



European Network for
Rural Development

FACTSHEET

Decision support for **climate action across the bioeconomy**

ENRD Thematic Group 'Bioeconomy and
climate action in rural areas'





What is the bioeconomy and who is part of it?

'The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles.'⁽¹⁾



Why is climate change mitigation important for the bioeconomy?

'Exploiting biomass is not necessarily circular and sustainable.'⁽²⁾ The EU concept of the bioeconomy focuses on added value, innovation and sustainable development. The push towards a circular bioeconomy has the potential to support the development of an environmentally sustainable resource base, that also plays a role in climate change mitigation. Innovations and practices in the bioeconomy have the ability to both reduce GHG emissions and promote the sequestration and storage of carbon in biomass and soils.



Opportunities for climate change mitigation

The EU and its Member States have adopted policies focused on mitigating climate change and reducing emissions.⁽³⁾ There are many ways in which parcels of land, business activities, rural communities and value chains can both contribute to the economy and to climate change mitigation.

All enterprises in bio-based value chains have several possibilities to reduce their greenhouse gas (GHG) emissions. These include shifting to energy efficient equipment and practices, sourcing inputs with a limited carbon footprint, or better management of products' end of life, wastes and residues.

For farmers and land managers, the opportunities include both carbon sequestration, as well as minimising GHG emissions, through their land management practices. The options available depend on the nature of the business involved (e.g. arable land, livestock, forestry) and the local conditions such as soil type and climate patterns.

Rural communities have a wealth of options to take climate action. Clean energy and transport solutions often feature in such plans. They can also have links to building local, circular food systems, waste management and ecosystem services. Community level climate action has been found to be successful in bringing about behavioural change due to tailored, personal messaging and ability to engage people.⁽⁴⁾ Rural development funding has been used to support collective decision-making on climate change mitigation, for example by Local Action Groups who promote local or territorial climate strategies.⁽⁵⁾



Getting the motivation and the means right

Contributing to climate change alone might not be a sufficient goal to motivate behavioural change. A rural actor's decision to change practices to do more for the climate can be driven by different needs and drivers, which will impact on the objectives and ultimately the choices made. Possible drivers include policy: i.e. in terms of how to comply with policy and regulation; or the possibility of making economy savings through resource efficiency; or they might be driven by *consumer demand* for climate friendly products. It has been demonstrated that farmers' decisions are heavily influenced by social factors, such as their perception of the surrounding community's expectations of them and by the example set by other farmers.⁽⁶⁾

Any actor or collective considering climate mitigation practices must first understand the practical options available and the wider costs, risks and benefits – economic, social and environmental – of each option. Based on this knowledge they can then prioritise opportunities, plan the most relevant actions within their activity, and seek funding and support if needed.

(1) Statement on the bioeconomy's coverage - 2018 revision of the EU's Bioeconomy Strategy, https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf

(2) The circular economy and the bioeconomy (2018) European Environment Agency, https://circulareconomy.europa.eu/platform/sites/default/files/the_circular_economy_and_the_bioeconomy_-_partners_in_sustainabilitythal18009enn.pdf

(3) Bioeconomy and natural carbon sinks is one of seven strategic areas within the EU's Strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy by 2050 – A Clean Planet for All, <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-long-term-strategy>

(4) Local communities leading the way to a low-carbon society, AEIDL, <http://www.aeidl.eu/images/stories/pdf/transition-final.pdf>

(5) Examples of using LEADER funds to promote local collective climate efforts were presented in an ENRD LEADER Thematic Lab on 'Climate change mitigation and adaptation' in December 2019, https://enrd.ec.europa.eu/news-events/events/enrd-leader-thematic-lab-climate-change-mitigation-and-adaptation_en

(6) Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review, <https://academic.oup.com/erae/article/46/3/417/5499186>



Decision support tools

Decision support tools are tools designed to help users make more effective decisions by presenting the likelihood of various outcomes resulting from different actions.⁽⁷⁾ They can help to provide structured information on the available options and identify possible synergies and trade-offs: an action designed to decrease GHG emissions should not in turn lead to an increase in pesticide use, for example.

Efficient decision support for farmers needs to be holistic enough to provide a full picture of all available options and their different likely outcomes in terms of yields, climate performance and biodiversity. A good farm-level decision support tool, combined with adequate advice and information, helps the farmer to find an acceptable balance between all the possible impacts of farm management decisions.⁽⁸⁾ Various experiences show that farmers' understanding of their activities' impact on climate and environment is essential in their decision to adopt environmental measures.⁽⁹⁾ An effective decision support tool helps increase this understanding.

Different tools exist for assessing the social, economic, environmental and climate impacts of community-based initiatives. For example, the Track-It! calculator allows grassroots organisations and other citizen-led initiatives to estimate the avoided CO₂ emissions of their activities. It uses a simple method that compares local initiatives' activities against the average consumer behaviour to estimate their climate impact.⁽¹⁰⁾

Decision support tools can also highlight broader considerations such as the cumulative impacts of change across a region or the consequences of changes elsewhere in the production system, value chain, or for land management. Several modelling tools exist to support decision-making on a broader scale, for example over a territory. A good modelling tool allows for the comparison of possible outcome schemes depending on different sets of inputs and management practices and can be helpful in drafting policy.



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Upscaling decisions to mitigate climate change

Decision making must be underpinned by an understanding of needs: what should be achieved, by whom and by when. It is not sufficient to state simply that a value chain should reduce GHG emissions or increase carbon sequestration. The targets should be clear in order to support decisions across the bioeconomy.

Deciding on the right climate intervention to meet defined targets requires:

- knowledge (including an understanding of farm, community and value chain needs);
- a process by which actors can be brought together to draw conclusions about the best opportunities and combinations of action (as it is rarely one intervention) on farms, by communities and along value chains; and
- a plan for transforming opportunities identified into actions to deliver change.

(7) D. Rose et al (2016) Decision support tools for agriculture: Towards effective design and delivery, *Agricultural Systems* 149 (2016) 165–174

(8) https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_ws_tools_for_environmental_farm_performance_final_report_2017_en.pdf

(9) Discussion at the second meeting of the ENRD Thematic Group on Bioeconomy and Climate Action in rural areas, https://enrd.ec.europa.eu/news-events/events/2nd-thematic-group-meeting-bioeconomy-and-climate-action-rural-areas_en

(10) Results of the Towards European Societal Sustainability (TESS) research project <http://www.sustainable-communities.eu/tools/>

Work by EIP-Agri has noted that the most effective environmental decision making at farm level is embedded within a wider system of actors and networks which enhance the way in which the choices are made. This would include advisers, demonstration farms, farmer groups, and supply chain actors. Peer example and organisations or people appearing as ‘honest brokers’ can enhance rural actors’ trust in the reliability of the results of their management choices.

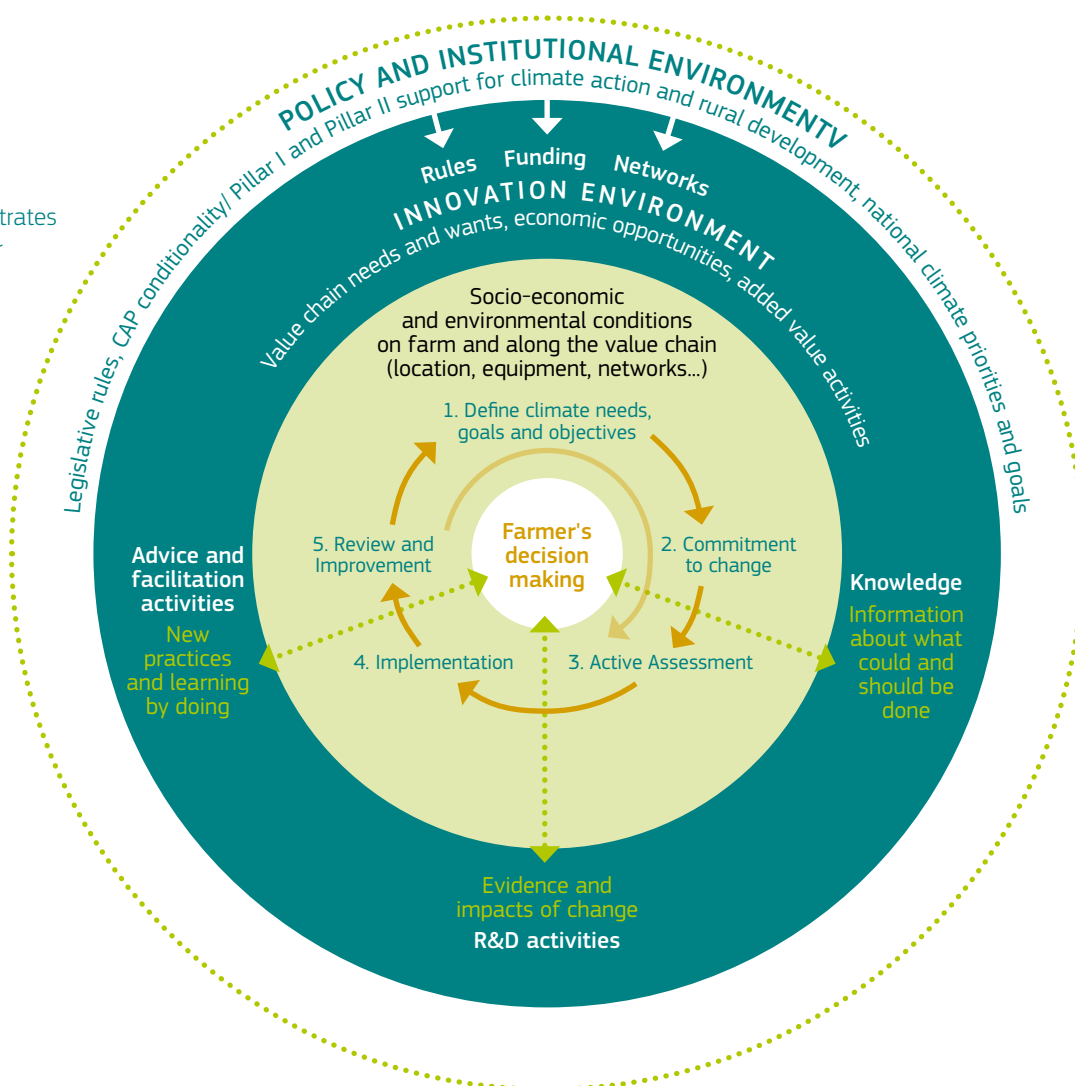
For rural communities, networks provide an effective channel for sharing tools and good practices and referencing climate targets. Networking and communities of practice to exchange knowledge on local mitigation initiatives can grow around a funding opportunity, as in the case of the [Scottish Climate Challenge Fund](#). Several international movements are spurring climate mitigating practices through grassroots action or more institutional initiatives led by local authorities. These include, for example, the [Transition Network](#), the [ECOLISE](#) network, or the [Covenant of Mayors for Climate and Energy](#).

National Rural Networks can also act as important multipliers of information between advisory services, land owners, farmers and foresters, as well as rural communities.

The ambition level of climate action differs across EU Member States depending on a country’s strategic objectives and the possibility for emission reductions across the wider economy. Hence, strategic planning documents such as CAP Strategic Plans and National Energy and Climate Plans need to clearly articulate specific goals for change and how support for change will be prioritised. These goals should be developed in cooperation with farmers, researchers, environmental organisations, authorities and market actors in order to tailor decisions on climate action in the bioeconomy to societal priorities.

Figure 1. This diagram illustrates elements influencing farmer decision making on climate and the factors needed to support change. Elaborated based on material from the Agrilink project^(*) and its conceptual framework for innovation on farm and analysis of decision support tools by D. Rose et al (2016).

^(*) <https://www6.inra.fr/agrilink/content/download/3606/35459/version/1/file/AgriLink.pdf>



EXAMPLES OF DECISION SUPPORT APPROACHES FOR CLIMATE ACTION

Producers – Tailoring climate action and decisions to farm conditions

Wiesław Gryn, a Polish cereal farmer, was first approached by university soil scientists 20 years ago, and he agreed to let them experiment on reduced tillage and other soil conserving approaches on a parcel of his land. Following the experiments, Mr Gryn realised that yields on test fields were not reducing. As his understanding of the soil functions increased, he slowly started to contribute to the experiments more actively. He started developing suitable machinery as it was not available on the market. He also started applying the methods of no tillage, increasing organic matter, and injecting nutrients into the soil on his other fields. Recently Mr Gryn has noticed that these fields are more resilient than average during times of drought. His farm is now an award-winning climate and environment champion showcasing soil and climate friendly practices to other farmers, including through a farmers' association and an EIP-Agri Focus Group.⁽¹¹⁾

Carbon Action⁽¹²⁾ is a platform which aims to advance sustainable soil management practices and increase permanent carbon storage in agricultural soils to improve the climate and environmental performance, resilience and productivity of agriculture. It engages over 100 Finnish farmers, specialised agricultural advisors, several food companies and research institutes.

The key motivation for the farmers to join the platform is to assess the problems they experience related to their fields' productivity and risk management. These include loss of soil productivity due to monoculture which has led to soil compaction, poor drainage and loss of organic matter and soil microbiological activity. These are all phenomena which can be remedied with the right soil management and farming practices, such as crop rotation and incorporation of perennial grasses, maximising vegetation cover year-round and minimising tillage. Farmers have valued the practical approach, testing different practices on their farms and sharing experiences with other farmers in small groups. Dialogue between farmers and top researchers from soil, agronomic and climatic sciences is a key element in Carbon Action and very valuable and rewarding for all parties.



**CARBON
ACTION**

Whole farm assessment tools to mitigate climate change

Several whole farm assessment tools are being used throughout Europe to orient farm management towards climate mitigation. CAP'2ER[®] ⁽¹³⁾ is a tool that allows on farm emissions in the ruminant livestock sector (beef, dairy and sheep) to be assessed in a way that is tailored to the specific situation on farm. It is intended to raise awareness among farmers and advisers about environmental issues including climate mitigation and sequestration and associated opportunities (level one). It also provides a decision-making tool for advisers to assess in detail a farm's environmental footprint, identify opportunities for change and build a plan for action (level two). The intention is that the use of the tool will facilitate on farm change and efficiency improvements. In addition, the tool is now being used as part of the CARBON AGRICULTURE scheme in France, in an attempt to value the GHG emission reductions achieved.

CAP'2ER[®] applies multiple criteria to conduct an assessment of sustainability. The criteria include measures intended to capture both negative environmental impacts such as GHG emissions, nutrient load/quality of water, air quality linked to acidification, use of fossil fuel resources (both direct and indirect) and positive benefits or opportunities linked to livestock farming such as maintaining biodiversity, carbon storage, provision of food, working conditions and economic performance. Once details are entered, on-farm performance can be compared to performance indicators to identify opportunities for improvement. The intention is that the tool helps farmers to make decisions that better integrate low carbon solutions into their overall farm activities and provides a basis on which advisers can help farmers deliver specific interventions.



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CAP'2ER

(11) <https://ec.europa.eu/eip/agriculture/en/focus-groups/moving-source-sink-arable-farming>

(12) <https://carbonaction.org/front-page/>

(13) <http://idele.fr/services/outils/cap2er.html>

Strategic Planning for mitigation action in territories

The development of the bioeconomy across a region involves the coordination of local resource use and adding value to local activities and products. Local Action Groups can have a key role in promoting local community based initiatives, regional bioeconomy clusters and regional bioeconomy strategies intended to coordinate public policies.⁽¹⁴⁾ Taking such structured coordinated action is important not only to promote and share climate action knowledge and best practices, but also to ensure added value mechanisms (such as labels and supporting analytical tools) are taken up.

The Condruz Local Energy and Climate Policy (**POLLEC**)⁽¹⁵⁾ covering seven rural municipalities in Belgium attempts to coordinate and support local action to reduce the territory's CO₂ emissions by 40% by 2030. The policy was designed jointly by the Local Action Group (LAG) Pays de Condruzes, an association focusing on renewable energies, and the province of Liège. It provides a territorial action plan designed through a participatory process, and with a consistent budget. The

action plan builds on an evaluation of the territory's emissions per sector and areas with a high potential for emission reductions. The plan proposes packages of financial and technical support measures for energy efficiency in housing, measures to promote low-emission transport, support for locally produced renewable

energy and measures to help enterprises, public institutions or farms diagnose and reduce their carbon footprint, mainly in terms of (fossil) energy consumption. The LAG coordinates the implementation of the action plan by local public and private actors.



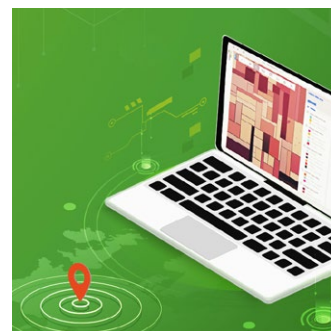
© LAG Pays des Condruzes



Supporting landscape scale decision making

Several initiatives are developing decision support systems or modules that facilitate the identification of relevant and efficient climate action at a landscape scale.

The H2020 project '**LandSupport**'⁽¹⁶⁾ is attempting to develop a spatial decision support system that can help those planning policy interventions reconcile agricultural, environmental, sustainability and policy implementation. The intention is to promote an integrated approach to rural development planning including an understanding of trade-offs between different land uses from a climate action perspective.



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Another H2020 project 'Distributed, Integrated and Harmonised Forest Information for Bioeconomy Outlooks – **DIABOLO**'⁽¹⁷⁾ used national forest inventory data and earth observation data to produce models that foster, among other things, understanding of the long-term sustainability of forest biomass supply and trade-offs between biomass supply and other ecosystem products and services. The resulting outlooks aim to facilitate decision making with regards to EU policy, national forest administrations and forest planning entities.



(14) For more information on use of territorial approaches to facilitate the bioeconomy see https://enrd.ec.europa.eu/sites/enrd/files/tq2_bioeconomy_highlights.pdf

(15) <https://www.galcondruzes.be/realisations/le-plan-climat-du-condroz/>

(16) For further details see <https://www.landsupport.eu/project/>

(17) <http://diabolo-project.eu>

Industry orienting mitigation action in meat production

The European Livestock and Meat Trades Union (UECBV) developed a life cycle assessment approach to identify emission hot spots in meat production and along the value chain. The



resulting tool – **Footprint Category Rules for Red Meat**⁽¹⁸⁾ – provides a harmonised approach on climate change mitigation for the European meat industry. It is aimed at medium to large farms, as mitigating measures on their scale represent serious economic decisions and must be based on solid scientific evidence to base on. Adoption of sustainable practices by the larger

players also has an impact on smaller farms. The industry actively shares good practices but consumer standards are the most decisive factor in introducing change to the sector.

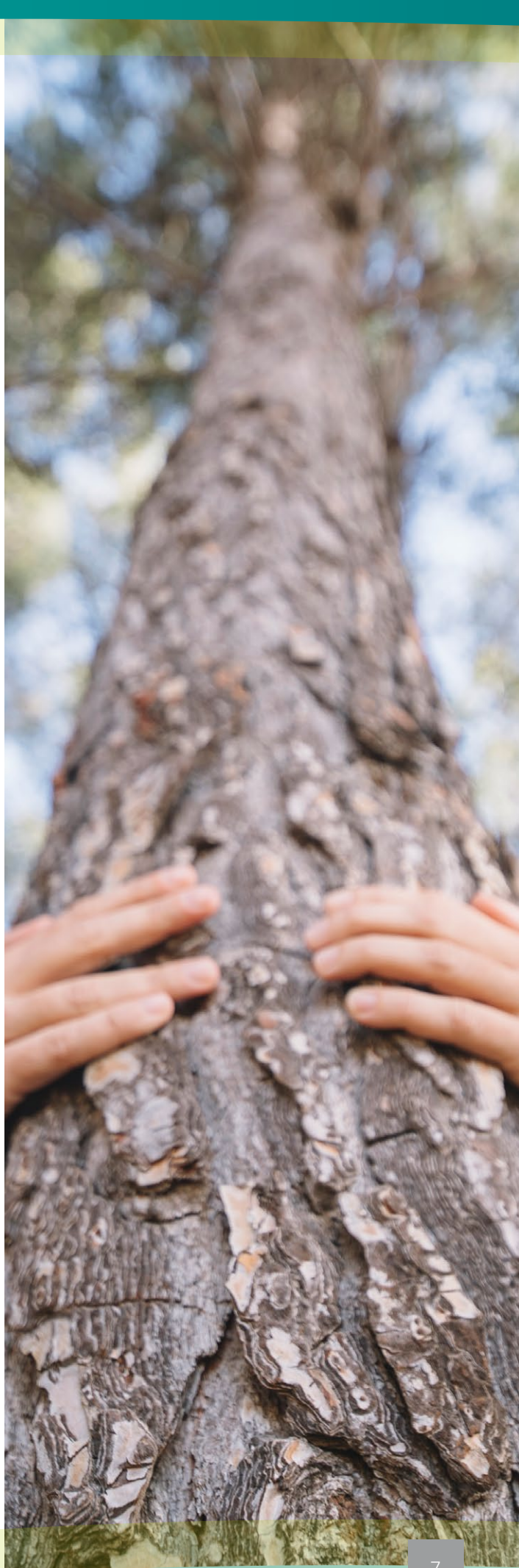
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Forest owners adopting Sustainable Forest Management

Large areas of forest in Europe are abandoned by their owners for various reasons. These include the small size of the property, long distance from the owners, low economic interest, and lack of knowledge of the possibilities for organising the management of the forest plots. Unmanaged forests are not achieving their full biomass potential and capacity to sequester and conserve carbon. In France the Regional Centers of the Forest Property (CRPF) inform the forest owners of a given territory about the economic, social and environmental potential of their property. The owners are supported to make a management plan for their forest plots individually and then as a group. A national label GIEEF (economic and environmental forest interest group) promotes these consultative approaches between owners on the same territory. Participation implies committing to a joint long-term management plan. The scheme is attracting new forest owners as it accommodates the needs of both small and larger scale private forest owners and grants them a say within the territory.



(18) <http://www.uecbv.eu/UECBV/documents/FootprintCategoryRulesRedMeat16661.pdf>

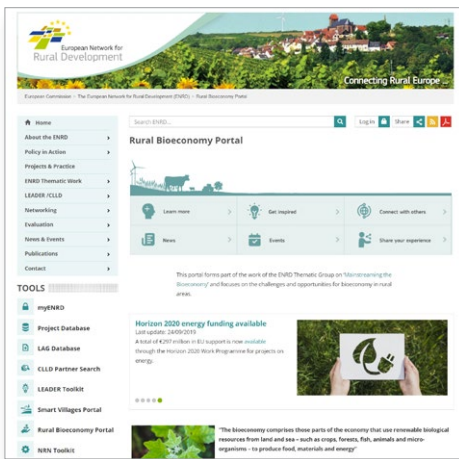


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ENRD RESOURCES AND TOOLS

RURAL BIOECONOMY PORTAL

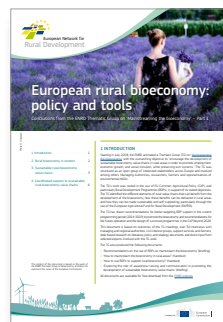
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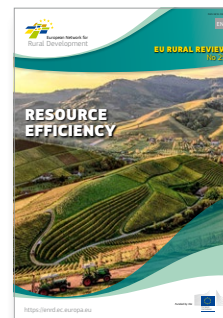
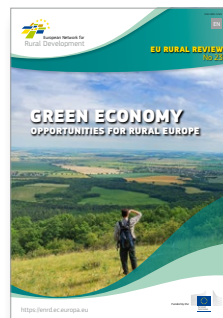


Awareness-raising

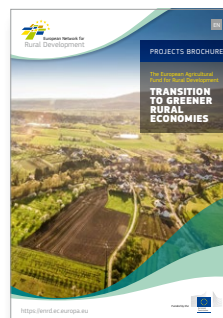


ENRD publications

EU Rural Review

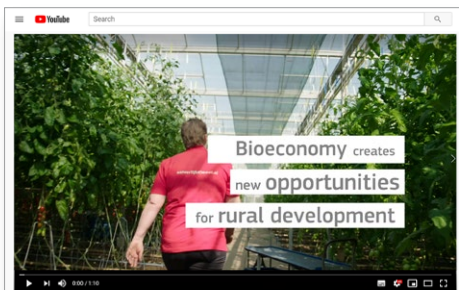


EAFRD Projects Brochure



BIOECONOMY VIDEOS

Rural bioeconomy in Europe: De Laarhoeve (NL)



Rural bioeconomy in Europe: Alvesta Biogas (SE)

