

GENB TOOLKIT FOR TEACHERS

high school



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GENB TOOLKIT FOR TEACHERS IN HIGH SCHOOL

Bioeconomy resources for teachers to enhance their own training and to provide effective materials for teaching fourteen- to nineteen-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 fourteen- to nineteen-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 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 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.

Eager to learn more?

How can I reinforce my knowledge of the bioeconomy? Take a look at the GenB [Library](#). Explore the videos, delve into the activity workbooks, like the [Circular Classroom](#) project, and consider launching your own Club! You could organise lunchtime meetups with classmates who are curious about the topic or suggest to your teacher to set aside some time in class to explore it further.

Remember that this resource and more can be found in the [GenB Library](#).

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Biointeresting fact!

Integrating bioeconomy topics into secondary education enhances advanced skills such as strategic thinking and leadership. Teenagers engage in projects that involve evaluating the sustainability of various industries, encouraging them to develop competencies in data analysis, ethical reasoning, and entrepreneurial thinking. These experiences prepare them to navigate and influence environmental and economic systems, empowering them to become proactive leaders in the transition to a sustainable future.¹

3 Which GenB tools can help my high school 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.

- Curious about real-world bioeconomy careers? [“Bioeconomy Job Profiles”](#) introduces students to five careers within the bioeconomy, inspiring them to explore and develop skills for a sustainable future. Factsheets and video interviews are available. This resource is available in Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish.
- The [GenB Bioeconomy Quiz](#) includes twenty quizzes about sustainability, bio-based plastics, bioenergy, and waste management. With multiple-choice and true/false questions, it supports effective self-assessment and is suitable for both individual study and group activities or games. It links directly to related educational cards by a code. The quiz is available in two formats: printable cards for classroom use and an online version for social networks. This resource is available in Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish.
- The [GenB Bioeconomy Educational cards](#) offer twenty concise, visually engaging resources on sustainability, renewable energy, and waste management. Designed for

¹ Leicht, A., Heiss, J., & Byun, W.J. (2018). *Issues and trends in education for sustainable development* (Vol. 5). UNESCO publishing.

Tilbury, D. (Ed.). (2002). *Education and sustainability: Responding to the global challenge*. IUCN.

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both self-study and educational settings. It links directly to related quiz cards by a code. The educational cards come in two formats: a horizontal site format for websites and a square carousel format for social media. This resource is available in Dutch, English, French, German, Greek, Italian, Portuguese, Slovak, and Spanish.

Learning through play is always a welcome approach, and these materials fully embrace its potential.

- 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.
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Looking for more resources for my students?

Explore this selection of past bioeconomy projects to help your students delve deeper into the “bio” side.

- What do you know about the bioeconomy? Take the [BLOOM Bioeconomy Quiz](#) to find out! Use it as a warm-up for introducing the bioeconomy to secondary students or as an assessment tool to evaluate their understanding.
- [The Bioeconomy starts here...be part of it!](#) This resource offers multilanguage subtitles.
- [A Bio-based day](#) This resource is available in English, German, Italian, Portuguese, Slovak, Croatian and Spanish.
- [Videos about bio-based materials and products](#) This resource is only available in English.
- [Young Bioeconomy Entrepreneurs](#) This resource is only available in English.

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.

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

Incorporating bioeconomy concepts into the curriculum for students aged fourteen to nineteen enriches their educational experience by fostering advanced skills such as strategic thinking, data analysis, and ethical reasoning. This approach prepares students to tackle complex environmental and economic issues through practical applications and innovative solutions, equipping them to become proactive leaders in a sustainable future.²

- Understanding of the bioeconomy
 - Gain in-depth knowledge of bioeconomy principles, including the transformation of renewable biological resources into value-added products such as food, bio-based materials, and bioenergy.
 - Understand the critical role of bioeconomy in advancing towards a circular and low-carbon economy, emphasising sustainability in diverse sectors.
- 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.

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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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 fourteen- to nineteen-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 Natural Sciences, Geography, Technology, and Environmental Education to help students understand the interconnection between ecosystems, sustainable economy, and responsible product design.

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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