

TrainERGY project

IO Number: 4

Transnational Knowledge Transfer Partnerships for Energy Efficient Operations Curriculum Co-Creation and Peer-Training

Open innovation & co-creation framework for EEO curriculum development methodology  
(QUADRUPLE HELIX CO-CREATION) ENG



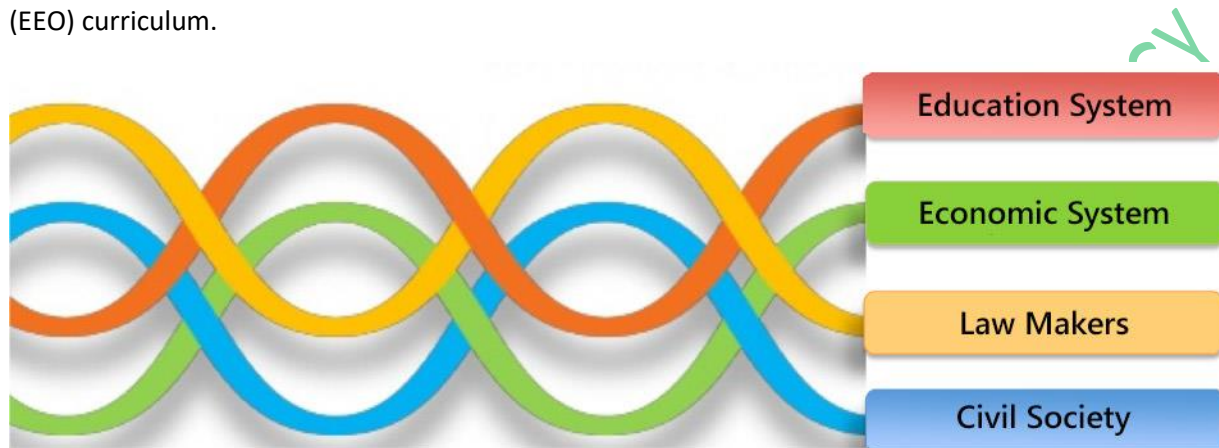
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# 1 Introduction

This document provides an overview on the open innovation & co-creation framework for EEO curriculum development methodology, hereafter referred as quadruple helix co-creation & open innovation toolkit that sustain the who vision of TrainERGY in terms of ensuring a balanced view/insight of all the quadruple helix stakeholders in all the project deliverables with specific relation to the Energy Efficient Operations (EEO) curriculum.



## 2 Overview & Contextual Positioning of the Quadruple Helix

### 2.1 Overview

The roles of the quadruple helix co-creation & open innovation toolkit are:

- Ensure proper goal alignment, skill-gap assessment and mitigation in relation to the EEO curriculum.
- Ensure proper face-to-face quadruple helix collaboration and co-creation during the transnational training sessions.
- Ensure proper understanding the-each quadruple helix actor in order to know how to engage them in the curriculum development and to ensure their sustainable co-creation around EEO in an open-innovation manner.

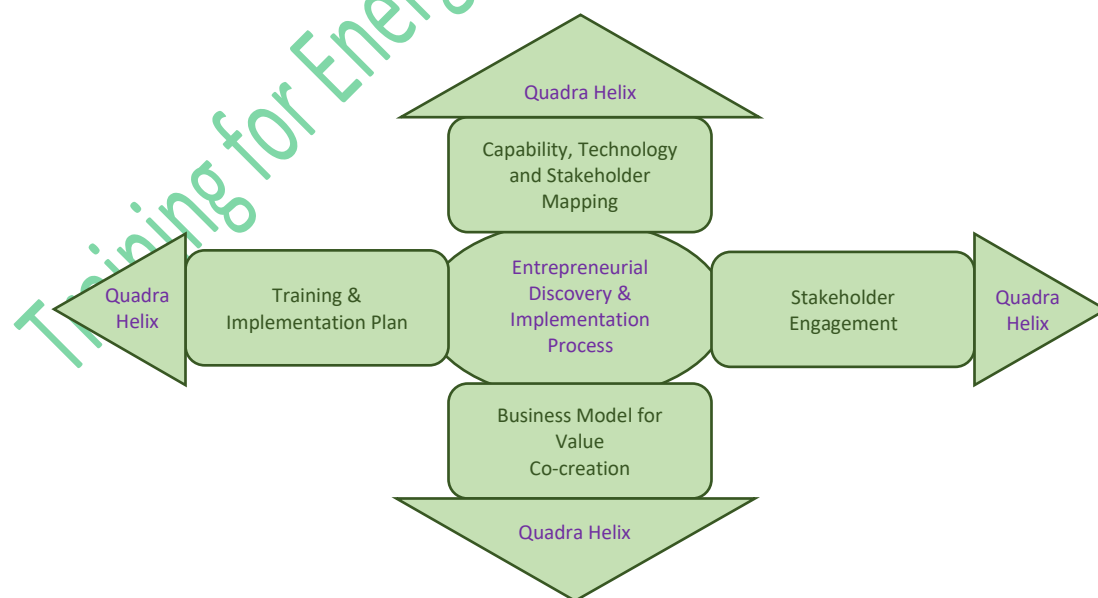
### 2.2 General context

Quadruple helix co-creation & open innovation should be contextualised within the overall interpretation underlying the present situation of EEO curriculum development and expressed in the project structure.

- Science (i.e. EEO), as any other institution of modernity (political institutions, trade unions, institutional religions, etc.), is suffering from the **shift from modern to post-modern society**. Quite paradoxically, while science is becoming technically stronger (in terms of impacts and results), it is also becoming socially weaker.

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- Some **critical issues** pertaining to science & EEO curriculum development are, for example:
  - decreasing authoritativeness and social recognition of scientific institutions and, to a certain extent, decreasing credibility of scientists
  - growing diffusion (as an effect of the emergence of the so-called “post-factual age”) of societal views (of facts, events, processes) which are explicitly alternative or even opposite to those based on science, often propelled by anti-science attitudes and pseudo-scientific beliefs
  - ever-stronger connection between science, environmental and ethical and policy issues, triggering and feeding social tensions on controversial issues and “public battle” among experts
  - increasing sensitiveness of the public towards science-related risks
  - people’s decreasing trust in scientific institutions leading to a growing demand for accountability and transparency
  - need for science institutions to increasingly demonstrate their social, environmental and economic usefulness to citizens as taxpayers.
- It is easy to see that these critical issues are similar to those affecting the other social institutions of modernity. See for example some of the phenomena affecting **politics**:
  - decreasing authoritativeness, social recognition and credibility of politicians and political parties
  - growing diffusion of anti-political and populist views, leading to a decreasing people’s propensity to vote
  - ever-stronger connection between politics and ethical issues, especially regarding aspects like environmental sustainability, privacy, security, medical issues, or civil rights
  - increasing sensitiveness of the public towards risks connected to politics (for example, corruption, connections between politics and industry, high costs of political institutions, etc.)
  - people’s decreasing trust in politicians and political institutions leading to a growing demand for accountability and transparency
  - need for politicians and political institutions to increasingly demonstrate their capacity and usefulness to citizens as taxpayers.

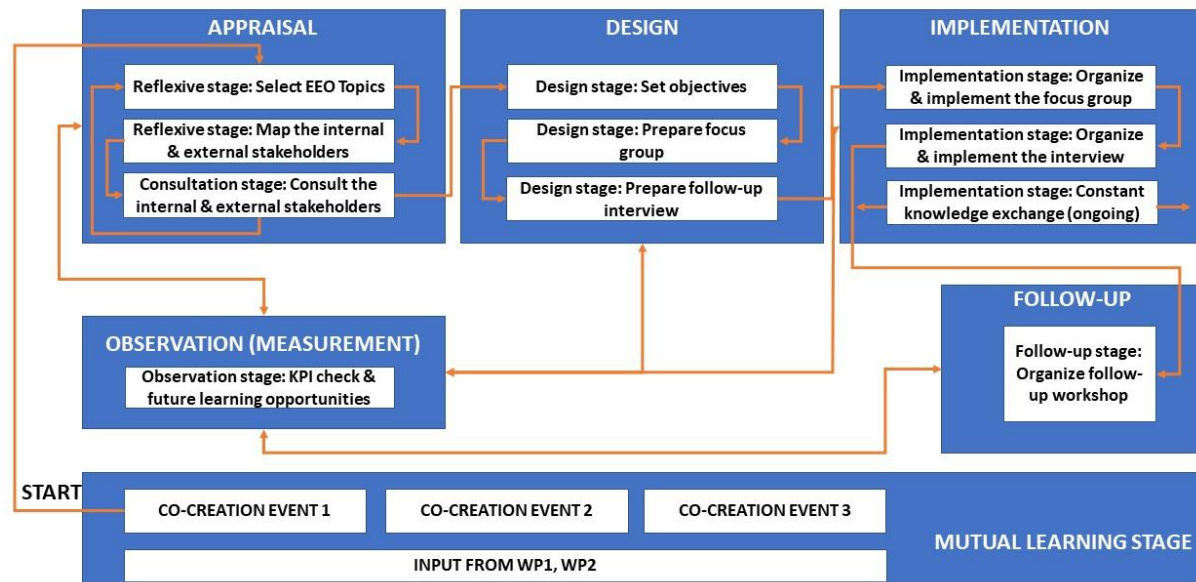


Therefore, there is a high need for a quadruple helix co-creation/communication in all aspects of nowadays society and especially in the prospect of EEO curricula development.

Enabling energy efficient operations (EEO) is a target priority for policy-makers as 23% of CO<sub>2</sub> emissions globally is attributed to business operations, and the EU has set stringent targets for minimizing such negative environmental impact (20% energy savings target by 2020). However, SMEs lack the knowledge to implement such practices (i.e. CO<sub>2</sub> mapping and measurement, operations optimization, efficient network design, smart infrastructure planning, tactics for energy consumption reduction) and achieve EEO which is due to lack of proper market oriented curricula offered by academic institutions that will enable the emergence of graduates suitable to tackle EEO concepts. Still, academic knowledge provided by the higher education institutions can be used to provide solutions for the industry in relation to effective design and implementation of EEO. Alternatively, the industry provides the realistic setting where scientific knowledge can be applied. However, to be effective, Industry-Academia collaborations should be based on mutual trust, commitment and knowledge exchange/sharing of knowledge resources. One way of achieving this 'open communication' between academics and the industry, is through co-creation. Chesbrough (2003; 2013) argued that co-creation is the cornerstone of open innovation practices in today's industry. For example, through co-creation, academia can gain useful input from industry, policy and society, that will eventually lead to more market oriented curriculum and better prepared graduates capable to implement EEO (Chesbrough 2010; Chesbrough 2011).

More recently, Carayiannis (2013) introduced the concept of targeted open innovation arguing that open innovation should be focused, strategic, and tailored to the current needs of the industry, while complying to policy and society's needs. thus universities need to enhance their curricula accordingly. Hence, open innovation and co-creation among the quadruple helix stakeholders will highly increase academia's capacity of producing more market oriented curricula that will lead to graduates capable of being next generation leaders in EEO. To this end, the proposed project (Training for Energy Efficient Operations or TrainERGY) responds to this need by aiming to develop an innovative, evidence-based transnational framework that will markedly improve the knowledge and skills of academic institutions to produce more market oriented EEO curricula, reducing the barriers in this field. The project consortium comprises key academics, SMEs, and industrial association partners from different sectors who will co-create in a quadruple helix approach the envisaged EEO curriculum and will pilot it through an open innovation and co-creation virtual learning environment (VLE).

### 3 Overall method for quadruple helix co-creation & open innovation



#### 3.1 Appraisal

The first main step in the implementation of the quadruple helix co-creation is the identification of the actual (ongoing/new) interests of the main initiating institution (in relation to EEO needs shown by WP1) and description of its main features as exemplified in the table below:

<b>Organizer</b>	<name of the institution>
<b>Description</b>	<few lines denoting the main needs in relation to EEO>
<b>Stakeholders</b>	<list which actors internal & external are involved>

#### 3.2 Mapping

The next step is the stakeholder mapping process (identify internal + external stakeholders).

<b>List the internal stakeholders</b>	<p>Internal stakeholders can be:</p> <ul style="list-style-type: none"> <li>• The research/teaching team (PDRAs, PhDCs, Academics, RAs, etc)</li> <li>• Teaching coordinator / Teaching office</li> <li>• Finance team</li> <li>• Any EEO-related office.</li> </ul>
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	Provide a list with names, full titles/positions and contact of all the aforementioned stakeholders.
<b>List the internal stakeholders</b>	<p>External (quadruple helix) stakeholders can be:</p> <ul style="list-style-type: none"> <li>• Other external institutions interested in EEO</li> <li>• Local/regional/national policy bodies</li> <li>• Other field-compatible research centres, researchers and companies</li> <li>• Citizens and NGOs</li> <li>• EEO influencers, industries</li> </ul> <p>How to identify the external stakeholders:</p> <ul style="list-style-type: none"> <li>• Undertaking a sectoral profile in the region/country to identify the key external players in this field</li> <li>• Undertaking a sectoral profile in other successful regions/countries from EU where the stakeholder-group is well-established in order to identify new relevant external stakeholders</li> <li>• Identification of the main regulatory framework that governs the EEO sector in order to reach the responsible institution (that monitors/control the regulation)</li> <li>• Analysis of the regional/national innovation &amp; science communication policy framework in order to understand the actors involved</li> <li>• Analysis of similar research performed by fellow (or top performing) institutions in order to identify the names of the innovators in this field</li> </ul> <p>Provide a list with names, full titles/positions and contact of all the identified stakeholders.</p>

### 3.3 Consultation

After the stakeholders are mapped (identified), a consultation step will follow:

	<p>An informal survey (2 responses per stakeholder type) targeting both internal &amp; external stakeholders will be implemented. The survey will contain the following items:</p> <ul style="list-style-type: none"> <li>• Description of the EEO challenge (needs)</li> <li>• Description of the purpose of the co-creation</li> </ul>
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<b>Survey/Interview</b>	<ul style="list-style-type: none"> <li>• Assessment of the know-how/implementation of EEO in the stakeholders' institution/work</li> <li>• Assessment of the stakeholder's institutional EEO governance settings</li> <li>• Assessment of the stakeholder's interest, motivation, perceived usefulness of EEO</li> <li>• Assessment of the relevance/usefulness of key related EEO practices &amp; governance settings emerged from WP1, WP2</li> <li>• Qualitative input related to the quadruple helix implementation (how to bring the quadruple helix (related to the ongoing task of developing EEO training outputs) together more effectively</li> <li>• Assessment of the stakeholder's interest in participating in the co-creation events, follow-up interview and follow-up workshop related to the envisioned experiment</li> </ul>
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The quadruple helix co-creation event design step consists of the blueprint required to engage quadruple helix stakeholders co-creation EEO training outputs. In order to proceed to this stage, the stakeholder mapping and consultation must have been finalized to ensure that the entire stakeholder group and their views are properly considered in the experiment design process. As a guide for the design phase, the following table provides an overview:

### 3.4 Design

<b>Organizer</b>	<name>
<b>Topic</b>	<topic.. i.e. EEO area >
<b>Objectives</b>	<p>Stipulate the EEO objectives of the co-creation (based on the identified needs)</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Identify how to embed green marketing in companies and what policy guidelines/support is required ?</li> <li>• Assess what changes are required in the policy framework in the EU to better support companies to implement waste reduction strategies ?</li> <li>• What are the key trends in resource optimization and how do these affect society ?</li> </ul>
	<p>Organize a first focus group with internal + external stakeholders in order to discuss the objectives of the quadruple helix co-creation. This implies:</p> <ul style="list-style-type: none"> <li>• Set the date &amp; time of the focus group (2.5h)</li> </ul>



<b>Focus group</b>	<ul style="list-style-type: none"> <li>• Send invitation to the identified stakeholders to participate in the focus group</li> <li>• Implement the focus group with the objectives that have been set.</li> </ul> <p>The goal of this focus group would be to open to the debate for the achievement/implementation of the previously set objectives. As a result, a clear set of actions will emerge. After this focus group, each stakeholder will be asked to “resume” their normal operation in their institutions and assess/identify how the objectives (through the emerged set of actions) can be implemented (in theory) and what changes/further actions would be required. Such changes can be operational, regulatory, etc. In any case, the idea is to minimize the effort for the stakeholders in order to ensure they participation.</p>
<b>Quadruple helix co-creation implementation approach</b>	<p>The multi-stakeholder management during the focus groups will be implemented following the forthcoming guideline(s):</p> <ul style="list-style-type: none"> <li>• Introductions &amp; overview on the research, chosen EEO needs, objectives of the quadruple helix co-creation.</li> <li>• <u>For each stakeholder</u>: current awareness and interest related to the EEO needs[repeat for each need]</li> <li>• <u>For the internal stakeholders</u>: what do you require from industry and policy in order to better develop EEO curricula into your ongoing teaching framework?</li> <li>• <u>For the internal stakeholders</u>: how can you better involve society in your teaching material design, implementation &amp; follow-up stages and how would this impact on embedding the chosen EEO pillars in your curriculum ?</li> <li>• <u>For industry</u>: what would make you engage more with universities (i.e. internal stakeholders) in order to properly facilitate the development of EEO curricula? What perceived benefits do you foresee and what are the blockers? How is the policy framework supporting such engagement?</li> <li>• <u>For policy makers</u>: How should the co-creation between the internal stakeholders, society and industry evolve in order to</li> </ul>

	<p>properly contribute to the national/regional policies on supporting EEO curricula? What are your main mechanisms to control and monitor the developments of EEO curricula implementation (and how do you measure the impact (graduate know-how) at a local/regional/national level)?</p> <ul style="list-style-type: none"> <li>• <u>For industry &amp; policy</u>: Would you be willing to provide funding for boosting the embedment of the EEO curricula in other universities?</li> <li>• <u>For society</u>: How would you expect to be involved and contribute in the design, implementation and follow-up stages of this ongoing EEO curriculum development? How will your contribution impact on embedding the EEO curriculum in universities?</li> <li>• <u>Consensus</u>: Direct the discussions towards achieving (if possible) a consensus among the stakeholders and set the following next steps that each stakeholder will have to consider.</li> </ul>
<p><b>Follow-up interview/questionnaire</b></p>	<p>Organize a follow-up interview/questionnaire with (the same) internal + external stakeholders in order to discuss the follow-up on the actions set in the first focus group.</p> <p>The objective would be to understand to what extent the previously set actions can be implemented and if (perhaps) any other blockers are emerging while also updating on the research progress. This would enable the internal stakeholders to incorporate progress-feedback in their process of assessing the implementation of the EEO curriculum. Guidelines:</p> <p>The targets upon which the progress should be reported are:</p> <ul style="list-style-type: none"> <li>○ <u>Internal stakeholders (as well as external researchers/universities)</u>: Identify how to involve the quadruple helix stakeholders for better boosting this co-creation for EEO curriculum development. A practical approach could be adopted by the internal stakeholders by piloting the most relevant EEO needs that have been debated during the co-creation meeting.</li> </ul>

	<ul style="list-style-type: none"> <li>○ <u>Policy makers</u>: identify what policy changes are required (and if they are feasible) to better support the quadruple helix co-creation around EEO.</li> <li>○ <u>Industry</u>: identify potential cooperation opportunities with the internal stakeholders and what would be the framework/expected outcomes (win-win) in terms of enhancing the development of marker-oriented EEO curricula.</li> <li>○ <u>Society</u>: identify the current/ongoing needs (based on the overall context discussed in the focus group &amp; related to the chosen EEO needs) and propose ways for the internal stakeholders to account them in the research stages.</li> </ul> <p>Each stakeholder will be contacted by phone for a brief interview (30 minutes) in order to follow-up for each of the set targets.</p>
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### 3.5 Observation

The quadruple helix co-creation will be implemented based on the previously developed design. Throughout the implementation, inter-co-creation knowledge-exchanges (within TrainERGY) as will take place. During the implementation of the quadruple helix co-creation, the teams will promote an idea exchange among them so as to building a common view of the open innovation & knowledge-flows and to learn from each-other.

The ultimate role of observation is not to act as a corrective measure but to identify learning opportunities that will be discussed in the follow-up quadruple helix co-creation events. The observation will take place at the following stages:

- Initial stage (after the quadruple helix co-creation design is finalized)
- Mid-stage (after the follow-up interviews)
- Final stage (after the EEO curricula is fully developed)

The observation will be based on the following co-creation KPIs:

#### Quantitative:

- Representation of each internal & quadruple helix actor
- Interest in EEO of each internal & quadruple helix actor [at the beginning & end of the co-creation ]
- Awareness of EEO of each internal & quadruple helix actor [at the beginning & end of co-creation ]

- Perceived usefulness of EEO of each internal & quadruple helix actor [at the beginning & end of the co-creation]
- Number of EEO best practices, curricula, case studies evaluated and highly rated by the stakeholders
- Number of internal stakeholders involved in the co-creation
- Number of quadruple helix consensus solutions (common agreed plans/steps) for supporting the collaboration around EEO

**Qualitative:**

- Policy change recommendations
- Organizational change recommendations
- Industry proposals for collaboration with academia
- Society-driven proposals for collaboration with academia
- Observation of result/best practice multiplication in the quadruple helix ecosystem

## 4 Operationalizing the quadruple helix co-creation

The quadruple helix co-creation approach described in this document has been used in all of TrainERGY's outputs, however the best example (show-case) of how this is taken into practice is shown by each training event (C1, C2, C3) organizing according to the Training Scheme Methodology document. Each training is basically a quadruple helix co-creation in which actors from each relevant quadruple helix sector gather in various setting (i.e. workshops, trainings, dissemination & co-creation sessions) in order to co-produce the targeted objectives. In the case of C1, C2, C3, the objectives would be to: pilot & subject to open innovation & co-creation the EEO training material & VLE in a quadruple helix context, identify further trainings needs and raise awareness on EEO. In order to organize these sessions, each training event organizer has utilized the quadruple helix co-creation guidelines for engaging the stakeholders and then they have operationalized the co-creation by relying on the training methodology.