes
- Regional adaptation to climate changes
- Development of Irrigation systems
- Development of Wildfire prevention systems

Navarre
- International and regional cooperation
- Bioenergy in woodland and farmland: Logistics, traceability, quality standards, biomass
- sustainability and 2nd generation biofuels.

BIOCLUS project offered an extraordinaire opportunity to facilitate the regional research driven cluster development. During the project the partners implemented capacity building, competence promotion and networking. The project organised five international study tours (Agrobiomass logistics, Energy crops and their co-firing potential, Forest biomass production and energy production, Biomass study tour, Agrobiomass cofiring targeting high efficiency for CHP) and JAP facilitation workshops (Agrobiomass logistics, Cofiring of herbaceous biomass , Forest Biomass use in energy production , Sustainable Use of Biomass, Agrobiomass cofiring targeting high efficiency for CHP) for biomass professionals with background in research, development and training, large number of events for peer entities, for authorities and for public, many expert exchanges at cluster and consortium level. Besides, the clusters built their capacities by participating in the seminars, conferences, study-tours, workshops and other events at regional, national and international level. These activities supported strongly the strategic work as well as initiated the joint actions of the cluster regions and the consortium of five European regions involved in the process. The project promoted activities targeting in further research and development, training and innovation cooperation.

The cluster regions analysed their existing innovation systems and innovation environment as well as recognised the improvement needs. Some

regions focused in the general innovation system development and some regions in research related innovation system development. The regions had great opportunity to improve their system by learning by benchmarking visits in two successful regions (Michigan Keweenaw area and Styria, Austria) and by promoting and learning best practices and by mentoring process.

Impacts of BIOCLUS

The partners have intensive three year period. The first half was concentrating in the regional strategic works. The second half has been JAP facilitation by concrete action improving the research capacities and networking. The cooperation will continue in forms of the joint actions that have been initiated during the project and have become possible due to BIOCLUS contacts. Besides, the new cooperation opportunities are under consideration. The additional value for BIOCLUS cluster has been analysed at European, regional, organizational and personal level. In practice the Steering Committee meeting it was decided that the consortium will get together in autumn 2013 along the international bioenergy conference organized in Central Finland. The consortium will continue the cooperation in many fields.

The surplus value of BIOCLUS project at regional level, organisational level and personal level is introduced in the following:

Regional level
- Supports regional strategic work
- Joint strategic view of regional key actors
- Useful analyses about biomass resources
- Activation of innovation systems
- Increased cooperation in the field biomass
- Stronger capacities for biomass R&D&I activities

Organisational level
- JAP facilitation cooperation
- Supported expertise promotion of staff
- Growth of regional and international networks
- Increased interaction of triple helix actors
- Seventh Framework Programme (FP7) Learning process

Personal level
- Great opportunity to increase expertise – also at practical way (e.g.personnel exchanges, competence promotion)
- Wider personal networks
- Further knowledge about partner regions operational environment and organisations
- Intercultural skills developed

Project Results:
3. A description of the main S&T results/foregrounds
In this section the key activities of BIOCLUS are described and the results and impacts are introduced. The further information is available e.g. in the project website: http://www.bioclus.eu.

3.1 Results of Strategic Research Agenda process (WP2)

The objective of WP 2 'Analysis of State of Play and Creation of Regional Strategic Research Agendas' was to produce regional level Strategic research and development agendas (SRA) for sustainable and multi-functional use of biomasses. Operational environments of BIOCLUS clusters were analyzed and two SWOT analyses for each cluster were provided. The aim of tasks was to facilitate the creation of European research network between the BIOCLUS regions. The research and development agendas were based on comprehensive understanding of regional biomass resources. SRAs facilitate the success and strengthening of BIOCLUS regions.

The main objectives of this WP were following:
- Committing the stakeholders
- Analysing the operational environments of RTD and business activities in the BIOCLUS cluster regions
- Producing SWOT analysis of BIOCLUS clusters
- Producing Strategic research agendas for each BIOCLUS region
- Providing the basic information to create the European research network for the BIOCLUS clusters

The work package was coordinated by ITP. The WP coordinator assisted the BIOCLUS regions by facilitating working methods by leading the work and by producing templates for analysis, mapping, SWOT analysis and SRAs. The regional coordinators (CENER, NFC, CERTH) of each BIOCLUS region carries out the tasks of WP2 and is supported by regional partners and key-stakeholders, except in Finland project partner VTT had the main responsibility for this task and other partners support VTT in its work. In Finland biomass resources and use study was published in 2009 and updated in 2012.

The key-stakeholders were committed in the BIOCLUS cluster development work at this phase. The successful implementation of Joint Action Plans (WP3) is possible only if the essential stakeholders (such as companies, financiers and public authorities) are committed to the objectives.

The work package was formed two main tasks that provide back-round information for Regional Strategic Research Agendas (SRAs). This workpackage also provided the basic data for WP 3 (Joint Action Plan – from Planning to Action), WP 4 (Capacity Building) and WP 5 (Improving Regional Innovation Systems by Benchmarking, Mentoring & Mutual Learning).

According to Quality Management evaluation process the regional Strategic Research Agendas were evaluated to be excellent. It was also evaluated that ''The content of regional SRA's are seen as very useful for the development of JAP.''

Background information for SRA production
For SRA production following analyses and mapping were carried out:

a) Analysis of existing innovation environment including financial opportunities

The sub-task was closely related to the sub-tasks 2.1. b) Analysis of Business potential in the field of sustainable use of biomass resources and 2.1 e) Analysis of existing research and development resources and activities. Regional innovation systems include the producers and users of new information, knowledge and know-how and the various ways in which they interact. Better science, technology and innovation policies can ensure a balanced development of the regional innovation systems and strengthening cooperation within them.

b) Analysis of Business potential in the field of sustainable use of biomass resources
In this sub-task the aim was to identify the business potential in the field of biomass resources in BIOCLUS regions. In the cluster regions there are variety of the companies using biomass resources. However, there are still some biomass resource potentials that are not efficiently taken in use. Especially the resources that are presently identified as wastes from industrial and agricultural processes should be considered for further refinery. That would support strongly sustainable waste management and save natural resources when replacing some products produced of virgin raw materials. Also some new markets could be invented. This can provide some new financial tools too. Therefore the development activities should consider these new business areas and support their further development.

c) Analysis of biomass production, processing, logistics and use
In this sub-task the present use of biomass resources was analysed. It is closely related to the sub-task 2.1 d) Analysis of regional biomass potential. The production, processing, logistics and use of biomass resources are analysed in ecological, economic and social terms.

d) Analysis of regional biomass potential
In this sub-task the existing biomass potentials were analysed. In the BIOCLUS regions there are great biomass resources, for example following:

- Wood and other woody biomass from wood processing industry
- Herbaceous biomass from arable land
- Residues and by-products of agriculture
- The municipal solid waste including biogenic fraction
- Others, such as fast growing species (woody and herbaceous) in river banks and in windy places etc.

e) Analysis of existing research & development resources and activities
In this sub-task existing human resources of research, training and development, and research facilities as well as previous research, training and development activities were mapped and analysed. The human resources included researchers, experts, educational staff (professors, teachers, research facility operators etc.), students, and consultants. The research facilities and infrastructure included research centres and units, experiment sites and other machinery, equipment and systems available for RTD activities.

f) Mapping operational context
In this sub-task the operational environment in regional, national, European and international context was mapped. The promotional, regulative and collaborative conditions were considered. The aim was also

to map the existing links to European Technology Platforms, such as Renewable Heating and Cooling Energy Technology, Joint Technology initiatives and other European projects. These documents facilitated the production process to create the regional level strategic research and development agendas (SRA).

g) SWOT analysis in RTD perspective and in economic perspective
The objective of this task was to produce two SWOT analyses for regional level Research Agendas. The information gathered in the previous task was utilized in SWOT analyses production.

The first SWOT analysis covered RTD and economic (innovation, business) strengths, weaknesses, opportunities and threats in the field of biomass resources. The second SWOT analysis identified internal and external factors that are favourable and unfavourable to achieve sustainable use of regional biomass resources. The SWOTs were built up in points of view of biomass user (and end-user), such as and paper production, energy production, wood product industries and food supply.

All of these reports are located in BIOCLUS Extranet and disseminated in BIOCLUS public website in the regional level publications.

Production of regional Strategic Research Agendas
The objective in this task is to produce strategic regional research agendas (SRAs) focusing on sustainable use of biomass resources for each BIOCLUS region. The SWOT analyses and other previous tasks in this workpackage provided information in which knowledge areas each region should focus in their strategic research agendas. The strategies covered the identification of possibilities and synergies for mutual learning and exchange of best practices. Therefore SRAs supports strongly the planning processes of later workpackages WP 4 (Capacity Building: Competence and Collaboration) and WP5 (Mentoring & Mutual Learning) and provides the basis for WP3 (Joint Action Plans).

Regional SRAs have been prepared both in English and in national language versions. Each Region has printed at least 150 copies of its Regional SRA in national language for communication and dissemination purposes. All Regions presented their SRAs on second BIOCLUS Project meeting in Thessaloniki, the 30th-31st of March 2011. There were good discussions about the regional research focuses and potential future activities. The SRAs have been used in regional level.

Strategic Research Agendas supported the production of Joint Action Plan in BIOCLUS project. The SRAs are available in BIOCLUS website in the regional level publications:

http://www.bioclus.eu/en/index.php/news-a-publications/regional-level-publications

Comparative of Analysis of Regional SRAs
Comparative analysis of the regional SRAs contains the comparative analysis of Regions natural conditions, Regional visions, missions, goals and strategic research focuses. Regional Strategic Research Agendas comparison points on common collaboration need for Regional goals achievement. Experiences, good practices and knowledge are required to speed up Regional goals achievement. It was a good base for mutual learning.

Strategic Researches (written in Regional SRAs) are focused on problems with the sustainable use of biomass resources. There can be distinguished following research directions (independently from biomass kind):

- Increasing biomass yield,
- Strengthening biodiversity ,
- Sustainable development,
- Development of new and innovative technologies development, Expert systems creation (with Artificial Intelligence implementation),
- Emissions reductions,
- Reduction of production costs (optimization, new solutions, new products),
- Biorefining biomass to new product and biocommunities

The Comparative analysis of SRAs is available on the public website of BIOCLUS in following link:

http://www.bioclus.eu/en/images/files/SRAs/BIOCLUS_Comparative_analysis_of_Regional_SRAs.pdf

Highlights of SRA realisation

In general, the regional Strategic Research Agenda (SRA) process the schedule was really challenging. While the SRA work was initiated also the whole project was started up. All regional clusters have wide networks to communicate with and whom to commit in SRA process. In this phase it can be concluded that the work took a little bit longer than it was expected but didn't hazard the later WP implementation. Besides, according to quality monitoring process the qualities of the regional SRAs were excellent.

3.3 Joint Action Plan Production - From planning to action (WP3)

The main objective of WP 3 was to develop Joint Action Plans (JAP) at regional and consortium level. Regional JAPs and the consortium level JAP are tools to implement Regional Strategic Research Agendas and to promote development, co-operation and integration of BIOCLUS cluster regions in the field of biomass resource related activities and innovation commercialization. The work-package was led by CERTH/ISFTA (Greece). In the WP 2 the operational environments of BIOCLUS regions were analysed. SWOT analysis gave essential information for the roadmaps. These documents were used as bases in WP3: Joint Action Plan production.

According to Description of work JAPs consider:

- Measures to improve human resources (mobility, knowledge promotion)
- Promotional activities to share human resources as well as research, training and development (RTD) infrastructure and other facilities.
- Identification of investment and development needs of infrastructure and other facilities
- Recognition of relevant research related projects (short term) and research areas (long term)

In practice the JAP process was implemented in two different terms. In the focus there was the Joint Action Plan implementation for the regional clusters and for the consortium. In the other hand there were tasks to support this process.

Supporting of JAP production process
In the beginning of the project the consortium produced the 'Review on of biomass related programmes and initiatives at regional, national and European level and research & technology platforms'. This work was carried out by CERTH-ISFTA with input of regional key partners and with help of JI.

This review consists at cluster level and European level:

- Programmes related to biomass sustainable use
- Initiatives related to biomass sustainable use
- Research and technology platforms

The review was disseminated in BIOCLUS website in the international publications:

http://www.bioclus.eu/en/index.php/news-a-publications/international-publications

The information collected was following and disseminated to the regional research driven clusters with 19 Newsletters. Ten of them were published for international use in English. Central Finland cluster produced 9 newsletters for the national use in Finnish.

Newsletters have been useful tools for BIOCLUS partners and stakeholders for mapping opportunities and legal issues offering fast overview of relevant information. Newsletters have been disseminated at consortium level via website.

Production of Joint Action Plans for regional clusters
In this task the objective was to produce the Joint Action Plans for the regional research-driven clusters. The JAPs support the regional development, co-operation and integration of BIOCLUS cluster regions in the field of biomass resource related activities and innovation commercialization. The JAPS were formed in common understanding with the partners and key-regional stakeholders, e.g. in Central Finland the business representatives were interviewed and invited in the workshop. The JAPs are based in the regional SRAs and they consider the existing action plans and strategies of different public and private entities.

The JAPs included about the strategic research areas following information:

- General description of the research area with the explanation why this topic was chose for SRA/ JAP process. It was also described how it supports the regional businesses.
- Expertise 2020 that needed to achieve the strategic targets set in the regional strategic research agenda (SRA)
- Expected impact during the this strategic process
- Management structure describes the entities that take the responsibility to implement the set action and the networks with defined expertise that are needed to support the implementation.
- Time table for actions to be implemented
- Performance indicators that follow up the implementation of the action plan
- Resources and finance needed for the implementation

Preliminary the regional JAPs were supposed to be produced in national language. The regions produced them in English as well. This made easier for other regions to learn to know the strategic focus of the cooperative regions.

The key topics to sustainable growth of biomass production and use by 2020 in JAP were following:

- Strategic research for wider implementation of forest biomass
- Strategic research for broader implementation of agricultural biomass
- Strategic research for whole biomass supply chain
- Other important Strategic research for achieving regional objectives related to sustainable production and use of biomass

In general, JAPs will target to activities within the period 2011-2020. This is the same period that was stated in SRA as well. Besides, the focus of JAP would be in activities that can be promoted during the project and are likely to be implemented by 2015. For these activities also impacts can be evaluated by the end of BIOCLUS at some extent. The impact evaluation for activities after BIOCLUS period can be carried out by the organization by themselves or by the partners in cooperation. The project success can be measured by the RTD projects that have been initiated by project in workpackages WP4 and WP5.

The regional JAPs are available in BIOCLUS website:

http://www.bioclus.eu/en/index.php/rtd-a-innovation-development/joint-action-plans

Production of Joint Action Plan at consortium level
In this task the objective was to produce the consortium level (mutual) Joint Action Plan for five BIOCLUS regions. The Joint Action Plan supports the regional development, co-operation and integration of BIOCLUS cluster regions in the field of biomass resource related activities and innovation commercialisation. The task is carried out in co-operation with regional clusters. The regional Joint Action Plan had following topics:

Central Finland
- Biomass combustion
- Biomass supply chains
- Biomass refinery
- Sustainability assessment
- Product and service development

Wielkopolska
- Biogas technologies
- elaboration for small size units
- Region accommodation to climate changes (drying)
- Biomass yield increase
- investigation with LCA use

Western Macedonia
- Development of Knowledge Based Economy
- Investigation of Combustion processes
- Regional adaptation to climate changes
- Development of Irrigation systems
- Development of Wildfire prevention systems

Navarre
- International & regional cooperation
- Bioenergy in woodland & farmland: Logistics, traceability, quality standards, biomass
- sustainability and 2nd generation biofuels.

Based on these, the consortium level Joint Action Plan contains five topics that the regions have joint interests - sustainability assessment, forest biomass, agricultural biomass, supply chain and energy conversion. All joint actions are based on regional SRAs and JAPs.

In short term the aim was to produce high quality proposals in EU programmes and in long term to supports regional cluster capacity building and networking. By the end 2012 there were in total 3 international proposals accepted, six are under evaluation or under preparation, two are waiting for suitable call and two has been rejected. Preconditions for consortium level JAP topics were following:

- Joint development need at least for two BIOCLUS regions
- BIOCLUS regions have capability & opportunity to carry out joint actions
- R&D activity will be base for lead market initiative
- Action support BIOCLUS objective and impact realization

Energy production in general and biomass supply in particular are crucial in helping Europe achieve its objectives for growth, jobs and sustainability. The BIOCLUS consortium is responding to this challenge by putting in place a range of measures to help reduce dependence on energy imports, increase sustainability and stimulate growth and jobs.

The key drivers in the plan can be summarized as:

- Desire for stronger sustainable economic growth
- Need to reduce energy demand
- Commitment to increase the use of renewable energy sources
- To promote biomass-based industrial activities
- Desire to diversify energy sources, particularly focusing on domestic and sustainable resources
- Opportunity to enhance international cooperation

As already mentioned above, biomass supply is a key issue in the BIOCLUS regions. There are regions with well-developed supply chains and others which need improved assessment of available or future resources and capacity building. The Joint Research Action Plan describes the activities and project consortium's commitments to initiate joint research, capacity building, knowledge transfer and other activities during the project's remaining duration and until 2015 or 2020.

Benefits and highlights of strategic process

In general the strategic process has had for example following results:

- By the end 2012 there were in total 3 joint international proposals accepted, six are under evaluation or under preparation process, two are waiting for suitable call and two have been rejected.
- By the end 2012 there were in total 5 regional initiatives accepted, seven are under evaluation or preparation process, five are waiting for

suitable call and three have been rejected. Five of these are international proposal but there has been only one cluster region involved.
- The results, deliverables and experiences of the strategic process have been used widely in the strategic planning of the cluster regions and in the activity focusing of the clusters.

Benefits and highlights of strategic process of BIOCLUS are introduced as follows:

- In CF the regional authority has financial instruments and has been convinced to invest in bio-energy.
- JAMK, JYU and the Polish partners are very interested in vocational education and different kind of exchanges.
- The Polish partners said that the small and medium-sized entreprises (SME)s in their region are suspicious to discuss with big companies regarding the bio-energy sector, because they are afraid to be overtaken. Often there are no clear rules regarding the Public Private Partnership.
- The Polish partners have established a well-developed supply chain of energy crops, which includes cultivators, pelletizers, boiler manufacturers etc. In this way Research and Development (R&D) and entrepreneurship is enhanced.
- Bio-energy in Greece can be characterised as fragmented and highly individualistic. There are a number of institutions (R&D, Universities, etc.) involved in a range of research and demonstration activities in the field, but clear interaction and role allocation among these is inadequate and sometimes missing. Flow of information among the universities and industry is limited and most of the times fragmented and uncoordinated.
- There are potentialities in W. Macedonia, but the financial situation is not very favorable for small and medium-sized entreprises (SME)s. Uncertainty, lack of stability and financial incentives are handicaps in this direction.
- All partners agreed that the language is no barrier to participate in EU projects
- In Slovakia the resources for new products are limited.
- In CF there is a fairly well developed cooperation between small and medium-sized entreprises (SME) and big companies. In addition, there exist facilitators which bring the two parties together.
- It was mentioned, that in Finland the cost of Research and Development (R&D) is higher in comparison with other countries. This could be a serious drawback for Finnish Companies.
- All partners agreed that the results, which clusters create, are visible and tangible after a period of time. In the other hand, most small and medium-sized entreprises (SME)'s are waiting for immediate results.
- BIOCLUS has increased cooperation in the following fields of biomass utilisation in Central Finland: wood fuel supply chains, biomass use in forest industry sector aiming to comprehensive bioeconomy research and strengthened cooperation with international bioenergy research with partner organisations.
- JAP facilitation at consortium level and regional level is strong track

Further information about JAP facilitation process results are analysed in the Table 1 and in the following sections.

3.3 Facilitating strategic process: capacity building & networking (WP4)

The objective of this WP was to strengthen the expertise and competence in the BIOCLUS regions and to improve the regional and transnational collaboration capabilities. This workpackage implements the strategic capacity building actions that were stated in the regional and mutual joint action plans. Therefore this is essential part of the strategic process. The expertise and competence were strengthened by developing the human expertise capacity as well as by improving collaboration capabilities of cluster experts

The work was carried out by:

- Personnel exchanges were carried out at regional and consortium level
- Consortium organized study tours at regional and consortium level
- Consortium organized JAP facilitation workshops at regional and consortium level
- Consortium produced proposal at regional, national and European programmes
- Clusters organized competence promotion events for the stakeholders and public at regional level organized by project partners to disseminate information and exchange experiences
- BIOCLUS partners participated in the events and at regional, national and European level and build and strengthen their personal networks and improved their expertise.
- Clusters produced plans how to share research, training and testing facilities at regional and international level.

In short term the most concrete result of this networking and capacity building are the joint R&D activities, such as proposals, at regional, national and European level. The planning work was supported by the cluster level and consortium level workshops. For example, in the field of torrefaction research VTT, CENER and JYU has had very active personnel exchange and two successful joint project proposals.

The over-all coordination of this WP was carried out by CENER (Spain). At cluster level the coordination is organized by CENER (Navarre), CERTH (Western Macedonia), ITP (Wielkopolska), NFC (Slovakia) and JYU (Finland). WP Leader was actively promoting WP activities.

Improving regional collaboration and strengthening competence at cluster level

The objective of this task was to improve collaboration between research and training actors, business community and authorities in the regional research driven BIOCLUS clusters. This task facilitated regional level Joint Action Plans (task 3.2) that were based on strategic research agendas produced in task 2.3. The task was carried out by organizing workshops and by exchanging personnel between the regional key-stakeholders.

Regional JAP facilitation workshops (Task 4.1a)
The aim of this task was to plan and organize four (4) thematic regional work-shops per cluster region to plan regional projects and initiating international activities. The regional workshops aimed at planning regional projects and initiating the international activities which had been identified in regional level and consortium level Joint Action Plans (task 3.2). The workshops use the results of task 3.1 Review on biomass related programmes and initiatives at regional, national and European level and research and technology platforms in identifying the suitable

instruments to strengthen the clusters and to improve collaboration at regional, national and European level. In the workshops plans to achieve funding for the projects and activities are discussed and elaborated. The regional workshops were open to all relevant stakeholders.

In total 34 regional JAP facilitation workshops were organized. The target was four per region, in total 20. There were almost 800 persons participating and in total 100 participations of BIOCLUS partners' staff.

The main concrete result of the regional workshops has been the enhancement of the cooperation between regional cluster members. By the end 2012 there were in total 5 regional initiatives accepted, seven are under evaluation or preparation process, five are waiting for suitable call and three have been rejected. Five of these are international proposal but there has been only one cluster region involved.

The main themes of the regional JAP facilitation workshops were following:

- Biomass energy clusters
- Agrobiomass cofiring in large scale combustion
- Sustainable Use of Biomass and Forest
- Biomass logistics
- Biomass processing, e.g. storage, drying
- Ash management
- Sustainable management of forests
- Forest and agrobiomass production for energy purposes
- CHP technologies – small scale, high efficiency
- Drying technologies and storage of solid biofuels (state of art and research needs)
- Biomass combustion (icl. cofiring) technologies and challenges
- Bioeconomy –conversion of forest industry
- Environmental impacts of biomass use

Regional level personnel collaboration (Task 4.1.b)
In the planning phase of the project it was understood that personnel level contacts are essential precondition for the genuine collaboration and efficient expertise transfer in the regional research-driven clusters of BIOCLUS. Therefore the personnel level contacts were promoted in several ways from which the personnel exchange was one of most successful ones. It gives deeper understanding to the operations of other stakeholders. It strengthens the clusters. The person-to-person contacts build trust and mutual understanding between the organizations. The personnel contacts are precondition for successful cluster collaboration. The personal level collaboration also improves adaptation to the changes occurring in the operational environment.

The project target was organise four regional personnel exchanges in each cluster region, so in total 20 exchanges. However, the project organized in total 29 regional exchange periods that had 41 persons to participate.

Personnel exchanges at regional level are suitable tool to introduce new co-operational models and practices to the stakeholders as well as to promote collaboration between the organizations. The regional level Joint Action Plans (WP 4) recognize the organizations that would benefit from personnel exchanges. The exchanges can occur between two same kinds of entities (for example research institute and university) or between two different kinds of entities (for example research institute and business

entity). The exchanges were carried out mostly in short-term periods, less than a week (1-3 days).

The regional personnel exchanges covered following topics:

Pellet certification, solid biofuel standards, biomass conversion, biomass boilers, biomass pelletizers, solid biofuels characterization at laboratory, carbohydrates chemistry, sustainable biomass production, woody biomass, biomass use in forest industry, sustainable biomass production and online measurements, energy crops, water protection.

Benefits of the regional exchanges
The benefits and findings of the regional exchanges are introduced as follows:
- Explaining the expertise of each partner organizations and understanding with which topics they are willing to collaborate. Win win thinking.
- Building a regional network and learning to know other organizations and their staff.
- Clearing up the role of different stakeholders in the cluster. Trying to make all understand the complementarity of each other, not only the competing.
- Promotion of regional initiates on biomass topics by means of regional projects
- Face to face contacts make us collaborate as friends.
- The partners will have collaboration possibilities open for the future
- The partners will support other regions to find the solutions to their problems, facilitate possible contacts, etc.
- The common discussions in such heterogeneous groups makes us to be more open minded to different problems, solutions, challenges that biomass faces

Regional competence promotion – organizing events for regional key-stakeholders (Task 4.1 c)
The partners organized regional events to essential stakeholders to support the regional development. The events are targeted especially to biomass producers, user or decision-makers such as biomass suppliers (agricultural enterprises, foresters etc.), local authorities, biomass users, and general public. The events typically lasted a half a day or one day.

The events covered e.g. following themes:

Sustainable use of solid biofuels, sustainable use of biomass energy in production and industry, commercial, industrial and agricultural exhibitions, biomass boilers, promotion of biomass use, energy and climate change, cooperation with municipalities in biomass topics, energy.

Fostering transnational collaboration and strengthening competence in consortium level
The objective of this task is to improve transnational collaboration, to promote expertise as well as to facilitate the JAP implementation by exchanging knowledge, market intelligence and qualified staff. The knowledge exchange was carried out by organizing common events for BIOCLUS regions and by personnel level collaboration. This task was based on the consortium level Joint Action Plan and it supported WP5 (Improving

Regional Innovation Systems by Benchmarking Mentoring & Mutual Learning). It is formed of following activities:

International study tours for competence building (Task 4.2. a)

The aim in this task was to plan and organize five international study tours to increase and disseminate knowledge of good technical practices in the field of biomass resources. The international study tours were related to sustainable use of biomass resources and were open to all relevant key-stakeholders. One study tour was organized by each cluster region.

The study tours aimed to increase and disseminate knowledge of good technical practices in the field of biomass resources. They improved collaboration and networks between BIOCLUS clusters. The study tours were organized in specific expertise areas recognized in the strategic process of WP 3: Joint Action Plan.

The main themes of the international study-tours were following:

- Agro-biomass logistics
- Agrobiomass cofiring targeting high efficiency for CHP
- Cofiring of herbaceous biomass,
- Forest biomass supply for bioenergy production
- Sustainability of biomass production.

International JAP Facilitation Workshops (Task 4.2 b)
The aim of this task was to plan and organize of one international JAP Facilitation workshop per project region. Every workshop was planned and organized by different partner regions (one by each region) and was targeted to different fields of expertise, such as

- Agrobiomass logistics
- Agrobiomass co-firing (CHP)
- Cofiring of herbaceous biomass
- Biomass supply chain
- Sustainability of biomass use

The workshops were organized to improve the technological development activities in traditional and emerging business sectors and to mobilize financial possibilities. The workshops utilized the results from task 3.1 Review on of biomass related programmes and initiatives at regional, national and European level and research and technology platforms in identifying the suitable instruments for strengthening the clusters and collaboration at regional, national and European level. All workshops were organized along other BIOCLUS events, such as the international studytours. That was fruitful because the participants had more time to build international networks and exchange experiences. Besides, it saved the project resources.

The main statistics of workshops are the same as the ones of the study tours, since as mentioned previously these two activities were organized together. The main result of the international (consortium level) workshops has been the enhancement of the cooperation between international cluster members. This has been reflected in proposals preparation at international level. By the end 2012 there were in total 3 joint international proposals accepted, six are under evaluation or

under preparation process, two are waiting for suitable call and two have been rejected.

The main themes in the international JAP facilitation workshops are following:

- Production of solid sustainable energy carriers from biomass by means of torrefaction, deployment of resource-efficient value-added chains in Europe's emerging energy crop sector,
- Sustainable networks for the energetic use of lignocellulosic biomass in South-East Europe,
- Development and demonstration of sustainable logistics chains of agricultural residues to be used as fuels into the bioenergy market,
- Promotion of residual forestry biomass in the Mediterranean basin into the bioenergy market,
- Boosting bioenergy investments by sustainable wood fuel supply chains,
- Demonstration of optimized energy systems for high performance energy district,
- Carbohydrates utilisation, agrobiomass cofiring targeting high efficiency for CHP,
- Sustainable development of logistic chains.

The workshops themes were improved to intiatives to the following European programmes:

- Seventh Framework Programme (FP7) – Energy, Bioregions, KBBE, Smart cities and communities, Regions, Marie Curie
- Polish-Norwegian Research Programme
- Intelligent Energy for Europe
- South East Europe

International level personnel exchange (Task 4.2 c)
The aim of this task was organize 20 international short-term personnel exchanges (4 short-term exchanges per project region) and five international long-term personnel exchanges. The project organized in total 26 international exchange periods – 13 short exchanges and 10 long exchanges – that had 121persons to participate. The most of exchanges had more than one participant. This way the exchange supported the project objectives by networking the cluster regions at personal level and it was also more cost efficient.

In general, the personnel level collaboration is an essential precondition for the genuine collaboration and efficient expertise transfer between the BIOCLUS regions. Joint Action Plans (WP 3) recognize expertise areas that are the most crucial for enhancing the competitiveness and growth in BIOCLUS regions. Personnel exchanges at international level are targeted to these areas. The exchanges are carried out as short-term (less than a week) and long-term (1-4 weeks) exchange periods.

The international personnel exchanges were dealing with following themes:

Renewable energy souces in the cluster regions, regional cooperation opportunities (e.g. Welkopolska Region with the five Greek municipalities), biomass plant management, operations and investments, second generation biofuels, biomass energy cluster synergies between Navarra and Central Finland, torrefaction research, mapping of the regional Cluster of Navarra, small scale gasification (mobile gasifier)

with local available biomass recourses, sustainability, energy crops, energy efficiency, innovation management, research and business promotion at regional level, forestry strategies and practises in Central Finland, mapping of the regional cluster of Central Finland.

The benefits of the international exchanges and studytours

The benefits of the international exchanges and studytours are introduced as follows:

- Explaining the expertise the other regions and understanding with which topics they are willing to collaborate. Win win thinking.
- Small discussion groups are positive for the understanding of the characteristics and situation of other region. Facts make you also understand in which situation is your region compared to the others.
- The clusters where the use of biomass is not very important (GR) at national level could learn from other countries, and the knowledge transfer will be basis for the development of the sector in less developed regions.
- From the best practices of other regions it was learned how to do things right.
- Improved the knowledge on specific topics as torrefaction, straw logistics and combustion, co-firing, forest management and harvesting, CHP and clusters
- Important to note that the learning has not been only between researchers and scientists, but active involvement of politicians and decision makers. It might influence in the decisions.
- Face to face contacts make us collaborate as friends.
- The partners will have collaboration possibilities open for the future
- The partners will support other regions to find the solutions to their problems, facilitate possible contacts, etc.
- The joint discussions in such heterogeneous groups makes us to be more open minded to different problems, solutions, challenges that biomass faces.
- The unknown potential and knowledge of other regions were discovered.
- Promotion of international initiates on biomass topics by means of regional projects

The improvement potential:
- Increase the education and training activities during the project
- We could have worked also in other areas as bioeconomy, bio-materials, biogas and bio-sequestration

Other events facilitating competence promotion and networking at regional, national and European level (Cluster competence promotion) (Task 4.2 d)

The aim of this task was to promote the cluster competence. It was carried out by partner participation in events (seminars, study tours, trainings and other relevant events) not organized by the project consortium at regional, national and European level. BIOCLUS partners were expected to participate in seminars, study tours, trainings and other relevant event at regional, national and European level. The participation strengthened their expertise capacities as well as supports networking with the experts of biomass related fields identified in JAP (WP 3). Besides the events supported regional level strategy implementation. These events are not organized by BIOCLUS project.

Highlights of cluster competence promotion

- A private company Gizex (PO) has contacted a Spanish boiler company. Now collaboration together for the use of straw as raw material.
- A private company Gizex (PO) with the ideas raised in the workshops has produced a new machine for hot air generation.
- The regional authority UMWW (PO) is promoting an Eco-Energy and Innovation Centre based on some ideas of the visit to NA
- The regional authority UMWW (PO) is collaborating with CF for the improved of their training programs, focused on more practical aspects
- A private company BIOTERNA (NA) has developed and established their pellet production certification systems ENplus.
- The University JYU (CF) carried out two month long personnel exchanges in CENER (NA)
- with the topic solid biomass sustainability
- The cooperation of our regions in now behind of us, and it will last for the future
- Biomass is now included with an specific chapter in the 3rd Energy Plan of Navarra
- In Navarre (SP) the regions has reach to have a relation of different areas of the regional administration dealing with biomass
- In Navarre (SP) it has been approved an ERANET+ BEST Bioenergy
- In Western Macedonia (GR) the regional authorities are very willing to make district heating projects

Improving the use of RTD facilities at regional and international level

The task aimed to create of five models for sharing RTD facilities, one in each cluster region. The objective was to promote the efficient use of research, training and testing facilities. The needs to use and develop the existing research, training and testing facilities were assessed in regional level Joint Action Plans and the consortium level Joint Action Plan. This task was carried out by analysing at least five cases, one per region.

The basis for this works was carried out in WP2. The regional R&D environments were analyses as well as expertise areas of personnel of the partner organisations. These are introduced in website in the regional publications.

http://www.bioclus.eu/en/index.php/news-a-publications/regional-level-publications

The work was based on the model prepared by WP Leader. The regional models for sharing R&D facilities are introduced in BIOCLUS website in following page:

http://www.bioclus.eu/en/index.php/models-for-sharing-facilities

In the quality monitoring process the deliverables were evaluated to be very much line with the scope planned and the value was noted as high.

3.4 Improving Regional Innovation System (WP5)

The objective of this work package was to promote and network the innovation systems in BIOCLUS cluster regions as well as enhance innovation related co-operation between the cluster regions. It aimed to strengthen the research commercialization and competitiveness in BIOCLUS regions by

- Benchmarking the existing innovation systems
- Identifying improvement needs
- Improving the innovation systems in the BIOCLUS regions by promoting best practices and by mentoring

In the workpackage Capacity Building (WP4) the research abilities of regional clusters were developed and communication skills improved whereas this work package established favourable environment for competitive innovation. WP5 supported the realization of long-term vision stated in the Strategic Research Agendas (WP2). The long-term vision is reached by benchmarking the existing successful innovation systems and by enabling favourable development of innovation systems in BIOCLUS regions. The favourable development is supported by co-operation and integration of RTD related research entities, authorities and business actors.

In WP 2 the regional clusters produced 'Analysis of existing innovation environment including financial opportunities'. It was used in as a background material for WP5.

Benchmarking the existing innovation systems
The objective of this task was to produce Mentoring & Mutual Learning plans for clusters by developing the knowledge level of decision-makers and other stakeholders. The clusters gather knowledge for that with various means. They have collected basic information about their regional innovation environment in task 2.1. Also, the clusters shared their experiences in the international workshop and carry out benchmarking visits to successful regions. Thus the regions were able to provide the plans for mentoring and mutual learning process. It was formed of the regional plan and mentoring and mutual learning activities, such as cluster level mentoring and the joint blog in website.

International workshop on establishment and promotion of innovation system (Task 5.1 a)
The aim of this sub-task was to organize one international workshop with high-quality introduction from innovation management experts at one from each cluster region. The workshop was targeted to the BIOCLUS research-driven cluster members. Also Seventh Framework Programme (FP7)/ Regions of Knowledge Programme was represented. The aim was to identify possibilities for cooperation and mentoring, get ideas for planning and discuss common issues.

The workshop confirmed that disparities between EU regions with regard to research investment and innovation are significant. The stronger cooperation between businesses and public research can be supported by

- Creation of regional and trans-regional clusters and
- Capacity building in research, including information and communication technologies, research infrastructure and human capital.

The workshop materials are available in the following BIOCLUS website:

http://www.bioclus.eu/en/index.php?option=com_content&view=article&id=10&Itemid=23&dir=%2Fvar%2Fhttp://www%2Fjsmallfib_top%2FInternational/Events%3A+International+Innovation+Workshop+in+Bratislava+Slovakia+in+Sept+2010

Benchmarking visits to USA and Austria (Task 5.1 b)
The aim of this sub-task was to learn and get new innovative ideas from visit sites that introduce best practice case in the field of innovation

management. There were two visits targeted in the regions that have successful innovation systems. The benchmarked regions had similarities to BIOCLUS regions in terms of magnitude of regional economy and the fields of RTD activities. The aim is to learn and obtain new ideas from the peer entities.

The first Benchmarking visit was targeted to Michigan Keweenaw area, cities of Houghton and Hancock, due to the inspirational successful innovation systems in existing similar conditions of BIOCLUS regional partners. Related to BIOCLUS activities were e.g.

- tailored visit of Sustainable Futures Institute with focus on a sustainable model including economic-industrial, environmental and societal sustainability,
- visit to Finlandia University Jutila Center for Global Design and Business, teaching facilities and business incubator area,
- visit Mtech Zone,
- Lakeshore Center, business incubator
- Examples of programs for students were introduced – e.g. Enterprise program, very strong support of commercialisation of results of research at MichiganTech,
- Cooperation between universities (MichiganTech, Finlandia) and enterprises (enterprises finance lot of research projects at the universities),
- Commitment of local society to develop the region, very strong supporting organisation working in the area to develop new businesses e.g. WUPPDR, incubators.

The first benchmarking visit provided the opportunity for establishing contacts and cooperation in the area of biomass-related business, education and research and development. The group received a good overview of the regions R&D, innovation, and education institutes as well as its systems for supporting entrepreneurship and economic growth.

Synergies between host and visiting regions represented small and relatively poor regions. Common interests culminated into the discussion regarding further cooperation activities between Keweenaw area and participating regions in the area of biomass production. Both sides have been exchanging information on opportunities, new innovations and also other on matters related to biomass business development, doing business in each respective country, etc.

NFC established cooperation with US Embassy in Slovakia, relevant departments of Ministry of Agriculture and Rural Development of Slovak Republic.

The second Innovation Benchmarking visit was targeting in Styria, Austria. It was organized in close cooperation with consortia IN2WOOD-project (see http://www.in2wood.eu online) and RoK-FOR project (see http://www.rokfor.eu online). Both projects are Framework Programme Regions of Knowledge projects as well.

There were following expectation for the innovation benchmarking study-tours and the most of them were fulfilled:

- Gain understanding on regions innovation system, bioenergy R&D interests and bioenergy business potential (including technology transfer).

- Have an overview of US innovation systems.
- Meet interesting organizations and find potential partners for future co-operation.
- Get understanding of the present situation of biomass utilization and development trends in the US. Research interests and how the research results are brought to industries. Understanding of the financing research, start-up companies and investment projects.
- Carry out the overview and comparison of the regional BIOCLUS and US innovation systems, considering the roles of Academy-Government-Industry and their interactions, based on the triple helix concept (Academy-Government-Industry).
- Develop new R&D and business networks/contacts
- Learn how to commercialize ideas from R&D activities (e.g. available financial instruments), how to create innovative atmosphere, how to encourage people to start a business, how to efficiently utilize financial instruments, how the technical universities teach marketing communication business skills.
- Gain understanding on regions innovation system, bioenergy R&D interests and bioenergy business potential (including technology transfer).
- Discuss the research topics
- Meet entrepreneurs and investors in biomass business and to hear also their view of biomass business now and in future.

It was decided also that after the visit the participants provided information how the visit developed their understanding at personnel level, organizational level, regional level and consortium level. Besides they analysed and how it supported BIOCLUS objective and impact realization. In practise, they filled the Questionnaire 3 of WP4. It provided information for impact evaluation and for quality management process.

The summary of the additional value of studytours was following:

- Support of networking and cooperation with fulfilled expectations of BIOCLUS regions
- New opportunities for BIOCLUS regions within common projects and common business
- Regular exchange of information, benchmarking process developed
- Increased awareness of the staff related to knowledge and technology transfer as well as entrepreneurship
- Transfer of research results to business life and to commercial applications

Mentoring and Mutual Learning plans for BIOCLUS regions (Task 5.1 c)

The aim of this task was to produce the mentoring and mutual learning plan for each cluster region by interviewing regional stakeholders in all cluster regions to support the realization of mentoring and mutual learning plans. Each region had specific needs for the innovation system development. The ground information and ideas for improvement promotion were identified in the Regional Strategic Research Agendas (WP2) and in the previous sub-tasks: Benchmark visits and International workshop.

In the Steering Committee (SC) it was agreed that regions have different needs at this moment. For example in Central Finland the regional innovation system is already quite advanced. The major development needs are inside the research entities. For this reason the SC decided that

Central Finland may concentrate in the research related innovation management of the universities and research institutes while for example Slovakia was developing their national system and lobbying the best practices.

The regional Mentoring and Mutual Learning Plans are available in the following website:

http://www.bioclus.eu/en/index.php/rtd-a-innovation-development/25-innovations-boosting-regional-development/84-innovationsboostingregionaleconomy

Mentoring and mutual learning platform (Task 5.1 d)
The objective of this task was to improve regional innovation systems in order to maximize economic advantages and introduce Innovation development Experts blog. The aim was to promote the establishment and development of regional innovation systems and enhance the implementation of the Mentoring and Mutual Learning plans. In addition to this, the aim was to consult and mentor partners and regional stake-holders on possible ways to implement the mentoring and mutual learning plans.

Each region nominated at least one Mentoring expert to whom all the other partners and other regional stake-holders could contact from blog site. The innovation management system development was introduced and analyzed in the reports. Some of them were delivered in the final seminar and disseminated in other events during the following years. The reports of innovation system development or establishment tracks of the clusters are introduced in the following website:

http://www.bioclus.eu/en/index.php/rtd-a-innovation-development/25-innovations-boosting-regional-development/84-innovationdevelopmenttrack

Besides, there has been some other achievement due the project. In Central Finland we have developed so called Yritystehdas (Business factory) concept. It is built by JAMK, JI and JYU to promote new entrepreneurs. It offers services to new entrepreneurs.

Innovation development Experts blog
The innovation blog is located in BIOCLUS website in following address:

http://www.bioclus.eu/en/index.php/innovation-blog

There are innovation related blog texts provided by regional innovation experts. The CVs and contact information of experts is introduced in the website.

The articles have following topics:

- Bioclus getting started! (written by Ms Marta Martínez Arellano, Puente International Company): It describes different Innovation structures between BIOCLUS regions, learning from others, experiences of the benchmarking visits as well as innovation in RES and Biomass in Navarra and Future, technology and knowledge Transfer.
- Is the Innovation like a 'life itself' – when an innovation is born? (written by Mr Pekka Taskinen, VTT)
- Observations related to innovation systems in US (written by Mr Asko Ojaniemi, Benet Ltd)

- BIOCLUS and Bio Cluster in Western Macedonia (written by Dr Yannis Fallas, UoWM): An article, describing the state of art in the region and the innovative projects, initiatives etc. of the participating entities.
- Innovation blog BIOCLUS case Wielkopolska Region (written by Marek Hryniewicz, ITP)

Participation and contribution to EU innovation initiatives (Task 5.1 e)
In the project proposal it was noted that the project coordinator and project partners would also take part in the European cluster alliance and the European Club of clusters managers, as well as provide descriptions and relevant data to be collected in the framework of the European cluster observatory, set up under Pro Inno Europe and Europe INNOVA. BIC Bratislava – one of the partners - is active in these innovation platforms (see http://www.bic.sk online).

The aim was to share experiences with larger public and experts in the field of innovation and cluster development. The partners have been active in following innovation related platforms and initiatives:

- European Technology Platform on Renewable Heating and Cooling (RHC-Platform) brings together stakeholders from the biomass but also geothermal and solar thermal sector - including the related industries - to define a common strategy for increasing the use of renewable energy technologies for heating and cooling. (VTT and CERTH in major roles)
- CHORUS cluster gathers 12 companies (including 10 small and medium-sized entreprises (SME)) and a research institution in the region of Central Macedonia (Greece), in order to develop innovative products and integrated solutions for 'green'energy (clean energy, low carbon and renewable energy) and 'green' mobility which include high added value and high functionality due to strong internal synergies.
- BIOPLAT: Spanish Biomass Technology Platform (CENER)
- APPA: Association of Renewable Energy Producers. (CENER)
- PTFE: Spanish Forestry Technology Platform(CENER)
- EERA: European Energy Research Alliance (CENER and VTT)
- Enterprise Europe Network - "Business support at your doorstep" - is providing broadest range of services to help, assist and advise European small and medium businesses in the field of business, internationalisation, innovation, technology transfer and research. (BIC)
- b2europe is the alliance of European business support networks assisting companies, in particular Small Medium Enterprises (SMEs), and potential entrepreneurs to compete and succeed. (BIC)
- European Innovation Relay Centres Network - These centres have been created in order to facilitate the transfer of innovative technologies to and from European companies or research departments. (BIC)
- IRE - The Innovating Regions in Europe (IRE) network is the joint platform for collaboration and exchange of experience for regions that are developing or implementing regional innovation strategies and schemes. (BIC)
- EBN - the European BIC Network - is a non-profit making association based in Brussels. EBN offers services aiming at coordinating the activities of the BICs, developing and promoting the BIC concept within and outside the European Union.
- SPICE (Science Parks and Innovation Centers Expert Network). SPICE Group is a global network of individual experts. (BIC)
- PRO INNO Europe - is an initiative of Directorate General Enterprise and Industry which aims to become the focal point for innovation policy analysis, learning and development in Europe, with the view to learning

from the best and contributing to the development of new and better innovation policies in Europe. (BIC)
- PAXIS Network - Managed by the Commission's Enterprise Directorate-General under the 6th Framework Programme, 'Research &Innovation Programme', PAXIS promotes the setting-up and development of innovative companies across Europe – a driving force for employment and economic growth. (BIC)
- National Network of BIC and RAIC - Slovak network of Business innovation centres (BIC) and Regional advisory and information centres (RAIC) co-ordinated by the National Agency for small and medium-sized entreprises (SME) Development
- CLEEN Ltd. - Cluster for Energy and Environment (Finnish national clusters)
- Finnish Bioeconomy Cluster FIBIC Oy
- Energy Technology cluster – JI coordinates the cluster, JAMK, JYU, VTT and Benet are partners in the cluster
- Forest Industry Future cluster - JI coordinates the cluster, JAMK, JYU, VTT and Benet are partners in the cluster
- Finnish Innovative Cities Initiative preparation It is targeted to 5-6 focus areas at national level. The decisions about the focus areas will made by the Finnish Ministry of Employment and the Economy. (JI, JAMK, JYU, regional authority Keski-Suomen liitto)
- National material and immaterial resource efficiency project as a pilot region. The project is financed by Sitra – The Finnish Innovation Fund. (JI, JAMK, JYU, VTT, BENET, regional authority Keski-Suomen liitto)

Benefits and highlights of innovation related cooperation
In Navarra the draft of the IV Technology Plan Navarra 2012-2015 is published. It is based on and follows Moderna Plan (General plan for the economic development of Navarra) lines, designs strategies to give R&D a more systemic nature. Public support will be focused on the sectors and clusters identified (economy of health, green economy and economy of talent). The Plan contains specific indicators, strategic lines, and budgeting tools necessary to achieve the four global goals scored: promote a balanced and sustainable development of regional economy; facilitate open innovation in a global environment, stimulate regional competitiveness by promoting the socialization of science and innovation, and to foster regional innovation system at European and global levels.

The four strategic areas of innovation are: to develop international, high-level and market-oriented R&D&I; to give added value and create technology-based companies; systematic use R&D&I as a competitive tool for the industry, and promoting the use of new services and products to the society.

In Wielkopolska Innovation system development experiences and knowledge transfer are going to be implemented for an innovation system development in Wielkopolska. Institute of Technology and Life Sciences (ITP) will be the leading unit as the key cluster partner for the development of Research, Technology and Innovation. System changes in the Institute will be tightly conjugated with the innovation system development. ITP will implement the electronic flow of documents for faster documents circulation. It should accelerate administrative procedures for programs and equipment purchase.

New programs and equipment will be used for investigations and research into biomass field especially innovative biomass technologies with their impact on environment assessment, new biomass processing technologies,

logistic chains elaboration for biomass, machinery and equipment design for biomass processing and energy from biomass production. Virtual prototyping will be implemented for the design process. Computer simulations and tests will be carried out instead of traditional costly and long term real prototype investigations (from laboratory scale, through small scale, till to full industrial large scale prototypes). Cooperation with industry will be improved by tightening links with enterprises and better information flow about industry needs. Cloud computing and distant work will be promoted with Internet use. These solutions will facilitate scientists work. Also, it should speed up knowledge transfer about newest progress in biomass matters to all biomass market actors (farmers, biomass processors, logistic firms and firms which use biomass as raw material). In such way, bioeconomy will be developed with such effects as farmers incomes increase, rural areas development, social welfare increase, sustainable economy development, new jobs creation on rural areas related to biomass sector, etc.

In Slovakia increasing of productivity and utilization of biomass energy including related activities in Slovakia, maintaining their sustainability and improving economic and ecology parameters of these processes as well as using favourable effects on employment in rural areas is conditioned by significant improvement in the area of innovation in Slovakia in its broad context. Innovation should cover all range of activities related to production, processing, storage, transport and energy use of biomass including evaluation of economic, ecological and social influence of these activities. Necessary condition for improvement of innovation system in the area of production and utilization of energy biomass is improvement of cooperation of relevant stakeholders and higher effectiveness of their activities. Several steps should be implemented to improve the innovation system in Slovakia:

- Complex analysis of present situation in production and utilisation of energy biomass related to innovation including cooperation among ministries, local and regional governments, RTD institutions and companies. The results of the project BIOCLUS should also be used
- Identification of main problems where support of above mentioned institutions is necessary. An agreement on further cooperation should be adopted. The results of the project BIOCLUS should also be used
- Elaboration of innovation strategy in the area of production and utilisation of energy biomass in cooperative way between the RTD institutions and the ministries taking into account demands of stakeholders
- Continuous financial support of innovation including preparation stage and its implementation. Taking into the consideration present financial conditions in Slovakia public funding is necessary. Private funding should be used for implementation of innovation in private companies particularly those producing energy and wood processing and pulp companies and their suppliers.
- Stabilization of innovation systems in order to fulfill the targets until 2020 and onwards that assume: institutional stabilization between ministries and RTD institutions, financial stabilization thus combination of using public and private financial sources, stabilisation of legislative particularly in relation to entrepreneurs environment(biomass and energy producers, service providers) and local and regional authorities, monitoring of innovation system, its effectiveness according to the targets. It is necessary to focus on solving key problems in different areas in order to achieve the objective of innovation system

developing, formation and operation of clusters, as the supporting structures of innovation implementation.
-
Two major operational programmes (OP) focused on innovation are implemented in the current programming period 2007-2013:

- OP Competitiveness and Economic Growth (Support measures: Innovation and technology transfers; Support of common services for entrepreneurs; Support of innovation activities in enterprises)
- OP Research and Development (Support measures: R&D infrastructure, Networks of excellence, Transfer of knowledge and technologies)

For the next period, the Strategy for research, development and innovation in the Slovak Republic until 2020 is being prepared in present time (January 2013) under leadership of the Ministry of Education, Science, Research and Sport of the Slovak Republic. The strategy should present a basis for planning the EU Structural Funds supporting the research, innovation and competitiveness in the period 2014-2020.

On the regional level, the Bratislava Self-Governing Region has adopted the first Regional Innovation Strategy (RIS) for the period 2014-2020 in the Slovak Republic in January 2013. RIS Bratislava is setting the priorities, tools and measures for the next period according to the Smart Specialisation Strategy manual issued by the EC.

In Western Macedonia the Innovation System is characterised by a strong public sector, a huge private sector, namely due to the presence of the ex-public Electric Power Company and a rather young developing education and R&D sector. Thus, public sector prevails in the Region, both in terms of economy and in terms of mentality. The interaction among the three parts of the regional economy is rather weak and prohibits the development of crucial synergies that can boost the regional development.

Additionally, regional structural funds do not promote innovation, as the horizontal support of entrepreneurship does not focus on the potential drivers of the regional development. Policies are not focused on promising, emerging or existing niches, sectors or clusters, but rather tend to spread horizontally to every small and medium-sized entreprises (SME), limiting in the end the effect created from such an intervention. To add to this rather negative image, almost all the entrepreneurship groupings in the Region suffer from a clear lack of self-organisation which prohibits the creation of any further multiplying effects. The success of the few initiatives taken in the Region in this direction, namely the Regional Innovation Pole, indicates the potential for such cooperation, which needs a swift of mentality and attitude at local and regional level. In that sense, BIOCLUS was innovative for the region and the processes of regional development.

In Central Finland the innovation environment at national and regional level is very developed. For that reason the focus was in internal process of cluster orginsation. Especially the research related entities were active under BIOCLUS project.

The partners have participated actively in the research related innovation platforms. For example JYU and VTT are partners in following national clusters:

- CLEEN Ltd. - Cluster for Energy and Environment

- FIBIC Ltd. – Finnish Bioeconomy Cluster

Besides, Jyväskylä Innovation is managing regional two Centres of Expertise that are related to biomass:

- Energy Technology cluster - BIOCLUS partners JAMK, JYU, VTT and Benet are partners in the cluster
- Forest Industry Future cluster - BIOCLUS partners VTT and JAMK are partners in the cluster.

JAMK, JYU, JI, Benet, VTT and Keski-Suomen liitto are participating in the national Innovative Cities Initiative preparation. It is targeted to 5-6 focus areas at national level. The decisions about the focus areas will made by the Finnish Ministry of Employment and the Economy. Additionally JAMK and JYU are participating in the national material and immaterial resource efficiency project as a pilot region. The project is financed by Sitra -The Finnish Innovation Fund. The innovation initiatives are very important for the regional cluster members. However, the work is mainly carried out with other resources.

The benefits and highlights of innovation related cooperation are introduced as follows:

Benefits and highlights of innovation related cooperation

Benchmarking findings and benefits:
- Positive valuation of the USA (Michigan) of the use of wooden biomass - being very close to the market and having more efficient innovation system compared to Europe
- Learning also from other countries, e.g. Austria, Finland how to use biomass and to structure clusters
Regional innovation track
- Funding system for innovation, e.g. regional seed money for innovation,
- National and European funding system for innovation
- Evaluation of ideas, early development stages and processes
- New knowledge in biomass processing, cardoon biomass utilisation, etc.
BIOCLUS impact on innovation creation and commercialisation and research environment
- Increase of interaction between research and business
- Positive effect on public sphere
- New opportunity in biomass use, e.g. in electricity generating
- Improving commercialisation capacity, here the Quercus example
- Improving innovation capacity in NFC
- Impulses for channelling regional money (funds) to boost business initiatives
- Providing essential information and material for Strategy for research, development and innovation in the Slovak Republic until 2020 (January 2013).

BIOCLUS expertise dissemination
- Large mutual expertise dissemination
- Participation in national and European platforms - not all consortium
- Partners, Finland was there participating already before BIOCLUS
- Project, Slovakia came to European technology platform through BIOCLUS
BIOCLUS contribution to networking and activities integration at consortium and European level
- Large know how transfer from Finnish partners to other consortium

- Partners, e g. technical possibilities of forest and biomass use, clean and renewable energy generation in the regions, innovation funding
- System and its impact on business development, the Tekes model,
- Structural funds (SF) impact , use of the "de minimis" rule for small and medium-sized entreprises (SME)
- Implementing innovations
- Positive BIOCLUS impact on relevant small and medium-sized entreprises (SME)s in the respective regions, strengthening relevant New small and medium-sized entreprises (SME)s, implementing new technologies, expanding markets, boosting commercialization
- Developing of operating environmental clusters or at least clustering activities through facilitators
- Development of expert networks
- Mutual regional learning from each other regions

Potential Impact:
3.4 Impact and additional value of BIOCLUS

BIOCLUS objective was to boost the regional competitiveness and growth in five European cluster regions:

- Central Finland
- Navarre (Spain)
- Western Macedonia (Greece)
- Slovakia
- Wielkopolska (Poland).

The project promoted collaboration and integration of cluster regions and strengthens the innovation environment by improving research potential and innovation management. Besides, the project supports sustainable development by improving the use of biomass resources. The development is achieved by

- Promoting scientific, strategic and business competence at cluster and consortium level
- Developing collaboration capabilities in the clusters and consortium level
- Improving innovation to business environment by mutual learning and by mentoring

The BIOCLUS clusters locate in the rural regions and all possess great biomass resources such as forests, agriculture, industrial and agricultural by-products and residues as well as municipal waste. The biomasses are challenging raw material. The utilisation chains require special technical and practical competence as well as applications.

The global trend is that renewable resources replace non-renewable resources. Besides, the use of resources should be efficient and sustainable. Therefore, the clusters aim to improve the RTD activities and innovation systems. Furthermore, the biomass resources offer great possibility to BIOCLUS regions in economic and social terms.

In general BIOCLUS was very successful project in many terms. It was inspirational and offered great opportunities to all participants. This was seen strongly from the commitment of the project entities. There were no changes in the consortium of 20 organisations during three year project. Also the key persons were same over the project life cycle. The large consortium was the strength of the project due to extraordinaire expertise concentration. It also gave some challenges to communication and information dissemination to relevant entities.

The surplus value for European R&D&I work was carried out with following steps:

- The partners participated and followed actively European innovation initiatives, for example in Renewable Heating and Cooling Platform
- It prepared the regional research driven clusters for new era of Horizon 2020
- It supported the participation, knowledge transfer and innovation management by networking and promoting expertise and competences
- BIOCLUS supported innovation management development at national level e.g. in Slovakia, at regional level e.g. in Navarra and at organisational level e.g. in Central Finland

- It offered an opportunity to have more objective view in European R&D&I development by taking experts in USA
- It was possibility for technology transfer and practice transfer between research orientated clusters and between EU and USA
- Cooperation platform for research facility joint use at strategic and practical level (e.g. SUORA forest industry research …)
- It provided new knowledge based networks (e.g. in the field of torrefaction) and supported them to build new initiatives for Seventh Framework Programme (FP7) and other programmes

Regional research driven clusters focusing in sustainable use of biomass
In the beginning of the project the regional research driven clusters collected basic information about their present use of biomass as well as the potential of biomass. Besides the land use, policies and strategies were considered. The clusters studied the regional innovation environment related to biomass as well as potential bioeconomy businesses. Based on that information the clusters produced five regional strategic research agendas (SRAs) for the research orientated cluster and the regional joint action plans (JAPs) called implementation plans by the half way of the project. Thus the consortium continued to carry out the tasks including activities that it was committed to Grant Agreement.

The regions mentored each other about biomass related research, business, policy and innovation themes during the events and expert exchanges organized by BIOCLUS. The staff of BIOCLUS clusters promoted their expertise and strengthened their personnel, organizational and regional networks. The bioeconomy offers new opportunities for European rural regions. It is likely to enhance the sustainable use of biomass resources. In BIOCLUS project the focus has been in developing biomass related research driven clusters in five European regions. The regional SRAs and JAPs have a strong focus in sustainability in terms of economy, social wellbeing and environment. Besides, the actions often have cross cutting approach in the research and developing. There is a strong base for development of new biomass based production e.g. wood. The project organized large number of regional event targeted to the stakeholders from experts and authorities to public. This boosted biomass knowledge and implementation of new business concepts.

The political situation during the project has been challenging especially in many of the partner regions. In many cases this has decreased the financial support for biomass related R&D activities. However, there are exceptions. Especially in Greece the oil price has risen rapidly and the competiveness of bioenergy has increased. This has increase the knowledge demand as well. BIOCLUS experts have been able to support the regional and national development by disseminating information and by organizing essential events.

The innovation related topics were much more valuable for the partners that they expected before the project. The innovation related benchmarking visits were very fruitful from the partners' point of view. The intellectual property related information was valuable especially for Wielkopolska cluster. The cluster members got new ideas about cluster development and innovation management. Also the authorities changed valuable information about strategic planning and promotion.

Networking and cooperation were in the focus of BIOCLUS. It offered an opportunity to collaborate at regional, national and European level while the professional competences improved. It provided a network of biomass

related people form public sector, research environment and business organisations. It also offered a platform for regional triple helix to cooperate.

European additional value of BIOCLUS
At European level BIOCLUS gave great input in technology platform work, especially for Renewable Heating and Cooling Platform. It offered an opportunity to learn about and prepare oneself for Horizon 2020. It supported many European networks by offering opportunity for participation and information dissemination, e.g. Fedarena cooperation and standard promotion. Besides the network development lead to new expertise networks that have already resulted for example Biodrying proposal for Seventh Framework Programme (FP7) proposal.

BIOCLUS supports the joint use of research facilities by disseminating information about them and by introducing a model for the joint use of facilities. In business point of view it support of international cooperation for the fuel biomass market. It increased technology transfer (and practice transfer) between research orientated clusters and between EU and USA as well as technology optimisation. Besides, the benchmarking visit in USA gave extraordinaire opportunity for European experts, businessmen and decision-makers to learn about innovation management as well as initiative development.

At international level, there will be dissemination activities related to the best practices biomass solutions. For example biomass boilers will be exported from Poland. Cooperation with other foreign units will be done for biomass sector development. At international scale, ideas will be implemented in practice from following documents elaborated in BIOCLUS SRA, JAP and Mentoring and Mutual Learning Plan.

In nutshell the European additional values is following:

- Regional strategic development
- Technology transfer (and practice transfer) between research orientated clusters
- Capacity building and networking (e.g. Torrefaction)
- Innovation management development
- Cooperation platform for research facility joint use

Additional value for BIOCLUS clusters
The partners have intensive three year period. The first half was concentrating in the regional strategic works. The second half has been JAP facilitation by concrete action improving the research capacities and networking. The cooperation will continue in forms of the joint actions that have been initiated during the project and have become possible due to BIOCLUS contacts. Besides, the new cooperation opportunities are under consideration. The additional value for BIOCLUS cluster has been analysed at European, regional, organizational and personal level. In practice the Steering Committee meeting it was decided that the consortium will get together in autumn 2013 along the international bioenergy conference organized in Central Finland. The consortium will continue the cooperation in many fields.

At regional the project has produced valuable information in terms of analyses that were produced for the strategic works and for innovation environment development. For example in Navarra the process to provide

the regional strategy for bioenergy and in Central Finland it supported the regional climate strategy work by providing background materials about biomass use and potential as well as and by offering expertise for setting the regional targets for bioenergy. The project has been a process to increase the regional cooperation and it has formed joint views for biomass related research cluster member. The organizations have been cooperating and committed in joint research focuses. Besides the research facility has developed. The mentoring and mutual learning of regions have been active and successful. There has been information and experience exchange as well as collaborative discussion between experts, authorities and business representatives.

The project has produced new initiatives at regional, national and European level. Also transatlantic cooperation has been strengthened. The JAP facilitation process has produced more than 10 new cooperation platforms, e.g. European Framework Programme. It has supported European torrefaction network development. The experts, authorities and business representatives have at once had exceptional opportunity to develop their capacities and networks. This has resulted great ideas and perhaps innovations.

In Central Finland, for example JYU/VTT nanotomography co-operation continues as well as JI and VTT: INT-Testaa intl. co-operation. Besides the BIOCLUS works continues under Innovative cities initiatives that JAMK, JI, Regional authority Keski-Suomen liitto, Benet and VTT are involved. The innovation environment has been developed at different levels in different clusters. For example in Central Finland the new concept to support potential and new entrepreneurs, Yritystehdas (Business factory) has been initiated. It is operated in cooperation of JAMK, JYU and JI/ Protomo.

The regional biomass use and potential up-dated analyses will be used in the climate strategy up-date work. Furthermore, CERTH and VTT has introduced topics for RHC-platform, such as Advanced Fuels (sustainable production of biomass feedstock for new biocommunities (thermally treated biomass e.g. torrefied biomass and pyrolysis oil) and Industrial heat (Agrobiomass cofiring) and for EERA BIoenergy cooperation. JAMK and the vocational school of natural resources (POKE) have agreed about future training cooperation in the field of Solid biofuels standards. The basis of this training is in cooperation with VTT experts that have been participating in the international standard group. The first training will be in April 2013. The Central Finland JAP will be used in the further innovation work related to sustainability and biomasses, such as Innovative city initiative. In practise the cooperation continues also in the field of shared facilities in terms of

- JYU/VTT nanotomography co-operation continues
- JYU/VTT Future fibre products development facilities co-operation
- JYU/VTT PhD-thesis of Janne Keränen: Increasing the drying efficiency of cylinder drying,where the potential of impingement drying for improving paper drying rate and quality were demonstrated
- JYU/VTT PhD-thesis of Antti Oksanen (December 2012), Improving the material efficiency of furnishes in papermaking by stratification and chemical modifications
- JYU and VTT nanotomography and dewatering cooperation continues. Cooperation includes measurement and modelling in these areas.
- JI and VTT: INT-Testaa intl. co-operation: Piloting possibilities to small and medium sized companies (SMEs) is offered. The previous TESTAA-

project was launched to build up co-operation between the small and medium-sized entreprises (SME), large companies and research institutes in national level. In this concept small and medium-sized entreprises (SME) proved the potential of their technology cost-effectively in pilot-scale papermaking environment. Only own costs were expected to cover by SMEs. New small and medium-sized entreprises (SME) were sought all the time from different business areas: process devices, measurement and sensors, materials, chemicals, modelling etc. During BIOCLUS-project VTT enlarged this work for international level in project called INT-TESTAA.

In Slovakia the project has initiated of intensive cooperation of relevant stakeholders on national level including national authorities, biomass and energy producers. It has established of the fruitful cooperation within Slovakia Research driven cluster as well as between European regional clusters in the field of Sustainable Use of Biomass Resources. Also the awareness within biomass resources sustainable use has increase in Slovakia. BIOCLUS elaborated feasibility studies within the biomass production and its supplies for the biomass producers in forestry, wood-processing industry and agriculture. The feasibility studies are elaborated also for the biomass energy producers in the field of supplies ensuring and biomass quality and production processes efficiency increase. The Self-Governing Region Banská Bystrica, Department of Regional Development and Working Group for support of biomass production and utilization, coordinated by the Ministry of Agriculture and Rural Development SR utilize the BIOCLUS results to extent cooperation. For example it has been used for the update of Slovakian national strategy of wood biomass production and utilization.

In Wielkopolska, cardoon will be implemented as a new and innovative biomass energy source for dry areas of Wielkopolska, especially re-cultivated land after the lignite mines' activities. Knowledge about cardoon was transferred from Western Macedonia to Wielkopolska during BIOCLUS project. New boiler will be designed or accommodated for cardoon firing. Promotional activities will be done towards increase in number of agricultural biogas plants in the Wielkopolska Region. Greenhouse gases emissions will be decreased by energy efficiency improvement in different energy consuming devices. BIOCLUS ideas will be implemented in practice. New projects will be generated.

At national level in Poland, biomass boilers design will be improved for higher energetic efficiency. Green certificates introduction will be promoted for heat energy production from biomass. Financial support implementation will be promoted for small biomass boilers in dependence from boiler power (smaller powers – bigger support). It should decrease investments costs of biomass boilers for end users. Also, it should enable boilers on fossil fuels exchange to biomass boilers. Based on BIOCLUS activities and achievements, there will be cooperation with Polish Ministry of Agriculture in the elaboration of support rules for biomass investments and their operation. New, innovative biomass logistic chains will be elaborated with BIOCLUS experiences application. There will be implemented in practice ideas from following documents elaborated in BIOCLUS SRA, JAP and Mentoring and Mutual Learning Plan.

In Navarra, due to the impact of BIOCLUS project in the near future different activities are going to be carried out in the region related to biomass. At regional level, after the approval in 2011, 'Renewable Energy Technician' (including biomass energy) will be possible. Also BIOTERNA pellet production industry has started and will continue its EN+ Pellet

certification. Besides, with BIOCLUS project it has been reached a cooperation relation between all the stakeholders of the region belonging to research, industry and administration. This relation has started during the project but will last in the next future. This fact will enable further capacity of biomass sector.

At international level, the Seventh Framework Programme (FP7) projects prepared and approved during BIOCLUS (SECTOR and LOGISTEC) will make it possible to research deeply torrefaction and logistic issues related to biomass. Besides, ENERMASS from Interreg-SUDOE is now running for the creation of a transnational biomass cluster between regions of France-Spain-Portugal. Also, Navarra is participating on Bioenergy BESTF ERANET+, which will bring new opportunities to the region for the development of new biomass related research.

However, it is still pending the creation of a formal regional cluster. Besides, although the regional and consortium research lines in biomass are established in the JAP, its financing is not concreted and special efforts must be done regarding this aspect.

In Western Macedonia the first step of the BIOCLUS strategy was to select the right members. This cluster is consisting of all types of partners (enterprises, educational organisations / research institutions and regional authorities) to achieve the specified goal. The enterprises got into the cluster bringing their experience of the market, the educational organisations used their experience to inform/train the employees of the enterprises, the research institutions applied their high knowledge on biomass to solve important problems of the enterprises that do not allow them to increase their share in the market. In addition, the regional authorities provided all the other partners with information on available potentials, and through dissemination activities spread the outcomes of the project.

Before the first positive results showed up, it was important that the cluster would have been promoted by any mean in Western Macedonia. Hence, all types of public relations were elaborated (newsletters, brochures, webpage of each institution and project webpage, participation in exhibitions and conferences, TV and radio, etc.), in order to bring social awareness. This way, any new, innovative action on behalf of the cluster was known immediately.

Brainstorming between the enterprises' personnel gave solutions to common problems of all partners and then common solutions were investigated. Market issues were discussed and the main issues were strained (i.e. public opinion about biomass, market analysis, logistics, and political perspective of the government and local authorities). Then, public relations were used to solve as many misunderstandings as possible.

The experience of working in a team with companies of the same economic sector (on national and international level) increased extroversion and gave ideas for new collaborative work for industrial research and development projects, EU research funded proposals, sales of bundled products, etc.

Apart from that, the research institutions got valuable information and experience within this project, regarding e.g. harvesting technologies, biomass characterisation technologies etc which were based on the capacity building.

At organizational level the project has supported strongly the strategic developing process. It has facilitated the first steps identified in Joint Action Plan. It has supported the expertise promotion of research related cluster and supported interaction between triple helix actors. It has been a great learning process in Framework Programme world. Before the project the most of the partners didn't have experience about it. Now they are strongly prepared for Horizon 2020.

Furthermore, the personal processes have been in the focus. The project has facilitated large scale personnel exchanges. The people have built and strengthened their networks to peer-organisations at regional and international level. Besides, they have been able to cooperate with other kind of entities. For example the researchers have visited authorities and business cluster members, the authorities have learned from authorities in the different countries how to implement sustainability in strategic and practical level. The personal benefits has been networking and getting new competences and strengthening the old ones. Furthermore, the language skills as well as intercultural skills have been developed.

The details of the impact of project activities are introduced in the section 'A description of the main S&T results/foregrounds' – along the description of the activity.

In general level the impact of the project are following:

Regional level
- Supports regional strategic work
- Joint strategic view of regional key actors
- Useful analyses about biomass resources
- Activation of innovation systems
- Increased cooperation in the field biomass
- Stronger capacities for biomass R&D&I activities

Organisational level
- JAP facilitation cooperation
- Supported expertise promotion of staff
- Growth of regional and international networks
- Increased interaction of triple helix actors
- Seventh Framework Programme (FP7) Learning process

Personal level
- Great opportunity to increase expertise – also at practical way (e.g.personnel exchanges, competence promotion)
- Wider personal networks
- Further knowledge about partner regions operational environment and organisations
- Intercultural skills developed

Highlights of BIOCLUS
- New biomass investment: Co-generation plan to Slovakia with the efficiency of 1,8 MWe /1,2 MWth. The company carrying out the investment is the partner in the project and got decision-making support through the project
- Networking and expertise exchange led to new R&D&I proposals at cluster and consortium level – the cooperation continues in many projects and other intiatives

- Cardoon introduction to Wielkopolska region – it was learned in the study tour in Western Macodonia and studied by the Wielkopolska cluster member in the regional project
- Biomass is added in the 3rd Energy Plan of Navarra
- BIOCLUS analyses have been used as the background papers in the regional strategy development in all BIOCLUS regions
- Technology and practice transfer between research orientated clusters in Europe and between European Union and USA
- Regionally BIOCLUS supported regional competence promotion and other campaigns and concept development e.g. to convert heating from oil to renewable heating sources (small district heating networks and village schools).
- Commitment of organisations and staff - it is unusual to have 20 organisations to be cooperated for three years with same key staff!
- Strategic processes were supported, e.g. Navarra got bioenergy strategy
- Intercultural skills were developed - Be hard for a problem and soft for the people

4. Use and dissemination foreground

In BIOCLUS project has the BIOCLUS dissemination strategy that aims to support and give practical guidance for partners in dissemination activity planning and implementation. According to description of work the main objectives of BIOCLUS communication and dissemination are

- To ensure the communication and information dissemination between the consortium members
- To ensure the communication and information dissemination in the cluster regions and with the stakeholders
- To disseminate the project outcomes and results and to promote the awareness concerning sustainable use of biomass resources among the stakeholders and public.

The aim of BIOCLUS dissemination is to distribute information related to project activities. To exploit experiences and lessons learned as well as disseminate the deliverable to relevant stakeholders. The internal dissemination between project partners is introduced in Communication plan.

Material and information to disseminate

During the project life span the project produced interesting deliverable to disseminate during and after the project, such as

- Regional state of play analyses for regional strategic work
- Regional strategic research agendas
- Regional joint action plans
- Consortium level Joint action plan
- Models for sharing facilities
- Regional Mentoring and mutual learning plans
- Innovation track reports
- Event findings and materials

These deliverables are interesting as themselves, but also the process of producing strategic documents are very interesting. For that reason the consortium disseminated the experiences along the deliverables. The means to disseminate (dissemination channels) were introduced already in the dissemination strategy. The main channel has been the website (see http://www.bioclus.eu online). Besides, the partners wrote publications and gave presentation at regional, national and European level events.

The media was also used by sending media releases and by giving interviews.

Future dissemination activities

In Central Finland
The deliverables of BIOCLUS are in active use of the BIOCLUS cluster and Central Finland region. Especially the strategic works background materials (the analyses, mapping and SWOT analyses) and the documented views of future research focuses and next steps have been used at regional level for the strategic action. The national and regional bioeconomy initiatives are supporting that. Besides the innovation related information has been utilised at further steps in the development track.

In the near future the BIOCLUS partners disseminated BIOCLUS results, experiences and findings other possible events, such as international conferences, workshops, seminars. For example next annual Energy Day – seminar organised by BIOCLUS partner Benet – partners give presentations related to BIOCLUS topics. Besides, there is one presentation by VTT about the findings of the regional biomass use and potential analysis of WP2. The partners also use BIOCLUS results within international cooperation with international Research-driven-clusters.

In Wielkopolska
At international level, information about BIOCLUS achievements, deliverables and gained knowledge will be disseminated through Internet (eg. cluster members' websites), conferences, events and personal meetings. Baltic Sea Foundation will be contacted for attracting investments in biogas sector on the base of BIOCLUS materials. Dissemination activities will be focused especially on following states Ukraina, China, Senegal, Russia, Belorus, Moldova and other EU future members. Also dissemination activities will be done in other world's countries according to future opportunities.

At regional level, BIOCLUS materials will be disseminated at regional fairs, biomass related regional events organized by UMWW and during contacts with biomass market actors for biomass sector development in the region.

At national level, BIOCLUS materials will be disseminated at national fairs, among GIZEX customers and through Internet (eg. cluster members' websites). Information and dissemination about BIOCLUS achievement and generated solutions will be transferred to Polish Ministry of Agriculture. BIOCLUS information materials about deliverables will be presented to industrial enterprises for biomass sector development. Information materials will be used for knowledge transfer from different regions participated in the project to different Polish units. Foundation for the Development of Polish Agriculture will use BIOCLUS materials during its trainings in different parts of Poland. It will be done especially during trainings for biogas stations operations organized for agricultural advisors. BIOCLUS information materials will be presented during national and international conferences organized by ITP (min. 3 conferences per year). Materials will be transferred and disseminated through Polish Agricultural Engineering Association and through Polish Biomass Association POLBIOM.

Slovakia

In Slovakia BIOCLUS results and experience will be disseminated as follows:

- Professional and consultancy activities, utilization of BIOCLUS knowledge and experience, within forestry, agriculture, energy sector and environment
- Presentation of the BIOCLUS results for the seminars, workshops, conferences organized on national level
- Presentation of the BIOCLUS project results during working sessions and meetings with the relevant authorities and stakeholders
- Publishing the BIOCLUS results in the relevant press media

Western Macedonia
At regional level the first steps of dissemination activities after reporting period has been taken. On 10.12.2012, the partners who participated in the exchange visit to Central Finland made a thorough presentation of this visit to the assembly of the Regional Council of Western Macedonia. The members of the Regional Council were enthusiastic about the prospects and gave a warm welcome to the biomass concept and its perspectives for the regional economy. In addition, some data regarding biomass potential and perspectives will be utilized in order to attract investments in that field (pellets-, biogas production, district heating etc.), some of which are being considered in on-going feasibility studies.

At national level Western Macedonian cluster will disseminated the BIOCLUS outcomes on regional level during workshops organized in the framework of the Smart+ subproject 'TREC', which will be organized in W. Macedonia in March 2013 and will target regional authorities interested in RES clusters. It will also be disseminated within the project 'Enermed' in a workshop organized in Athens in April 2013 and on Crete in May 2013, targeting at regional authorities interested in investing in RES.

Navarra
After BIOCLUS Project is finished Navarra members will keep with the dissemination of the regional and consortium JAP in the events attending. Besides, these results will be specifically disseminated to the ENERMASS regions (France-Spain-Portugal), since this is very valuable information in which to be build up the strategies for the creation of the future cluster.

Besides, the Government of Navarra considers this project and the participation of the region in the project as a Best Practice to be disseminated and given as a good example of how a sector must be promoted and things must be done.

European level
The BIOCLUS consortium has already taken the first steps to disseminate the results and experience at European level. The following abstract are under evaluation:

- An abstract to The 2013 University-Industry Interaction Conference: Challenges and solutions for fostering entrepreneurial universities and collaborative innovation with the title of 'Strategic process supporting biomass orientated research-driven cluster development'. The authors: Kirsi Knuuttila and Heikki Malinen (JAMK), Goizeder Barberena and David Sánchez& Ines Echeverría (CENER) Chrysovalantis Ketikidis and Panagiotis

Grammelis (CERTH), Ingrid Krissakova &Milan Oravec (NFC) and Marek Hryniewicz and Anna Gryzbek (ITP)
- An abstract to The 2013 University-Industry Interaction Conference: 'Jyväskylä business and innovation factory (BIF) ' The authors Mikko AHONEN, (JI/Protomo), Heikki Malinen (JAMK) and Risto Kinnunen (Jyväskylä Regional Development Company Jykes Ltd)
- The partners use their cooperational networks to disseminate the experiences and results of BIOCLUS – e.g. ROKFOR and ResGEN cooperation, Bioregions and other IEE cooperation networks, Fedarene-networks etc.
- JAMK and Keski-Suomen liitto (regional authority) are building proposal to promote regional bioecomy for call Bioregions (FP7) with CERTH (Western Macedonia). Through this cooperation network the results will be disseminated.

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Furthermore there will be presentation of the BIOCLUS results within international conferences, workshops, seminars.

List of Websites:
http://www.bioclus.eu.