



Innovation and Circular Economy in the Mountain
Forest Supply Chain: How to close the loop?

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INTRODUCTION



The circular economy is based on “sharing, leasing, reuse, repair, refurbishment, and recycling” of products and materials in an ideally closed loop.¹ The goal is to reduce waste by keeping products and materials within the economy. The necessity for a more circular economy will only increase with increasing pressure on and decreasing availability of natural resources.

The adoption of the circular economy will be particularly important in mountain areas which contain exceptional primary resources such as forests, water, and minerals, and provide ecosystems services such as carbon sequestration, clean water, landscapes, and recreation. Maximizing the value of extracted resources and managing them sustainably is particularly important for maintaining a high quality of life in mountain territories. The circular economy can create new economic opportunities that will provide much needed employment and economic growth in mountain areas.

Mountain areas face specific natural conditions, such as slope, climate, and soil types, that make the exploitation of mountain resources difficult. Other challenges associated with connectivity and transport make economic activity all the more challenging. The development of the circular economy in mountain areas will allow inhabitants to benefit from resources and services available in the mountains. It will also drive the development of new approaches, for example in governance, technology, or in the building of novel tools, in so doing providing new opportunities for jobs and growth in mountain regions.

At Euromontana, several members from South-Western Europe have begun work on how best to develop circular territories, not just in one sector, but for the whole territory. The goal is to create circular territories by developing closed economic loops at the local level across the territory. The potential benefits of such an approach include reduced waste, greater resource efficiency, a lower environmental impact of economic activity, and sustainable economic growth.

With this booklet, we have decided to focus on the forest sector as the sector is particularly adapted to a circular approach in mountainous areas in Europe. Forests are a primary landscape feature of Europe’s mountains: in 17 European countries, forests cover more than 41% of mountain areas.² Mountain forests in particular provide multiple functions essential for human activities. These include natural resources (wood and non-wood based forest products) and ecosystem services such as protection against natural hazards, carbon storage, the regulation of water supplies, habitats for biodiversity, and landscapes. The biological cycle and renewable resources form the base of the forest sector. The biological cycle involves materials that can be decomposed by living organisms. The forest sector is thus already based in a cycle that is renewable. Products from the sector should be able to be returned to the sector through natural processes and the primary materials at the base of the sector, if properly and efficiently managed, can regrow naturally. This makes the sector particularly adapted to incorporation into the circular economy.

On November 29th, 2016, Euromontana organized a workshop entitled *Innovation and [Circular Economy in the Mountain Forest Supply Chain: How to Close the Loop?](#)* in Skrad Croatia with its member organization, PINS, a Croatian local development agency based in Skrad and with the support of Croatian MEP, Jozo Radoš, from the RUMRA (Rural, Mountainous and Remote) intergroup. The presentations and the discussions from the workshop have informed the content of this booklet and the recommendations presented in the Conclusion.

Thus, with this booklet we aim to: better understand the policy framework supporting the circular economy; explore visions for a circular economy all along the mountain forest supply chain; present tools, instruments, and processes to improve the circular economy in forestry; and present experiences and good practices, ideas and proposals. The booklet is divided into two parts. Part 1 presents the concept of the circular economy, its potential application in forestry, with a focus on the mountain forest supply chain, and the circular economy at the EU level. Part 2 presents a series of good practices in innovation and circular economy in mountain forestry to show how the concepts presented in Part 1 may be applied in practice. We hope the booklet, the recommendations for the circular economy presented in the Conclusion, and the good practices collected in Part II, will inspire mountain actors to move towards more circular territories.

Juan Andres Gutierrez Lazpita, President of Euromontana



1 Bourguignon, D. (2016). Closing the loop: New circular economy package. European Parliament Research Service. Members’ Research Service. PE 573.899, 2.
2 EEA (2010). Europe’s Ecological Backbone. European Environment Agency. Copenhagen, Denmark.

A. WHY DO WE NEED A CIRCULAR ECONOMY?



1. CURRENT ECONOMIC MODELS BASED ON THE LINEAR ECONOMY ARE NOT SUSTAINABLE

Every year, humanity consumes 1.4 times the resources available on the planet. As a result, every year we get closer to the day we will exhaust the natural resources needed to support our current lifestyles.³ Already today, the **need for land, natural resources, and waste management is placing stress on the natural environment and leading to biodiversity loss, climate change, pollution, and ocean acidification.** These environmental changes in turn threaten economic livelihoods and human health and well-being⁴ as environments are degraded or destroyed. The world population is expected to be greater than 11 billion people by the end of the 21st century (UN DESA, 2015 – EEA).⁵ Resource use is expected to double by 2030 in line with a threefold increase in economic output between 2010 and 2050.⁶ As pressure on resources increases due to population growth and economic development, the availability of resources, renewable and non-renewable, will decrease. While some resources will remain unobtainable due to physical and biological limitations of the resources, sustainable management can increase the supply of resources available while maintaining productivity and functionality of those that are renewable. Sustainable management of non-renewable resources requires efficient and fair management of finite stocks.

Existing economic models based on linear processes of production, consumption, and disposal cannot sustain our current or projected resource use. Continued dependence on a seemingly unlimited and unhindered supply of natural resources both imported and domestic makes Europe vulnerable to price volatility, interruptions in flow due to conflict, and price increases. The circular economy seeks to address both the environmental and economic risks associated with current economic models based on a linear production and consumption process.

At European and international levels, the circular economy is being increasingly promoted as a way to reduce the environmental impact of human activities. By reducing waste and promoting sustainable resource use, the circular economy contributes to European sustainable development and environmental protection objectives. At the international level, the United Nations Sustainable Development Goals (SDGs) lay out a series of goals and targets to achieve sustainable development worldwide. SDG Number 12 calls for sustainable consumption and production. The circular economy can contribute to the achievement of this goal. At the EU level, one of the five targets is climate and energy: specifically reducing greenhouse gas emissions to 20-30% of 1990 levels, increasing the amount of energy obtained from renewable to 20%, and increasing energy efficiency by 20%.⁷ The EU's 7th Environment Action Programme calls for the decoupling of economic growth from environmental

3 Bourguignon 2016.

4 EEA. (2016) Circular economy in Europe: Developing the knowledge base. European Environment Agency EEA Report No 2/2016. Luxembourg Publications Office of the European Union.

5 UN DESA. (2015). Population change – Outlook from UN DESA. European Environment Agency (EEA). Available from : <http://www.eea.europa.eu/data-and-maps/indicators/total-population-outlook-from-unstat-2/assessment>

6 EEA 2016.

7 European Commission. (2015). Europe 2020 targets. European Commission. Available from: http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/targets/index_en.htm

pressures “in order to maintain ecosystem resilience and prevent impacts on human well-being”⁸. The circular economy can help achieve this objective. The circular economy also has the potential to lead to new and innovative economic models and in turn economic growth and job promotion. In so doing, it further contributes to the Europe 2020 strategy which calls for smart, sustainable, and inclusive growth. **The SDGs, the EU Environment Action Programme, and the Europe 2020 strategy recognize that we need a new economic model if we are to sustain human life, promote equality, and preserve the environment.** The circular economy is one way to work towards these ends.

In response to these calls at the international and EU level, the European Commission passed the circular economy package in December 2015. The package consists of an action plan for the circular economy, a list of measures, and four legislative proposals on waste policy in the EU. The package has begun to pave the way for a transition to a circular economy in Europe. The package will be discussed in further detail below, but first, what is the circular economy?

2. WHAT IS THE CIRCULAR ECONOMY

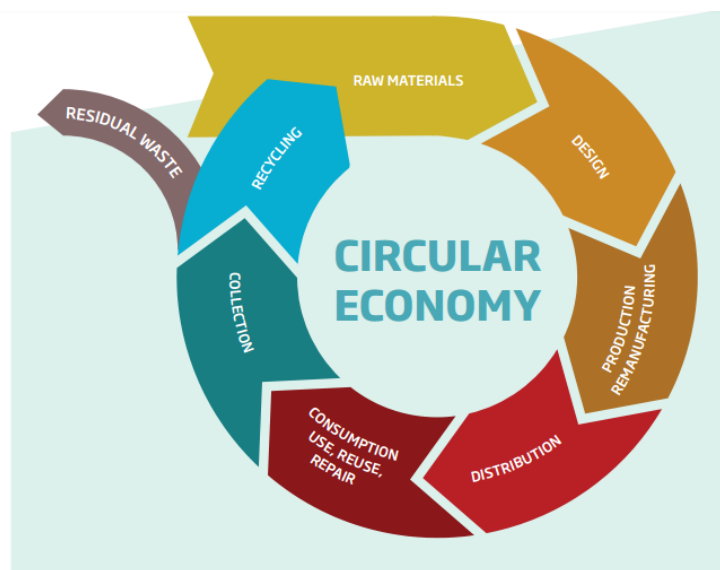
The circular economy is an alternative to existing largely linear economic models

The Ellen MacArthur Foundation in their extensive study on the circular economy identified three key principles upon which the circular economy is based:

- 1.) The preservation and enhancement of “natural capital by controlling finite stocks and balancing renewable resource flows”
- 2.) The optimization of “resource yields by circulating products, components, and materials at the highest utility at all times”,
- 3.) The fostering of “system effectiveness by revealing and designing out negative externalities, such as water, air, soil, and noise pollution; climate change; toxins; congestion; and negative health”.⁹

These three principles form the basis of six actions that drive the circular economy: “**sharing, leasing, reuse, repair, refurbishment, and recycling**” of products and materials in an ideally **closed loop**¹⁰ (Figure 1¹¹). This is in contrast to traditional linear economic models that assume an infinite supply of resources and therefore do not consider the end life of a product.¹² The goal of the circular economy is instead to reduce waste by keeping products and materials within the production-consumption chain for as long as possible and **maintaining a high utility and value of products at all points** in the production-consumption cycle.¹³

The circular economy cycle begins with product design that considers what will happen to the product at the end of its



The circular economy involves intrinsic recycling and feedback loops and applies to the whole economy. source diagram: European Commission

⁸ EEA 2016, 31.

⁹ Ellen MacArthur Foundation (2016). INTELLIGENT ASSETS: UNLOCKING THE CIRCULAR ECONOMY POTENTIAL, 19. Available from: https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Intelligent_Assets_080216-AUDIO-E.pdf

¹⁰ Bourguignon 2016.

¹¹ EIP-AGRI (2015). EIP-AGRI Workshop “Opportunities for Agriculture and Forestry in the Circular Economy” Workshop Report 28-29 October 2015, 5. The European Innovation Partnership ‘Agricultural Productivity and Sustainability’ (EIP-AGRI) Agriculture and Innovation. European Commission. Available from: https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_ws_circular_economy_final_report_2015_en.pdf.

¹² EEA 2016.

¹³ Bourguignon 2016; Ellen MacArthur Foundation. (2015). Circular Economy Overview. The Ellen MacArthur Foundation. Available from: <https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>

life. In the circular economy, the materials out of which a product is made are kept in the economy to the extent that it is possible¹⁴. The goal is to minimize the resources and energy inputted in to and lost from the economy by turning what was once considered waste into inputs¹⁵. Emissions associated with resource extraction and waste management should decrease in line with the reduction in resource extraction and imports¹⁶.

What are the benefits of adopting a circular rather than a linear economic approach?

The European Parliament and the EEA outline several potential opportunities arising from the circular economy, outlined in Table 1.^{17,18}

Table 1: Benefits of a transition to a circular economy.

BENEFITS OF A TRANSITION TO THE CIRCULAR ECONOMY	
ENVIRONMENT	The environment will benefit from reduced greenhouse gas emissions and environmental destruction caused by resource extraction both inside and outside Europe, from improved waste management, and from declines in energy use.
ECONOMIC AND RESOURCE SECURITY	The reuse and recycling of raw materials will reduce dependence on imports, decrease risk and uncertainty associated with price volatility linked to supply, and ensure a greater stability of resources.
ECONOMIC COMPETITIVENESS	Industries that adopt circular economy principles will be more competitive because they will be more resource efficient. The switch to a circular economy will demand innovation to produce new products, processes, and materials. New jobs will arise as new markets emerge and new skills are demanded in order to produce products and services that are adapted to the circular economy.
HEALTH AND SAFETY	As people engage in sustainable consumption behavior, improvements in health and safety are expected because the environmental impact of resource extraction, greenhouse gas emissions, and waste disposal will decrease.

What are the challenges faced in implementing the circular economy?

At the same time, a transition to a circular economy presents several challenges outlined in Table 2.¹⁹

Table 2: Challenges that may accompany the transition to the circular economy

CHALLENGES IN IMPLEMENTING THE CIRCULAR ECONOMY	
FINANCING	Financial investments for the transition remain low. The transition to a circular economy will require initial financial investments to promote new business models, innovation, waste management systems, and infrastructure. Economic motivators such as incentives, markets, and pricing systems are not yet in place making the transition to a greener, more circular economy tricky and risky especially for SMEs.

14 Bourguignon 2016.

15 EEA 2016.

16 Ibid.

17 Bourguignon 2016.

18 Bačová, Martina, Kai Böhme, Marie Guitton, et al. (2016). Pathways to a circular economy in cities and regions: a policy brief addressed to policy makers from European cities and regions. ESPON, Interact, Interreg Europe Joint Secretariat, URBACT. Available from: http://www.interregeurope.eu/fileadmin/user_upload/documents/Policy_brief_on_Circular_economy.pdf

19 EEA 2016.

EDUCATION	Current education does not adequately train workers with the skills needed for the new types of employment and new ways of designing products demanded by the circular economy.
CONSUMER EDUCATION	Consumers are not currently educated to value products over the long term, to manage and reduce their waste, and to purchase sustainable products.
GOVERNANCE	Governance is not currently designed for the circular economy. Governance will have to be organized across levels (local, regional, national, etc.) and in diverse policy areas. This will require internal and external collaboration.

The benefits and challenges associated with a transition to a circular economy range from governance to education and from financing to health and safety. To reap the benefits, we must address the challenges. Mountain areas specifically stand to benefit from the circular economy, but also face unique challenges that may make the transition particularly difficult. The next session addresses the need for a circular economy in mountain areas and highlights the benefits and challenges associated with such a transition.

3. WHY DO WE NEED A CIRCULAR ECONOMY IN MOUNTAIN AREAS?

Mountain areas stand to benefit from a circular economy that values primary resources, protects the environment, and promotes innovation and sustainable economic development.

Mountains provide renewable primary resources and ecosystem services that must be properly managed to ensure their durability over time

Mountain areas contain primary resources such as forests, water, and minerals, but these resources are limited and thus must be managed in a sustainable, circular manner that ensures their continued supply. Current economic models do not promote resource durability over time, though policies and programs to sustainably manage forests continue to develop. A transition to a circular economy would make sustainable forest management an integral part of the economic model.

Mountain areas contain a wealth of resources. Forests cover 41% of mountain areas and mountains provide between 30 to 60% of the water flowing through Europe's lowlands²⁰. Mountain areas also provide ecosystem services such as carbon sequestration and storage, support of biodiversity, clean water, landscapes, and recreation opportunities. The resources in mountain areas are limited and vulnerable to overexploitation and threats such as those posed by climate change. The circular economy promotes the maximization of value from extracted resources and therefore protects limited and vulnerable resources, including the wood and non-wood products from Europe's forests. By increasing efficiency, therefore, the circular economy decreases the amount of resources that must be extracted and minimizes environmental damage from extraction and over-use. The application of the circular economy concept in mountain areas **will promote the extraction of the greatest amount of benefit possible from mountain resources, will prioritize ecosystem services, will reduce waste production, will ensure the durability and sustainability of mountain resources, and will minimize the environmental impact of economic development.**

Transporting resources is a challenge in mountain areas

Resources extracted from mountain areas are more difficult to transport than in other areas due to natural barriers (slope, steepness, remoteness, less infrastructure). For example, the median accessibility, or the time it takes to get from a given location to the next destination of interest using existing transport options, for mountain areas ranges from a low of roughly 100 minutes in the Central European mountains to a high of roughly 175 minutes in the Eastern Mediterranean and Nordic mountains.²¹ A circular economy can reduce the transport of resources by encouraging the processing of resources at local and regional scales. This will also reduce pollution from transport and promote economic activity and jobs at the site of primary resource extraction.

²⁰ Price, M. (2015). Mountains: A Very Short Introduction. OUP Oxford.

²¹ EEA (2010).

The circular economy can promote economic activity and provide employment

The pursuit of a circular economy in mountain areas could promote the development of sustainable and innovative economic activity that provides employment in mountains and counteracts rural depopulation and economic underdevelopment. As the circular economy is focused on preserving resources and reducing waste, the development of economic activity based on circular principles would ensure that, unlike in traditional development based on linear economic models, the development activities would not deplete valuable resources or negatively affect the environment in mountains. The **new economic activity would provide jobs which would employ people already living in mountain areas, encourage people to stay in mountain areas, and attract people to the mountains.** The economic activity would have as small of an impact as possible on the environment and therefore protect the quality of the environment and ensure that mountains remain desirable places to live. The companies [3-Visjon AS](#) and [Aldval Skurlag](#) from Norway have created jobs in local communities by diversifying their activities and designing new products in response to changes in the local economy, for example the closing of the local saw mill.

The circular economy depends on different businesses working together. For example, a tree cutting company may need to dispose of the small branches and chips that are produced from tree processing. It can sell this “waste” to another company that can then take the waste and use it as a primary input. As such, the circular economy can have a ratchet effect and promote the development of several different and innovative businesses working together. These synergistic activities could bring multiple economic benefits and employment opportunities to mountain communities. The forestry sector, with its base in the biological cycle and renewable resources and its economic importance in mountain areas covered in forests, could benefit from the adoption of circular economy concepts. The next section addresses why we might need a circular economy in forestry, how it might come about, and challenges and opportunities associated with the economic transition.

B. THE CIRCULAR ECONOMY IN FORESTRY: WHY DO WE NEED A CIRCULAR ECONOMY IN FORESTRY AND HOW MIGHT A CIRCULAR ECONOMY BE ACHIEVED?



1. WHY DO WE NEED A CIRCULAR ECONOMY IN FORESTRY?

Forests are an important landscape feature and economic sector in Europe

Forests cover **41% of Europe’s mountains** and in **17 European countries they cover more than 50% of the mountain territory.** **Forests in Europe have increased by 17 million hectares since 1990.** Over half of these hectares are planted forests. Forests have increased at a rate of 0.4% per year²² in recent decades due to land

22 European Commission EU Forest Strategy (2013). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS : A new EU Forest Strategy: for forests and the forest-based sector. Brussels, 20.9.2013 COM(2013) 659 final. Available from : http://eur-lex.europa.eu/resource.html?uri=cellar:21b27c38-21fb-11e3-8d1c-01aa75ed71a1.0022.01/DOC_1&format=PDF

abandonment and to the planting of forests on previously forestless land. Forests currently cover 180 million hectares in Europe and provide income for 16 million forest owners.²³

3.5 million people are employed in forest activities which generate a financial turnover of nearly 500 billion euros.²⁴ **Today, 60-70% of the annual increment is harvested, but projections of future consumption suggest an increase of 30% by 2020 relative to 2010.**²⁵ 58% of the wood biomass harvested in the EU is used in industry and accounts for 7% of EU manufacturing GDP.²⁶ The economic importance of the forestry sector may increase as increasing emphasis is placed on using renewable forest resources in manufacturing and energy production in the circular economy. The benefit to the sector, though, will depend on a smooth transition to a circular economy and proper forest management to meet the ever-increasing demand on goods and services from forests.

Forests provide important goods and services

Forests provide goods (wood and non-wood) and services (ecosystem and social). Forest products include **wood, biomass, charcoal, palm oil, rayon, tanbark, fibers, mushrooms, fruits, game, nuts, and spices**. These products are used in a range of goods and services including **construction, paper and packaging, medicines, food, furniture, clothing, bio-fuels, and energy production**.²⁷ The ecosystem services provided by forests include **climate change mitigation, soil and water retention and provision, protection against erosion, habitats, protection of biodiversity, landscapes, and spaces and resources for cultural activities**. For example, forests absorb greenhouse gas emissions (10% of Europe's GHG emissions) and their biomass contains 80 billion tons of carbon making them an important tool in climate change mitigation.²⁸ As another example, fifty hectares of forest in Sweden offset the carbon dioxide emissions of 40 Swedes.²⁹ Forests also provide much needed employment in rural areas. With a transition to the circular economy, employment opportunities in the forestry sector might increase to meet demand for local forest resources. Effective forest management for a circular economy will manage forests to sustainably derive the most benefit from the range of products and ecosystem services contained in forests, but must also address existing threats to forests.

Forests today face increasing pressure and must be properly managed

Today, **forests face pressure from climate change, land-use decisions and policy that do not protect or promote forests, and the expansion of urban areas**.³⁰ Natural and seminatural forests are particularly susceptible. These pressures have fragmented forests thwarting the movement and survival of species, particularly in the face of climate change. As a result, the maintenance of biodiversity is at risk. Forest fires continue to increase in frequency and intensity and damage hundreds of thousands of acres every year. Insects and diseases also increasingly threaten Europe's forests. In the fifteen years between 1990 and 2005, the damage caused by insects and diseases doubled to affect 2.7% of Europe's forests. Invasive species, or species non-native to Europe's forests, are also a threat because they can outcompete, replace, or hybridize with native species and affect entire ecosystems as a result, **threatening biodiversity, ecosystem stability, and forest structure and health**.³¹ Storms, wind, and snow affect forests particularly in mountain areas and can increase forest mortality and vulnerability.³² Mountain forests are especially important in the provision of drinking water to both mountain and lowland communities. Today, only 20% of forests are managed in a way that protects water and soil and most of these forests reside in mountain areas. As mountain areas provide 30 to 60% of the water flowing through lowland areas, the forest sector in mountain areas must be particularly careful to respect and preserve water sources.

23 Ibid.

24 EEA (2014, updated 2016). Eight facts about Europe's forest ecosystems. European Environment Agency. Available from: <http://www.eea.europa.eu/highlights/eight-facts-about-europe2019s-forest-ecosystems>

25 European Commission EU Forest Strategy 2013.

26 Ibid.

27 FAO (17/01/2014). Food and Agriculture Organization of the United Nations. Non-wood forest products: about non-wood forest products. Available from: <http://www.fao.org/forestry/nwfp/6388/en/>; USFS (United States Forest Service) No Date. Energy and Forest Products: Forest Products. And US Forest Service (ND). Forest Products. US Department of Agriculture. Available from: <http://www.fs.fed.us/science-technology/energy-forest-products/forest-products>

28 EEA Forests Briefing (18/2/2015, updated 15/11/2016). Forests. European Environment Agency. Available from: <http://www.eea.europa.eu/soer-2015/europe/forests>

29 Eivnert, Johan. (06/01/2016). Can we create a green circular economy without forestry? The European Forest-based Sector Technology Platform. Available from: http://www.forestplatform.org/files/FTP_Presentations/2016_06_01_EP_ALDI_-_Can_we_create_a_green_circular_economy_without_forestry.pdf

30 EEA Forests Briefing (18/2/2015, updated 15/11/2016).

31 FAO (11/11/2015). Invasive species: impacts on forests and forestry. Food and Agriculture Organization of the United Nations. Available from: <http://www.fao.org/forestry/aliens/en/>

32 Ibid.

Effective forest management for a circular economy will have to consider all of the above pressures alongside competing demand for forest products versus services, the natural constraints associated with the particular landscape features of the areas where the forests are located, and political and economic constraints.

The biological cycle makes the forestry sector well suited to the circular economy

Two cycles underlie the circular economy, a biological cycle and a technical cycle.

1. The **biological cycle** involves **materials** that can be decomposed by **living organisms**. These include biological cycles such as those on which the forestry sector depends.
2. The **technical cycle** contains **materials that cannot be decomposed** by living organisms.

The forestry sector lies squarely in the biological cycle. At the base of the forestry sector are natural resources. These include “resources such as water, soils, nutrients, and biodiversity [which] underpin the functioning of ecosystems and the land that provides the space in which we work”³³. In the circular economy, the natural resources, inputs (Nitrogen, Phosphorus, Potassium, and Carbon), and energy that are the primary upstream resources of the sector are recovered throughout the forest supply chain and at the end of the product cycle and reintroduced as primary inputs³⁴. Resources are thus more efficiently used and therefore the environmental burden of extraction decreases due to decreased demand.

The natural resources at the base of the forestry sector can become depleted if not properly managed and returned to the biological cycles from which they were extracted. A circular economy in forestry thus promotes resource efficiency, waste reduction, and reduced demand on primary natural resources.³⁵ In the next section, we address how the circular economy might be applied in order to achieve these outcomes.

2. APPLYING THE CIRCULAR ECONOMY IN FORESTRY

What might the circular economy in forestry look like?

The European Innovation Partnership for agricultural productivity and sustainability (EIP-AGRI)³⁶ and the Ellen MacArthur Foundation present the following as key features of a circular economy in forestry:

1. “The preservation and enhancement of natural capital by balancing renewable resource flows;
2. Optimizing (not maximizing) natural resource yields by circulating products, components and materials;
3. Fostering effectiveness by revealing and designing out wastes and detrimental practices; and
4. Encouraging interaction between people, understanding our resources and making the most of our unavoidable wastes.”³⁷

The next section outlines keys to success and challenges for the achievement of these features of a circular economy in forestry.

Keys to success and challenges for the circular economy in forestry

Success in the circular economy in forestry will depend on a well-organized, managed and optimized forest supply chain. A systematic coordination of the whole supply chain is required for performance improvement.

The forest sector has the potential to play an important role in the circular economy because it has at its base the biological cycle and the natural resources, such as water, nutrients, soil, wind, and sun that make up that cycle. For the circular economy in forestry to provide economic benefits, meet rising demand for renewable resources, and remain sustainable over the long term, the sector will have to overcome challenges associated with markets, education and knowledge, innovation, and funding, for example. The sector must effectively manage renewable, but finite resources, become attractive for small and medium sized enterprises, come up with novel business models, and innovate in order to discover new ways to use and reuse resources, such as residues and co-products. At each step along the way, there will be challenges to overcome and factors that will contribute to success.

³³ EIP-AGRI (2015).

³⁴ Allen, Ben. The role of agriculture and forestry in the circular economy. EIP-AGRI Workshop on circular economy. October 28, 2015. Available from: https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/field_event_attachments/ws-circulareconomy-20151028-pres03-ben_allen.pdf

³⁵ EIP-AGRI 2015.

³⁶ EIP-AGRI 2015; Ellen MacArthur Foundation (2015b). Towards a Circular Economy: Business Rationale for an Accelerated Transition. Ellen MacArthur Foundation. Available from: https://www.ellenmacarthurfoundation.org/assets/downloads/publications/TCE_Ellen-MacArthur-Foundation_26-Nov-2015.pdf

³⁷ EIP-AGRI 2015, 6; Ellen MacArthur Foundation 2015.

The below chart identifies several keys to success and challenges for the circular economy in forestry. The chart was developed from the EIP Agri workshop on circular economy in agriculture and forestry, Bourguignon (2016), and inputs from forestry sector professionals.³⁸

Table 3: Keys to success and challenges for the circular economy in forestry

KEYS TO SUCCESS	CHALLENGES
<p>PARTNERSHIPS AND COLLABORATION</p> <p>Sharing of good practices</p> <p>Proximity</p> <p>Motivation and investment of all stakeholders</p>	<p>PARTNERSHIPS AND COLLABORATION</p> <p>Difficulty of coordinating with partners either in different sectors or locations</p> <p>Competition for land and resources - can reduce willingness to partner and make it hard to start up a business</p>
<p>RESEARCH</p> <p>Must be easily accessible, up to date, innovative, and continuously evolving. Potential research topics: technology, management, new product design, new markets, organization, and business strategies</p> <p>Knowledge and technology is already available to be applied within the context of the circular economy, but this knowledge and technology needs to be made available and accessible to the sector. Knowledge and technology transfer are therefore critical.</p>	<p>RESEARCH</p> <p>Difficulty in obtaining research funding. The transition to the circular economy will require investment from EU, national, and regional level. Therefore, the circular economy must become a priority at each of these levels and incorporated into funding and research schemes.</p>
<p>TECHNOLOGY</p> <p>Must be organized, available, easy to use, innovative, and effective</p>	<p>TECHNOLOGY</p> <p>Similar to research, technological development requires funding that is currently difficult to obtain.</p> <p>Difficulty in effectively sharing technology</p>
<p>MARKETS</p> <p>Must exist for available products</p> <p>Activities must meet demands of local markets and needs</p>	<p>MARKETS</p> <p>Difficult to generate demand for new products and maintain market for products that, for example, may be more expensive</p> <p>Lack of coherent policy support for markets</p>
<p>FINANCIAL SUPPORT</p> <p>From European, national, regional, and local level</p> <p>Subsidies and vouchers</p> <p>Private investment – the circular economy can increase the profits of forest companies along the supply chain. These companies may be willing to invest in adaptation and optimization processes to facilitate the transition to the circular economy</p>	<p>FINANCIAL SUPPORT</p> <p>Difficult to identify and access long-term funding</p> <p>Financial barriers associated with start-up and infrastructure costs can thwart business development</p> <p>In many areas, forestry is not attractive from an economic perspective due to the low prices of wood. The sector must identify ways to increase the value of wood.</p>
<p>POLICY</p> <p>Coherent, long-term policies that align also with availability of funding</p>	<p>POLICY</p> <p>Existing policy is often not coherent and can sometimes block innovation. Policies must show continuity over the long term so that investments are</p>

³⁸ EIP-AGRI 2015; Bourguignon 2016.

	not made and then rendered futile by changed policy
ENVIRONMENT Ensure that primary resources are not depleted and remain readily accessible Keep waste low, reuse high	ENVIRONMENT Preventing unsustainable forest management that depletes resources faster than they can be renewed
REUSE AND RECYCLING Need innovative methods of resource recovery Need markets for reused materials	REUSE AND RECYCLING Recovery of used wood products can be difficult and costly
EDUCATION Need trained forest sector professionals, researchers, business owners, and entrepreneurs to drive and support the transition	EDUCATION Existing education does not prepare people for the circular economy. Will need educational material, trained professionals, resources, and facilities to train professionals for a circular forestry sector Traditional business people may not be receptive to changes in the forest supply chain and the forestry sector
INNOVATION Innovation undergirds the transition to the circular economy and must occur in all the above areas	INNOVATION Relatively small investment in research, businesses, and education for the circular economy can make it hard for the sector to innovate. There is a need for a new mindset that both allows and fosters innovation for an alternative economic model

An example of the challenges and opportunities posed by the circular economy: using wood for bioenergy

Wood that is consumed for energy results in loss of materials from a circular forest supply chain. At the same time, burning wood for energy reduces our dependency on fossil fuels. Currently, roughly 50% of the wood in the EU is being used for energy. By 2020, National Renewable Energy Action Plans predict that biomass will account for 42% of the 20% of renewable energy target.³⁹ Under this scenario, all the wood currently harvested in the EU would go to energy production. Unfortunately, the exclusive use of wood and wood products for energy results in a massive loss of resources in the supply chain as wood is burned for energy. Energy subsidies in place to increase renewable energy use encourage the burning of wood, part of which is imported from other countries, and in so doing prevent wood products from circulating for longer in the economy. If wood were allowed to circulate longer, it could replace other carbon intensive materials and reduce fossil fuel dependency and greenhouse gas emissions.⁴⁰ One way to adopt the circular economy and overcome the problem of wood overconsumption would be to use non-commercial size trees or slash and burn for energy production, in particular if using efficient burning processes such as co-generation. **A challenge for the forestry sector in the future will be to balance wood for energy us versus keeping wood in the circular economy for longer.**

Looking to the future: what are the priority sectors for future research and work in the circular economy in forestry?

EIP-Agri has identified several areas where research and work will be critical in order to promote the success of the circular economy in forestry:

³⁹ European Commission EU Forest Strategy 2013.

⁴⁰ FERN (30/9/2015). Mending the circle – How the Circular Economy could work for forests. Available from: http://www.fern.org/sites/fern.org/files/Circular%20economy_Fern_final.pdf

- 1.) Figuring out how to involve foresters and farmers in the circular economy, for example in the development of new processes and activities, in ways that guarantee they receive benefits from their participation without the addition of excessive burdens
- 2.) Understanding how to categorize and mark raw materials and wastes as resources
- 3.) Better understanding how waste can be used as a resource
- 4.) Developing leadership, innovators, and trained professionals to work in the circular economy
- 5.) Coming up with a shared vision for the circular economy that is relevant and practical in specific contexts
- 6.) Ensuring there is start up support, a coherent policy framework, and financial incentive to join the circular economy⁴¹

The keys to success and the challenges facing the forestry sector's transition to the circular economy outlined above include topics as varied as partnerships and collaboration, financing, innovation, education, reuse and recycling, policy, and markets. These keys to success and challenges are relevant for all phases of the forest supply chain. Therefore, research projects must involve collaboration between research institutes, businesses, government and policy makers, employees in the forestry sector, and local stakeholders, and examine all phases of the supply chain, from cultivation through to consumption and recycling and reuse. The next section outlines the phases of a circular forest supply chain and good practices in the circular economy at each of the phases.

3. THE CIRCULAR ECONOMY ALONG THE FOREST SUPPLY CHAIN

The linear forest supply chain consists of cultivation and sourcing, harvesting, transformation and production, distribution, and consumption (Figure 2).

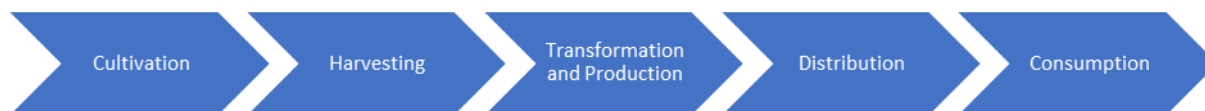


Figure 2: Traditional linear forest supply chain.

Transport of forest products connects the different phases. Once cultivated and harvested, wood is transported to local or regional pulp and paper mills, sawmills, and plywood plants, stored in stockyards, or exported to further away destinations, including overseas, via ship, rail, or truck.⁴² The products produced are either sold as end products or transported to a manufacturing plant where they are turned into complex products for industry and building, either domestic or international. The end life of the product is not the concern of the primary producers.

On the other hand, a circular forest supply chain consists of cultivation and sourcing, harvesting, transformation and production, distribution, consumption, and **reuse/recycling (Figure 3)**. In Figure 3, you can see each phase of the circular forest supply chain as well as good practices associated with that phase of the chain. The descriptions of the good practices can be found below and in Part II of the booklet.

The circular economy in the forest supply chain would require producers to reduce waste and imagine the end life of their product during the production phase. Therefore, the forest supply chain in the circular economy cannot stop at the production of primary products, but also must grow to include how waste products from the traditional production chain might be used to produce additional products. It must also include the processes by which products are re-incorporated into the supply chain or fed into other supply chains at the end of their life span.

⁴¹ EIP-AGRI 2015

⁴² Weintraub, A., & Epstein, R. (2002). The supply chain in the forest industry: Models and linkages. In *Supply chain management: Models, applications, and research directions* (pp. 343-362). Springer US.

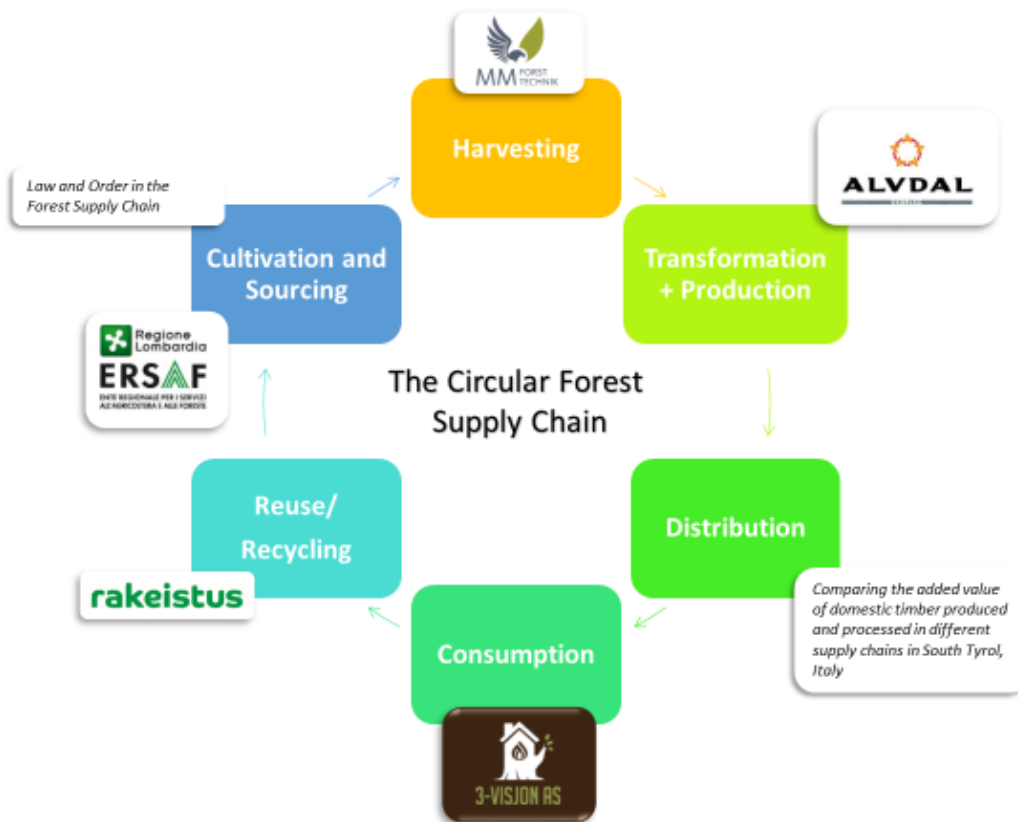


Figure 3: A reimagined forest supply chain for the circular economy with example projects that have adopted circular economy principles at different stages of the supply chain. More details about the projects can be found in Part II.

The existing linear forest supply chain may do an effective job of using the many parts of the felled tree, but the process can improve in terms of waste reduction and reuse/recycling of end products. Additionally, forests can be better managed for the production of non-wood forest products, such as berries, mushrooms, and medicines, and for the promotion of ecosystem services. Innovation will be required along all stages of the supply chain in order to build the circular economy. The sections below present examples of organizations and companies who have already come up with innovative ideas at each stage of a circular forest supply chain.

Cultivation, harvesting, and sourcing

At the beginning of the circular economy in the forest supply chain lie primary resources, primarily wood, which must be cultivated and extracted, and ecosystem services. **Any effective circular economy strategy for the forest sector must consider and enforce ways to prevent damage to the environment and human well-being originating in initial phases of the forest supply chain.** Trees cannot be cut down faster than they can grow back and extraction of lumber must not damage other forest resources, such as plants, or ecosystem services, such as opportunities for recreation or clean water.

The sustainable and environmentally friendly extraction of trees from mountain forests is made particularly difficult by treacherous and steep terrain. The Mayr Melnhof Forsttechnik company of Austria has developed innovative forestry machinery designed for steep terrain (Figure 4). The machinery reduces the cost of harvesting and is low impact and low energy, causing minimal damage to the remaining forest and young growth. These types of extraction systems preserve the forest, maximize the profit while minimizing the environmental impact of wood extraction, and can reduce the impact of wood extraction on non-wood forest products and ecosystem systems (see good practice: [Cable Cranes and Economy in Skyline Areas, Mayr Melnhof Forsttechnik](#)).



Figure 4: Mayr Melnhof Forsttechnik technology for the sustainable and environmentally friendly extraction of trees in mountain areas. Available from the Mayr Melnhof Forsttechnik website: <http://www.mm-forsttechnik.at/en/>

Forest management and planning

For the success of the circular economy in forestry, forests must be managed in a way that ensures forests grow and regrow at a speed that matches demand and prevents depletion.

Forests must be managed to provide both wood and non-wood forest products as well as ecosystem services.

ERSAF, the Lombardy Regional Entity for Services to Agricultural and Forestry, is involved in the project [Integrated management processes of the Forests of Lombardy](#). The project was born as a response to the need to implement and disseminate sustainable forestry management processes and to adopt modern and effective forest management tools to meet the needs of the Lombardy region. The project has promoted sustainable wood production via sustainable management certification and timber products; the protection and conservation of natural ecosystems; the enhancement of ecosystem services of forests (water, tourism, landscape, climate, etc.); the involvement of local communities; and the sharing of long-term monitoring and education. It is an example of how regions and communities and public and private organizations can work together to promote sustainable forest management.

In the Gorski-kotar region of Croatia, a team of individuals from the public and private sector has been put together to help each private forest owner in the region to understand the location and state of their forest parcel (Good practice No. *Law and Order in the Forest Supply Chain*). The goal is to understand the state and condition of each land parcel in the region and then to legally and sustainably integrate them into the forest supply chain. This is the first step in ensuring that forests are sustainably managed.

Forests must also be healthy so that they grow quickly and provide high quality primary materials.

Healthy and growing forests produce both wood as a primary resource, non-wood forest products, and ecosystem services such as carbon sequestration. The [Rakeistus company](#) takes discarded bioash from pulp and paper and biomass energy companies and turns it into granules which can be used as fertilizer. Forests fertilized with granules grow much faster and are more healthy than unfertilized forests. Rakeistus is an example of a company that is simultaneously reusing discarded materials from the supply chain and in so doing reducing waste while also promoting healthy and fast growing forests that can supply the forest supply chain (Figure 5).

Transport and distribution of wood and non-wood forest products

Mountain forests are often isolated and difficult to access, rendering transport difficult and expensive. Trucks that transport wood out of mountain forests release pollution into the environment and greenhouse gases that contribute to climate change. Regional processing and valorization of forest resources could help reduce the cost and pollution associated with the transport of wood.



Figure 5: In picture above, the forest on the left was fertilized with bioash granules and the forest on the right was not. The forest on the right grew taller and faster. (Source: Kiviniemi, Rakeistus: Granulation of Bioash, November 29th, 2016)

The project, [Comparing the added value of domestic timber produced and processed in different supply chains in South Tyrol, Italy](#), conducted research on the economic effects that would accrue from the regional processing and valorization of natural forest resources. It found a regional added value for each of the three forest supply chains examined: (1) converting pulp wood to energy, (2) converting logs to wood-panels for constructing timber houses, and (3) converting high quality logs to furniture. If products are processed and valorized regionally, waste from transport can be reduced and local economies can benefit from, for example, job creation in rural areas.

Product Development

The forest sector produces a wide range of wood products such as packaging, furniture, wood for construction, paper, moulding, and framing. In the circular economy, products are designed to be environmentally friendly, durable and long-lasting, and with the end phase of their life cycle (disposal or reuse/recycling) in mind during initial phases of production. **A big challenge for the sector going forward will be to find out how to reuse and recycle wood products, many of which are notoriously hard to reuse and recycle.**⁴³

The companies [3-Visjon AS](#) and [Aldval Skurlag](#) from Norway have developed innovative products that are aligned with circular economy principles. 3-Visjon AS produces small building elements that are environmentally friendly. The elements fulfill all new regulations for modern buildings and can be used in a range of building design, from traditional to modern. The construction methods used by the company do not involve plastic and the insulation is made of wood, a renewable resource. The products are a sustainable alternative to traditional building elements and contribute to better internal living conditions.

Alvdal Royal is an innovative wood treatment method that combines the use of oils and a drying process. This results in products with a very long life and limited maintenance requirements. Alvdal Royal can be supplied as clear oil, or in the colors brown, dark brown, red or ocher, all supplied with UV protection. The product emerged in response to a need for a new and more environmentally friendly impregnation method that would allow products to last longer without being harmful to consumers and the environment. The impregnation method ensures that the wood products to which it is applied last longer. In so doing, it helps reduce demand on primary resources. At the same time, it does not harm the environment.

Waste management and reuse/recycling

Two key principles of the circular economy are to reduce waste and promote the use of secondary raw materials. While product design with the end life of the product in mind is one way to reduce waste and promote reuse, waste is produced at all phases of the forest supply chain, not only at the end life of a product. How to reduce and reuse waste will be a key challenge for the circular economy going forward, but there are already companies taking steps to reduce waste. For example, sawing to cut boards out of a log creates wood chip waste and sawdust. These products can then be used as fuel in sawmills and pulp and paper mills.⁴⁴

The [Rakeistus company](#) is reducing the waste produced by the forestry sector while also using a secondary raw material produced by the sector (Figure 6). Powerplants and paper and pulp companies have to dispose of bioash in dumps, an expensive process due to the rules of the 2011 EU waste directive. Dumping bioash is a waste as bioash can be productively recycled through granulation. The Rakeistus company thus provides an example of a company that not only helps promote healthy forests, as described above, but takes secondary raw materials and uses them as a primary material for a new and innovative business. In so doing, they reduce waste and add value to resources.

⁴³ Allen 2016.

⁴⁴ Weintraub, A., & Epstein, R. 2002.

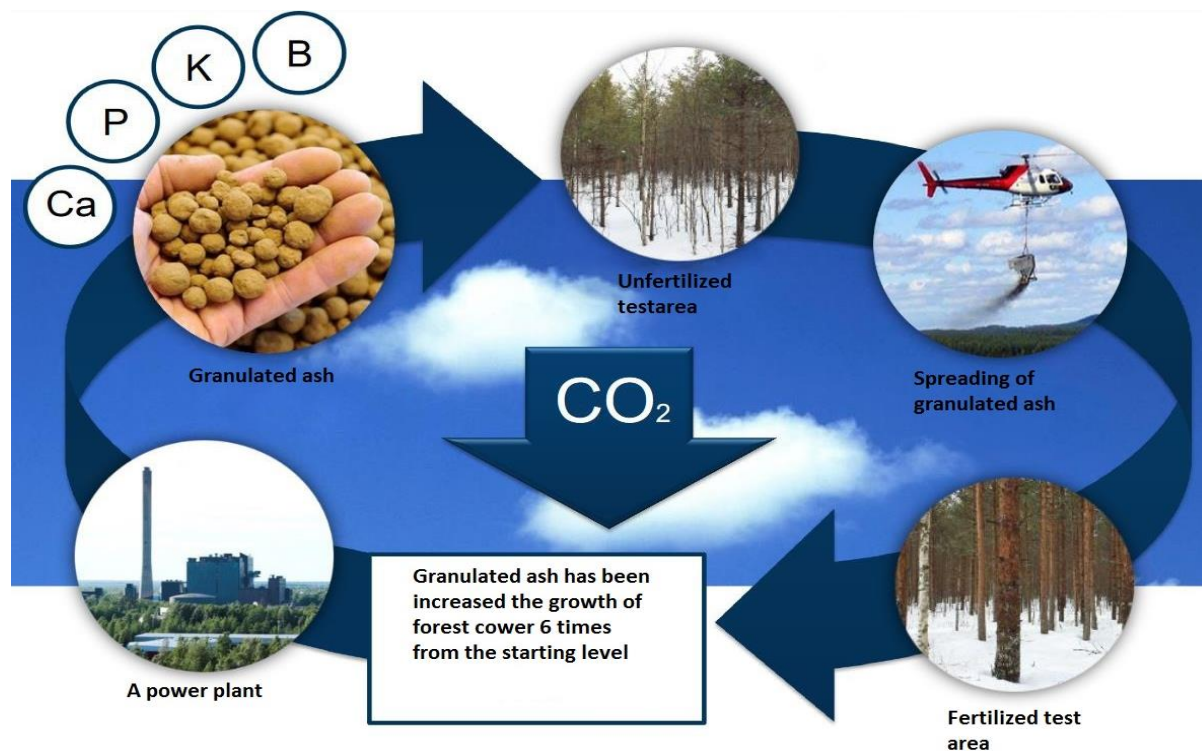


Figure 6: The circular economy of bioash. Source: Sakari Kiviniemi, Presentation on 29/11/2016 at Innovation and circular economy in mountain forest supply chains workshop, Skrad, Croatia

The above examples show how the circular economy has been adopted in the forest supply chain and forest sector. The extended descriptions of the good practices in Part 2 provide more information about the factors that contributed to the success of the project and the challenges the project had to overcome. One of the challenges identified both in the keys to success and challenges section above and in a number of the good practices is coherent policy support for the circular economy. The next section thus presents how the European Union is promoting the circular economy through policies, programmes, and financing.

C. A NEW LEGISLATIVE FRAMEWORK: THE CIRCULAR ECONOMY PACKAGE AND THE EU FOREST STRATEGY



1. WHAT IS THE CIRCULAR ECONOMY PACKAGE?

The circular economy package was presented by the European Commission on December 2nd, 2015.⁴⁵ The package consisted of an action plan for the circular economy, a list of measures, and four legislative proposals on waste policy in the EU. This section will present the progress of the package through the EU (Figure 7), the contents of the package, and the importance of the package for mountain forestry.

Developing, proposing, and voting on the package at the EU level

On July 9th, 2015, the European Parliament presented its resolution “resource efficiency: moving towards a circular economy” and asked the European Commission to develop a proposal for the circular economy. The European Parliament resolution asked the Commission to propose legislation for waste, to consider the education and training policies needed to promote the circular economy, and to review “eco-design legislation and relevant product-policy legislation, to gradually include mandatory resource- efficiency requirements, measures promoting the development of markets for secondary raw materials, compulsory green public procurement, and mobilization of EU funds for resource efficiency.”⁴⁶ The call for a circular economy package builds on two previous European Parliament Resolutions:

- 1.) The European Parliament 2013 resolution “eco-innovation- jobs and growth through environmental policy” which asked for a resource efficient and sustainable industrial policy that would support a transition to a green sustainable economy.⁴⁷
- 2.) The European Parliament 2012 resolution calling for a “resource efficient Europe” that has decoupled economic growth from resource consumption.⁴⁸

The Parliament requested that the 2015 European Commission proposal be an improvement of the initial circular economy package proposed by the Commission in July 2014. Between May and August, 2015, the Commission solicited feedback on the package from the public and on December 2nd, 2015 published the final circular economy package.

Throughout 2016, the European Commission worked to implement the package and to develop strategies and legislative proposals to promote the circular economy. The Commission’s 2017 Work Programme commits to the continued timely implementation of the package (more details can be found below).

45 European Commission (2/12/2015). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy. COM/2015/0614 final. Brussels. Available from : <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52015DC0614>

46 Bourguignon 2016, 7.

47 Bourguignon 2016.

48 Ibid.

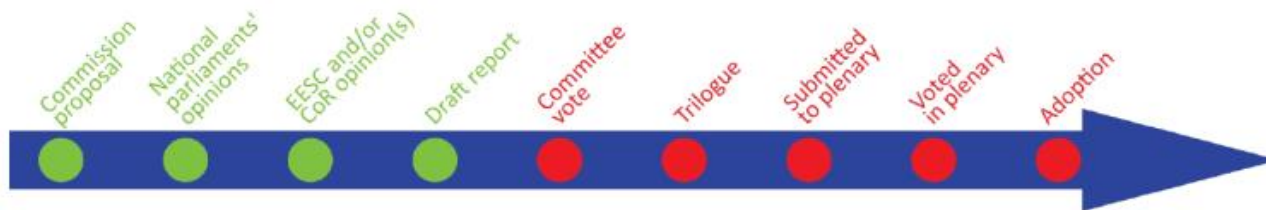


Figure 7: This figure shows the various steps the circular economy package must take before it is adopted. Currently, the package is at the Committee Vote stage of the process.

On January 24th, 2017, the Environment Committee of the European Parliament reviewed the package and voted to amend a portion of the proposal on waste. This is the first step towards a review of the package by the Triologue, a meeting of the Parliament, Commission, and Council. Following the meeting of the Triologue, the package will be submitted to the plenary where the whole European Parliament will vote to adopt or reject the contents by a simple majority. Following the vote, the package will be adopted and the legislative proposals will be implemented. More information about the current progress of the package through the Parliament can be found below. Before that, we will examine the contents of the package.

What does the circular economy package propose?

The circular economy package presents an action plan for the circular economy and a list of measures and legislative proposals on waste policy in the EU. A general outline of the package can be found in Figure 8.

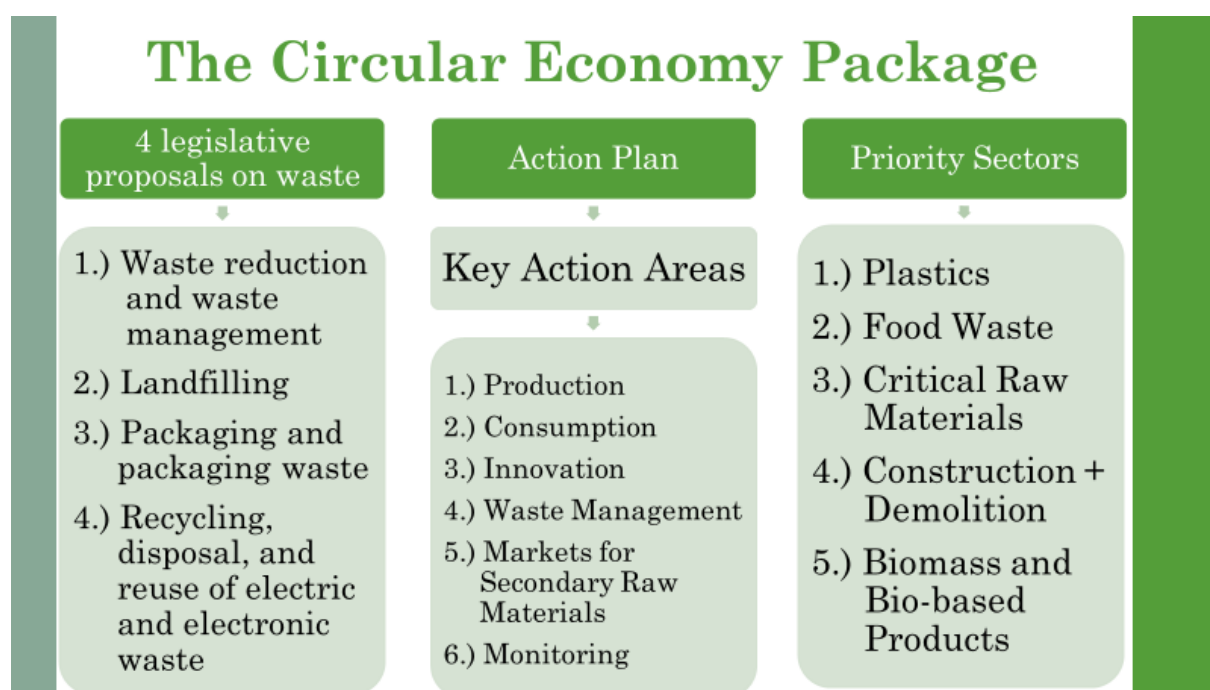


Figure 8: The circular economy package is divided into three areas, legislative proposals, an action plan, and priority sectors each with individual target areas for action.

The action plan

The action plan addresses production, consumption, innovation, markets, waste management, and monitoring.⁴⁹ The action plan supports the circular economy at each point along the value chain from

⁴⁹ Ibid.

production and consumption through to secondary raw materials. The tables below describe each of these components of the action plan and their application and relevance to forestry and mountain areas.

- 1.) **Production** – “A circular economy starts at the very beginning of a product's life. Both the design phase and production processes have an impact on sourcing, resource use and waste generation throughout a product's life.”⁵⁰

PRODUCTION	
DESCRIPTION	<p>Summary: The action plan promotes product design of products that are more durable and easier to repair, upgrade, remanufacture, and recycle. The goal is to protect resources and reduce waste, make production more energy efficient, and encourage the use of waste as raw material.</p> <p>Commission Actions:</p> <ol style="list-style-type: none"> 1.) Implementation of the Eco-design Directive. The Directive sets environmental impact requirements for energy related products. The extended producer responsibility schemes require producers to take responsibility for a product beyond the consumption phase⁵¹. Both encourage producers to design products with a long-life cycle or that can be upgraded or repaired. 2.) Best waste management and resource efficiency practices will be developed. 3.) Product policy will be aligned with the circular economy.
RELEVANCE TO FORESTRY	Forest based products are biological and therefore can be naturally decomposed if properly designed. They are also renewable. Designing for the end life of a product at early stages in the forest product production-consumption cycle could reduce the amount of waste produced by the forestry sector, contributing to the waste reduction objective of the action plan as well.
RELEVANCE TO MOUNTAIN AREAS	Many mountain areas are experiencing depopulation and underemployment. The circular economy has the potential to bring jobs back to mountain areas by encouraging local production and consumption. This will provide mountain residents with the opportunity to remain in mountain areas and design innovative products and production systems in those areas.

- 2.) **Consumption** – “The choices made by millions of consumers can support or hamper the circular economy. These choices are shaped by the information to which consumers have access, the range and prices of existing products, and the regulatory framework. This phase is also crucial for preventing and reducing the generation of household waste.”⁵²

CONSUMPTION	
DESCRIPTION	The Commission will promote better labeling of products so that consumers will be informed of the sustainability of the products they purchase. Consumers will be encouraged to share and reuse products or consume services rather than buying and disposing their products. Finally, public procurement will be made

⁵⁰ European Commission (2/12/2015), 3.

⁵¹ European Commission – Environment. (17/08/2015). Development of guidance on Extended Producer Responsibility (EPR): Introduction. Available from: http://ec.europa.eu/environment/archives/waste/eu_guidance/introduction.html

⁵² European Commission (2/12/2015), 6.

	<p>“greener” meaning that public organizations will purchase resources and products that are more sustainable.⁵³ See for example the good practice Project BioEUParks in Sila National Park, Italy.</p>
<p>RELEVANCE TO FORESTRY</p>	<p>Forest based products are naturally sustainable and renewable at their origin and could benefit from labeling indicating their sustainability. As consumers are encouraged to be environmentally friendly in their consumption, a natural direction to turn will be bio-based products such as those from forests.</p> <p>“Green” public procurement of products will create new demand for forest based products in local, regional, and national governments and potentially create more jobs in rural and mountainous areas where many forests lie and which will experience increasing demand for natural forest resources.</p>
<p>RELEVANCE TO MOUNTAIN AREAS</p>	<p>Many of the traditional products produced in mountain areas are produced in line with the principles of the circular economy. They are also high quality and help preserve mountain traditions and livelihoods. The facultative term « mountain product » is meant to valorize these food products and protect against the fraudulent labelling of a product as from a mountain area. Proper labelling of products so that consumers can be cognizant of the origin of their product is critical also for mountain products. As the Commission develops product labels for sustainable products produced in the circular economy, it would be beneficial for mountain products to be given particular room to shine.</p>

- 3.) **Innovation** – Innovation will be essential in the systemic change required by the transition to a circular economy. “In order to rethink our ways of producing and consuming, and to transform waste into high value-added products, we will need new technologies, processes, services and business models which will shape the future of our economy and society. Hence, support of research and innovation will be a major factor in encouraging the transition.”⁵⁴

INNOVATION	
<p>DESCRIPTION</p>	<p>The Commission will provide support for innovation through funding for research, removal of regulatory obstacles to innovation, and the mobilization of stakeholders.</p>
<p>RELEVANCE TO FORESTRY</p>	<p>Innovation and optimization of existing forest and non-forest products will drive the forestry sector’s incorporation into the circular economy. Production cycles, marketing, reuse, recycling, upcycling, education, and management in forestry will all benefit from innovation.</p>
<p>RELEVANCE TO MOUNTAIN AREAS</p>	<p>Mountain areas stand to benefit from the job creation, regional production and consumption, and environmental benefits that will follow from the transition to a circular economy. Mountain areas also have much to contribute to the circular economy in terms of natural, renewable resources and ecosystem services. Innovation will be essential in all sectors in order to facilitate the transition and ensure that mountains benefit.</p>

- 4.) **Waste Management and Markets for Secondary Raw Materials** – “The way we collect and manage our waste can lead either to high rates of recycling and to valuable materials finding their way back into the

⁵³ European Commission – Environment (22/11/2016). Green Public Procurement. Available from: http://ec.europa.eu/environment/gpp/index_en.htm

⁵⁴ European Commission (2/12/2015), 18.

economy, or to an inefficient system where most recyclable waste ends in landfills or is incinerated, with potentially harmful environmental impacts and significant economic losses.”⁵⁵

MARKETS & WASTE MANAGEMENT	
DESCRIPTION	<p>Markets: The Commission will promote markets for secondary raw materials. It will do so by “setting quality standards for materials recovered from waste, encouraging nutrient recycling in fertilizers, and promoting non-toxic recycling cycles”⁵⁶ while also developing measures to allow for treated wastewater to be safely reused.</p> <p>Waste Management: The Commission has adopted legislation on recycling, extended producer responsibility schemes, economic instruments, and definitions and calculation methods for waste production.</p>
RELEVANCE TO FORESTRY	The secondary raw materials, such as bioash and wood shavings, produced in the forestry sector, are already being used to generate energy and novel products. For example, bioash from energy and pulp and paper companies is being used as a secondary raw material to produce bioash granules then used as fertilizer in forests (see for example the good practice: Granulation of Bioash).
RELEVANCE TO MOUNTAIN AREAS	Mountain areas often have fragile ecosystems that provide important resources and ecosystem services. Measures that reduce the environmental impact of humans on these ecosystems can promote healthier and more productive mountain ecosystems. For example, Mayr Melnhof Forsttechnik has developed technology that allows for the environmentally friendly extraction of wood in mountainous areas.

5.) **Monitoring** – “In order to assess progress towards a more circular economy and the effectiveness of action at EU and national level, it is important to have a set of reliable indicators.”⁵⁷

MONITORING	
DESCRIPTION	The Commission will develop a monitoring platform for the circular economy.
RELEVANCE TO FORESTRY	A monitoring system will ensure that the forestry sector actually transitions towards a circular economy and will allow the transition to be monitored to see if it is achieving circular economy objectives.
RELEVANCE TO MOUNTAIN AREAS	As the economy transitions from a linear to a circular model, businesses in mountain areas will have to adapt. Their progress will be monitored by the Commission platform and the businesses will be able to see whether they are successfully achieving the transition.

The five priorities of the action plan

The five priority areas of the action plan are:

- 1.) plastics,
- 2.) food waste,

⁵⁵ European Commission (2/12/2015), 8.

⁵⁶ Bourguignon 2016.

⁵⁷ European Commission (2/12/2015), 20.

- 3.) critical raw materials,
- 4.) construction and demolition, and
- 5.) biomass and bio-based products.

The Commission has developed measures addressing each of these priority areas. These include legislative proposals, such as fertilizer regulations, proposals for water reuse, and incorporating the circular economy into the Eco Design Directive; implementation and enforcement measures, such as how to deal with products at the end of their life, how to monitor waste, and standards for recycling; support measures, such as good practices, information exchange, and support for innovation; and financing instruments, such as funding for the circular economy through the European Fund for Strategic Investments (EFSI) and Cohesion Policy funds.⁵⁸

Each of the priority areas is relevant to mountain areas and forestry. Table 4 below documents the priority areas and their relevance to mountain areas. Table 5 shows how the forestry sector is particularly relevant to four of the priority sectors identified in the circular economy package, namely plastics, critical raw materials, biomass and bio-based products, and construction and demolition.

Table 4: Mountain areas and the five priorities of the circular economy action plan

PRIORITY	RELEVANCE TO MOUNTAIN AREAS
PLASTICS	Plastics consumed in mountain areas must be disposed of or recycled at the end of their life. Reducing the plastics consumed in mountain areas will reduce the impact on the environment from having to process plastic waste in landfills or incinerators. This will keep mountain areas clean and healthy places to live. Reduced consumption of plastics will also create demand for wood products, potentially creating more economic activity in mountain areas with many forests.
FOOD WASTE	The economic cost of food waste in the EU is about 143 billion euros yearly. Food waste leads to an unnecessary loss of limited natural resources. Food that is not produced in mountain areas must be transported into the mountains in vehicles that pollute. The circular economy encourages local food consumption and production, which would benefit mountain economies. Mountain areas can also benefit from measures designed to reduce food waste and that, in so doing, decrease the environmental impact of food consumption on delicate regions, save money, and preserve natural resources.
CRITICAL RAW MATERIALS	Mountains contain critical raw materials such as wood, water, and minerals. Measures that protect critical raw materials and encourage environmentally friendly extraction will protect mountain environments from the environmental impact of the extraction of these materials.
BIOMASS AND BIO-BASED PRODUCTS	The demand for bio-based products could increase demand for forest resources from mountain areas and increase economic activity in growth in mountain areas as a result. It will be important to ensure that the mountain resources are sustainably extracted or

⁵⁸ Bourguignon 2016.

	the long-term benefits to mountain areas will be reduced.
CONSTRUCTION AND DEMOLITION	A push towards sustainable construction may drive demand for wood from the forestry sector. This could bring economic benefits and employment to mountain areas that contain this wood, though proper management will be necessary to ensure that limited resources are not depleted.

Table 5: The forestry sector and the priorities of the circular economy action plan: focus on the priorities most relevant to the sector

PRIORITY	RELEVANCE OF THE FORESTRY SECTOR
PLASTICS and BIOMASS AND BIO-BASED PRODUCTS	Forest products are bio-based and renewable and may become an increasingly viable alternative to fossil fuel based plastic products as restrictions and regulations around plastic use increase.
CRITICAL RAW MATERIALS	Wood is an important critical raw material both in product design and for energy production. It is also critical because it is a renewable resource that must be properly managed in order to guarantee its sustainability and avoid its depletion.
CONSTRUCTION AND DEMOLITION	A push towards sustainable construction may drive demand for bio-based products from the forestry sector.

The legislative proposals

The legislative proposals on waste in the package include several measures of relevance to the forestry sector. These proposals and their application to the forestry sector are presented in Table 6.

Table 6: The legislative proposals on waste

LEGISLATIVE PROPOSAL	APPLICATION TO FORESTRY SECTOR
NEW WASTE MANAGEMENT TARGETS	These targets include increasing municipal and packaging waste that is recycled or reused (to 65% and 75% respectively) as well as reducing landfill waste (to 10%). Products that are produced in the forestry sector will have to be properly designed and packaged so that the products and packaging can be reused or recycled. All along the forest supply chain, waste will have to be minimized and waste products reused.
MONITORING SYSTEM	The forestry sector will have to comply with set monitoring targets.
REQUIREMENTS FOR EXTENDED PRODUCER RESPONSIBILITY SCHEMES	Extended producer responsibility means that the producer is responsible for the product after the consumption phase. Forest products are naturally regenerating and product design should be able to easily comply with requirements to consider the post-consumption life of a product.

END OF LIFE MANAGEMENT OF PRODUCTS

This includes provisions for how by-products and end-of-waste status should be evaluated. In the forestry sector, regulation on the end of life management of products will be important for understanding when a forest based product can be removed from the economy and how by-products should be used.

2. 2017 UPDATES TO THE CIRCULAR ECONOMY PACKAGE

On January 24th, 2017, the circular economy package was brought before the Environment Committee of the European Parliament and members of the Committee voted to amend the legislation related to waste. **They concluded that recycled waste should increase from its current 44% to 70% by 2030, landfilling should be reduced to 5%, and food waste should be decreased by 50% by 2030.**⁵⁹ These are ambitious goals and reflect an EU dedication to promoting the circular economy. The waste proposals were voted on by the full House on March 13-16 during the plenary session in Strasbourg. They supported the ambitious Commission targets. While this vote by the MEPs is important, there are other aspects of the circular economy package on which the Commission must continue to work. The January 26th, 2017 Commission report on the implementation of the Circular Economy Action Plan is one step towards achieving other objectives of the package.⁶⁰

The Commission report highlights progress made in 2016 on the implementation of the package and objectives for 2017. Outcomes of interest for the forestry sector in 2016 were the following⁶¹:

- **Legislative proposals on waste** (voted on by the European Parliament Environment Committee as described above)
- **Ecodesign Working Plan for 2016-2019:** The working plan was adopted by the Commission in November 2016. Of particular importance for the circular economy is the plan's objective to expand "the focus of future eco-design measures beyond energy efficiency to possible circular product requirements such as durability, reparability, upgradeability, design for disassembly, information, and ease of reuse and recycling."⁶²
- **Development of a Circular Economy Finance Support Platform:** The Platform will serve as a contact point for innovators and investors interested in the circular economy. For more details, see the section below on *European Programmes Supporting the Circular Economy*.
- **Launch of Innovation Deals:** These deals are meant to assist innovators in overcoming regulatory challenges.
- **Specific Horizon2020 call for proposals on *Industry 2020 in the circular economy*:** The call is specifically for "innovative demonstration projects for circular economy and industrial competitiveness"⁶³
- **Documents regarding green public procurement**
- **Biomass and Bio-based products:** On November 30th, 2016, the Commission recast the [Renewable Energy Directive](#) and adopted criteria for the sustainable use of bioenergy. Public support will be provided only for efficient biomass to electricity conversion. This is important for the forestry sector as it will have implications for biomass resource use for energy and product development.

For 2017, the Commission will continue to pursue the objectives of the Circular Economy Action Plan. It will do so by putting forth a Plastic Strategy for plastic recycling, reuse, and management; publishing an analysis of challenges associated with chemical, product, and waste recycling; developing a legislative proposal on waste water reuse; implementing the Ecodesign working plan for the circular economy; and developing a monitoring

59 European Parliament (24/01/2017). Press release: Waste: boost recycling, cut landfilling and curb food waste, say MEPs. Environment Committee. European Parliament. Available from : <http://www.europarl.europa.eu/sides/getDoc.do?type=IM-PRESS&reference=20170123IPR59605&language=EN&format=XML>

60 European Commission (26/01/2017). REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the implementation of the Circular Economy Action Plan. European Commission. European Union. Available from: http://ec.europa.eu/environment/circular-economy/implementation_report.pdf

61 European Commission – Fact Sheet (26/01/2017). Circular Economy: Commission delivers on its promises, offers guidance on recovery of energy from waste and works with EIB to boost investment. European Commission Press Release Database. Available from: http://europa.eu/rapid/press-release_MEMO-17-105_en.htm

62 Ibid.

63 Ibid.

platform to measure progress towards the circular economy.⁶⁴ While these actions do not directly impact the forestry sector, they may indirectly impact the sector through increased regulation of waste and of product design. In 2017, the Commission hopes to increase its communication with stakeholders to ensure their needs are met. Specifically, there will be a stakeholders' conference in Brussels on the 9th and 10th of March, 2017.

The circular economy remains a priority for the European Union. As the circular economy package continues to move through the Commission, Parliament, and Council, you can monitor its progress at this site: <https://epthinktank.eu/2016/09/27/circular-economy-package-four-legislative-proposals-on-waste-eu-legislation-in-progress/>

3. THE EU FOREST STRATEGY AND THE CIRCULAR ECONOMY PACKAGE

In 2013, the EU launched its new Forest Strategy. The European Commission published a paper on the strategy, "A new EU Forest Strategy: for forests and the forest based sector", in which it calls for sustainable forest management that maintains forest "biodiversity, productivity, regeneration capacity, vitality" and the ability of forests to "fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems".⁶⁵

The EU Forest Strategy is a response to the Forest Action Plan 2007-2011 that addressed "competitiveness, environment, quality of life and coordination and communication." The 2013 Forest Strategy builds on the Action plan and "develops and implements a common vision of multifunctional and sustainable forest management in Europe."⁶⁶ Forests today face new demands and threats that require a coherent policy environment. The new framework of the Forest Strategy is coherent with the objectives of the circular economy. Table 7 lays out the framework of the Forest Strategy and its coherence with circular economy principles.

Table 7: Coherence of the EU Forest Strategy with the circular economy

EU FOREST STRATEGY FRAMEWORK OBJECTIVES	COHERENCE OF THE FOREST STRATEGY WITH THE CIRCULAR ECONOMY PACKAGE AND CIRCULAR ECONOMY PRINCIPLES
Manage forests sustainably to promote forest resources and ecosystem services.	The circular economy seeks to protect limited resources and promote ecosystem services in order to reduce waste and the impact of human behavior on the environment.
Allow increasing demand for raw materials and renewable energy in the bio-based sector to be met through sustainable forest management.	The circular economy protects primary resources, for example through resource efficiency and waste reduction and reuse.
Address challenges posed by energy and resource demand and efficiency, logistics, innovation, training and education, climate policy, and the need for innovation.	The circular economy faces similar challenges. Proposed Forest Strategy measures and circular economy measures should be designed to cohere in order to create a streamlined policy environment that promotes both the circular economy and the forest sector and the circular economy in the forest sector.
Protect forests and forest services from threats (climate change, fire, pest, disease).	The circular economy in forestry depends on the health of the biological cycle and its protection from threats.

⁶⁴ European Commission (26/01/2017).

⁶⁵ European Commission EU Forest Strategy 2013.

⁶⁶ European Commission EU Forest Strategy 2013.

Address impact of EU imports on forests worldwide.	The circular economy in the forest supply chain depends on primary inputs from the forest sector. The EU currently meets this demand through domestic production and wood imports. A sustainable circular economy cannot be sustainable only in Europe. It must apply the same principles to its imports and the forest supply chain that underlies those imports.
Maximize the contribution of forestry to rural economic development, growth and job creation	The circular economy in forestry can promote economic activity and job growth in rural areas through new demand for forest products and through new business development, research, and innovation.
Develop the forestry sector so that it can be a competitive and sustainable contributor to the bio-based economy	The bio-based economy and the circular economy intersect in forestry. The bio-based economy depends on biological inputs from sectors such as the forestry sector. These same biological inputs underlie the biological cycle of the circular economy. A competitive and sustainable forestry sector will therefore support both the bio-based economy and the circular economy, as well as their intersections.
Train qualified managers, workers, and entrepreneurs to contribute to the forest sector	Training programs on the circular economy in forestry should address managers, workers, and entrepreneurs in the forest sector.
Promote innovation in the forest sector	The transition to the circular economy will require innovation in the forest sector to develop new products, sustainable management methods, and waste management.
Promote sustainable forest management's social functions	Social innovation that addresses forest management practices, consumer preferences, and the ideals that underlie current forest management and consumer behavior will be critical to the future of sustainable forestry, the circular economy, and their intersections.
Support bioenergy use, green economy, and forest-based industries	Forest based industries that adopt circular economy principles can support bioenergy use and the green economy, but will have to be careful to not deplete limited forest resources.
Focus on forest ownership, including small forest owners	The circular economy provides opportunities for innovative business development including in rural and mountainous regions that can in turn provide forest owners with new opportunities to sell their products and incorporate themselves into a circular forest supply chain.
Provide a system to monitor and assess each of the above.	The circular economy package also calls for a monitoring system. The two systems should be coherent with each other.

The strategy also calls for:

- The Commission and Member States to adequately value the goods and services that forests provide and to promote sustainable forest management that provides a balance between extraction and the delivery of goods and services.
- Member States to develop a framework by 2020 for valuing ecosystem services and integrate the that framework into accounting systems at the EU and national levels.
- The EU to dedicate rural development funds and regulation to support the implementation of sustainable forest management.
- The EU to develop good practice guidance for sustainable wood mobilization and the “cascade” principle, or the prioritization of the use of biomass as material rather than energy.
- The EU to support resource and energy efficient manufacturing processes in forest based industries, SMEs, and microfirms.

The Circular Economy Package and the EU Forest Strategy intersect in their objective to promote a sustainable future. In word, the European Union is dedicated to the objectives of both the strategies. How, though, is the EU supporting the circular economy in practice?

D. PROMOTING THE CIRCULAR ECONOMY



The circular economy is enabled by effective policy, novel business models, eco-design, emphasis on reuse and repair, and waste prevention. Here, we look at how these enablers may apply in forestry and mountain areas. Specifically, we look at how European programmes and policy, innovative business models, and novel design can help drive the circular economy.

1. EUROPEAN PROGRAMMES SUPPORTING THE CIRCULAR ECONOMY

The European Union implements its policies through a series of programmes that provide financial support for businesses, regions, universities, research centers, towns, and NGOs, among others. Several of the tools provided by the EU can be used to develop research and implement new actions to promote a more circular economy including in forestry.

Rural Development Programmes (Common Agricultural Policy Pillar II)

Priorities of the Rural Development Programmes

The EU Rural Development Policy, also known as the second pillar of the Common Agricultural Policy (CAP), promotes the development of rural areas and is funded through the European Agricultural Fund for Rural Development (EAFRD). **To enact the policies, Member States develop rural development programmes (RDP)**

implemented at the regional or national level and tailored to the specific needs of their territories. The programmes address at least four of six common EU priorities:

1. “Fostering knowledge transfer and innovation in agriculture, forestry and rural areas;
2. Enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management;
3. Promoting food chain organisation, animal welfare and risk management in agriculture;
4. Restoring, preserving and enhancing ecosystems related to agriculture and forestry;
5. Promoting resource efficiency and supporting the shift toward a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors;
6. Promoting social inclusion, poverty reduction and economic development in rural areas.”⁶⁷

With its focus on innovation (Priority 1), restoring, preserving, and enhancing ecosystems (Priority 4), waste reduction and energy efficiency (Priority 5), the circular economy is closely tied to three of these six priorities. Rural development programmes implemented at regional levels should utilize the circular economy as a way to achieve the EU priorities. RDPs must target 30% of their funding towards environment and climate change measures.⁶⁸ They could use a portion of this funding to promote and develop the circular economy as a circular approach can help preserve and protect the environment and mitigate climate change.

The Agricultural European Innovation Partnership (EIP-AGRI) Operational Groups

The EIP-AGRI seeks to foster “a competitive and sustainable agriculture and forestry sector that ‘achieves more from less’”⁶⁹, and to promote “agricultural innovation that is more resource efficient, productive, low emission, climate-friendly, and resilient and that operates in harmony with the essential natural resources on which farming depends.”⁷⁰ To promote innovation, the EIP-AGRI has developed the **interactive innovation model**, linking stakeholders through the EIP-AGRI network, and supporting research projects through the Horizon 2020 funding scheme of the EU (see section *Horizon 2020*). The interactive innovation model “focuses on forming partnerships: using bottom-up approaches and linking farmers, advisors, researchers, businesses, and other actors in **Operational Groups** that engage in practical projects”.⁷¹

Operational Groups are groups of local actors from different practical and scientific backgrounds working together on projects to develop concrete, practical solutions to problems or innovative opportunities (Figure 9).⁷² Projects range from “the development of new products, practices, processes and technologies to testing and adapting existing technologies and processes in novel geographical and environmental contexts.”⁷³ For the 2014-2020 funding period, there are 3205 planned groups. If you are interested in starting an Operational Group, EIP-AGRI has made a handbook for new groups. It can be found here: <https://ec.europa.eu/eip/agriculture/en/my-eip-agri/operational-groups>. The work of existing Operational Groups can be found on the EIP-AGRI website.

Rural Development Programmes in Member States support Operational Groups and provide project funding and innovation support services.

67 Rural Development 2014-2020. (2016). European Commission: Agriculture and Rural Development. Available from: https://ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm

68 Ibid.

69 Cossu, Fabio. (10/28/2015). EIP-AGRI: Boosting innovation for the circular economy. EIP-AGRI Workshop on circular economy. October 28, 2015. https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/field_event_attachments/ws-circulareconomy-20151029-pres04-fabio_cossu.pdf

70 EIP-AGRI (2016). EIP-AGRI Operational Groups – basic principles. European Commission. Available from:

<https://ec.europa.eu/eip/agriculture/en/content/eip-agri-operational-groups-%E2%80%93-basic-principles?stakeholder=3394>

71 European Commission. (2013). Strategic Implementation Plan European Innovation Partnership “Agricultural Productivity and Sustainability”. European Innovation Partnership, European Commission. Page 2. Available from: https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/strategic-implementation-plan_en.pdf

72 EIP-AGRI (ND). EIP-AGRI Operational Groups: Turning your idea into innovation. European Commission. Available from:

http://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_brochure_operational_groups_2014_en_web_updated_01032016.pdf

73 Ibid.



Figure 9: The Operational Group (Source: Cossu, 2015, EIP-AGRI Workshop, Opportunities for Agriculture and Forestry in the Circular Economy, 28-29 October 2015)⁷⁴

Horizon 2020 program

Horizon 2020 is a European funding scheme oriented towards boosting research and innovation both fundamental and applied. It funds three main types of projects:

- 1.) **Research and innovation action (RIA)** - Supports activities aiming to establish new knowledge, basic and applied research, technology development, lab-scale prototypes, H2020 provides 100% of the funding rate
- 2.) **Innovation action (IA)** - Supports activities to develop new, altered or improved products, processes or services; prototyping, testing, piloting, product validation, demonstration; H2020 provides 70% of funding rate for most of its beneficiaries
- 3.) **Coordination and support action (CSA)** - Accompanying measures: Networking, coordination between programmes, mutual learning, dissemination, standardization; H2020 provides 100% of the funding rate

For 2016-2017, Horizon 2020 funded projects related to the circular economy under the following calls for proposals: *New technologies and life cycle management for reconfigurable and reusable customised products* (IA, call FOF-10-2017), *Integrated approach to process optimisation for raw material resources efficiency, excluding recovery technologies of waste streams* (IA, call SPIRE-07-2017), *New models and economic incentives for circular economy business* (CSA, call CIRC-04-2016), and *Smart Specialisation for systemic eco-innovation/circular economy* (CSA, call CIRC-03-2016).

Funding under Horizon 2020 is organized around a series of work programmes. The 2016-2017 Work Programme is divided into specific *Societal Challenges*. Two *Societal Challenges* are of particular interest to those seeking funding related to the circular economy and forestry:

- Food Security, sustainable agriculture, marine and maritime, inland water research and the bioeconomy
- Climate action, environment, resource efficiency and raw materials (greening the economy).

The H2020 Work Programme for 2016-2017 includes a specific initiative on "Industry 2020 in the circular economy" which provides funding for projects on the "economic and environmental feasibility of the circular economy approach, and at the same time gives a strong impetus to the re-industrialisation of the EU".⁷⁵ It has funding of 650 million Euros.⁷⁶ More information about Horizon 2020 and the Societal Challenges can be

⁷⁴ Cossu 2015.

⁷⁵ European Commission (26/01/2017), 12.

⁷⁶ European Commission (2/12/2015).

found at the European Commission website page on *Horizon 2020: The EU framework programme for Research and Innovation* (<https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>). The Work Programme for 2018-2020 should be published in Autumn 2017.

Interreg Europe

The European Regional Development Fund (ERDF) “aims to strengthen economic and social cohesion in the European Union by correcting imbalances between its regions”⁷⁷. It finances different Operational Programmes in Europe, the most relevant for actors working in different countries is the Interreg Europe programme.

Interreg Europe is dedicated to improving the performance of regional development policies and programmes. Within the Interreg Europe programme, ERDF finances projects under the following four priorities relevant to the circular economy:

- 1.) Research and Innovation (through stronger infrastructure and capacities, regional innovation chains)
- 2.) SME competitiveness (regional support of SMEs)
- 3.) Low carbon economy (transition in all sectors of the economy)
- 4.) Environment and resource efficiency (natural and cultural heritage promotion and protection, resource efficient, green economy, eco-innovation)⁷⁸

The circular economy can be applied to or contribute to each of these topic areas. **While there are, no specific projects focused on forestry, it may be possible to design projects that have to do with regional policy that is related to forestry and the circular economy.** Some existing projects already address the circular economy suggesting that there is the potential for further projects in this area. For instance, the Circular Economy for SMEs (CESME) project is an Interreg Europe project that “addresses SME inclusion in the circular economy, by interregional meetings identifying good practices aiming to examine how best regional and local authorities and business development agencies can improve relevant policy instruments and design support packages to assist SMEs to enter the circular economy.”⁷⁹ CESME is an example of interregional cooperation for policies and programmes related to the circular economy. A Systemic Approach for Regions Transitioning towards a Circular Economy (RETRACE) is another Interreg Europe project on the circular economy that “aims at promoting systemic design as a method allowing local and regional policies move towards a circular economy when waste from one productive process becomes input in another, preventing waste being released into the environment.”⁸⁰

The co-funding rate for Interreg projects is 85% or 75% (public or private bodies) and 50% for Norwegian partners. More information about Interreg Europe can be found on the Interreg Europe website at this link: <http://www.interregeurope.eu/projects/project-development/>

Other EU schemes: Erasmus +, COSME, LIFE

Erasmus+

Erasmus+ is a funding program of the European Commission for students and for vocational training. Its goal is to improve skills and knowledge and to develop entrepreneurship mind-sets and skills. Erasmus+ courses can be traditional courses or online (MOOCs). The co-funding rate for Erasmus+ is a per diem for staff that varies by country and lump sums to develop and run the course. There is the potential for courses to be developed on the circular economy and forestry as well as the circular economy in forestry in order to train entrepreneurs, forest managers, and students, among others. More information about the Erasmus+ programme can be found here: http://ec.europa.eu/programmes/erasmus-plus/node_en

Competitiveness of Enterprises and SMEs (COSME)

The Competitiveness of Enterprises and SMEs (COSME) programme supports entrepreneurship and the growth and competitiveness of enterprises and SMEs. It provides access to loan guarantees and risk capital while also helping enterprises reach new markets and reduce challenges associated with administration. Enterprises and

⁷⁷ European Commission (15/04/2014). European Regional Development Fund. Regional Policy: InfoRegio. Available from: http://ec.europa.eu/regional_policy/en/funding/erdf/

⁷⁸ Interreg Europe (March 2016). An Accelerator for regional development. Interreg Europe Secretariat. European Regional Development. European Union. Lille, France. Available from: http://www.interregeurope.eu/fileadmin/user_upload/documents/Interreg_Europe_brochure.pdf

⁷⁹ CESME – Interreg Europe (2016). Circular Economy for SMEs : Project Summary. Interreg Europe. Available from: <http://www.interregeurope.eu/cesme/>

⁸⁰ RETRACE – Interreg Europe (2016). A Systemic Approach for Regions Transitioning towards a Circular Economy: Project Summary. Interreg Europe. Available from: <http://www.interregeurope.eu/retrace/>

SMEs seeking to transition to the circular economy or new businesses can benefit from the COSME programme. More information about COSME can be found here: http://ec.europa.eu/growth/smes/cosme_en

LIFE

The LIFE programme is dedicated to environment, nature conservation, and climate action projects. It has funded more than 670 projects related to recycling, reuse, and waste reduction since 1992. In the 2014-2020 funding period, LIFE has already invested 100 million euros in roughly 80 projects related to the circular economy. The forestry sector could benefit from LIFE funding as forests are environmentally important, in need of conservation, and important for climate change mitigation. For more information on LIFE programmes, please visit the LIFE website at: <http://ec.europa.eu/environment/life/>

Smart specialisation strategies

All Member States have had to develop smart specialization strategies (S3), which are research and innovation strategies meant to promote regional innovation and economic growth. Member States have analysed their regional strengths and technologies and identified action areas. To achieve the objectives in their strategies, the regions must bring together businesses, public organizations, and education and research institutions. Member States then apply for funding to achieve their S3 strategies. As countries continue to develop their strategies, they should continue to include the development of a circular economy as a priority. Slovenia, for example, has already included the circular economy in its S3 strategy as a key foundational tenant for development moving forward.⁸¹ The Smart Specialization Platform helps regions implement their smart specialization strategies by fostering collaboration among regions (available here: <http://s3platform.jrc.ec.europa.eu/>).

The Circular Economy Finance Support Platform of the European Commission

The new Circular Economy Finance Support Platform is a joint initiative of the Commission, the European Investment Bank (EIB), National Promotional Banks, and institutional investors. It will also include Member State ministries, NGOs, and other interested stakeholders. **The objective is to “increase awareness of the circular economy business logic and improve the uptake of circular economy projects by investors”.**⁸² It is divided into three pillars:

1. *Coordination and awareness:* This pillar is about good practices sharing, analysis of circular economy projects needs and financing, advice, and activity coordination in regards to financing. This is the first pillar that will be tested.
2. *Advisory:* This pillar is about project development and bankability.
3. *Financing:* This pillar will examine whether there is the need for specific financing instrument for circular economy projects.

The Platform is still being developed and will become available to stakeholders in 2017. You can find more information about the platform [here](#).

Conclusion

Existing EU programmes such as Rural Development Programmes, Horizon 2020, COSME, and Interreg are already in place to support the transition to a circular economy. All that is needed are focused, creative applications.

As local and regional governments develop circular economy plans for their region, it is important that the forestry sector ensure that it is incorporated in these plans in ways that ensure the sustainability and profitability of the sector. Regions can include circular economy in their smart specialization strategies. Those regions that have many forests may consider including forests as a key component of the circular economy in their region.

For more information or to apply to any of these programmes, visit the links contained in the paragraphs above. Here we have presented the funding programmes we deemed most relevant for the circular economy, but there are other programmes available that may also be useful for funding projects on the circular economy.

⁸¹ Republic of Slovenia (August 2014). Smart Specialisation Strategy of the Republic of Slovenia. Available from: <http://www.sbra.be/sites/default/files/Smart%20Specialisation%20Strategy%20of%20Rep%20of%20Slovenia.pdf>

⁸² European Commission (26/01/2016).

For a list of additional EU programmes, visit the Programmes page of the European Commission by clicking [here](#).

While each of these European funding schemes can support the circular economy, businesses on the ground must also take steps to adopt circular economy principles. The final two sections present ways the circular economy might be applied in business either through innovative business models or product design.

2. INNOVATIVE BUSINESS MODELS SUPPORTING THE CIRCULAR ECONOMY

As businesses turn towards the circular economy, they will have to adopt novel business models. A few models already exist and can serve as starting points for both new and old businesses. These are:

1. Service- and function-based business models focused on the consumer
2. Collaborative consumption business models focused on sharing
3. Waste-as-a-resource business models that make waste productive

The sections below outline each of these business models and suggest how the model may be applied in the forestry sector.

Service- and function-based business models focused on the consumer

Service- and function-based business models focus on the functions a product serves to its consumer rather than the physical product itself (EEA 2016, Olundh and Ritzen 2001; Mont 2007). In this business model, maintenance and take-back agreements may be offered as services at the time of the product sale; users may be provided the option to lease, rent, share, or pool a product; or the product may serve to create a desired result in a setting (EEA 2016). In the forestry sector, this type of business model might include selling furniture with quality guarantees, providing product rentals, or guaranteeing the buy back of a product at the end of its life so that the wood may be reused in a new product or to produce energy.

Collaborative consumption business models focused on sharing

Collaborative consumption business models involve “sharing, swapping, bartering, trading, or leasing products and other assets such as land or time” (EEA 2016 page 16, Botsman and Rogers 2010). Demand is matched with supply often at the consumer-consumer level. The internet has allowed this sort of business model to expand. In the forestry sector, this business model could allow businesses to exchange materials, products, and services across the supply chain so that resources (material and intellectual) and or waste produced in one business could be used in another. Products, resources, materials, and technologies could be shared, rented, or leased between businesses. The risk for the forestry sector is a decline in demand for primary resources such as wood as resources are reused and recycled for a longer period of time. Sharing and renting, though, could reduce business costs by not requiring businesses to, for example, each buy a technology that could be shared.

Waste-as-a-resource business models that make waste productive

Waste-as-a-resource business models promote the use of one business’ waste as the input resource for another business or another activity within the first business. Such models create demand for secondary raw materials and promote industrial symbiosis, or the process by which activities are clustered locally to reduce waste. In the forestry and the forest supply chain, the waste produced from wood refining, for example, could be used to make energy or secondary products.

How to achieve success through innovative business models

In order for alternative business models to be successful in the forestry sector, innovative finance mechanisms and policy must be implemented to provide support for these models. Finance mechanisms could include changes in the way property rights are managed, systems that allow payments to be received and processed throughout a product’s life cycle rather than just at the beginning, and increases in taxes on businesses that damage the environment rather than higher taxes on personal income. Policy frameworks must be updated to accommodate the change in social, technological, and economic contexts that the shift to the circular economy will trigger. If policy does not protect against social disruptions caused by the circular economy, then the positive impact on the environment and economy triggered by this transition will be reduced.

3. NOVEL DESIGN FOR THE CIRCULAR ECONOMY

Key to the circular economy is the design of products that are made “with fewer resources, using recycled and renewable resources and avoiding hazardous materials, as well as with components that are longer lasting and easier to maintain, repair, upgrade and recycle” (EEA 2016:18). Product redesign and novel product design can reduce production costs, waste, and resource and energy consumption. The need for new products can create demand for new jobs and increase consumer trust in the quality and sustainability of the products and services they consume. For examples of novel product design, see the good practices from companies such as [3-Visjon AS](#), [Aldval Skurlag](#), [Mayr Melnhof Forsttechnik](#), and [GDi GISDATA](#).

Redesigned products can also be made to last longer and have a longer life cycle so that the products and the materials they are made of are reused in new products. Preparing a product for reuse will create employment as it requires “checking, cleaning, repairing or recovery operations” (EEA 2016). Wood based products that are not highly processed may be able to be reused easily. Wood incorporated into more complicated products will require more effort to reuse, but if economic incentives for reuse are high enough, then it may become economically viable to reuse the wood in these products as well. In order to ensure the competitiveness of reuse, policies on quality standards, warranty regulations, reuse networks, and reuse centers will need to be developed. In response to demand for policy for the circular economy, the European Commission developed the circular economy package discussed above. Businesses and researchers must continue to design new products and services in order for the circular economy to succeed.

E. RECOMMENDATIONS FOR THE CIRCULAR ECONOMY IN MOUNTAIN FORESTRY



At Euromontana’s October [2016 European Mountain Convention](#) on climate change, the organization committed itself “to encourage a circular economy in order to reduce waste and energy use and preserve limited natural resources”. Euromontana will continue to pursue this commitment in different sectors, including forestry, in order to facilitate the mitigation of and adaptation to climate change. At the November 29th, 2016 workshop in Skrad, Croatia on *Innovation and Circular Economy in Mountain Forest Supply Chains: How to Close the Loop?*, Euromontana took first steps towards this commitment. The workshop, organized by Euromontana and its member organization, PINS, a local development agency based in Skrad, Croatia, provided important inputs and good practices for this booklet. The workshop had four objectives:

- (1) to understand the policy framework supporting the circular economy,
- (2) to explore visions for a circular economy in the mountain forest supply chain,
- (3) to present tools, instruments, and processes to improve the circular economy in forestry, and
- (4) to facilitate the exchange of experiences and good practices, ideas and proposals.

The technical presentations and the good practices shared at the workshop informed the content of this booklet.⁸³

In conclusion, this booklet has built on the results of the workshop to further examine how the circular economy can be applied in mountain areas and specifically the forestry sector. Euromontana now awaits the adoption of the circular economy package by the European Parliament, a process that began in January 2017 and will continue in the future. The new legislative package combined with the EU Forest Strategy can help to establish a relevant framework for a more circular forest supply chain in mountain areas. In order to implement this new framework, an adequate toolbox for research, funding, governance, and knowledge sharing should be put at the disposal of the mountain actors. As such, **Euromontana proposes the following recommendations** to promote the circular economy in forestry and mountain areas:

- 1.) We recommend that the European Commission **develop more applied research and innovation** on circular economy in general and more specifically in the forestry sector. The H2020 calls for proposals for 2016-2017 include some possibilities to develop a more circular approach for food, blue-green innovation, soil and water resources, and industry. We welcome these opportunities. Nonetheless, we regret that forestry and bio economy more generally are not targeted. Thus, we encourage the inclusion of specific calls for proposals on the forest supply chain in the H2020 programme under Societal Challenge 2.
- 2.) **We recommend that funding be provided for SMEs so that they can adapt their businesses to align with circular economy principles.** EU, national and regional grants and financial instruments, including at the micro-level, could help SMEs in mountain areas transition to a circular economy. We recommend that at the EU level there be COSME calls more directly promoting adaptation towards a circular economy and that at the national and regional level authorities also support the transition to a circular economy, notably through the Cohesion Policy.
- 3.) Some of the Operational Groups of EIP-AGRI address circular economy issues. We recommend that **local actors seize the opportunity to participate in these groups** and to develop new Operational Groups specifically on the circular economy in forestry.
- 4.) We recommend **dialogue between all actors of the value chain.** The initial coordination of such a dialogue may be a task for regional authorities. While technology and tools that could be transferred to and applied within the circular economy in forestry exist, there is resistance within the sector to change and to adopt these tools. Dialogue is one way to overcome this resistance and plan for how to effectively and efficiently transition to the circular economy.
- 5.) Currently, EU Member States are defining national plans on the circular economy. We recommend that Member States **integrate specific support, funding and actions** for the circular economy in the forest sector and in mountain areas into their national plans. We also encourage Euromontana members to contact their Member States to make them aware of how mountains can contribute to the circular economy and to define adequate tools to be deployed in mountain areas.
- 6.) We recommend that the EU, Member States, and regions work together to **develop an integrated territorial approach** to the adoption of the circular economy, including inviting local stakeholders to the table. For example, the Lombardy Regional Entity for Services to Agriculture and Forestry (ERSAF) organized meetings and encounters in order to join stakeholders together in managing Lombardy's forests. The result was a series of set actions to be applied across the Lombardy region, Italy (see good practices [Forest Contract's](#) and [Integrated Management Processes of the Forests of Lombardy](#)). South Tyrol's efforts to assess the added value of regional production demonstrates the potential economic benefits of a territorial approach (see good practice from [South Tyrol](#) on the added value of regional

⁸³ The workshop was divided into three sections, an introduction with speeches by Croatian MEP, Jozo Radoš, Euromontana, and PINS; technical presentations; and a presentation and discussion of good practices. The technical presentations involved an analysis of the EU Circular Economy Package presented by Sarah Whitaker from Euromontana, a presentation on the circular economy and bioeconomy in mountain forestry by Ben Allen from the Institute for European Environmental Policy (IEEP), a discussion on circular economy and sustainable development by Saša Čegar from the Faculty of Economics at the University of Rijeka, and a presentation of EU funding opportunities by Marie Clotteau from Euromontana. Following the technical presentations, four speakers presented four of the good practices found in Part 2 of this booklet. They provided examples of how the circular economy is being practically applied across Europe. Speakers came from Italy, Finland, and Croatia. These presentations and the discussions that followed provided inspiration for this booklet and the final recommendations you will find below.

production). A territorial approach will also allow for the better identification of legal and policy barriers to the adoption of the circular economy.

- 7.) Good Practices are being implemented across Europe. The opportunity to share knowledge and experience from these good practices would allow diverse actors to understand how to move concretely towards a more circular economy and how to transfer these good practices to other territories. While some existing Interreg Europe projects are already collecting good practices, they are doing so only at the project level. Thus, **we recommend that the European Commission develop a platform to share good practices in the circular economy**. This platform should be divided by subjects (forestry, agriculture, waste, water, etc.), by types of actors implementing the actions (SMEs, regional authorities, farmers, etc.), and by geographical area (urban, rural, mountain, remote, etc.). The European Commission recently announced a [Circular Economy Finance Support Platform](#). We hope that the platform will help in achieving our recommendation.
- 8.) Euromontana should contribute to the above effort and **collect and share good practices** and exchange experiences in the circular economy in mountain areas, including for the forestry sector.
- 9.) **Developing skills and raising awareness** about the concept of and practical adaptation to a circular economy is as important as providing tools. Thus, we encourage universities and training institutions, especially our members in mountain areas, to develop adapted educational programmes for students to educate students and professionals about the circular economy in mountain areas. The creation of a MOOC on circular economy in mountain areas applied to different sectors, such as forestry, tourism, agriculture, etc., could be an interesting Erasmus + project to be developed further with our members.
- 10.) **Stimulate the market** in ways that promote the circular economy, encourage the use of wood more generally in the market, and specifically encourage the adoption of the circular economy in the forest sector through sensibilization and awareness raising. For example, stimulate the market for endogenous wood. Here, public authorities can play a leading role, for example through procurement rules that prioritize construction with endogenous wood and wood products. Part of this process would be strengthening the wood processing economy, for example by promoting SMEs such as [Aldval Royal](#) that produces environmentally friendly wood products in a rural area. Another way to stimulate the market to promote the circular economy would be to encourage the use of labels in a way that creates more transparency for consumers.

The work of South Tyrol on the added value of regional supply chains is an example of how research can help raise awareness and produce convincing data showing the economic benefits to the forestry sector of regional supply chains. Improving accessibility to forests can also stimulate the market. Mountain areas provide physical challenges such as steep terrain that make it hard to access forests and extract resources. Companies such as [Mayr Melnhof Forsttechnik](#) are leading the way in designing technology that allows for efficient wood extraction in mountain areas.

If adopted, these recommendations could help promote the circular economy in forestry and in mountain areas more generally. Euromontana will continue to work towards the transition to a circular economy in mountain areas in order to promote living mountains for current and future generations.

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PART II

Collection of good practices in forestry and circular economy

Part II presents good practices in innovation and circular economy in forestry divided into four parts.

A: INNOVATIVE PRODUCTS IN FORESTRY AND CIRCULAR ECONOMY

This section is dedicated to good practices in product design and labelling. These companies, as with the companies in Section B, have found that adopting a circular approach can be profitable.

1. **3VISJON AS, DREVSJØ (NORWAY) AND IDRE (SWEDEN):** Small environmentally friendly wood building elements
2. **ALDVAL ROYAL, ALDVAL SKURLAG COMPANY, NORWAY:** Environmentally friendly and long-lasting wood impregnation product and method.
3. **CABLE CRANES AND ECONOMY IN SKYLINE AREAS, MAYR MELNHOF FORSTTECHNIK, AUSTRIA:** Cable yarding, carriages, and cranes for timber harvesting in mountain areas.
4. **MONITORING AND MANAGING FORESTS WITH GDI SOLUTIONS, GDI GISDATA D.O.O, CROATIA:** Use of graphic device interface to monitor forests.

B: INNOVATIVE EXAMPLES OF THE CIRCULAR ECONOMY IN THE FOREST SUPPLY CHAIN

This section contains examples of organizations and companies reimagining the forest supply chain for the circular economy, for example through using secondary materials as primary inputs for their business or creating local supply chains to reduce transport costs and waste.

5. **GRANULATION OF BIOASH, RAKEISTUS COMPANY, FINLAND:** Granulation of bioash for use as fertilizer in forests.
6. **PROJECT BIOEUPARKS, ITALY:** Development of a local biomass supply chain to provide energy for the Sila Park structures.

C: GOVERNANCE AND RESEARCH IN FORESTRY AND CIRCULAR ECONOMY

This section presents examples of innovative governance of forests and forest resources and of research projects in forestry.

7. **FOREST'S CONTRACTS:** an instrument of development and participatory management, Italy: Agreement of participatory management for the Lombardy region forests.
8. **INTEGRATED MANAGEMENT PROCESSES OF THE FORESTS OF LOMBARDY, ITALY:** Integrated process of multifunctional and sustainable exploitation of forests in the Lombardy region.
9. **COMPARING THE ADDED VALUE OF DOMESTIC TIMBER PRODUCED AND PROCESSED IN DIFFERENT SUPPLY CHAINS IN SOUTH TYROL, ITALY:** Study on the added value of the regional processing and valorization of three production chains.

D: LOOKING FORWARD: NEW PROJECTS IN FORESTRY

This section presents two projects in governance and supply chain management for the circular economy in forestry. The projects are just beginning and results are forthcoming.

10. **LAW AND ORDER IN THE FOREST SUPPLY CHAIN, CROATIA:** Project objective is to incorporate private forest owners into the forest supply chain.
11. **EU STRATEGY FOR THE ALPINE REGION (EUSALP) SUB-GROUP « ALPINE WOOD », ITALY, SLOVENIA, FRANCE, GERMANY, SWITZERLAND:** Transnational and integrated management of forest services, resources, and management.

3-VISJON AS
Drevsjø in Engerdal municipality | Hedmark County Council
Norway

PROJECT NAME

3-Visjon AS / 3-Visjon AB.

CONTACT PERSON AND ORGANIZATION

Organization: 3-Visjon AS, Tretorget AS

Contact: Jarle Mosshäll, Ola Rostad (ola@tretorget.no; tel: +47 91153636).



LOCATION AND DURATION OF PROJECT

Drevsjø (Norway) and Särna (Sweden)

Established: 23rd August 2012

WEBSITE

www.3-visjon.no

www.idrebyggsservice.se

ABSTRACT

The company produces small building elements that are environmentally friendly. The elements can be assembled in such a way that the architectural design either complies with a traditional log-building or a more modern funkis-style, and, in both cases, fulfills all new regulations for modern buildings. The construction methods used by the company do not involve plastic and the insulation is made of wood so that the final construction is open to air diffusion and breathes, providing an excellent indoor climate.

KEYWORDS

Sustainable, breathing building system made of wood.

CONTEXT

The entrepreneur (Mr. Jarle Mosshäll) has a long history of experience in the building sector. He is especially experienced in building with wood. He identified a need to industrialize the production of wood building elements and so he sought help from the Tretorget business incubator and began an industrial building elements business in Drevsjø in Engerdal, Norway where the local sawmill had been closed down shortly before.

The project has brought the following benefits to the community:

- Development of an environmentally friendly building system with small elements.
- New jobs and local value creation.

MAIN OBJECTIVE

Modernizing the production and assembly of traditional breathing wood house-construction as a competitive and sustainable alternative for the future.

TARGET GROUP

Companies selling houses and cabins, companies looking for an alternative to traditional structural work.

PROJECT ACTIONS

Support from the Tretorget business incubator (finding the best competence, making a business plan, negotiations with the municipality and other businesses, financing).

INNOVATIVE RESULTS AND IMPACT

The building system is innovative because it is both environmentally friendly and modern in design, while based on traditional principles.

The newly installed production machinery is a simple, but efficient manufacturing line for the actual elements. The main parameters for the elements can easily be varied in such a way that different architectural solutions can be achieved.

A company with this production is established in Drevsjø, and a sister production is being established on the other side of the border, in Särna, municipality of Älvdalen, Dalarna, Sweden – close to the Norwegian border.

FINDINGS

The project found that:

- Skilled entrepreneurs that are open-minded and take advice from other persons with complementary competence can create novel products.
- Endurance is needed in order to transform an idea into an innovative product.
- Building legislations can hinder innovation (breathing constructions are not pre-qualified).

CHALLENGES AND PLACES FOR IMPROVEMENT

It is tough to establish a new company, and financing is troublesome. Delayed income is common and has been a major challenge for the company. It also takes time for a new product to become accepted in the market. Funding systems (bank and governmental support) are not designed for innovative projects, and this makes establishing new industrial production systems extremely challenging for an entrepreneur.

TRANSFERABLE LESSONS

It can be hard for an entrepreneur to establish new industrial productions in rural areas, with limited financial resources and few other companies with whom to cooperate. In this case, cooperation with business incubators in both Norway (Tretorget) and Sweden (Dalarna Science Park) has been of great help. The distance to the business incubators (150-300 km) has been overcome by a combination of personal meetings and extensive use of electronic communications.

SOURCE(S) OF FUNDING FOR THE PROJECT

- Private (the entrepreneur)

- Innovation Norway (funding for developing projects)
- Tretorget (business incubator services)

INTELLECTUAL PROPERTY

None.

PROJECT NAME

“Alvdal Royal” from the company Alvdal Skurlag AS.

CONTACT PERSON AND ORGANISATION

Roar Voll, Alvdal Skurlag AS, roar@alvdalskurlag.no



LOCATION AND DURATION OF PROJECT

Alvdal, Hedmark, Norway

Established: 1955

WEBSITE

<http://www.alvdalskurlag.no/>

ABSTRACT

Alvdal Royal is an innovative wood treatment method that combines the use of oils and a drying process. This results in products with a very long life and limited maintenance requirements. Alvdal Royal can be supplied as clear oil, or in the colors brown, dark brown, red or ocher - all supplied with UV protection.

KEYWORDS

Environmentally friendly treatment, impregnation of wood.

CONTEXT

The product emerged in response to a need for a new and more environmentally friendly impregnation method that would allow products to last longer without being harmful to consumers and the environment. The company closed their sawmill in 2010 and there was a need for new and more products for the company so that it could remain open and solvent.

MAIN OBJECTIVE(S)

To develop a new and more environmentally friendly impregnation method and product and to find new and more products for the company so that the company could stay active and continue to provide employment in the community. The impregnation is without toxic metals and can be delivered in a lot of colors. No further painting is needed.

TARGET GROUP

Distributed primarily for the Norwegian market. Both for professionals and DIY (Do It Yourself). Used for wooden terraces, cladding on walls and ceilings.

PROJECT ACTIONS

The project involved developing a good impregnation process and learning how to operate the process. The product then had to be marketed and new products developed from the new process. These new products include wooden roofs and wooden shingles and shakes, all made of Alvdal Royal. Finally, the company invested in a new production line for increasing production.

INNOVATIVE RESULTS AND IMPACT

The project developed a new and more environmentally friendly impregnation method and new and more products for the company. The environmentally friendly method ensures that the impact of using the product is minimized and that the impregnated materials last longer, reducing waste. The combination of materials in different colors and an impregnation without toxic metals gives the product an advantage in the market. The project created jobs in the company after the saw mill closed and created value by producing a new process and product. The project saw an excellent return on investment. The project is both innovative, in terms of product design, and contribute to the circular economy through the production of long-lasting and environmentally friendly products.

FINDINGS

The impregnation process and associated products have met with success on the market. The company can stay in business and continue to sell its innovative products.

CHALLENGES AND PLACES FOR IMPROVEMENT

The project ran into difficulty with establishing routines to control the process so they could guarantee the same quality from batch to batch. This has been solved in cooperation with external expertise. External expertise has also been used to introduce LEAN-tools to manage the processes. The collaboration is an example of how organizations can work together to innovate for the circular economy.

TRANSFERABLE LESSONS

By combining a tradition of making impregnation products with new qualities (environmental friendliness), the company opened up new markets. It takes time to establish a process that provides the same quality (e.g. color) from batch to batch, but the return on investment is worth the input.

SOURCE(S) OF FUNDING FOR THE PROJECT

Private (Alvdal Skurlag AS). Some investment (from Innovation Norway) to develop new products.

INTELLECTUAL PROPERTY

Yes. If you are interested in using the product, please contact the company.

CABLE CRANES AND ECONOMY IN SKYLINE AREAS

Mayr Melnhof Forsttechnik Company
Frohnleiten, Austria

PROJECT NAME

Cable cranes and economy in skyline areas.

CONTACT PERSON AND ORGANIZATION

Company: Mayr Melnhof Forsttechnik.

Contact: Mr. Johannes Loschek

MM Forsttechnik GmbH

Mayr-Melnhof-Straße 9 8130 Frohnleiten, Austria

T: +43 3126 5099 0

F: +43 3126 5099 4068

E: office@mm-forsttechnik.at



LOCATION AND DURATION OF PROJECT

Frohnleiten, Austria, on-going.

WEBSITE

www.mm-forsttechnik.at/en/

ABSTRACT

Forestry activities in mountainous areas must overcome the challenges posed by steep terrain. Forsttechnik develops innovative forestry machinery for cable yarding in steep terrain.

KEYWORDS

Forest technology, cable yarding, mountainous terrain.

CONTEXT

The Mayr-Melnhof-Saurau family has worked in the forest sector for generations. Today, its company is the largest private forestry business in Austria. Its woodlands are mostly in mountainous regions, which naturally present special challenges for managing forestry efficiently and at the same time sustainably.

It's therefore no surprise that the family began early on to reflect on adapting timber harvesting technology for its own purposes – and began to develop its own solutions. The focus was the development of forestry machines for timber extraction in mountainous terrain. By using this machinery in the company's own operations it was continuously tested, adapted and optimised in a harsh working environment at an average gradient of 63%.

These efforts were so successful that other forestry companies started to take note and, as a consequence of the constantly increasing demand, a separate company was set up in 2007: MM Forsttechnik GmbH. They concentrate exclusively on continuing and developing the expertise for cable technology in forestry that they started building up in the 1960s. Forsttechnik has responded to the need for technology that allows for the

sustainable extraction of wood from forest areas. (Source: <http://www.mm-forsttechnik.at/en/ueber-uns/ueber-uns.php>)

MAIN OBJECTIVE

To develop technology for the economical and ecologically friendly extraction of timber from mountainous regions.

TARGET GROUP

Forestry sector operating in mountainous regions.

PROJECT ACTIONS

The company's techniques and procedures successfully bring the two most important aspects of forestry into harmony:

- **Economy:** low timber harvesting expenses thanks to rapid extraction (transport) from the logging site to the road network
- **Ecology:** low-impact timber transportation using environmentally-friendly and energy-saving machines with minimal damage to the remaining forest and young growth.

Our TÜV-tested cableway machines can be used flexibly and meet the highest safety standards. They work uphill, downhill or on the flat with variable tractive force and can be installed on a range of different vehicles. It is, therefore, with good reason that they are technological market-leaders in Europe and are in use successfully all over the world.

INNOVATIVE RESULTS

The company has developed cable yarding technology such as:

- 1.) The MM-SHERPA® is a universal carriage for the transport of timber or other materials. The remote control has the advantage that the carriage can be fixed at any position of the skyline and the load can be held at any height above ground. This kind of operation enables a most efficient but gentle loading of timber on different carriage positions, even while pulling the load to a line, as well as an exact landing on the storage. All MM-SHERPA® - types are equipped with a mainline breakshelter.
- 2.) The SYNCROFALKE® is an all-terrain cable yarder, which allows working uphill, downhill and in flat terrains with highest performance. The cable yarder can be remotely controlled, gently loads timber, can work at up to 900 meters, and has a high timber output.
- 3.) The WANDERFALKE® has been developed for yarding small or medium sized timber and can also be used for thinning. It has a skyline range of 700 meters and can pull load two to three tons.

These products are innovative as they are specifically designed for mountainous areas where steep and uneven terrain make timber extraction difficult. They can contribute to the circular economy in forestry by allowing for more sustainable and environmentally friendly wood extraction.



Source: MM Forsttechnik GmbH website

FINDINGS

The above technologies allow timber to be extracted economically and sustainably from forests in mountain areas.

IMPACT

The business is successful and sees continued demand for its products.

CHALLENGES AND PLACES FOR IMPROVEMENT

Not Available.

TRANSFERABLE LESSONS

Not Available.

SOURCE(S) OF FUNDING FOR THE PROJECT

Private investment.

INTELLECTUAL PROPERTY

Yes. Please contact the company for additional information.

MONITORING AND MANAGING FORESTS WITH GDI SOLUTIONS

City of Zagreb | Zagreb
Croatia

PROJECT NAME

Monitoring and managing forests with GDi solutions.



CONTACT PERSON AND ORGANIZATION

Ivan Lukić, GDi GISDATA d.o.o., Zagreb

LOCATION AND DURATION OF PROJECT

Croatia, on-going project.

WEBSITE

www.gdi.net

ABSTRACT

Through the use of different technological solutions and platforms based on spatial data, GDi solutions contributes to the efficient management of forest assets. GDi solutions assist in forest management through monitoring, data analysis, and planning.

Geographic information systems (GIS) integrate many different data sources - field work, UAV data collection and satellite imagery – to provide rapid and accurate estimations of forest conditions. With these estimations in hand, forest managers can assess the state of their forests and ensure forest health. Easy to use tools in the hands of experienced foresters are a powerful solution for saving our planet and its great resources.

KEYWORDS

GDi, forest monitoring, UAV, drones, satellite imagery, forest condition, forest health.

CONTEXT

Forests are already very important renewable resource. As demand for renewable resources increases in the future, forests will have to be managed to maximize output while ensuring forest sustainability. To effectively manage a forest, keep it healthy, support the provision of ecosystem services, and ensure that the maximum benefit is obtained from forest resources, it is necessary to understand the state of the forest. Often, foresters do not know the condition of their forests. At the same time, forests face many threats from diseases, pests, climate change, deforestation, pollution, etc. GDi believes that a quality monitoring system that collects data from different sources and places them in one geo-enabled database will allow for more efficient and effective forest management. While some data is already available, we need fresh data to help forest owners and government officials monitor the state of the forest and software solutions that will automatically indicate problematic areas. Such a monitoring system will ensure that valuable forest resources at the beginning of the supply chain are managed in a way that ensures the maximum amount of benefit in the future in terms of primary resource output and in terms of ecosystem services provision.

MAIN OBJECTIVE

To establish a forest monitoring system that:

- Improves inventory
- Improves land administration
- Improves sustainable forest planning
- Better the management of timber exploration

TARGET GROUP

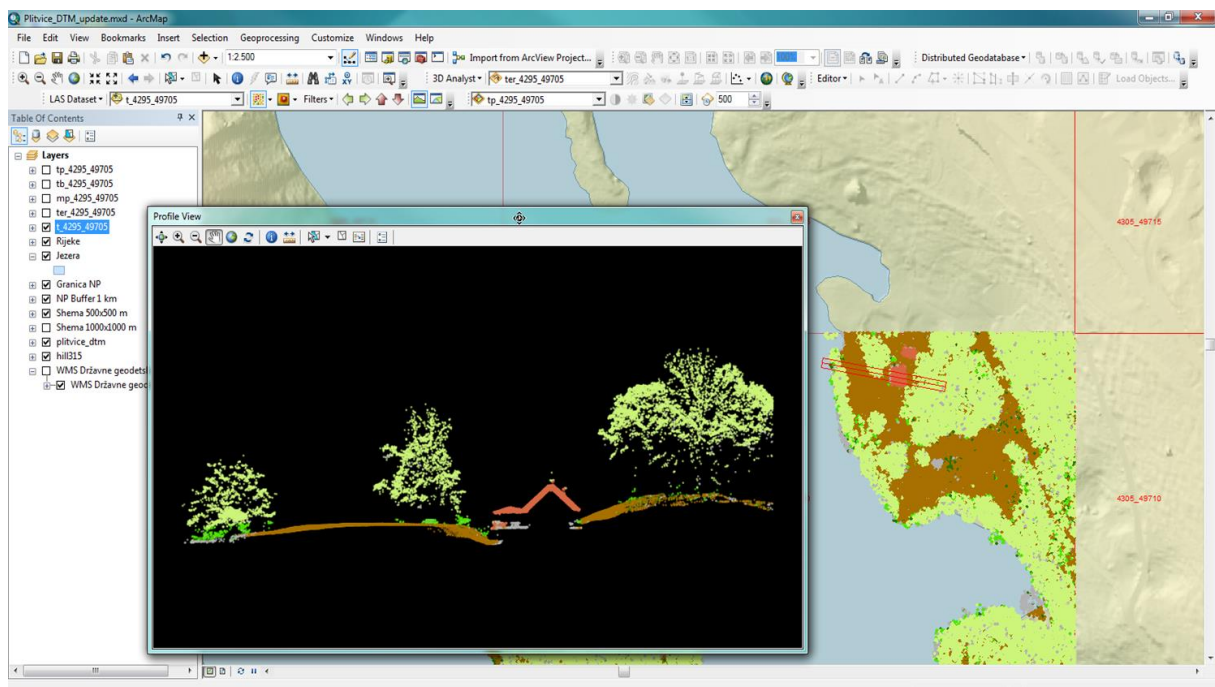
Forest managing companies – private and state owned, national and nature parks, protected areas.

PROJECT ACTIONS

GDi integrates various types of forest related data into existing GDi software solutions and then provides analysis of the data and collection of new data from imagery.

INNOVATIVE RESULTS AND IMPACT

Novel software solutions and new data collection techniques bring many advantages and improvements to the existing forest monitoring systems. Such systems allow forest management decisions to be made based on facts, not guesses about the state of the forest. The benefits of these solutions are: fast and accurate decision making, monitoring in real time, assistance in the management of forests all along the forest cycle, and cost optimization. Through LIDAR technology, for example, forests structure, composition, and health can be assessed from the air using scans. The product is a 3-dimensional image of the forest which can be used to assess the content and state of the forest in order to make forest management decisions.



Source: Ivan Lukić, GDi GISDATA d.o.o., presentation at workshop Innovation and Circular Economy in Mountain Forests, 29/11/2016.

The technological solutions provided by GDi allow for better forest management which in turn results in faster growing, healthier, and productive forests that can provide primary resources and ecosystem services. Additional benefits include strong support in the monitoring process (provided by GDi), fact based decision making, resources management in real time, and crisis management support.

FINDINGS

Not Available.

CHALLENGES AND PLACES FOR IMPROVEMENT

Many foresters are not ready for the new technological tools provided by GDi. They are also not including the technology in their budget plans. Even if they recognize benefits of the solutions, they may not have funds to implement the technology.

GDi hopes to educate the forestry sector about the benefits of using the new technology and data analysis and, in so doing, help the sector do its every day work more efficiently.

TRANSFERABLE LESSONS

The use of GDi software solutions bring benefits to foresters no matter the country and area where they operate.

New technology brings more efficient and accurate tools for forest management and monitoring.

Many different data sources about forest conditions enable more relevant inputs for management and monitoring tasks, but the sector has to be made to understand these benefits and trained to use the new tools.

SOURCE(S) OF FUNDING FOR THE PROJECT

Not Available.

INTELLECTUAL PROPERTY

GDi software solutions and tools. Please contact the company for more information.

GRANULATION OF BIOASH
Rakeistus Company
Northern Ostrobothnia, Oulu, Finland

PROJECT NAME

Rakeistus: Granulation of Bioash

The logo for Rakeistus, featuring the word "rakeistus" in a bold, green, lowercase sans-serif font.

CONTACT PERSON AND ORGANIZATION

Company: Rakeistus
Contact: Rakeistus Oy, Sakari Kiviniemi
E: sakari.kiviniemi@rakeistus.fi
T: +358 400 218 775.

LOCATION AND DURATION OF PROJECT

Finland, Oulu. Project has been completed and the granulator is running.

WEBSITE AND SOCIAL MEDIA

www.rakeistus.fi

ABSTRACT

The Stora Enso of Oulu, Finland site granulates bioash and spreads it on forests as fertilizer. The Rakeistus company is the only company in Europe that concentrates on the building of bioash granulators and the granulation of bioash.

KEYWORDS

Bioash, reuse of energy waste, fertilizer, circular economy.

CONTEXT

Bioash is a byproduct of energy production and paper and pulp company productions. Bioash originates from the burning of biomass, such as wood or peat. It contains useful nutrients such as Phosphorus, Potassium, and Calcium. In Finland, 650,000 tons of bioash are made each year. Of this, 500,000 tons is lost. By 2020, it is estimated that 1 million tons of bioash will be produced each year. Powerplants and paper and pulp companies have to dispose of bioash in dumps, an expensive process due to the rules of the 2011 EU waste directive. Dumping bioash is also a waste as bioash can be productively recycled through granulation.

MAIN OBJECTIVE

Powerplants and paper- and pulp companies burn biomass and produce bioash. This company takes discarded bioash and turns it into granules which can be used as fertilizer. The challenge was to develop a process to effectively convert bioash into a useful product.

TARGET GROUP

Forest owners and managers.

PROJECT ACTIONS

The company granulates bioash in so doing turning a waste into a resource. The granulated bioash can be used as a fertilizer for forests and in technical constructions, such as under roads. The company builds granulators in Finland Oulu. The company is happy to share their knowhow in bioash granulation and granulator plant construction.

INNOVATIVE RESULTS AND IMPACT

The company found a cost-efficient way to handle bioash in so doing reducing waste produced by energy and pulp and paper production. The granules can then be used to fertilize forests as an environmentally friendly alternative to chemical fertilizers. The company also actively participates in research on bioash granulation with two universities in Finland so that the company can remain up to date on the newest technologies.

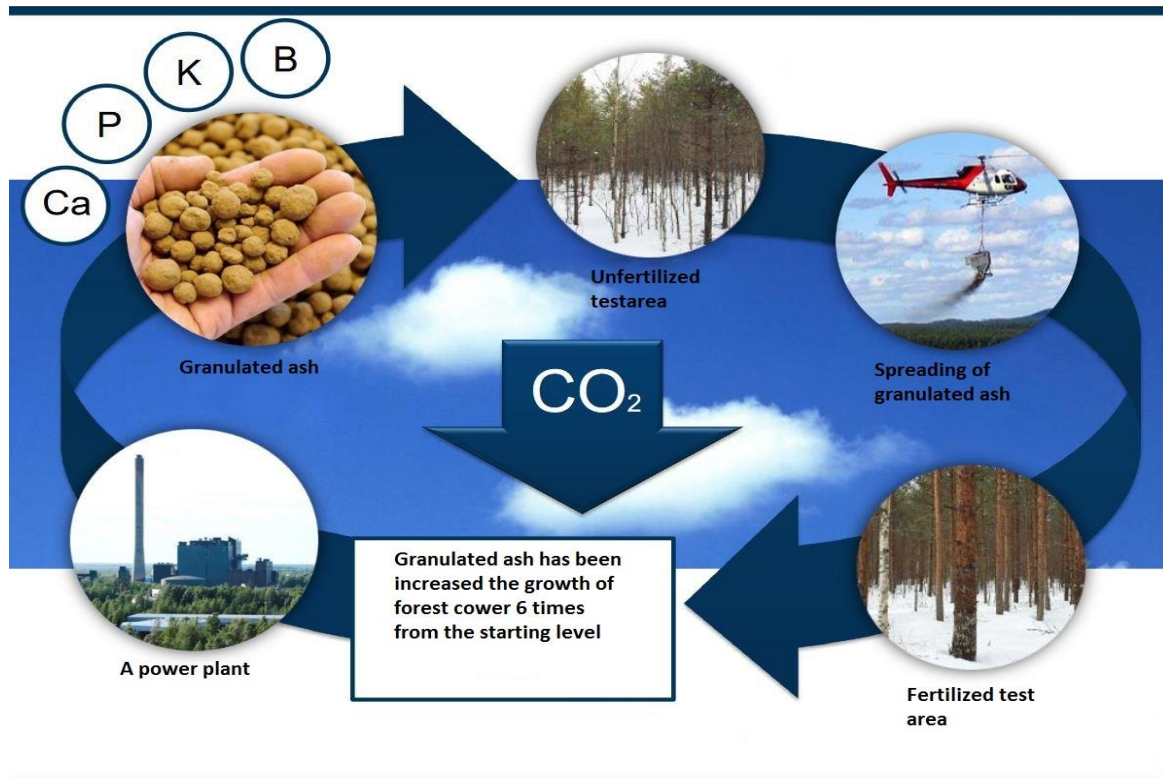
FINDINGS

Customers are satisfied with the bioash granules and use them as fertilizer. Fertilized forests grow faster and taller than non-fertilized forests. This means they are more productive and can provide more forest products and ecosystem services than non-fertilized forests. The fertilizer is environmentally friendly.

The company is promoting the circular economy by turning a secondary resource from two industries into a primary resource for a third. In so doing, it is reducing waste. At the same time, the company is producing a product that can be returned to the forest to boost growth and promote forest well-being. In turn, the forest is more productive. As forests are a primary and renewable resource, a healthy productive forest is crucial for a circular forest supply chain.



In picture above, the forest on the left was fertilized with bioash granules and the forest on the right was not. The forest on the right grew taller and faster. (Source: Kiviniemi, *Rakeistus: Granulation of Bioash*, November 29th, 2016)



Source: Sakari Kiviniemi, Presentation on 29/11/2016 at Innovation and circular economy in mountain forest supply chains workshop, Skrad, Croatia

CHALLENGES AND PLACES FOR IMPROVEMENT

Not Available.

TRANSFERABLE LESSONS

Any low use natural production could be a mine of richness if we change our point of view.

SOURCE(S) OF FUNDING FOR THE PROJECT

Not available.

INTELLECTUAL PROPERTY

Not Available.

PROJECT BIOEUPARKS

Sila National Park Calabria, Italy

PROJECT NAME

Project BioEUParks, Socio-Economic and Environmental Responsible Models for Sustainable Biomass Exploitation in European Protected Areas, Sila National Park



CONTACT PERSON AND ORGANISATION

Organizaton: Sila National Park, Italy
Contact: Engineer Domenico Cerminara

LOCATION AND DURATION OF PROJECT

Sila National Park in Italy /3 years.

WEBSITE

https://www.facebook.com/Parco-Nazionale-della-Sila-165416980476/?ref=aymt_homepage_panel

http://www.bioeuparks.eu/files/bioeuparks/documents/d.1.2_bioeuparks_publishable_report.pdf

www.bioeuparks.eu

ABSTRACT

The project sought to reuse biomass in the Sila Park protected area. The Sila Park, as all the other Parks involved in the BioEUParks project, developed and set up a local biomass supply chain changing the pre-existent final destination of the park biomass from outside the park to inside the park. In so doing, it contributed to the creation of an economically and environmentally virtuous circle in the Park area and nearby.

KEYWORDS

Biomass, Protected Area, Stakeholders, Development sustainable economies

CONTEXT

Sila National Park protects 73.695 hectares of great environmental interest. About 80% of the Park territory is covered with forests (about 60.000 hectares) composed primarily of conifers and hardwood forests. Before the project started all the biomass produced within the park area was burned in the big scale electric power plants of Crotona and Cosenza, Italy. The plants, of average dimension of 35MWe /40MWe, are located 70-80 km away from the biomass harvesting area and are characterized by low efficiency and high environmental impact both for the air and for the waters used to cool the plant. The energy produced is put into the national network and does not benefit local consumers. This situation causes social conflicts against the plants owners and in general against the use of biomass for energy. The BioEUParks project sought to address this problem by burning the biomass harvested in the Park within the Park, in so doing reducing the current environmental footprint associated with the transport and burning of the biomass outside the Park.

MAIN OBJECTIVE(S)

The project had three primary objectives:

1. To heat public buildings inside the park with wood biomass obtained through the maintenance of protected areas;
2. To heat the offices of the park administration with wood biomass from the park area;
3. To produce wood fuels and sell them to inhabitants inside the Park.

TARGET GROUP

Park administration, forest owners, inhabitants of the Italian region of Calabria.

PROJECT ACTIONS

The project developed a local biomass supply chain within Sila National Park. To do so, it involved key actors from the territory including forest cooperatives, farmers, associations, etc. and presented them the potential opportunities involved in activating a local and sustainable supply chain. The project then identified boilers located in the Park territory, for example in restaurants, hotels, and farms. This initial phase found that forest cooperatives were interested in supplying local industries, but that there wasn't enough demand locally. Therefore, the Park decided to act as the end user in the supply chain and converted its boilers from oil powered to biomass powered. Now that the supply chain is set up, there is the potential to expand the number of end users.

INNOVATIVE RESULTS AND IMPACT

The creation of the supply chain in the Sila National Park area built a closer connection between local consumers and biomass harvesting areas, gave a more transparent image of the territory, and consequently stimulated local economies. The Park developed a Green Procurement Model for selection of the pellet provider, an example of excellence in how public authorities could play an active role in promoting short range and sustainable biomass supply chains.

Furthermore, the creation of local supply chains implied **reducing distances for the transport of feedstock** and **decreasing CO2 emissions**. Other important effects include:

- the reduction of "intermediaries" involved in the process, leading to a fairer distribution of the added value among the players and to a better remuneration for biomass producers;
- the sustainability of the production phase, improving the inclusion of local producers in the social context and reducing risks of conflict with the population;
- the promotion of new local markets, creating new jobs along the supply chain, slowing down rural depopulation, and improving local skills related to harvesting, processing and transport of wood.

FINDINGS

The project achieved the following:

- The **introduction of wood biomass** which replaced LPG and diesel fuels;
- **Changing the destination of biomass**: a part of the biomass stored by local producers has been addressed to small plants located within the Park area rather than big thermal power plants outside the Park;

- The **creation of an economically virtuous circle** within the Park thanks to the establishment of a biomass Purchase Group that seeks to improve cooperation among territorial stakeholders even after the end of the project;
- Increase in the **added value of forestry and agriculture** subproducts.

CHALLENGES AND PLACES FOR IMPROVEMENT

The project faced challenges in diverting biomass from the existing large power companies to local consumption because most local forest cooperatives are tied with contracts to the existing energy plants.

TRANSFERABLE LESSONS

This project was created in a network with other European Parks, universities and associations and can serve as a model for other areas seeking to establish local biomass supply chains.

SOURCE(S) OF FUNDING FOR THE PROJECT

European resources 2012 of the AEI (Executive Agency for competitiveness and innovation); PROGRAMME ALTENER Intelligent Energy Europe

INTELLECTUAL PROPERTY

Yes. Please contact the Park and project for more information.

MORE INFORMATION

The Project BioEUParks: Socio-Economic and Environmental Responsible Models for Sustainable Biomass Exploitation in European Protected Areas is a European Project that occurred across several European Protected Areas. The following areas were involved:

- 1.) Sila National Park, Italy
- 2.) Rodopi National Park, Greece
- 3.) Kozjanski Regional Park, Slovenia
- 4.) Danube-Ipoly National Park, Hungary,
- 5.) Sölk-täler Nature Park, Austria

Detailed descriptions of the process of biomass exploitation in each of these parks can be found in the project results document available here:

http://www.bioeuparks.eu/files/bioeuparks/documents/d.1.2_bioeuparks_publishable_report.pdf

For each project, the booklet outlines the ex-ante condition, the main problems and barriers, the overcome strategy, and the obtained results.

Forest's Contracts: an instrument of development and participatory
management
Lombardy Region Forests | ERSAF
Italy

PROJECT NAME

Forest's contracts: an instrument of development and participatory management

CONTACT PERSON AND ORGANISATION

Organization: Regional Entity for Services to Agriculture and Forestry (ERSAF), Lombardy Region, Italy

Contact: Calvo Enrico, Piccardi B., Nastasio P., Ossola F., Andreani F., Buzzetti I., Comini B., Giumelli G., Guglini M., Rapella A., Rovedatti L., Richini A.

LOCATION AND DURATION OF PROJECT

Lombardy Forests in the Lombardy Region, Italy, 2004-2016.

WEBSITE

www.ersaf.lombardia.it

<https://www.facebook.com/ersaf.lombardia/>

ABSTRACT

The Lombardy Region is the owner of 20 forests covering 23.000 ha, FSC and PEFC certified. In 2005, ERSAF signed with Lombardy region municipalities and partners, a Regional Forests Charter, with 16 commitments for the shared management of the region's forests.

As part of the Charter is the "Forest's Contract", an agreement signed for each forest by stakeholders interested in building a permanent place of confrontation, elaboration, promotion and implementation of actions aimed at the local development.

The Forest's Contract is a tool:

- Of participatory management for the promotion and the implementation of actions aimed at the unitary development of a territory;
- Of governance for local development that is founded on the concerted effort and on the subsidiarity of various levels of government;
- Of sharing and unitary management of development policies, strengthening networks of relationships among partners and stakeholders;
- Of integration, for a wider area than a single forest and of policies in the environmental and territorial field.



The Forest's Contract operates through a periodic work table of evaluation and shared decision making regarding various actions of development and territorial promotion.

KEYWORDS

Contracts, participatory management, governance.

CONTEXT

In an effort to promote local partnership and the sharing of tools for forest property management, the Lombardy region signed in October 2004 the "Charter of the Forests of Lombardy - for the sustainable management and sustainable development of forests and pastures of Lombardy".

The Charter lays out guidelines for a model of development and asset management of regional forests and is based on the principles of partnership and participation of local communities in territorial.

The Charter specifically identifies an operational tool, "The Forest Contract", to be subscribed to by each regional forest. The contract is between the regional administration and local public and private stakeholders and is an effort to build a permanent place of confrontation, processing, promotion and implementation of actions aimed at local development. The contract is an agreement between public and private entities for the development of the territory containing the Lombardy region forests and the surrounding area. The contract seeks to use the regional forest as a development tool.

MAIN OBJECTIVE(S)

The aims of the Forest's Contract are:

- to form and strengthen local partnerships;
- to promote actions that enforce the communal programs of the partners;
- to develop/increase the agro-sylvo-pastoral activities;
- to protect and improve the natural and cultural heritage of the region;
- to promote a sustainable and conscious use of forests;
- to improve the employment and the economic development of the area;
- to guarantee an adequate divulgation and promotion of the areas and of the activities carried out in the region;
- the integration of vision, governance, and policies;
- the building of networks between partners;
- the coordination of resources and the development of synergies and a global and unified vision;

TARGET GROUP

The communities in the territories where the Lombardy forests are located, including municipalities, forest and agricultural businesses and organizations, schools, local associations, etc.

PROJECT ACTIONS

The Contracts have three levels of action:

- Actions aimed at creating community agreement, facilitating the exchange of knowledge, and promoting sharing, cooperation, development, and planning;
- Specific actions for the implementation of interventions in the various sectors of interest (forests, pastures, tourism, biodiversity, etc.);

- Actions for communication, dissemination, support, and training for actors involved and the decisions and activities of the Contract.

INNOVATIVE RESULTS AND IMPACT

The establishment of a system of actors who recognize an idea and are capable of self-organizing, self-designing and self-managing their own development. The Contract is, therefore, a system of public and private entities with a common sense of identity tied to the territory and that is expected to strengthen over time to the extent that the collective strategy defined and its implementation will prove to be effective and evolve to meet the needs of the territory.

The development and sharing of a "strong idea" of territorial development, with a broad and ambitious vision, but also based on the reality of daily actions constructed and applied together in time.

The application of "variable geometry" according to the interlocutors' needs and possibilities. There is no pre-established model, but a model that each "community" adopts and develops.

The project promoted sustainable planning that was based on a vision of the Lombardy forests as part of a whole territory environmental system. The project also promoted sustainable management by achieving forest management certification in 2009 (PEFC and FSC) and improving production from pastures. It advanced green values and developed the forests as places not only for resource extraction, but also as landscapes, places with an identity, and site of diverse activities and beliefs.

The project developed a new vision of development originating in the communities of the Lombardy region, promoted synergies between partners in so doing rebuilding links and networks along all parts of the supply chain and at all levels, and rebuilt solidarity by bringing diverse stakeholders and collaborators together under a shared vision.

FINDINGS

To date, 8 Forest's Contracts that cover 20.000 ha of regional forests and 90.000 ha of other territory have been signed involving almost 80 partners including local administrations, cultural and touristic associations, agricultural enterprises, and schools. The Contracts have realized projects totaling an investment of 8 million Euros. Three new Contracts are being currently defined.

CHALLENGES AND PLACES FOR IMPROVEMENT

The next challenge is to give continuity to the constituted community of people and organizations from the Lombardy region and to increase the human and economic resources of the region.

TRANSFERABLE LESSONS

- Participatory management of forest areas, even in countries with an advanced economy, is necessary for political subjects and demanded by civil society.
- Participatory processes are still not widespread in Italy and Lombardy and therefore the experiences gained through the Forest Contracts are important points of reference.
- It is necessary to promote a participatory culture and equip oneself with appropriate instruments of governance, through which to achieve common objectives.
- The organizing of the participatory processes required innovative work and required new expertise.
- Participation in the management processes enables the construction of development projects and actions on a large scale. These projects and actions are better able to attract resources and have a greater likelihood of success.

SOURCE(S) OF FUNDING FOR THE PROJECT

Source(s) of funding for the project:

- Region of Finance and ERSAF
- Income Sales, timber, pastures, leisure suite, etc.
- European funds (LIFE)
- Co-financing of private sector

INTELLECTUAL PROPERTY

Yes. Please contact ERSAF for more information.

Integrated Management Processes of The Forests Of Lombardy

Lombardy | ERSAF Italy

PROJECT NAME

Integrated management processes of the Forests of Lombardy

CONTACT PERSON AND ORGANIZATION

Organization: Regional Entity for Services to Agriculture and Forestry (ERSAF)
Contact: Enrico Calvo, ERSAF

LOCATION AND DURATION OF PROJECT

Forests of the Lombardy Region, Italy, 2004-2016.

WEBSITE

www.ersaf.lombardia.it

<https://www.facebook.com/ersaf.lombardia/>

ABSTRACT

The activity described concerns the integrated process of multifunctional and sustainable exploitation of forests in the Lombardy region by ERSAF and its partners. The project began in 2004 and regards management of the Forests of Lombardy and the agro-forestry properties of the Lombardy Region. The process was initiated with the preparation of a document of principles and commitments, signed by the Region and ERSAF, as a guide to the development of the region's heritage as a resource for the citizens of Lombardy, for local territories, and for the agro-forestry sector. The project seeks to establish unitary management. A key outcome of the project was the achievement of PEFC and FSC certification (ERSAF is one of the rare examples of dual certification), with the aim of improving and valorizing to a high degree the forest management system and becoming a model for the regional forestry sector.

KEYWORDS

Forests of Lombardy, integrated management, forest certification.

CONTEXT

Italian forests face global challenges posed by the market, the environment, and society and the dynamic and interdependent relations between global and local actions. In order to implement international processes in Lombardy's forests (Pan-European Conference on Forests, today Forest Europe), the Lombardy region and ERSAF began a process in 2004 for the multifunctional and sustainable valorization of regionally-owned forests (over 20,000 ha distributed in 20 forests, FSC and PEFC certified since 2009). This process was born as a response to the need to implement and disseminate sustainable forestry management processes and to adopt modern and effective forest management tools to meet the needs of the Lombardy society.



MAIN OBJECTIVE

The main objective of the project is to value public forests as a common good and to provide services to the community through:

- 1.) Sustainable wood production via sustainable management certification and timber products;
- 2.) The protection and conservation of natural ecosystems;
- 3.) The enhancement of ecosystem services of forests (water, tourism, landscape, climate, etc.);
- 4.) The involvement of local communities;
- 5.) The sharing of long-term monitoring and education.

TARGET GROUP

Local communities, governments.

PROJECT ACTIONS

In 2004, the project signed a Regional Forest Charter with all the project municipalities and partners. The Charter put forth 10 principles of sustainable forest management and required signatories to agree to 16 commitments. The project has implemented the following: sustainable forest management certification schemes PEFC and FSC for Lombardy forests; biodiversity conservation with the Institute of Integral Nature Reserves and Wilderness Areas; the establishment of parks and a theme path with a strong educational value and the annual implementation of the initiative "Forests to live" that sees the active involvement in the forests of thousands of people; the management of forestry production through the involvement of local businesses with long-term contracts and multi-service; the development of the local partnership and participation in the promotion and management of resources, through the signing of "Forest Contracts" with public and private partners; the involvement of more than one hundred partners in the management of activities in the forest (shepherds, local associations, environmental groups, etc.); the enhancement of the historical and cultural memories of forests with the recovery of the historical evidence of the landscape and rural culture and forestry; transparency of actions through annual assessments made by an independent committee of Guarantees; participation in research, development and dissemination of information about forests as places of sustainable production; protection of water resources and climate change; and monitoring of biodiversity and the health of forests.

INNOVATIVE RESULTS AND IMPACT

Innovative elements:

- Unit enhancement process by hiring public and transparent commitments and having an annual review;
- The process of involvement of local communities;
- The development of a network of all parties in the supply chain;
- The enhancement of all forest services;
- The transition from a linear, top-down process to a circular engagement process whereby people and organizations at all levels provide feedback, knowledge, and expertise.

The project has increased participation in and awareness of ERSAF's forests and the importance of properly managing them both for resource extraction and the provision of ecosystem services. The forest also brings a return on investment for the territory and forest operators.

FINDINGS

A little over ten years after the project began, it has produced a significant network of widespread model experiences in the region that ERSAF continues to implement and to improve through the continuous

comparison with stakeholders and adjustment to socio-economic changes. ERSAF manages its forests as a common heritage for Lombardy's citizens and for future generations in order to promote the sustainable and balanced development of society and provide a high quality of life in the Lombardy region. The project has implemented a transition from a linear, top-down process to a circular engagement process whereby people and organizations at all levels provide feedback, knowledge, and expertise. This process ensures that benefits from the forest sector fall on the territory.

CHALLENGES AND PLACES FOR IMPROVEMENT

Future challenges include the improvement of the integration processes between local forests and other properties, for example through the extension of forest certification (FSC and PEFC schemes), the integration of forest exploitation, the territorial management of the supply chain and of pastures, and the establishment of territorial communities of process management.

TRANSFERABLE LESSONS

Lessons from the project include:

- How to obtain multiple forest certifications for a single forest in order to better protect and valorize the forest;
- How to develop a system of territorial governance for forest management;
- How to enhance the value and protection of ecosystem services.

SOURCE(S) OF FUNDING FOR THE PROJECT

The project had several sources of funding:

- Regional financing and ERSAF
- Income sales from timber, pastures, leisure suite, etc.
- European funds (LIFE)
- Co-financing of private sector

INTELLECTUAL PROPERTY

None.

Comparing the added value of domestic timber produced and processed in different supply chains in South Tyrol, Italy

Trentino-Alto Adige | Südtirol Italy

PROJECT NAME

Comparing the added value of domestic timber produced and processed in different supply chains in South Tyrol, Italy

CONTACT PERSON AND ORGANIZATION

Organization: European Academy of Bolzano, Institute for Regional Development and Location Management
Contact: Hoffmann Christian (christian.hoffman@eurac.edu), Oberegger Philipp, Brozzi Riccardo, Bertoni Paolo, Mühlberg Christoph, Stauder Michael

LOCATION AND DURATION OF PROJECT

South Tyrol in Italy

WEBSITE

www.foropa.nlcsk.org/

tis.bz.it/de/cluster/holz-technik/doc/pdf/doks-foropa/copy_of_FOROPA_Wertschpfungskette_Holz_DE.pdf

www.wiso.boku.ac.at/fileadmin/data/H03000/H73000/H73300/Toscani/IUFRO_2016/Tagungsband_web_fin.pdf

ABSTRACT

Domestic timber supply in South Tyrol is still lacking. In 2014 the foreseen harvest covered 2.6 m³/ha, which is approximately 46% of the increment (5.5 m³/ha). Although South Tyrol runs a very dense network of district heating plants (DHP) which create demand for timber chips, the small structured local forest owners are still convinced that the management of forest resources does not produce any relevant income. Consequently, foreign suppliers are benefitting from the demand for timber in the region. Although there would be the capacity to cover parts of the supply from the neglected endogenous potential of unthinned forest stands, or the not exploited harvest-quotes in relation to the annual increment, South Tyrol is still not capitalizing that unused proportion to gain additional added value (Mühlberg et al., 2013). In response to the lack of extraction of natural timber resources in South Tyrol and limited consideration of cascaded timber usage due to micro-economic irrational market-behaviour, this project conducted research on the economic effects that would accrue from the regional processing and valorization of natural forest resources.

KEYWORDS

Domestic wood supply, value added chains, cascaded timber usage.

CONTEXT

The added value of a production chain is usually not calculated for specific sectors or a branches in the region. Therefore, the analysis of the production chain conducted in this study provides useful information regarding the economic strength that exists in a region if actors work together to create a regional added value network. The collaboration between actors along the production or refinement chain (horizontal) and their intermediate

suppliers (vertical) empowers the vitality of a region enormously, if they are capable to stay competitive on the market. Jobs, taxes and regional reinvestments stand to benefit from economic growth in the forestry sector due to the creation of a regional added value network.

MAIN OBJECTIVE

To point out the economic impact of regional added value chains.

TARGET GROUP

All actors along the forest supply chain.

PROJECT ACTIONS

The project conducted an empirical study of the added value chain of timber chips, construction wood, and joiners' logs of high timber quality. To point out the range of added value (AV) processed and refined domestic timber may gain, we analysed the AV from:

- converting pulp wood to energy,
- converting logs to wood-panels for constructing timber houses, and
- converting high quality logs to furniture for a bed room.

There is empirical data for all three chains. Therefore, actors along these chains were interviewed and confronted conceptually with the procedure of their business approach. The actors either provided us directly with the requested data or provided us their balance sheets or information from the cost-accountancy to derive their specific added value in the chain. If data were missing, we calculated them from surrogates or available databases. For all these three options the impact of multiplying effects (additional value added) from intermediate-suppliers, which are inter-connected to actors along the value chain, was evaluated, too. The higher the degree of processing of a raw material within the region, the more actors are involved and the more added value that is gained for the region. In the case of timber chips, an AV of 118€/m³ is achievable, which is three time greater than if the raw timber resource is sold outside the region. Concerning the chains with a higher refinement quote, the production of timber houses gains an AV of 305€/m³ when produced regionally. At the highest stages of refinement, gains of closer to 1,118€/m³ are possible. Were the logs of highest quality to be exported immediately, the loss of AV would amount to 93%. The concept of added values enables a deep and detailed insight on vertical and horizontal relations with intermediate suppliers from different sectors along the production chain. Although the derived figures are impressive, a precondition to benefit thereof is to be competitive on the market.

INNOVATIVE RESULTS AND IMPACT

This project was innovative in the following ways:

- 1.) The stepwise-calculation procedure;
- 2.) the inclusion of intermediate suppliers;
- 3.) the evaluation of potential economic losses if pulp wood or logs are exported without being processed or refined;
- 4.) the awareness gained among the stakeholders in the timber-processing industry;
- 5.) the consideration of the meaningfulness of the economic added value in the agenda of the timber-charter for South Tyrol.

The concept of added values enables deep and detailed insight on vertical and horizontal relations with intermediate suppliers from different sectors along the production chain. It raises awareness among the

stakeholders of the sector and among decision makers (politicians) and motivates regions to enable their endogenous potentials for empowering their available added value networks.

FINDINGS

In the case of timber chips, an AV of 118€/m³ is achievable, which is three time more than if the raw timber resource would have been sold outside the region. Concerning the chains with a higher refinement quote the production of timber houses gains an AV of 305€/m³ whereas in the highest stage of refinement gains of closer to 1,118€/m³ are possible.

CHALLENGES AND PLACES FOR IMPROVEMENT

- Although the derived figures are impressive, a major precondition to be considered for gaining the calculated benefit is to be competitive on the market. Technical innovations in refining and processing timber resources or management decisions in logistics and supply enable the compensation of scale effects of other competitors, or market conditions are created, where the value chain operates under monopolistic framework conditions.
- Conflicts between micro-economic interests and macro-economic benefits - value added chains are targeting.
- Conflicts regarding the consideration of the cascaded timber usage: material use before energetic use and the refinement chain from high quality logs to low quality pulp wood.
- Internal concurrency according the comparative advantages of endogenous potentials with superior values from more productive economic sectors, due to the limitation of production factors.
- Dependency from provincial subsidies for supplying timber chips to the district heating plant.

TRANSFERABLE LESSONS

The concept and procedure can be applied to any other sector or branch and is useful for influencing decision makers.

SOURCE(S) OF FUNDING FOR THE PROJECT

FOROPA (SEE Program), 2012 - 2014.

INTELLECTUAL PROPERTY

None.

LAW AND ORDER IN THE FOREST SUPPLY CHAIN
Primorsko goranska županija | Gorski kotar
Croatia

PROJECT NAME

Law and Order in the Forest Supply Chain

CONTACT PERSON AND ORGANIZATION

Contact: Davor Košmrlj, Čabar Private forest owners association, secretary and Goran Šoštarić, government, Forest advisory service

LOCATION AND DURATION OF PROJECT

Primorsko-goranska županija, Microregion-Gorski kotar, Croatia. Project began in 2016 and is ongoing.

WEBSITE

www.ups-cabar.hr

www.facebook.com/UPSCabar/

ABSTRACT

The proposed project involves all private forest owners in the region. Its goal is to help each member to know the location of the forest - land parcel, in what condition physically and legally this particular land parcel is, and what his or her options are regarding successful management of the forest in the modern forest supply chain.

KEYWORDS

Legal aspect, ownership, land parcel, professional advice, legal advice, forest service.

CONTEXT

Legally and physically, forest land parcels have been neglected for many years. Our association, together with regional and government institutions is trying to change this situation. We are trying to contact each private forest owner in our region. The goal is to understand the state and condition of each land parcel in the region. After sorting legal (ownership, possession) and other physical (condition of the vegetation, size, access by forest road) problems with each land parcel, we hope that these parcels will be able to be the first link in our forest supply chain.

MAIN OBJECTIVE

Integration of privately owned forest land parcels into the regional forest supply chain.

TARGET GROUP

Private forest owners and any person or company that could be a part of the forest supply chain.

PROJECT ACTIONS

The project will undertake the following actions:

- 1.) Identifying land parcels and owners;
- 2.) Finding appropriate funding;
- 3.) Sorting out any legal problems;
- 4.) Helping forest owners in cooperation with professionals to change the condition of their land parcel according to forest rules and regulations so that it may become the first step in the forest supply chain.

INNOVATIVE RESULTS AND IMPACT

The project will engage in the following innovative activities: promote cooperation between legal experts, forest experts and land parcel surveying experts; implement modern technologies - GIS, GPS, etc.; and promote cooperation of private sector and private owners with state and regional institutions.

Impact will depend primarily on the will of the individual owner and his financial situation. If the project succeeds the impact on the local economy could be very positive. It will be the foundation and the first link of the future forest supply chain.

FINDINGS

The project is just beginning and so has primarily identified the problem: the disastrous physical and legal situation of many forest land parcels; an old population; emigration of the young population; and a catastrophic demographic situation which are contributing to economic decline but which could be partially remediated through better understanding and management of the forest.

CHALLENGES AND PLACES FOR IMPROVEMENT

Funding. Better cooperation of participants.

TRANSFERABLE LESSONS

Using the legal, GIS, GPS and forestry knowledge, and practical solutions on forest land parcels.

SOURCE(S) OF FUNDING FOR THE PROJECT

Regional and local administrative districts, private funding.

INTELLECTUAL PROPERTY

Property Rights could be associated with the software for GIS and GPS and the specific collection of legal and geographic data.

EU STRATEGY FOR THE ALPINE REGION SUB-GROUP « ALPINE WOOD »
Regions: Piémont, Lombardy, Baden-Württemberg, Bavaria, Land of
Salzburg
Countries : Italy, Slovenia, France, Germany, Switzerland

PROJECT NAME

Sub-group « alpine wood » of the EU
Strategy for the Alpine Region (EUSALP)
Action Group on economic development

CONTACT PERSON AND ORGANIZATION

Pilot Project: Auvergne-Rhône-Alpes
(francois.trusson@auvergnerhonealpes.eu).

Actors Involved: Piedmont, Lombardy,
Baden-Württemberg, Italy, Slovenia,
Bavaria, Switzerland, Etat italien, Etat
slovène, Etat français, Bavière, Suisse, Land
Salzburg



LOCATION AND DURATION OF PROJECT

The project will operate at the level of the Alpine macro-region. It has received initial funding from the AlpGov Alpine Space program for 3 years. The project will continue beyond those three years.

WEBSITE

<http://www.alpine-region.eu/>

ABSTRACT

The project is part of the Alpine macroregional strategy, the economic pillar of which seeks to valorize Alpine resources by designing transnational and integrated models of products, services, and investments. The objective of the project is to coordinate Alpine actors in the forestry sector in order to add value to the forest supply chain, following models such as the French project *Bois des Alpes*. The project will bring together existing initiatives with common objectives to better valorize forest materials through sustainable use of wood, for example in construction, following the logic of a green economy.

KEYWORDS

Coordination, supply chain, label, construction with wood, green economy

CONTEXT

The timber industry is one of the key sectors of the EU's Strategy for the Alpine Region (EUSALP) and is identified as such in the EUSALP action plan. Forest exploitation in alpine forests is not as valued as it should be, especially for the use of wood in construction. Numerous experiments have begun in the Alps in order to encourage the use of this raw material:

- Evaluation of technical properties of wood

- Tests of new architectural methods
- New quality standards

This movement to increase the valorization of wood is tied to larger global issues :

- The social value in local, high-value production and consumption chains
- The environmental benefits of carbon storage in wood

There are large disparities within the Alpine region in terms of wood valorization and innovative initiatives remain scattered and separate. Moreover, current public policies do not sufficiently integrate existing initiatives primarily driven by economic actors. The different segments of the economic chain do not cooperate, to the detriment of the whole sector.

MAIN OBJECTIVE

- Increase demand for alpine wood products
- Develop short supply chains and especially target Alpine metropolises
- Highlight the benefits of increased added value for Alpine enterprises
- Converge public support (direct and indirect) towards the forestry sector

TARGET GROUP

Businesses and SMEs specialized in wood transformation and construction, local and regional authorities, wood producers, building sector.

PROJECT ACTIONS

The specific actions are being developed. Work will begin with an inventory. The first steps include:

- Comparison of quality standards for alpine wood, based on confirmed characteristics of alpine species, to evaluate the possibility of a general quality standard for alpine wood,
- Creation of a network of all Alpine wood construction projects with demonstrative value (from a technical as well as an economic point of view)
- Demonstration, with a view to its promotion, of the inclusion of alpine wood in sustainable uses (mainly in construction) as an efficient means of storing carbon. Evaluation methods have yet to be refined and pedagogy has to be conducted in the direction of users (architects, public owners)

INNOVATIVE RESULTS AND IMPACT

This is a macro-regional project that aims to go beyond the framework of a typical European project to coordinate the public policies of an entire massif around a single objective.

FINDINGS

The project has just begun (kick-off meeting on 19/10/2016) and continues to be developed. It is therefore premature to suggest any results.

CHALLENGES AND PLACES FOR IMPROVEMENT

Not Available as the project is in its infancy.

TRANSFERABLE LESSONS

Not Available as the project has just begun.

SOURCE(S) OF FUNDING FOR THE PROJECT

The project will benefit from funding from the AlpGov Alpine Space project which is implementing the EUSALP strategy. Other sources of funding will be identified at the national, regional, and European level in the future.

INTELLECTUAL PROPERTY

None.