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EIT Climate-KIC and the future of the forestry sector

A synthesis of partners' contributions and recommendations to increase the resilience and sustainability of European forests

March 2018

Overview

Forests have a key role to play in climate change mitigation, given their critical influence in the global carbon cycle. Yet the world's forests face many threats, which in turn jeopardise this role.

This paper focuses on the specific climate issues and challenges faced by European temperate forests and the potential of forests to make a significant contribution to global climate change mitigation, both directly, and indirectly by relieving commercial pressures on wood supply chains in other regions.

This knowledge is urgently needed, as there are currently many opportunities for European stakeholders to work together to innovate and find new forest-based solutions to the global fight against climate challenge. Recent studies suggest that the European forestry sector's current contributions to greenhouse gas mitigation – equivalent to 10 per cent of Europe's total greenhouse gas emissions – could double, if the right incentives are developed to support afforestation, improved forest management and the substitution of fossil-based products.

Europe's efforts to tackle climate change must therefore ask several questions of its forestry sector, including: how might forests and their derived wood value chains optimise the role they play in mitigating climate change? How might forests sustain and enhance their significant carbon sequestration capability, while also contributing to the substitution of fossil-based materials in downstream industries?

Background

In 2016, EIT Climate-KIC began to explore these questions, and the role that forest management practices could play in enhancing climate innovation. Between July 2016 and March 2017, it organised three stakeholder workshops, in France, Switzerland and Finland, to better understand the current state of the European forestry sector. In November 2016, it launched a call for a series of white papers to increase understanding of the most pressing environmental and economic challenges facing the sector, its partners' current perspectives on these, and their visions for the future of the sector.

The inputs developed and submitted by these partners together with the work developed by the community in the context of current Climate-KIC innovation projects were used to inform this document.[1] This process also identified some major opportunities for EIT Climate-KIC's innovation community, and underpins the strategy behind its flagship forestry programme, which will be launched later in 2018.

This document synthesises our sectoral analysis and summarises key visions and challenges identified from our partners' own white papers and project activities. From a methodological point of view, EIT Climate-KIC wishes to clarify that challenges and case studies related to deforestation in tropical countries have not been included; these themes fall under the remit of a specific sub-group of partners.[2] Instead, this paper is split into four main sections:

- A market overview of forestry and wood-based activities in Europe
- A review of the threats and opportunities facing forest value chains and why the market is at a turning point
- A summary of the most significant opportunities for the European forest sector to incentivise and maximise the contributions it makes to greenhouse gas mitigation, and other environmental services, into the future
- Conclusions.

1 EIT Climate-KIC would like to thank all those who contributed to this strategic research by producing case studies and challenge descriptions. The complete list can be found at the end of this paper.

2 Deforestation in tropical countries is well identified and understood at the international level, and is increasingly addressed through Integrated Landscape Approaches, an emerging strategic domain for climate innovation and for EIT Climate-KIC.

1. The state of Europe's forestry market

While European forests only account for approximately five per cent of the world's forests, they cover almost 40 per cent of Europe's land area: around 160 million hectares (Eurostat a, nd). The forestry sector in Europe has existed for a long time; Figure 1 shows how the harvesting of forests varies across Europe.

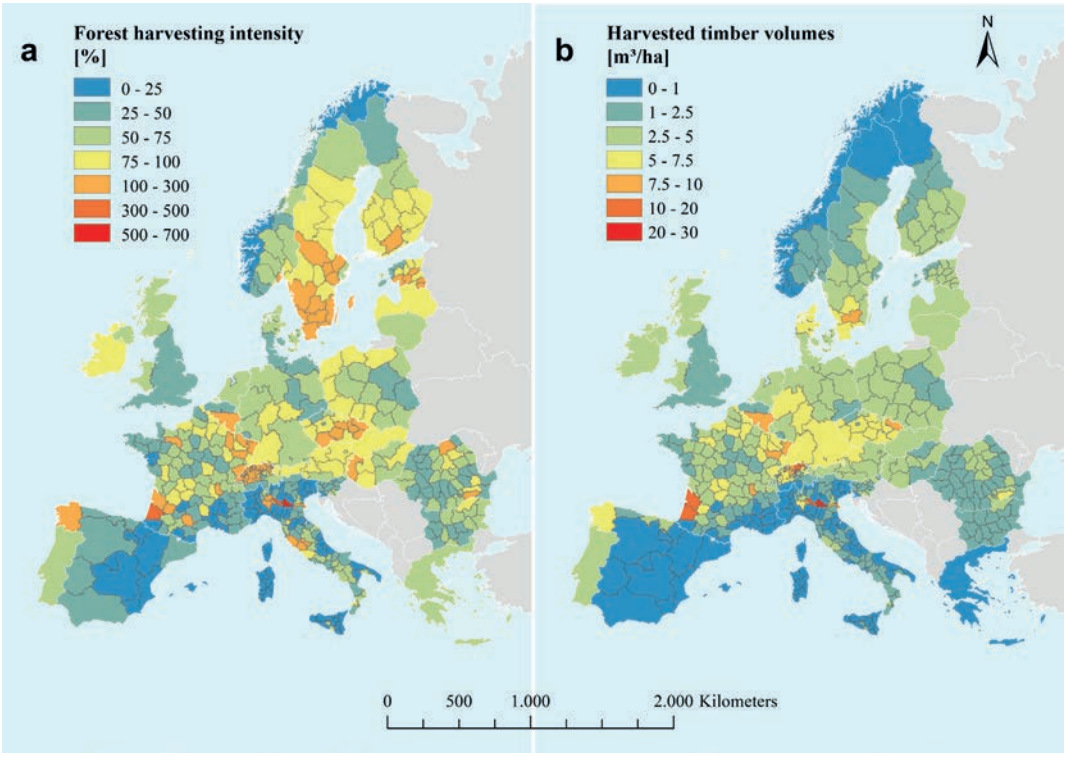
Europe's forestry sector is structured along various value chains, most of which usually involve the following actors:

- Landowners
- Mobilisers (foresters, loggers, transporters, etc.)
- Value-adders, who process roundwood (i.e. wood in its felled state, which may be round, split or roughly squared) and sawn wood (sawn products from logs)
- Facilitators (brokers, distributors, wholesalers, etc.)
- Consumers.

Around 60 per cent of European forests are privately owned (Eurostat b, nd). In most of Europe, they are exploited below their yearly increment, which means that forest stocks are increasing overall. Despite peaks in roundwood production (the main indicator measuring wood sector production), due to severe storms that resulted in an unexpected number of trees being available for use, growth in roundwood production is low (see Figure 2), increasing by less than 10 per cent from 2000 to 2015, to reach a level of 446,819m^3 annually (Eurostat c, nd). This calls into question the ability of forestry actors to supply a significant proportion of the demand for wood to feed production in the coming years.

There are more than 400,000 enterprises active in wood-based industries across the EU-28.[4] The gross value-added by forestry and logging is estimated to be

Figure 1. European administrative units (NUTS 3)[3] showing (a) average forest harvesting intensity and (b) average harvested timber volumes, 2000–2010

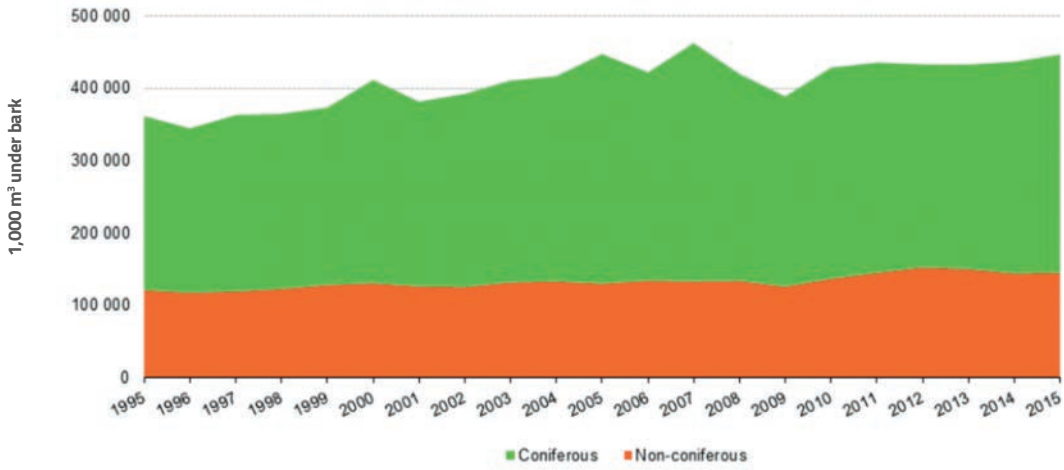


Source: Levers et al. (2014)

3 NUTS refers to Nomenclature of Territorial Units for Statistics, and is an EU classification. See: http://ec.europa.eu/eurostat/web/nuts

4 The member countries of the European Union. See: www.gov.uk/eu-eea

Figure 2. Annual production of roundwood, EU-28 countries



Source: Eurostat d (nd)

around €30 billon, and in all European countries there is a strong correlation between roundwood production and gross value-added, despite the different uses of roundwood found between countries.

The uses of roundwood fall into two main categories: processed wood and fuelwood. The uses of processed wood are multiple, and include pulp and paper production, engineered wood, and wood chips and pellets. Fuelwood consumption in Europe is difficult to evaluate precisely, and is probably underestimated, but it is estimated to account for more than 20 per cent of roundwood use in Europe. Significant discrepancies exist in the use of roundwood between countries (see Figure 3); for example, in Sweden, Finland and Norway, only around 10 per cent of roundwood is used for fuelwood; in France, Denmark and Italy, this figure is more than 50 per cent (Eurostat c, nd). This is just one example of the differences in the structure of wood product value chains that are found within Europe.

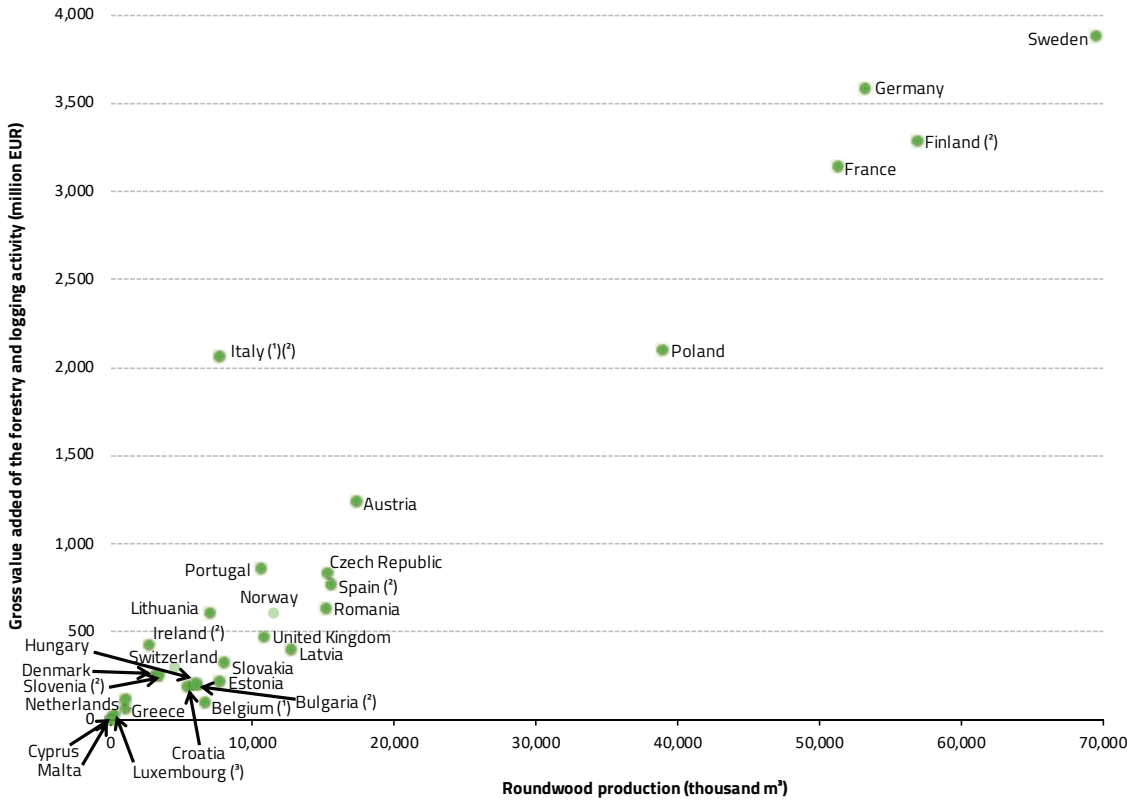
2. EU forestry: a market at a turning point

Over the next two decades, new data and geo-technology applications are needed to transform how principal actors understand Europe's forests and their roles in maximising wood value chains. New circular markets make the forestry supply chains even more complex. Greater collaboration and data-driven insights between actors and decision-makers can help create systemic change across the forestry and wood

Lund University contribution: Biorefining has been identified as an interesting development for the forest and wood product industries as a possible way of developing new, valuable products from the raw material. Biorefining has also been identified as a key measure for ensuring an efficient use of by-products of biomass processing, an increasingly important aspect in a world where renewable resources are in greater demand as substitutes for previously used fossil resources.

Sweden's Lund University has conducted research into new value chains for products from forest-based biorefineries. These have seemingly proved difficult to establish. Although biofuels have been supported through different subsidy schemes, wood-based biofuels still only have a minor share of the market. Investments in full-scale production units are still relatively scarce in number. Lund has focused research on challenges related to the commercialisation of biorefinery technologies, e.g. collaboration patterns and managerial competencies, which are indirectly yet still crucially important for climate change mitigation. It found greater collaboration will be required if biorefineries are to reach their full potential for climate protection, energy and environment.

Figure 3. Roundwood production and gross value-added of forestry and logging, 2013



(1) 2012; (2) Estimate; (3) 2011.

Source: Eurostat e (nd)

sectors, encouraging new climate-resilient forests that will play a key role in European climate mitigation.

Differences in roundwood usage noted above are explained by the multiple factors that affect wood prices, which highlight the complexity of decision-making in the forestry sector. As a significant example, European production of wood pellets and other agglomerates roughly quadrupled in the seven years following 2008, and reached 16 billion tonnes by 2015. This growth coincided with a significant increase in market prices. Over the same period, imports of wood pellets to Europe, which were insignificant before 2008, reached six billion tonnes in 2015 (Eurostat e, nd), which led to a combination of economic and environmental losses compared with intra-European production. This illustrates the slow response of Europe's wood industry to rapid demand-side growth, as well as the non-optimal use of by-products, including those from sawn wood.

WoodpickER case study: Backed by EIT Climate-KIC, WoodPickER analyses the feasibility of a sustainable forest management model in a pilot area of Italy's Emilia-Romagna region. The potentially replicable model integrates advanced sustainable forest exploitation technologies with short-rotation forestry and the most profitable biomass valorization options. Engaging local stakeholders and analyzing technical, environmental and economic feasibility of the model, WoodPickER allows policy instruments (Rural Development Plan) to obtain better value for money, generating positive economic outputs and employment opportunities at local level, while reducing overall greenhouse gas emissions and creating effective carbon sinks.

Challenges and leverage points

Fragmented ownership and difficulties in accessing wood resources lead to many forests in Europe being left unmanaged from a commercial perspective. Investment – or rather, the lack of it – is another obstacle to harvesting non-managed forests. To maximise the carbon mitigation effects that the

forestry sector offers, more investment is needed to encourage sustainable harvesting practices and from currently unmanaged forest blocs. One lever to achieve this would be to create incentives for small forest owners to adopt climate-smart forestry practices, and create financial incentives to promote clustering.

Another key challenge for the forestry sector comes from the lack of structured interactions and communication between the different actors in value chains, which lead to difficulties in understanding each other's constraints. A key leverage point to overcome this is the development of more inclusive value-chain partnerships. This would, among other benefits, enable much better use of by-products from wood processing – one of the key challenges faced by forestry value chains.

3. Time for a new approach to forest management

Overall challenge: How can metrics and tools lead to better decisions, and to resilient and adapted value chains?

European forests are facing new stresses related to global changes, which all put the overall carbon stock at risk. These include nutriment limitations, droughts and pathogen attacks – and climate change is modifying the number and nature of these risks. Climate change is also increasing the risk, in frequency and order of magnitude, of extreme events, namely storms and forest fires. Urban expansion adds to these risks in the peri-urban areas of Mediterranean countries. Risk forecasters and the insurance industry have identified limitations to traditional risk tools and models to cope with recent extreme events, which in turn tend to limit investments in forests.

The pace of change is sufficiently fast that spontaneous migrations or classical adaptation measures are unlikely to be sufficient to cope, leading to the risk of profound disorders in forest ecosystems. Forest landowners need to reconsider their management strategies to cope with this constantly evolving environment, and will require new approaches.

Varying sources of data, including from remote sensing, drone and LIDAR[5] technology, are progressively allowing for better monitoring of European forests' status and evolutions. These already reduce the costs of forest inventories and, as these technologies become more cost-efficient, they will increasingly pave the way for innovative new forest management regimes that help forest managers to act in a timely manner.

The decision-making processes in the management of all natural resources – including forests – remain multifaceted, however, due to the complexity of ecosystems, the many issues (social, economic, environmental) that need to be considered, and the involvement of multiple stakeholders in management processes. As well as new technologies, actors and decision-makers in forest value chains need new analytical and decision-support tools. Current models only consider forest management or substitution effects; they do not integrate the whole value chain, nor are they timely or spatially explicit.

Lastly, improved data collection and integrated models for wood value chains should decrease transport-related climate impacts and connect providers to consumers more effectively and efficiently. A leverage point here is the development of greater insights into existing and upcoming supplies of wood, which would allow better decision-making by forest managers and support 'wise' investments by forest-dependent industries. Having more and better data would also help European-level planners and policy-makers to create an environment suitable for the development of a bio-based regional economy, which could lead to enhanced climate impacts.

Challenges and leverage points

Maintaining carbon sequestration in European forests is likely to lead to changes in forest species and in forest management approaches, which will affect most forest products and their associated value chains. Anticipating these changes is difficult, as it will involve multiple local decisions made by forest owners and managers, and, as mentioned, there is often a lack of communication between different actors.

5 Light Detection and Ranging

Forland case study: Forland partners are convinced a business opportunity at a European scale exists to combine new technological innovations and scientific knowledge into a user-friendly portal that can help decision-makers model forestry, agriculture and land-use policy. Forland aims to democratize and promote the use of predictive capabilities and geo-assessment tools together with the latest technology (remote-sensing and predictive modelling) to optimise land-use and forest planning decision-making for those who may not have a scientific background.

Forland aims to provide all stakeholders involved in forest and land-use planning and rural development with a set of electronic geo-decision tools to stimulate, formulate, optimise, monitor and manage land-use projects, assessing their economic, environmental and social performance. The concept would integrate factors like carbon sequestration, ecosystem services, climate change resilience, etc. into a GIS (geographic information system) approach, allowing holistic assessment of land-use decisions, where different scenarios can be compared according to different criteria.

Lack of knowledge about the potential of management measures to boost forests' resilience to climate change is another barrier, limiting the number of foresters that adopt these new techniques and the geospatial decision-support tools that could help them. Nevertheless, links between data and decision-making are not always obvious, and high-resolution national forest inventory data is hardly ever used in decision-making. Identifying the right decision-makers and creating customer-oriented tools is a key opportunity for the sector.

Another barrier is the lack of available capital for investing in improved management, and this has a strong negative impact on forest value chains. This is primarily caused by the perceived high risk of forest-based investments, as well as the lack of adapted de-risking tools and funds to invest in long-term forestry projects. A clear leverage point is the creation of specially adapted tools and financial products to attract investors and inject much-needed capital into the forestry sector.

Wageningen University (WUR) contribution: The WUR research project looked at whether innovative forest management regimes in Europe could create an adaptive and climate-resilient forest sector driven by strengthened markets. Investment in young forests is often hampered because there is no common understanding of future markets in 20–30 years' time. Owners, planners and traders need a better understanding of standing resources and qualities in the forest, now and in the future. Forest supply chains are becoming increasingly complex. Greater insight into qualities and flows of biomass, and better matching of supply and demand in an open market for the different industries, could have a positive effect on price levels throughout the entire wood chain.

4. Enhancing market readiness for European forestry and forest-based products

Overall challenge: How can we achieve financial sustainability and good management practices in the European forestry sector?

Despite the economic value of European forests, including the value of the wood they contain, many forest goods and services are not supported by sustainable financial models. Forest services in particular are rarely and insufficiently valued. As well as carbon sequestration, forests provide services such as water resources management, biodiversity preservation, and cultural heritage and recreation; these are all often economically undervalued, if they are valued at all. These environmental services must be included in existing financial mechanisms, with research into possible European and international certifications and labels that could cover these services.[6]

VOCAL case study: The Voluntary Carbon Land Certification (VOCAL) project, backed by the French government, aims to create a national carbon certification framework for France's agriculture and forestry sectors. The certification framework tries to address the complexity of MRV processes and provide an operational tool for public and private actors to use. The National Centre on Forest Ownership (CNPF) conducted a study to assess the willingness and capacity of French forest owners to get involved in carbon certification projects. Climate mitigation projects could see increased carbon sequestration in forests, through afforestation/reforestation or improved forest management. VOCAL could also play a role in forest adaptation to climate change. Carbon projects will have to take into account climate change considerations (e.g. raising of temperature, increased frequency for drought, natural disaster, etc.), by choosing species resilient to those new conditions.

Due to their risk of non-permanence (e.g. their complete disappearance in the case of extreme events such as storms and forest fires), and the difficulties and costs of monitoring, and despite their climate change mitigation potential, forestry activities have been largely excluded from the Kyoto flexibility mechanisms. Forest carbon credits are not eligible for the EU Emission Trading Scheme, which until recently was the main source of demand for carbon credits. Forestry projects thus account for less than one per cent of the total credits issued under both the Clean Development Mechanism and Joint Implementation schemes. Moreover, carbon market prices have significantly decreased over the past 20 years, and the expected benefits are not always sufficient to cover monitoring and certification costs.

Wood product traceability is a rising requirement of, and a basis for, the assessment of substitution factors and biomass sustainability standards. On the demand side, biomass traceability is a key factor in avoiding the unsustainable use of biomass and in favour of cascading and circular approaches. This means that biomass needs to be used sequentially and, as often as possible, as a material – and finally, to generate energy. Cascading use of biomass increases resource efficiency and the general availability of raw material supply, because the biomass can be used several times. Substitution coefficients, which evaluate the amount of fossil carbon avoided by using wood products, must also consider the residence time in wood products. Consequently, they rely on the traceability of wood products.

Two major international standards certify the sustainability of forest management: the Forest Stewardship Council and the Program for the Endorsement of Forest Certification schemes. These standards do not include carbon benefits, but deliver forest certificates and wood product labels. Alongside these, civil society groups and companies have launched initiatives to promote and assess zero per cent deforestation commitments. Although global schemes evaluating the deforestation impacts of production systems have been created for some raw materials, such as palm oil, there is no proper standard certifying that any specific product is deforestation-free.

Challenges and leverage points

Any results-based payment for services, including carbon services, will rely on strictly codified monitoring, reporting and verification systems. Consequently, the transaction costs involved will have a significant impact on the financial viability of carbon projects, especially for small-scale projects – as most European forestry projects are. Combining the needs for certification with acceptable monitoring, reporting and verification costs will be a key lever for how the European forestry sector values sustainable forest management.

One factor in the sustainable development of the forestry sector will be the inclusion of more forest-based activities that account for environmental services; at present, only a few forestry activities are rewarded in this way worldwide. One key lever will be a deeper understanding of value chain footprints and substitution effects. These will reinforce decision-making and add weight to international standards and certifications.

6 See, for example, FSC's new ForCES system: http://forces.fsc.org

5. Conclusions and recommendations

EIT Climate-KIC has identified five key recommendations for innovations that will maintain and increase the resilience and sustainability of European forests:

1. Develop new business models that integrate accounting methodologies and financial instruments for risk management, in order to enhance the sustainable harvesting of unmanaged forests – the principal categories at risk from extreme events and pests.

2. Facilitate traceability and transparency measures in the wood market to improve connections between sustainable forestry management and downstream value creation.

3. Support the widespread substitution of fossil carbon with bio-based products, including wood construction products, and ensure that wood entering downstream value chains contributes to climate change mitigation efforts.

4. Develop long-term scenarios for wood availability, in terms of both quantity and quality. These are critical for policy-makers and investors: wood industry investments are long term and capital intensive, and without confidence in the availability of wood, policies and investments are difficult. Availability challenges are becoming

French National Institute for Agricultural Research (INRA) contribution: INRA's paper addressed key climate resilience challenges threatening the future diversity of products and services from European forests. INRA identified three strategic solutions. Firstly, to advance broader knowledge and understanding of forest ecosystems and the climate resilience of individual tree species. Secondly, to design and deploy new tools and methods to manage and monitor climate adaptation in forests. Thirdly, to encourage risk-averse forest managers to adopt new long-term climate-smart management practices. INRA took a close look at the impacts a changing climate and a changing society could have on forests and how forest stakeholders must take best advantage of these trends today, to prepare for tomorrow. A healthy future for European forestry depends on new decision-making strategies, bolder long-term forestry management perspectives, and the development of innovative digital tools to model, measure and manage these adaptation efforts. Finally, INRA emphasized the need for greater collaboration between different stakeholders, investors, value chains and sectors to drive the necessary change.

even more acute with climate change, so the explicit inclusion of adaptation measures in these scenarios is required.

5. The ways in which fossil carbon can be replaced by forest carbon in downstream value chains needs to be better understood and assessed. For instance, the residence time in value chains remains unknown and unaccounted for. As an example, substituting fossil carbon in cement construction products, compared with substituting it in plastic bags, will have totally different climate impacts – but these are not known. The circular economy offers a significant opportunity to boost the residence time in a series of products, and needs to be more closely connected with the bio-economy. Without a robust substitution framework, the development of new downstream value chains will be difficult, and will not necessarily achieve the greatest possible climate impact.

Encouraging a systemic approach to European forestry management, and fostering synergies between actors across value chains, will be fundamental to developing solutions to these challenges. Collaborative work and approaches will also be essential. EIT Climate-KIC's new forestry flagship programme will encompass all these issues to accelerate innovative bio-economy value chains that are based on sustainable and resilient forest management.

Contacts and references

For more information on EIT Climate-KIC's flagship forest programme, and to get involved, please contact Fabrizio Rossi at: fabrizio.rossi@climate-kic.org

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Acknowledgements

This White Paper was coordinated by the Sustainable Land Use team at EIT Climate-KIC, with considerable support from the staff at its national centres and in the Sustainable Production Systems team. We are extremely grateful to the many EIT Climate-KIC partners who attended our workshops and shared their strategic content, cases studies and white papers with us; these informed this synthesis paper. These contributions will be more fully recognised as the new flagship forestry programme develops.

The full list of contributions to this paper is as follows:

ASTER (2017) WoodPickER: Development of an Adaptation Service for Forest Maintenance in Emilia-Romagna, unpublished

ASTER (2017) Activating Local Value Chains Making Forest Maintenance Sustainable, unpublished

Bauer et al. (2017) Challenges for Development of Biorefineries and New Forest-based Value Chains – Insights from a Social Science Perspective, Lund University, unpublished

Caquet et al. (2017) Challenges in European Forest Management for Increased Resilience, INRA/ONF, unpublished

Elmqvista et al. (2017) Moving from Production and Protection as Opposing Interests, COWI, unpublished

Grimault et al. (2017) Monitoring, Certifying and Financing Forestry Projects, Institute for Climate Economics, unpublished

I4CE (2017) From the VOCAL (Voluntary Carbon Land Certification) project to the French "Low-carbon standard", Institute for Climate Economics, unpublished

ONFI (2017) Allometric Equations for the Congo Basin: How to Scale-up a Scientific Project into International Negotiations on Climate Change? ONFI, unpublished
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Climate-KIC is supported by the EIT, a body of the European Union

March 2018

Editing, design and layout: Green Ink (www.greenink.co.uk)