Engineering Education for a Sustainable Future

Embedding sustainability in engineering teaching

# EESF Integration Guide for Engineering Educators Teaching teams in higher education institutions March 2026

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# Introduction

**Engineering Education for a Sustainable Future (EESF)** is an Erasmus+ initiative that supports engineering educators in embedding sustainability competences and SDG-aligned thinking into existing modules.. The EESF approach is intentionally flexible and does not require full familiarity with the project to begin using its resources. This guide provides a practical starting point for educators to:

- Use the EESF Teaching Framework and OER activities
- Integrate them into existing courses with minimal change
- Adapt materials to your local context
- Gather light-touch feedback for improvement

# Overview

## What this guide is

This guide supports engineering educators in integrating EESF resources into existing modules, assessment, and delivery without requiring full programme redesign.

## Who it is for

It is intended for lecturers, tutors, demonstrators, and teaching teams involved in delivering engineering education.

## What you will find

This guide provides support for integrating EESF resources into teaching practice through a practical, step-by-step approach. It includes guidance on using the Teaching Framework, with a brief example to support understanding, and explains how to select an appropriate OER, including expected time requirements and learning outcomes. It also outlines flexible teaching delivery options (in-person, online, and hybrid), offers low-effort assessment ideas, and highlights common challenges with practical mitigation strategies. Finally, it provides direct links and access points to EESF resources and templates.

## How to use this guide.

# How to use this guide

Choose where to start based on your immediate teaching need. This guide is designed to be used as a practical navigation tool, not read sequentially.

- If you are planning teaching, start by mapping your module to learning outcomes using the EESF Teaching Framework.
- If you are selecting content, move to choosing an OER activity that fits your time, topic, and student level.
- If you are preparing delivery, explore the teaching delivery options (in-person, online, or hybrid).
- If you are designing assessment, review the low-workload assessment ideas.
- If you face challenges, go directly to troubleshooting and support.

For a quick overview of key responsibilities and next steps, see the Action Points at a Glance section, which summarises recommended actions for educators, programme teams, and institutional leaders.

The EESF approach is designed to be lightweight and adaptable, allowing you to integrate sustainability competences into existing modules without redesigning your programme.

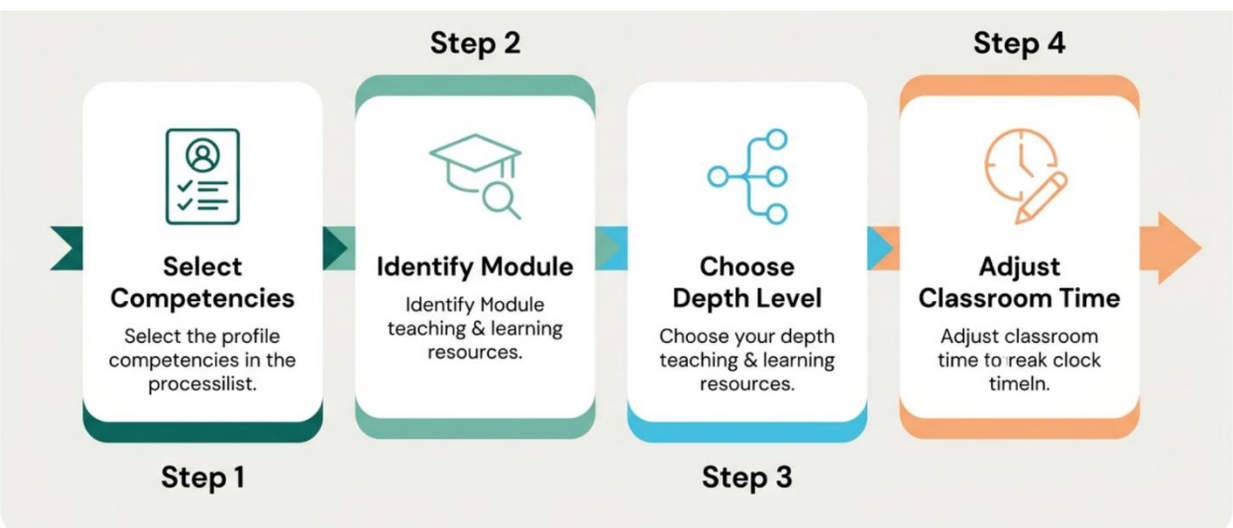
## If you are planning teaching (EESF Teaching Framework)

Start by identifying what students should be able to do by the end of the unit, focusing on learning outcomes rather than content coverage. Then use the EESF Teaching Framework as a mapping layer to connect these learning outcomes with sustainability competences and their alignment with the SDGs. This allows you to make explicit how your module contributes to sustainability goals.

Next, locate where these learning outcomes, competences, and SDG links already exist within your current module structure (e.g. lectures, labs, projects) and identify any gaps or opportunities for reinforcement. This creates a clear baseline without requiring redesign.

Finally, use this mapping to identify one or two relevant EESF OER activities that can be embedded into specific sessions or assessments, ensuring alignment between learning outcomes, sustainability competences, and teaching delivery.

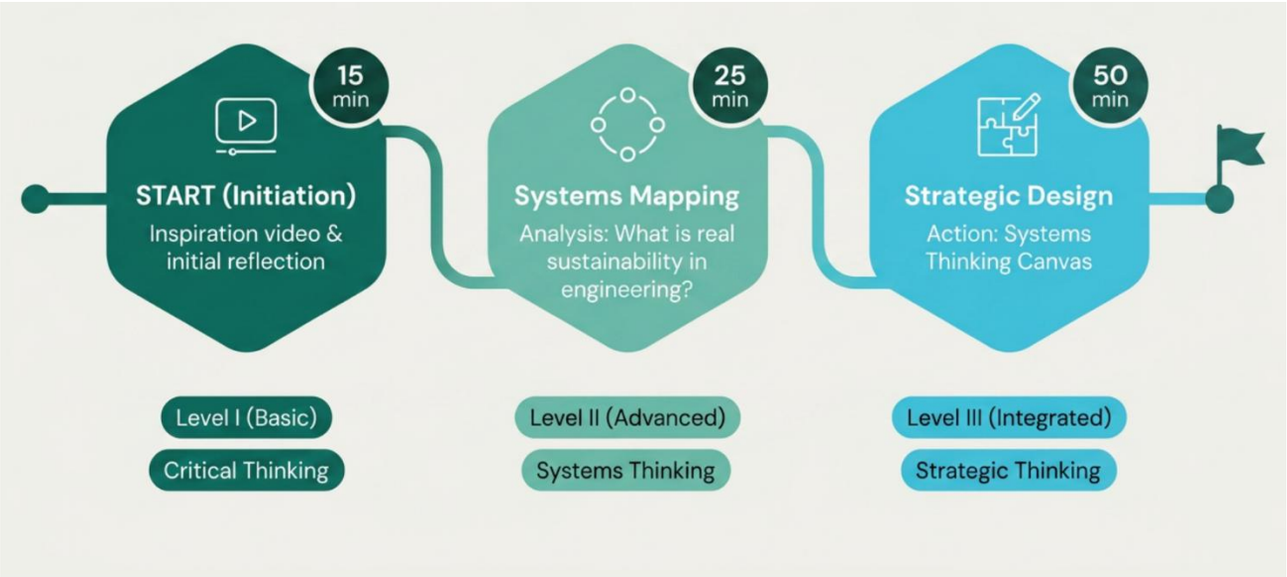
You can use the mapping tool available in the web under **How to use the EESF OERs?** to support the process. This tools allow you to understand better the relationship between competences, SDGs and EESF OER content and activities.




## If you are selecting content (Choosing an OER)

Start by identifying the topic you want to address and the learning purpose of the session, considering both the student level and the available teaching time. Then explore the EESF OER collection and select an activity that best matches your learning outcomes and the sustainability competences you want to develop. EESF has different activities that meet your students' needs.

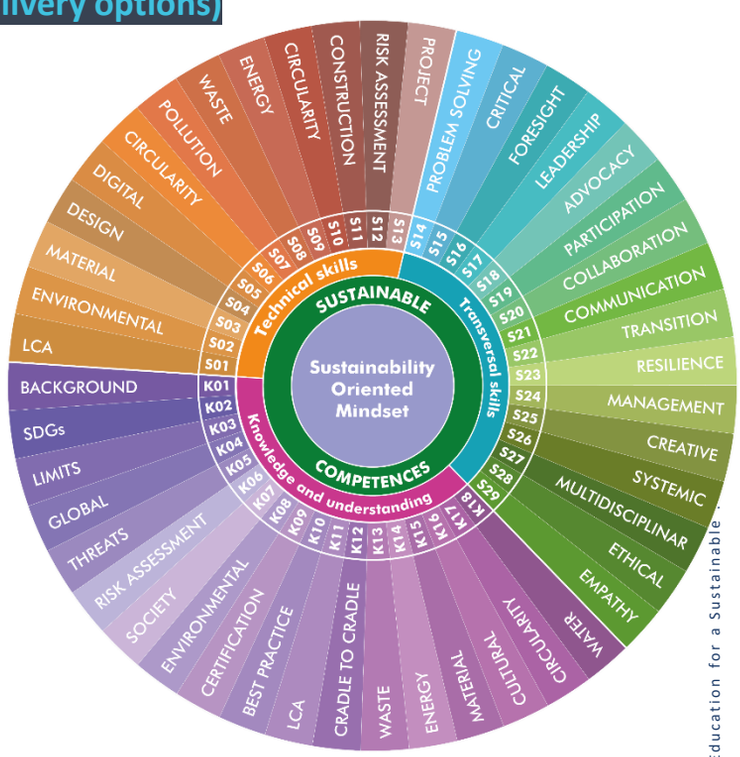
Next, check how the selected OER connects to relevant SDGs and how it fits within your existing module structure, ensuring it can be integrated without requiring major changes. Pay attention to the suggested timing, required resources, and expected learning outcomes of the activity.




Finally, decide how the OER will be used in practice, whether as a standalone activity or embedded into a broader teaching sequence, and adjust it lightly to fit your classroom context.

## If you are preparing delivery (Teaching delivery options)

Start by selecting the OER activity you want to use and consider how it will fit into your teaching context, including group size, timing, and student engagement level. Then choose the most appropriate delivery format (in-person, online, or hybrid) based on how students will interact with the activity and each other. More information about these methods could be found in the EESF Pedagogical Guide



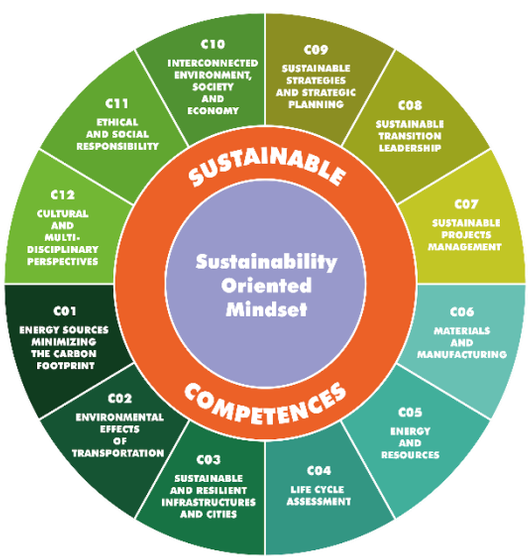
Next, adapt the activity structure to match your delivery mode, ensuring alignment between learning outcomes, sustainability competences, and student interaction. This may include splitting the activity into pre-class, in-class, and post-class components.

Finally, confirm how students will engage with the material across the chosen format and ensure that the activity remains focused on applied sustainability learning rather than content delivery alone.

## If you are designing assessment (Low workload assessment ideas)

Start by identifying what evidence of learning you want from the OER activity, focusing on demonstrated understanding of sustainability competences rather than complex assessment design. Then select a low workload assessment format that fits naturally with the activity, such as short reflections, group outputs, or applied problem responses.

Next, align the assessment task with the learning outcomes and the relevant sustainability competences, ensuring it clearly reflects both subject knowledge and SDG-related thinking. Keep the assessment simple, formative where possible, and directly connected to the activity.




Finally, integrate the assessment into your existing module structure with minimal disruption, using it as a light-touch evaluation of applied understanding rather than a standalone exam-style task.

## If you face challenges (Troubleshooting and support)

Start by identifying the specific challenge you are facing, such as limited time, difficulty integrating content into your module, or uncertainty about teaching sustainability topics. Then relate this challenge back to the EESF structure to identify where support can be applied (Framework, OER selection, delivery, or assessment).

Next, apply a targeted solution using the EESF approach, such as using a single OER activity instead of a full module redesign, simplifying delivery into one session, or using guided materials to support confidence in teaching sustainability competences.

Finally, adjust your implementation gradually rather than redesigning your module, using small iterative changes and feedback from students to improve future delivery.

## The EESF offer

Engineering Education for Sustainable Futures (EESF) provides resources designed to help engineering educators embed sustainability competences and SDG-aligned learning within existing curricula, without requiring a full programme redesign.

At your institution, the core offer to teaching teams can include:

- EESF Teaching Framework (competences, prompts and mapping approach)
- OER modules with lesson plans, learner activities and supporting materials
- Educator guidance for delivery and adaptation
- Short thematic videos that explain the approach and show examples
- Separate integration guides are available for students and for heads of department

| Students and learner experience | Educators and delivery teams | Leadership and programme teams |
|---|---|---|
| **What you get:**<br>• Learning activities linked to real-world sustainability challenges<br>• Clear connections between engineering content and the SDGs<br>• Opportunities to reflect, discuss and apply<br><br>**Start here:**<br>• Ask lecturers which EESF activities will be used this semester<br>• Join feedback activities to improve the resources | **What you get:**<br>• Ready-to-use teaching activities and materials<br>• A framework to map sustainability competences to existing modules<br>• Options for online, classroom and hybrid delivery<br><br>**Start here:**<br>• Pick one EESF activity to pilot in one module<br>• Use the quick-start checklist on pages 11–12 | **What you get:**<br>• A staged pathway to embed EESF at module, programme and institutional level<br>• Decision checklists and a light-touch evidence plan<br>• Integration guide templates that reduce workload<br><br>**Start here:**<br>• Agree 1–2 programmes to start with<br>• Assign a coordinator and confirm timelines |

# Why now

## Ready-to-use vs adaptable

The table below clarifies what can be used immediately and what can be adapted to local teaching needs. EESF resources are designed to balance ease of use with flexibility, allowing educators to either apply materials directly or tailor them to their specific module, discipline, or student context.

| Component | Use as-is | Adapt to your institution context |
|---|---|---|
| **Teaching Framework** | Yes | Map to your institution modules, learning outcomes and assessments |
| **OER activities and worksheets** | Yes | Select examples and adjust scenarios to local modules and industries |
| **Educator guidance** | Yes | Add your institution-specific delivery notes (VLE, lab settings, contact hours) |
| **Integration checklists and templates** | Yes | Insert your institution processes (module boards, programme review, QA cycles) |

## Why EESF matters for engineering education

Engineering programmes are increasingly expected to prepare graduates to work with complex sustainability challenges across energy systems, infrastructure, manufacturing, digitalisation, and global supply chains. EESF supports this transition by offering a practical, flexible teaching approach and ready-to-use resources that can be embedded directly into existing engineering modules

## Why embed sustainability in engineering now

Across higher education and industry, several key drivers are accelerating the need for sustainability integration. Employers increasingly demand graduates who can operate across technical, environmental, and social constraints. At the same time, policy and funding frameworks place greater emphasis on sustainability competences and green skills. Programme accreditation bodies are also strengthening expectations around ethics, impact, and responsible engineering practice. In parallel, students are expecting more applied, real-world learning connected to global challenges. Importantly, there is also a growing need for teaching materials that support this transition without increasing staff workload.

# Why now

## How EESF supports teaching, learning outcomes and graduate readiness

EESF is designed as a supportive layer that enhances, rather than replaces, existing teaching. It enables educators to map sustainability competences onto existing learning outcomes, integrate authentic engineering scenarios through problem-based learning, and build progression from short introductory activities to more complex project-based work. It also supports light-touch evidence collection to reflect on student engagement and improve teaching over time.

## Implementation pathways

EESF is designed to be implemented gradually, allowing educators to start small and build confidence over time.

### Start small (0–3 months)

Focus on quick, low-effort entry points that fit within existing teaching.

Begin by selecting one module you are currently teaching. Choose a single EESF OER activity and map it to one learning outcome. Deliver the activity within your normal teaching context and collect brief student feedback (3–5 minutes) to inform future improvements.

### Embed (3–12 months)

Focus on building consistency across teaching practice.

Use 2–3 EESF activities across a module or programme, and begin to align sustainability language within your teaching team. Introduce at least one low-workload assessment or reflection activity linked to sustainability competences to support evaluation and progression.

### Sustain (12+ months)

Focus on long-term integration and institutional embedding.

Develop a small bank of adapted EESF activities and teaching notes that can be reused and shared across staff. Support onboarding of new teaching staff using the framework and examples. Review and refine implementation annually based on student feedback and teaching evidence.

# What we learned from implementation

## Evidence from pilot teaching (educators and students)

### Educators particularly valued:

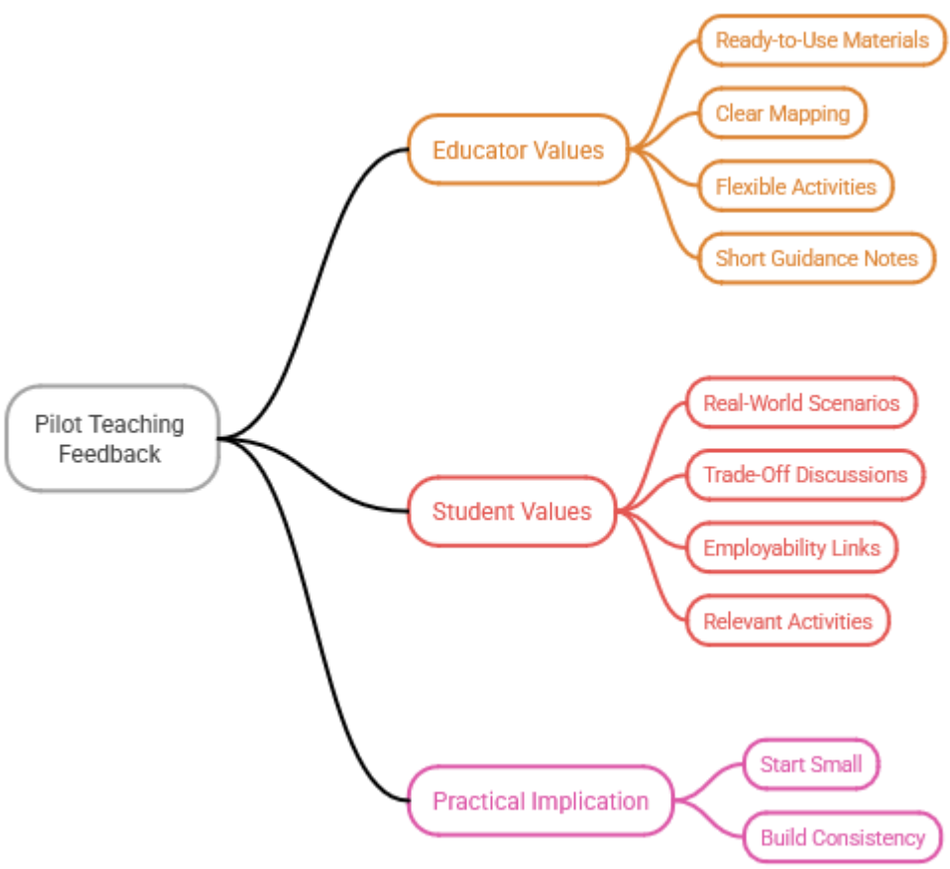
Ready-to-use materials that integrate easily into existing modules, clear mapping between sustainability competences and learning outcomes, flexible activities that can be used across lectures, labs and online delivery, and short guidance notes that reduce preparation time.

### Students particularly valued:

Authentic, real-world engineering scenarios, opportunities to discuss trade-offs, ethics and impact, clear connections to employability and future roles, and activities that feel directly relevant rather than abstract or theoretical.

### Key implication:

Start small with a limited set of activities, then build consistency once teaching staff gain familiarity and confidence.



# What we learned from implementation

## Evidence from quality assurance and Deep Impact (partner learning)

Findings from quality assurance processes and the Deep Impact workshop highlight three critical conditions for sustained adoption.

Consistency matters: Adoption improves significantly when teaching teams share a common language and expectations around sustainability integration.

Workload must remain realistic: Simple templates and short feedback cycles are more effective than complex reporting structures.

Evidence should be light-touch: The focus should be on improving teaching practice, not generating administrative documentation.

Action for implementation: Use the minimum evidence approach in this guide to track engagement and impact without increasing staff workload.

# Common challenges and practical mitigations

While embedding sustainability into engineering curricula can feel demanding at first, EESF is designed to reduce barriers by focusing on practical, low-effort integration. The most common challenge is finding time to redesign teaching materials, which is addressed through ready-to-use OER activities and lightweight integration approaches. Another challenge is consistency across teaching teams, which is mitigated through shared frameworks and common sustainability language. A further barrier is uncertainty about how to assess sustainability competences, which is supported through simple, low-workload assessment options embedded in the resources.

The table below lists common pressures that can make integration harder and practical mitigations that reduce workload. It can be adapted to local teaching contexts.

| Common challenge | What helps | ATU example |
|---|---|---|
| **Limited time for new content** | Use one activity as a replacement for an existing exercise, not an add-on | Pilot in one module and reuse next year |
| **Unclear fit with module outcomes** | Use the Teaching Framework mapping prompts to align to outcomes and assessments | Add mapping notes to module documentation |
| **Confidence and consistency across staff** | Share short examples and run a quick peer discussion in a programme meeting | Create a shared folder of ‘what worked’ |
| **Overly heavy evaluation** | Use a light-touch evidence plan with 3–4 simple indicators | Short feedback snapshot after delivery |
| **Lack of visibility beyond the pilot** | Agree one internal update and one external post per term | Log activity in dissemination sheet |

# Common challenges and practical mitigations

## Benefits over time

EESF implementation generates value progressively, from immediate classroom impact to long-term institutional change.

### Short-term benefits (this semester)

Educators can quickly trial sustainability teaching using ready-to-use activities, allowing students to engage with real engineering challenges from the start. Teaching teams can also gather rapid feedback to refine and improve materials with minimal effort.

### Medium-term benefits (this academic year)

As adoption increases, sustainability language and expectations become more consistent across modules. This strengthens alignment between teaching, assessment, and graduate competences, while also improving visibility of sustainability work in internal quality processes and external engagement.

### Long-term benefits (programme and institutional level)

Over time, sustainability competences become embedded across engineering programmes, supporting clearer graduate readiness narratives and stronger employer engagement. Resources become scalable for staff induction and continuous improvement, while institutions increase their contribution to SDG-aligned education and practice.

# Action point at a glance

EESF is designed to support implementation at multiple levels, from individual teaching practice to programme and institutional development. The following checklists summarise the key actions for educators, programme teams, and leaders, helping ensure that sustainability competences can be embedded effectively, consistently, and with minimal additional workload.

## Start here (3 steps)

| ✓ | **Leadership decision items** |
|---|---|
| ☐ | Agree the scope: which programmes or departments will start first |
| ☐ | Nominate a coordinator and confirm time allocation |
| ☐ | Confirm where resources will be stored and how staff will access them |
| ☐ | Agree a light-touch evidence plan and reporting rhythm |
| ☐ | Confirm how student feedback will be gathered and used |
| ☐ | Plan one internal and one external communication point per term |

## Educator quick-start checklist

| ✓ | **Educator quick-start items** |
|---|---|
| ☐ | Choose one EESF activity that replaces an existing exercise |
| ☐ | Check learning outcomes and assessment fit using the Teaching Framework prompts |
| ☐ | Decide what you will adapt (examples, scenarios, timing) and what you will keep |
| ☐ | Deliver the activity and capture one short feedback snapshot |
| ☐ | Share a two-line reflection with the programme team |

## Assessment ideas (low workload)

| ✓ | **Programme or department items** |
|---|---|
| ☐ | Select pilot modules and confirm who is responsible for delivery |
| ☐ | Map sustainability competences across the programme (where they are taught, practised and assessed) |
| ☐ | Agree a small set of shared language and expectations for staff and students |
| ☐ | Create a shared folder for adapted resources and version control |
| ☐ | Schedule one short peer review or sharing session per term |
| ☐ | Confirm how EESF integration will be reflected in module and programme documentation |

# Resources and templates

## Minimum evidence plan (light-touch monitoring)

Use this plan to track what you used and what you learned without creating additional workload.

| Indicator | Measure | Frequency | Owner / tool |
|---|---|---|---|
| **EESF activity used** | Yes/No | Each delivery | Module lecturer |
| **Number of learners reached** | Count | Each delivery | Module lecturer |
| **Quick learner feedback snapshot** | 3 prompts | Each delivery | Short form or VLE |
| **Staff reflection and improvement note** | 2–3 lines | Each term | Programme lead |

**Quick links**

- Project website and resources: eesfproject.eu
- OER platform or shared folder: (insert link)
- Conference videos and short clips: (insert link)
- Local folder location (optional): (insert link)

**Contacts**

Local teaching and learning support: (insert contact)
Programme lead or module coordinator: (insert contact)
Technical support for the platform or links: (insert contact)

**Templates included**

- Module mapping template (learning outcomes, sustainability competences, assessment link)
- Adaptation notes template (what changed and why)
- Feedback snapshot (short educator and learner feedback prompts)
- Minimum evidence plan (light-touch monitoring)

**FAQ**

Q: Do we need to redesign programmes to use EESF?
A: No. Start with one activity in one module, then scale in stages.
Q: Can we adapt examples to our local context?
A: Yes. The resources are designed for adaptation while keeping the teaching approach consistent.
Q: What evidence do we need to collect?
A: Keep it light-touch: what was used, who engaged and what you will change next time.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