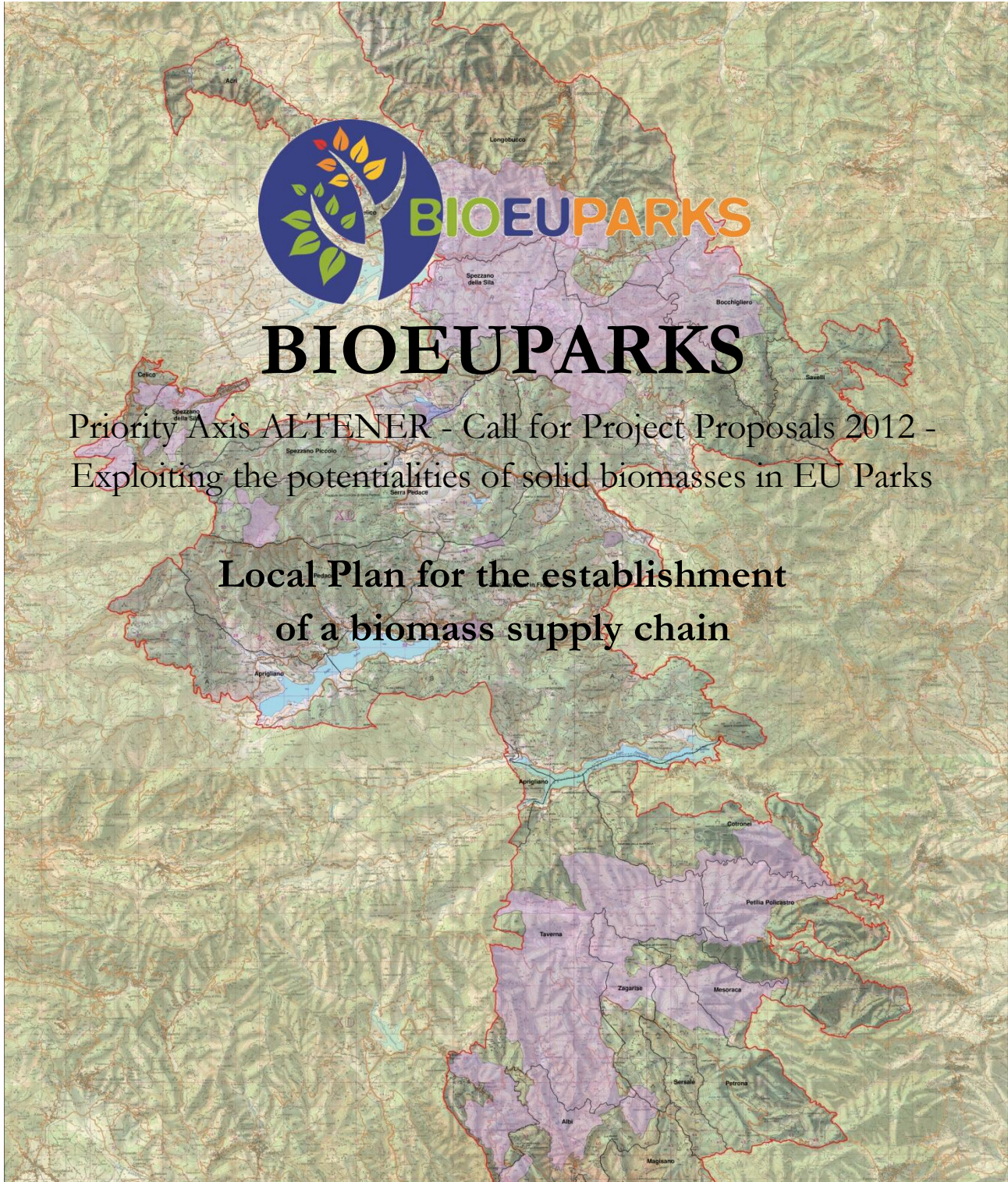




Co-funded by the Intelligent Energy Europe Programme of the European Union



## Table of contents

1	The BIOEUPARKS project .....	- 3 -
2	Stakeholders involvement process .....	- 3 -
2.1	Methodological approach .....	- 3 -
3	TERRITORIAL FRAMEWORK.....	- 4 -
4	THE SUPPLY CHAIN.....	- 6 -
4.1	FEEDSTOCK.....	- 6 -
4.1.1	Land Use.....	- 6 -
4.1.2	Estimate of biomass that can potentially be available from the forests of Sila National Park.....	- 8 -
4.1.3	Assessment of the biomass that can actually be available from SNP forests .....	- 9 -
4.2	HARVESTING .....	- 10 -
4.3	TRANSPORT.....	- 11 -
4.4	STORAGE .....	- 11 -
4.5	CONVERSION.....	- 12 -
4.6	ENERGY PRODUCTION.....	- 12 -
4.7	END- CONSUMER .....	- 15 -
5	Important aspects of the supply chain .....	- 16 -

## **Introduction**

During the last two decades, we have witnessed a growing interest in renewable energies and energy saving, linked to the key-issues of securing energy supply and fighting against climate change, as well as to the economic development ensured by technological advance and innovation in this field.

In this perspective, one of the fundamental points of EU's energy policy is creating a decentralised system for the production of renewable energy based on criteria of environmental sustainability and organised on local scale.

Furthermore, energy saving and renewable energies are the fundamental pillars of Kyoto protocol (1997) and the related commitments made at community and international level aiming at the reduction of emissions of greenhouse gases after 2012.

In April 2009, the Council launched the so called "Climate and Energy" package or "20-20-20" package (Dir. 2009/28/CE) that aims to achieve two binding targets within 2020: the first one fulfilling 20% of community energy consumption with renewable sources; each Member State has a specific national target, namely, 17% for Italy. The second target is fulfilling 10% of energy consumption in the transport sector with renewable energies (biofuels, etc....).

### **1 The BIOEUPARKS project**

In close relation to the above described context, the BIOEUPARKS project aims at expanding the local supply of biomass generated by sustainably managed forests and promoting a more efficient use of it for heating purpose and cogeneration systems. These objectives have to be achieved through the activation of local biomass supply chains in the natural parks of 5 EU countries, focusing on short supply chains and small size plants.

This Local Plan was developed through a process of discussion and co-programming among the main local actors (owners of forests, forestry companies, local authorities) aiming to deal with possible social conflicts.

### **2 Stakeholders involvement process**

#### **2.1 Methodological approach**

The Local Action Plan for the creation of a biomass supply chain was conceived as a living document, undergoing a process of co-planning with local stakeholders likely to be involved directly or indirectly in the supply chain.

The Sila National Park has drafted this strategic overview of the plan based on the analysis of the available data and feedbacks from awareness-raising events held between September and November 2013, which local stakeholders (forest owners, forestry companies, transport companies, public authorities) actively took part in.

During these events, the SNP made the decision of drawing the detailed plan after further discussion that would take place in specific meetings scheduled in February/March 2014, with the goal of starting the supply chain activities in the beginning of April 2014.

During these specific meetings, some crucial themes were approached: energy and plants, Structural Funds incentives, financial management of the supply chain, forestry and energy certifications. Besides the key-actors of the supply chain, trade associations, professional organisations, research institutes, local authorities and representatives of Calabria region were invited.

The result of this process is the detailed identification of:

- companies interested in supplying services and products linked to biomass-based heating, with particular reference to the sector of heat/electricity generators linked to district heating systems and solid biomass cogeneration;
- project designers, building companies and owners of buildings (both public and private ones) interested in installing biomass heating systems in buildings under their property or responsibility;
- economic actors interested in developing cooperation in the sector of biomass heating, including biofuel supply chain.

The final goal of this participation process is to identify forms of cooperation, under the direction of SNP, between one or more fuel suppliers and final users, in order to ensure, for each plant, a stable supply in terms of quantity, quality and cost.

The SNP' supervision will ensure the environmental sustainability and the environment-friendly nature of all processes.

### 3 TERRITORIAL FRAMEWORK

The Sila National Park was established in 1997 by law n. 344 and its perimeter was confirmed with DPR [President of the Republic's Decree, translator's note] of 14/11/2002, it has a total area of about 74.000 hectares and involves 21 municipalities and 3 of the provinces of Calabria region, with a population of about 130.000.

The SNP preserves areas of the highest environmental value in the so called Lesser Sila, Greater Sila and Greek Sila: a total of 73.695 hectares involving 21 municipalities, 6 mountain communities and 3 of the provinces of Calabria region.

CATANZARO	COSENZA	CROTONE
Albi Magisano Petronà Sersale Taverna Zagarise	Acri Aprigliano Bocchigliero Celico Corigliano Calabro Longobucco Pedace San Giovanni in Fiore Serra Pedace Spezzano della Sila	Cotronei Mesoraca Petilia Policastro Savelli

Being a predominantly mountain and woodland territory, Sila has represented a valuable economic resource for populations that have settled in Calabria since ancient times. This is witnessed by the old sawmills existing in Sila forests and constituting, today, literal examples of industrial archaeology, as well as by the thousands of carbon sinks spread all over the Park, normally in beech woods, that have been used for many years to produce coal.

The present-day role of SNP is to increase and make available to everybody the natural heritage of Sila highland, preserving its rich biodiversity, supporting social well-being, creating cultural added value and attracting tourists; these are all important aspects of a sound territory management.

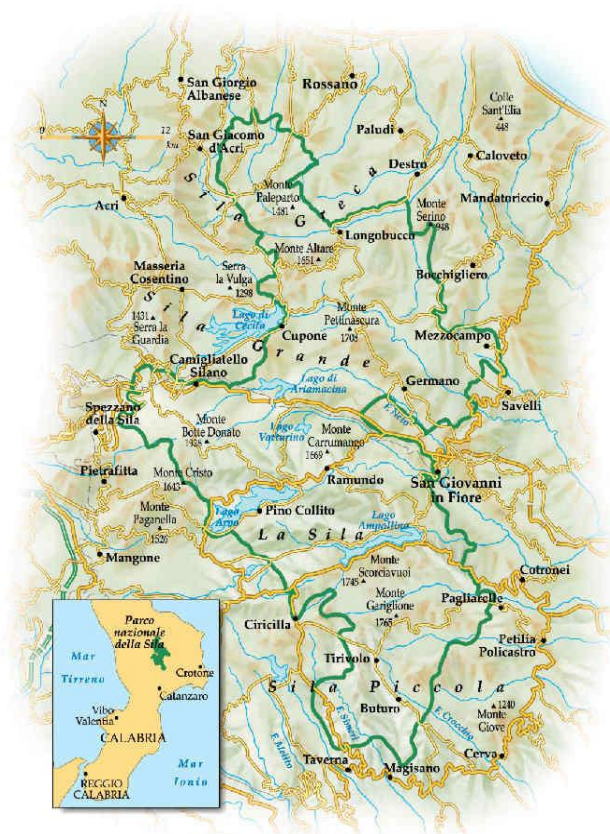


Figure 1 – Perimeter of Sila National Park.

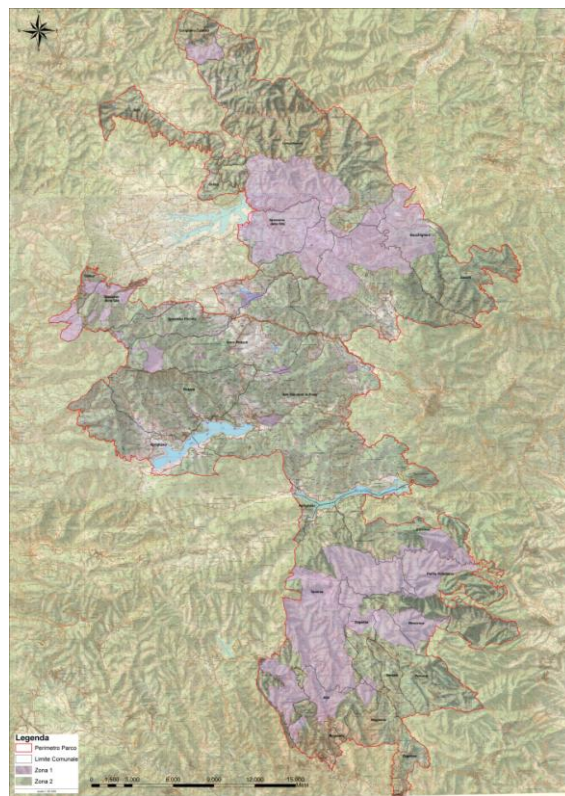


Figure 2 – Perimeter with indication of protected zones.

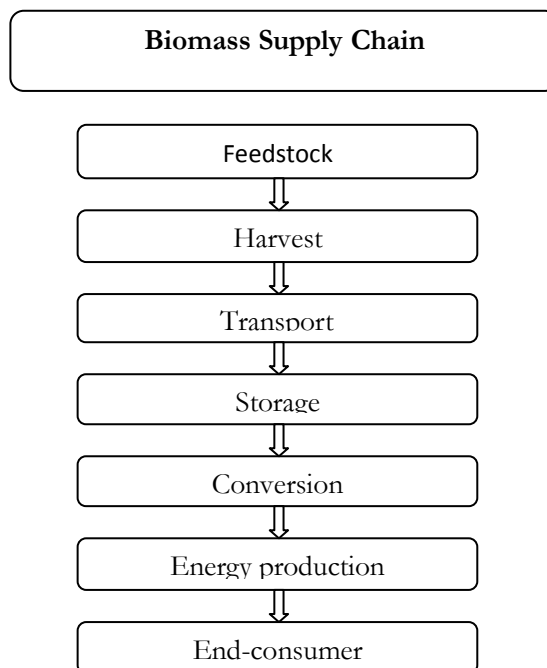
The Sila National Park, as marked out on the 1:50000-scale map attached to D.P.R. 14/09/2002, is divided into the following zones:

Zone 1 – (purple colour on the map) of high natural and landscape value with absent or low degree of anthropisation;

Zone 2 – (green colour on the map) of high natural and landscape value and higher degree of anthropisation and presence of agro-silvo-pastoral activities.

#### 4 THE SUPPLY CHAIN

The biomass supply chain has been realised following the Supply Chain Guideline. Therefore, specific meetings were held in order to match biomass demand and supply and establish the supply chain. The following chapters will point out the potential supply of biomass, as well as all processing phases and further steps needed to start the supply chain, up to the identification of biomass final users.



#### 4.1 FEEDSTOCK

In order to draw a detailed outline of potential biomass production that could be available from SNP forests, we used data processed by CRA (*Council for Research and Experimentation in Agriculture – Experimental Institute for Silviculture – Cosenza Territorial Office*) who made measurements in some permanent experimental parcels of the Park. Furthermore, during the specific meetings, potential biomass suppliers were submitted questionnaires to assess yearly production of biomass in areas included in the SNP.

##### 4.1.1 Land Use

About 80% of the Park territory is covered with forests. More specifically, about 60.000 hectares, out of the 73.000 of the SNP area, are forests, distributed as follows:

- ❖ Conifer forests = 36.000 hectares (60,0 %)
- ❖ Hardwood forests = 15.700 hectares (26,0 %)
- ❖ mixed forests = 8.300 hectares (14,9 %)

<i>Land use and land cover</i>	<i>Area (hectares)</i>
Beech forests	13214
Mixed forests with prevalence of beech	10307
Beech and spruce mixed forests	737
Corsican pine forests	27595

Mixed forests with prevalence of Corsican pine	5789
Deciduous oak forests	4597
Chestnut-tree forests	329
Evergreen sclerophyllous forests	176

Table 1 – classes of land cover and land use and respective areas in SNP

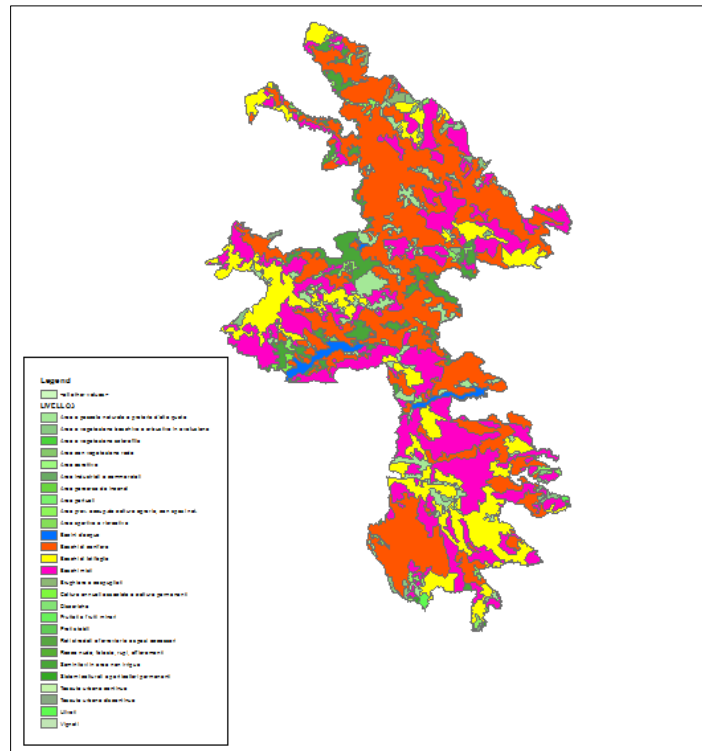


Figure 3 – Corine Land Cover

The Park is characterised by large, wild forests covering the entire area of Greater Sila where the predominant species is Corsican Pine, (*Pinus laricio var. calabrica*), a resinous tree typical of Calabrian Appenines. At the lower climate-zone border, the Corsican Pine mixes up with Turkey oak or chestnut tree. At the upper climate-zone border, instead, it mixes up with beech.

In the coldest valleys and on the northward sides, the Corsican Pine is completely replaced by the beech. (*Fagus selvatica*).

Other hardwood species are the Turkey oak (*Quercus cerris*), the sycamore (*Acer pseudoplatanus*), the aspen (*Populus tremula*), the black alder (*Alnus glutinosa*) and other resinous trees such as the silver fir (*Abies alba*) mixed with beech.

In Lesser Sila, the composition of forest, is similar but the presence of silver fir forests and silver fir/beech mixed forests is to be emphasised.

In the most humid and cold zones, alders, aspens and pussy willows are found, while the warmest and driest mountain sides are the habitat of frugal Turkish pine (*Pinus brutia*).

In the basal zone, there are coppiced woods with chestnut trees and oak, generally used to make poles and firewood.

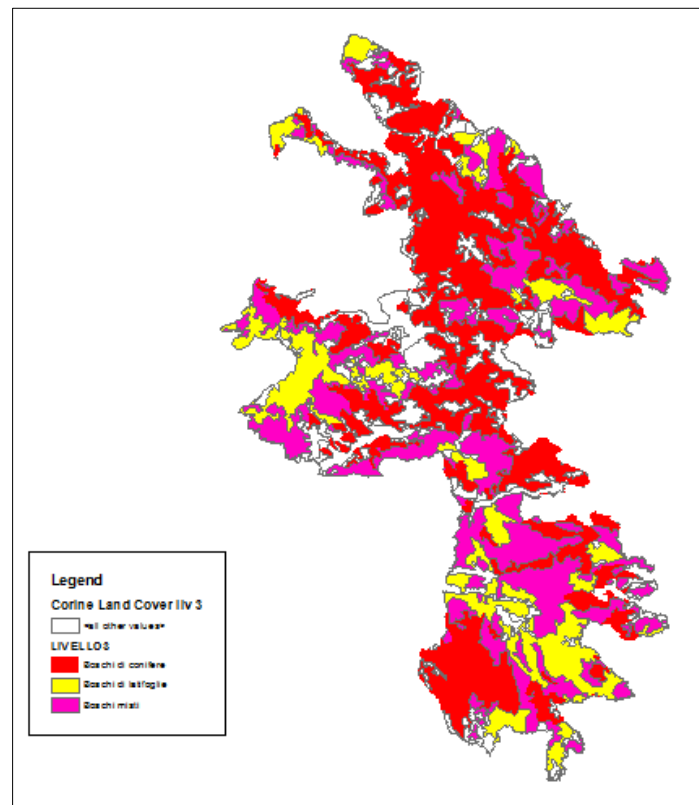


Figure 4 – land cover with identification of the main types of forest

The Sila National Park area, although being almost completely mountainous, is characterised by artificial communities that are typical of the Mediterranean basal area and evergreen forest. According to Pavari's phytoclimatic classification, the zones of *Fagetum*, *Castanetum* and *Lauretum* can be recognised.

The present-day distribution of forest vegetation is directly influenced by climate and pedological differences, as well as by anthropic activities that have determined a simplification in forest structure and floristic composition.

#### 4.1.2 Estimate of biomass that can potentially be available from the forests of Sila National Park

As already mentioned, about 80% of the area of Sila National Park is covered with forests. More precisely, forests cover about 60.000 ha out of 73.000 ha. Except for Integral and Biogenetic Reserves (property of the Region) and areas owned by the municipalities, forests are privately owned. This is why private owners were invited to take part in the meetings held by the SNP to discuss the biomass supply plan.

In order to draw a realistic estimate of the amount of biomass produced in the Park forests, some dendrometric data must be preliminarily gathered, particularly those concerning the existing types of forests. To do this, forest areas need to be divided into vegetational belts or biomes (Corsican pine, beech, downy oak, Turkey oak) and each of these into chronological classes.

At present, data gathered by the National Inventory of Forests and Forest Carbon Pools (INFC – Ministry for Agriculture and Forestry) are available.

It can be therefore supposed that the existing amount of wood in the forests of SNP, divided per land cover and use classes, corresponds to the figures reported in the table below:



Classes of land cover and use	Area (hectares)	m <sup>3</sup> /ha	Tot. amount /m <sup>3</sup>
Beech forests	13214	350	4.624.900,00
Mixed forests with prevalence of beech	10307	350	3.607.450,00
Corsican pine forests	27595	322	8.885.590,00
Mixed forests with prevalence of Corsican pine	5789	300	1.736.700,00
Deciduous oak forests	4597	200	919.400,00
Chestnut-tree forests	329	150	49.350,00
Evergreen sclerophyllous forests	176	50	8.800,00
		<b>Total</b>	<b>19.832.190,00</b>

The total amount only represents the total biomass of the SNP, without distinction of assortment.

It must be considered that not all of the Park forest area can be used, particularly areas located in Zone 1, that is, Integral and Biogenetic Reserves where law prohibits any cut.

Furthermore, no forest can be entirely used for energy purpose, as all wood assortments have to be valorised. Thus, the amount of extracted biomass should be fixed in relation to yearly tree growth rates, with no impact on existing stocks, that is, without reducing the existing amount of wood.

This is a sustainable use of forests and implies paying a strong attention to the environmental compatibility of the biomass supply chain.

#### 4.1.3 Assessment of the biomass that can actually be available from SNP forests

Out of total amounts of wood growth, the net amount of biomass that can be supplied to energy conversion plants is determined by the analysis of wood assortments and their use destination, ground slope degrees, other forestry programmes, mechanisation and, importantly, the authorisations yearly issued by Calabria Region upon forest owners request.

Supposing that available conifer biomass is up to the 25% of yearly wood growth, available hardwood biomass is up to 10% of yearly wood growth and available area is up to 13000 ha conifers and 9000 ha hardwoods:

Forest type	HA	Amount m <sup>3</sup> /ha	Growth m <sup>3</sup> /ha	Biomass per year m <sup>3</sup> /ha	Potential Extraction per year m <sup>3</sup>
Pure and mixed Conifers	13.000	350	4	0,8	10.400
Pure and mixed Hardwoods	9.000	400	4,5	0,675	6.075
				<b>TOTALE</b>	<b>16.475</b>

#### Conifers

The forests of Sila National Park that are potentially suitable to supply biomass occupy an area of about 28.000 HA, entirely in zone C. More specifically, the area involved in the plan is up to **13.000 ha** conifers, representing 50% of SNP areas, almost exclusively composed by Corsican Pine *var Calabria* or Corsican Pine mixed with beech.

#### Present day scenario

From the analysis of data concerning land cover in SNP, it can be argued that the production of biomass for energy purpose, based on conifer forests.

The availability goes down again due to lack of forest management plans is, currently up to around **5.200 tons/year**.

### **Hardwoods**

As regards hardwoods, 12.000 ha of SNP area, also included in zone C, will be involved.

More specifically, hardwoods forests can be identified into **9.000 ha** of beech forests and beech forests mixed with other hardwoods. Most of these SNP forests are not included in any Forest Management Plan, therefore, their exploitation is up to the owner (either private or public) who asks Calabria Region for a cut permission.

### **Present day scenario**

From the analysis of data concerning land cover in SNP, it can be argued that the production of biomass for energy purpose, based on hardwood forests. The availability goes down again due to lack of forest management plans, is currently up to around **3.035 ton/year**.

To fix these amounts, information from questionnaires submitted to forest owners and forestry companies during the specific meetings has been taken into account. Forest uses in areas close to SNP borders have been also considered.

## **4.2 HARVESTING**

From the analysis of questionnaires submitted during the specific meetings, where forestry companies have described their machinery and working procedures, it can be concluded that harvesting operations depend on local orography and technical capacities of harvesters (that is, forestry machines and the equipment they use).

The following procedure is used by most of the forestry companies operating in the SNP territory:



### **Preparatory phase:**

Preparation implies wearing personal protective equipment (chainsaw trousers, chainsaw, steel-toe boots, helmet, gloves and ear defenders). Forestry operations can be generally synthesised as follows.

### **Felling**

Felling consists in cutting the tree at the bottom. This operation is generally carried out with chainsaws and other tools able to determine the felling direction, such as wedges, felling levers, tackles, etc... the operator has first made the undercut and then the felling cut.

### **Processing**

It includes delimiting, cross cutting, debarking where necessary. Delimiting and cross cutting are carried out through the chainsaw and manual tools such as bush knives and adzes. This operation can be carried out either in the felling point or in the landing area, after extracting the whole or delimited trees.

### **Bunching and extraction**

The cross-cut wood or the long stems are first moved from the felling point to the strip road, along which they



are later brought to the landing. The landing is an area dedicated to the gathering of wood and it is accessible by roads suitable for heavy vehicles. The most common extraction systems involve the use of tractors equipped with winch or, in inaccessible areas, of draught animals. Where allowed by the condition of the striproads and by orography, forwarder forestry tractors are used.

### Chipping

This operation involves reducing woods of different kind and form in small-sized pieces (called chips), through a mechanic cutting. In the use of biomass for energy purpose, chipping can be carried out in the forest, this shows some advantages compared to traditional bunching techniques:



- it allows to use all wood biomass available, including branchwood that, as in traditional bunching it is usually left on the forest ground, represents a dangerous fire fuel;
- it allows to partially or totally eliminate the bunching of small-sized assortments, saving workforce and improving ergonomics.

Chipping in felling site is only possible in plains (up to 20% inclination) and less uneven areas. When working conditions are not favourable (too much inclination or too uneven lands), it is necessary to extract the whole tree up to the area where chipping will take place, through the so called “whole-tree” technique.

Chipping can also be carried out on trail, provided that it is wide enough to allow machines to move. If this is not possible, the extraction must be continued up to the landing, where pulpwood would be chipped after cutting the portion of wood to be processed.

### **4.3 TRANSPORT**

The **transport** of extracted wood or wooden chips to the energy production plant or the storage facility will be carried out through lorries. In particular, long trunks will require the use of articulated lorries (up to 13 meters of length).



In those extraction areas where wooden chips are processed, lorries equipped with roll-of containers or live bottoms are used, particularly those with highest capacity in order to maximise the use of this means of transport.

Unfortunately, wheeled means cannot be replaced at the moment, as in the SNP area there is no suitably equipped railway.

#### **4.3.1 STORAGE**

During the specific meetings, it was decided that biomass supply chain should feed two plants: Station for the production of 114 KWt heat located in the seat of SNP providing heating to SNP

office; Gasification plant of 200 KWe/953 KWt producing electricity and heating (cogeneration) in the territory of Longobucco. The station in the Park seat will be positioned under a roof and fed with wooden chips/pellet. The boiler is equipped with a 200 kg storage tank feeding the burner through a hopper. For this station, no storage facility can be identified, therefore biomass will be supplied on a weekly basis until a storage structure is realised.

On the contrary, the Longobucco plant has several units dedicated to storage. The supplied material can be stored under roof. The capacity of the main storage facility corresponds to about 10-day feeding and the volume of stored loads is up to 160 cubic metres. Through a machine, the raw material is brought from the storage area to a 31-m<sup>3</sup> tank able to feed the system for 32 hours approximately. A cochlea takes wooden chips and conveys them via a bucket elevator. A rotary feeder and a guillotine valve system allows for a continuous feeding and isolation from the external environment.

The size of feedstock handling and gasification feeding system depends on the time needed by the elevator for uploading the biomass in the hopper.

Another option highlighted during the meetings is the creation of storage facilities by the biomass and wooden chips producers. It was argued that about 1500 m<sup>2</sup> indoor and 10.000 m<sup>2</sup> outdoor areas are available, this could allow to modulate the production depending on final user's demand and to provide wooden chips with a lower degree of humidity than the fresh ones, obviously with some differences in price.

#### **4.4 CONVERSION**

The conversion of biomass into energy can be realised in many ways, such as chipping, pelletisation, briquetisation, that make processed feedstock easily transported and stored.

According to information collected during the specific meeting, the forestry companies working in the SNP, almost exclusively produce fresh wooden chips, amounting to 45.000 m<sup>3</sup>, and firewood, totally 3000 m<sup>3</sup>. Chips are mainly transported to thermal power plants in Crotone and Cosenza provinces, while firewood, after being cross-cut, fulfills the needs of some of the villages in the SNP area.

As far as SNP stations are concerned, the one in the Park seat will be fed with chips/pellet. Among the companies currently participating in the project, no one is producing pellet, but surveys show that some producers in the SNP area exist and will be asked for supply.

As regards Longobucco gasification plant, anhydrous material is needed, that is, with 15% moisture. Thus, the plant will be equipped with a drier and a pelletizer to transform chips into pellet that will be then brought to the gasifier.

#### **4.5 ENERGY PRODUCTION**

The production of electricity and thermal energy is realised through thermal machinery fired with wooden fuel (chips, pellet, etc...) that may have different functioning and different performances in terms of efficiency.

The figures concerning potential energy production, depending on the potential conifer and hardwood biomass supply described in the previous paragraphs, are showed in the table below. As the table points out, there is currently no production of thermal energy. Indeed, no district heating system using the thermal energy produced by plants within a range of 50 km distance from the SNP territory exists up to this day.

As regards the planned stations, the ones located in the Park seat and in Longobucco, technical specifications are described below:

➤ Technical specifications - SNP seat station

The boiler the Park is going to start will represent an effective alternative to traditional boilers fed with gas or liquid fuels (methane, LPG, gasoline), thanks to its cheap management due to the low market price of fuel. The boiler will be able to burn various kinds of solid, middle-sized fuel, such as wooden chips, sawdust, pine nut and almond shells, pellet, olive pomace, corn (with low residual moisture and mixed at 50% with pellet).



Model	Max. nominal power		Max. power to firebox		Min. nominal power		Min. power to firebox		Consumption	
	[Kcal/h]	[kW]	[Kcal/h]	[kW]	[Kcal/h]	[kW]	[Kcal/h]	[kW]	[Kg/h] MIN.	[Kg/h] MAX.
<b>CSB99</b>	99000	114,84	118000	136,88	29700	34,45	35400	41,06	2	26,8

The fuel, stored in a mixer-fitted tank located near the burner body, is automatically taken through a cochlea powered by a gear motor and conveyed to the cast iron burner in the combustion chamber.

The heat generated during combustion can be ideally divided into two parts:

1. direct transferred by open flame radiation;
2. indirect generated by conduction and convection fumes

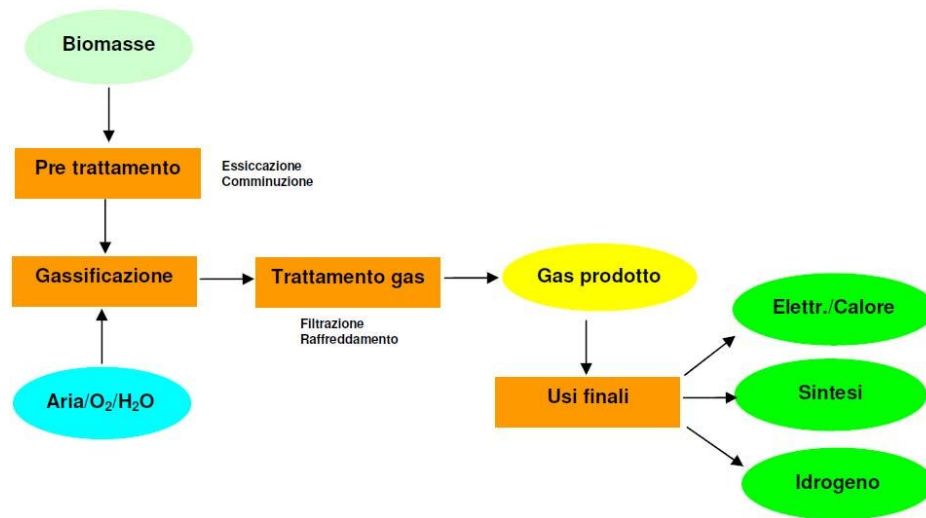
Fumes follow a set course, called “three-pass”, going from the lower part of the boiler to the burner and up to the connection with the flue pipe in the back part of the machine. This course inside the burner body, thanks to convection exchange, allows to recover heat that is then transferred to water. The heated water will be circulated through the system.

As regards consumptions, if the boiler is used during the autumn-winter months (6 months), operating at full capacity, that is, at top consumption, for 10 hours per day and during 4 more months with minimum consumptions, **the amount of chips/pellet needed is approximately 50 tons/year.**

➤ Technical specifications – Longobucco station

The gasification plant has a nominal power of 196-220 kg/h biomass (conifer chips, lower calorific value of 15.6 MJ/kg) and a thermal power varying between 850-953 KWt coupled by units producing electricity and heating at 200 KWe net electric power.

The gasification technology is based on down-draft fixed bed reactors. This technology ensures good efficiency and high-quality gas in terms of tar levels. The basic systems have optimised conversion efficiency and gas cleaning standards, automatic functioning (startup, operation and switching off), in a view of ensuring the highest technological simplicity.



The plant is composed by a feeding section, a gasification section, a gas cooling and cleaning section, electricity production units and auxiliary units.

The gasification section is of down-draft fixed bed type. The traditional configuration involves a fixed bed of feedstock to be gasified; the gasification agent works in a limited zone of the gasifier, where the highest temperatures are reached; the high-temperature gas flow is then reduced to an underlying coal bed.

<b>Project max. capacity</b>	
Nominal capacity:	Daily: 16 hours/day: 1060,8 kg/g
	Hour: 196 kg/h (natural state moisture 15%)
Max. capacity:	220 kg/h (natural state moisture 15%)
Project calorific value:	15.6 MJ/kg (natural state moisture 15%)

<b>Project thermal capacity</b>	
Nominal capacity:	849,3 KWt
Max capacity:	953,3 KWt
Deliverable power in the transport network:	200 KWe
Deliverable power alternator:	210 KWe
Delivery voltage:	380 V or other
Thermal power recovered:	300 KWt at 90°C

Input material are biomass, as defined by the laws in force. By “biomass”, the D.L. (decree-law, translator’s note) of 29 December 2003, n. 387 means: “the biodegradable part of products, waste and residues of agriculture”.



The gasification plant has a gross thermal power and a net electric power of

849,3 KWt and 200 KWe respectively. The 15%-moisture wooden chips consumption per hour is up to 196 kg/h.

**Daily and yearly consumptions go up to 3,14 t/day and 980 t/year respectively if we consider a functioning of 16 h/day and 5000 h/year.**

The plant's gross and net electric power is up to 210 and 200 kWe and the yearly potential production of gross and net electricity goes up to 1050 and 1000 MWh in the case of 5000 hours functioning.

The cogeneration unit should recover 300 kWt thermal energy available as 70-90°C hot water for destination buildings. The cogeneration functioning should last for about 3000 hours/year, with a potential production of thermal energy of 900 MWh.

Finally, from the analysis of stations' needs and the potential biomass supply, it can be concluded that the supply chain is realisable without bringing feedstock from territories outside the SNP.

#### **4.6 END- CONSUMER**

Analysing the flows of biomass produced within the SNP area up to this day, it came out that the final users of wooden biomass are thermal power plants in the provinces of Crotone and Cosenza and, in general, GSE (Energy Service Management company, translator's note). Thus, it can be argued that the whole of energy produced from SNP biomass enter the national-scale network without any benefit for the local territory.

By starting the Park seat and the Longobucco stations, the final users of energy will be partially modified.



➤ boiler in the SNP seat

The final users will be the employees working in the Park seat and all visitors.

➤ Longobucco station

Downstream from the plant, a cogeneration system fed by the syngas produced by the gasifier will supply hot water to a newly realised district heating system. The final users of this heating distribution

network will be the following buildings:

**1) “former monastery of Reformed Friars” – via Roma, seat of the SNP Museum, with a 108 kW installed thermal power capacity;**

**2) “Santa Croce school” - via Matinata, with a 72 kW installed thermal power capacity.**

These buildings are located in the centre of Longobucco, about 800 meters above sea level. Longobucco is situated in the E climate zone, it has 2392 DD (degree days) value and thermal systems can work for 14 hours a day from 15 October to 15 April.

The planned thermal power demand corresponds to the sum of the two generators' plate data, that is, 180 kW. With reference to the plate data of the cogenerator, the network might be expanded in future.



## 5 Important aspects of the supply chain

The drafting of this project was inspired by the full awareness that finding a solution to environmental problems requires a comprehensive approach rather than actions on specific sectors. This is also emphasised in EU energy policies that, recognising the crucial role played by local authorities, encourage them to develop a mid-term integrated energy programme in their territories.

In this perspective, the Sila National Park has decided to take part in this important initiative recognising the huge potentialities of its forests and aiming to contribute, through a territorial planning strategy, to the creation of an agro-energy short supply chain based on the guidelines provided by this Local Biomass Supply Plan.

This plan is not exhaustive but can be considered as an open document for a first pilot project; it aims to be replicable in the territory and, therefore, flexible and adaptable to different contexts.

According to the principles of supply chain management, there is the need to set up cooperation tools among the actors of the agro-energy supply chain, in order to ensure its functioning within a context of shared rules.

The key-issues for the success of this work plan are listed below and represent the main challenges the SNP will deal with during the project:

- a model of governance that ensures the durable participation of agriculture/forestry companies, forest owners and institutions in the agro-energy system;



- encouraging final users confidence towards the supply chain and its actors, through the organisation of periodic and thematic meeting;
- the application of track and trace models to the agro-energy supply chain, ensuring the sustainable management of forest land from which biomass originates;
- promoting the PEFC and PSC forest certification frameworks;
- drafting of a Strategic Territory Plan, conceived as a planning tool suitable for a territory scale larger than the municipality, geographically and administratively homogenous;
- providing assistance, upon request, for the drafting of framework contracts for the supply of biomass. Contract procedures have to be subject to standardisation and continuous adaptation, including quanti/qualitative specifications of biomass supplied, relation to plant capacity, assessment of economic aspects, in order to avoid disagreements and problems in the execution of the contract.