

How do we integrate sustainability into TU Delft's education by 2030?

Goal: By 2030, every TU Delft graduate will be a green engineer.

TU Delft has the ambition to be **carbon neutral, climate-adaptive and circular by 2030**, with a focus on biodiversity and quality of life. At the same time, TU Delft is making the campus available as a testing ground for innovations in the field of sustainability. This will bring together the expertise of our engineers, designers, scientists and the public sectors.

Education for Sustainability develops **knowledge, skills, ethical values, worldviews and sense of responsibility**, which students need to act in ways that contribute to a sustainable world and sustainable lifestyles.

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Methodology

Evaluate the current status of TU Delft's education

Due to the large amount of courses, the first analysis consisted in reviewing the presence of certain keywords, such as "sustainability" in study guides. Approximately 1700 subjects from the 2022-2023 academic year were manually reviewed.

A second analysis, tested the use of Large Language Models as a pilot for automating study guide reviews. Courses were reviewed according to their suitability to meet Sustainable Development Goals.

Develop a framework which guides how and what to change in TU Delft's education

Research consisted in a literature review of existing frameworks in engineering higher education as well as consultation with different stakeholders within TU Delft

2nd Analysis: Total Amount of Subjects per SDG

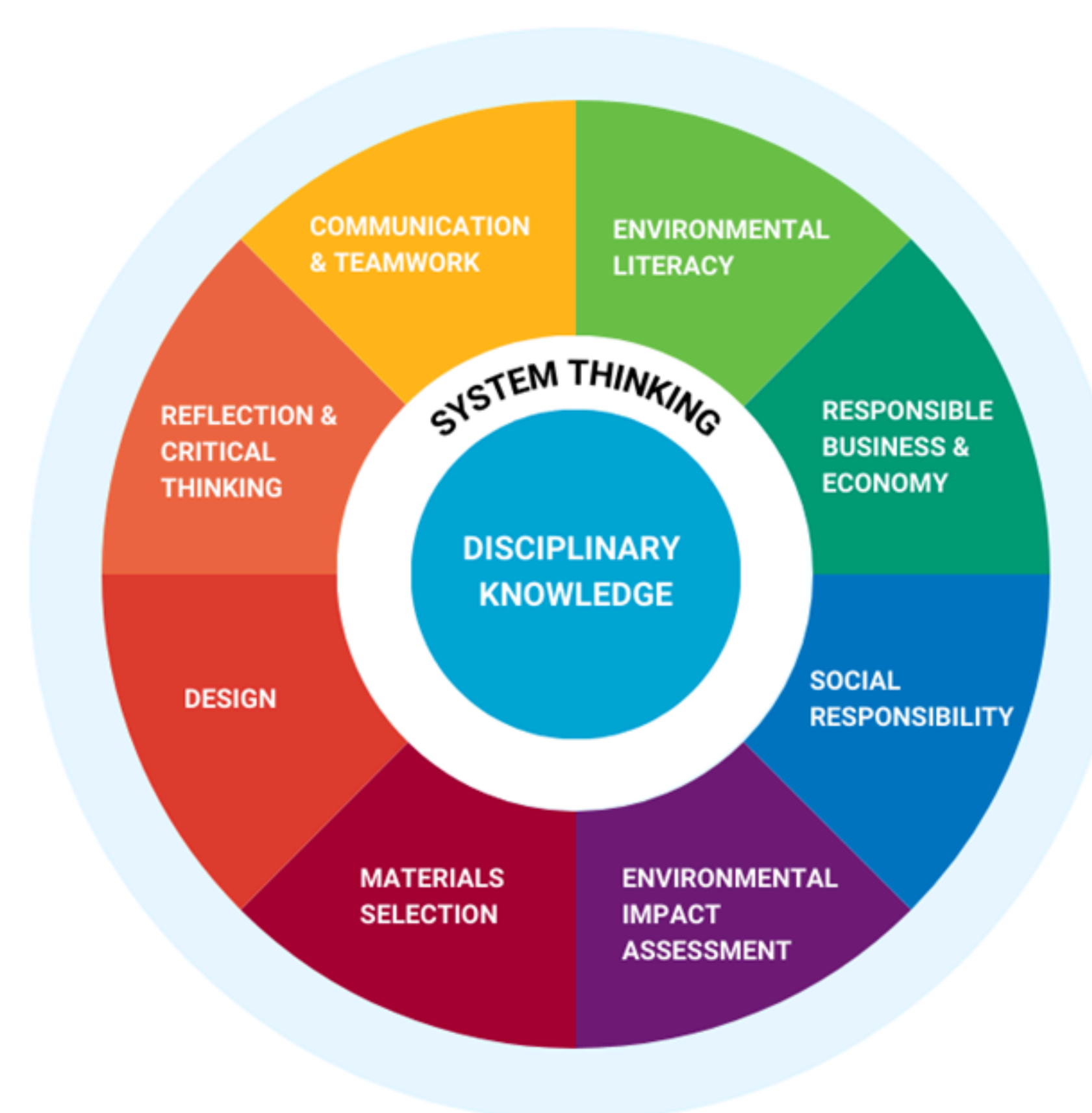


TU Delft framework

This framework was developed by integrating Wiek's framework on Key Competencies in Sustainability (Wiek & Redman, 2022) into the Engineering for One Planet framework (Anderson & Copper, 2022).

The framework was specifically adapted to TU Delft's context, prioritising disciplinary knowledge at the core. Recent research highlights the importance of a framework to guide changes and support educators (Wijnia, 2024).

Further iterations are expected as feedback is received and progress is made.



The initial results indicated that TU Delft is **offering a higher number of subjects related to sustainability** or SDGs than initial expectations.

In addition, the analysis highlights **the need for more sophisticated and standardized criteria** as well as using a **scale of sustainable education**.

Lastly, the research highlighted **the difficulty of comparing** in sustainability terms courses **from different scientific and engineering disciplines**. Each faculty has a **specific understanding of what sustainability means in their education** and the review should reflect these particularities.

GreenTU & GreenDatabase

In collaboration with GreenTU, the GreenDatabase was created to share the results with the student and TU Delft community. The GreenDatabase seeks to become the central platform to support students in their sustainability learning journey. It is an open source/learning environment and a start of monitoring sustainability education.

Future research

What's next for this research?

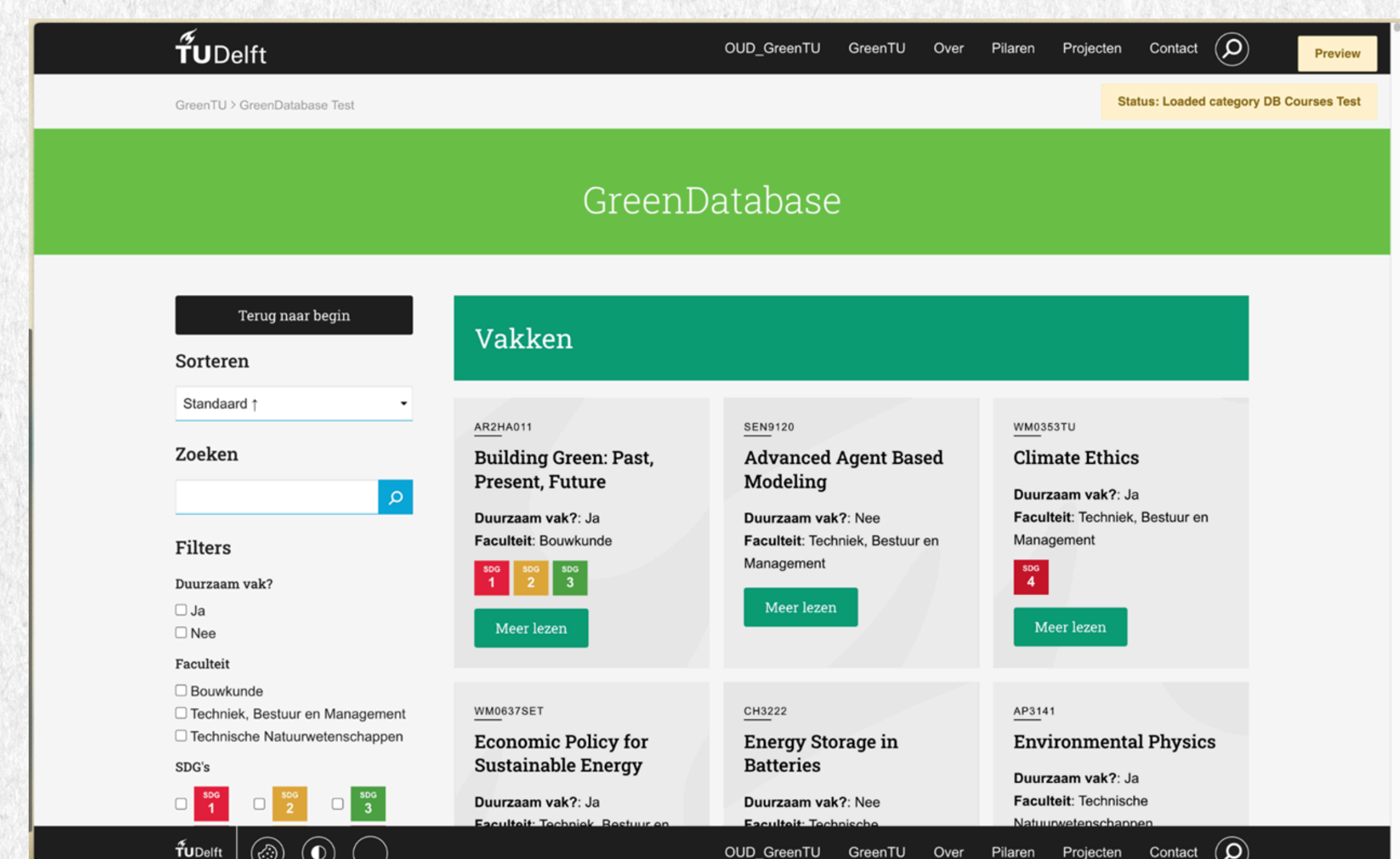
- Applying the framework and evaluating results
- Review education 23-24 and 24 -25
- Develop a monitoring system for sustainable education per faculty and TU Delft

Remaining questions

- How can the framework be integrated into education?
- What is the minimum required sustainability knowledge for all students?

Related literature

- Anderson, C., and C. Cooper (eds). The Engineering for One Planet Framework: Essential Sustainability-focused Learning Outcomes for Engineering Education. Portland, OR: The Lemelson Foundation, 2022.
- Wiek, A., and A. Redman. What Do Key Competencies in Sustainability Offer and How to Use Them, 27-34. In: P. Vare, N. Lausset, and M. Rieckmann (eds). Competences in Education for Sustainable Development. Cham: Springer, 2022.
- Wijnia, P. A systematic approach to implement education for sustainable development in applied science: A case-study of the TU Delft Applied Sciences Faculty. Master Thesis. Delft: Faculty of Technology, Policy and Management, 2024.
- <https://www.tudelft.nl/en/greentugreendatabase>



Check the database here! Sustainable TU Delft