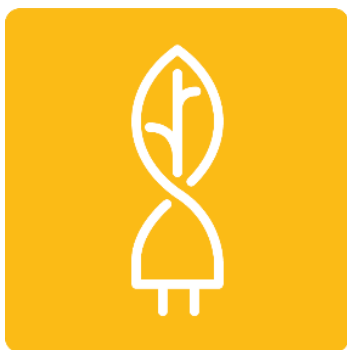


Skills development approach

D2.1

Aleksi Heinonen



SEED
sustainable energy education



Document history

Version	Date	By whom	Main area of changes
0.1	11.1.2022	Aleksi Heinonen	Imported to SEED template, changes based on feedback received
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Summary sheet

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Summary	<p>The European energy market and related skills needs are evolving rapidly. SEED is aiming to address those needs by developing the vocational education of sustainable energy by implementing new solutions, approaches and cooperation models in regional and transnational level. This document provides the guideline for skills development in this context. This guideline was developed in SEED project as part of activities in Work Package 2 Skills analysis fossil free energy. It will be used during the project to guide the skills development activities in all five participating regions and on transnational level. The guideline aims to provide a joint framework for all skills development activities in SEED in the five different regions. It provides a methodology to be used for performing skills scans to assess the skills demand with regional stakeholders and how to address those needs. The primary goal of the skills development is to establish regional Centers of Vocational Excellence (CoVE) formed by regional project partners and stakeholders. The methodology described here will be adapted as part of the CoVEs to create a permanent methodology to help achieving these goals.</p>



COVE SEED

COVE SEED (Centre of Vocational Excellence – Sustainable Energy Education) is focused on providing excellent and innovative vocational education to become a fossil free energy continent. While challenges on the energy transition develop rapidly and technologies are constantly evolving, well-equipped students, professionals and suitable labor capacity are needed. SEED sees vocational education as an important driver for innovation and growth, agile in adapting to the labor market. The objectives of the project are therefore focused on innovative energy education that meets the needs of the labor market: a) Preparing learners, students and professionals with skills and competences for the future; b) Empowering regional innovation based on regional needs; c) Upscaling and promote work-based education, and will lead to d) the establishment of an international learning community and e) establishment of Centres of Vocational Excellence (COVES) in five regions. SEED consists of educational VET providers (EQF level 2-7), working professionals and policymakers from The Netherlands, Finland, Spain, Germany and Greece. The result is an international community on vocational excellence dedicated to sustainable energy. During the project the partners will co-create and increase not only regional cooperation, but also transnational cooperation. Good practices and innovative approaches for learning with impact will be exchanged and developed.

Funded by the European Union. Erasmus+, EU Solidarity Corps under grant agreement No 101056147. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.





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1. Introduction

1.1 Context

The European landscape and energy markets are developing rapidly, especially due to recent developments. The skills demand of workforce is evolving with the same pace. It is important that new skills demand is implemented in VET training and teaching as soon as they have been identified.

This guideline was developed in the SEED project as part of activities in Work Package 2 Skills analysis fossil free energy. It will be used during the project to guide the skills development activities in all five participating regions and on transnational level. The skills development approach described in this document is designed to serve the context of the SEED project and needs to be adapted if applied in other contexts.

1.2 Objectives

The guideline aims to provide a joint framework for all skills development activities in SEED in the five different regions. It provides a methodology to be used for performing skills scans to assess the skills demand with regional stakeholders and how to address those needs. The primary goal of the skills development is to establish regional Centers of Vocational Excellence (CoVE) formed by regional project partners and stakeholders. CoVEs will provide a sustainable framework for promoting the skills development still after the project activities are over. CoVEs will continue utilizing and further developing this skills development approach as a systematic inclusive methodology for addressing the regional skills needs.

1.3 Outline

The report starts with a glossary that defines the terminology used in this document and will be used throughout all the skills development activities in SEED. The next part describes the skills development approach developed for SEED. Then the methodology for assessing regional skills development needs is explained in detail. Finally, the report explains how these identified needs are addressed in the project.

2. Defining a shared vocabulary

As the terminology and used definitions can vary widely depending on the source and the context, it is important to define a shared vocabulary to be used. The shared vocabulary will help to avoid the pitfalls of misunderstandings, while ensuring an efficient cooperation and transfer of ideas between different regional and transnational partners. The terminology was studied based on European Union and other well-established sources.

Most of the definitions were derived from Terminology of European education and training policy published by the European Centre for the Development of Vocational Training (Cedefop). The rest are also well-established definitions set by Unesco and International Labour Organization (ILO). The glossary of most important vocabulary is listed in the following section.

2.1 Glossary of terms

Skill



“Ability to apply knowledge and use know-how to complete tasks and solve problems.”

(Cedefop, 2014)

Comments:

- The term “skills” is often used as an overarching term for the knowledge, competence and experience needed to perform a specific task or job. It will be used like this in the SEED project as well.

Skills development

“Understood in broad terms to mean basic education, initial training and lifelong learning.”

(ILO, 2000)

Soft skills

“Non-vocational, non-technical skills or competences that are needed to perform at work and in society. They apply to work generally, rather than being specific to an occupation or industry. Core employability skills include the ability to work with others and in teams; the ability to solve problems and use technology; communications skills; and learning-to-learn skills.

Also called generic skills, key competences, key skills, portable skills, core skills and transferable skills” (ILO, 2006).

Comments:

- Can be difficult to measure objectively
- Can be innate and personal

Digital skills

“Digital skills are defined as a range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create and share digital content, communicate, and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and social activities at large.”

(UNESCO, 2022)

Green skills

“Abilities needed to live in, develop and support a society which aims to reduce the negative impact of human activity on the environment.”

(Cedefop, 2014)

Comments:

- Can be sector/region/company specific
- Green skills is a very broad term ranging from generic skills to highly specialized technical skills.

Training needs analysis

“Systematic evaluation of present and future skills needs against the skills available to implement an efficient training strategy.”

(Cedefop, 2014)



Skill needs

“Demand for particular types of knowledge and skills on the labour market (total demand within a country or region, economic sector, etc.).”

(Cedefop, 2014)

Skill gap

“Situation where an individual does not have the level of skills required to perform his or her job adequately.”

(Cedefop, 2014)

Skill shortage

“Situation where skills supply (type of abilities and number of people available on the labour market) is not sufficient to meet labour market demand.”

(Cedefop, 2014)

Upskilling

“Short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills and/or competences acquired during previous training.”

(Cedefop, 2014)

Lifelong learning

“All learning activity undertaken throughout life, which results in improving knowledge, know-how, skills, competences and/or qualifications for personal, social and/or professional reasons.”

(Cedefop, 2014)

3. Skills development approach

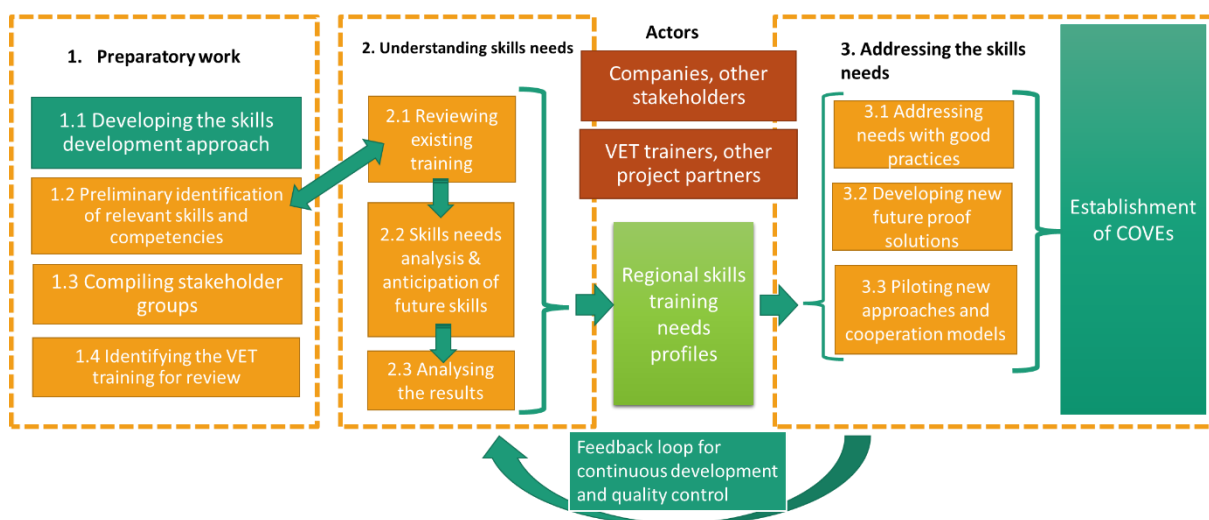
This skills development approach is designed to serve as a general guideline and methodology for all skills development during SEED project. It aims to provide clear step-by-step instructions to be followed for measuring and analyzing the skills needs and for developing and piloting the new innovative solutions to address those needs. The approach will play a crucial role when building the regional innovation ecosystems and establishing Centers of Vocational Excellence.

The skills development process is illustrated in Figure 1. The starting point of the process is developing this guideline and the end goal is the establishment of the five COVEs.

The activities for skills development are divided into three steps:



Figure 1 The skills development process



1. Preparatory work

Skills development approach is first developed and accepted in the project level (1.1). Before the actual skills assessment, regions will identify preliminary the regionally most relevant skills and competencies (1.2), compile stakeholder groups (1.3) and identify the vocational education and training that will be reviewed in the next step (1.4). Regional partners will also preliminary identify the regionally most important generic and technical skills.

2. Understanding skills needs

Skills needs assessment is started by reviewing the VET training selected for the review (2.1). The review will provide information of skills needed before the training and skills gained from it. When these skills provided by each individual course/training are pooled together, an overview of skills provided can be specified. The methodology of these reviews is validated by involving the learners from the reviewed courses to assess the skills they have gained. After this, the skills needs and anticipated future skills needs are assessed in cooperation with the regional stakeholders by surveys and interviews (2.2). This assessment will provide an overview of regional skills demand.

After the assessments a comprehensive analysis is done based on the results (2.3). An overview of skills development needs is created based on the skills demand and skills already provided. The results are also cross compared in order to identify the joint needs and challenges across the regions and the topics where knowledge transfer could be especially beneficial.

3. Addressing the skills needs

In the final step, the regional needs are addressed by implementing various innovative solutions. First, the 16 Good Practices selected for SEED project proposal will be matched with appropriate skills (3.1). Then the good practices that can be used replicated and developed to address regional development needs can be identified. As these Good Practices are unlikely to meet all regional needs, in order to meet all the needs, new innovative solutions, approaches and cooperation models will be developed in regional and transnational cooperation (3.2). An individual set of good practices, solutions and cooperation models are piloted in each region (3.3) and COVE framework for sustainable skills development is developed for each region in strong regional and transnational cooperation.



While the process from identifying needs to addressing them is described as step-by-step process, a strong feedback loop is integrated in the model to ensure continuous development and to address anticipated future skills needs in a proactive way. The steps are described more in detail in the following parts.

3.1 Defining the skills to be measured

When assessing the skills needs in different regions and developing solutions to address these needs, it is important to understand what skills are actually being assessed and developed. The SEED project plan has identified green skills, digital skills and soft skills as essential for sustainable energy education. Although these categories can be seen to cover well the necessary skills, they are not suitable to be used as such, as their definitions are not precise, there are no universal comprehensive classifications available and the categories are overlapping. In particular, the term green skills is problematic as it can refer to a large variety of different skills, only some of which are related to sustainable energy.

In order to streamline the skills assessments, it was decided to restructure the skills in such a way that there are only two categories: generic skills and technical skills. Generic skills include all transversal skills that are not dependent on country, market, employer or job function. These skills can be taught with similar methods everywhere and are transferable with the worker from one work environment to another. Both soft skills and digital skills can be seen to fall under this category. Generic skills are complemented with technical skills that can be sector, field and employer specific and that are less transferrable. Another essential way to streamline the process is that instead of focusing on individual skills, the assessments will focus on competences those skills are related with. This prevents fragmentation of the process and makes it possible to efficiently cooperate on the topic.

Generic skills

European Commission's science and knowledge service Joint Research Centre (JRC) has developed several key competency frameworks. These frameworks are developed to support teaching and learning of transversal skills across the Europe. JRC has developed four frameworks:

- EntreComp: The Entrepreneurship Competence Framework (Bacigalupo, et al., 2016)
- DigComp 2.2: The Digital Competence Framework for Citizens (Vuorikari, et al., 2022),
- LifeComp: The European Framework for Personal, Social and Learning to Learn (Sala, et al., 2020)
- GreenComp: the European sustainability competence framework (Bianchi, et al., 2022) All these four frameworks identify a holistic set of competencies for the framework's topic. By pooling these competencies together, a reference list of relevant competencies for generic skills can be compiled. The compiled list of competencies is presented in Table 2.

The reference list of generic skills adapted from the three JRC frameworks will be utilized to identify generic skills already developed by existing education and market needs in different regions. The tools for reviewing VET training and teaching and performing the market demand assessment, will be developed based on this reference list. Regional priorities and other differences are still likely to be reflected in the assessment results, but the use of the same reference list will allow effective comparison between regions and ensuring common definitions to enable efficient transnational cooperation when developing solutions.



As the list of generic skills is rather extensive a hierarchy will be created during the development of the assessment tools. This hierarchy will make the reference list more manageable and make it easier for regional partners and stakeholders to identify the most relevant skills. In addition to that, regional prioritization will be done by regional partners in order to highlight the expected regionally relevant generic skills to the stakeholders during the skills demand assessment.

Technical skills

Holistic classifications and listings of technical skills are difficult in general, due to their sector and context specificity. With technical green skills it is particularly difficult, due to the fact that the field of sustainable energy is evolving rapidly and continuously.

Therefore, a similar reference list of competencies cannot be compiled for the technical skills. Instead, a list of relevant technical skills/competences will be compiled by a regional activity based on the regional strategies, markets and other priorities. A draft version will be compiled by regional partners along with reviewing the VET training. After the preliminary lists have been compiled by the regional partners, the results are compared in a transnational workshop, where joint categorization is created for the skills and joint definitions and terminology to be used is defined. The regional draft lists will be improved and further developed by stakeholders during the market skills needs assessment.

Table 1 Reference list adopted from JRC core competency frameworks for assessing generic skills

ENTRECOMP		DIGCOMP 2.2		LIFECOMP		GREENCOMP				
Into action	Taking initiative	Information and data literacy	Browsing, searching, and filtering data, information, and digital content	Personal	Self-regulation	Embodying sustainability values	Valuing sustainability			
	Planning & management		Evaluating data, information, and digital content		Flexibility		Supporting fairness			
	Coping with ambiguity, uncertainty & risk		Managing data, information, and digital content		Wellbeing		Promoting nature			
	Working with others		Interacting through digital technologies	Social	Empathy		Systems thinking			
Learning through experience	Sharing through digital technologies	Communication	Critical thinking							
Ideas & Opportunities	Spotting opportunities	Communication and collaboration	Engaging in citizenship through digital technologies	Learning to learn	Collaboration	Embracing complexity in sustainability	Problem framing			
	Creativity		Collaborating through digital technologies		Growth mindset		Futures literacy			
	Vision		Netiquette		Critical Thinking		Adaptability			
	Valuing ideas		Managing digital identity	Managing learning	Exploratory thinking					
Resources	Ethical & sustainable thinking	Digital content creation	Developing digital content	Acting for sustainability	Envisioning sustainable futures,	Acting for sustainability	Political agency			
	Self-awareness & self-efficacy		Integrating and re-elaborating digital content				Collective action			
	Motivation & perseverance		Copyright and licences				Individual initiative			
	Mobilising resources	Programming								
	Financial & Economic literacy	Protecting devices								
	Mobilizing others	Safety	Problem solving				Protecting personal data and privacy			
							Protecting health and well-being			
							Protecting the environment			
							Solving technical problems			
							Identifying needs and technological responses			
Creatively using digital technologies										
Identifying digital competence gaps										

3.2 Preparatory work for Skills development

Activities in SEED will take place: 12/2022-01/2023.



Figure 2 Preparatory steps before Skills needs assessment



Once the skills development approach has been finalized, there are still three preparatory steps needed before the process of skills needs assessments can be started. These steps illustrated in the Figure 3 are performed by each region and coordinated by WP2. There are no restricting interconnections between the steps, and the activities can be performed parallel to each other. Each step is described in detail in the following parts.

Preliminary identification of the relevant skills and competencies

This skills development approach introduces a reference list of competences for assessing skills needs for generic skills and a method for acquiring regional list of technical skills/competences. Since the list of generic skills is rather extensive, the most important skills for each region will be identified. As each region has its unique business structure and individual priority areas, it is important to do this step regionally. The method for this step will be internal workshops where partners preliminary identify the generic skills to prioritize and identify the regionally relevant technical skills. The regional stakeholders will later provide their feedback and input for these lists during the skills demand assessment. It is important to remember that the lists will be living documents and should be updated when new information from regions is gained. The new identified skills and other findings will be communicated and discussed within the consortium as part of an ongoing dialogue on European skills needs in the field of sustainable energy.

Compiling regional stakeholder groups

The core of CoVEs is bringing together a diverse range of regional stakeholders: VET providers, universities of applied sciences, research institutions, employers, and development agencies. These stakeholders have a crucial role in understanding the current and anticipated skills demand and developing new innovative solutions in cooperation with the VET providers.

Stakeholders have an important role in the beginning of the process by helping to define the current market needs and helping to anticipate future needs. To create an innovative and agile skills ecosystem that can adapt to changing needs, new solutions and approaches must involve a



participatory role from regional companies. Therefore, it is crucial to carefully compile the regional stakeholder groups to ensure they accurately represent the sustainable energy sector.

To effectively compile stakeholder groups, each region may consider following these steps:

- **Identify Key Stakeholders:** Include VET providers, universities, research institutions, and industry representatives of all sizes, along with regional development companies and local authorities.
- **Consult Regional Development Agencies:** Work with regional bodies to identify and validate additional stakeholders.
- **Ensure Sector Representation:** Assemble a group that accurately represents the sustainable energy sector and its skills needs.
- **Foster Participatory Engagement and Co-Design:** Use co-design methods and workshops to engage stakeholders in developing innovative solutions. WP3 will provide training and instructions for organizing these regional co-design workshops in upcoming meetings.
- **Organize regular Workshops and Meetings:** Host sessions to discuss market needs and trends, and collaborate on solutions.
- **Document and Review Input:** Capture feedback and update the stakeholder group as needed.

By following these steps, regions can effectively compile stakeholder groups and lay the groundwork for establishing a Regional CoVE that is well-equipped to address and adapt to the evolving skills demands in the sustainable energy sector. The results will be collected in a stakeholder database delivered in work package 7.

Identifying the VET training to be reviewed

In order to prepare for the training needs analysis performed in the next step, all existing vocational education and training relevant to the sustainable energy education needs to be defined first. This review is limited to the teaching and training provided by the VET providers and the Universities of Applied Sciences involved with SEED project. This step is done in each region by the VET trainers supported by other partners. At this stage it is enough that all of courses and training assumed to contribute to sustainable energy education will be identified and listed.

4. Understanding skills needs

Activities in SEED will take place: 02/2023-11/2023.

The starting point of any skills development is understanding the skills needs. The European landscape and energy markets are developing rapidly, especially due to recent developments. The skills demand of workforce is evolving with the same pace. It is important that new skills demand is implemented in education/trainings as soon as they have been identified. The objective is to identify the future demand of skills in a fast-changing environment, which means to identify the needed skills before the skill gap occurs. That way skills needs can be addressed in a proactive manner. Traditionally it takes several years until the changes of curricula can be seen in the skills of workers in the labor market, therefore it is important to emphasize reactivity and future skills anticipation. Otherwise, the skill gap will occur for a too long duration and therefore will be slowing down market developments, thus opportunities will be lost. Traditional curricula development might not be enough to keep up with the pace. During the SEED activities curricula development will be supported by developing new innovative and agile solutions and cooperative models.

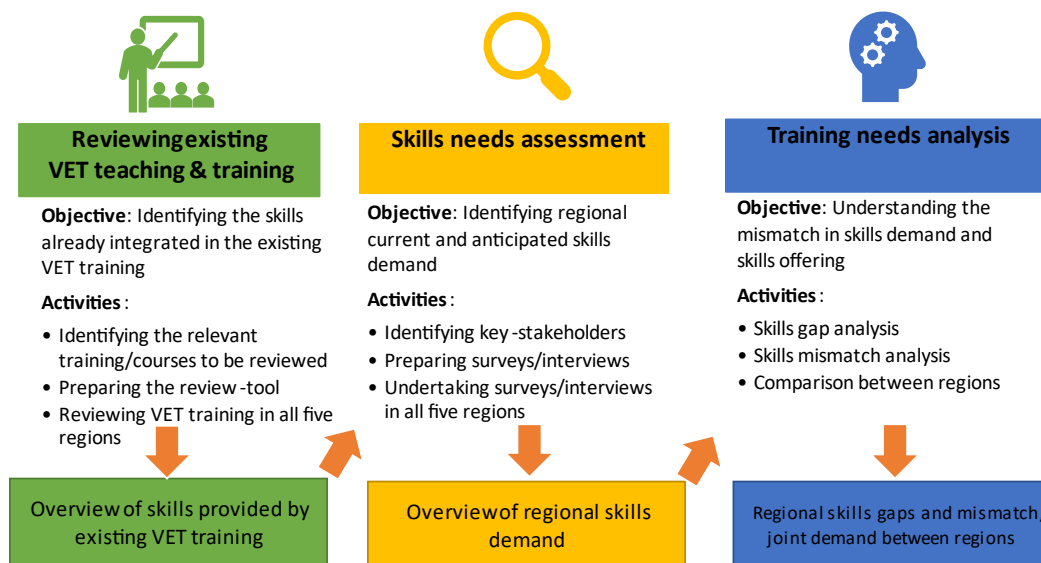


In SEED this activity is performed during spring 2023 with the following sub activities

1. Reviewing existing VET teaching & training
2. Skills needs assessment
3. Training needs analysis

These steps illustrated in the Figure 3 are further described in the next chapters.

Figure 3 Process of assessing skills needs



4.1 Training needs analysis

Activities in SEED will take place: 02-04/2023

The training needs analysis will be performed in each region lead by the VET partners focusing on the training provided by those partners only. The objective of the analysis is to identify what kind of generic and technical skills the training is already developing and what kind of skills learners should have after each training. Together with the results of market needs analysis, the training needs will be revealed. The analysis will be done based on the list of VET training identified.

The analysis will be performed over several internal workshops, where teaching and training will be analyzed. A simple canvas tool based on the black box methodology has been developed in the project to facilitate this analysis. The tool, which is referenced in Figure 4, is used in workshop settings by teaching staff to review the skills outcomes of the training (Granholm et al., 2021). During these workshops, a skills scan canvas is filled out for each course, training, or program relevant to the SEED projects context.



Region & Partner	
Date	
Participants	

N.B! Only the expected skills output is compiled to the Excel and utilized in the WP2. **Pre-requisite skills is optional field** and is there just to help you to learn more about your teaching&training.

PRE-REQUISITE SKILLS	GENERIC SKILLS	TECHNICAL SKILLS
Name of the reviewed course/training/program:		
EXPECTED SKILLS OUTPUT	GENERIC SKILLS	TECHNICAL SKILLS

Figure 4. Canvas tool developed for internally reviewing skills related to teaching and training.

After all the relevant education/training is reviewed, the results will be compiled in excel tool for categorization. In the tool each generic and technical skill identified from a course or training will be categorized based on the categories defined in SEED project. For the categorization of the generic skills the European Skills, Competences, and Occupations (ESCO) Classification for Transversal skills and competences, developed by the European Commission, was employed (EC, 2023). This classification system offers a more streamlined and manageable method for categorization. It is structured around 6 main categories, including: T₁ - core skills and competences, T₂ - thinking skills and competences, T₃ - self-management skills and competences, T₄ - social and communication skills and competences, T₅ - physical and manual skills and competences, and T₆ - life skills and competences. For technical skills, own categorization was developed. Categorization consists of field, skill category, and skill level. The Excel tool is illustrated in Figure 5 and Figure 6.

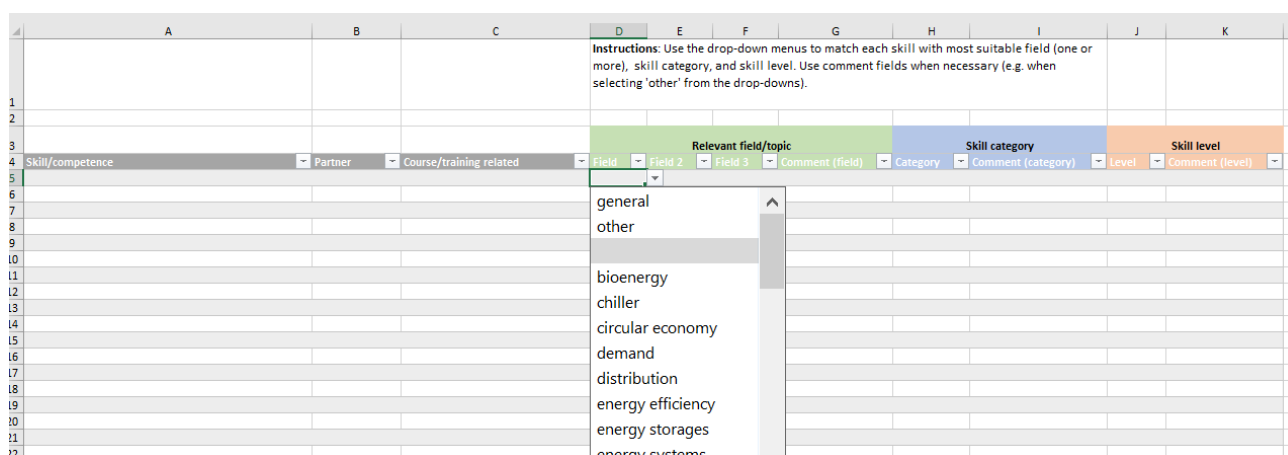


Figure 5. Screenshot of input view for generic skills in the Excel tool.

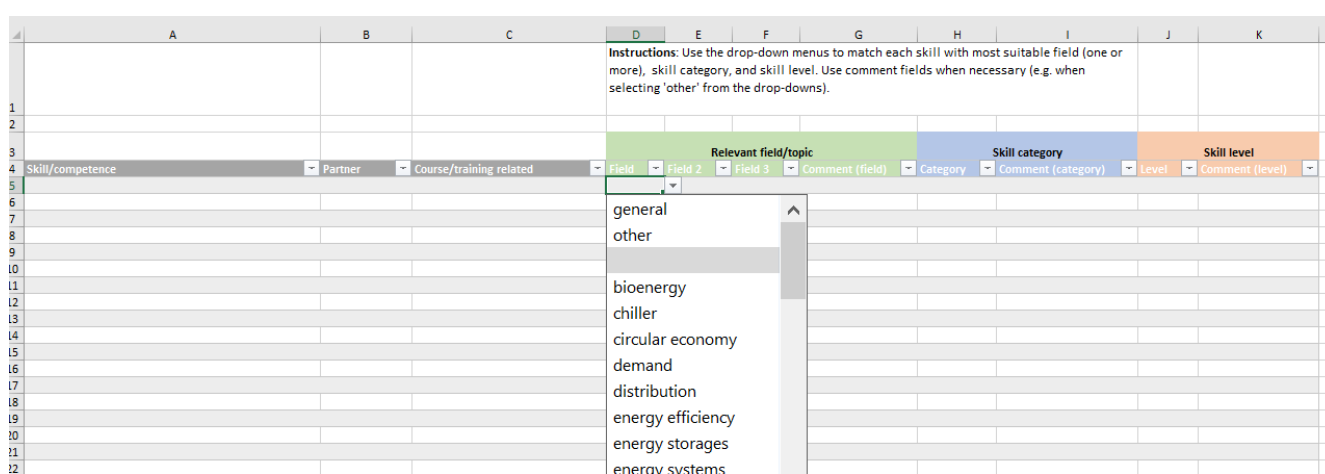


Figure 6. Screenshot of input view for technical skills in the Excel tool.

The canvas and excel templates provide necessary instructions for partners for performing the analysis to ensure that the tools are used in the intended and similar way in each region. This work will also be coordinated in WP2 by frequent meetings, where progress and results are discussed regularly.

As the reviews are based on internal workshops based on subjective professional opinions, the methodology needs to be validated. This is done by involving a sample of learners that have participated some of the reviewed trainings/courses. In a semi-structured interview, the learners will provide their subjective view on the skills they have gained from the training. If the results align well with the results from previous reviews, the review methodology is validated. In case the results are conflicting, the VET training reviews need to be re-evaluated, improved and repeated.

After performing the analysis on each course/training and validating the methodology, an overview of skills already developed can be compiled from the results.

The methodology of the training need analysis is explained more in detail in subsequent SEED deliverable SEED Skills Analysis Report (Heinonen, et al., 2023).

4.2 Skills needs analysis

Activities in SEED will take place: 04-05/2023.



Skills market needs analysis will be performed in each region using the tools developed in the project. Although there are some promising results on how skills needs analysis could be supported with big data analysis (e.g. data mining) such tools will not be utilized in this project due to the huge amount of time, resources and expertise required. Instead, the skills needs analysis will be performed with more traditional tools such as surveying and interviewing the regional stakeholders. This is also seen a better method in that sense that it will enable closer interaction with stakeholders than data-based tools would have, which is beneficial for getting the stakeholders actively involved with the project.

A survey tool was designed based on a list of generic skills identified in SEED WP2. To allow efficient analysis of the results, most of the questions were closed-ended, though open-ended questions were included to enable free input from stakeholders.

Additionally, surveys could be conducted in the form of semi-structured interviews, using the survey form as a framework while allowing more in-depth, open discussions with key stakeholders. These interviews could be conducted in person, over the phone, or via online meetings. During the interview, the reviewer was required to follow the question structure from the survey, filling in the form and making notes of any additional remarks or comments. Importantly, there is no need to record the interviews. To ensure appropriate coverage SEED partners used their own discretion when selecting which stakeholders to interview, with the aim of ensuring both the quality and quantity of responses.

The survey form includes a short introductory text explaining the SEED project, as well as the context and objectives of the skills scans and surveys performed. It is important that these same elements are discussed at the beginning of the interviews to maintain consistency. While the surveys provided broad coverage, the interviews helped enhance the quality of the results and facilitated more accurate analysis. The data from surveys and interviews is gathered to online survey tool (Webropoll) where it can be exported for further analysis.

The output from the skills needs analysis reflected the market's perspective on current and anticipated skills needs, as well as any skills shortages. The methodology of the skills need analysis is explained more in detail in subsequent SEED deliverable 2.2 Comparative Analysis of vocational excellence scans on skills and training material (Heinonen, et al., 2023) where also the final survey and semi structured interview form used can be found as an appendix.

4.3 Analyzing the results

Activities in SEED will take place: 06-11/2023.

After the skills market needs analysis and training needs analysis has been completed in each region, the results will be analyzed by the project. The most important outcome of the analysis are the overviews of regional skills development needs that will be used when designing and implementing solutions to address the needs. In addition to this, the results will be compared between the five regions to identify shared skills development needs or needs that some other region is already covering well with their existing training or necessary future skills some regions might have not identified due to focusing on other areas and markets.

The analysis will be done in the project level in cooperation with each region. At least the following results will be reported:

Per region:

- Skills needs



- Anticipated skills needs
- Skills offering
- Skills shortage
- Skills mismatch
- Overview of regional skills training needs

Project level:

- An overall comparison between the regions
- Shared challenges/skills needs
- Specific topics for knowledge transfer

The methodology and results from the analysis is explained more in detail in subsequent SEED deliverable SEED Skills Analysis Report (Heinonen, et al., 2023).

Overview of regional skills training needs

The overall result of the skills demand assessment are the five regional overviews of skills training needs. The overviews are created with following formula by pooling the current and anticipated regional skills needs and subtracting the skills already provided by the existing teaching and training:

These regional skills training needs will act as recipes for the skills development in the further activities in SEED, describing what kind of solutions needs to be developed in each region to meet all the skills needs.

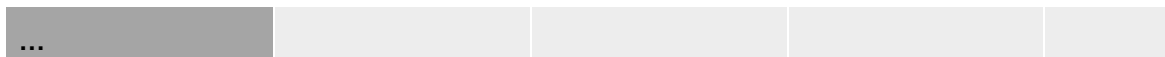
5. Addressing the skills demand

Once the regional skills training needs overviews are compiled, the next step is to address the identified skills demands with tailor-made solutions designed for each region. These solutions will involve replicating successful project practices and developing new, innovative approaches through regional and transnational cooperation. To address all needs systematically, a matrix based on the regional overview of training needs will be used. In the matrix (example in Table 3) each skills demand is matched with one or more possible solutions. The matrix serves as a simple tool to ensure that all needs are addressed.

To effectively match skills demands with solutions, the matrix should apply several key criteria: relevance to the specific skills needs, feasibility within the regional context, effectiveness in bridging the skills gap, sustainability for long-term benefits, scalability for adaptation in other regions, and innovation for new and improved approaches. By applying these criteria, the matrix will help systematically align each skills demand with the most appropriate and effective solutions. These solutions will also be incorporated into regional development plans, which will be developed for each region later in the project.

Table 2 Matrix for matching skills demand with solutions

	Skills demand 1	Skills demand 2	Skills demand 3
Solution 1				
Solution 2				
Solution 3				



5.1 Matching regional training needs with Good Practices

During the SEED proposal phase 16 good practices demonstrating regional innovation were selected to be further developed and replicated in the project. The good practices cover various topics in clusters of Teaching and learning, Cooperation and partnership and Governance. All the Good Practices are presented in Table 4.

The good practices will be documented in detail and the skills the practice is developing will be identified based on the classifications defined in this Skills development approach. The identification will be done regionally by the partners responsible of the good practices in question.

Once all the good practice skills are listed, the regional skills training needs can be matched with good practices to see which of the skills needs can be addressed by implementing good practices. The outcome of the matching process is a range of good practices to be utilized and a list of skills needs that need to be addressed by other means.

Table 3 Sixteen regional Good Practices selected for SEED

Teaching and learning	<p>TL 4 Innovative Learner-centred teaching and learning methodologies</p> <ul style="list-style-type: none"> ▪ "Minor Smart Sustainable Cities" (Netherlands) ▪ "Agrocircularity capacity building programme" (Greece) <p>TL 7 Higher level VET programmes and flexible pathways</p> <ul style="list-style-type: none"> ▪ "VET EQF level 4 to 5" (Netherlands) ▪ "UpTRain level 7", a concept for the integration of a trial further training for level 7 (Germany) <p>TL 8 continuing development of professionals teachers</p> <ul style="list-style-type: none"> ▪ "Vocational training digitalisation plan" (Spain) ▪ "Solarleap PV training for VET teachers" (Finland)
Cooperation and partnership	<p>CP 12 business education partnerships for sharing, exchange</p> <ul style="list-style-type: none"> ▪ "Cooperation between the VET centre of UOWM and the HENDO network" (Greece) ▪ "Applied innovation project Inclusive Energy" (Spain) <p>CP 13 innovation hubs, technology diffusion centres and applied research</p> <ul style="list-style-type: none"> ▪ "Business REgion Turku - regional development company" (FIN) ▪ "BObby Energy HUB: solar charging station for sustainability in micro mobility" (Germany) <p>CP 18 skills competitions, raising attractiveness and excellence in VET</p> <ul style="list-style-type: none"> ▪ "Challenge-based education in Hoefkwartier Amersfoort" (Netherlands) ▪ "Schools competition of Shell Eco Marathon Europe" (Spain)
Governance	<p>GO 25 Making full use of EU (European Union) financial instruments and funds</p> <ul style="list-style-type: none"> ▪ "EU financial instruments and funds to support cohesion policy and the just transition" (Greece) ▪ "Sustainable Energy Impact" (Germany)



GO 23 Developing sustainable financial models that combine public and private funding

- “Public Private partnership model COE” (Netherlands)
- “Machine technology centre TURKU” (Finland)

5.2 Developing new future-proof solutions

After matching the skills demand with suitable good practices in the matrix, new innovative solutions will be developed and piloted in order to address all remaining regional skills training needs. These new solutions are designed in close cooperation with the regional core stakeholders and the transnational SEED consortium. New solutions will be aligned with the EU Commission’s recommendations for future-proof VET (Figure 5). The demand can be addressed for example by:

- Developing new contents to the existing VET programmes
- Training for VET trainers/trainers
- Projects between VET providers and companies
- New regional and transnational cooperation and partnerships
- Student competitions

What is the Commission proposing to make VET future-proof?



Figure 5 Tips from European Commission for future-proof VET (European Union, 2020)

Developing cooperation models

Alongside with implementation of good practices and the development of the new solutions, models for regional and transnational cooperation need to be developed and piloted as well. The cooperation models will support the skills development and create the basis for Centres of Vocational Excellence.

Alongside with concrete solutions to skills needs, new models of cooperation and partnership will be developed for both regional and international knowledge exchange. These models aim to make the development, piloting and deployment of new solutions agile, enabling proactive response to the rapidly developing needs. The aim is also to ensure close involvement of stakeholders in COVE activities enforcing the regional innovation ecosystem. Addressing the increasing needs of sustainable energy sector, will also require reskilling and upskilling workers already on the job market, which requires development of new cooperation models.



The starting point for developing these new cooperations and partnerships is again the SEED Good Practices, where three Good Practices were selected for the Cooperation and Partnerships -category. In addition to the good practices, new modes of cooperation and partnerships will be developed and piloted based on ideas raising from the regional stakeholder groups and the transnational knowledge exchange.

5.3 Establishment of Centres of Vocational Excellence

Once each region has compiled and activated regional stakeholder groups, assessed the skills demand, and developed and piloted new solutions to address the demand, the five Centres of Vocational Excellence can be established to support sustainable energy education. However, in order to adapt the SEED COVEs as a lasting framework for regional and transnational innovation, a sustainable operating model needs to be developed. To support this objective, a transnational learning strategy and regional action plans will be developed. These documents will steer the development of regional innovation ecosystems and the transnational knowledge transfer between the COVEs. Important aspect for securing the operation of COVEs even after the SEED project has ended is finding sustainable governance and financing models. Funding and governance possibilities will be assessed in each region and new models are developed and implemented based on the four SEED good practices related to that topic.

As skills needs in the field of sustainable energy will keep evolving, a strong feedback loop is integrated in COVEs to ensure that emerging needs are responded proactively rather than reactively. In order to recognize the changes in the skills needs and to be prepared the anticipated needs will be periodically assessed with the regional stakeholders. When new needs emerge, skills development is addressed with solutions developed together with regional partners in collaboration with the interregional COVE network. The overall outcome of the skills development in SEED project are the five SEED COVEs, regional innovation ecosystems actively developing sustainable energy education in close regional and transnational cooperation.

6. Conclusions

Work Package 2 will perform the skills needs assessment and analysis for each region based on this guideline during 01/2023-11/2023. The results of this work will be published as a comparative analysis report (D2.2) by 11/2023. The identified skills development needs will be addressed by other Work Packages following the overall methodology described above.

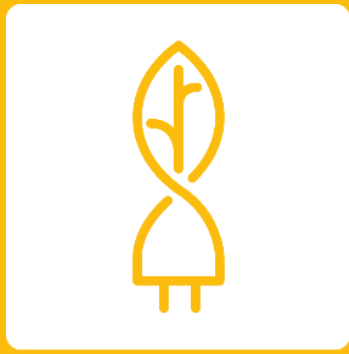
During these activities, this guideline will be clarified, improved or revised if necessary to ensure its relevance throughout the project.

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