GREEN SKILLS

At Vocational Education

Project Number: 2017-1-TR01-KA202-046803

"Recommendations for policy makers about the inadequacies of vocational education for construction workers from the perspective of green skills concept"

Erasmus+

RECOMMENDATIONS FOR POLICY MAKERS ABOUT THE INADEQUACIES OF VOCATIONAL EDUCATION FOR CONSTRUCTION WORKERS FROM THE PERSPECTIVE OF GREEN SKILLS CONCEPT.

Project implemented in “Erasmus+” Programme ActionKA2 – Cooperation for Innovation and the exchange of good practices Strategic Partnership for vocational education and training

Co-funded by the
Erasmus+ Programme
of the European Union

CONTENT

1) Project Description page 4

2) Green Skills in General page 4

3) About Report page 5

4) Recommendations for policy makers about the inadequacies of Vocational education for electricians' from the perspective of green skills concept. page 5

   a. TURKEY page 5

   b. SPAIN page 10

   c. UK page 14

   d. ITALY page 18

   e. ROMANIA page 21

5) Content Based Recommendations for Each Country page 23

   a. TURKEY page 23

   b. SPAIN page 26

   c. ITALY page 27

   d. ROMANIA page 28

Bibliography page 30

Project Description

Climate change is the main environmental policy priority across Member States and Turkey. It is often related to other environmental pressures and policy areas, for example water scarcity and energy. Public policies and enterprise strategies in many areas focus on greener economics. Countries take into account environment when they are preparing their legislation etc. Although all Member States and Turkey recognise the importance of environment in general policy statements, the skills dimension of climate change and low-carbon policies is disregarded. In fact green skills for different occupations plays a crucial role in having an eco-friendly world.

The project aims to analyse and make some positive changes for greener economics by contributing the Vocational Education by identifying the needs of partner countries on green skills for construction and electric sectors.

The expected results of the project are:

- contribution to the protection of environment in long term in partner countries.
- contribution to the expansion of green skill jobs.
- increase in the quality of green skills vocational education and training in partner countries.
- increase of the awareness of policy makers, VET trainers VET students, employers and all communities in partner countries on green skills
- contribution to European Union's green skills strategy
- improvement of the employment opportunities for the workers graduating from partner countries' VET organizations by increasing the awareness of VET systems regarding green skills education for construction and electric sectors.
- share of knowledge about and experiences of the green skills occupation in vocational training for construction and electric sectors.
- A cross-border cooperation among partners in the field of education and employment from different EU countries from different nature (VET, private sector, NGO's) but with common goals related to the potential increase in vocational education.
- The Enhancement of the commitment of local and regional public authorities in the high quality VET offer, labour inclusion by work-based training and the identification of key skills for construction and electric sectors.
- The involvement of participants in this project will improve their capacities in the area of strategic development, organizational management, project management, international cooperation in EU level, leadership, quality of learning provision, equity and inclusion.
- increase in the human resources capacity of partner institutions.

Green Skills in General

Climate change is the main environmental policy priority across EU Member States and Turkey. A significant amount of money has been dedicated to dealing with climate change and moving towards a low carbon economy through national stimulus packages adopted in response to economic crisis. The focus for green stimulus spending tends to be energy efficiency in buildings, renewable energy, low-carbon vehicles and sustainable transport.

Climate change and environmental degradation are jeopardising livelihoods and future sustainability in many areas of economic activity around the world. Alongside other drivers of change such as

globalisation and rapid technological change, they are causing important shifts in labour markets and skills needs.
Although all Member States and Turkey recognise the importance of environment in general policy statements, the skills dimension of climate change and low-carbon policies is disregarded. In fact green skills for different occupations plays a crucial role in having an eco-friendly world.
Public policy, together with private initiatives, can foster expansion of green transformation and harness energy efficiency and renewable energy potential, all of which requires transformation of the skills base. Skills development responses need to focus on adding to existing competences, emphasising core skills, for all levels of skill needs. Every job can potentially become greener. Understanding the environmental impact of a job, and its possible contribution to greener economies, needs to be mainstreamed into education and training systems. Integrating sustainable development and environmental issues into existing qualifications and capturing new and emerging skill needs on the greening job market are a massive task.

Green jobs are jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable. The ILO defines 'green jobs' as work in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment while also meeting requirements of decent work: adequate wages, safe conditions, workers' rights, social dialogue and social protection

About Report

The main objective of the project is raising awareness of the policy makers and other stakeholders in vocational education system about the green skills for 2 professions (electricians and construction workers). This report (recommendations paper) has been developed to make recommendations to policy makers, VET professionals, VET trainers, and other stakeholders on how to promote green skills at construction vocational training. All partner countries have totally different VET systems so the recommendations are different from each partner country. The report has been prepared country-based. We focused on training content, physical infrastructure of VET institutions, role of practical training and internships, trainer skills, changes needed at VET systems.

We used O1, O2 and O3 for developing this report. We received thoughts of VET experts, trainers and trainees by workshops for this report.

Recommendations for policy makers about the inadequacies of Vocational education for construction workers from the perspective of green skills concept.

TURKEY:

Introduction:
Turkey is a EU member candidate country and is trying to make its all systems closer. Education is one of the most problematic field on this subject because EU has not a standard education system. Each country has its own experience and system. Although this fact, education and especially vocational education need

some principles for all EU countries. EU has an agency CEDEFOP that supports development of European vocational education and training (VET) policies and contributes to their implementation. The agency is helping the European Commission, EU Member States and the social partners to develop the right European VET policies and Erasmus+ VET program is working for sharing knowledge and experience between countries. Turkey is a stakeholder as a candidate country for Erasmus+ program.

Technology changing very rapidly and this change affects all sectors. We explore and develop the better ways of doing sth. And this technological change leads new problems. Environmental problems is one of these problems and its solution is global and versatile. Developing environment-friendly technologies is one of the most important aspects of the solution but we can implement these new measures with only qualified workers. Workers shall know which methods and materials is better for environment, what are the possible behaviors for better environment at their sector as a worker. This needs a comprehensive strategy for each country because VET systems are big and complicated. There shall be several measures taken by VET policy makers in each country and these measures shall be in compliance.

Biggest negative impact of construction industry on the environment is caused by the burning of fossil fuels, like gas and diesel. Every construction project results in these gas emissions of carbon dioxide, methane and other waste products that pollute the air and are believed to contribute to global warming. Aside from contributing to climate change on a global scale, individual construction projects can have a significant impact on local environments and nature. There are numerous sources of water pollution on building sites, including diesel and other fossil fuels, paints, solvents, and toxic chemicals.

This report has been developed for the recommendations for VET policy makers in Turkey on how they can contribute to train VET students at construction field from the aspect of green skills. We mostly focus on directly construction activities. The mining process used for construction or transportation of these materials are not included at this report as the part of construction industry.

Recommendations for Policy Makers:

We had developed that gives information about Turkey's VET system at our previous report - Comparative report about the curriculums for construction workers on green skills. We mentioned about the different types of VET centres at that report. Some of our recommendations are based on that report.

Curriculum:

Turkey has a centralized education system. Most of vocational education is being supervised by Ministry of National Education so that it is easy to entrain the necessary curriculum to the VET centres. Talim Terbiye Kurulu is the main body that has the right to make necessary changes at VET curriculums. Talim Terbiye Kurulu is linked to Ministry of National Education. Universities are independent and they are not supervised by Ministry of National Education but there is a directive body (Yükseköğretim Kurumu-YÖK) for universities and they can suggest new changes for curriculum.

Increasing green skills of VET students shall start by educating students about importance of environment in general. They shall know why environmental issues are important for our future and the link between environment and construction. . So we recommend to put a lesson on importance of environment and green skills linked with construction sector.

There is a module for construction students under the Vocational Education unit named as Protection of Environment. This is a common module for all fields. It can be better to prepare this lesson according to sectors. The knowledge shall be different for construction students or child development. It gives very general information and it is only 2 hours for a week for at 9th class. There are 7 units under Vocational Development. 2 hours weekly means, 56 hours yearly for Vocational Development and 8-10 hours for Protection of Environment. This shall be increased

Mesleki Eğitim Merkezleri is another type of VET centres in Turkey. These centres are for the people who are also working. The apprentices who are working in a company come to these centres for theoretical education. They come 1-2 times in a week for 4 years. A environment based lesson can be helpful for them too.

Curriculum change is not only adding a lesson for environment. Some of the technical lessons are directly linked to green skills. The content of these lessons shall be reviewed and changed. All the contents shall be looked over by experts at environment field before the approval of Talim Terbiye Kurulu. You can see some advices as attached for the training content of vocational high schools. Surely these are only some examples, the experts shall scan all the content and make necessary content changes.

Curriculum development on environmental issues is important but environmental issues has another aspect too. Mostly they are cost increasing on short term. So there shall be representatives of construction sector on curriculum development process. Their views are also important. There is a risk of exaggerating environmental measures and to hurt the construction sector and industry with these measures.

Raising Awareness on Environment:

Technology is changing very rapidly and the threats against environment and environment-friendly technologies also change. This means green skills is not related to some information about the environment at an exact time. It is related to conscious of all stakeholders including the workers. VET students shall be trained on green skills and how to adapt themselves to changing technologies and risks.

We recommend some campaigns for students, teachers, administrators, parents and other staff as background information about environment. There can be some field based campaigns for related stakeholders in construction field. Construction sector employ several types of workers. Green skills related to energy saving, and pollution because of used materials are very important at this field. VET institutions has small size construction works and promoting green skills on these works and workshop activities is a good way of raising awareness of VET students trained at construction field.

Practical construction training is difficult at workshops in VET institutions. Practical training is mostly is made by job training (internship). VET institutions work with some sector companies on job training of VET students. Turkish laws obligate all companies to host VET students as interns if it is necessary. This means the companies who host VET trainees for job training can be thought as VET centres and a raising awareness campaign targeting these companies is necessary for green skills. Especially construction activities that are carried out by governmental institutions shall take into account environment.

There are some campaigns organized by Ministry of Energy ad Natural Resources on energy saving. We recommend Ministry of National Education and Ministry of Energy to work together for raising awareness campaigns at VET institutions. Ministry of National Education can start some raising awareness activities with Ministry of City Planning and Environment about how to raise awareness of construction VET trainees. Construction sector consists of big and small-scale companies. Big –scale companies can contribute to raising awareness activities.

Good examples are very important at education and designing some VET schools that are very well equipped on energy saving, have very well trained trainers (may be trained at Europe) can be an important part of raising awareness.
Construction is one of the worst linked occupations with VET system in Turkey. Most of the people working at this sector don't have VET education on construction and most of the graduates of construction education don't work in their own sector. To be able to reach real construction workers, making changes on VET system will not be enough so that we shall target the existing workers at sector by raising awareness campaigns.

Training of VET Trainers:
Construction education is mostly made at vocational high schools. There are also some other VET institutions as people education centres, vocational education centres for apprentices. All the vocational teachers and trainers at these VET institutions shall be trained about green skills at construction sector. There are thousands of VET teachers at construction field and unfortunately it is difficult to find trainers for training these teachers. So that there shall be a national planning for these trainings. Firstly Ministry must carry out some training of trainer activities.

Ministry of National Education organize distance learning for teachers before the start and after the end of classes every year. Training VET teachers during these trainings can be good idea. Additionally some formal trainings can be organized for VET teachers. Provincial Directorates of Ministry of National Education can take role at these trainings.

Curriculum development of training of teachers shall be organized simultaneously because the content changes on curriculum shall be taught to teachers. Ministry must collaborate with universities for this purpose.

Physical Infrastructure of VET institutions:
There are workshop training activity on construction training. VET institutions shall follow the environment principles for the trainings at workshops and VET institutions have some construction activities at their campus. They shall be selective on making these construction works by being respectful to the environment.

Students can use new technology products that are environment-friendly at their workshops. All the workshops shall be changed simultaneously with the curriculum development. The teachers of these workshops also shall be trained about these changes.

Training of existing construction workers:
Technology is changing rapidly. This also influence the green skills so that a training on VET institutions will not be enough. The graduates and the workers on the sector shall be retrained at regular intervals. According to Türkiye'de Mesleki ve Teknik Eğitimin Görünümü Raporu (Outlook of Vocational and Technical Education in Turkey) only 7,85% of the construction students work on sectors directly related to their education and 42,58 % of them work at other sectors. This statistics is for the students who are trained between 2008-2014. The report is published at 2018 by Ministry of National Education.

This Statistics shows that most of the construction sector workers are not trained at VET institutions in Turkey too. These workers shall be trained on green skills related to their job. It is difficult to reach the workers at construction sector because most of them work as daily base in small constructions. According to Construction Sector report prepared by Türkiye İnşaat İşverenleri Sendikası (Turkey Construction Employers Union) construction workers without social security is higher than the average of other sectors (33 % in 2018). Additionally 7,94% of the workers are from high schools that are not VET, 10,82 % have university graduate, only 9,14% of them graduated from VET institutions under university level. Most of them are from primary or secondary school.

Ministry of National Education and related labour organizations, chambers of industries, employer associations shall work together for a wide range of training program. There shall be some raising awareness campaign that can reach to these workers and short term trainings organized by VET institutions. Membership to the labour union is too low at construction sector accordindg to some other sectors because the employment process is not too long at same company. This makes labor union weaker at construction sector. So that Ministry of Education shall focus on employer organization to collaborate.

To reach this wide range of sectors will be difficult but we can recommend to start with the partners of VET institutions for job training activities. Vocational high schools and Vocational Education centres has close relationships with the companies. They organize job trainings together. Training of existing workers shall start from these companies. Then Ministry of National Education can contact to big level construction companies.

Following national level organizations can be stakeholders for training of trainers:

a) Çevre ve Şehircilik Bakanlığı –Ministry of Environment and Urbanization
b) Türkiye Odalar ve Borsalar Birliği- Union of Chambers and Commodity Exchanges of Turkey
c) Türk Mühendis ve Mimar Odaları Birliği (TMMOB) - Union of Chambers of Turkish Engineers and Architects
d) Türkiye Esnaf ve Sanatkarlar Konfederasyonu- The Confederation of Turkish Tradesmen and Craftsmen
e) Türkiye Müteahhitler Birliği – Turkey Contractors Union
f) İnşaat Müteahhitleri Konfederasyonu- Confederation of Construction Contractors

g) İnşaat Müteahhitleri Sanayici ve İş Adamları Derneği (İMSİAD)- İnşaat Müteahhitleri Sanayici ve İş Adamları Derneği
h) İnşaat Mühendisleri Odası (İMO) - Chamber of Civil Engineers
i) Mimarlar Odası- Chamber of Architects
j) Türkiye İnşaat Malzemesi Sanayicileri Derneği (İMSAD)- Construction Material Producers Association of Turkey
k) İnşaat İş Sendikası-Construction Labour Union
l) Öz-İnşaat İş Sendikası
m) Devrimci Yapı, İnşaat ve Yol İşçileri Sendikası

SPAIN

Introduction

Green Skills project (2017-1-TR01-KA202-046803) steams from the challenge, especially at European level, related to facing the problem of environmental respect and climate change in an innovative and functional way. For that, this project aims at producing recommendations for workers directly involved in the environmental issue, like construction workers.

Nowadays, according CEDEFOP, skills gaps are already recognized as a major bottleneck in sectors closed linked to "green economy" such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services, manufacturing. Moreover, other sectors need workers and entrepreneurs with those skills.

International Labour Organization (ILO) calls on countries to take urgent action to train workers in the skills needed for the transition to a greener economy, and provide them with social protection that facilitates the transition to new jobs. Countries should take urgent action to anticipate the skills needed for the transition to greener economies and provide new training programmes. There is scope for policies in the world of work and training to advance environmental sustainability; and for environmental policies to ensure decent work. A coherent and integrated legal framework is a step in this direction. Advances have been made by including decent work issues in environmental regulations, such as climate action policies that take note of their skills implications.

Providing workers with the right set of skills and recognizing workers' skills will help the transition to sectors with employment growth, and also to better jobs. The relationship between work and the environment will be fundamental in the following years, in fact jobs in many sectors rely on natural resources and GHG emissions directly, while other sectors, by virtue of economic linkages, rely on them indirectly. They are threatened by the increasing scarcity of natural resources and by the limits of the Earth's capacity to absorb the related waste and emissions. Advancing towards a green economy (transition to a low-carbon and resource efficient) creates and change the employment at the global level. It entails a reallocation of employment across industries and requiring policies to ensure the transition including the acquisition of necessary skills to work in that green future.

Recommendations

These recommendations are obtained with the analysis of different European and national documents (it can be checked in the Bibliography), previous research of this project (IO1, IO2 and IO3) and a work group with 8 teachers of Spanish VET system in Construction Technician course or other courses of "Construction and civil works" family.

Recommendation 1:
Make studies about the links between job and environment. It is necessary in Spain to make a deep study to update the information about the relation between the different jobs and environment. It is necessary to add to the contents of the different courses inside the Vocational education and Training (VET) the different information about emissions of GHG, relation with resource extraction, relation of the analysed job with ecosystem services, the possible vulnerability to local environmental risks, the effect of this job to increase impact of natural hazards, and the relation of this job with the environmental degradation and the possible transition to an environmentally sustainable economy. Professionals of construction should be aware of these matters since the beginning of their studies and it is crucial to move the focus to these concerns.

Recommendation 2:

Add a full subject about circular economy in construction studies. Circular economy is a topic that it will be essential in the near future in Europe and rest of the world and it is needed to be added to the different studies. Although the amount of publications on circular economy is growing, there is no real definition yet. By comparing the definitions that are used in literature, Kirchherr, Reike& Hekkert. 2017 found that most scholars describe circular economy by referring to the 3Rs: Reducing materials need and waste, Reusing products and product parts and Recycling materials. A circular economy is characterized as an economy which is regenerative by design, with the aim to retain as much value as possible of products, parts and materials. This means that the aim should be to create a system that allows for the long life, optimal reuse, refurbishment, remanufacturing and recycling of products and materials. In theory, the circular economy has the potential to lead to material savings of over 70% when compared with raw material extraction in businessas-usual models; to achieve this, it is necessary the implication of professionals of the construction. Circular economy ass for innovative solutions based on a new way of thinking. Reflecting on circular rather than linear value chains and aiming for optimization for the entire system where an organization is part of, results in new insights, and interdisciplinary collaboration between different professionals. Building a circular economy for Europe is a key priority of the EU. (EU Policy Report Jan 2017). the transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized, is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy Innovations in circular economy may help to reduce humanity's impact on the environment and reliance on non-renewable natural resources. Circular economy system can contribute since incorporates dimensions like eco-design, repair, reuse, refurbish, remanufacture, product sharing, waste prevention and waste recycling.

In Spain, different regional governments are trying to implement Circular and Green Economy policies in the following years with creation of green business initiatives and responsible use of natural resources. But it is still necessary to implement these initiatives at training level, it is crucial to create “green leaders”, meaning the awareness raising and development of a professional leadership that encourage the design and implementation of Green and Circular Economy in the developing of construction projects.

Recommendation 3:

Improve specific training programmes for the green skills development in construction workers: unemployed or in active labour market. It is recommended that public employment service will be directly involved (like in France) to monitor and boost the possibilities of green skills training to update the current curriculum of construction workers; public employment service in the different Spanish regions could offer different specific training programmes and highlight it inside the general updating courses, moreover they could highlight work offers related with green job opportunities

Recommendation 4:

Increase the subsidies and incentives that private companies are receiving for developing green skills in their staff. It is usual that numerous companies will not give time during the working hours to their staff to focus in their capacity enhancement, and numerous workers are not happy to spend their free time in any course. For that, it is recommended to increase the possibilities of the construction workers to develop those skills during working hours and compensate the companies in some way to ensure the systematic involvement of the private sector in training provision.

Recommendation 5:

Give the focus to companies that have workers with green skills and who use those skills in their daily work. Such companies could have a positive impact by acting as frontrunners in green production processes and green products, and setting ambitious standards in green skills for their employees, which can act as an inspiration for other companies to follow. Moreover, collaboration between companies can

also be used to meet training needs; this can be especially helpful for SMEs lacking the time and resources to provide training on their own

Recommendation 6:

Apply the Spanish National Climate Change Adaptation Plan (PNACC) and coordinate policies related to this, for example with the economic incentives to reduce the environmental impact of economic activities and promoting the use of alternative energy sources. These policies will achieve that green skills will be more necessary inside the construction sector and companies will add these requisites to the new job offers or they will foster the acquisition by their staff.

Recommendation 7:

Add concepts to be learnt in a practical way about green skills in construction in the last part of VET training courses which is called "Training in Work centers" and is taken place in real environment of companies with real tasks related with the acquired qualification. Previously, it will be necessary that in those organisations where those practical activities will be taken place will be analysed the presence of those green skills about construction to be sure that the student could use there and moreover, it will be important and necessary.

Recommendation 8:

Add to the Construction Technician VET course a part about Green architecture (sustainable architecture) and green building systems, which is the science about the design and construction of buildings in accordance with environmentally friendly principles. Green architecture strives to minimize the number of resources consumed in the building's construction, use and operation, as well as curtailing the harm done to the environment through the emission, pollution and waste of its components. In order to limit these effects and design environmentally sound and resource efficient buildings; "green building systems" must be introduced, clarified, understood and practiced. It is important that the professionals of construction are familiarised with this concept and their applications.

Recommendation 9:

Develop training courses for VET teachers about the last innovations in sustainable constructions and give the suitable tools for giving information to the students about the acquisition of green skills. It could be added that the VET teachers should need to pass a test about current environmental technologies to check that they are up to day and they could transmit this to their VET students. In the case that some VET teachers would not pass the test, he/she could receive a course about this material, this course will be free and inside their working hours.

Recommendation 10:

Update of the current subjects in construction VET courses. It is necessary to include more contents about green skills in mostly every subject of the current training curriculum of the Construction Technician course. It is necessary to add the possibility to acquire and test the knowledge about new materials, insulation, sustainable construction, sanitation and energy savings among other topics. It is necessary that the future professionals have information about techniques and resources for measuring pollution levels on air, soil and water, methodologies to reduce impact in the environment, protocols to organize and manage waste treatment.

It would be expected that future professionals acquire skills and knowledge to reduce the pollution impact of the tasks involved in construction and even to measure and control of the toxics and wastes. They need to know how to reduce the energy cost and the generation of waste in the construction process. It is necessary that the student will be familiar wit h the Energy Performance of Buildings Directive (EPBD) and their transposition into Spanish legislation like R.D.235/2013 and the Spanish Certification of Buildings (similar to the Energy Performance Certificate of UK)

***Recommendation 11**:*
Enhancement of infrastructures and systems for the promotion of green skills. It is indispensable that the infrastructures of public bodies will have respect for the environment and are sustainable because they will be examples for everyone about where the construction sector should be focused. Moreover, it is important to promote a strategy for boosting the renovation of older buildings to be adapted of the new environ mental regulations.

Recommendation 12:
Professionals need to be familiar with European regulation. It is necessary that new employees, future professionals, unemployed of construction sector would know about some important European regulations:

- Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. This Directive is very ambitious and affects all energy efficiency policies: about eco-design requirements to energy-related products; label of energy-related products; promotion of co-generation; use of energy and energy services;

- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy efficiency of buildings: Minimum energy performance requirements of the building and its elements. Promotion of energy efficiency measures. Need to properly train installers and builders. Incorporation of the term "Nearly zero-energy buildings" (NZEBs)

- Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 addresses or consumption of energy and other resources by energy-related by labeling and standard product information, to ensure consistency with related initiatives and minimize a possible market fragmentation

- Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishes a framework for the setting of eco-design requirements for energy related product

Recommendation 13:
Increase the effort to apply the national plan to increase the number of NZEBs - Nearly zero-energy buildings Article 9 of Directive 2010/31/EU regulates nearly zero-energy buildings and obliges Member States to ensure that by 31 December 2020, all new buildings are nearly zero energy buildings and brings this date forward to 31 December 2018 for new buildings occupied and owned by public authorities. In order to achieve this target, it also establishes that Member States must draw up national plans for increasing the number of nearly zero-energy buildings. These national plans may include targets differentiated according to the category of building. In Spain is done an effort to develop a national plan with legislation like Law 8/2013 or R.D. 235/2013 but it is needed an important push. It is necessary to remark that in Spain, two global indicators are used for NZEBs - energy consumption and demand and it is being analysed the possible subsequent inclusion of a third indicator limiting building CO2 emissions.

***Recommendation 14**:*
Currently in Spain, all workers have to do a course about occupational risk prevention. This is a very good opportunity to speak about “Green Skills” to new construction worker, therefore this course has to include a lesson about good environment practices and how to implement or follow a safety environmental plan.

In the same way, the workers who have been working in the company for many years would have to do a “green course” even if they have taken the occupational risk prevention course.

UK

Introduction

This report is intended to raise awareness about the state of 'green skills' within vocational education and training (VET) for construction in the UK and offer recommendations based upon work carried out in the "Green Skills at Vocational Education" project, funded in part by the European Commission. These recommendations are to be of interest to policy makers, VET professionals, VET trainers and other stakeholders.

For this project, teams from five countries (Italy, Romania, Spain, Turkey, UK) agreed upon a pan-European working definition of 'green skills' which covers:

-environmental awareness
- expert knowledge on procedures for energy, waste, resource efficiency and sustainable development
- being practically involved in saving energy and protecting ecosystems
- being responsible for environmental management.

Recommendations are based upon three of this project's stakeholder interviews, survey results, and a review of the current state of the UK's vocational educational environment for 'green skills' (Landward Research, 2018a; 2018b; 2019). The recommendations are UK-orientated and cover three subject areas: vocational education and training (VET); regulations and standards; and wider construction policy.

Recommendations: Vocational Education and Training

Recommendation 1:

Continue to promote sustainability and construction as embedded concepts rather than separately. A consciousness of sustainable methods or materials and reducing waste should run through all aspects of training, rather than be seen as an add-on.

- Several interviewed employers and educators highlighted how the term 'green skills' is used less in the UK than elsewhere in the EU. Stakeholders emphasised that sustainable methods should not be promoted not as an alternative or a 'green' way, but as a fundamental approach which runs throughout all working practices.
- In terms of established job roles, 'green skills' should be embedded in training rather than their own separate qualifications, so as to avoid proliferation of qualifications. The *Whitehead Review of Adult Vocational Education in England* (2013) identified proliferation of courses leading to weaker links to occupational standard and a more complicated qualification system.
- New T-Level courses (currently in design phase) should embed sustainable approaches throughout.

Recommendation 2:

Qualifications should offer students a higher level of understanding of sustainability across the whole construction process, in order for each worker to better comprehend their role within larger objectives of waste management, energy conservation and sustainable design.

- 'Lack of collaboration and improvement culture' was an identified as a symptom of poor performance in the *Farmer Review of the UK Construction Labour Model* (2015).
- Better understanding of sustainable practices taught at VET level will avoid situations where workers unintentionally undercut each other's work, for example a heating engineer placing a flue in a wall which punctures the airtight membrane laid by an insulation installer.
- Universal multi-skilling of each worker is unattainable, but providing workers with a general knowledge of the whole building process can improve integration and teamwork. All levels of education and practice should better understand each other's roles, particularly in order to improve waste management.

Recommendation 3:

Training must reflect market favourability, providing skills which are in-demand. The industry is often seen as reactive and can move towards becoming proactive through government policy, industry strategy and training provision working in tandem.

- The National Infrastructure Assessment (NIC, 2018) identifies off-site construction and heat pump installation to be key investment areas.
- The Construction Leadership Council (CLC) stresses the role that the industry has in being able to create demand by creating a 'narrative based on hard data' to 'encourage funders/lenders to procure for whole-life performance' (CLC, 2018).

Recommendation 4:

By better reflecting market demand and proactive innovation in construction, qualifications should focus on procedural knowledge in vocational training and make the practical application of skills clearer to learners.

- Our survey data showed suggested that despite 92% of employers preferring their new staff to already have 'green skills', only 58% of learners think those skills will help them find a job. Employers most valued expert procedural knowledge.
- Stakeholder interviews suggest that general environmental awareness is integrated into Level 2 construction qualifications, but that Level 3 environmental pathways are seen as an 'easy option'.
- Long-term practical procedural knowledge such as maintenance, repair commissioning and waste management should be better catered for in Level 3.

Recommendation 5:

Educators and qualifications need to be kept up-to-date on modern methods of construction. With a lack of educators trained in modern methods of construction, apprenticeships should be encouraged – especially in off-site construction and digital methods.

- The new T-Level qualifications in particular – currently under development – must reflect modern methods of construction.

Recommendation 6:

Industry employers and associations must work together to co-design mandatory Continued Professional Development (CPD) which reflects market requirement, in order to allow vocational learners to continue keeping up-to-date throughout their career.

- This recommendation reasserts Recommendation 4 of the Westminster Sustainable Business Forum's *Building Better*: 'The different professions and trade associations must come together to co-design new programmes and pathways to create the fully integrated workforce the construction industry needs to become truly sustainable' (WSBF, 2015).

Recommendation 7:

Beyond the VET focus of this project, environmental awareness should be promoted at school level, with students being made aware of sustainable construction through school work and careers advice.

Recommendations: Standards and Regulation

Recommendation 8:

Increase the implementation and scope of the Sustainable Building Training Guide for a better didactic framework for 'green skills'. The guide can be expanded to serve as a mandatory standard for 'green skills' inclusion at all education levels, including VET.

- Educators surveyed for this project identified a lack of didactic framework amongst the greatest hinderances to their teaching of 'green skills'.

- The CLC's *Sustainable Building Training Guide* (2017) identifies the principles of sustainable building for the development of learning content.
- The guide could provide a useful standard for other European countries, which could encourage the greater mobility of skills, practices, and innovation.
- Sustainability skills should be embedded as per the current move to embed digital skills, following, for example, the Construction Industry Training Board's (CITB) recommendation: 'Digital competence requirements across the built environment sector are standardised and embedded in qualifications, training and employer HR planning' (CITB, 2018b).

Recommendation 9:
Qualifications should provide students with better knowledge of standards and regulations concerning sustainability and energy efficiency, such as BREAMM and the Home Quality Mark (HQM). Concomitantly, the government must make sustainability and efficiency standards stronger in order to guide VET.
- According to the Construction Leadership Council (CLC), there are currently no consistent standards on how asset performance is measured or a national rating system for performance of suppliers (CLC, 2018). Industry professions and associations should work with the government to establish and enforce standards which inform vocational training.
- As the industry works to implement a 'single, more streamlined, regulatory route to oversee building standards' (Hackitt, 2018) from the perspective of health and safety after the Grenfell Tower disaster, there is scope to include sustainable building standards within the new streamlined regulation standard.
- A 'quality mark' for energy efficiency and sustainability was suggested by the independent review *Each Home Counts* (2015), and is currently under review.

Recommendation 10*:*
Competence in 'green skills' should be more visibly recognised and identifiable by employers, site managers, and clients.
- Sustainability could be made a requirement at Level 2 for the Construction Skills Certification Scheme (CSCS) card, ensuring that all workers at this level have demonstrable knowledge of sustainable methods, materials and waste management. Government contracts with major construction firms should require all staff and subcontractors to demonstrate knowledge to this level before entering a contract, in order to ensure the knowledge is not superficial.
- The industry is currently looking at how to better recognise and demonstrate competence in health and safety, as per recommendation of the *Hackitt Review of Building Regulations* (2018: 5.23).

Recommendations: Wider Construction Policy

Recommendation 11:
Better broadcast the construction industry's ability/determination to tackle environmental issues to address ingrained negative perceptions of the industry as well as problems with attracting young, more diverse workers.
- The industry's poor image was identified in the Farmer Review (2016) as negatively impacting entry into the sector as well as client relations. Schools should be involved in presenting a more holistic view of the industry for all abilities, which emphasise modern, digital, environmentally friendly and innovative working processes.

Recommendation 12:

Encourage the recognition that 'green skills' greatly overlap with digital skills – a skills area that is currently being invested in. Digital technologies allow for more efficient building design, material use and reduction of waste.

- The UK government is investing in new technologies, such as sensors, smart systems and materials into built assets (BEIS, 2018), as well as off-site construction, manufacturing and digital design (IPA,2017).
- VET learners should also be familiar with BIM, which is currently being promoted towards international partners to encourage mobility of skills and design (BEIS, 2018).
- Recommendations 5 of the *Farmer Review* calls for 'producing talent which is appropriate for a digitally enabled world' (Farmer, 2016), which the CITB has produced its own recommendations (CITB, 2018b)
- There is currently no requirement to capture data during construction (CLC, 2018). Recommendation 2.3 of the *Hackitt Review* (2018) calls for better handover of relevant information – making data shared to improve practices and ensure quality. Information regarding sustainability and energy efficiency should be also be shared and from the basis of building practices. VET learners should be aware of how to record data digitally.

Recommendation 13:

Greater cross-party consensus must be reached in order to create long term agendas which avoid fluctuation, thereby giving businesses the stability and confidence to invest.

- Government incentives such as the Green Deal and targets such as the number of zero-carbon homes have been pulled, creating a lack of confidence for investors.
- This recommendation reaffirms Recommendation 2 of the Westminster Sustainability Business Forum's 2015 *Building Better* report.
- The current UK government has committed to cleaner economic growth (BEIS, 2018).

Recommendation 14*:*

At time of writing, the UK's planned exit from the European Union ('Brexit') has been delayed until 31st October 2019. The following recommendations concern the effect of the UK's exit from the EU, 'green skills' and vocational education.

- ***Recommendation 14.1****:* As per the advice of the CLC, *prioritise the mutual recognition of qualifications across the UK and EU* (CLC, 2019) to ensure that the UK continues to attract the workers needed to keep up with demand. This government has pledged to become a world leader in the 'future of mobility' and must attract 16,580 new recruits over the next 5 years to meet demand (CITB, 2019). Currently, 10% of the construction of buildings workforce is (non-UK) EU-born (ONS, 2018).
- ***Recommendation 14.2****:* As per the advice of the CLC, *lower the qualifications required to be a 'skilled worker' to NVQ Level 2*. CITB research (2018a) demonstrates that 80% of migrant workers would not qualify as skilled under the current requirements. Our research for this project demonstrated that NVQ Level 2 includes, at the least, general environmental awareness (Landward Research, 2019). If adjusted, Level 2 should include more practical waste management, building regulation and sustainable materials content.
- ***Recommendation 14.3:*** The UK government should align its own environmental and sustainability targets to that of the EU, to encourage the mobility of workers, goods and innovation as promised in the *Construction Sector Deal*. In particular, zero carbon homes – a policy scrapped by the UK in 2015 has cost new home owners an estimated £58 million (ECIU, 2019). The UK should recommit to zero-carbon as per the European Commission 2050 long-term strategy (2018) in order to facilitate 'green skills' transfer and innovation.

ITALY

Introduction

Nowadays, we are standing at a great transformation that is taking place at international, national and local levels. The traditional growth strategies will not get us so far and they have inspired a new way in which modern societies deal with financial, climate and resource scarcity issues.

Today, new energy technologies and financial innovation have opened up new industrial and economic possibilities. Smart sustainable initiatives have led to job creation, innovation and local sustainable entrepreneurship. Highly efficient technologies and an intelligent cycle of materials coupled with workers reskilling and upskilling can stimulate a shift in our energy production and exploitation of environmental resources.

It is widely recognized that the opening to a green economy would lead to new frontiers in labour markets, highlighting the great growth prospects and the possibility of eco-Europe becoming a world leader in the industry sector, consequently creating opportunities for new jobs of quality.

The European Parliament in its resolution "Eco-innovation - and jobs growth through environmental policy" proposed special recommendations for a socially responsible transition towards high-quality green jobs. Member States should make use of the European Social Fund for programs aimed at up-skilling, training and retraining employees. The Commission and the Member States are invited to intensify their actions for the full implementation of the proposal in the context of the 2020 Strategy and to build a common vision on the different strategic opportunities that eco-innovation provides for the future.
At national level Member States are advised to develop strategies to align the skills of the workforce with the opportunities offered by the sector of green technology. This is by examining the different sub-sectors and their needs for skilled labour, recommending promotion of the creative and innovative potential of young people to contribute to sustainable development.

"Green Skills" are seen as a relevant qualification for the European industry, not only for the sake of the environment but also as a European competitive advantage.

In this sector it is important on one hand the necessity of the best available technologies for energy reduction, the importance of reusable and biodegradable materials, but also on the other hand that this has to go conjointly with a human resources improvement of green skills and the awareness of green production and behavior. It also embeds the involvement of the customers and their purchase decisions by improving their green awareness and the application of the green content to the whole learning chain (school - apprenticeship - higher technical education - continuous training - company).

General recommendation

After a careful analysis of the Italian VET schools curricula, we realized that the number of subjects that deals with green skills in the different courses is very high. These have specific programs that vary from region to region and also from institution to institution, both public and private.
More or less in any subject studied, from planning to training there is a part that concerns green topics. However, In the curricula's analysis what springs most immediately is that contents need more attention and must be studied in depth, specifically they need more practical moments.
In this regard, we suggest below some general recommendations that we want to propose after this careful analysis:

Have a wide range of educational training offers in the field of green skills.
The educational offer available in the VET training area is not very extensive.
The courses that are available in the building sector gave to students a qualification of "Construction Worker" after having achieved three years and a qualification of "Construction Technician" after having achieved a 4-year course.
In both curricula the current specialists are:
- Construction site worker
- Construction worker
- Completion worker

It is necessary create a wide range of educational courses that deal with green world.

To address the need for the unskilled workers that have not been learned, at least the basic green skills during basic VET, due to age.
The introduction of green skills in the educational training courses is quite recent. It is necessary to train or to reform all those professional profiles who have been working for years and have never learned basic green skills. It is useful to provide specific courses for these profiles to update them on recent green topics.

Development of training offers based on market demand and in collaboration with other stakeholders in the construction sector and on the labor market.
Before providing training courses, it would be necessary to consult the market demand in the construction sector.
It is well known that the supply and the demand for labor change considerably from year to year. We need to adapt the curricula content to the market supply to ensure that the new professional profiles are always up to date and in line with current job profiles.

Encourage the increase of training courses for learning green skills in association with an accredited certification at least at national level.
Nowadays we all know the importance of certification. Thanks to certifications it is possible to affirm that our activities have the minimum environmental impact and respect the environment. It is very important to enrich the training offer with courses that allow the study of various useful certifications in the construction sector.

It is necessary to know not only steps required of how to conduct a certification but it is necessary that after some years the learner can be a certifying professional with the skills required. This expedient means that the training offer becomes more attractive for future students and complies with the directives undertaken in the construction-environmental field.

Some certifications on which it is possible to carry out an ad-hoc courses are:
LCA – The Life Cycle Assessment is used to evaluate a set of interactions that a product has with the environment, considering its entire life cycle that includes the phases of extraction and / or recovery of raw materials, production, distribution, use (therefore also reuse and maintenance), recycling and final disposal.
ECOLABEL - The Eco-label is used to certify the reduced environmental impact of the products or services offered by the companies.
IMQ-ECO - It is the Italian proposal of the IMQ (Institute of Quality Mark), which defines a Certification of Environmental Product Assertions. It serves to guarantee that the ecological characteristics declared by the manufacturer correspond to the truth and they are measurable and are maintained over time.
LEED - Leadership in Energy and Environmental Design is a "guide for the energy and environmental project". It is a system of certification for constructions that establish some rule to build in a sustainable

way, both from the energy saving point of view and from the point of view of the all environmental resources involved in the construction process.
BREEAM - Building Research Establishment Environmental Assessment Method is the first and most widespread environmental assessment protocol in the world, aimed at green building. For the first time it was defined in Great Britain.
FSC - Forest Stewardship Council, is an international and independent certification specific for the forestry sector and the products - wood and not-wood - derived from forests.
GREENGUARD – It is an American product certification issued by the Greenguard Laboratory, which verifies a series of technical conditions on the materials used in closed environments (for example cabinets for home, school, offices, etc.).
Be informed and take into account the impact of Directive 2010/31 / EC and set measures that comply with the requirements.
Possible requirements on curriculums and training content for construction workers
Below are some more in-depth recommendations regarding the content of the curricula of vocational education courses in construction sector. It would be necessary to implement contents concerning the identification of the main construction materials according to an eco-friendly logic. the environmental impact they have on the surrounding environment and on the people, who come into contact with them. Regarding these contents it would be necessary to include the study of "Sustainable materials used in coatings" and in such a way that students are able to select materials that have the best effects on the environment, thanks to low energy consumption or a low environmental impact.

It's necessary not only a more in-depth analysis for the best choice for the use of materials in relation to respect for the environment but an analysis on all the technologies that can help protect the environment in the building field. An important aspect can be the possibility to integrate visits to companies that produce building materials to better understand the differences between them. This can be important for students because practically they can identify if materials, machines and systems are sustainable and respect the environmental certifications.

In addition, contents should be implemented concerning not only the environmental impact of building materials technologies used and also the environmental impact of the buildings themselves, with particular attention to energy efficiency in buildings, including the analysis of the energy needs of the building and their verifications, through the implementation of energy saving strategies. In this regard, as previously specified, great importance is given to the study and acquisition of skills that allow the issuing of certifications.

Another important aspect to implement is a deepening in the building design phase. Solutions that can be taken into consideration and that have the least environmental impact. Focus on choices regarding aspects of energy efficiency and not on the economic aspect. It would be necessary to integrate more practical exercises that include all building sectors, in a sustainable way, such as: which energy plants to use, what should be the right position of a building, recycling in the waste water system, etc. Furthermore, practical tests should be carried out on plants that use renewable energy. Deepening on them, on their use, certifications and related incentives.
Considerable importance for future builders is the acquisition of technical design skills in relation to environmental issues. These must be able not only to reproduce the technical specifics from an environmental point of view but also to be able to read a technical document with the appropriate specifications.

Another theme is to improve the contents of the subjects that deal with the design of waste management systems so that they are efficient and eco-compatible. Specifically, it could be possible to add notions on the decrease in the production of construction and demolition waste. Water saving also takes on considerable importance in the construction of buildings with low environmental impact. Specific notions should be introduced about it.
To insert more info about environmental regulations and practical examples of environmental protection and sustainability. To insert practical examples on how to develop a safety and control plan and how to adopt an environmental protection / sustainability behavior.
To implement practical follow-up regarding the control and monitoring of a building and the various certifications that can be issued and carried out with particular attention to the "VIA" certification.

More generally, what could be improved or added is the increase in practical exercises on how to implement existing environmental solutions. It would be necessary to increase the sessions of the workshops and have a comparison with the reality by carrying out inspections on the spot.

Finally it is important to stimulate students in such a way as to have a greater awareness of climate change. Practical exercises to implement, evaluate and verify all the principles studied in the course. Practical examples of waste management with the implementation of an adequate awareness of the problem.

Possible requirements needed in trainers skills.

As far as the trainers are concerned, they should be able to update themselves daily on news and directives in the environmental field and acquire skills that during their training career could not be acquired due to a lack of time, or a lack of preparation or because there was still no light on environmental issues.
The trainers should also follow not only the performance of the classic frontal lesson but could carry out their lessons with non-formal learning exercises, i.e.: brainstorming, follow-up, games, practical exercises, etc. in order to fully involve the student.

ROMANIA

Introduction
The construction industry consumes 40% of the total energy and about half of the world's major resources. Therefore, it is imperative to regulate the use of materials and energy in this industry in order to protect the environment and achieve sustainable constructions.
By Directive 2010/31 / EU on the energy performance of buildings, Member States are required to adopt the methodology for calculating the energy performance of buildings, which should include thermal characteristics, thermal insulation, water supply, air conditioning, built-in lighting, indoor climatic conditions and, last but not least, electricity produced from cogeneration.
There are currently ecological building valuation systems such as LEED and Green Globes certification that greatly contribute to the sustainability of the construction industry.
The construction workers are executives and the proposals for implementing the green skills, must be strictly limited to their level of competences and decision-making.
In order to assimilate the green competences at the level of construction workers, it is necessary to refer to the requirements of an ecological system for the assessment of constructions.
Thus, our proposal is top-down approach, namely the requirements of the evaluation system need to determine the competencies in which students will be trained.

In Romania, according to the National Qualifications Framework, in the field of Construction (Construction, installation and public works), at qualification level 3, there are defined 14 occupations for which professional training is made: Constructor of monolithic structures, Steel bender -prefabricated fitter, Mason-stonemason-plasterer, Carpenter – parquet layer, Plate mosaic-fitter, Painter, plaster, dryer, wallpaper gluing, Plumber of local distribution networks and gas pipelines, Plumber of technical, sanitary and gas installations, Plumber of central heating installations, Plumber of ventilation and conditioning installations, Insulator, Railway constructor, Constructor of roads and bridges and Constructor of hydro-technical works. The curriculum was designed according the Professional Training Standards related to the 14 occupations.

The specific environmental protection rules norms are generally mentioned in the Professional Training Standards, focusing on specific techniques for collecting, transporting and storing waste resulting from activities such as: construction of buildings and infrastructure objectives, construction and maintenance of roads, total or partial demolition of buildings or infrastructure objectives.

The learning content about environmental protection, efficient use of energy in construction is at the discretion of teachers, which specifies that there is not enough learning material available to them and to students. The knowledge about environmental protection, efficient use of energy is not grouped into "green" competences, their assessment is made within other specific competencies to the qualification, with a share of only 5%.

For the development of green skills for construction workers, we propose the following steps:

- Establishing a coherent and flexible qualification framework for construction qualifications to adapt easily to the dynamics of the labor market;
- Establishing a list of additional competencies relevant to environmental protection, energy efficiency and the use of renewable energy sources for each occupation in the construction field based on green building assessment systems (LEED, Green Globes certification). We do not consider it necessary to set up new qualifications for green skills in construction, but to introduce additional green skills for each existing qualification. It is important to identify the common green competences for the construction qualifications and then the specific green skills for each occupation.
-Detailing of these skills through the abilities and technical knowledge required for each qualification in the construction field.
-Completion of handbooks with concrete references to the ecological knowledge necessary for each construction qualification.
- Providing specific endowments for school workshops.
-Providing contracts for the students practice with companies that apply ecological systems for building evaluation (LEED, Green Globes certification) and awareness of the practice enterprises regarding the importance of assimilation of green skills by students.
- Establishing an effective tutoring system for the students' practice at the practice enterprises and its monitoring.
-Training of teachers for teaching and assessment of green skills knowledge.
-Training of tutors from practice enterprises for teaching of practical knowledge to students and assessment of their assimilation.
-Continue collaboration with the practice enterprises in order to adapt the curriculum to the green skills dynamics.
-Including the green competences in the student assessment system according to the green assessment systems of buildings (LEED, Green Globes certification) and increasing their share in the final grade. Assuring a certification for green skills for the graduates.
-Permanent information to increase the level of knowledge / understanding to stimulate the demand for green skills - environment protection, energy efficiency solutions and the use of renewable energy sources in buildings (consumers / investors and employers)
-Monitoring the results obtained through the degree of insertion into the labor market and the green buildings realized in the local area.

In particular, green skills for construction field, ISCED 3 qualification level, refer to the following:
-Recognition of the value of natural resources, biodiversity, energy, water, waste management. Developing an proactive attitude for the environment.
- Wise use of resources, in particular reducing the consumption of non-renewable natural resources of land, air and water and promoting a use related to real needs and not simply to consumer demand.
-Use materials and thermal insulation technologies.
- Efficient use of energy and priority to increase the use of renewable energy sources.
- Promoting construction and renovation works more efficient in terms of resource use, for example, by reducing the volume of construction waste and by recycling / reuse of materials and products in order to reduce the amount of waste deposited.
- Use of recycled materials, re-use of existing materials and the use of waste as fuel; concrete can often be recycled on demolition or construction sites, near urban areas where it will be reused, resulting in reduced transport demand, cost savings and associated emissions reductions.
-Maintenance of construction and transport equipment.
-Using a spraying system during construction to suppress dust emissions.

Content Based Reccomendations for Each Country

We searched training content at partner countries and you can find our recommendations about the content here. Eah country has different systems so we focused on some parts of construction training in partner countries. We mostly have chosen most popular and common education field in partner countries.

TURKEY

COURSE	Recommendation that need to be included
Woodwork- Wooden framed buildings	Some information about the influence of using wood on environment. There may be some comparisons with the alternatives of wood and wood work. There are some information about the some chemicals used in woodwork (glues etc.) There may be some more information about the effects of these chemicals. The measures to reduce the effects of these chemicals to the nature shall be mentioned. -Some information about increasing the expected life of the woods will be helpful for environment. The constructor shall inform the customers about how to use.
Concrete testing	There shall be information about the chemicals used at the production of concretes. By this way they will not use unnecessary chemicals. -There shall be information about distortion in nature about concrete types and its ingredients. --There is information about use of waste materials to produce some types of concrete. This information can be linked to environment and can be detailed. By this way the waste materials will be recycled. -There are some regulations about the concrete factories but there is no training for the employees who work here. Some training can be included about the environment legislation.

Ferroconcrete Equipment	Some information to increase the lifetime of buildings will be protective for environment.
Formwork (timber forms and tunnel formwork)	There shall be better comparison between different tunnel systems from the aspect of environment.
Decoration methods. (Wood decoration, Protection of decorated Works, wall decoration)	Some types of chemicals used. Some info about the effects of these chemicals on environment. Some advices to minimise the use of these chemicals.
Design with computer	No advice
Models	Some info about the materials used at model making from the aspect of environment. Not to use plastic materials etc.
Building Relief	No advice
Frontispiece Systems and Montage	Comparison between different facing materials from the aspect of environment. -Regulations (legislation) about the external thermal insulation. -Importance of thermal insulation. Effects of materials used at thermal insulation to the environment in long term.
Roof Systems	There may be some information about the effect of materials used at roof systems and roof insulation.
Steel Building Fabrications	Steel painting is included at the module and there can be information about use of minimum paint and other chemicals.
Cement Tests	More detailed information about types of cement and why they are better for environment. Information about the chemicals used at cements. Dissolving time in nature. Effect of cement industry on environment in general. Information about what shall be done with the waste cement.
Wall and floor covering	Effects of materials used to the environment.
Drawing	There can be information about the importance of design and drawings on environment. Especially energy efficiency is directly related to drawings of the buildings including indoor and outdoor drawings. Taking into account heat abduction is so important. Drawing includes the outdoor spaces of the building. Design of the garden is included. Giving advice to create more green spaces will be a good element.
Indoor decoration	Effects of materials used to the environment.

Vocational Development	Better links to the construction needed at environmental protection sub unit. Sub unit gives theoretical information about general environment. Work Ethics sub unit can give more information about the importance of environment and respect to environment.
Architectural Drawings	There can be information about the importance of design and drawings on environment. Especially energy efficiency is directly related to drawings of the buildings including indoor and outdoor drawings. Taking into account heat abduction is so important.
Stone (concrete) block and curb pavement	There is no information about the negative effect of concrete on nature. The chemicals and other materials used at concrete production and their effect on nature shall be mentioned.
PVC Joinery and coating	Plastic materials is harmful for environment because they are dissolved at the nature very late. There shall be information about the types of materials and their effect on nature. It is said that PVC is nature friendly. This information shall be reviewed.
Decoration Art	Paints are chemicals. There can be information about harm of these chemicals to the nature. Some warnings about what shall be don by chemical wastes. Not to put them into the nature.
Paints at Buildings	Comparison between chemicals(paints, varnish thinners etc…) from the aspect of their influence to the nature will contribute students to understand better. Information about how many years take the chemicals dissolve in nature and raising awareness of students about the effects of chemicals used at nature.
Ground Tests	Excavation can affect environment because it will change the ground and underground waters. There can be some warnings about the effect of excavation. Additionally there shall be more information about what can be done with the soil after the excavation. It can be used for gardening etc.

SPAIN

	Recommendation that need to be included
Building	Identification of main materials in construction, it could be oriented to work with sustainable and eco-friendly materials. Environmental impact of buildings Energy efficiency in buildings, including the analysis of the energy demands of the building and verify the implementation of strategies of energy savings. Certifications. Implementation of renewable energies in the buildings
Interpretation of construction drawings	Integration of energy savings and renewable energy systems in the right place in a construction drawing Design waste management systems which are efficient and eco-friendly
Factories	Designed and implemented factories in an environmental protection way, including waste management
Coatings	Add a part about " Sustainable materials used in coatings"
Formworks	Selection of material with better effects towards the environment, due to its low energy consumption or its low level of pollution. Decrease the production of constuction and demolition wastes Insullation of the walls to affect the energy consumption
Reinforced concrete	Dosage control taking into account the field and sustainability Reduce pollution levels
Training and career guidance	Recommendation of doing a course of sustainable construction
Organization of construction works	Objectives of the sustainable construction Selection of materials and natural resources Environmental Product Declaration (EPD). Life-cycle environmental impact of products
Urbanisation works	Environmental impact of any urbanisation, how to reduce this impact. Certifications Water savings Control of the use of energy Eco-friendly parking system (bikes, points to recharge an electric vehicle)
Flooring, tiling and plating	Stimulation of using new eco-friendly materials
Covers	Measures to have the lowest possible transfer of energy. Improvements in the environmental behavior of covers Use of ecological and multifunctional covers Reutilization of material
Waterproofing and insulation	Improvement of Energy efficiency. Use of natural materials Efficient water management
Business and Entrepreneurship	Business related with environment in construction
Practical Formation in work centers	Practical activities about sustainable construction

ITALY

	Recommendation that need to be included
CONSTRUCTION TECHNOLOGY: (buildings, floors, roofs, covers, electrical systems, lighting systems, renewable energy, ISO standards, energy requirements, LCA, recyclability, eco-friendy materials)	- Increasing practical exercises on how to implement the environmental solutions described in the module. It would be necessary to increase the workshop sessions and to have a comparison with the reality by making inspections on-site. - Deeper analysis is needed to do the best choice for the use of materials in relation to the environment respect and all the technologies that can help to protect the environment in the construction field. - Deepening also on renewable energies, their use, certifications and incentives related to them.
BUILDING WORKSHOP (on-site work, building in relation to environmental respect and use of eco-friendly materials):	Deepening in the building design phase. Solutions that can be taken into consideration and that have the least environmental impact. Focus on the choices regarding the aspects of energy efficiency and not on the economic aspect. It would be necessary to integrate more practical exercises that include all the fields of construction building, in a sustainable way, such as: which energetic plants to use, what should be the right position of a building, the recycling in the waste water system, etc ... Integrate visits to companies that produce building materials to better understand the differences between them.
TEST MONITORING AND VERIFICATION (VIA):	Practical follow-up concerning the control and monitoring of a building and the various certifications that can be issued and achieved with particular attention to the "VIA" certification.
WORKSHOP ON PLANT (plant certification, main factors of environmental impact, efficiency and energy requirements, etc ...):	Practical insight on how to identify if the materials, machines and plants are sustainable and how to certify them.

SAFETY (risks of environmental impact, processes, materials and buildings, worker's safety in relation to the environment, environmental protection in the design and construction of a building):	More information regarding environmental regulations and practical examples of environmental protection and sustainability. Practical examples of how to draw up a safety and control plan and how to adopt environmental protection / sustainability behavior.
SCIENCE, (temperature inside and outside a building, active and passive systems, earth system, ecosystem, exploitation of natural resources, climate, climate change):	To stimulate students in such a way that they have greater awareness of climate change. Practical exercises to implement, evaluate and verify all the principles studied in the course. Practical examples on waste management with the implementation of adequate awareness of the issue.

ROMANIA

The module	Recommendations
Components for making buildings, installations and public works	-Information about the environmental impact of the construction sector (consumes 50% of natural resources extracts per year in Europe; consumes 40% of energy and16% of water; issues 36% of CO2 emissions; generates 40-50% of waste production of solid waste in Europe) -Information about sustainable building materials: renewable, recyclable, light disassembly, standardized dimensions, low energy enriched, non-toxic materials -Information about green buildings, features and benefits
Equipment and machinery for processing materials	The maintenance procedures for tools, and machinery must take account of environmental protection Selection of materials based on their environmental performance, service life and health consequences The degree of sustainability of the materials is given by the extent to which it damages the planet throughout the process of production, commissioning, use, and final storage.

Measurements in construction and public works	-Information about the environmental impact of the construction sector related to the importance of reducing the material consumption
Lining out of construction works	The importance of accurate measurements to protect of the sites with high ecology (agricultural land, green spaces) and to reduce the wastage of materials
Formwork operations	-Using recycled materials for formwork panels; -Selection of construction and demolition waste (including excavated earth from contaminated sites) -Selection of packaging waste in construction field -Information about circular economy: waste and resource use are minimized, the value of products and materials is kept as long as possible, and resources are re-used and value added.
Concreting works	The use of re-used concrete aggregates in construction reduces the ecological impact; The environmental impact of recycled concrete aggregates is lower than that of traditional concrete materials. - reduced use of natural resources; - reduction of transport to / from extraction sites; - reduced consumption of energy; - reduction of the volume of demolition waste sent to the landfill.

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