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NE(W)AVE

reNEWAble e-VEt learning

From VET learning to jobs in the field of renewable energy: Opportunities and recommendations

newaveproject.eu

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Index

1. Executive summary 1
1. From VET learning to 'green jobs': Current policy background 3
2. NE(W)AVE Experience 14
3. Reasons for Initiating Changes 20
4. Policy Recommendations 22
5. Existing Good Practices in the NE(W)AVE Partner Countries 27
6. Conclusion 31

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1. Executive summary

This paper is the final result of key activities, conducted in the frame of the Erasmus+ project *NE(W)AVE: reNEWable E-Vet learning*[1].

The aim of this paper is to use the experience gained through the NE(W)AVE project implementation to provide evidence based suggestions for local and regional authorities across the EU on how to enhance the integration of vocational education and training (VET)[2] learning pathways and international work-based experience and how to better promote the collaboration between VET providers, companies and other relevant stakeholders.

The content of this paper is designed for a broad range of stakeholders and decision-makers in the field of VET learning and renewable energy, with a particular focus on policy makers, VET institutions, relevant companies, public authorities and NGOs.

In order to demonstrate the diversity in approaches of European countries in the training and further education landscape with regards to the 'green jobs' transition, certain parts of this paper are dedicated to the current situation in the following partner countries: Austria, Denmark, Greece, Italy and Spain. Even though the fragmentation across Europe is considerable, there are a number of overarching areas, which are crucial and applicable to most countries. The following list summarises such areas and at the same time represents the main messages of this paper:

[1] Find more about the project on the project website: https://newaveproject.eu/

[2] Vocational education and training, abbreviated as VET, is the training and skills related to a specific vocation, trade or occupation.

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Dialogue between businesses and educational institutions matter.

Companies and educational institutions should be encouraged to take an active role in seeking partnerships and collaborations. A much-needed balance between the education system and industry demands could be achieved by actively involving the business sector in the design and implementation of learning resources.

The quality and relevance of educational offers cannot be underestimated.

Education systems based on a flexible approach ensure a better response to qualification changes in time. Where possible, renewable energy topics as well as transversal 'skills for green jobs' should be implemented into curricula and lessons, while taking into account local specifics and individual needs of target groups.

Support measures provide significant help for both learners and educators.

A significant strengthening of vocational training programmes is more likely if governments take action, provide subsidies and promote the inclusion of underrepresented groups. For VET providers and professionals, exchanging ideas and experience is important. Joining support networks helps them in keeping up with new regulations and provides a relevant platform for networking. The overall effectiveness of learning could be increased by combining traditional learning resources with coaching and mentoring based on personal contact.

Taking into account the European dimension broadens the horizons.

Promoting European exchange and support in the field of renewable energy and VET learning by establishing new partnerships and mobilities of all forms is crucial to exchange best practices, obtain new knowledge and to gain a bigger insight into the renewable energy sector.

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1. From VET learning to 'green jobs': Current policy background

This chapter offers a brief introduction to current policies focusing on renewable energy and the transition from vocational education and training (VET) to 'green jobs'. As outlined in the following pages, European directives have provided a common framework for the transition towards the use of renewable energy sources and helped Member States to initiate actions. Due to different approaches within partner countries in terms of their education and training systems, but also renewable energy use, this chapter is divided into five country examples, each outlining countries' individual approaches.

Before identifying specific international and national policies and approaches, it is important to understand the meaning of the terms 'green jobs' and 'green skills'. Both expressions do not have a universally agreed definition, which can lead to different understandings and continuously evolving approaches among countries.[3] Already in 1999, OECD defined the environmental goods and services industry as *'activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products and services that reduce environmental risk and minimise pollution and resources'*.[4] Whereas the International Labour Organization defines 'green jobs' more broadly, namely as occupations, which have a positive impact on the environment in both traditional sectors (such as manufacturing or construction) and new green sectors (such as energy efficiency or renewable energy), while meeting the requirements of decent work.[5] The term

[3] 'Skills for green jobs 2018 update', European Centre for the Development of Vocational Training, 2019, https://www.cedefop.europa.eu/files/3078_en.pdf
[4] 'The Environmental Goods & Services Industry: Manual for Data Collection and Analysis', OECD, 1999, https://unstats.un.org/unsd/envaccounting/ceea/archive/EPEA/EnvIndustry_Manual_for_data_collection.PDF
[5] 'What is a green job?', International Labour Organization, 2016, https://www.ilo.org/global/topics/green-jobs/news/WCMS_220248/lang--en/index.htm

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'green skills' is even more complicated to pinpoint, as it is broadly used in various contexts (environmental awareness, technical skills, skills for green sectors etc.). To avoid any confusion, this paper will instead prefer to use the term 'skills for green jobs', which can be understood as '*technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community*'.[6] In light of the transition towards 'green jobs', the provision of relevant skills specifically related to a certain profession in the renewable energy sector is one of the most important conditions leading to success.

The Renewable Energy Directive 2009/28 /EC[7], published on 23rd April 2009, significantly influenced the transition towards renewable energy across the European Union. The directive mandates levels of renewable energy use within Member States and provides a common framework, in which Member States shall develop National Action Plans to increase the use of renewable energy and thus meet the targets set by the EU. The Directive requires that at least 20% of the overall energy consumed within the EU is renewable and sets a number of further requirements regarding the renewable energy sector.

In order to fulfil the requirements, European countries are required to take action and update and adapt their own vocational education and training systems according to the current needs of the renewable energy sector. The current Renewable Energy Directive ends in 2020; the new Directive

[6] 'Green Skills Agreement', Council of Australian Governments, 2009, http://www.ivet.com.au/cgi-bin/user.pl?download_file=1&file=17

[7] 'Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC', Official Journal of the European Union, 2009, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN

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2018/2001/EC (Renewable Energy Directive 2, also known as RED II) has been adopted in December 2018 and raises the target for renewable energy consumption by 2030 even further – to 32%.[8]

In 2011, the International Labour Organization with the support of the EU published a policy paper named *Skills and Occupational Needs in Renewable Energy*[9], which addresses new jobs emerging from the renewable energy sector and the educational adjustments needed. This policy paper underlines that to make the most of investments in renewable energies, governments and social partners need to make sure that the workforce is adequately trained. According to this policy paper, an efficient training system for renewable energy must be integrated within overall policies to support the growth of the sector, involve social partners in the design and delivery of training, and include a good combination of practical and theoretical knowledge. According to research carried out by the consortium, this policy paper was the first to focus on the existing gap between the rapid changes in demand for skills and the difficulties for providers of training and education to adapt their curricula.

The following pages outline the partner countries' diverse education and training systems, as well as different approaches to the ambitious targets set by European policies.

Austria

The Austrian education system is characterised by an early differentiation of VET paths from lower secondary level onwards and a broad VET provision at upper secondary level.[10] Austria has a qualification-oriented VET system, which prepares for broad, well-structured, legally defined

[8] 'Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources', EUR-Lex, 2018, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC

[9] 'Skills and Occupational Needs in Renewable Energy', International Labour Office, 2011, https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166823.pdf

[10] 'The Austrian Education System', Austrian Agency for International Cooperation in Education and Research, 2014, https://www.bildungssystem.at/en/

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vocations ('Berufe') via the combination of an apprenticeship system with a comprehensive school-based VET system (at upper secondary level).

Competence for various VET programmes is divided between national and regional governments. The coexisting governance systems, controlled by different actors, mean that no coherent overall control of the VET system exists. A key role is played by the Austrian social partnership. Traditionally, based on legal entitlements of various kinds, social partners are involved in all major educational issues, thus contributing – particularly in VET and adult education – to intensive interconnections between educational institutions and the society.

In the context of the European Union's climate and energy package, Austria has committed to reduce greenhouse gas emissions by 2020 by another 16% compared to 2005 levels and to increase the percentage of renewable energy sources up to 34% by 2020.[11] In 2010, 30,8% of the total energy consumption was already assigned to renewable energies. The goal of the government is to make energy consumption entirely based on renewable energies by the year 2050.[12] The increase in renewable energy production and consumption in Austria has also led to a higher demand for qualified personnel able to work in the growing sector of renewable energy. This is partly reflected by the fact that an increased number of traditional technical and economic training courses include the subject area of renewable energy in their regular lessons and thus take steps to ensure a medium-level awareness of the graduates.

Austria is generally considered to be a pioneer in the area of energy production and consumption, with the first energy-autonomous model regions established already in the 1990s. Currently, there

[11] 'Klimaschutzbericht', Umweltbundesamt, 2019, https://www.umweltbundesamt.at/fileadmin/site/publikationen/REP0702.pdf
[12] See also: https://www.bmlrt.gv.at/service/publikationen/umwelt/mission-2030-austrian-climate-and-energy-strategy.html

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are more than 80 climate and energy model regions relying on regional resources for their energy supply ('Klima- und Energie Modellregionen').

Denmark

The Danish education system enables a transition already during the education and training phase. Apprentices are employed in companies, where they are able to complete their education and training along their school-based training. The development of the curriculum is done in close cooperation with social partners and the Ministry of Education, which secures that competences in the area of renewable energy are embedded in the curriculum. Local social partners also have a say in the design of the curriculum, which ensures that teaching and educational materials are in accordance with the current needs of companies.

As a reaction to the changing sectors and increased shift towards renewable energy sources, some education programmes have been thoroughly revised and adjusted to better respond to current needs. For instance, the programme for skilled plumbers was updated and renamed to 'energy-plumbing' in 2015, incorporating areas such as energy saving into its trainings and curricula. Apart from updating outdated programmes, Denmark introduced entirely new types of vocational education, such as 'wind turbine operator' and 'environmental technologist'.[13]

In order to promote sustainable development and increase positive effects on employment by creating new green jobs, the United Federation of Danish Workers (3F) set up the 'Green ThinkTank' in 2014. The trade union 3F has also established a special website dedicated to green jobs (www.groennejobs.dk). In their research paper *'Green Transition: The road for new jobs and better*

[13] 'Skills for green jobs in Denmark: an update', Cedefop, 2018, https://www.cedefop.europa.eu/files/denmark_country_report_2018.pdf

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climate' published in 2015[14], the think tank put forward specific recommendations on how to create thousands of new green jobs by focusing on areas such as waste and resources, district heating, energy renovation, bioeconomy and water technology. Moreover, a recent analysis made by the Economic Council of the Labour Movement[15] found that an increased establishment of climate-friendly energy can lead to a creation of 6,700 new jobs within a period of five years. Almost half of the new jobs should be created due to a district heating expansion and almost 2,000 should arise in connection with the replacement of oil and gas boilers. The rest mainly by setting up new wind turbines.[16]

Greece

Despite the fact that training in the workplace increases the probability of being employed after the completion of VET training, in Greece, the percentage of young people who choose to follow vocational education is lower than the European average. More specifically, with regards to lifelong learning, the results of the labour force survey in Greece revealed a 2.4% participation rate in 2011, with a European average at almost 9%.[17] Moreover, the overall greater cost of green solutions leads to a decreased customer demand, and despite their importance, they remain not much sought after. One solution for improvement taken up by the Greek government is the inclusion of financial incentives for workers and unemployed people to take part in continuous vocational training

[14]'Green Transition: The road for new jobs and better climate', Fagligt Faelles Forbund, 2015, https://www.groennejob.dk/dokumenter/documents?page=3
[15] 'Vision Danmark', Fagligt Faelles Forbund, 2020, https://tema.3f.dk/visiondanmark
[16]'Ny Rapport: Klimatiltag Giver Op Mod 7.000 Grønne Job Til 3F'Ere', Fagbladet 3F, 2020, https://fagbladet3f.dk/artikel/klimatiltag-giver-op-mod-7000-groenne-job-til-3fere
[17]'Vocational education and training in Greece: Short description', Cedefop, 2014, https://www.cedefop.europa.eu/files/4130_en.pdf

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programmes, aimed at upgrading their knowledge, skills and competences. Continuous vocational training is already subsidised.[18]

Currently, a very low percentage of young people choose to follow vocational training in sustainable development, and the main reason appears to be the perception of parents and children is that such training is always a 'plan B' rather than the main aim of their learning pathway. According to most recent laws[19] regulating secondary education, which aim, among other things, to attract more young people into VET, students now have more options in addition to general upper secondary school.

Italy

In recent years, the renewable energy sector, and in particular the photovoltaic sector, is experiencing a strong development. Many private companies and VET providers offer specific courses to become installers, maintenance experts and electrical operators of photovoltaic systems. Currently, there is a number of VET providers' offers in the sector, such as the training course addressed to electric operators on solar and photovoltaic systems, arranged by the training and professional guidance agency Afol Sud Milano[20] or the course aimed at installers and maintainers of photovoltaic systems organised by the VET centre A.C.I.I.E.F. in Naples.[21] Some of these courses foresee an internship at the end of the training at renewable energy companies, in order to gain professional experience and a better chance on the job market. In the past ten years, there has also been a significant increase of university courses addressing environmental issues. Annually, over

[18] Ibid.
[19] 'Greece: Organisation of the Education System and of its Structure', European Commission, 2019, https://eacea.ec.europa.eu/national-policies/eurydice/content/organisation-education-system-and-its-structure-33_en
[20] See here: http://www.afolmet.it/index.php/chi-siamo/
[21] 'Corsi fotovoltaico', Ambiente&Energia, http://www.ambiente-energia.info/fonti_di_energia/corsi_fotovoltaico.html

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500 public and private bodies offer around 2,000 climate-related courses, with a number of participants ranging from 50 - 55,000 people.

The *'National Strategy for Sustainable Development (SNSvS)'* draws a vision of the future and development focused on sustainability, as a shared and essential value to face global as well as national challenges of Italy. As a consequence of this strategy, in 2018, the Italian government adopted guidelines for cooperation initiatives on energy and development. In order to support policy elaboration in the domain of development cooperation and sustainable energy, key stakeholders from civil society, the private sector, research institutions and academia were involved in drafting the guidelines within the framework of the 'Multi-stakeholder platform [on Sustainable Energy]', established in 2016. The cross-sectoral approach to the implementation of SDG7[22] (affordable and clean energy) helped identify synergies between sustainable energy, economic development, food, water, health, climate change, gender equality, local empowerment and humanitarian aid. The process enabled the government to define clear, comprehensive and coherent implementation guidelines that integrate the objectives of the 2030 Agenda and strengthen the SDG implementation.

The professional qualification for the installation and maintenance of biomass boilers, fireplaces and stoves, solar photovoltaic and thermal systems on buildings, low enthalpy geothermal systems and heat pumps, better known as the *Fonti Energie Rinnovabili (FER) qualification*[23], is an obligation introduced by the '*Legislative Decree 28/2011*[24] *- Implementation of Directive 2009/28/EC on the promotion of the use of energy from renewable sources'*. In order to obtain the FER qualification, it

[22] 'Ensure access to affordable, reliable, sustainable and modern energy', United Nations Sustainable Development Goals, https://www.un.org/sustainabledevelopment/energy/
[23] 'Quadro Normativo', Registro Nazionale Installatori FER, 2018, https://www.registroinstallatorifer.it/quadro-normativo.html
[24] 'Decreto Legislativo 3 Marzo 2011 N.28', Certifico, 2017, https://www.certifico.com/ambiente/legislazione-ambiente/4957-decreto-legislativo-3-marzo-2011-n-28

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is necessary to have experience on the field but also a compulsory training course with a minimum duration of 80 hours. For this purpose, all Italian regions activated a training programme focused on photovoltaic system installers or in some cases, entitled specific VET providers who organise and implement the programme.

Even though Italy experiences a clear shift towards the use of renewable energy and green jobs, a lot remains to be achieved. The current system in Italy is not particularly flexible, mostly due to the weakness of the Italian public administration, which causes delays that prevent the modernisation of systems according to various territorial contexts and their cultural and economic vocations.

Spain

Spain has suffered different periods in terms of renewable energy development, with intervals of low development mainly due to the ineffective policies implemented during the last economic crisis. However, since 2019, renewable energy, and more specifically photovoltaic and wind energy, has been undergoing a strong evolution caused by the change in national renewable energy policies, particularly by the Royal Decree 244/2019, of 5th of April, which regulated the administrative, technical and economic self-consumption power and initiated a new revolution in photovoltaic system installations. This significant development has been also possible due to the reduction costs of photovoltaic panels, which resulted in a strong payback reduction.[25]

The following graphic shows the influence of policies adopted over the years on the development of renewable energies in Spain, specifically on photovoltaic and thermosolar energy.

[25] 'Analysis of the key developments introduced by the new Royal Decree 244/2019, of 5th April, regulating the administrative, technical and economic conditions of self-consumption of electrical energy', Osborne Clarke, 2019, https://www.osborneclarke.com/insights/analysis-key-developments-introduced-new-royal-decree-2442019-5th-april-regulating-administrative-technical-economic-conditions-self-consumption-electrical-energy/

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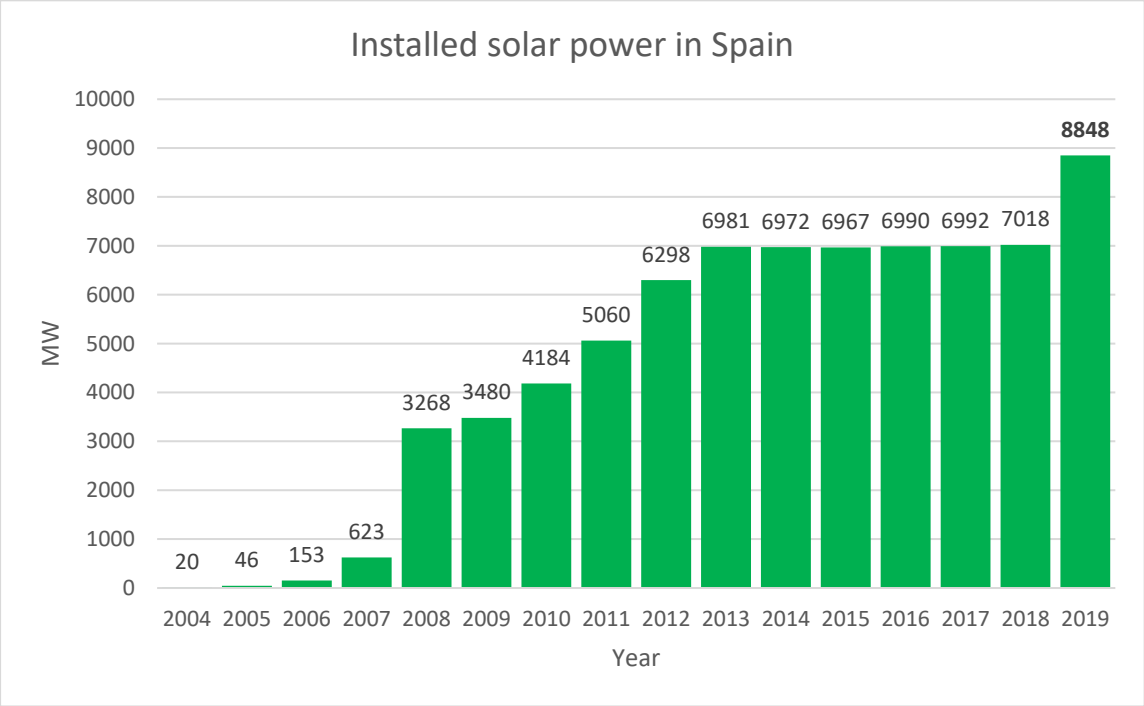

Influence of the policies adopted on the development of photovoltaic and thermosolar energy in Spain 2004-2019. Source: Own elaboration from Red Eléctrica de España (REE) data

The graph clearly shows that, since the implementation of the Royal Decree for the promotion of renewable energy in 2019, there has been a strong growth on the development of photovoltaic and thermosolar energy in Spain.

Despite positive developments outlined above, there is still a reduced educational offer in the renewable energy sector, currently causing a discrepancy between the education system and the demands of the industry. Practical trainings, where problem-solving skills are included (in terms of how to manage and solve technical problems in the renewable energy field) are mainly present in VET degrees. Despite the fact that there are VET degrees in renewable energy in Spain, the current focus on educational offer in the renewable energy sector is mostly on universities, which generally offer broader and more multidisciplinary programmes. The outstanding reasons for low levels of

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vocational training are large market fluctuations and the current structure of the industry, in particular for wind and photovoltaic energy. In many cases, the sector relies heavily on outsourcing. These subcontractors do not necessarily have specific skills for the renewables sector, but they are able to execute, for example, generic electrical works. If renewable energy companies continue to outsource these tasks, the sector as such will most likely have no interest in communicating with the education sector to work together on trainings in more specialised areas.

In this sense, the *'Spanish National Integrated Energy and Climate Plan (PNIEC) 2021-2030'*[26] addresses the challenge of training qualified professionals, both in the area of decarbonisation and in energy efficiency, and proposes measures related to knowledge generation, dissemination, awareness and training of professionals. The Plan emphasises the need for cooperation between the General Administration, the autonomous communities with competences in education, and companies, where an important part of trainings and trade unions are developed. In addition, the Plan recognises the need for training to enable the mobility of professionals within the European Union, where it is aspired to reach a single market in renewables.

[26]'Borrador Actualizado del Plan Nacional Integrado de Energía y Clima 2021-2030', MITECO, 2020, https://www.miteco.gob.es/es/cambio-climatico/participacion-publica/pniec_2021-2030_borradoractualizado_tcm30-506491.pdf

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2. NE(W)AVE Experience

The aim of the Erasmus+ Project *NE(W)AVE: reNEWable e-VET learning*[27], is to contribute to the employability of NEETs[28], VET learners and young professionals in relevant technical and manual professions by upgrading their competences, and by establishing VET-business partnerships in the renewable energy field among the partner countries in Italy, Austria, Denmark, Greece, and Spain.

Key activities and results

Key results

During its lifetime, NE(W)AVE has planned, developed and introduced a total of four key results:

1.Gap analysis	• Outlines the real and current needs of the sector in terms of thematic content and requirements of companies.
2.Online course	• Upgrades and converts existing competences of VET learners and empowers them to work in the renewable energy field.
3.E-toolkit	• For VET trainers dedicated to online training and the management of European mobility.
4.Best practices	• Available to institutions, companies and public administrations to strenghten sectoral policies in the renewable energy field.

Key results of the NE(W)AVE project.

[27] *NE(W)AVE: reNEWable e-VET learning is funded by the Erasmus+ Programme, Key Action 2 – Strategic Partnership in the field of VET.*
[28] NEET stands for „Not in Education, Employment or Training" and refers to individuals, who are not employed, not in school or vocational training.

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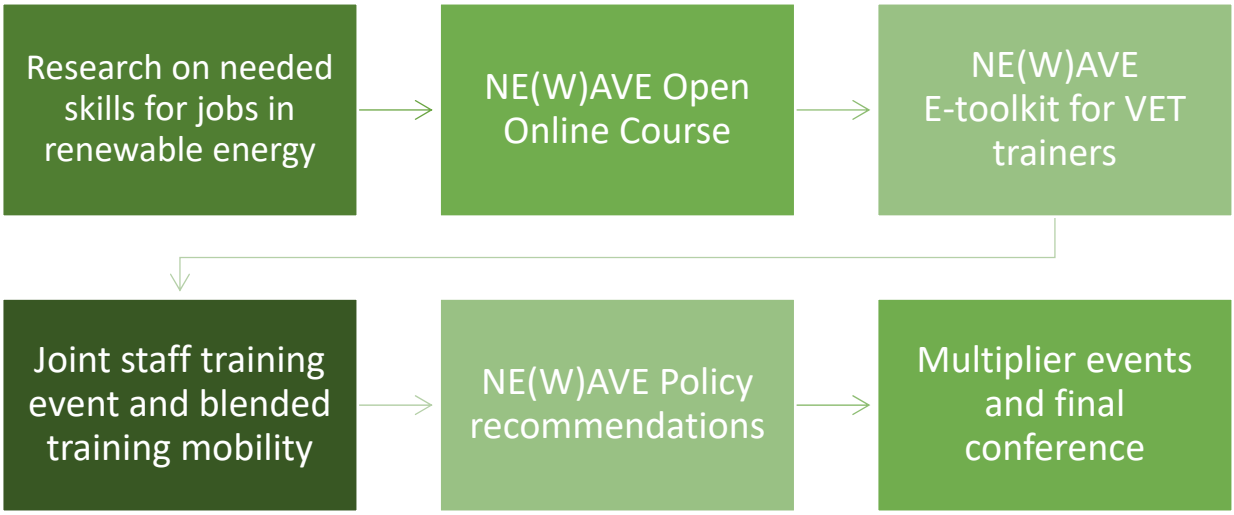
Key activities of NE(W)AVE vary from research reports to online courses and interactions with key target groups. All activities have been carefully developed throughout the entirety of the project and can be summarised into the following six main areas:



Key activities of the NE(W)AVE project.

NE(W)AVE initiated its activities with the development of the document ***'Research on Skills Needed for Jobs Related to Renewable Energy'***[29], which provides a general glance on the situation in the renewable energy sector and the process of an appropriate adaptation of relevant skills in the project partner countries. The project then proceeded with the development of the innovative

[29] The Research in all partner languages + English is available here: https://newaveproject.eu/media/newave-io1-overall-report-en.pdf

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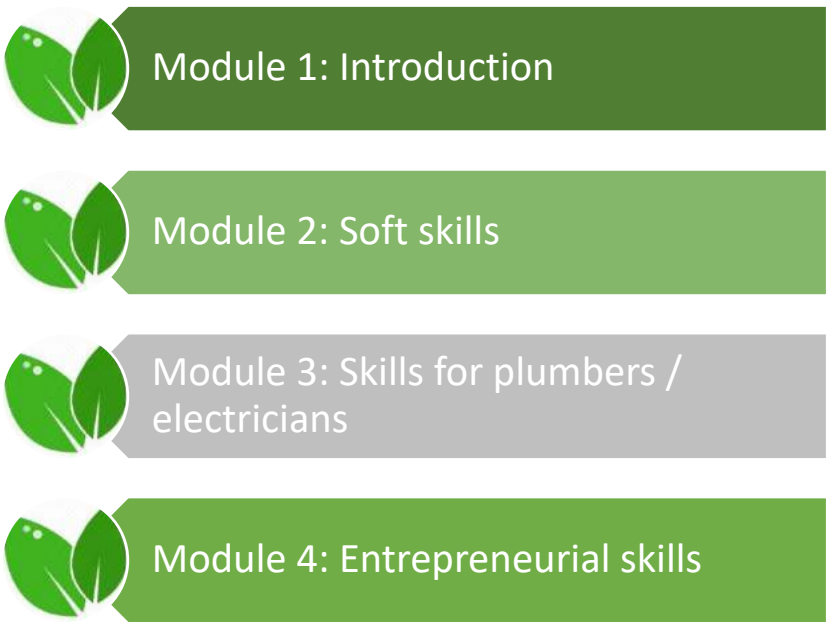
training course ***'NE(W)AVE Open Online Course (OOC)'***[30] addressed to future professionals of the renewable energy sector, especially plumbers and electricians, who wish to upgrade their competences and requalify themselves in this field. The online course consists of the following four modules:



List of NE(W)AVE Modules.

All modules are accessible on the developed e-learning platform on the project website. The modules are available free of charge and in all partner languages + English.

The project further developed the ***'NE(W)AVE E-toolkit'***, a ready-to-use training tool for VET trainers. Apart from containing the Open Online Course (OOC) itself, the E-toolkit offers VET trainers

[30] The NE(W)AVE Open Online Course is available here: https://newaveproject.eu/course/

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tailored materials, important guidance and relevant tips on how to implement and work with the developed products.

A milestone of the NE(W)AVE project has been the ***'joint staff training event'***, where a total of six mentors working at partner organisations underwent a training on the importance of mobility, not only from a social and educational point of view, but also from a professional one. The aim was to prepare the mentors to host VET learners during the next milestone – the ***'blended training mobility'***, an international work-based experience for VET learners, where theoretical contents of the Open Online Course are put into practice. Upon completion, all trainees received the Europass Mobility Certificates prepared by their sending organisations.

The final step of NE(W)AVE is the development of the herewith presented ***'Policy Recommendations'***, which aim to exploit the key project results and introduce suggestions for local and regional stakeholders on how to integrate VET learning pathways, international work-based experiences and how to enhance collaboration between VET providers, relevant companies and other stakeholders.

An integral part of NE(W)AVE is also the ***final conference*** and ***multiplier events***, which are organised in the partner countries with the aim of sharing the project outputs with a wider audience. Both types of events aim to disseminate the project, to multiply the project's results by offering VET providers the chance to learn how to integrate training resources into the framework of their own institutions, and finally to disseminate the project's results to national and European stakeholders.

Evaluation of student activities in NE(W)AVE

Partner countries have used the following means of evaluation within both the Open Online Course and the mobilities:

- Certificate of participation for electricians and for plumbers at the end of the course

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- Self-assessments and tests embedded in the Open Online Course
- Table of competences for every learning module in the Open Online Course
- Europass Mobility for the trainees attending the training mobility

The above stated evaluation tools ensured that students worked independently and without teachers present. The table of competences, used to assess the VET learners' competences at the beginning and at the end of the course, served as an effective checklist what students are expected to learn. The Europass Mobility covers the practical part of the students' learning and is a very valuable document to record knowledge and skills acquired in a foreign European country, moreover, it is an important document for students in their future career, as it documents the international obtaining of skills as well as the willingness to go abroad to study and learn.

Validation of students' learning abroad

Key Action 2 (KA2)[31] projects, including NE(W)AVE, are extremely valuable in creating a solid ground for further cooperation and development – in our case within the green sector. To bring KA2 projects further, we recommend the integration of the European Credit system for Vocational Education and Training (ECVET) and the implementation of available tools in order to establish transfer and validation of skills and competences acquired in the Open Online Course and through mobilities. ECVET is a set of tools, which allows to accumulate, transfer and use learning in units. The added value of ECVET is the possibility to apply it in different countries and within different educational contexts.[32] In the case of further development of the achieved NE(W)AVE project

[31] Key Action 2: Cooperation for innovation and the exchange of good practices is one of the activities, which can be funded under the Erasmus+ programme. Within Key Action 2, organisations from across Europe work together with the aim to develop innovative practices in the field of education, training and youth.

[32] 'European credit system for vocational education and training', Cedefop, *https://www.cedefop.europa.eu/en/events-and-projects/projects/european-credit-system-vocational-education-and-training-ecvet*

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results, partner countries are strongly encouraged to develop a programme for European Green Education by using ECVET tools.

Sustainability of NE(W)AVE

The NE(W)AVE project is designed to have positive effects on target groups during its duration and beyond. This is due largely to the structure of the project and the methodology used; in particular the opportunity to transform the outcomes into a source for future activities will ensure its long-term impact. The quality of the outcomes, piloted and developed by transversal processes from local to EU level, ensure their relevance and future interest in their use.

The following results, outputs and services will be offered during and beyond the project lifetime:

***NE(W)AVE Open Online Course and E-toolkit:** the Open Online Course and the E-toolkit will remain available at least 3 years beyond the project lifetime and will be enriched by the VET trainers' contribution through the Online Course forum.

***Transferable Open Online Course:** due to its structure and the multilingual content delivery, the Open Online Course will be transferable to different learning platforms in order to ease the adaptation by VET providers. The English version will allow VET providers in other Member States to benefit from the Online Course.

***Availability in five languages:** all materials will be available in five languages (English, Italian, German, Greek and Spanish) and accessible free of charge.

***Materials available on an Open Platform:** uploading the resources in the Erasmus+ Open Platform will ensure a long-term sustainability not only for the developed products, but also for the idea behind it: the cooperation among users and the usage will inspire a sustainable dialogue among its members, on the path of an open and lifelong learning.

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3. Reasons for Initiating Changes

The Copenhagen Process initiated the development of vocational education and training systems by agreeing on a strategy to improve the results, quality and attractiveness of VET-education. In Bruges in 2010, the European community again emphasized the importance of cooperation and continuing the work on the Copenhagen Process as an integrated part of the strategical goal for education and training in 2020. In 2015, all United Nations Member States adopted the Sustainable Development Goals (SDGs), also known as the Global Goals, as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. With regard to NE(W)AVE, Goal 7 of the SDGs – *'Affordable and Clean Energy'* – is particularly relevant, as it seeks to ensure access to affordable, reliable, sustainable and modern energy for all. This will only be possible if VET providers actively incorporate SDG visions into their programmes.

In order to develop a well-skilled labour force ready to work in the renewable energy sector and answer EU's regulations and low carbon agenda, changes in policy and systems on national levels are necessary. Member States should follow the recommendations introduced by the EU, otherwise there will be an alarming lack of trained labour force in this sector. This is true especially for those occupations, which are very specific and require high technical skills, knowledge and constant trainings to update their competences in a field that is always rapidly changing.

With respect to training processes of students, political changes are crucial. Well-designed changes in policies ensure the alternation of training and schoolwork in a way to increase job opportunities and enhance the skills of students. It is also essential to change the mindset about vocational

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training in sustainable development among students and their parents. Even though frequent reforms are made, they have not succeeded in providing a solid perspective for VET graduates.

Following the 2020 energy and climate package, the EU has outlined further targets for the period from 2021 to 2030 through its *2030 climate and energy framework*.[33] The framework sets three ambitious key targets to be reached by 2030: at least 40% cuts in greenhouse gas emissions (from 1990 levels); at least 32% share for renewable energy; at least 32.5% improvement in energy efficiency. Moreover, the 2050 long-term strategy sets the objective of making the EU climate-neutral by 2050. EU is thus at the forefront of the transition to a greener economy, which implies the creation of new green jobs and structural changes across various sectors and occupations. In order to reach EU's goals, Member States should adjust their internal regulations, including adjustments among national and regional VET providers, who should offer regularly updated training courses, which address new professions in the renewable energy sectors and the needs of the job market. Companies in the sector will have to be constantly aware of the emergence of new needs and actively communicate with VET centres to help them provide effective and up-to-date training courses.

The NE(W)AVE report *Research on Skills Needed for jobs related to Renewable Energy*[34] found that many green job opportunities are expected to be created especially for positions which require high technical skills. However, the project countries experience a skill discrepancy between job demands and learning offers caused by the lack of flexibility of the VET systems on the one hand and the low level of communication between companies and VET providers on the other.

[33] '2030 climate & energy framework', European Commission, https://ec.europa.eu/clima/policies/strategies/2030_en

[34] See the Report here: https://newaveproject.eu/outputs/

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4. Policy Recommendations

The recommendations presented in this document have been compiled by the NE(W)AVE project partners based on the experience and information acquired throughout the project lifetime. We hope that the suggestions set out below can contribute to the initiation of actions on local, national or European levels and help local and regional stakeholders across the EU in better integrating VET learning pathways and promoting collaboration between VET providers, companies and other relevant stakeholders.

The following recommendations are divided into four main categories: the promotion of business-education dialogue; quality and relevance of educational offers; support measures for learners and educators and the European dimension.

1. Promotion of the business-education dialogue

Strengthening of the sectoral perspective in training coordination

Strengthening sectoral perspectives would significantly help in planning for the future and monitoring the qualification needs. A quality criteria catalogue can be created for relevant qualification offers. One way this could be carried out is by the establishment of (independent) sector-oriented coordination offices that also facilitate intensive exchange between VET decision makers/providers, the business community and other relevant stakeholders (e.g.: initiate coordinated dialogue forums).

Promotion of the direct contact of companies and educational institutions

An existing good practice for companies in the renewable energy sector is the direct and continuous contact with training schools/technical institutes and universities, with the aim of increasing curricular internships, useful for theoretical but also practical student training. In this way, the students have an opportunity to approach the working dynamics so that they can better combine

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university school knowledge with work practice. Both sides – companies and educational institutions – should be encouraged to take an active role in seeking partnerships that will benefit them both.

Integration of companies into course design

The constant communication between VET providers and companies is crucial in order to provide effective, up-to-date and useful learning courses. The learning resources should be created in a continuous interaction with representatives from the micro-enterprise sector to ensure that the outputs are up-to-date and beneficial to the target group.

2. Ensuring the quality and relevance of educational offers

Increasing the flexibility of education systems

The goal is to better respond to changes of qualification demands. This can be accomplished through modular apprenticeships, which can be added to existing qualification offers or upgraded with further education modules. Some parts can be made compulsory and some optional, so that specific regional needs can be addressed. The modular form is also better suited to the needs of the companies, which cannot always spare their vital employees for a prolonged period of time. Shorter modules can be adjusted to the availability of the company employees.

Introducing sustainability into mainstream curricula

Renewable energy issues can be integrated into curricula and lessons. New materials can be developed on the training of teachers and trainers, enabling them to introduce sustainability issues (as well as SDGs) into their teaching and lesson plans.

Implementation of ‘skills for green jobs’ into mainstream education

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The inclusion of some of the transversal 'skills for green jobs' (energy, environmental effects, systemic effects) into mainstream educational offers could serve as an efficient way how to increase general environmental awareness and enlarge interest in green occupations.

Strengthening of transparency

This could be accomplished through ECVET/development of sectoral qualification framework(s)/validation against the European Qualifications Framework (EQF)[35] levels. This would support needs-oriented qualification planning. It would also help in designing learning offers that take into account the transition options and also help to facilitate them (e.g. in case of expansion of individual economic sectors).

Designing additional qualifications

Additional qualifications, such as the installation of photovoltaic installations, is important to fulfil the current industry demands. Here, the NE(W)AVE approach could serve as a useful basis.

Taking into account local specifics

European directives related to renewable energy goals and agenda should be adjusted on a national level. Learning resources should be localised and adapted to the needs of national target groups.

3. Introduction of improved support measures for learners and educators

Assistance in the development of a support network

Designing and developing comprehensive support networks for professionals working in the renewable energy sector and VET providers will help them to keep up with all the news, new regulations, as well as qualifications needed to work. In order to answer the renewable energy

[35] The European Qualifications Framework (EQF) is a translation tool that helps understand and compare qualifications awarded in different countries and by different education and training systems.

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professionals' needs to catch up with the constant updates and demands of the renewable energy sector, the *Professional Membership Programme for Renewable Energy* was created. It is a global programme approved by the European Energy Centre and based in the UK, with thousands of members joining from all over the world. The programme has been established to help professionals working in renewable energy to fully develop their skills and proficiency.

Increase of the promotion of online platforms for job orientation in the green energy sector

In order to reach the intended audience, it is of crucial importance to make use of proper communication channels. Vocational orientation can help bring new recruits to the green energy training field, especially if a link is made to the expected increase in demand of green energy specialists. Online platforms are a channel of increasing relevance, and in some circumstances the best way of delivering the right information to people. Such platforms already exist in many countries, but they could benefit from a better visibility and promotion.

Subsidising of vocational training programmes

In some countries, vocational training is seen as less attractive at the moment due to a perceived limited demand on the side of the market. While the market situation may already have changed, retraining the workforce takes time and a proactive stance by the government could lend considerable assistance.

Introduction of re-training for employees in the non-green energy sector

The decline of coal and other fossil fuels will lead to a considerable loss of jobs in the near future. Yet these people could benefit from the increased demand for skills for green jobs. If timely access to learning offers at an appropriate level is offered, the transition can be made smoother both for the employees and for the economy at large.

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Introduction of programmes targeted at underrepresented groups

Groups, which are currently underrepresented in the green energy field, such as migrants and women, could act as a significant boost to the number of specialists in the future, if given a chance. Promoting green energy professions within these groups could help both increase and diversify the workforce of green energy specialists.

Introduction of targeted job coaching and mentoring

Next to traditional learning resources, coaching and mentoring are a way to support budding professionals. Personal contact has a considerable effect on the effectiveness of learning. Sometimes the mere fact that one possesses a resource one could turn to in case of difficulties is enough to support a smooth job transition.

4. Promotion of the European dimension

Promotion of European exchange and support

New European partnerships and mobilities of all forms can be established and the funding available increased. Active measures can be taken to inform VET schools about available mobility offers and funds.

Inclusion of SDGs and renewable energy

The presence of Sustainable Development Goals and renewable energy issues within the priorities of future European learning mobility funding programmes is essential to boost the sector and insure an increased awareness and interest on a European level.

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5. Existing Good Practices in the NE(W)AVE Partner Countries

Austria

As Austria's training and further education landscape is very fragmented and information on the evaluation of relevant existing offers is difficult to find, it is rather not possible to give an example of specific good practices in terms of 'green up-skilling'.

However, with respect to renewable energy production and consumption, Austria is considered to be at the forefront. The developments of the energy-producing sector in Austria contributed to the establishment of energy-autonomous model regions abstaining from fossil energy. Currently, Austria has already 85 of such model regions. The first of these initiatives started in 1990 in Güssing, when the municipal council decided to stop using fossil energy supplies. In 1996, with funds from the European Union, the European Centre for Renewable Energy Güssing (Europäisches Zentrum für Erneuerbare Energie, EEE[36]) was established and since then has been working to develop sustainable, regional and local approaches to energy generation and the use of renewable energies.

Another example is the 'Green Energy Lab', the largest innovation project ever approved for the development and demonstration of green technologies with the aim to reach 100% of renewable electricity and heat in Austria. The project spreads over four provinces (Burgenland, Lower Austria, Styria and Vienna) and involves more than 100 businesses and research partners in 31 sub-projects.[37]

[36] European Center for Renewable Energy', Europäisches Zentrum für Erneuerbare Energien Güssing, http://www.eee-info.net/index.php/en/
[37] 'Green Energy Lab', Vorzeigeregion Energie, https://www.vorzeigeregion-energie.at/vorzeigeregion/green-energy-lab/

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Denmark

Sønderborg, a municipality in the region of Southern Denmark, introduced a strategy to become carbon neutral already in 2007. The vision called ProjectZero focuses on sustainable growth and the creation of new green jobs with the ambitious goal of being carbon neutral by 2029. Since its start, carbon emissions have decreased by 35% and consumption of energy by almost 14%.[38] In 2018, ProjectZero published a report named *Roadmap 2025, 50 steps towards carbon neutral Sønderborg*[39]. This paper outlines the strategy for reaching a 75% carbon decrease by 2025 and aims to inspire other cities and business to increase their climate efforts. With respect to teaching and skills for green jobs, ProjectZero puts particular emphasis on the provision of climate-related education at all levels and on the provision of skills for green jobs to graduates and adults. For this purpose, ProjectZero initiated the creation of House of Science – a joint venture programme between the municipality, colleges, education programmes, businesses and the local university, which provides high quality educational materials covering topics related to climate, innovation and sustainability.[40] This approach importantly shows that even cities can play a crucial role in the creation of green jobs and serve as an inspiration for other cities and regions across the country.

Greece

With regard to VET and green occupations, the German-Greek project *GRÆDUCATION* from 2017 represents an interesting example, as it aims to contribute to the development of dual vocational education and training in the field of green professions and to a more intense dialogue between companies and educational institutions. The project, due to be finished in 2020, actively addresses shortcomings present in the 'green entrepreneurship' sector in Greece by creating innovative and

[38]'The Sonderborg area's energy consumption keeps decreasing', ProjectZero, 2017, http://brightgreenbusiness.com/news/archive/2017/the-sonderborg-areas-energy-consumption-keeps-decreasing
[39] 'Roadmap 2025', ProjectZero, 2018, https://smartencity.eu/media/roadmap2025_eng.pdf
[40] Ibid.

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tailored education services and exchanging ideas and best practice among German and Greek partners.[41]

Greece has a great potential in the field of renewable energies, even though the focus of production still lays on fossil fuels. As it is the reality for most European countries, the heavy focus on fossil fuels will slowly but surely shift towards renewable energy, which in Greece could represent an attractive market for potential investors. This shift however requires a high-quality and professional qualification in the field.

Italy

The province of Bergamo – one of the most productive Italian provinces – pays particular attention to the transformations taking place in the job and labour market. According to a survey carried out by Confindustria Bergamo[42], there seems to be a growing awareness of the importance of 'Training 4.0': in 2015, 22% of the companies interviewed made investments and trained their staff, and almost 45% plan to carry them out in the near future.[43]

Overall, Italy is showing a significant shift towards a sustainable economic system and a clear increase in the demand for green jobs. According to the most recent annual report *'GreenItaly 2019'*[44] published by Symbola, in the last five years over 432,000 Italian companies invested into

[41]'Graeducation – das Projekt', Graeducation, https://graeducation.org/
[42]'La Formazione Continua in Italia e in Prospettiva comparata: Dati e Buone Pratiche', Confidustria Bergamo, https://www.confindustriabergamo.it/files/assemblea/2017/centroeinaudi_confindustriabergamo_formazionecontinua.pdf
[43] Ibid.

[44] 'GreenItaly 2019', Symbola, 2019, https://www.symbola.net/ricerca/greenitaly-2019/

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environmentally friendly products and technologies. In 2018, the number of green jobs in Italy exceeded 3 million, which is in comparison with 2017 an increase of 100,000 jobs.[45]

Spain

The *Empleaverde programme*, introduced by the Ministry for Ecological Transition and the Demographic Challenge and operated by the Biodiversity Foundation, is an initiative for the promotion and improvement of employment, entrepreneurship and the environment. Taking direct advantage of the real growth opportunities in economic sectors linked to the environment, the Empleaverde programme aims to create jobs, improve employability and support the creation of companies in the green and blue economy, with particular focus on a low-carbon and circular economy. As of 2013, Empleaverde assisted in the creation of more than 2000 businesses and directly created more than 500 new jobs. Moreover, 55,000 workers have been adequately trained with the aim to reduce the environmental impact of their occupations.[46] The Biodiversity Foundation further operates the *Red Emprendeverde* network, which is a project aimed at helping entrepreneurs start new green businesses. In 2013, the network recorded over 4,000 registered entrepreneurs and more than 80 investors.[47]

[45]'GreenItaly 2019, investimenti nella green economy per le imprese italiane', Non Solo Ambiente, 2019, https://www.nonsoloambiente.it/greenitaly-2019-investimenti-nella-green-economy-per-le-imprese-italiane
[46] 'OECD Environmental Performance Reviews: Spain 2015', OECD, 2015, https://www.oecd.org/spain/oecd-environmental-performance-reviews-spain-2015-9789264226883-en.htm
[47] 'Emprendeverde Network', Empleaverde, https://www.empleaverde.es/en/emprendeverde-network

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6. Conclusion

The 'greening' of the economy will belong to top priorities for European countries and their policy-makers for many years to come, however, such greening requires a comprehensive development of tailored and high professional skills, which for many countries is still considered a challenge. Moreover, European countries do not represent a homogenous environment, instead, they are rather diverse in their approach to both define and develop green jobs and relevant skills, which often leads to an uneven development and discrepancies. With the inevitable shift towards renewable energy, the need for a professionally trained work force with solid technical skills able to adequately respond to the updated or newly created jobs will continuously increase.

In this light, the project NE(W)AVE has contributed to the idea of 'recycling' existing VET skills with the aim to update them into skills necessary for the employment in the renewable energy sector by actively cooperating with key stakeholders and offering tailored e-learning and mobility opportunities for learners. Over the course of the project implementation, NE(W)AVE acquired valuable input from VET stakeholders and key players in the renewable energy sector, which resulted in the herewith presented paper. The transition towards a green economy is both a challenge and a huge opportunity – we hope that this document served as an inspiration for local and regional stakeholders across the EU on how to enhance the transition of VET learning jobs to jobs in renewable energy and promote the collaboration between VET providers, companies and other relevant stakeholders.

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