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BIOEUPARKS

Reports on social – environmental impact of the supply chain

D2.5

WP 2 AWARENESS RAISING AND DEVELOPMENT OF METHODOLOGIES FOR FACING LOCAL CONFLICTS

LEGAMBIENTE
Lead Partner

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Contributing Institutions:

1. Legambiente
2. Kozjanski Regional Park, Slovenia
3. Sila National Park, Italy
4. Danube-Ipoly National Park, Hungary
5. Sölktäler Nature Park, Austria
6. Rodopi National Park, Greece

1. Introduction

Responsible partner: LEGAMBIENTE

The BioEUParks project has important implications on social and environmental aspects, either because the set-up of a supply chain entail an impact on local economies, either because the project foresees a participatory process aimed at involving all local actors, in order to avoid conflicts or - at least - to achieve a resolution of these conflicts. One of the aims of the project is in fact to reduce the environmental and social impact of the planned activities as much as possible and look for benefits for affected communities.

Furthermore, the activation of a supply chain has also played a role in promoting the development of local economies, satisfying the market demand, stimulating the growth of income and employment - also trough the creation of local networks - and ensuring participation and an inclusive decision-making process that involved local communities.

On this basis, a key part of the project is to examine how Parks identify and assess the potential environmental and social impacts of the project, evaluate alternatives, and design appropriate environmental and social management plans during and after the life-cycle of the project.
To accomplish this task, Parks took into account several aspects:
- Ex ante evaluation of the socio and environmental contest
- Analysis of the information needed to check project progress and evaluate the effectiveness of the activities carried out.
- Final evaluation that allow partners to analyze the results of the project, especially taking into account difficulties and weak elements that arose during the activities, with the aim of identifying enhancement and mitigation measures.

Parks started the evaluation on these aspects in their first *Report on the social and environmental impact of the supply chain*, drafted during the months of June and July 2015, at the end of the first heating season. Thanks to this final report, the collected data have been integrated in order to have a full framework of the social and environmental impact of the project.

Methodology used

According to the project, a common template in English has been created and distributed to the consortium, in order to be filled and integrated – if necessary - with other elements, thus to make it more functional as possible to each partner specific needs. The template identified the main issues that partners should have been taking into account during this analysis: the legislative framework, the identification and analysis of potential social and environmental impact resulting from the project, the indicators that could have been used to monitor the impact.

2. Sila National Park, Italy

General Overview

During the project period, thanks to the involvement of local economic actors, the supply chain designed to provide biomass to the Sila National Park has been established as project pilot action.
The objectives of the pilot action

- involving stakeholders of the Sila National Park area and exploring their potential interest in the supply chain, also taking into account the environmental, economic and social context;
- involving other public authorities of the Sila National Park territory;
- Analysing the potentiality of creating a supply chain for the supply of biomass as fuel within a 50-km range from the extraction area;
- identifying new stakeholders with the aim of enlarging the supply chain and evaluating potetial positive impacts.

Environmental regulatory framework

Besides the national policies for the forestry sector and energy supply chain listed in the first report on the environmental and social impact of the project, it is important to keep in mind the regional forestry legislation. In fact, forest cuts in the Park area are subject to three main regulations:

- *Calabria Region's forestry law (L.R: n.45 2012) "Management, protection and valorisation of the regional forestry heritage"* laying down general rules and guidelines to improve sustainable forest management designed to preserve the territory and fight against climate change. This law aims at strengthening forestry supply chain starting from the production level in a way that ensures, in the long term, the multi-functionality and diversity of forest resources. This law also says which forestry interventions can be realized.

- *General Provisions and Forest Police Provision (GPFP) laying down technical and administrative rules for the use of forests.*

These provisions state that, in order to obtain cut authorisations, public and private forest owners have to present a project drafted by a qualified expert

- *Sila National Park management plan*

Art. 23 – Interventions in forests and tree cuts

Zones A (integral natural reserve)	Any sylviculture intervention is forbidden
Zones B (oriented general reserve), C (protected areas for traditional uses) and D (areas of economic promotion)	Sylviculture interventions (forest utilisations, thinning, pruning, plant health cuts, etc…) must be authorised by the Park following explicit request.
Zones B	In corsican pine, beech, oaks and other high forests, forestry utilisations are allowed (based on selection cuts) with an utilisation rate of 1,5%.
Zones C and D	Thinning can be made according to GPFPs.

The local key stakeholders involved in the project

In order to disseminate "Bioeuparks" project on the territory, forestry companies, forest owners and transport companies existing within the Sila National Park area were involved. In particular, dissemination events aimed at identifying potential biomass producers and highlighting current biomass utilizations. The awareness events also helped to identify companies equipped with forestry machines suitable for harvesting residual biomass and processing it for heating purposes.
Moreover, the companies had to be included in the regional register of forestry companies with specific reference to forestry works, environment restoration, biomass chipping, reforestation, restoration of degraded forests, wood transportation. All these criteria were taken into account while drafting the public tender.
About the companies that took part to the project they had very diverse structure: from small ones, employing few workers and using few machines as well as medium-size enterprises with many machines and 30 to 40 employees.
In the case of the tender for the supply of pellet to the boilers of Sila National Park, the winning applicant is a company with 40 employees, half of them are skilled workers.
This company's core activity is a sawmill producing construction wood for the local market. Moreover, the enterprise makes forest works and harvests trunks for the sawmill and wooden sub-products destined to shredding or chipping that used to be sold to thermal power plants in Crotone and Cosenza provinces.

Identification and analysis of potential social and environmental impact resulting from the pilot supply chains

In general, the concrete benefits of using biomass fuels supplied by the sustainable supply chain are related to improved life standards both in terms of less emissions (compared to traditional fuels) and more job opportunities generated in the local context.
The activities of Bioeuparks allowed to realise:

1. the starting of heating boilers that had so far remained switched off (see the list in the following table);

N	Building	Village	Province	Fuel	Brand	Mod	KW
1	Park seat	Lorica	Cs	pellet	Pasqualicchio	CSB180	208
2	Cupone sawmill	Spezzano Sila	Cs	pellet	Pasqualicchio	CSB180	208
3	Cupone Study Center	Spezzano Sila	Cs	pellet	Pasqualicchio	CS70	77
4	Longobucco Museum	Longobucco	Cs	pellet	Pasqualicchio	CSB80	92
5	Lorica-Mellaro	Lorica	Cs	pellet	Pasqualicchio	CSB99	114
6	CTA- Melis quarry	Longobucco	Cs	pellet	Palazzetti	Martina 15	15
7	CTA-Carbonello	Taverna	Cz	pellet	Palazzetti	Martina 15	15
8	CTA-	Spezzano	Cs	pellet	Palazzetti	Martina	15

	Cupone	Sila				15	

2. Realisation of the biomass supply chain;

3. Reduction of biomass transportation to local thermal power plants;

	DISTANCE IN KM	**AVERAGE CONSUMPTION KM/L**	**DIESEL CONSUMPTION**	**DIESEL COST**	**EMISSIONS IN KG OF CO2 PER SINGLE SUPPLY TRANSPORTED**
Thermal power plants					
Crotone	53	2,8	148,4	175,854	409,92
Strongoli	55	2,8	154	182,49	425,59
Rende	70	2,8	196	232,26	541,66
Laino borgo	170	2,8	476	564,06	1315,47
Park plants					
Park headquarters	27	2,8	75,6	89,586	**208,91**
Cupone	36	2,8	100,8	119,448	**278,56**

4. Creation of a pellet purchasing group.

From the analysis of the above-mentioned activities, the impact of this project in the Sila Park territory is certainly positive. In particular, environmental benefits deriving from the use of biomass for energy purposes are clear, as the use of biomass instead of foxile fuels allows to avoid the emission of significant amounts of CO2. Furthermore, the emissions linked to feedstock transportation to local thermal power plants have been avoided. The performance figures are showed in the table below:

PERFORMANCE INDICATORS: ESTIMATED RESULTS				
SNP with LPG	**2013**	**2014**	**2015**	**2016**
Consumption LPG/kg	3329,6	11261,6	9282,0	
Emissions CO2/ton	9,8	33,2	27,4	
SNP - PELLET				
biomass produced (ton/y)		0	90	153
electricity produced Mwh/year		0	0	0
thermal power produced MWh/year			209	355,73
renewable energy produced MW/year		0	209	355,73
primary energy savings TOE/year			21,14	35,94

reduction of greenhouse gas GHG TON co2 /year		0	80,33	136,56

From an economic perspective, positive impacts are clear as well. In fact, the budget allocated by the Sila National Park for the purchase of fossil fuels amounted to around **€ 50.000,00** in the past years. Today, the budget spent to purchase local biomass is up to **€ 27.636,00**.
Therefore, this is a concrete saving for the Park authorities; morevoer, it represents a value added to local economy, as the money used to purchase the pellet does not go to foreign countries or oil transnational companies but creates a virtuous circle in the local community.
From the social point of view, the use of biomass will allow in the future the development of a local-scale forestry economy where workers, experts and companies of the forestry sector will find opportunities to start new entreprises and create new jobs, multiplying the positive effects in the territory.
The increase in the use of biomass as fuel will be ensured by the recent creation, promoted by the Sila National Park, of a pellet purchasing group. This group is composed by local companies of the tourism sector that have biomass heating systems in their facilities. This group of entrepreneurs will be coordinated by Assopec (a trade association) operating in the municipality of San Giovanni in Fiore.
The purchase group committed to respect the same criteria set by the Park in relation to the following aspects:

- occupational health and safety;
- traceability of raw material: all actors have to conform to UE Regulation n. 995/2010 that, since the 3rd of March 2013, have obliged all European operators to reduce the risk of illegal wood import through the adoption of specific actions and procedures;
- prevention of environmental risk. The supply chain involve issues relating to forest management and emission of pollutants. Thus, monitoring the real environmental impacts of the wood-energy sector is extremely important;
- the promotion of new local markets that may create new jobs in the whole supply chain and tackle rural depopulation phenomena.

Indicators and potential mitigation measures

PROTECTION OF ENVIRONMENT	INDICATOR
Responsability A sustainable wood-energy supply chain has to comply with principles of environmental responsibility. All actors are tied to the full respect of laws, also considering that the supply chain is realised within a protected area.	• Traceability of feedstock, as a parallel feedstock import sector exists. It is important that all wood biomass participants comply with EU regulation n.995/2010 that dating from 3rd March 2013, requires all European actors to adopt appropriate procedures reducing the risk of importing wood products of illegal origin.
Environmental impact To ensure an appropriate	• Prevention of environmental damage: the supply chain

management of raw material, particularly in the early steps of the supply chain (from woodland to sawmill), may help protect forest ecosystems and biodiversity, as well as avoid biomass waste.	involves issues related to the management of woodlands and emission of pollutants. • Besides protecting the ecological functions of woodlands, an accurate forest management (through thinning interventions and the removal of residues after forestry works), also in hard-to-access areas, reduces the risk of fires and soil erosion. • Carbon neutrality (that is, of CO2 emissions) represents a fundamental difference between biomass and fossil fuels and is the main justification of public interventions in this field. It is important, therefore, to monitor an reduce emissions caused by the production and transport of biomass during the steps of the supply chain.

LOCAL ECONOMIC DEVELOPMENT	
The creation of the supply chain in the Sila National Park area will build a closer connection between local consumers and biomass harvesting areas. This may present, in turn, a more transparent image of the territory and consequently stimulate local economies. Furthermore, the creation of local supply chains implies reducing distances for the transport of feedstock and decreasing CO2 emissions. Other important effects include:	• the reduction of "intermediaries" involved in the process, leading to a fairer distribution of the added value among the players and to a better remuneration for biomass producers; • the sustainability of the production phase, improving the inclusion of local producers in the social context and reducing risks of conflict with the population; • the promotion of new local markets, creating new jobs along the supply chain, slowing down rural depopulation, and improving local skills related to harvesting, processing and transport of wood.

Conclusions

During the last years, the massive introduction of natural gas in Calabria determined a sudden and serious loss of energy self-reliance of local communities that had to go through systematic fossil fuel supplies, being exposed to their effects in terms of price volatility. In general, social benefits connected to biomass use refer to improved life standards, lower emissions compared to harmful fossil fuels, job opportunities for locals and sustainable use of woodlands. In this project, the substitution of boilers and the introduction of biomass fuels will allow the Sila National Park to play a leading role in the communitym and the use of local biomass represents and added value for local economy.
The money needed to buy pellet to fuel boilers will no more be destined to other countries or to oil transnational companies: on the contrary, it will create a virtuous circle for the local community.

Keeping the money within the local economy will, in turn, help revitalise other activities.

Environmental benefits deriving from the use of biomass for energy purpose are widely acknowledged.
The use of biomass rather than fossil fuels allows to avoid the emission into air and soil of huge amounts of CO2 and other polluting elements. While burning, biomass emits the same amount of CO2 it has accumulated during its life. Moreover, emissions linked to the transportation of biomass to thermal power stations will be avoided.

The use of biomass, mainly from forestry processing residues, will favour the development of a local, forest-based economy where companies and experts may start businesses and create jobs with concrete impact on the territory. That already happened thanks to the creation of a local purchasing groups that could guarantee the reduction of market costs of the heating products and, on the offer side, it could contribute to ensure the economic sustainability of the supply chain, ensuring a stable and aggregated demand of biomass.

3. Solktaler Nature Park, Austria

Introduction

The implementation of the supply chain is slighlty different in Sölktäler Nature Park from the other natural parks involved in the project. The reason is related to the impossibility of activating a new supply chain, as biomass was already exploited on the territory. So the Park concentrated its effort in the promotion of the using of local biomass in the thermal plant of Stein/Enns previously fed by external biomass for the 80%. The result was the signing of a contract where the Plant owner commits himself to feed the plant 100% with local biomass processed according with defined sustainability criteria.

Environmental regulatory framework

The most important rules for the forest is the Austrian Forest Act 1975. It also highlights the commitment to sustainability is regulated:

- §1 (3) »Sustainable forest management within the meaning of the Austrian Forest Act means the management and use of forests in a way and to an extent that their biodiversity, productivity, regeneration capacity, vitality and potential to be maintained permanently, to present and future ecological, economic and social functions to meet at local, national and global levels, without damaging other ecosystems."
- The Austrian Forest Law ensures that the forests are managed sustainably. In the Austrian Forest Law the definition of sustainable forest management (SFM) is already fulfilled (Call on 22.11.2012 with Dr. Albert Knieling Ministry of Agriculture. Albert Knieling confirmed that the principles of Sustainable Forest Management (SFM) are fulfilled by the Austrian Forest Act 1975).

Local key stakeholders involved in the project

- Forest Enterprise in Sölktäler Nature Park: 137 forest enterprises are farming 8.785ha of forests in the Sölktäler Nature Park (Styrian country stats 2010). Forests without use are not included in this area.

- Forest Enterprise without agricultural farm: 16 forest enterprises are in the Sölktäler Nature Park.

- Farmers with forest land: 121 farmers are farming 50% of the forests in the Sölktäler Nature Park. Farms are usually operated by family: they have no employees for the work in the forests. Farmers also work together with felling companies

Identification and analysis of potential social and environmental impact resulting from the pilot supply chains

During the implementation of the project Sölktäler Nature Park worked about the identification of local forester and farmers which could supply local sustainable harvested biomass for the Stein/Enns plant and, on the other hand, about convincing BIOwärme Tasch, owner of Stein/Enns plant, to purchase local biomass.

Thanks to its actions, SNP obtain the signing of an agreement between plant owner and the park itself in which are detailed some key conditions - according with sustainability principle and the respect of SFM criteria - that the operator will respect in producing thermal energy for the local end user (municipality Sölk, Sölktäler Nature Park, elementary and middle school, residential houses).
Therefore, when looking at the the supply chain there was an increase of the share of regional biomass during the project lifetime, and in Stein/Enns 8 farmers were involved for cutting, extracting and transportation of the timber. 1 company did the chipping of the timber.
In this supply chain the increase of the share of regional biomass is 80%. Based on the monitoring data for the supply chain this means 1.600 more working hours (2.000 in total) for the farmers and the chipping company in the region of Sölktäler Nature Park.
Furthermore, in the 3 supply chains in Sölktäler Nature Park 14 farmers were involved for cutting, extracting and transportation of the timber. 2 companies have done the chipping of the timber. In the process of supply chain total 42 stakeholders were involved.
Must be also said the awareness strategy was able to avoid social conflicts: the inhabitants from Sölktäler Nature Park were involved in the project at every time and the board from Sölktäler was informed regullary in the board meetings. The employee´s from Sölktäler Nature Park had many informal discussions with land owners and the owners of the heating plants.
The signing of 10 Memorandum of Understandings by stakeholders and heating plant operators is proof of the broad support for the project BIOEUPARKS on national and regional level.

About the environmental impact, by increasing the share of regional biomass by BIOEUPARKS project to 100% the complete supply of biomass from sustainably managed forests is ensured in Sölktäler Nature Park.
The use of 100% regional biomass causes in 2015 primary energy savings of 166,4 TOE and a reduction of 478,5 tons CO_2. The calculation is based on a comparative production of heat with fuel oil.
When looking at the the supply chain in Stein/Enns the primary energy savings is 72,7 TOE and the reduction of CO_2 is 209 tons. Taking into account only the increase of regional biomass in this supply chain (+80%), the primary energy savings is 58,2 TOE and the reduction of CO_2 is 167,2 tons.
The use of regional biomass reduced long distance truck rides. About 10.000km/year could by saved by the use of biomass within a 50km range. This means an additional CO_2 reduction of 271km/year.

Indicators and potential mitigation measures

DESCRIPTION	INDICATOR	MITIGATION MEASURE
Increase the proportion of regional biomass used in the heating plants in Sölktäler Nature Park	• The proportion increased 50% within the project BioEuParks • The increase in the regional proportion of regional biomass transport route has been shortened to	

	10,337km. • CO2 reduction is due to the reduction of transport routes: this causes a CO2 reduction of 271kg	
Potential for increasing the share of regional biomass is in family homes	• Data collection is very difficult in this area, as there is no obligation to report the change of the heating system. • Based on the survey for the conversion of the heating systems in family homes, the change in CO2 emissions can be calculated.	Data collection will be done by survey in the various districts.

Conclusions

By BIOEUPARKS it was possible to increase the share of regional biomass to 100%. It is proven that the total biomass used in the heating plants in Sölktäler Nature Park comes from sustainable managed forests.
Through an intensive awareness-raising process in the project BIOEUPARKS it was possible to avoid social conflcts in Sölktäler Nature Park.
Throw the increase of the share of regional biomass it was possible to create almost one additional job (1.600 working hours) in the region.

4. Kozjanski Regional Park, Slovenia

Environmental regulatory framework

Slovenia has a comprehensive legislative framework for renewable energy sources (RES). As one of the activities within Holistic project is installation of heating system on wooden biomass in the selected object in the Municipality of Ajdovščina, only the most relevant legislative documents will be presented in this chapter.

New Energy Act (EZ 1)

New Energy Act (EZ 1) was adopted in March 2014. Governed by the provisions of the ten European directives, it arranges the field of energy market, promotes energy efficiency, and renewable energy.
The law gives the legal basis for the adoption of the national strategic documents that will define the long-term policy in the area of land use and energy supply in the future.

Resolution on the National Energy Programme (ReNEP)

Resolution on the National Energy Programme (ReNEP) was adopted in 2004. It is a strategic document for the future functioning of the coordinating institutions dealing with energy supply.
It puts the objectives and sets out the mechanisms for achieving reliable, competitive and environmentally friendly energy supply.
Furthermore, it puts the objectives and mechanisms for increasing the understanding of the role and importance of energy in increasing prosperity.
It contains the objectives, guidelines and selected strategy of energy supply and use and prospective energy balance for a periods of 10 and 20 years.
Also, it determines the long-term development objectives and policies of energy systems and energy supply, among which are incentives for investments in energy efficiency and renewable energy, and the use of economically eligible technologies for the production of fuels and energy production.

The Second National Action Plan for Energy Efficiency for the Period 2011-2016 (AN URE2)

The Second National Action Plan for Energy Efficiency (AN URE2) contains an overview of the objectives and implementation of The First National Action Plan for Energy Efficiency for the Period 2008 to 2010 (AN URE 1), assessment of the achieved effects and planned activities during the period 2011-2016, and financial resources for the implementation of programs and measures for achieving the objectives of energy efficiency.

National Renewable Action Plan 2010-2020 (NREAP) Slovenia

National Renewable Action Plan (NREAP) was adopted in 2010. It is a strategic document aiming at determining quantitative values of energy usage from RES. In the NREAP first is presented national renewable energy policy, followed by expected final energy consumption for period 2010-2020. In the second part of the document national

and sectoral targets and trajectories are presented. The main part of the document prescribes specific measures needed to fulfill the requirements of the Directive 2009/28/EC, and describes support schemes for promotion of energy from RES.

National Energy Programme (NEP)

National Energy Programme (NEP) is in adoption process from 2011. NEP identifies the long-term development objectives and guidelines of the national energy policy, energy systems and energy supplies, taking into account the environmental and technological criteria, the development of public infrastructure and infrastructure of national importance, and the incentives and mechanisms to encourage the use of renewable energy sources and implementation of measures for the efficient use of energy.

Furthermore, there are many different documents (see first Reports on social – environmental impact of the supply chain) related to production and use of biomass for heating. Some of them are indirectly related with RES (administration, construction, environment impact assessment, etc.), while others are lower legislative acts addressing heating of buildings.
Besides, the forests area is covered by the Act on Forests which regulates the protection, silviculture, exploitation and use of forests, and the disposal of forests as natural resources with the aim of ensuring their close-to-nature and multi-purpose management in accordance with the principles of protection of the environment and natural values, long-term and optimal working of forests as ecosystems, and enabling their functions (Article 1 of the Act on Forests).

Local key stakeholders involved in the project

1. Slovenian forest service (Regional unit Brežice and Celje). It is a public organization with 110 employees, area of competence is 290.463 ha. Objectives: Preservation and close-to-nature development of Slovenian forests and of all their functions for their sustainable and good management and use as well as nature conservation in forest space for the good of present and future generations. Competences are described in national forestry law
2. The Chamber of Agriculture and Forestry of Slovenia (Regional unit Celje and Novo mesto). It is a public organization with 100 employees, area of competence is about 400.000 ha. Objectives: They advice owners of agricultural lands at management.
3. Representatives of the local community (Kozje (89,7 km^2 – inside park 89%), Bistrica ob Sotli (31,1 km^2 - inside park 100%), Podčetrtek (60,6 km^2 - inside park 52%), Brežice (268,1 km^2 - inside park 52%), and Krško (286,5 km^2 - inside park 2%)), This are public organisations with 30 employees.
   Objectives: Local communities are taking care of infrastructure, educational system, associational activities and health supply inside their area.

Furthermore in our area there are 8 companies with cca 200 employees. In our area there are also two agricultural cooperatives with cca 20 employees. In the Park we don't have a local or regional management plan. Every year we prepare a program of our activities for the exact year.
In accordance with the Act on Forests (art. 5) the tasks of forest owners are:

1) Rights of ownership to forest shall be exercised in such manner as ensures their ecological, social and productive functions. The owner of a forest must therefore:

- manage the forest in accordance with regulations, management plans and administrative acts issued on the basis of the act;
- allow free access to and movement in the forest to others; and
- allow beekeeping, hunting and the recreational gathering of fruits, herbal plants, mushrooms and wild animals in accordance with regulations.

2) Owners of forests shall have the right to participate in procedures for adopting forest management and wildlife management plans and in the preparation of forest silviculture plans. Their needs, proposals and requests shall be respected as far as is possible and consistent with ecosystem and legal restrictions.

Identification and analysis of potential social and environmental impact resulting from the pilot supply chains

- 3 new jobs - new jobs are in a private sector because of a working remote control heating sistem (1 new job – direktor of District heating Kozje, 2 new jobs- production and sale of wooden biomass;

- Increased local income because of production and sale of more wooden biomass for the need of of District heating Kozje. Everything is running inside of a private sector. Public institute Kozjanski park is working as an important intermediary between solo private actors;

- Better environmental awareness - as a part of a project, we held many events and meeting where we gave information to attendees about positive influences on environment with use of wooden biomass used for heating;

- Unspoiled biodiversity in general - With increasing wooden biomass used for heating we positively influence on keeping biodiversity in a sense that the environment is less polluted and destroyed and therefore many plants and animals would better life conditions, especially inside Natura 2000 areas. Within the project we held many classes where we introduced positive effects.

Conclusions

1. We succeeded in establishing system of Local supply chain in a settlement Kozje - The use of fosil fuel has reduces, we connected manufacturers of wooden biomass, owner of a remote control heating sistem and final users.
2. With executing workshops, round tables and solo meetings we contributed to bigger awarness of residents about the meaning of protecting environment.
3. We introduced the project to visitors of a protected area on our events. This is how we contributed to getting to know the meaning of using wooden biomass.
4. We made a lot of articles in local newspapers so we can inform residents of protected area with project activities.
5. We want to establish society of forest owners– with help of society we could fulfill project goals even more also the durability of this would assured.

5. Rodopi National Park (Rnp), Democritus University Of Thrace (Duth), Greece

Environmental regulatory framework

The RNP area is protected by multiple protection regimes in National, European and Global level. In particular, seven (7) areas of the RNP have been integrated into the Natura 2000 network according to the Habitats Directive 92/43/EEC and the 2009/147/EC (two (2) SPA and five (5) SCI), 2 areas have been characterized as Preserved Natural Monuments, seven (7) areas as Wildlife Reserves according to the Greek law and three (3) regions which have been characterized by the European Council as Biogenetic Stocks

The Forest Service as the owner and responsible for the management of the forests and local Forest Workers Cooperatives are involved in the harvesting procedures of the forest biomass.
The Forest Workers Cooperatives (FWC) are legal entities commissioned to operate in state forests providing logging services.
The main legislation documents that rule their operation are:

- Law 86/1969 "Forest Code" Article 134
- Presidential Decree 126/1986 "Procedures for granting the operating, maintenance and improvement of forests belonging to the State and legal persons of the public sector in forest cooperatives".

The Forest Workers Cooperatives could exercise wood trading without restrictions, a case which is actually very rare.

The framework that regulates RES use is a cluster of laws and regulations (Ministerial decrees) from which the most significant are the following:

- Law 3468/06 "Production of Electricity from Renewable Energy Sources and CHP plants and other provisions"
- Law 3851/2010 "Accelerating the development of Renewable Energy Sources to deal with climate change and other regulations addressing issues under the authority of the Ministry of Environment, Energy and Climate Change" –
- Law 4062/2012 "Exploitation of former Hellinikon Greek Airport - HELIOS Project - Promotion of renewable energy use (Directive 2009/28 / EC) - Criteria for Biofuels and Sustainability Bioliquids (Directive 2009/30 / EC) ".

There are only few and relatively recent regulations and guidelines for the protection of consumers from fraud during their transactions during biomass trade which are:

1. Guide for firewood transport which is actual a technical description for biomass storage and trade published from the Ministry of Development and edited from CRES (Centre for Renewable Energy Sources)

2. Solid biomass fuels for non industrial use - Requirements and Test Methods Ministerial Decision 198/2013 (GG 2499/B/04-10-2013), Ministry of Finance

Local key stakeholders involved in the project

As has been described Forest Service is the sole owner and responsible for the management of the forests. Local Forest Workers Cooperatives commissioned by law are involved only in the harvesting procedures of the forest biomass. The Forest Service in the RNP area is represented with 3 basic units-forest offices which are:

1. The Forest Office of Drama with 91 employees
2. The Forest Office of Nevrokopi with 16 employees
3. The Forest Office of Stavroupoli Xanthi with 11 employees

Forest Workers Cooperatives perform the harvesting operations inside the RNP and therefore their participation in biomass production process in a LSC is mandatory. Inside the RNP area operate 72 Forest Workers Cooperatives comprising 463 members. These numbers reveal a great fragmentation and a small average size of membership.

The Forest Workers Cooperatives share the prescribed for harvesting wood volume according to annual or biennial programs, compiled by each Prefectural Directorate. Each FWC is installed in one or more forest stands inside the harvesting area by the Forest Service. A 12% of the revenues derived from wood products sell are transferred to the Forest Service and to the Green Fund and an administrative fee of 5% is paid to the municipal authority where the harvesting takes place.

Alfawood is the only operable biomass processing facility inside the RNP. It has been established in 2010 nearby the town of Nevrokopi it has production capacity of 65,000 tons per year. This facility uses 100% coniferous logs and wood from products that are residues of coniferous wood processing. The production in 2012 was about 40,000-45,000 tons where 95% of this production is channeled to the local market and only 5% is exported. Only a small portion of this production (less than 5,000 tons/year) was derived from pine wood post-processing residues. About 10 to 15 people are working in the facility and the number balances over the time.

The population of the area is 19.502 people that are settled in 23 small and medium sized communities. These communities are distinctive spatial units that belong in 4 different municipalities which is the target group of the end users in the LSC. Contacts and specific meetings they have already performed by the Bioeuparks partners with representatives of all of them. Since today one municipality thanks to Bioeuparks doubled the number of biomass boilers in municipal buildings and raised greatly the established thermal capacity and the energy efficiency use. A second municipality is ready to install two biomass boilers and discuss to obtain two more using leasing.

Identification and analysis of potential social and environmental impact resulting from the pilot supply chains

An ultimate assess of the impacts should not be limited only to environmental and social impacts but it should contain also an assessing of the economic impact of the LSC implementation as well. For facilitation reasons each impact will be fallen only in one of the three main categories even if it attaches directly or indirectly all categories. The three categories are:

⇒ Environmental impacts
⇒ Social impacts
⇒ Economic impacts

Different types of those categories are analyzed in detailed below:

Climate change mitigation is an environmental impact that focuses directly to the goals that EC have set by the Directive 28/2009 and in addition to the country's targets regarding the 20-20-20 policy and of course beyond that. The positive contribution of the impact is low because of the low total established capacity (1MW) of biomass boilers until today. This contribution could be greater as more authorities we assume to be engaged in the established LSC in the near future. The direct effects of the impact in local population are extremely low but the indirect ones for the country and its obligations could be assessed as impermanent but moderate.

GHG reduction is also an environmental impact that is related directly to the goals that EC have set by the Directive 28/2009 and also the country's targets regarding the 20-20-20 policy. The positive contribution of the impact is assessed as moderate because of the great reduction of fossil fuels consuming even if the total established capacity (1MW) of biomass boilers is low until today. This perspective will be better visible as more public authorities will be engaged in the LSC in the near future. The direct effects of the impact in local population is extremely low but the indirect ones could be assessed as impermanent but moderate.

Pressure on natural resources is an environmental impact that focuses directly the goals that have set by the Directives 92/43/EEC and 2009/147/EC and in country's environmental and forest legislation. The negative contribution of this impact is assessed as low. The direct effects of the impact in local population are extremely low.

Dependency on fossil fuel is a social impact that focuses directly the goals regarding the 20-20-20 policy beyond. The positive contribution of this impact is assessed as low. The direct effects of the impact in local population are extremely low but the indirect economic ones could be assessed as permanent but high because of the great difference of costs between pellets and the equivalent oil for the same thermal result.

Energy use efficiency is an economic impact that focuses indirectly the local population. The positive contribution of this impact is also assessed as high.

Knowledge & experience transfer is a social impact that focuses directly to other authorities as end users and to the local population. The positive contribution of this impact is assessed as moderate today but there is great possibility to be assessed as high as time passes.

Consensus building is a social impact that focuses directly to all local actors in the LSC. The positive contribution of this impact is assessed as moderate today but there is great possibility to be assessed as high as time passes. The project operates as motive causing hesitant communication between local actors in an area where the chances for local economy stimulation through biomass LSC development were not assessed before.

Local economy growth is an economic impact that focuses directly to all local actors and indirectly to the local population. The positive contribution of this impact is assessed as high as the area's economy is based mainly in agro-forestry sector. The LSC acts as an opportunity for new income creation directly and indirectly.

Jobs maintenance and creation is a social impact that targeting directly to the local population. The positive contribution of this impact is assessed to be low to moderate as the area's economy is based mainly in agro-forestry sector. The project acts as an opportunity for new jobs creation in all levels of NACE and in all types of actors involved in the LSC.

Indicators and potential mitigation measures

no	year	site	Maximum capacity Kwh	Mean capacity Kwh	capacity Kcal/h
1	2013	Fire station	80	60	51,600
2	2013	City hall	80	60	51,600
3	2013	Neyrokopi gym	150	110	129,000
4	2014	Perithori school	222	186	160,000
5	2014	Bolakas gym	278	232	200,000
6	2014	Bolakas school	222	186	160,000
7	2015	Adriani school	154	116	100,000
8	2015	Nikiforos school	154	116	100,000
			1,340	**1,066**	**952,200**
			Max capacity	**>1**	**MW**

The total installed max capacity is today 1.34MW greater of 1MW that the project has set as reference number. Even if this max capacity is obtained from eight different units the results could be comparable someway with those obtained by CHPs. The goal of installed capacity equal or greter of 1MW achieved so no mitigation measures needed. In addition, the possitive trends between the two heating seasons is very strong sign of the transform of the social attitude and the acceptance among local stakeholders.

	RNP - Benchmarking	RNP - 1st year	RNP - 2st year	Trends 2013-2014
Biomass Produced (Ton/year)	0	1,783.38	3,484.05	95,36%
Electrical power MWh/year	0	0.00	0.00	#
Thermal energy MWh/Year	0	8,827	17,249.96	95,41%
Renewable Energy production (MW/year)	0	396.00	881.10	122,50%
Primary energy savings toe/year	**0**	**36.04**	**80.18**	**122,48 %**

Reduction of GHG ton/year	**0**	**137.00**	**304.82**	**122,50 %**

As the benchmarking indicators in the beginning of the project were equal to 0 for the RNP the results followed the 1st year of the LSC implementation show a success story for the Bioeuparks project. The results of the 2nd year are more sound and robust for LSCs' implementation and operation. In general the production tension goes upward so that no mitigation measures needed.

6. Danube-Ipoly National Park, Hungary

General overview

The goal of the BioEUParks project is to promote setting up local biomass supply chains and thus promote sustainable use of solid biomass for Energy production. The plan was to elaborate a local supply chain system, which ensures sustainable land use. The partners discussed a lot, how sustainability should be measured.
Regarding the many different usage and meaning of the word "sustainability" it was considered to set up our own definition of sustainability but this turned out to be too ambitious intention because of the wide variety of nature sites and local societies with different character involved in the project.
Therefore a common set of sustainability criteria was set up by the project partners based upon the European criteria regarding biofuels. This set of criteria is the base of examination of the impacts of the pilot supply chains. (Annex 1.).
Furthermore the basic tools of project level Environmental Impact Assesment (EIA) procedures were used for identification and evaluation of key impacts.
From the very beginning of the project possible impacts were considered and early involvement of the public and possible stakeholders was an important part of ex-ante assessment of the possible impacts of the project.
Therefore some impacts were already mitigated during setting up pilot supply chains by prioritizing biomass resulted from nature conservation management. In the first part of this report we discuss all the possible impacts and those mitigations are not considered, when we evaluate a possible impact as "High".
While using the project-specific indicator set and in the detailed description of the impacts of the actual pilot supply chains we see that some of these impacts became of low importance. However, when promoting setting up similar local supply chains these possible impacts must be analyzed for every new site and supply chain again.

Identification and analysis of potential social and environmental impact resulting from the pilot supply chains

To come up with a legal proposal the impact assesment must be widened to the level of Strategic Environmental Assessment (SEA) as some aspects fall outside of project level EIA:
- small projects which individually do not cause significant impacts collectively may do so;
- connecting non-project actions may have significant consequenses as well.
Elaborating a full SEA is definitely overwhelming the frames of the BioEUParks project but the main aspects of it should be kept in mind during the discussions of the policy proposal to be come up with by the end of the project.

Being the pilot areas nature parks (nature protected areas) for identifying significant effects we use methodological tools of the Environmental Impact Assessment concept, not forgetting that nature cannot be saved without the contribution and commitment of the local communities, which underlines the importance of examining social impacts as well. In the second part of the project monitoring the impacts of the first pilot supply chains continued and as new pilot supply chains started the monitoring was extended.

Also the screening and scoping had to be checked as the new types of supply chains could have brought new types of impacts.

Screening and scoping:
The new supply chains to be considered for revision of screening and scoping are the Type 1 LSC started in Winter 2015 in Esztergom (LSC7 Esztergom Animal Farm) and the "Virtual Powerplant" concept set up in Summer 2015 as first step of a possible new supply chain. The review has not revealed any new important type of impact so it was not necessary to add new elements to the tables because of the new supply chain plans.
The identified impacts were monitored for each pilot supply chain by the end of the project (the virtual power plant, which got only in preparation phase in the project period is not included in the impact tables, however the plans were considered and remarks were made regarding this plan where it was relevant.)
Impacts of each elements of the supply chains have been examined: feedstock, harvesting, transport, storage, conversion, energy production, end-consumer
The level of the impact is given as compared to the other elements of the supply chain. (Obviously one small scale heating or CHP installation has little impact on climate on global level, but because of the CO emission this impact is significant compared to the storage of the BM fuel of the facility.)
In some cases the level of impact was increased compared to the first report because of the significantly increased amount of biomass and thus size of harvesting area.
As no newly built power plants are part of the project, the level of impact of the energy production on the landscape was decreased.

Level of impact: VH – very high H-high M-middle, L-low, N-nothing or not applicable

	habitat	air	soil	water	noise	climate	roads, buildings	landscape
feedstock	**H-VH**	L	M	M	N	M	N	**H**
harvesting*	**H**	M	**H**	L	**H**	M	M	N
transport*	L-M	**H**	N	L	**H**	**H**	**H**	L
storage	M	N	L/N	N	N	N	M	M
conversion	M/N	M	L	L	L	M	N	N
Energy production	N	**H**	N	M	L	**H**	N	**L**
end-consumer	N	N	**N**	N	N	N	N	**N**

* Removing the BM from the site of harvesting to the transporting vehicles is considered as part of the harvesting (because it is strongly connected to the method of harvesting), "transport" is considered as the transport on the existing road system. (In future development of supply chains impacts of transport might need reconsideration eg. in case of building new roads or special transport systems, like conveyor)

Ex-post evaluation:
The public was informed from the very beginning of the project and the main stakeholders were given early and effective opportunities to participate in the decision making procedures before setting up the supply chains. Conflicts raised by previous biomass-energy developments in Hungary were examined as well. Three main problems had been identified in the ex-ante evaluation:

- large areas of protected habitats or valuable habitats of high biodiversity had been clear-cut for harvesting feedstock
- new demand had increased significantly the price of the fire wood in the areas of the developments
- local inhabitants have fears from air-pollution and negative landscape effects of building big new energy production facilities.

These impacts are also included in the evaluation matrixes and were examined carefully. Based upon the monitoring of the pilot supply chains it can be declared that **none of these adverse effects came up** because of the initialization and operation of the pilot supply chains.
In case of some possible harmful impacts the ex-ante evaluation suggested that these are overwhelmed the national legislation. The ex-post evaluation based upon the continuous monitoring of the pilot supply chains verified this. Lately a proposal to change of the Forestry Law cropped up – this process should be followed with special attention. If the legislation becomes weaker, the supply chain monitoring must deal with the new hazards. This topic is involved in the policy recommendation provided by the national workshop organized in the frame of the project.
Legislation covering the main impacts of setting up local biomass supply chains:

- Habitats are protected by the Nature Conservation Law[1] and Forestry Law[2] and the nature conservation management plans and forestry plans of the sites ordered by those laws.
- Air: regarding emissions from the small scale (<20MW) facilities of the local BM supply chains neither Air Protection Law nor Environment Protection Law and the connecting governmental order[3] is relevant but the Law on protection of the Built Environment[4] and the connected governmental order[5] regulates licensing procedures for building new Energy production facilities if the size of the building is bigger than 50m3 or higher than 3m and emission can be regulated in the prescriptions of the licensing authority; and in the technical standards of the heaters.

- Soil is protected by the Agricultural Law and Soil Protection Law[6] but it has little relevance regarding the possible harmful effects of BM supply chains except ensuring that management must be in line with the landuse category and permission is necessary for changing of landuse. Local municipalities' Environmental Programs (where such a program exists) may include further soil protection regulations. Regarding harvesting methods the forestry plans contain strict prescription. (Based upon the Forestry Law only those forestry activities may be carried out which are included in the forestry plan of the site accepted by the National Forestry Agency. The nature conservation manager participates in the authorization process of the forestry plans.)

[1] 1996. évi LIII. törvény - a természet védelméről
[22] 2009. évi XXXVII. törvény - az erdőről, az erdő védelméről és az erdőgazdálkodásról
[3] 314/2005. (XII. 25.) Korm. rendelet a környezeti hatásvizsgálati és az egységes környezethasználati engedélyezési eljárásról
[4] 1997. évi LXXVIII. törvény - az épített környezet alakításáról és védelméről
[5] 312/2012. (XI. 8.) Korm. rendelet az építésügyi és építésfelügyeleti hatósági eljárásokról és ellenőrzésekről, valamint az építésügyi hatósági szolgáltatásról
[6] 2007. évi CXXIX. törvény - a termőföld védelméről

- Water: small scale facilities and activities are not directly regulated by the environmental legislation but the general regulations of the Nature Conservation Law, the governmental order on protection of groundwaters[7] and Soil Protection Law. Special regulations are relevant in case of Sensitive Areas and in drinkwater resource protection areas.

- Noise: regarding the small scale of the supply chains the strictest requirements are set up by the Nature Conservation Law - in context of disturbing habitats of protected species – and labour safety and local municipality regulations – in context of noise injuries and noise pollution in.

- Climate: small scale activities are out of the scope of the existing legislation, technical standards of fuel, vehicles and burners/heaters ensure that the emission of GH gases is controlled. Taking into account the whole life cycle of the solid BM supply chains and assuming that fossil fuels are replaced by BM in the Energy production, the impact on climate is positive (the overall GHG emission is decreased)

- Roads, buildings: Law on protection of the built environment and local regulations can offer controlling tools in case of unacceptable impacts.

Relevant legislation regarding the raws of the impact matrix (the elements of the supply chains):
Feedstock and harvesting is controlled by the Nature Conservation Law and Forestry Law.

- Landscape: regarding new facilities the Nature Conservation Law, the Environmental Law and the Law on protection of the built environment are relevant, while impacts of biomass extraction are controlled by the regulations of the Nature Conservation Law and Forestry Law.

The relevance of all the indicators included in Annex 1. have been examined for the case of the pilot supply chains considering all the possible impacts marked as High in the screening matrix. In this phase the importance of the possible impact is reconsidered based upon the warranties of legislation. Furthermore some of the impacts rated as High are not relevant for the basic types or in the area of the pilot supply chains.
The impact of transport is high where marked so only compared to the other elements of the supply chains. The overall impact of transport is minimized by maximizing the transport distance in 50 km.
Level of impact: H-high M-middle, L-low, N-nothing or not applicable, W-warranted by legislation

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
Biomass production or extraction shall have neutral or positive effects on biodiversity at the landscape level	H	H	L	L	N	N	L
Biomass production or extraction can only be performed in protected areas or areas with high conservation values if it	H	N	N	N	N	N	L

[7] 219/2004. (VII. 21.) Korm. rendelet a felszín alatti vizek védelméről

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
is part of a management plan to protect biological values							
The integrity of relevant ecosystems and habitats for rare and endangered species shall be maintained	W	W	N	N	N	N	N
Biomass extraction shall, if possible, be conducted in relation to other management practices in the landscape so as to sustain or enhance biodiversity, including the regional recovery and persistence of endangered species	H	H	M	H	M	H	L
Buffer zones or vegetation filters between biomass production areas and waters and wetlands shall, if needed, be used to reduce the risk for damage	N	N	N	N	N	N	N
Methods shall be chosen to minimise the risk for permanent physical damage to the soil	M	H	N	N	N	N	N
Methods that cause a net depletion (after compensatory measures) of humus, nutrients and minerals in the soil below levels necessary for the maintenance of the long-term soil production capacity shall be avoided	N	N	N	L	N	N	N
Nutrient rich waste products and by-products should preferably be recycled	H	H	N	N	N	N	N
Residues from forestry and agriculture should be used for energy production or other purposes	H	H	N	N	N	N	N
Biomass production and extraction shall be conducted in a way that prevents further deterioration, for example by erosion or nutrient leakage, and protects (or enhances) the status of aquatic ecosystems	H	H	N	M	M	N	N
Land shall be used efficiently, and practices that optimise productivity shall be used.	H	H	N	N	N	N	N
Residues and by-products should be used for energy or other applications in order to increase efficiency	H	M	N	N	N	N	N
If reuse or recycling of waste in not possible, use for energy shall be preferred over dumping	N	N	N	N	N	N	N
The energy input in production, extraction and conversion of biomass to bioenergy should be minimized	H	H	H	N	H	N	N
Efficient conversion technologies shall be used	N	N	N	N	H	N	N
Long distance transports of non-processed raw materials shall be avoided				H			
Use of waste heat shall be encouraged	N	N	N	N	N	N	N
Combine production of heat, electricity and other products (chill, steam) should be promoted whenever possible	N	N	N	N	N	N	N
The GHG emission savings of the production chain – including production, extraction, conversion and transport – shall be maximized and compared to a reference scenario with fossil fuels. Both long and short term gain and losses shall be evaluated	L	L	L	N	L	L	N
The use of waste, residues and by-products shall be encouraged and accounted for when calculating GHG emission savings	H	H	N	N	N	N	N
Land with high carbon stock such as wetlands and continuously forested areas should not be used for the production of liquid biofuels if it implies a permanent	H	N	N	N	N	N	N

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
change in land status							
The production of biomass for energy shall only occur at sites where it does not threaten local/regional food supply	N	N	N	N	N	N	N
Negative effects of competition between energy, food, fodder and material use should be minimized	H	N	N	N	N	N	N
The possibilities of a secured long-term supply of biomass shall be considered and demonstrated when establishing a heat or power plant	H	H	L	H	L	N	N
The bioenergy producer should take responsibility for the assessment of the values of the production area and also for the assessment of how the production may affect the local community	H	N	N	N	N	H	N
Production of biomass for energy should no influence the possibility for recreational activity in a negative way	H	H	M	L	N	N	N
Local acceptance and avoidance of conflicts should be reached through regional and local planning instruments, and preferably comprise multi-stakeholder dialogues	H	N	N	N	N	H	N
Activities shall have generally positive effects on social welfare and accessibility to rural areas	H	H	N	N	N	N	N
Development of local energy systems that enable combinations of different renewable energy sources shall be encouraged	N	N	N	N	N	N	N
Bioenergy systems should preferably have positive effects on the local economy	H	H	N	N	N	N	N
Cost effective raw material production (logging operations, …)	N	N	N	N	N	N	N
Cost effective transportation of raw material	N	N	H	N	N	N	N
Cost effective processing and storage of the bioenergy product (pellet, chips, …)	N	N	N	H	H	N	N
Cost effective conversion of biomass to energy (thermal or electricity).	N	N	N	N	N	H	N
Cost effective raw material production (logging operations, …)	H	H	N	N	N	N	N

In the monitoring of the supply chains the indicators signed by H were examined case-by-case. The main observations are the following:

	feedstock, harvesting, transport, storage, conversion, Energy production, End-consumer
Biomass production or extraction shall have neutral or positive effects on biodiversity at the landscape level	The amount of wood production was not increased because of the pilot supply chains, only the use was reorganized to ensure local use of a certain amount of biomass – this way the impact is positive. The nature conservation and forestry legislation ensures the fulfilment of this criteria
Biomass production or extraction can only be	The forestry activities are carried out

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
performed in protected areas or areas with high conservation values if it is part of a management plan to protect biological values	accoding the forestry management plans, the nature conservation manager is involved in the elaboration of these plans						
The integrity of relevant ecosystems and habitats for rare and endangered species shall be maintained	W	W	N	N	N	N	N
Biomass extraction shall, if possible, be conducted in relation to other management practices in the landscape so as to sustain or enhance biodiversity, including the regional recovery and persistence of endangered species	The local use of biomass and the involvement of local people ceonnects biomass extraction to other local activities. In case of LSCs Type 1 and 2 the extraction fits in the strategic management plans of the DINPD.						
Buffer zones or vegetation filters between biomass production areas and waters and wetlands shall, if needed, be used to reduce the risk for damage	N	N	N	N	N	N	N
Methods shall be chosen to minimise the risk for permanent physical damage to the soil	In case of Ocsa supply chain (wetland forest) special prescriptions were included in the contracts/MoUs to protect the soil.						
Methods that cause a net depletion (after compensatory measures) of humus, nutrients and minerals in the soil below levels necessary for the maintenance of the long-term soil production capacity shall be avoided	N	N	N	L	N	N	N
Nutrient rich waste products and by-products should preferably be recycled	Not relevant for the pilot supply chains. However, selective collection of organic waste and composting was started at the headquarter of the DINPD.						
Residues from forestry and agriculture should be used for energy production or other purposes	This is ensured by the use of biomass produced from the removal of invasive species and other nature conservation management activities (esp. in LSC1 and LSC7)						
Biomass production and extraction shall be conducted in a way that prevents further deterioration, for example by erosion or nutrient leakage, and protects (or enhances) the status of aquatic ecosystems	Ensured by the legislation, additional attention is given by the rangers during monitoring.						
Land shall be used efficiently, and practices that optimise productivity shall be used.	In protected areas priority is given to nature conservation – according to this the amount of biomass production is not maximized.						
Residues and by-products should be used for energy or other applications in order to increase efficiency	This is ensured by the use of biomass produced from the removal of invasive species and other nature conservation management activities (esp. in LSC1 and LSC7)						
If reuse or recycling of waste in not possible, use for energy shall be preferred over dumping	N	N	N	N	N	N	N
The energy input in production, extraction and conversion of biomass to bioenergy should be minimized	The pilot supply chains were based mainly on existing infrastructure and therefore there was no chance to influence the energy input.						

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
	However, regarding that the supply chains run fully market based the need of financial efficiency pushes all the members of the supply chains to minimize energy input. Furthermore, the use of man power in harvesting and transport in the small supply chains directly replaces fossil fuel input. Also the shortening of transport distances – which is one of the basic goals of this project – ensures the decreased energy input in transport. For the conversion also the existing infrastructure is used. In case of type 1 LSCs special attention was given to the regular check and replacement of the blade of the chopping machines – the sharp cutting edge ensures more energy efficient operation. The use of fire wood in several pilot supply cahins is a good solution for decreasing the energy input in conversion.						
Efficient conversion technologies shall be used	The pilot supply chains are based upon the existing boilers and heating devices. In the pilot supply chains 1,3,4,5 these are highly efficient devices. In case of residential supply chains several small household scale owens are part of the supply chain and the efiiciency is unknown. (For this reason a lower estiomation of efiiciency was used in the calculation of the indicators.) The residual small household scale heating devices cannot be replaced ta once because of lack of capital. It would be necessary to provide funds available for the households to replace their biomass based heating devices. In LSC7 new boiler of high efficiency was installed. In case of future supply chains efficient conversion technologies shall be purchaised.						
Long distance transports of non-processed raw materials shall be avoided	IN case of the Type1 and 2 pilot supply chains this criterium is fulfilled as in most cases the raw material is processed on the harvesting site. In case of type3 pilot supply chains the criterium is fulfilled as well regarding that the maximum distance of transport is 50 km anyway and the non processed wood is transported on even shorter distance. This criterium must be planned and monitored site by site in protected areas as processing the wood in the harvesting site might have adverse effects on the habitat.						
Use of waste heat shall be encouraged	N	N	N	N	N	N	N

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
Combine production of heat, electricity and other products (chill, steam) should be promoted whenever possible	N	N	N	N	N	N	N
The GHG emission savings of the production chain – including production, extraction, conversion and transport – shall be maximized and compared to a reference scenario with fossil fuels. Both long and short term gain and losses shall be evaluated	L	L	L	N	L	L	N
The use of waste, residues and by-products shall be encouraged and accounted for when calculating GHG emission savings	Big amount of bomass used in the pilot supply chains isproduced by nature conservation and maintenance activities and it is included in calculation of the project indicators						
Land with high carbon stock such as wetlands and continuously forested areas should not be used for the production of liquid biofuels if it implies a permanent change in land status	Part of the biomass is produced by nature conservation activities (eg. removal of invasive species). Forestry management (logging) is involved only in areas where this had been the landuse before the project as well and the forestry legislation ensures the long term sustaining of these foress.						
The production of biomass for energy shall only occur at sites where it does not threaten local/regional food supply	N	N	N	N	N	N	N
Negative effects of competition between energy, food, fodder and material use should be minimized	In the pilot supply chain plan the possible fuels were examined and some areas are not involved in the supply chains as biomass fuel production areas because of this criterium. In caase of type 3 supply chains the forestry production mix was not changed, only the distance of transport was shortened (the fire wood is sold locally) therefore negative effects did not occure.						
The possibilities of a secured long-term supply of biomass shall be considered and demonstrated when establishing a heat or power plant	In case of each pilot supply chains data assessment of the available biomass was the first step of the planning.						
The bioenergy producer should take responsibility for the assessment of the values of the production area and also for the assessment of how the production may affect the local community	Setting up local supply chains ensures that the actors of the supply chain know the whole process from harvesting till end use and thus understand the effects of their activities.						
Production of biomass for energy should no influence the possibility for recreational activity in a negative way	The biomass used in the pilot supply chains is produced by DINPD and Pilis Park Forestry Ltd. Both producers are responsible for the hiking trails and other recreational sites in their area and directly involved in ecotourism, which ensures this criterium.						
Local acceptance and avoidance of conflicts should be reached through regional and local planning instruments, and preferably comprise multi-stakeholder dialogues	The awareness strategy of the project was followed during the project and it proved to be successful as no conflicts were raised during the project.						
Activities shall have generally positive effects on	The positive effects are described in chapter						

	feedstock	harvesting	transport	storage	conversion	Energy production	End-consumer
social welfare and accessibility to rural areas	4.						
Development of local energy systems that enable combinations of different renewable energy sources shall be encouraged	N	N	N	N	N	N	N
Bioenergy systems should preferably have positive effects on the local economy	The positive effects are described in chapter 4.						
Cost effective raw material production (logging operations, …)	N	N	N	N	N	N	N
Cost effective transportation of raw material	The shorter distance ensures lower cost of transportation. In Ocsa LSCs using small machinery and man power is an extremely cost effective method.						
Cost effective processing and storage of the bioenergy product (pellet, chips, …)	In the pilot LSCs storage is mostly done by the end users in their own areas, which is the most cost effective way.						
Cost effective conversion of biomass to energy (thermal or electricity).	The existing equipements are used in the pilot supply chains (except Esztergom LSC). Pay back period of new investments must be included in the cost calculations.						
Cost effective raw material production (logging operations, …)	Cost effectiveness is achieved by the fact that the biomass is the byproduct of other activities in most pilot supply chains.						

Indicators and potential mitigation measures

Early involvement was a key element for identifying important stakeholders and key impacts.
Awareness raising actions helped to identify the most important social aspects and concerns and eliminating basic fears based upon the experiences of previous BM Energy production developments, like increasing fire wood prices or clearcutting (see previous report).
Stakeholders were identified in the frame of group meeting of the project stuff and face-to-face discussions with other employers of the DINPD, partners of the DINPD and experts. Existing facilities and municipality intentions were mapped by involving experts.
Data analysis of available biomass in the region also included social aspects, like alternative landuse etc. Project staff, other experts of the DINPD and sub contracted experts were involved in data analysis.
Focus group meetings (ad hoc meetings, round tables and specific meetings) were organized to understand deeply the considerations of the different stakeholders.
Questionnaire surveys were conducted to deepen the understanding of different aspects and interests.
The results of the project were discussed and shared with relevant stakeholders at the national workshops and conference. Experts were involved both in organizing these events and planning and monitoring the pilot supply chains. These were the forums of identifying key actors of possible future supply chains.

Finally, not only the setting up of local BM supply chains but also the other project activities had significant positive impact on developing partnerships with municipalities, social associations, expert societies and transferring knowledge to other park administrations.

Description of the most significant effects of the local solid biomass supply chains and mitigation measures:

Selection of feedstock has important social and environmental impacts. In the assessment of available biomass possibilities of other land uses, alternate products, alternative use of the BM product and other social-environmental aspects were examined.
- Hay is not used as feedstock in the final pilot supply chains because in those areas managed by the DINPD in the Ipoly Valley-Borzsony region, where hay is available, the alternate use (feeding the animals) is significant and in years, when hay production is not so good, all the available hay is necessary for feeding the animals. In Esztergom the new boiler can run on all types of biomasses produced in the nearby area from nature conservation management.

- Fire wood is available in big amount in the region. Logging has serious negative impact on the environment, therefore increasing the intensity of logging is not required. For the local supply chains based upon fire wood BM exploitation can be increased on a moderate level without endangering the habitats – this is ensured by the Forestry Law and forestry plans.
What ensures even more that no negative impact is arisen on the habitats by setting up the pilot supply chains is the fact that no extra amount of biomass is harvested, only the users of the biomass were changed: the forestry companies sell less firewood for the big BM plants and sell more firewood locally. In case of the residential supply chains less fire wood is sold for the forestry companies and the remaining part is sold directly to the local inhabitants and local entrepreneurs.

- Using small branches resulted from nature conservation management as by-product could have negative impact on the habitats if such BM is removed from the area which should be left in the area for nature conservation purposes. In the areas producing feedstock for the pilot supply chains removal of the invasive species does not have negative impact on the site.
The project gave the opportunity to discuss site by site the nature conservations preferences of removing or not the biomass (killed invasive plants) with rangers and other employers of the DINPD and discuss this issue with other nature conservationists at the national workshop as well.
Using by-products or waste has a definite positive social-environmental impact compared to BM resulted from logging or BM that could be used for food production.

Main impacts of the selected harvesting methods:
- Logging is regulated by the forestry law and plans so the environmental sustainability of the harvesting in case of pilot supply chains based upon the fire wood produced by the forestry companies are ensured by the legislation.
- The removal of the BM must be examined for each new site because in some habitats removal of the BM can harm the protected species around the invasive species or the soil. This is also relevant for the logging in Ocsa, where additional criteria was

prescribed in the contracts for the timing of the harvesting and for the removal of the BM from the site.
- The logging done in Ocsa by the employers of the DINPD and not by subcontracted forestry companies decreased the costs of logging. Giving the possibility for local people to remove and transport the fire wood themselves results in lower costs of the firewood. The same is relevant for small branches as well. Labour safety regulations must be followed strictly to avoid negative impacts, like injuries.
- Time restrictions of harvesting prescribed by the forestry and nature conservation legislation decreases the negative impacts on habitat caused by noise and other disturbance. As in the pilot supply chains only heat production is involved, which is mainly seasonal, the time restrictions don't endanger sustainable supply. In case of the pasta factory the demand is less seasonal – here the bigger storage capacity is available to ensure the continuous fuel supply.

Transport methods couldn't be influenced a lot. There are some negative social-environmental impacts:
- Usually vans are used for transporting the fire wood and the woodchips. Air pollution, emission of GH gases, noise, heavy load on the public roads are the main negative impacts of transport. Regarding the small scale of the supply chains these impacts are not so relevant. Maximizing the transport distance decreases these impacts.
The small scale or non-motorized transporting utilities in Ocsa Suply Chain further minimalize the negative impacts of transport.
Impacts of storage and conversion in the pilot supply chains have little significance. In planned small settlement supply chains using the own human and instrumental capacities of local municipalities would be a preferable solution for creating jobs and decreasing the costs of the BM.

Impacts of energy production:
- In case of the pilot supply chains existing facilities are involved, the process is not changed, therefore the – obviously existing - negative environmental impacts are not increased by the project. In case of Sas-Hill Supply Chain the amount of produced energy was increased because the needs (opening hours in winter time etc.) increased. This means that the emission has increased as well but this cannot be avoided if we want to fulfil the increased demand. The BM heater is a much more environmental friendly and cheaper solution than the electric heating before the reconstruction of the visitor centre.
- The new biomass heater ensures cost effective heating of the new animal farm, which result in saving public money.
- The socio-economic advantages of BM heaters were communicated during the project and many municipalities such as individuals decided to establish biomass heating facilities. Lack of financial resources delay such initiations. During the project a new found was opened and one application was delivered with the help of the project partnership.

Conclusions

Setting up very small scale local BM supply chains and local supply chains based upon BM resulted from nature conservation or from existing MB production and based upon existing burner facilities have mainly positive impacts on the society and the environment. Especially the Ocsa Supply Chain is a very successful pilot action resulting

a win-win-win situation: costs of the end users (local inhabitants) have decreased, income of the biopmass producer (DINPD) has increased and the new method of removal resulted in better nature conservation status of the harvesting area (protected wetland forest).

Selection of the feedstock has key importance determining the impacts. Selecting the end user might influence the selection of the site and thus the whole process. In case of establishing new facilities other possibly significant impacts must be examined very carefully. Before setting up many small scale local supply chains further SEA type of impact assessment is necessary. Further refinement of the feasibility study of the "Virtual Power Plant" concept is necessary as well – this task is overtaken by the ETE.

7. Conclusions

After having considered the second report on the socio – environmental impact of the project, we can draw some conclusions highlighting the main aspects that the Parks took into account in their analysis. While doing this, we should also keep in mind the common sustainability criteria drafted during the project by FNR. The criteria identified were related to biodiversity conservation, resource and energy efficiency, climate mitigation, social and environmental aspects.
The same criteria have been identified by Parks while making their evalutation. For this reason the model of supply chain that was implemented during BioEuParks grounded on different pillars:
1. the set up of a short range supply chain, that could minimize the impact on the environment.
2. the importance of the local engagement, involving inhabitants, economic actors and policy makers to build consensus around the project.
3. the local economic development, thanks to new investements that create economic conditions for a new biomass request.

About the first pillar, one of most measurable environmental impact, closely linked to the production of a local biomass from a short range supply chain, is related to transportation and Co2 emission: for instance Sila National Park (Italy) higlighted the importance of the reduction of biomass transportation to local thermal power plan.
Solktaler Nature Park (Austria) in his conclusions wrote that »The use of 100% regional biomass causes in 2015 primary energy savings of 166,4 TOE and a reduction of 478,5 tons CO_2. The use of regional biomass reduced long distance truck rides. About 10.000km/year could by saved by the use of biomass within a 50km range. This means an additional CO_2 reduction of 271km/year.«
Therefore, GHG reduction can be considered as an achievement of the project, even though the positive contribution added is moderate and cannot easily evaluated after such a short period of supply chains activation. Rodopi Park (Greece) stated indeed "This perspective will be better visible as more public authorities will be engaged in the LSC in the near future".
However thanks to the project we can highlight that the **total reduction of GHG emission within the project was about 11059,13 Ton CO2.**

Another interesting environmental impact was the one underlined in the Danube-Ipoly National Park (Hungary): the Park - infact – choose the supply chains based upon biomass produced by nature conservation – especially removal of invasive species. In the areas producing feedstock for the pilot supply chains removal of the invasive species led to a positive environmental impact on the site, but also gave the "opportunity to discuss site by site the nature conservations preferences of removing or not the biomass (killed invasive plants) with rangers and other employers of the DINPD".
Furthermore, in the Danube-Ipoly Park the constant monitoring of the supply chain verified that the main problems identified during the ex-ante evaluation: potential impact on biodiversity due to clear-cut for harvesting feedstock, increasing of the price fire wood and concerns of inhabitants related to air-pollution and negative landscape effects, did not came up because of the early involvement of all stakeholders and the several meetings organized during the supply chain: in fact the awareness raising

actions helped to identify the most important social aspects and concerns, thus eliminating basic fears.
About the second pillar, all partners linked the social impact to the importance of the awareness strategy in avoding and mitigating conflicts. In fact, awareness raising actions helped to identify the most important social aspects and concerns. The involvement of local key actors in the process was able to overcome social conflicts, build consensus and fostering a local and economic growth. This last point led to interesting outcomes in Sila National Park (Italy) especially, where a local purchasing group, formalized in a private agreement signed in April 2016 and that will join the supply chain for the winter season 2016-2017, was created at the end of the project, thus ensuring a medium – long sustainability of the project after its conclusion.

Another important aspect that emerged during the project was the lack of knowledge regarding biomass exploitation potential in the park area, as underlined in the Kozjanski Regional Park (Slovenia): "In the area of the Park there are any data regarding exploitation and consumption of biomass inside the protected area and estimation on biomass use impact on biodiversity. Furthermore there are no forest owners organised to supply biomass to the Thermal Plant". For this reason, the awareness strategy and the process implemented through several meetings was able to foster the adoption of a social responsibility, underlining the territorial relevance of the exploitation of local biomass both in terms of regional development and environmental sustainability.

From an economic perspective (third pillar), Parks had a positive impacts either on their budget– for instance Sila National Park (Italy) is now spending € 27.636,00 to purchase local biomass instead of the € 50.000,00 paid in the previous years to purchase fossil fuels - either on their capacity of being the promoter of a virtuous circle in the local community. An clear example occurred in Greece, where the local economy is mainly based on agro-forestry sector, so "the Local Supply Chain acts as an opportunity for new income creation directly and indirectly". Must be also said, that during the design and setting up of the supply chain the market and economic conditions were the barriers that the Parks had to face. That happened for several reasons:

- no market condition for setting up of new supply chain;
- competition of large thermoelectric plant operating nearby the park area absorbing the whole woody biomass produced in the park area;
- high initial investment for installing biomass boilers and plants;
- competition of biomass feedstock and heating products (i.e. pellets) imported at lower prices from neighboring countries .

Therefore, from the project emerged the **need for a specific legislation and incentive schemes supporting the short range and sustainable supply chain** against model based on high pollutant process (big scale and low efficiency electric power plants, using of biomass harvested in a medium-long radium from the processing place and not in accordance with sustainability criteria, etc).

We must always bear in mind how the evaluation of the economic and social impact strongly depends on the characteristics of the territory in which concrete actions are realized, territory which is very different from country to country: in Solktaler Nature Park (Austria), for example, we consider an area that has a very low population density

(5 Inhabitants / km^2) and the "*potential for increasing the share of regional biomass is in family homes*".

Taking stock of the project after the contributions prepared by the five natural Parks, we can confirm that BioEuParks showcased **how forest management can preserve ecosystem whilst stimulating local economy**. The use of waste material arising from pruning and other field management activities is a great opportunity for protected areas throughout Europe to have smarter and efficient heating systems within the park's infrastructures.