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BOOSTING RURAL BIOECONOMY NETWORKS FOLLOWING MULTI-ACTOR APPROACHES

FACTSHEET

Drivers and barriers for the implementation of bioenergy and bioeconomy technologies in rural areas

This factsheet presents the key findings concerning the implementation of bioenergy and bioeconomy technologies in rural areas as explored in the BRANCHES project. The summary is based on a BRANCHES deliverable "Report on drivers and barriers for implementation of bioenergy technologies in rural areas". This Factsheet provides a summary of the key analysis highlights, addressing the demographic, economic, political and legal, ecological, socio-cultural, and technological drivers and barriers.

From demographic perspective, new bio-based value chains create employment and have a positive economic impact in the rural communities. As these communities become more modern and attractive, they may experience an increase in population, which contributes to the growth and vitality of the region. However, at least at first, acquiring enough trained workers for operation and maintenance of the new technologies can be a challenge. Also, the expansion of innovative technology can face limitations driven by demographic factors, such as a limited number of potential consumers for district heating or an underdeveloped transportation network for innovative products. These demographic characteristics can act as barriers to the technology's broader adoption and growth. In addition, structural changes in agricultural production can pose challenges in sourcing specific commodities like feedstock for certain processes. However, innovative bioeconomy technologies have the potential to generate new income sources for regions undergoing such changes.

KEY WORDS

Bioenergy, bioeconomy

COUNTRY

Finland, Spain, Italy, Poland , Germany

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As said, rural bioenergy production and bioeconomy solutions can create employment and hence foster economic growth in rural areas. For instance, farmers can obtain new sources of income and cost savings by supplying feedstock and being involved in raw material sourcing, and by producing electricity, heat and/or transportation fuels. In addition, using local biomass sources promotes energy independence in both farm-level and in rural communities, hence reducing reliance on imported fossil fuels and volatile energy markets. At the moment, the cost of fossil energy is high, which has a positive impact on the profitability of a bioenergy investments. However, despite that, investment costs for bioenergy production can be high. Financial support schemes and investment programs for these investments are often vital and can encourage wider adoption of rural bioenergy technologies.

Besides the primary product of a bio-based investment, such as electricity, biochar or bio-oil, additional value can be created from side-streams or by-products of the production process, leading to various income sources beyond the primary product. These income sources can include gate fees for processed side- and waste streams, generated heat, steam or hot water, and extracted chemicals from process water. In some cases, the profitability of the primary production may rely on these additional income sources.

Due to the high investment costs of bioenergy and bioeconomy technologies, available financial support mechanisms can facilitate and enable wider uptake of these technologies. However, the absence, as well as the complexity, of long-term financial support schemes can hinder investments on bioenergy and bioeconomy. Moreover, although climate policies favour production and use of bio-based products in many countries, uncertainties linked to future legislation may pose restraining barriers for new investments. For instance, unclear categorisation of the new activity, facility, feedstock, product or by-products when obtaining the environmental and construction licences can pose a barrier for implementation. Furthermore, certain new bioeconomy solutions may encounter extended regulatory processes before they can be applied. One approach to address this challenge is to establish and verify the environmental benefits of feedstock and products through methods such as certification or life cycles assessments, followed by the enforcement of supportive policies.

Bioenergy and bioeconomy solutions provide ecological benefits and reduction of carbon footprint throughout the rural value chains (farmers, cooperatives, communities, companies). For instance, greenhouse gas emission can be reduced by replacing fossil-based fuels with locally sourced sustainable alternatives in heat, power and transportation fuel production. Harnessing value from agricultural waste and side products has also positive impacts on rural waste management as the new technologies serve as a valuable outlet for sustainable biomass that might otherwise go to waste. Utilizing bio-based sources as a feedstock can mitigate environmental issues associated with the status quo, including fire risk and problems related to landfilling, such as methane emissions.

Local communities are generally more receptive to new technologies and processes when those processes involve renewable resources, circular practices, and contribute to decarbonization and sustainability. In addition, operating in a sustainable manner, such as by valorising waste streams into energy or using renewable energy as a fuel, can be beneficial for a local producer or a company from image perspective. However, societal attitudes may reduce interest in investment when the technology is disruptive or lacks successful examples. Previous bad references and the absence of existing full-scale facilities can hinder replicability potential and investment interest in new technology. Yet, an important factor in promoting social acceptance is that the concept suitable for rural region can benefit the local community members in various ways, such as by boosting local employment in raw material sourcing or in the plant operations.

Various innovative bioenergy processes offer flexibility in utilizing a range of raw materials, including agricultural by products and waste streams. The modular nature of these technologies also serve as a catalyst for their adoption, allowing for customization based on specific project requirements and on-site scalability. However, there are instances where the required scale does not align with the technology's capabilities. In addition, in many cases involving innovative technologies, a phase of piloting and demonstration is needed before widespread market adoption can take place. Even when technologies promoting local bioeconomy are mature and readily available, they may be out of reach for smaller entrepreneurs or risk-averse businesses due to a high investment cost.

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While successful examples for technologies utilizing biomass feedstock as a raw material exists, ongoing research and development efforts are essential to advance the bioenergy and bioeconomy technologies. These efforts are important to address technological challenges such as maturity, scalability and cost-efficiency, ultimately fostering growth in this field.

A variety of successful bioenergy and bioeconomy examples adopted in rural regions have already been established. The BRANHCES project has collected a comprehensive database comprising a diverse combination of available and innovative bioenergy and bioeconomy solutions. These examples are readily accessible via BRANCHES project webpage.

ABOUT BRANCHES

BRANCHES is a H2020 "Coordination Support Action" project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.

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