

STSM Report

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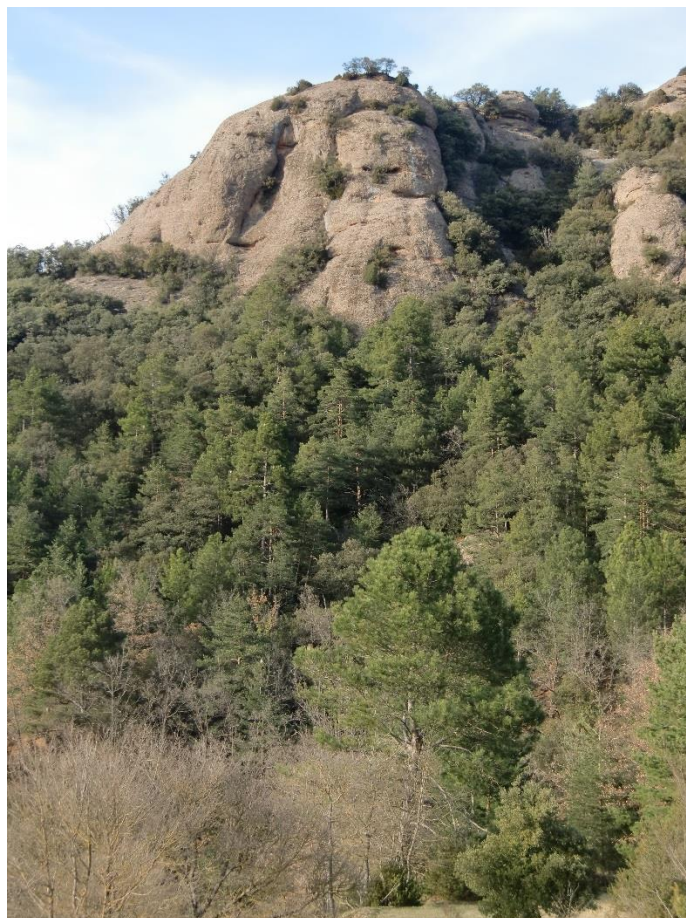
Title: Improving integration between forest fire, biomass production and rural development policy objectives. A multilevel and polycentric governance study of European, Spanish and Catalan policies.

Working group: WG1 “Forest-related policy targets and measures”

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Picture: Francesca Ferranti



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Abstract

The two topics of forest fire prevention and production of forest biomass for energy are receiving increasing attention in the debates about forest policy and governance. At the level of the European Union, legislations and policy documents were produced to regulate the way Member States deal with these two forest-relevant contexts. Consequently, actions have been taken by Member States as well as lower policy levels to implement European requirements. This project dealt with the analysis of the extent to which forest fire prevention and the production of forest biomass for energy were integrated in specific national and regional contexts. In particular, it concentrated on Spain and Catalonia (one of the Spanish Autonomous Communities) and on the way local policies and actors framed this integration. This Short Term Scientific Mission was dedicated to understanding if and how managing forests for fire prevention was deemed compatible with the production of biomass and with the development of rural areas. Moreover, the author examined whether forest management that had the objective of producing biomass was considered as having positive outcomes for the resilience to forest fire. While at European level the two topics of forest fire prevention and production of forest biomass are weakly connected, results showed that the lower the policy level the stronger the integration between these two topics.

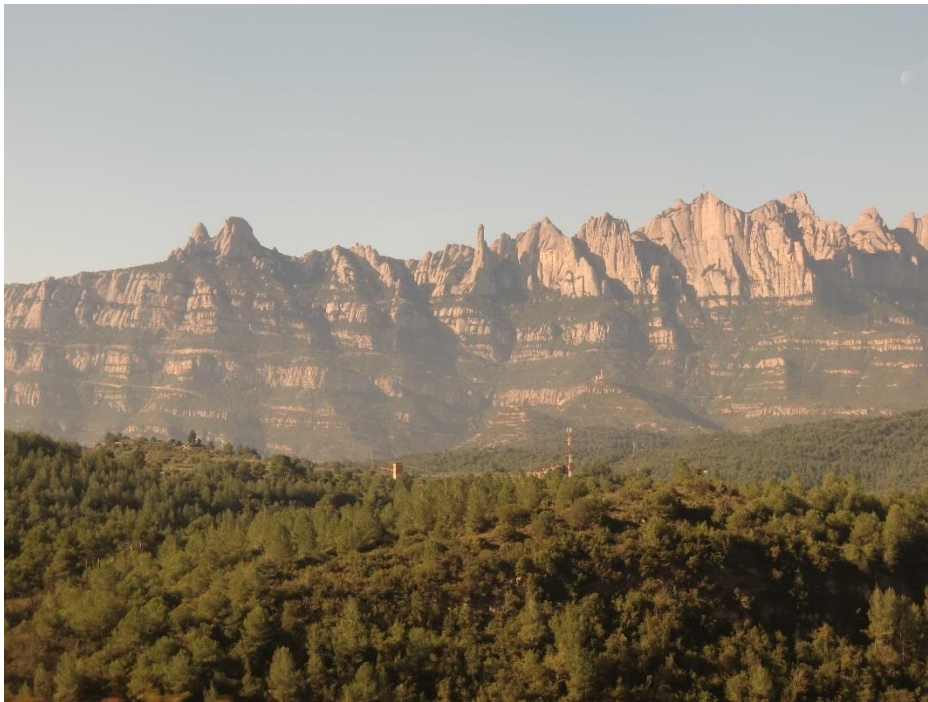


Figure 1: Montserrat and its forests. One of the most outstanding natural symbols of Catalonia. Picture: Francesca Ferranti

1. Introduction

Wildfires are among the main natural disturbances affecting European and in particular Mediterranean forests (San-Miguel-Ayanz et al., 2013; Joint Research Centre, 2014). Forest management in Mediterranean areas constantly deals with fire risk (Xanthopoulos et al., 2006). Best practice guidelines suggest that forest management in these areas incorporate fire risk into planning and execution of forest interventions, in order to reduce dangers and costs associated with this forest disturbance (Graham et al., 2004). The need of applying such approach has become increasingly vivid considering that forest fires are changing their patterns of occurrence towards the generation of large fires or megafires that often overcome human possibilities to control and suppress them (Costa et al., 2011). Among the underlying causes of the increasing occurrence of large fires figure some of the main consequences of climate and land use changes (Flannigan et al., 2009; Loepfe et al., 2012). Examples are increased frequency of drought that decreases the humidity of the vegetation (Flannigan et al., 2009); increased frequency of short but intensive rain events that generate stress in the vegetation and augments susceptibility to diseases and windstorm (De Luis et al., 2010); abandonment of agriculture, forest exploitation and grazing in marginal areas that give rise to denser forest structures and reforestation of previously non-forested areas (Fernandes 2013). All these factors cause increased levels and propensity to burn of wood fuels.



Figure 2: Impact of a large fire on a forest valley in the center of Catalonia. Picture: Francesca Ferranti

Consequently to the relevance of the forest fire problem for rural areas around Europe, forest-focused and forest-related policies incorporate elements of fire prevention, control and suppression both at European and at lower policy levels. For example, in the European context, DG environment, DG Regional Policy and DG Agriculture and Rural

Development have taken policy actions in the context of forest fires (European Commission, 2015). At national level, several Member States developed policies specifically addressing forest fire, as well as other policies for example related to climate change and biodiversity that refer to forest fire as an important factor in forest management and governance (see for example the emanation of the Spanish law “Ley 43/2003, de 21 de noviembre, de Montes”). Across Europe, also at regional and local levels several policy initiatives took place which more or less directly address forest fire. An example is the Decree which establishes prevention measures for forest fires in the Spanish Autonomous Community of Catalonia (Decreto 64/1995, de 7 de marzo, por el cual se establecen medidas de prevención de incendios forestales).

However, all these policies, as well as the subsidies they generate to support the achievement of policy objectives, mainly adopt an approach based on investments for suppression and prevention of forest fires (Plana et al., 2005). The policy consideration of the underlying causes of large fires is rather weak, as is the establishment of a link to rural development aimed at avoiding costs and increasing economic opportunities for rural populations who would engage in actions aimed at reducing the occurrence of these fires (Plana, 2010). This Short Term Scientific Mission revolved around such problem statement to reflect on the extent to which policy actions focused on or related to wildfires consider the underlying causal frame of forest fire and suggest solutions to link fire prevention and control to rural development. In particular, it addressed the topic of the

production of forest biomass for energy which is a very actual discourse in Mediterranean areas, due to the high potential attributed to Mediterranean forests to provide wood for energy generation and to the possibilities of biomass production to reduce wildfire risk (Becker et al., 2009; Regos et al., 2016). The Short Term Scientific Mission addressed this topic from multilevel and polycentric governance perspectives (Hooghe and Marks, 2003; Hartley, 2015), by analyzing forest fire policy and governance at different policy levels and in different governance sites (Yanow, 1996). As a case study of a Mediterranean area where these issues are particularly relevant, the Short Term Scientific Mission focused on Catalonia, an Autonomous Community in the north west of Spain. In order to include different governance sites in which policies are elaborated and implemented, the performer of the Short Term Scientific Mission carried out an analysis of European, Spanish and Catalan policies as well as prepare a questionnaire to submit to different stakeholder groups, which enquires their opinions on the issues at study.



Figure 3: A biomass project at the Centre Tecnològic Forestal de Catalunya. Picture: Francesca Ferranti

2. Purpose of the Short Term Scientific Mission

The main research objectives pursued during the Short Term Scientific Mission were:

- 1) Analyzing EU, Spanish and Catalan policies focused on (or related to) forests, in order to verify to which extent they integrate the two topics of fire prevention and production of biomass for energy.
- 2) Enquiring the opinion of relevant stakeholders on the extent to which the two topics of fire prevention and production of biomass for energy are actually linked in the practice.



Figures 4 and 5: The Centre Tecnològic Forestal de Catalunya. Picture: Francesca Ferranti

3. Description of the work carried out during the Short Term Scientific Mission and of the results obtained

The work and results are described for each objective of the Short Term Scientific Mission.

3.1 *Analyzing European Union, Spanish and Catalan policies focused on (or related to) forests, in order to verify to which extent they integrate the two topics of fire prevention and production of biomass for energy and link these topics to rural development.*

The methods adopted to achieve the first research objective consisted in examining the legislations and policies that were considered relevant for forests in general and more in particular for forest fire prevention and production of forest biomass for energy. Documents generally related to forests were screened to verify whether the two topics of forest fire prevention and biomass production were integrated, as well as how this integration was framed. Documents relevant for forest fire were analyzed to verify if

and how they mentioned the production of biomass for energy as a factor with positive consequences for fire resilience. Finally, documents relevant for biomass production were examined to understand the way fire prevention was considered in the legal and policy texts.

3.1.1 *European level legislations and policies*

European policies recognize the need to work on fire prevention to reduce fire risk and impacts. They also underline the need to rely on renewable energy sources, among which forest biomass represents an interesting example due to its carbon neutrality¹. The European Union is not equipped with a legally binding policy on forests. The reference document for forest policy is the 2013 [Forest Strategy](#) that substituted a Forestry Strategy emanated in 2006 (European Commission, 2013). The 2013 Strategy is not simply dedicated to forestry but to the whole ecosystem represented by forests, and to the sector which is managing and utilizing, but also protecting it. The Strategy takes an holistic approach by aiming to clarify the role of forests in satisfying the objectives of forest-exogenous legally binding policies indirectly affecting forests and forestry, like the Rural Development Policy and the European Union Climate and Energy Package. These policies contribute to the achievement of the EU 2020 targets and summarize important emerging issues that are relevant in the management of European forests, such as growing threats which need to be mitigated and growing (competing) demands which need to be balanced. The Strategy presents the situation of European Union forests in 2013, which is characterized by a rising growing stock, but also an expected increase in wood cuttings which might utilize the wood increments in the future. Forests are presented as multifunctional ecosystems which provide habitats for species and benefits for human health, recreation and tourism. Forests are also providers of raw materials like wood for construction and for energy and non-timber forest products. The socio-economic importance of wood as an energy source is stressed in the document. Sustainable forest management and forest multifunctionality are the keywords of the document.

The Strategy builds around eight priorities which are reported in Box 1. As it is possible to see from the Box, both forest fires and the production of biomass for energy play an important role in the Strategy. In particular, forest fires are mentioned in the Strategy with respect to forest protection and to climate change. Fires are considered as a pressing issue which is negatively affecting forests.

¹ Different opinions were raised in literature with respect to the carbon neutrality of forest wood, For an overview see: Ferranti F. 2014. *Energy wood: A challenge for European forests. Potentials, environmental implications, policy integration and related conflicts*. European Forest Institute http://www.efi.int/files/attachments/publications/efi_tr_95_ferranti_2014.pdf

- 1) Supporting rural and urban communities by promoting social welfare and sustainable jobs carried out by a trained workforce. Rural Development funds could be used by the MSs to accomplish social benefits from forests, but also to improve forest resilience and their environmental value.
- 2) Fostering the competitiveness and sustainability of the EU's forest-based industries, bio-energy and the wider green economy by promoting both material and energy uses of wood and their climate benefits. In particular, forest energy wood accounts for 42% of the wood used in the EU, corresponding to about 5% of total EU energy consumption. Harmonized sustainability criteria might be needed to regulate the production of energy wood.
- 3) Fostering the role of forests in mitigating climate change and applying adaptive forest management options which can counteract the negative effects of climate change. Both material and energy uses of wood are mentioned as examples which can help the achievement of this goal.
- 4) Protecting forests and enhancing ecosystem services by protecting biodiversity, avoiding habitat fragmentation and the spreading of invasive species, managing water sustainably and limiting the effects of storms, pests and fires. The application of Sustainable Forest Management and the correct implementation of the Natura 2000 network can help achieving this target.
- 5) Improving the knowledge base on forest ecosystems and their changes. 6) Researching ways to produce new and innovative forestry and added value products. 7) Properly addressing cross-cutting forest policy issues by ensuring that the objectives of other EU policies affecting the forest sector are taken into account. 8) Coordinating MS action towards the achievement of EU commitments taken in the international arena and affecting the European forest context.
- 6) Researching ways to produce new and innovative forestry and added value products.
- 7) Properly addressing cross-cutting forest policy issues by ensuring that the objectives of other EU policies affecting the forest sector are taken into account.
- 8) Coordinating MS action towards the achievement of EU commitments taken in the international arena and affecting the European forest context.

Box 1: Priorities of the 2013 European union Forest Strategy

Forest biomass is described as the most important source of renewable energy in the European Union as in 2013 it accounted for half of the Union's total renewable energy consumption. Satisfying increasing demands of renewable energy is depicted as an important challenge for European forests, as it poses important issues of competition among different industries that use wood from forests. Moreover, challenges are mentioned with respect to forest protection and nature conservation which are based on principles that go against an increase in the use of forest biomass. Despite the broad space assigned to the biomass topic, the Strategy does not establish any relation between fire prevention and biomass production.

Always in the forest context, two interesting legislations were emanated at European level, which however have already expired. These two legislations were directly focussed on forest fires. These are the [Council Regulation \(EEC\) No 2158/92 of 23 July 1992 on](#)

[protection of the Community's forests against fire](#) and the [Regulation \(EC\) No 2152/2003 of the European Parliament and of the Council of 17 November 2003 concerning monitoring of forests and environmental interactions in the Community](#). The first Regulation was valid from 1992 to 2002 and dealt with fire prevention, monitoring and restoration of burned forest habitats. This Regulation did not have a strong impact on the field as its budget to support forest prevention objectives was very low (European Commission, 2015). However, it strongly contributed to improve knowledge on forest fires in Europe, as among its objectives figured the determination of the main causes of forest fires. This Regulation required also a classification of forested areas in Europe according to fire risk. This Regulation did not mention the production of biomass for energy and it did therefore not establish any link between fire prevention and the contribution of forests to energy generation. The second Regulation, covering the years 2003 to 2006, was also known as *Forest Focus* and it concentrated on forest fire prevention but also on the protection of forests against another harmful agent, namely pollution. As the previous Regulation, also *Forest Focus* did not establish any relation between forest fire prevention and production of biomass for energy. A reason for this could be that the two legislations were emanated in a period in which the use of forest biomass for energy generation was not high on the policy agenda. The last policy emanated by the European Union and directly addressing forest fires is the [European Parliament resolution of 19 June 2008 on stepping up the Union's disaster response capacity](#). This document deals with the prevention and mitigation of, as well as response to, natural disasters in Europe. It includes a whole annex dedicated to forest fire which studies how to best synchronize prevention, preparedness, response and recovery activities. Also this document does not mention the production of biomass for energy and no link is established in its text between this production and forest fire prevention.

Several policy documents were emanated at European level with a specific focus on renewable energy. These documents often dedicate a space to biomass for energy. The main legislative reference in this context is the 2009 [Renewable Energy Directive](#) that aims at promoting security of energy supply, technological development and employment opportunities related to the increased use of renewable energy sources in the European context (Directive 2009/28/EC of the European Parliament and of the Council). The Directive also aims at reducing European Union energy import dependency and at increasing energy efficiency, saving and diversification. With respect to the renewable energy market, the Directive envisages a sustainability driven market in which, for example, woody biomass produced with sustainable management strategies can be sold at higher prices compared to those that are not. Energy prices should reflect costs of production and consumption, such as environmental, societal and healthcare costs. The Directive directly addresses forest biomass as a source of renewable energy and it expresses environmental concerns with respect to the exploitation of this energy source. It excludes lands with high biodiversity values from the production of renewable energy. Forests where there has been little or no intensive human intervention, and areas designated for nature protection purposes or constituting habitats for endangered species should not be exploited for energy production. Further, the Directive excludes areas with a high carbon stock, insofar as the extraction of biomass from these areas could result in the release of carbon into the atmosphere. These areas are represented by wetlands,

peatlands, and continuously forested areas. Environmental concerns are especially strong with respect to the conversion of lands into areas dedicated to forestry plantations and short rotation forestry. This conversion has to consider issues related to carbon balance and pollution.

The Directive establishes a 20% mandatory target for the overall share of energy from renewable sources to be achieved by 2020. The year 2020 is also chosen as a milestone for the European Union climate change policy, which imposes the target of reducing GHG emissions by 20% by 2020 with respect to the 1990 level. The combination of the two targets has been defined as the European Union “climate and energy package”. To achieve the 2020 renewable energy target, the Directive has imposed legally binding objectives on European Union Member States, individually designed taking into account the different starting points and potentials of each Member State. The main aim of the mandatory target is to provide certainty for investors and encourage technological development. The Directive has also imposed a 10% target for energy from renewable sources in transport to be reached by 2020. This last target is set at the same level for all Member States in order to ensure consistency in transport fuel specification. To organize their efforts in achieving the 2020 renewable energy target, Member States of the European Union are required by the Directive to draft national Renewable Energy Action Plans starting from 2005, the year for which the latest reliable data for all the Member States are available. These action plans have to consider that biomass has different uses, and that it is therefore necessary to mobilize new biomass resources to avoid competition among sectors. Especially with respect to woody biomass, which is often produced and used in local contexts, regional and local authorities should be involved in the realization of the Renewable Energy Action Plans. Forest fire prevention is mentioned in this legislation in one specific context, namely in the requirement that the use of forest biomass for energy in boilers and stoves and the training of personnel in this regard should take into account the overall situation of forests, including forest fire protection issues. No further link between forest fire prevention and biomass production is established in the text of the Directive.

A less recent but interesting policy is the 2005 [Biomass Action Plan](#) of the European Union (European Commission, 2005), which aims to create market incentives and reduce market barriers to the use of the three types of biomass: wood, wastes (also including wood residues from industrial processes), and agricultural crops. The Plan addresses the role of biomass in the three energy sectors of heating, electricity and transport. It requires Member States to develop national Biomass Action Plans which describe these sectors at the national level. According to the document, the heating sector benefits the most from the advantages offered by wood as a source of energy. Indeed, technology for the use of these biomass types in residential and industrial heating is simple and cheap. For example, the use of standardized pellets makes processes environmentally safe and easy to handle. The European Commission presents the district heating option through combined heat and power plants as a feasible alternative to reduce disadvantages and increase benefits of using wood in the heating sector. Disadvantages as identified by the Plan relate to the environmental implications of using wood in the heating sector (burning biomass emits pollutants), and to non-technical barriers such as market confidence and

stakeholder attitudes. The Plan mentions that about 35% of the annual European wood growth is not used because the market demand for small size timber suitable for energy production is very low. Most of the unutilized wood lies in small private holdings and it is difficult to mobilize. Moreover, studies and forecasts on the use of wood and wood wastes in the heating sector suffer from the lack of data completeness on the amount of woody biomass used by private households and on the degree of efficiency of the related heating process. Finally, wood as a resource needs planting, growing and harvesting activities. This increases the costs of producing energy from wood. With respect to the transport sector, second generation biofuels that can be produced from various biomass sources including wood and wood wastes are highlighted by the Plan as a viable option for using cellulose material in the production of liquid fuels. Second generation biofuels have a better quality than conventional diesel, they have the advantage of securing a higher market share for biofuels by allowing a wider variety of raw material as source, and potentially reduce GHG emissions by limiting the inputs necessary to the cultivation of the prime cellulosic material (if compared to traditional agriculture and first generation biofuels). Forest fires are mentioned in the Plan only in relation to the fact that in some regions, collecting residual forestry biomass can benefit fire prevention. No further link is established in the document between forest fire prevention and biomass production.

Another European policy which is relevant for the production of biomass for energy as well as for forest fire prevention is the Agricultural Policy and in particular the 2014 [Rural Development Policy](#) (Regulation (EU) No 1305/2013). This policy came to substitute an earlier version which was emanated in 2003 and then updated in 2008. It covers the years from 2014 to 2020. The 2014 Rural Development Policy aims at taking into account the unique and in some instances unexpected new challenges with which the European Union agricultural sector is confronted, and to develop a better targeted, more equitable and greener policy. The Rural Development Regulation includes voluntary measures that aim at the competitiveness of agriculture and diversification of economy also through the provision of specific environmental goods. The general concept for rural development is that Member States or regional governments are responsible for designing their own multi-annual programmes and to choose, depending on their characteristics, the measures available in the European Union's Regulation that meet their needs. The policy is based on a co-financing principle and supported by the European Agricultural Fund for Rural Development. The fund is structured around six priorities: i) fostering knowledge transfer and innovation, also through the European Innovation Partnership for Agricultural Productivity and Sustainability, ii) enhancing competitiveness of farming activities and sustainability of forestry activities, iii) promoting food chain organization and risk management, iv) restoring, preserving and enhancing ecosystems related to farms and forests, v) promoting resource efficiency and transition to low carbon economy in the agriculture, forestry and food sectors, and vi) promoting social inclusion, poverty reduction and economic development in rural areas. The fund concurs to the achievement of the European Union's 2020 targets through the request for Member States of setting a clear link to performance in the National Rural Development Plans they need to create. A specific percentage of the national Rural Development envelope needs to be reserved for voluntary measures which are beneficial for the environment, like actions aimed at mitigating climate change and adapting to its occurrence, as well as the implementation of

the Natura 2000 network in agricultural and forested areas. The new Rural Development Regulation refers to 30 different measures which can be financed through the fund, 21 of which are particularly relevant for the achievement of the environmental priorities of the policy.

The Rural Development regulation aims at offering farmers and foresters new opportunities to combine agriculture and forestry for the delivery of environmentally sound and sustainable goods and services, as well as at highlighting the role of forestry measures in supporting the shift towards a low carbon and climate resilient economy. In this perspective, the European Agricultural Fund for Rural Development can be used to finance measures linked to the production of biomass for energy such as “Investments in new forestry technologies and in processing and marketing of forest products”, “Agri-environment- climate” and “Forest-environmental and climate services and forest conservation” (Regulation (EU) No 1305/2013). These measures are directly linkable to the establishment of energy wood plantations or the fostering of energy wood production in already existing forested areas, and they target energy wood as an innovative forest product or as a product which potentially benefits climate change mitigation. Also other measures can be used to finance energy wood projects, such as “Afforestation and creation of woodland”, “Establishment of agro-forestry systems”, “Investments in physical assets” (Regulation (EU) No 1305/2013) and the various capacity building and training measures. Also forest fires play a role in the Regulation, though this topic is assigned a more limited space than the biomass production one. The policy aims at covering the restoration of forests damaged by fire or other natural disasters and catastrophic events and relevant prevention measures. It mentions also that preventive actions against fires should be undertaken in areas classified by Member States as medium or high fire risk. A whole article of the Regulation is dedicated to the measures aimed at “Prevention and restoration of damage to forests from forest fires and natural disasters and catastrophic events”. In this context, the following actions can be financed: (a) the establishment of protective infrastructure. In the case of firebreaks, support may also cover aid contributing to maintenance costs; (b) local, small scale prevention activities against fire or other natural hazards; including the use of grazing animals; (c) establishing and improving forest fire, pest and diseases monitoring facilities and communication equipment; and (d) restoring forest potential damaged from fires and other natural disasters including pests, diseases as well as catastrophic events and climate change related events. The Rural Development Policy does not establish a link between forest fire prevention and biomass production.

3.1.2 Spanish legislations and policies

At Spanish level, interesting policies directly addressing forests are the 1998 [Spanish Forest Strategy](#), emanated as an answer to international developments in the field of forest governance like the European Resolution on Forest Policy (Ministerio de Agricultura, Alimentación y Medio Ambiente, 1998)- and the 2002 [Spanish Forest Plan](#), which plaid an operative role with respect to the Strategy (Consejo De Ministros, 2002). The Plan has a rather broad scope and it includes sections that focus on a wide variety of topics. General topics include: i) a description of the main forest typologies that are

present in Spain, ii) a characterization of forests and of the forest sector at national level including the main forest activities carried out, iii) the organization of the national nature conservation system, iv) a reference to the role of Spanish forests as carbon sinks, v) a characterization of forest management in Spain by means of forest planning and certification, vi) the use of European funds in the forest sector and vii) the economic estimation of the value of forests in Spain. A specific section of the Plan is dedicated to forest policy and starts by examining international forest policy like the Ministerial Conferences for the Protection of Forest in Europe and the Rio Convention on Biological Diversity. This section then goes more in detail into European Union policy affecting forests like the Rural Development Regulation and the European Forest Strategy. The Plan proceeds by zooming into the Spanish situation and it gives an overview of the national legislative framework as well as it presents a comparative analysis of the forest plans developed by various Autonomous Communities.

After setting the context, the Plan displays its principles, objectives and the priority actions that it aims at accomplishing. Among the inspiring principles of the Plan figure sustainable development through the application of international sustainability standards; forest multifunctionality to achieve by increasing the profitability of forest production and by caring for environmental and social forest functions; territorial cohesion fostered through rural development; conservation of biodiversity; and public participation in forest policy making and forest management. The objectives of the Plan are reported in Box 2.

- Protecting the landscape by avoiding soil erosion and by restoring forest cover with protective functions and at the same time increasing carbon sequestration to contribute to defeat climate change
- Fostering the application of sustainable forest management by applying forest planning
- Fostering the improvement of forest production as economic alternative to rural development
- Protecting forests from fires, plagues and pollution
- Promoting biodiversity conservation
- Promoting with society a new way of thinking about forests which recognizes the need to respect forests and their value as sources of renewable materials
- Favoring forest recreation
- Fostering and improving forest training and research
- Improving collaboration among the actors involved in the forest sector (institutions, social actors...)

Box 2: Objectives of the 2002 Spanish Forest Plan

These objectives are achieved through priority axes which include specific actions. In the description of these actions, forest fires are mentioned in the following contexts:

- The need to recover forested areas which underwent wildfires to satisfy socio economic demands of the population;
- Fire prevention is one of the main objectives of current forest management actions and subsidies by the administration in forest areas which are not very profitable;
- Fire prevention is one of the reasons for which it is important to carry out forest interventions aimed at improving forest conditions and protecting biodiversity;
- Fire is among the threatening factors which generate the need to apply forest defense and protection actions. Specific actions should be taken in the fields of planning (for example by creating territorial plans which include fire risk sharing and ensure cost-effectiveness, drafting county defense plans for fire prepared by competent technical personnel, including fire monitoring through detailed statistics, intensifying the application of remote sensing technologies for damage and risk assessment), prevention (e.g. by improving the identification of fire causes, promoting training courses for forest officials and police, dissuading the use of fire in rural areas and increase public awareness on the related dangers, promoting forest associations for intensifying preventive silviculture e.g. by working on firewall areas, diversification of species and controlled burning) and extinction (for example by improving coordination among administrations to address large fires, applying computer prediction methods and systems for the simulation of fire behavior).
- Revitalizing forest economy by giving value to the high production of small assortments of wood which are produced in Spanish forests. These small assortments are often left in the forests as they are not exploited for timber production, representing a factor of risk for forest fire.
- Communication and participation should include the topic of forest fires, continuing a tradition started in the 1950s when public campaigns were started for promoting forest fire prevention in summer periods.
- Training of forest professionals, as well as forest research and information, should focus on forest fires.

Also the production of biomass is mentioned in the 2002 Spanish Forest Plan within the description of the actions to undertake in order to achieve the objectives of the Plan even though less space is dedicated to this topic than to that of forest fire). In particular, the biomass topic appears in the context of the reforestation of forest areas put in place to achieve production goals. The text refers to the potential of producing biomass for energy in these circumstances and it describes the public subsidies that could be generated for this purpose. The Plan also mentions that industries like those producing pulp and particle boards have objections to the subsidies, as they consider them a distorting factor in the market which would influence the competition for the residual wood. The production of biomass is also mentioned among the actions concerning forest interventions aimed at improving forest conditions, in particular in the context of fostering and improving production of all kinds of forest products. As mentioned above in the paragraph dedicated to forest fires, energy wood production is mentioned in the context of socio-economic actions and in particular in relation to the production of forest products and forest exploitation. Potentials in this field are broad when considering mountain oaks traditionally used for fuelwood. The use of these trees has declined much in recent decades to the widespread use of alternative sources such as fossil fuels. This lack of use generates a concrete danger for mountain

forests which might be subject to fires and insect outbreaks. The energy use of these products in new bioenergy plants and the crushing industry are presented in the Plan as good alternatives which could partly alleviate these problems. The only link which is made between fire prevention and biomass production is that extracting residual biomass from the forest allows reducing fire risk. However, the energetic use of this residual biomass is not directly mentioned. Reason for this could be that the Plan was emanated in a period in which biomass production was not high on the international and national policy agendas.

Among the legislations interesting for this study figure the 2015 [Spanish Forest Law](#) (Ley 21/2015), which substituted a law emanated in 2003. The law update is aimed among other things at complying with European novelties in the context of forest governance. Important objectives are strengthening the application of Sustainable Forest Management and of the forest multifunctionality concept. In this document, forest fire is playing a strong role as one of the topics of higher relevance in the Spanish context. The production of biomass for energy is a topic with a marginal importance, but nevertheless present in the document. One of the objectives of the document is establishing common guidelines for fire extinction and prevention and setting the context for the national funds available to the Autonomous Communities in the context of forest fire. The document refers to forest fires also in the context of forest planning, as forests characterized by high fire risk and forests with protective functions need to be adequately classified in the Spanish planning system. The legislation requires that Autonomous Communities plan fire prevention programs together with the national government aimed especially at determining the causes of forest fires and of the intentionality of individuals in setting the fires. The energetic use of forest biomass is instead mentioned in the context of the provision of subventions for forest interventions, which will prioritize the valorization of the use of biomass for energy generation. No link is established in the document between biomass production and fire prevention.

Another policy document which is interesting with respect to the link between biomass production and fire prevention is the 2014 [Plan for Socioeconomic Activation of the Spanish Forest Sector](#) (Ministerio de Agricultura, Alimentación y Medio Ambiente, 2014). The Plan includes a diagnosis of the current situation of the forestry sector from a socioeconomic perspective and an interesting SWOT analysis of the sector. From this analysis, 85 measures were developed that are supposed to contribute to solve the main problems identified and to seize the opportunities that this sector offers. The Plan is presented as a coordination plan and it is put in strong relation with the European Union 2014-2020 funding period. Indeed, next to identifying the actions to undertake to boost the forestry sector, the Plan indicates the financing instruments which can be used to support these actions. Most of the actions can be funded under the European Agricultural Fund for Rural Development (and in particular, for the contexts which interest our study, they fall within the actions related to agroenvironment and climate, prevention and reparation of the damages caused by natural disasters and basic services for the rural population) but also other funds are mentioned in the Plan.

With respect to the SWOT analysis, different aspects of the forests sector are taken into account: Legislation, coordination and cooperation; Planning and forest management

(including an analysis of the situation of forest ownership); Forest Production and economic sectors; Labor Issues; Information and forestry statistics and Forest culture. The forest fire topic is mentioned:

- Among the strengths of Legislation, coordination and cooperation (due to the existence of coordination and planning on forest fires at state level), of Labor aspects (existence of solid infrastructures and human resources for fighting forest fires) and of Forest culture (social awareness of the value of forests which leads to voluntary actions).
- Among the weaknesses for Planning and forest management (lack of forest management in some areas by both private and public owners which leads to problems of abandonment, increased risk of fires and loss of biodiversity) and for Forest Production and economic sectors particularly in relation to investments (unprofitability to carry out investments for the use of residues from forestry work, with the consequent risk of fire, pests and diseases).
- Among the opportunities for Forest Production and economic sectors as linked to structuring of the sector, associations, marketing and general aspects (increased demand for forest products resulting from sustainable forest management, as well as high sensitivity of the population on actions in third countries related to logging, fires, etc.) and as linked to the existence of local groups aimed at addressing problems of local nature (e.g. defense groups responsible forest fire prevention).
- Among the threats for Planning and forest management (increase of forest area without management and consequent increased risk of fires) and Forest production as a threat linked to the physical environment (increased uncertainty due to climate change: increased risk of fires and floods and pests or diseases).

The actions directed at preventing fires are mentioned in many contexts regarding the development of the forest sector in Spain, including resin production and fostering of pastoral activities in mountain areas, promotion of nature tourism and of environmental awareness to avoid forest fires, as well as training of professionals to improve productivity and competitiveness of the forest sector. Forest fire is mentioned as one of the topics which attracts a important amount of subventions by the administration. In the annex, the forest fire topic is mentioned among the causes of damages to forests amounting to 3.7% of damage in terms of amount of biomass. The accumulation of biomass in the forest is one of the causes of increased fire impact (in the past residual biomass was used for many things like heating). The Plan mentions a report on the [State of Spanish forests and forest sector in 2010](#) that reflects over the main causes of forest fires. The Plan recognizes the natural role of forest fires but it highlights the dangers associated to the increasing impact of large fires which represent a danger for biodiversity, forest soil and human safety. A specific section of the annex to the Plan talks about forest products and associated economic sectors. Forest fire is mentioned in the context of biomass accumulation in the forest and of the exploitation of this biomass. The Plan mentions that wood extraction rates in Spain are much lower than the countries' production capacity and are far smaller than the average of the European Union. This situation is due among other reasons to energy uses that have declined sharply compared to the past with the expanding use of fossil fuels, and to the abandonment of forest management activities in many areas. Lack of resource extraction from the mountain, reduced cleaning of the

underbrush and the abandonment of forestry residues on the forest floor contribute to the accumulation of fuel, so that greater amounts of dry matter accumulates and fires produce more damages. Therefore, the extraction of biomass contributes to reducing the risk of fire by removing the dry matter accumulated on the ground.

Also the topic of biomass production is broadly treated in this document, even though the space dedicated to this issue is smaller than that dedicated to forest fires. Besides what is mentioned in the previous paragraph in relation to the benefits for fire prevention linked to the collection of residual biomass, other benefits are mentioned like reducing greenhouse gases, improving phytosanitary conditions of forests, reducing the nitrogen content in areas with high concentrations problems, encouraging the reduction of fossil fuel imports and reducing dependence on foreign energy, as well as fostering rural development and creating jobs related to the sector. In the SWOT analysis, biomass production is associated to:

- Strengths in relation to Forest Production and economic sectors (the extraction of biomass from the forest is depicted as having environmental and economic advantages as well as reducing the risk of fire by removing dry matter accumulated in the soil) also in the context of the resin sector which is said to generate a large number of positive environmental externalities (fire prevention, biodiversity conservation, erosion control, etc.) and of the pastoral sector (advantages of controlled grazing as a preventive measure against forest fires: enhancement of the landscape, less environmental impact and reduced costs on the use of machinery and ease of access to areas of rugged terrain and difficult access).
- Opportunities in the context of Forest Production and economic sectors and in particular in relation to structuring the sector, associations, marketing and general aspects (ability to stimulate consumption of products from the mountain and to diversify employment opportunities).

A whole section of the SWOT analysis is dedicated to the topic of biomass for energy and specific strength, weaknesses opportunities and threats are identified. From the SWOT analysis, several of the actions derived and aimed at boosting the forest sector in Spain are associated to biomass production. For example, within the action of promoting the use and mobilization of forest products and economic sectors, biomass figures among the first and second sub-actions expressed as “Promoting sustainable mobilization of wood in Spain and promoting mechanization of timber forestry activities (including biomass)” and “Promoting energy use of forest biomass”. The Plan moreover turns around four fundamental axis of action, one of which relates to biomass production. As it is possible to see from this description, both implicit and explicit links are established in the Plan between the production of forest biomass and fire prevention. The mentioned unprofitability of exploiting forestry residues and the consequent increase in fire risk is an example, as are the topics treated in the section of the annex which is dedicated to forest products and associated economic sectors.

Among the other Spanish documents which deserve attention figure the 2010 [Action Plan for Renewable Energies](#) (Ministerio de Industria, Turismo y Comercio, 2010) and the 2011

[Plan for Renewable Energies](#) (Ministerio de Industria, Turismo y Comercio, 2011). The first document covers the period 2011-2020 and it is an answer to European Union Renewable Energy Directive of 2009. As a renewable source of energy, biomass plays a strong role and the Plan displays specific means to improve and foster its energetic use, without however distinguishing significantly among different biomass sources. The Plan analyses national sources and the possible competitions with other sectors that use biomass (from the agricultural and forest sector). It also provides indications for the companies that want to start biomass installations in different contexts and it refers to energy efficiency standards. The document proposes also some forecasts about the production and use of different types of biomass in 2015 and 2020. In this document, fire is mentioned in relation to the fact that much biomass is currently lying in forest mountains and it is increasing fire risk in these areas. No concrete link is made however with the utilization of this biomass for energy purposes. The second document adopts the same approach to biomass, considering not only forest biomass but also agricultural and industrial residues, as well as the biomass derived from forest plantations. The document however mentions that most of the biomass in Spain derives from forests. The document describes the Spanish strategy to comply with European Union requirements regarding renewable energy and 2020 targets. It also includes a reference to climate change mitigation, as those targets are strictly connected in European Union's policy. The document carries out an analysis of the role played by all renewable energies in the Spanish strategy. Biomass from forests is said to play an essential role especially in the heating sector. It is explained how biomass has the potential to become important also in the transportation sector and it is already improving its performance in the electricity sector. Fomenting the use of biomass in these two sectors is among the objectives of the Plan. A specific section of the document is dedicated to biomass in Spain and it describes the possibilities of technological evolution of the sector, it evaluates the potential and it describes the competition with the non-energetic use of biomass. It analyses costs related to using biomass and the barriers of the development of this sector. It proposes some actions to manage the sector and it details the objectives. This second document does not mention fire prevention. Both the previously described Plans refer to an interesting policy document called [Spanish Strategy for the Development of the Use of Residual Forest Biomass](#) (Ministerio de Medio Ambiente y Medio Rural y Marino, 2010) As the topic of this Strategy is strictly forest biomass, it was considered interesting to verify to which extent the document considers forest fire prevention. In the Strategy, it is mentioned that excessive accumulation of biomass in the forest increases fire risk and that utilizing residual biomass (for energy and other uses) should be subventioned in the context of fire prevention. This document therefore makes explicit the link between forest fire prevention and production of biomass for energy

The last two Spanish documents analyzed are the [Action Plan of Energy Saving and Efficiency 2011-2020](#) (Ministerio de Industria, Turismo y Comercio, 2011b) and the [National Action Plan of Energy Efficiency 2014-2020](#) (Ministerio de Industria, Turismo y Energia, 2014). Both documents mention the use of forest biomass for energy but do not refer to fire prevention.

3.1.3 Catalan legislations and policies

Several Catalan policy documents and legislations were considered relevant for the study. The main legal reference for forest policy in the region is the [Forest law of 1988](#) (Llei 6/1988, de 30 de març, forestal de Catalunya). The law was never updated after its emanation and therefore its text appears rather outdated with respect to recent global and European developments of the forest sector. The legislation broadly treats the forest fire topic and the prevention of forest fires, also regulating the functioning of the Forest Defence Groups, associations of forest owners and civil society representatives who commit in supporting fire fighters in the extinction and prevention of fires. The law requires the classification of the areas that are exposed to fire risk according to the degree of risk. Local administrations are requested by the law to prepare fire prevention plans for the areas at high fire risk. The energetic use of forest biomass is not mentioned in the legislation. Specific legislations dedicated to fire prevention were emanated in Catalonia. Examples are the 1995 [Decree establishing prevention measures for forest fires](#) (Decret 64/1995), its [amendment](#) (Decret 206/2005) emanated in 2005 and the 2003 [Law which establishes prevention measures for forest fires in urbanized areas](#) (Llei 5/2003). While being very specific on forest fire related issues (classification of areas prone to fire risk, subsidies dedicated to fire prevention, organization of Forest Defence Groups), these three legislations resulted poorly relevant for the study as they do not mention a link between fire prevention and the energetic use of forest biomass.

The [Catalan General Plan of Forest Policy](#) (Generalitat de Catalunya, 2014) is the reference document for forest policy at regional level. It is rather recent as it covers the years 2014-2020. The objectives of the Plan are included in Box 3.

- Promoting active management of forest lands and improving access to these lands to potentiate their environmental and socio-economic functions and promote the conservation of biodiversity (prevention of natural hazards such as forest fires).
- Supporting ownership and the forest industry as leading players, by fostering their organization (e.g. associations, cooperatives).
- Improving the perception of sustainable forest management and promoting the use of forest products.
- Promoting the development, innovation, technology transfer and technical training in the forestry sector.
- Promoting efficient planning of forest land and enhance coordination and incorporating environmental and economic values of forest planning in other sectors to promote synergies.

Box 3: Objectives of the Catalan General Plan of Forest Policy

The Plan explains how the document fits the Catalan system of territorial and land use planning and the European and national legislative systems, as well as provides a definition of the forested areas to which the document applies. The Plan aims at being:

- **Effective:** it is able to respond to new challenges, identify them, analyze their causes, determine the strategies and involve the relevant stakeholders and the media.

- Participatory: it involves the affected sectors and social groups, their knowledge, proposals and contributions to the definition of forest policy.
- Subsidiary: it establishes the role of both civil society and the government and the market, in accordance with the challenges, the reality of the world and new trends.
- Environmental: it recognizes the importance of sustainable forest management and multifunctional role of forests and the elements of environmental management (standardization, certification, continuous improvement, strategic environmental assessment, indicators, audits, etc.).
- Transversal: it addresses all aspects that affect forests.
- Proactive: the actions envisaged in the plan should reflect what society wants with respect to Catalan forests lands.
- Strategic: fast changes, market uncertainty and complexity of the factors affecting forestry require a strategic approach that provides a common framework for the whole territory.
- Auditable: the effectiveness of the policy should be measurable with specific indicators that allow objectively following the trend of the resources used and the results obtained.

The Plan starts with a diagnosis of the forest sector, it proceeds by identifying an action plan, it describes the funds available to achieve its objectives and it describes the system for evaluating the effectiveness of the policy. Forest fires play a relevant role in the document. The topic is mentioned in a broad variety of contexts, such as the risks that affect forest health (the Plan mentions that forest fires are currently occurring less frequently but with a higher intensity), the objectives of the Plan (see the 1st objective in Box 3) and the regional subsidies that support the achievement of these objectives. The document takes into account the infrastructural plans for fire prevention and the municipal plans developed by local authorities to protect forests from fires. The document includes a SWOT analysis of the forest sector in Catalonia, which mentions forest fires among the weaknesses of the sector that need appropriate planning, as well as among the threats, the strengths (existence of a system for detecting and acting upon forest fires) and the opportunities (fires is a forest characteristic which is taken into account when considering the forest infrastructure). Forest fire prevention is also among the strategic axis of the Plan. One of the actions that the Plan proposes for the achievement of its objectives is “Boosting the overall wildfire risk management and the adaptation of forest management to fire ecology”. Another action refers to the promotion of pastoral activities also in light of reducing fire risk. Fire prevention is also mentioned among:

- the guidelines to ensure the socio-economic development of forest land and the innovation of the forestry sector;
- the guidelines for the preservation and improvement of forest health and vitality and for the development of natural and adaptive strategies against climate change;
- the guidelines for strategic environmental assessment; and
- the guidelines for compatibility of forestry land use.

The biomass topic is mentioned in the Plan with respect to the need of reducing fuel loads in the forest to reduce fire risk. Such risk is manageable with an increased profitability of

forest works which could be derived among other things from an energetic exploitation of the biomass in excess which is lying in forests. The document is therefore establishing an explicit link between fire prevention and production of biomass for energy. Biomass production appears also among the objectives of the plan, in particular in relation to two objectives:

- improving the perception of sustainable forest management and promoting the use of forest products;
- promoting the development, innovation, technology transfer and automation of production processes in the forestry sector.

The document includes an interesting Table that describes the actions undertaken by the regional government in relation to the utilization of biomass for energy. Among these action figure the advice provided for the evaluation of biomass initiatives, the creation of specific subsidies for biomass utilization and for example for the installation of boilers as well as for lowering costs of extraction of residual forestry biomass, dissemination seminars and training addressed to different stakeholders. No mentioning is made of forest fires in this Table. Finally, the energetic use of biomass is mentioned among the actions to undertake for achieving the Plan's objectives as well as among some of the guidelines.

The 2014 [Strategy to promote the energetic exploitation of agricultural and forestry biomass](#) (Generalitat de Catalunya, 2014b) is a very interesting document for this study. The Strategy dedicates a consistent space to the production and use of forestry biomass. It starts by exposing an analysis of the state of the art of the forest sector in Catalonia and by treating the role of forests in fixating CO₂ as well as the concept of neutrality of emission applied to the use of biomass for energy generation. It deals with opportunities and barriers associated to the utilization of forestry biomass and with the environmental impact of this type of energy source. Very interesting is the chapter dedicated to the potential of forest biomass of generating positive externalities and in particular new employment possibilities that could be created in the contexts of forestry works, chipping and transportation. The documents concludes by presenting the technologic perspectives, by providing an analysis of the economic viability of the utilization of forestry biomass and by proposing a strategy for fostering the energetic exploitation of this resource.

In the Strategy, the forest fire issue is mentioned in a limited number of contexts but the role of this topic with respect to the production of biomass for energy is well developed in the document. The energy use of forest wood is presented as an important option for giving value to wood assortments which currently are not economically exploited and at the same time promoting fire prevention by reducing fuel load in the forests. Forest management is presented in the Strategy as a way to ensure the persistence of the forest environment, also in front of important threats to the forests like forest fires. The document mentions that currently, public subsidies are provided for the extraction of forest wood to use as source of energy, but that these funds should be reduced progressively in time and dedicated only to the extraction of biomass in areas of high fire risk and to improve forest accessibility for extracting the biomass. An explicit link is made in the document between fire prevention and production of forest biomass for energy. A whole section is dedicated to sustainable forest management and to fire prevention. This section explains the

important role played by the extraction of residual biomass and the creation of discontinuous forest structures to reduce fire risk. The Strategy explains that most approaches to the use of wood suggest a cascade use of this resource, where the wood is first used as material for construction and then destined to the energy industry before being treated as waste. However, in the case of fire prevention, the energetic use is to be placed at the beginning of the process of wood utilization. The document mentions that at the time in which the Strategy was elaborated Catalan administrations were working to reduce administrative burdens related to the obtainment of a permit to produce biomass, especially in the context of fire prevention and nature conservation (for example within protected areas belonging to the European Natura 2000 network).

A relevant legislation for our study is the 2013 [Order on the regime for obtaining energy qualifications for forest management](#) (Ordre AAM/79/2013). The legislation recognizes the need of diversifying the Catalan energy mix and reducing dependency from fossil fuels and imported sources of energy. Using forestry biomass to generate energy is presented as an opportunity to boost and diversify local economies, create new jobs and encourage forest management. The Order classifies the types of biomass to which the qualification for energy production can be applied and it requires that forest stands which get this qualifications are not exploited for any other types of wood production (the production of biomass for energy is compatible with the exploitation of non-wood forest products). Moreover, the Order deals with the traceability topic. The legislation mentions forest fire in the context of the great availability of low value wood in Catalonia, which for example derives from areas at high fire risk. This type of wood can be destined to the energy industry. This legislation establishes a tight link between the production of biomass for energy and fire prevention: extracting energy wood from forests is at the same time a way to boost local economy and a means to ensure an increased forest health by reducing fire risk. Another legislation was considered for the study and namely the 2014 [Order that approves a regulation for the provision of subsidies to the agricultural, food and forest sectors](#) (Ordre AAM/342/2014). This legislation is dedicated in particular to research, development and innovation projects which are focused on new technologies, processes and products that are able to contribute to address climate change, support the use of renewable energies, managing the use of water resources and protecting biodiversity. Among the targets of the subsidies treated in the legislation figure innovative projects aimed at transforming agricultural or forest biomass for renewable energy production. This legislation resulted to have a low relevance for the study as forest fire prevention is not mentioned in its text.

Besides strictly forestry and biomass related documents, also other types of legislations and policy documents produced at Catalan level were selected for the study. Examples are the 2005 [Law of landscape protection, management and planning](#) (Llei 8/2005) and the 2006 [Decree](#) that broadens the scope of the previous legislation to include also environmental impact procedures (Decret 343/2006). These two legislations include relevant topics for landscape management and represent very interesting cross-sectoral documents. However, they are poorly interesting for the study as they just briefly hint at forest fires as a threatens to Catalan landscapes, without making any reference to biomass production. Another document considered for this study is the [Plan for energy and climate change](#) that covers the years 2012-2020. The document is very large as it is

dedicated to the strategy adopted by Catalonia to diversify its energy mix in order to reflect global and European developments in the energy contexts. In the document, the use of forest biomass for energy plays a central role and it is dedicated a special space among the specific strategies focused on the different renewable sources of energy. The Plan expresses the need for a new forest law in Catalonia that should update the 1988 one and include the topic of biomass. It is interesting to verify if in the Plan, or more specifically in the strategy for the use of biomass for energy included in this document, the topic of forest fire is put in relation to that of biomass production. The forest fire topic is mentioned among the objectives for which the guideline for the calculation of emissions that is proposed in the Plan could be used. Also, forest fires are mentioned among the natural disturbances that can create uncertainty in the context of energy production, but only in the sense that they can compromise the functioning of energy installations. Surprisingly, no concrete link is made in the document between the topics of biomass production and fire prevention.

3.2 Enquiring the opinion of relevant stakeholders on the extent to which the two topics of fire prevention and production of biomass for energy are actually linked in the practice.

This objective was achieved by carrying out two interviews with experts of the forest fire and biomass contexts who provided background information on the issue at study and by preparing a questionnaire to distribute to a selected list of stakeholders.

The interviews were carried out with a representative of a Federation of Forest Defense Groups (which started also a cooperative for utilizing the wood extracted for fire prevention for energy purposes) and with a researcher of the Centre Tecnològic Forestal de Catalunya who deals with forest biomass issues. The results of the interviews will be used to support the article described in section 3.3 of this report. The questionnaire was developed and distributed during the Short Term Scientific Mission and the answers will be retrieved in the months following the Mission through voluntary collaboration between the performer and the host of the Mission. For the distribution of the questionnaire, the information collected during the policy analysis at point 3.1 and that retrieved during the expert interviews described above were screened to select a representative sample of interviewees. Interviewees belonged to the following stakeholder groups:

- Regional Government
- Provincial government
- Municipal government
- Scientists
- Ecology group
- Forest Owners Association
- Forest Defense Groups (In Catalonia civil society organizations exist which join the work of forest owners and other actors to protect forests against fire)
- Biomass cluster (a forum of industries, governmental agencies and other actors which discusses issues related to the production and use of biomass for energy)

- Companies (diverse typologies of companies were considered relevant including those producing and selling and those producing timber and pulp/paper/particle boards)
- Fire fighters
- Fire foundation (in Catalonia a foundation very active in the forest fire context exists).

The text of the questionnaire was prepared in English and then translated in Spanish, as interviewing local actors in their native language was considered a suitable strategy to increase comfort of interviewees with the questionnaire and consequently increase response rate. The questionnaire included closed and open-ended questions, in order to maximize possibilities of data analysis. Questions were short and limited in number, so that answering the questionnaire would not take more than 5 minutes of time. In this way, interviewees could perceive answering the questionnaire as a lesser waste of times. The first question enquired whether respondents believed that managing forests for producing biomass for energy would also result in more fire-resilient forest structures. The second question asked them to provide their opinion on the comparison between managing forests for traditional timber production and for biomass production, always with respect to the creation of fire-resilient forest structures. The third question requested interviewees to report their opinion on the level of integration between forest fire prevention and biomass production in the contexts of forest management, forest policy and marketing of forest products. Finally, the last question asked them to express suggestions for improving the integration between the two topics in the three contexts mentioned. The questionnaire was sent together with a cover letter from the email address of the host of the Short Term Scientific Mission, as it is proved that receiving an email from a person with whom previous contacts were established, or whose name is already heard of increases the rate of success of the interview process.

3.3 Future collaboration with host institution

The performer and the host of the Short Term Scientific Mission will collaborate to conclude the collection of answered questionnaires and eventually to perform some more expert interviews. The data collected in the literature review will be used in combination with the data retrieved from experts and stakeholders to elaborate a scientific article that will be submitted to an international peer reviewed journal.

3.4 Foreseen publications/articles resulting or to result from the STSM

See section 3.3

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Appendix 1. Letter of confirmation by the Centre Tecnològic Forestal de Catalunya of the successful execution of STSM.

