

GENB TOOLKIT FOR TEACHERS

*elementary
 school*



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GENB TOOLKIT FOR TEACHERS IN ELEMENTARY SCHOOL

Bioeconomy resources for teachers to enhance their own training and to provide effective materials for teaching nine- to thirteen-year-old students.

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Do you recognise the importance of teaching bioeconomy but need quality, easy-to-use training to get up to speed quickly? Looking for a simple way to introduce your students to bioeconomy concepts? Feeling overwhelmed by the abundance of online resources?

The **GenB Toolkit** and the **GenB Virtual Library** have made it easier by creating and gathering, respectively, the best tools and materials in one place. They help you learn about the bioeconomy and provide resources to explain these concepts clearly and effectively to nine- to thirteen-year-old students. Ready to make your teaching more effective and impactful?

Explore the GenB collection and make teaching the bioeconomy a breeze.

The **GenB Toolkit** is a rich collection of diverse resources, tools, and instructional materials designed to educate and raise awareness of the bioeconomy. Tailored to a wide audience—including pre- and early-stage students, primary and high school students, teachers, and multipliers—this toolkit is available in nine languages: Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish. Engage with materials that cater to various learning needs and levels, making bioeconomy education accessible and impactful.

The **GenB Virtual Library** is a user-friendly, extensive repository of high-quality resources and tools sourced from previous EU initiatives, European Commission projects, and other reputable platforms. Perfect for young people, educators, parents, policymakers, and the general public, this library offers over two hundred materials in several of the twenty-four official EU languages. Navigate a wealth of valuable content to enrich your understanding and teaching of the bioeconomy.

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1 What is the bioeconomy and why should it be taught?

The bioeconomy refers to the production of renewable biological resources and their transformation into value-added products. These products include food, feed, bio-based materials, and bioenergy. By strengthening the bioeconomy, we move closer to a circular and low-carbon economy.

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Incorporating the bioeconomy into education fosters an understanding of sustainability, preparing students to lead in a world that demands green solutions and forms committed citizens who drive sustainable and resilient development.

2 Which GenB tools can reinforce my knowledge of the bioeconomy as a teacher?

Bioeconomy training for teachers

The following materials have been designed to equip teachers with a solid foundation in bioeconomy concepts, providing them with the necessary knowledge and confidence to teach these topics effectively in the classroom using additional tools and resources.

- [Lesson plans](#), structured guides for teaching bioeconomy concepts in the classroom. These lesson plans introduce bioeconomy concepts through discussions, activities, AI tools, and interactive games, making complex topics accessible and engaging for young learners. This resource is available in Dutch, English, German, Greek, Italian, Portuguese, Slovak, and Spanish.
- [Training materials](#), designed to strengthen your knowledge of the bioeconomy and its teaching. They reinforce all the other toolkits so teachers can understand the concepts of the bioeconomy in the general framework of the FEE's Environmental Education "ECO-SCHOOLS" Programme. This resource is available in Dutch, English, German, Greek, Italian, Portuguese, Slovak, and Spanish.
- [The Bioeconomy for Educators: Cultivating a Sustainable Future MOOC](#), a free, accessible and self-paced online course to learn about the bioeconomy and how to engage students with the topic, while raising awareness of its benefits and challenges, and preparing them for future job opportunities. Focusing on sustainable solutions and future job opportunities, it aims to provide comprehensive knowledge and practical tools for integrating bioeconomy concepts into teaching practices, while creating innovative and adaptable learning experiences. Access the course on the [European Schoolnet Academy](#) or download it in {link: **PDF format**}. This resource is available in Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish.
- The [Colouring and activity booklet](#) features puzzles and colouring pages that introduce the bioeconomy in a fun and engaging way for kids aged eight to twelve. This resource is available in Dutch.

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Eager to learn more?

What is a “Circular Economy”? Why should we care? What does it mean for us? In this **TEDx Talk, *The Circular Economy: A Simple Explanation***, Cillian Lohan, CEO of the Green Economy Foundation, explains the concept and its potential to change the world. Remember that this resource and more can be found in the **GenB Library**.

Biointeresting fact!

Including bioeconomy concepts in the curriculum for students aged nine to thirteen can enhance skills such as critical thinking and innovation. Through projects that explore sustainable solutions, students learn to identify environmental problems and design creative strategies to address them. This practice promotes independent learning, the development of analytical skills, and the ability to work in teams to build a more sustainable future.¹

1 Which GenB tools can help my elementary stage students learn about the bioeconomy?

Resources for teaching the bioeconomy in the classroom

The following materials are designed for use by students. These tools provide teachers with a comprehensive repository to engage students in the teaching and learning process of the bioeconomy.

- Learning through play is always a welcome approach, and these materials fully embrace its potential.
 - The ***“Bio Race” educational board game*** increases youngsters’ awareness of the sustainable and circular bioeconomy through activities, quizzes, and interactions to be performed. Players over eight years old play to create new bio-based products by completing assigned recipes starting from a specific

¹ Urmetzer, S., Lask, J., Vargas-Carpintero, R., & Pyka, A. (2020). Learning to change: Transformative knowledge for building a sustainable bioeconomy. *Ecological Economics*, 167, 106435.

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biomass. Once the players have manufactured bio-based products, they transform the bio-based products into Sustainability Points. For four to six players. This resource is available in Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish.

- The [Escape4Future – Chemistry meets Circular Bioeconomy](#) escape room is a gamified experience where students, from 13 years, face a relevant challenge for the modern world—the planet is stuck in a pattern of making, using, and throwing away products (a linear lifestyle and consumption model), leading to problems like climate change, biodiversity loss, resource scarcity, and an increase in non-renewable fossil-origin waste, such as plastic. Students must solve six interconnected puzzles that address themes of green chemistry and the circular bioeconomy through hands-on experiments or games to find a way towards a more sustainable and circular lifestyle. This resource is available in English and Italian.
- The [BioHeroes: Let's save the planet!](#) card game uses a game-based learning approach to teach students, over six years old and available for two to six players, about careers in the bioeconomy. It introduces them to various professions, their specific tasks, and how these roles interconnect, all in a fun and practical way. This resource is available in English and Spanish.
- For audiovisual content, explore the following **educational videos**:
 - [Bio-based products](#) This resource offers multilanguage subtitles, as automatic translations of the social media captions.
 - [The Apple's dream](#) This resource is available in Italian.
 - [TEDx pitches](#) This resource is available in [Italian](#) and [English](#).

Looking for something more experimental? [Hands-on labs: bioeconomy experiments](#) offer nine practical and fun activities where students over 6 years old can explore various uses for bio-waste and biomass and see how it can be transformed into new bio-based products. This resource is available in Dutch, English, Greek, Italian and Spanish.

- Enable students to explore the bioeconomy through audiovisual means with this [participatory photography activity](#). They can narrate, investigate, and raise awareness of real-world bioeconomy applications by taking photos and/or videos. This resource is available in English.

Looking for more resources for my students?

The [Bioeconomy Memory Game](#) is designed to use a fun and visually engaging format to teach young pupils about the diverse range of bio-based products that can be created from the by-

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products of common biological feedstocks, such as coffee grounds, orange peel, and other organic waste.

4 What pedagogical approaches are covered within the GenB Toolkit?

The GenB Toolkit provides flexible resources to accommodate various pedagogical approaches, ensuring that educators can effectively integrate bioeconomy concepts into their teaching, regardless of their style or method. Key pedagogies include the following:

- **Inquiry-Based and Project-Based Learning:** Encourages students to ask questions, investigate, and solve problems related to bioeconomy through research and hands-on projects.
- **Experiential learning:** Engages students with practical activities that connect theoretical concepts to real-world applications, deepening their understanding of the bioeconomy.
- **Project-based learning:** Involves students working on extended projects that require applying knowledge and skills to solve real-world challenges or answer complex questions.
- **Differentiated instruction:** Offers diverse materials suitable for different learning levels and styles, allowing teachers to adapt resources to their specific goals, curricula, and lesson plans.
- **Interdisciplinary Learning:** Integrates content and skills from multiple subject areas to explore complex topics or solve multifaceted problems.

5 What competencies can teachers and students gain from the GenB Toolkit?

Incorporating bioeconomy concepts into the curriculum for students aged nine to thirteen promotes essential skills like critical thinking and innovation. Engaging in interactive projects and activities helps students explore sustainable solutions, develop analytical skills, and work collaboratively to create a more sustainable future².

- **Understanding of the bioeconomy**
 - Learn the fundamentals of the bioeconomy, including the transformation of renewable biological resources into valuable products such as food, bio-based materials, and bioenergy.
 - Understand how the bioeconomy supports the shift towards a circular and low-carbon economy, emphasising the importance of sustainability in everyday practices.

² European Commission: Directorate-General for Research and Innovation, Graaf, I., Papadimitriou, A., Peijl, S., Cuartas-Acosta, A., Hüsing, T., Korte, W., Lilischkis, S., Baltina, L., Diego, I., Hogarth, T., Imbert, E., Ladu, L., & Morone, P. (2022). *Promoting education, training and skills across the bioeconomy: policy brief*, Publications Office of the European Union. <https://data.europa.eu/doi/10.2777/026558>

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- Awareness of environmental responsibility and sustainable behaviours
 - Develop a sense of responsibility and awareness of the importance of reducing waste and managing resources efficiently.
 - Understand how daily decisions and individual practices impact the environment and the economy.
- Development of critical and analytical skills
 - Foster critical thinking and the ability to assess the environmental and economic impacts of different practices and products.
 - Promote problem-solving through research and the design of sustainable solutions.
- Preparation for innovation and the future
 - Explore different professions and opportunities in the bioeconomy field, preparing participants for careers in a growing sector.
 - Apply bioeconomy knowledge to create and adapt innovative solutions to environmental and economic challenges.
- Application of practical knowledge and creativity
 - Use hands-on activities and games to explore bioeconomy concepts, such as the reuse and transformation of waste.
 - Implement projects that integrate sustainability and bioeconomy concepts in real-world contexts.

6 Where can I find additional resources on the bioeconomy?

Remember! [GenB Virtual Library](#) is a repository of high-quality resources and tools that complements the [GenB Toolkit for nine- to thirteen-year-old students](#). Use the filters to refine your search and discover a wealth of valuable resources!

Inspire change from the classroom

Integrate the bioeconomy into subjects like Geography, Mathematics, and Social Studies to help students understand the interconnection between ecosystems, sustainable practices, and responsible production and consumption.

With these resources, teachers can create a dynamic and inspiring learning environment. The bioeconomy is not only a topic of study, but an opportunity to empower students to be agents of change towards a more sustainable future

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