

Estonia

Factsheet

This document provides an overview of Estonia's initiatives and current state in the bioeconomy sector, highlighting regional policies, educational programmes, key trends, existing and expected sub-sectors, and opportunities for personal advancement in bioeconomy related fields.

About the region

Estonia's bioeconomy remains relatively traditional, with significant untapped potential to maximise the added value derived from biomass. This presents a substantial opportunity to contribute further to sustainable economic development and the Green Transition. The primary sectors involved in the bioeconomy include Agriculture and Food, Forestry, Energy, and Marine resources.

The country is also proactively addressing climate change with its Climate Change Adaptation Development Plan. In the realm of education, Estonia has implemented a comprehensive governmental strategy, underpinned by several detailed action plans, ensuring robust structure and governance.

Noteworthy plans include the Action Plan for Environmental Education and Awareness, the Education Policy Development Plan, the Welfare Development Plan, and the Development Plan for Research and Development, Innovation, and Entrepreneurship (TAIE). These initiatives operate across multiple educational levels, fostering a holistic approach to advancing Estonia's bioeconomy and sustainability goals.

Thematic Orientation

Existing Sub-Sectors

- Energy Sector
- Agriculture and food sector
- Forestry
- Marine resources

Key Trends Influencing Innovation

- The most effective way to maintain competitiveness and increase the added value and innovation potential of the Estonian Bioeconomy is through additional specialisation and enhancing value in new, emerging, and fast-growing areas of the Bioeconomy. This includes areas such as the digital and green revolution in agriculture, the development of applications and business models in synthetic biology, and biotechnological breakthroughs in the food system and resource exploitation. Another possibility is niche development.
- A common denominator for most Bioeconomy sectors is the need for higher valorisation of resources and products. The use of bioresources is increasingly moving from traditional vertical chains to more horizontal ones.
- Regarding Estonian bioresource potential, it is estimated that, compared to the present, Estonia's wood resources will decrease significantly by 2050 due to the dynamics of harvesting maturity. At the same time, plant biomass, as well as meat and milk production, have the potential to grow.
- The blue economy is a significant development opportunity for Estonia, especially for Saaremaa. A sustainable blue economy carries great ambitions and, on the other hand, offers opportunities to create new business models.

Expected Sub-Sectors / Value Chains

Priority areas in the Development Plan for Agriculture and Fisheries 2030 include:

- Utilising residues and by-products as valuable resources.
- Unlocking the development potential of aquaculture and marine farming.
- Establishing biorefineries that cater to the needs of primary producers.

Additionally, the "Estonia 2035" Development Plan outlines the following priorities:

- Positioning Estonia as a recognised centre for Bioeconomy development in Europe.
- Supporting innovation and collaboration between companies and R&D institutions.
- Advancing technologies and innovation related to marine resources.

Opportunities for advancement (Growth, Career, Social etc.)

- Exploitation of applied research results, particularly from projects implemented by BIOEAST HUB members.
- Opportunities for education and skill development.
- Paid jobs offer a valuable opportunity, especially in a region where income has historically been below average.
- Establishing a start-up or spin-off enterprise with support from the regional university.
- Employment in existing companies that focus on the production and processing of renewable biological resources.



Governance, Education Levels & Skills

Governance structure in adult education on Bioeconomy, (or on the wider topic of sustainability (Higher Education, Vocational Training etc.)

- Existing Policies and Strategies:
 - Action Plan for Environmental Education and Awareness 2023–2025
 - Education Policy Development Plan 2035
 - Strategy "Estonia 2035"
 - Welfare Development Plan 2016–2023
 - Development Plan for Research, Development, Innovation, and Entrepreneurship (TAIE) 2021–2035

Governance Model, Regulation, and Legislation

- The Ministry of Education collaborates with the Ministry of the Environment, the Ministry of Finance (the national Maritime Spatial Planning authority), the Ministry of Rural Affairs, and the Ministry of Economic Affairs and Communications.

Adult Education on Bioeconomy Includes:

- General Secondary Education
- Vocational Education
- Higher Education
- Refresher Training

Organisation of Adult and Lifelong Learning

- The RITA project ADDVAL-BIOEC has emphasised the critical role of education in advancing the bioeconomy. It highlights the need for Estonian science and higher education to stay aligned with global advancements in biosciences and technologies, and to develop the capabilities necessary for the rapid adoption, testing, and further development of technologies created elsewhere.

- A Fisheries Information Centre has been established, along with a unit dedicated to organising advisory services nationwide in the field of agriculture.

- Museums and their educational programmes are closely integrated with national curricula, playing a significant role in raising societal awareness.

- Supporting lifelong learning is essential for enhancing employees' knowledge, which in turn supports innovation capacity.

Available Research on Bioeconomy Education

- Various training programmes are offered by different organisations. For example, Teeme Ära SA provides training that offers a comprehensive overview of environmental issues and the significance of green skills in today's world, highlighting their connection to broader societal challenges. On the practical side, the training focuses on developing green skills, such as recognising greenwashing, asking critical questions, and making more sustainable choices in various aspects of life.

Main Training, Retraining or Lifelong Learning on Sustainability

- Estonian University of Life Sciences
 - Bioeconomy Development Centre (BioMAK)
 - European Master in Biological and Chemical Engineering for a Sustainable Bioeconomy
- Tallinn University of Technology
 - Business and Innovation Center (Mektory)
- University of Tartu
- Estonian Academy of Arts
- Järvamaa Vocational Education Centre
- Estonian Environmental Education Association

Available Research on Bioeconomy skills needed

- Risk management skills – It is crucial to encourage the implementation of risk management measures. Increasing awareness of the necessity of risk management and developing the corresponding skills are essential for effective decision-making and preparedness.
- Product development skills – Demand-adaptive production requires advanced skills, including creativity, knowledge of new production processes and techniques, and an understanding of market and consumption trends.
- Quality management
- Data analysis
- Design thinking

Linking Art & Bioeconomy Education

Bioeconomy education in which Art concepts are applied

- Art to simulate the Bioeconomy needed skills:
 - Estonian Academy of Arts is the only public University in Estonia providing higher education in art, design, architecture, media, art history and conservation-restoration. Research activities focus on, for example, the sustainability of the historical environment, as well as material and technology research.
 - Sustainable Design and Materials Lab (DiMa) connects research and teaching activities with sustainable product development and design practices and brings together two research
 - Designers collective Studio Aine, which is a materials design and development
- Art to address different learning styles and facilitate inclusion of marginalised people:
 - Bioeconomy, biotechnology and biomedicine hackathon – Bioinnovation hackathon
 - BioHackaton as a side event of sTARTUp Day
 - Marinehack- for the development of environmentally friendly and sustainable solutions in maritime
 - The art contest "Useful art?! Sustainable work" organised by the Estonian Academy of Arts for high school students
 - Estonian Academy of Arts started with a series of discussion evenings Design Thought 2022

- Inspirational case studies and formats from art and design to educate in the Bioeconomy:
 - Sustainable building art: exhibition "ELEMENTary"
 - The exhibition "Ceremony on Algae" held by the Estonian Academy of Arts
 - TAB 2017 was the architectural event of the Tallinn Architecture Biennale
 - Exhibition of recycling "Give a new life"
 - Travelling exhibition which introduced Bioeconomy "Bio-Age – Wooden Future"
 - The exhibition "Effective material. Design and new technologies"
 - Tallinn Design Festival

- Injection of the Bioeconomy in design, art, architecture, etc.
 - Art exhibition "Effective material. Design and new technologies"
 - In Estonia, it is also possible to study arts embedded with sustainability, circularity and Bioeconomy.
 - Companies and designers, using biomaterials or recycled materials in production:
 - Gelatex
 - Myceen

Marginalised Groups

Priority is given to integrating young adults, NEET youth, rural communities (particularly in Ida-Viru County and island communities like Saaremaa), and Ukraine war refugees into the bioeconomy sector. Key opportunities for inclusion lie in emerging value chains such as clean energy, bioeconomy, circular economy, and eco-tourism, which can foster economic growth and job creation in rural areas.

To support integration, there is a need to develop vibrant living and business environments in rural areas, motivating residents and encouraging entrepreneurial activities. The Ida-Viru Just Transition Fund is actively working to enhance green skills through various development activities aimed at promoting renewable energy, energy efficiency, and circular, bio, and blue economies.



STRENGTHS

- Diverse range of sectors involved
- Strong competitiveness driven by innovation
- Growing shift towards horizontal value chains
- Expanding Blue Economy
- Rising employment and job opportunities
- Well-established educational strategies with defined policies and robust governance
- Abundant opportunities for lifelong learning, vocational training, and public awareness
- Significant overlap between bioeconomy education institutions and art-related institutions

WEAKNESSES

- Underutilised resources and products
- Bioeconomy not fully integrated with the country's socioeconomic priorities
- Absence of a National Bioeconomy Strategy
- Fragmentation of activities and priorities; lack of a cohesive organisational framework
- Insufficient advancement in bioeconomy education research

SWOT Analysis

OPPORTUNITIES

- Expansion opportunities, geographically considering the current political landscape
- Further leverage of Estonia's developed digital infrastructure
- Potential for Estonia to become a recognised hub for bioeconomy development in Europe
- Opportunity to build on the existing strong educational foundation
- Estonia can lead in bioeconomy and art integration on a European level, leveraging the synergy between related institutions

THREATS

- Possible depletion of resources by 2050 due to intensive harvesting
- Risk of brain drain due to lack of motivation
- The need to prevent marginalisation of young people without specialised education and some rural communities; their integration should be prioritised to avoid future marginalisation.

Consortium



For more detailed information, visit Estonia regions page in our website.

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