

Green Skills at Vocational Education Training



Intellectual Output O1

Qualitative analysis of the perception of green skills by VET trainers, VET policy makers and employers.

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1 Introduction:

The project “Green Skills at Vocational Education” (in the field of KA2-Erasmus + program, supported by the European Commission) aims to produce recommendations for the development of a professional curriculum for electricians and builders to make the labour market and economy in these two fields more environmentally friendly.

The following report encapsulates qualitative data accumulated through interviews with a range of VET educators, employers and policy makers from various organisations within the five project partner countries: Italy, Romania, Spain, Turkey and the United Kingdom.

1.1 Results summary:

Initial targets for the number of interviews to be conducted have been exceeded.

In the UK, individuals interviewed typically specialised in sustainability within organisations. Most respondents agreed that green skills are important to environmental, social and economic aspects of the construction industry, but more action needs to be taken to provide access to green skills for vocational educational learners.

Similarly, in Italy there was a good overall understanding of green skills and their role in construction. Green skills theory and practice were considered in need of greater integration through improving current systems for learning.

In Romania, green skills are provided in the curriculum but are not well-known by students due to a lack of didactic framework, hours and specialists. All three target groups consider green skills important, but currently they are not a priority of education providers or students. There is a discrepancy between the green skills competencies of the workers and the demands of the employers. Work projects tend to implement those green skills which create immediate financial benefits rather than those with long-term effects.

In Spain, most participants again agreed that green skills were important to the construction industry, however they feel that they are accompanied by an economic burden. Participants consider that the government should provide economic assistance to companies, and through this improve the system of green skills vocational education and training.

In Turkey however, many participants were unaware of the term ‘green skills’. Employer participants consider green skills to be an important issue, however current economic problems within the industry mean that employers don’t focus on the environment, which is viewed as costly and a burden on resources. As in Spain, many participants believe the government should be responsible for environmental issues, however here there was a belief that penalties and financial encouragements are more important than improving green skills training.

1.2 Interview participants

Interviews were conducted with VET educators, employers and policy makers within each country. A total of 73 individuals were interviewed.

The following table shows the number of individuals interviewed for each participant group from each country.

	VET Educators	Employers	Policy Makers	Total
Italy	5	6	2	13
Romania	5	5	2	12
Spain	5	5	2	12
Turkey	8	6	2	16
UK	11	4	5	20
Total	34	26	13	73

Additionally, 3 participants were interviewed from outside the EU (see Additional Information, UK). The total number of those interviews, including these participants, was 76.

2 Current consideration of green skills within organisations

2.1 Educators:

In Italy, Romania, Spain and the UK, educators typically agreed that green skills are taken into consideration within teaching curricula and organisations.

In both Spain and Italy, educators described teaching activities concerning the techniques and usages of environmentally-friendly construction materials. In Italy, this is accompanied by an attention to bio-materials and other energy-saving technologies. In Spain, one educator's students make models within which to justify the materials used. The educators in Spain were 'very aware' of plastic in the oceans, and so explain the importance of waste management to students.

In the UK plumbing and heating sector, one employer participant stated that all Level 3 VET students are offered a module in environmental renewables. Within the electrical industry, technical colleges offer green skills modules, with some colleges providing specialised training facilities for technologies such as solar thermal and underfloor heating. Design and management educators approach green skills from a more 'client-based perspective', educating students in sustainability assessment methods such as BREEAM. Continual professional development, publications, and educational videos are available in the UK, however one participant flagged-up the fast-changing nature of the green skills sector, stating 'most qualifications are 5-10 years behind the times'.

In Turkey however, educator participants agreed that green skills are not taken into consideration within teaching curricula sufficiently. Participants voiced a desire for the curriculum to be renewed, which in its current state does not educate students on the environmental effects of materials, and teaches energy-saving as a primarily cost-saving method. Educators from the electrical sector hinted that renewable energy will be encouraged by the Ministry of National Education – who decide on the curriculum content. A small number of educators take it upon themselves to study green skills in order to pass this on to their students.

2.2 Employers:

Within the UK, some employers engage with green skills within 'specific departments and stages of the construction process', but most hire short-term contractors to advise on sustainability. Decisions made at pre-conception stage could require green skills from builders 'further down the supply chain'. Similarly in Romania, employers take green skills into consideration 'from the design phase to execution'. In Turkey, there is a lack of qualified staff for the construction of environmentally considered buildings, with employers believing the training of green skills to be the government's responsibility.

In Italy, employer participants asserted the 'fundamental' nature and 'great attention' given to environmental sustainability within their work. Participants in the construction industry

described the transition to a sustainable economy and the requirement of new skills, specialisms and diversification of skill sets. In the UK, larger companies with specialist departments as well as green construction specialists have increased the need for builders to be able to delivering often specialist green services.

Within the electricity and installations sector, employers in Romania are 'concerned' about the implementation of renewable energy systems. In Spain and Turkey, employers are 'trying' to introduce such systems, but in Spain companies are reluctant to provide resources, while in Turkey employer participants consider the government to be late to offer support or implement sufficient controls. Employer participants in the UK and Italy described government initiatives which have affected the implementation of renewable energy systems. Regulatory provisions in Italy to improve the energy performance of buildings have increased the importance of knowledge in this area, while the UK government's initiative to de-carbonise the UK's heat supply has led to green skills requirements throughout the supply chain for heating networks. In Turkey, employer participants described the difficulty in finding intermediate staff for renewable energy, but recognise this issue is gradually improving.

2.3 Policy makers:

In the UK and Italy, policy-makers were either 'well-aware' or 'aware' of green skills, while in Romania, it was noted by policy-makers that green skills are part of VET education provision. In Italy, policy-maker participants described always considering the environment when applying current regulation, and 'necessary and indispensable' within the design phase. In the UK, policy-makers have conducted extensive research through projects such as 'Build Up Skills', a showcase of the need to embed green skills across all trades in construction, and leading to resultant training guides for better green skills having consideration within curricula.

In Turkey, the policy-maker participants deemed green skills 'essential' and described current curricula as insufficient in this area. Similarly in Spain, policy-maker participants in Spain indicated that green skills are not considered in VET training. However, the participants in Turkey highlighted that other stakeholders are not aware of the importance of green skills, noting that the environment doesn't have political support and a prevalent view that the country has 'more important problems'.

Within the UK, policy-maker participants described green skills as part of the 'modern methods of construction' agenda, which includes projects to develop a national occupational standard for modern practices; quality awards for 'modern method' training providers; raising awareness with employers, careers advisors and teachers; and upskilling current workers. However, another participant commented on the lack of funding for reviewing occupational standards and continued professional development.

In Italy, the policy-maker participants described environmental policy as 'short-term' in vision and often determined by emergency measures. The policy-makers were concerned with the need for coordination mechanisms for successful and continuous communication

between ministries, public bodies and government departments in order for incisive change to be made.

3 Green skills identified by interviewees

3.1 Educators:

Across educator participants in all five countries, green skills were most often identified in terms of reducing environmental impact, while possessing a knowledge of material sustainability and of current green technologies.

In the UK, Turkey and Spain, participants commented on environmental awareness being a key green skill. In Romania, this was described in terms of a 'responsibility'. In Turkey, increasing consciousness of environmental issues was seen as more important than giving students information, in the hope that students will be inspired to learn more about the specific green needs of their field. Similarly in Spain, educators 'lead by example', using recycled materials in projects and changing to low-energy bulbs in education centres.

The UK employer participants identified skills for site workers involving increasing resource efficiency and improving a building's 'long-term green credentials'. In Turkey and Italy, the design phase is noted as a key area in which green skills must be taken into account. Furthermore, in Italy, educators identified green skills as dependant on the subject area, ranging from a knowledge of thermodynamics for civil and industrial sectors, eco-design for planning sectors to materials and technology for installation sectors.

3.2 Employers:

Across several countries, employer participants suggested that the individual management and direction of businesses impacted upon the scope of their environmental efforts and implementation of green skills. In Turkey, employer participants mostly prioritised profit-making, believing environmental issues to be the role of the government, including the organisation and costs of green skills training. In Spain, one employer participant voiced a belief in green skills being a problem of 'product and machines manufacturers' rather than construction companies themselves, however other participants stressed the importance of a change in non-environmental product use, such as less toxic chemicals and solar panel technology. In the UK, the ethos of each company impacts upon green skills knowledge and implementation – one employer noting the Executive Director's attitudes greatly shaping the company's environmental strategy.

Employer participants in Italy described two dominant traits in how a company handles environmental issues: 'reactive' – considerate of the environment from a regulatory and strategic perspective; and 'proactive' – experts within or external to the company assisting in turning environmental issues into competitive advantages.

Employer participants tended to identify green skills more with whole-company processes rather than individual skills, such as the use of local resources and ecological materials by employers in Romania, and recycling, natural resources and fossil fuels in employers from Italy. Employer participants in Romania also discussed sustainable development as key in the design stage.

Regulations and frameworks were a factor for employer participants from UK and Italy. In the UK – where participants generally saw green skills as applicable to every role in a business – measures for sustainability such as BREEAM and SKAR were considered by employers, while in the Italy employers were highly aware of environmental regulations and their application.

3.3 Policy makers:

Policy-maker participants from both Turkey and the UK pointed to the need to account for environment-driven technological advances through green skills – predicted to become ‘widespread’ in Turkey and part of the ‘changing nature of the construction industry’ in the UK. Such changes include the need for training in digital competencies, logistics and techniques that are growing in popularity such as off-site construction.

In Italy, policy-maker participants described the country’s ‘state of emergency’ environmental changes, from which have produced numerous regulations and structures and ‘strong sectoral specialization’. The participants suggest that this is scope for improvement, agreeing that it is necessary to ‘adopt minimum environmental criteria in all areas’.

In Romania, the policy-maker participants suggest that they considered that green skills competencies are part of the curriculum, however, participants from Spain did not consider green skills within their organisations.

4 The importance of green skills

4.1 Educators:

Across all countries, educator participants commonly attributed the importance of green skills to broad environmental advantages, such as improving the lives of the general public, protecting the environment, reducing waste, saving energy and building sustainable futures.

In Turkey, the construction sector saw the importance of green skills in improving the lives of city inhabitants, while the electric sector’s concern lies with saving energy. Similarly in Spain, educator participants saw the importance of green skills for society and industry, while participants in Romania mentioned the health of the population.

Construction and electric sector participants in Turkey saw the importance of green skills for protecting the environment, in Romania the importance lay in keeping the planet clean, and in the UK mitigating the impacts of climate change and addressing the country's 'considerable construction waste'

Green skills were deemed important to prepare for greener futures in several countries. In the UK, this means training more designers and procures ensure availability of experts, as well as meet the growing demand of money saving technologies and solar panels. In Italy, the spread of technologies such as BIM provide the opportunity for sustainable energy action away from fossil fuels.

Several educator participants noted that the quality of green skills courses may affect worker's ability to compete in future markets. In the UK, most educators note that the construction industry can be reactive rather than proactive, one participant noting that courses are 'traditional' and qualifications 'aren't kept up to date or move fast enough'. Similarly, in Turkey educators expressed that workers are not trained according to the latest development of their sectors. In Spain, educators saw it important to correct the habits of workers and students.

4.2 Employers:

In the UK, Italy, and Turkey, employer participants noted the importance of green skills in order to comply with regulations. In Turkey, participants acknowledged the need for green skills workers to comply with measures such as heat regulation, but many indicated a concern with cost, and suggested the government should take on this burden if environmental measures prove too costly. By contrast, UK participants saw the opportunity for green skills to save clients' money. In the UK, participants referenced the growth aspect of the government's heating network investment project – expecting the sector to grow by 12-24% by 2021 according to one participant. Green skills were deemed important to achieve that growth, dependent on work of a high skill level, currently in extremely high demand.

In Spain, some employers did not see green skills as important owing to a perception that their small businesses do not have an impact on the environment. Others hold contrasting views, seeing the importance in renewable energy and sustainable waste disposal.

In Romania, employer participants saw the importance of green skills in general environmental advantages, such as protecting public health and reducing pollution, but also in smaller scale advantages such as lowering the consumption costs of buildings.

Changing market preferences was an important aspect of green skills for participants from the UK, Turkey and Italy. In Italy, green skills were important to distinguish the company from its competitors, but also a fundamental direction to develop in, described as 'the only sustainable solution for the future'.

4.3 Policy makers:

Policy-maker participants in the UK outlined how governmental agendas shape the importance of green skills. For example, lack of policy between 2012 and 2016 meant the industry did not know where to invest, therefore the importance of green skills was inhibited. By comparison, recent policy to reduce building emissions by 50% by 2025 has led to an increased importance of green skills due to large investments in modern methods of construction and offsite construction. One participant, however, stated that green skills was not an area that they had been looking at funding currently.

By contrast, in Turkey public agendas may shape the importance of green skills. Policy-maker participants see the governmental opinion on the importance of green skills tied to that of the public – as public consciousness for environmental issues grows, so should the government's. Currently, environmental issues are important to higher levels of government, but have been unable to make their way down to lower or bureaucratic levels.

Policy makers across several countries included wider issues in their estimation of the importance of green skills, such as global warming and corporate responsibility in the UK; energy efficient construction in Spain; reducing pollution, emissions and resource consumption in Italy; and the roles of future citizens to protect the environment and manage resources in Romania.

5 Understanding of green skills by businesses in construction and electrical sectors

5.1 Educators:

In Spain, Turkey and Italy, educator participants asserted an overall poor understanding of green skills by businesses. In Turkey and Italy, there is a perception that environmental methods are non-economical. In Italy, educators perceive that businesses are more interested in profits and convenience of energy efficient buildings, however educators in Turkey believe that so long as the government continues incentives for wind and solar energy, businesses will focus on green skills more.

In Romania and Italy, educators indicated that education and awareness of potential green skills may affect businesses poor understanding of green skills. In Romania, educators described how not all teachers were trained in green skills, while in Italy educators asserted that information regarding green skills is 'bad'.

Educators from both the UK and Turkey noted that bigger companies understand green skills better than small companies, in the UK due to large companies noticing demand and small companies only fulfilling those building regulations that are mandatory.

In the UK, some educators suggested an understanding of the importance of green skills in the building industry through a range of environmental services, including greywater systems and recycling schemes.

However, there was some disagreement between educators within the electrical sector, one participant estimating that 90% of businesses are 'not interested' in green skill installations such as solar power or heat pumps, while another stating that national trading standards have 'pushed electricians regarding the environmental agenda'. Another participant described how recent government policy deterred installer interest in green skills by being too short-term and potential impermanent, highlighting the need for long-term vision.

5.2 Employers:

Two prevalent views emerged amongst employer participants across all countries. The first, shared by the UK and half of the Italian participants is the view that there is a growing recognition of green skills amongst business. In the UK, this recognition and understanding is dependent on 'size, workload and client base of the businesses'. The second, shared by Spain, Turkey and the other half of the Italian participants, is that green skills are secondary to costs and profits. This means that green skills are forgotten in favour of providing the lowest price, as in Spain; placed secondarily to economic interests, as in Italy; or dependent on their ability to generate a profit, as in Turkey. In Romania, green skills are well understood at a design level, however their application is 'hampered by high costs'. At this level, the short-term financial benefits of green skills are well understood, however the long-term benefits are often ignored.

Green skills as an important aspect of fulfilling social responsibility was discussed by employers from both the UK and Turkey. In the UK, this can also involve large contractors encouraging smaller businesses to implement green skills.

5.3 Policy makers:

In the UK and Turkey, policy-maker participants suggest that the understanding of green skills amongst businesses is dependent on their size. One participant described how small businesses make up 95-97% of the construction industry, and amongst these businesses lies a perception that green skills, associated costs, and upskilling are a financial burden. Policy-makers in the UK agreed that main contractors had a role in implementing green skill understanding down their supply chains.

In Turkey, policy-makers believe that the understanding of green skills by businesses will be influenced by the environmental consciousness level of their customers.

In Italy, the interviews with policy-makers produced conflicting opinions – one participants seeing an increased sensitivity towards environmental approaches, the other asserting that businesses have a poor understanding of the importance of green skills. Similarly in Spain, policy-makers deemed green skills as understood by businesses as 'not important yet'.

6 Understanding of green skills by workers in construction and electrical sectors

6.1 Educators:

In general, across all countries, educators agreed that green skills were not understood particularly well by individual workers. However, as well as existing groups of environmental specialists, there is a trend of increasing interests in green skills by individual workers as demands grow and techniques change.

In the UK, one participant suggests that understanding green skills is generational – older workers are aware of ‘widespread issues such as global warming’ but may not apply that knowledge to their work.

Educator participants in Romania and Spain point to the lack of didactic framework in teaching, as well as education of green skills being dependent on the teacher’s own knowledge and interest, creating a fragmented understanding of green skills amongst workers. In Italy too, understanding of green skills is fragmented, borne of a perception from the 1980s that green jobs are specific and niche. The emergent need for green construction and the availability of master’s and VET courses has increased understanding of green skills, however educators worry that lack of political strategy may mean industry growth may not match the available labour market. Understanding of green skills in Turkey is linked to worker’s motivation to find better employment.

Changing techniques in the industry, such as the recognition of offsite construction in the UK, means that individuals are more likely to have to change their understanding of the sector. In the UK, the rapidly changing nature of the industry is often at odds with the speed at which green skills can be disseminated. One participant noted that the Level 2 NVQ in plumbing is insufficient for working in other countries, and that it is ineffective to expect workers to improve their skillset on a voluntary basis. In the electrical sector, high costs of certification schemes for sustainable techniques such as microgeneration deters workers from investing their own green skills.

6.2 Employers:

Employer participants from the UK, Turkey and Italy associate understanding of green skills amongst workers with size, income and skill level. In the UK, employers described how lower down the supply chain within construction, the less important green skills are to workers, who are more concerned with steady workloads. However, participants in the UK note that larger companies have the capacity and the resources to encourage individuals to invest in green skills to meet growing green requirements. In Turkey, the level of understanding of green skills is influenced by income level – higher paid workers understand better than lower paid workers, who often do not have knowledge of sustainable materials or energy efficiency. Employers in Turkey noted an interest in green skills amongst

individual workers, but a lack of training. In Italy, all participant employers noted that professions such as engineers and architects 'must' have green skills at their disposal.

In Spain, Romania, and Italy, employer participants generally asserted that green skills are not well understood by individual workers. In Romania, this was seen as being linked to very few projects implementing skills, and to the need for better information and training in Italy. Here, employers admitted previously associating green skills with the waste sector, but describe an expansion to all sectors.

6.3 Policy makers:

Policy-maker participants in the UK, Turkey, and Spain generally agreed that the individual workers in the construction and electrical industry understood green skills poorly. However, participants in the UK asserted that the industry is changing, with individual workers using green skills to capture niche markets. Similarly in Italy, participants agreed that participants are becoming 'progressively' more aware of green skills, and called for investing in human capital as a priority.

In Spain, policy-makers asserted that individual workers have an awareness of environmental issues, but not these issues relate to their work and practise.

In Romania and Turkey, it is a question of education. Policy-makers in Turkey indicate that the majority of workers have no VET, and even those with VET have no knowledge of green skills. In Romania, rather than individual workers, it is the recent or current students that understand the importance of green skills.

A similar generational difference is reflected in the responses of the UK policy-makers, who assert that some individual workers are 'traditional in their mind set', which may be linked to the construction sector's perceived lateness in adopting new skills and technologies – a matter of years rather than months. One participant mentioned an electrical industry magazine's role in promoting green skills awareness, but individual workers and sole traders rarely have time to read this.

7 Skills competency of current workforce

7.1 Educators:

Educators across Italy, Spain, Romania and the UK provided a range of green skills that they believed workers to be competent in. Only in Turkey did educators assert that current workers have no green skills. However, newly trained roles had at least a consciousness of environmental issues, and 'high-level' roles such as engineers and architects implement some green skills.

Consciousness of environmental issues was a competency identified by educator participants in Romania, alongside ‘responsibility for environmental management’ and ‘involvement in energy saving’.

In Italy and Spain, educators were concerned with communicating to students that green skills were a ‘fundamental requirement’ in the modern workforce. Educators in Italy gave the examples of competencies in outdated technologies concerned with efficiency and building envelopes, stressing that research into ‘innovative materials and bio-building’ must be put forward to overturn the idea that these are ‘unexplored or niche fields’. Participants in Italy also noted a lack of competency in management of buildings and a disconnect between low-impact products and workers with the competency to install them.

The UK educators gave specific examples of skills competencies, including awareness of sustainability in terms of materials use and following regulations for waste management. For the plumbing sector, training provided by manufacturers of boilers contributed to upskilling the installers of greener condensing boilers.

Educators commented on workers having basic knowledges of technologies such as solar panels, but the lack of skills to install them. Similarly, one participant considered that a lot of workers involved in offsite construction may not know ‘all the ins and outs [*details*] of the system’. In the electrical sector, ongoing maintenance, commission and decommission skills are lacking, while there was disagreement from educators over worker’s understanding of energy performance.

7.2 Employers:

Employer participants in the UK and Italy agreed that workers have a ‘good understanding of existing products and materials’. In both countries, employer participants suggested that the construction workforce can be hesitant to adopt new methods due to associated risks (UK) or being too rooted in traditional methods (Italy).

In Italy, employers considered a lack of competency in seizing opportunities and challenges made available by green skills and its demand. Workers here are often specialized but sectoral – lacking multidisciplinary. Correspondingly, employers in the UK describe a ‘PR issue’ whereby people do not realise the green skills the construction industry has available for them. Within the heating sector, UK employers describe ‘incredibly talented’ workers with competencies in commissioning and design control, held back by a lack of personnel.

In Turkey, employers provide workers with green skills information depending on the needs of each individual project. Employer participants recognise that some workers with awareness of environmental issues motivate employers to take action. It is inferred that a lack of competency may be down to the choices of the businesses – workers are familiar with energy saving as it equates to cost saving, but are unfamiliar with environmentally friendly materials.

In Spain, employers gave conflicting opinions on green skills competency, ranging from no green skills in the sector to competencies in waste disposal within construction and renewable energy by electricians. Similarly in Romania, energy saving and waste recycling was considered competent by employer participants, however lacking was: 'efficient use of resources, waste management, optimization of execution processes, protection of ecosystems, sustainable development.'

7.3 Policy makers:

Participants in the UK and Italy were concerned with competencies as they relate across sectors. In the UK, one participant was concerned with raising environmental awareness across all trades so that one industry does not cancel out the work of another, for example a heating engineer unwittingly tampering with insulation. Likewise, policy-makers in Italy were concerned with green skills in one sector being 'not compatible' with that of another. A UK-policy maker emphasised the need for an 'integrated teamwork approach' across all trades.

Policy-makers in Romania identified competencies in students in environmental protection and energy conservation, but a lack of knowledge around sustainable development. Similarly, in Italy participants identified competency in renewable energy sources, but a lack of knowledge for material and equipment impacts. In the UK, participants described a lack of competencies in new technologies, especially those requiring IT skills. The participants referenced the recent Grenfell Tower disaster as illustrative of the need for workers to have greater understanding, and ability to respond to, standards and regulation in practice.

In Spain, policy-maker participants described workings as not competent in green skills. Similarly in Turkey, participants stated that workers had an attention of, and positivity towards, environmental issues, but no knowledge bases that could be 'considered a skill'.

8 Teaching of green skills amongst students and apprentices

8.1 Educators:

In general, employers assert that students and apprentices consider green skills – or at least environmental issues – to be of importance, but institutions are unable to provide sufficient courses and curricula. In Spain and Romania, educators consider students to be aware of environmental issues, but course management inhibits green skills. In Spain, green skills 'do not play a large role in the classroom' while in Romania, 'not enough time' is dedicated to the subject.

In Turkey there are no courses below university which provide green skills for learners, with teaching being dependant on the teacher's own interest in the field. Similarly in Italy, there are no dedicated courses for students and apprentices to acquire a deep knowledge base. However, there are basic environmental notion discussed in engineering and architecture

university courses, and a few dedicated university courses such as eco-design at Turin Polytechnic. Some educator participants from Italy criticised the concept of 'green skills' as an acquirable set of skills, instead advocating the 'continuous acquiring' of tools and techniques to 'guarantee the best environmental conditions'.

In the UK, educators agreed that there was little green skills teaching at Level 2 National Vocational Qualifications, and some at Level 3. Acquiring green skills often requires the student to choose a pathway of environmental courses; there are perceptions that these courses are 'easy' and less lucrative than other endeavours.

8.2 Employers:

Employer participants from Spain, Turkey and the UK considered the question of importance of green skills amongst students as generational. Participants from these countries considered younger generations as being more positive towards, and more interested in, environmental issues and green skills. However, several participants noted a discrepancy between student aspirations and its application within a job. In Italy, one employer considered the concept of green skills 'not yet clear' in training, with students leaving education with 'very poor skills' which do not translate into the 'real world of workers'. In the UK meanwhile, employers typically believed green skills can be applied to any role, but that opportunities are being missed at apprenticeship level, and the realisation of green skills in terms of jobs is 'less clear'.

In Romania, employer participants considered students and apprentices to 'not understand green skills', while in Turkey, that understanding is dependent on what they are able to learn once on a job or project.

8.3 Policy makers:

Policy-maker participants, in general, discussed how students and apprentices are hindered in their access to green skills training.

Policy-makers in Turkey explained how despite 'some attempts', there is not yet specific content related to green skills within the VET curriculum. Key to promoting change here is the focus of the government and the Ministry of National Education, who are in charge of the 'very centralised' VET curriculum content.

In Spain, policy-makers identify a general awareness for the environment, however there is no specific green skill job training. Similarly in the UK, policy-makers identify an 'appetite' to learn, but with no green skills education until after NVQ Level 2.

Policy-makers in Romania, Italy and the UK considered the pedagogical method and provision given to students and apprentices. In Romania, policy-makers expressed that VET students should deepen their theoretical knowledge through on-the-job enterprise. In Italy, policy-maker participants were concerned with disseminating an 'environmental culture' at

all school levels, with the creation of systematic training paths for environmental roles and encouraging individual students to be 'active builders of their own knowledge'. In the UK, policy-makers raised concerns that college teachers are often 10-15 years out of the profession, and their knowledge needs updating as much as the students'.

UK policy-maker participants highlight a generational issue: new comers to the industry are better attuned to environmental issues and new technologies such as the digital marketplace, both areas which could challenge stereotypes and 'allow students to look at construction in a different manner'.

9 Current green skills training for new entrants to construction and electrical sectors

9.1 Educators:

Several educator participants described a 'gulf' between the theoretical or general knowledge learned about green skills and the environment during training, which are subsequently not able to be enacted within the job market. In the UK, only a 'minority' of VET students are following the few environmental pathways through their training, which is often case-specific and not systematically taught. These entrants are finding themselves unable to apply their skills in a competitive sector looking for the cheapest, not the greenest price. Similarly in Italy, educators describe graduates as at risk of being 'sucked into the speculative mechanisms' of the industry – unable to 'express their skills' due to a gulf of understanding between design and technological aspects of building. In Romania too, theoretical knowledge versus practical application is a concern.

Educators in Romania and Spain described green skills as 'not a priority' and a 'secondary aspect' of education, respectively. Similarly in Turkey, educators described no specific content for VET from construction departments, but some for specialists coming from departments of renewable energy. Renewable energy and energy savings were an area that educators in Spain believed entrants into the sector to be well trained in.

In the UK, one educator described entrants to the sector in the fields of as brick laying, plumbing and carpentry to be up to date on green techniques and materials, however another participant voiced concern that technologies such as solar heating and photovoltaics have been too concentrated on, with insufficient attention to other aspects of renewable technology. Respondents in the UK also commented on widespread defects from improper installation, currently being examined by the governmental *All Party Parliamentary Group for Excellence in the Built Environment*. Educators in Italy noted that entrants from apprentices in particular are not competent in green skills and need to acquire more knowledge

9.2 Employers:

Employers in Spain and Turkey note that new entrants to the sector have not received enough green skills training. In the UK, a respondent from the heating sector stated that there was not a dedicated training programme for this specific green skill set in the industry. Employers in the UK considered providing apprenticeships beneficial but organising higher training to be 'difficult, time consuming and cost intensive', and believe it is the responsibility of technical colleges, apprenticeships and VET courses to create the higher pool of people needed in the high-demand industry areas.

In Romania, employers noted that entrants generally possesses skills in waste recycling and thermal insulation, but they are not well training in: use of resources, optimization of execution processes, environmental management, sustainable development, accessibility of the built environment. In Italy, employers found entrants to have limited competences in organizational and management logics, but required further training in legislation, systems and materials.

9.3 Policy makers:

Policy-makers across several countries commented that the training of entrants on a scale from a 'good level' (Italy), 'to be expanded' (UK), to 'insufficient' (Spain). In the UK and Spain, policy makers believed that employers had a responsibility to provide on-the-job training, while in Turkey, policy-makers considered this to be the responsibility of the government.

In Romania, policy-makers considered general training on environmental protection to have been given at 'gymnasium level', with the chance to apply skills on the job at high or professional level. Entrants in Romania were less well trained in sustainable development. In Italy, entrants were less well trained in materials and technologies, but policy-makers noted a 'good level' of training from apprenticeships and the benefit of younger people being better predisposed to train in green skills.

10 Recommended methods of teaching green skills for new entrants

10.1 Educators:

In several countries, educators argued that the best way for new entrants to learn green skills was through distinct green curricula: 'specific instruction in the area' (Spain); 'specialization of teachers' (Romania); and 'dedicated courses' (Italy). In the UK, however, educators agreed that green skills should be a 'vital part of all construction training', but rather than individual courses, argued for green skills embedded throughout 'the entire learning and delivery of what you do'.

In Turkey, which has the least provision of green skills VET across partner countries, educators proposed a two-step solution: change the curriculum to reflect current technologies, and update VET trainers with the knowledge to pass on green skills in their subject areas.

Several educators discussed awards and qualifications, such as educators in Romania stressing the need for ‘proper evaluation’ of students against the backdrop of a ‘didactic framework for teaching’. In the UK, the need for proper evaluation and recognition – ideally recognised by the government – is linked to the need for tightening regulations, with one educator describing the ‘major issue’ of plumbing technologies that can currently be installed without training or a licence. In Italy meanwhile, educators were cautious about certificates or certificates of participation, noting that such awards do not guarantee an individual’s ability to ‘organize their work’ towards green goals. In the UK too, educators warned against creating ‘tiny qualifications’ for being too confusing, the likes of which were removed from qualification systems en masse due the 2013 Whitehead *Review of Adult Vocational Qualifications in England*.

Regarding the methods of teaching for entrants, educators across the partner countries highlighted the usefulness of: interdisciplinary activities (Spain); increasing contact hours (Romania); work experience strategies (Italy); giving environmental context as early as school level (UK); and attending external events such the technology exhibition EcoBuild (UK).

Educators from Italy recommended that ongoing contact is achieved with students and graduates to provide ongoing training and demonstrate the applicability of green skills within the workforce. Similarly in the UK, educators stressed that green skills must not be ‘dumbed down’, and must apply to technologies and products in demand such as solar thermal and ground source heat pumps.

10.2 Employers:

Employer participants suggested a broad range of recommendations for teaching new entrants to the sector. A common theme between employers in Spain and Italy was interaction with the current workforce. In Spain, employers considered the best method of teaching new workers to be through old ones, while in Italy, employers stressed the importance of consulting ‘veterans’ of the sector to understand the required criteria for green skill application. Employers in the UK were also concerned with current workers – highlighting the need to raise awareness for ‘common-sense knowledge’ such as ‘delivering efficient resources’ to be identified as a ‘green skill’.

Employers in several countries were concerned with certification. In Turkey, employers considered ‘certification systems’ for green skills to be a notable option; in Romania, a dedicated course with active practice, examination and qualification; in Spain, specific centres which provide an ‘official certification’; and in Italy, specific courses with final exams and certificates. Employers in the UK, similarly to UK educators, saw the process as more of an embedding into current courses.

Employers in Italy recommended seminars, technical tables and workshops as effective training methods, as well as stressing the need for courses to be updated to keep up with change.

Cost was considered by employers in Turkey and Italy. In Turkey, the cost-effectiveness of workers delivering energy saving green skills was considered an advantage, while in Italy employers advocated a 'profit-oriented development model' whereby students are educated in terms of the market for certain techniques and technologies.

10.3 Policy makers:

Recommendations made by policy-makers for methods to train students in green skills were largely dependent on their particular country.

In Turkey, policy-makers recommended VET institutions the best place for students to acquire green skills, and echoed educator participants in Turkey by stressing a two-step solution: update the curriculum and train teachers. Similarly in Spain, a policy-maker recommended specific courses, while another advocated green skills as early as basic compulsory education.

In Romania and Italy, recommendations focused on the provision of dynamic training activities. In Romania, this was accompanied by a theoretical base, while in Italy requires the involvement of 'academic, professional and industrial sectors' to develop a successful, common and integrated strategy'.

Typically, policy-makers in the UK referred to the 'Sustainable Building Training Guide', which provides green skills learning objectives to be implemented by national occupational standards, apprenticeships and qualifications.

11 Recommended methods of teaching and updating green skills for current workforce

11.1 Educators:

Educators from Italy, Turkey and the UK considered continual professional development to be 'very important'. The provision of specialist courses was considered important by educators across Romania, the UK, Turkey and Italy, with the added stress of market applicability and general 'holistic' skills by some educators in the UK. In Romania, the provision of such courses was considered the role of adult education providers, while educators in Turkey and Italy advocated for the use of 'on-site' training and evaluation.

In Spain, educators considered the needs of green skills providers, advocating for either the regular examination of educators or the provision of an education department-approved

certification to keep up to date. One educator in the UK noted that the only providers of up to date training were the manufacturers of environmental kits to be installed.

Also in the UK, educators discussed the need for the government to recognise a 'minimum standard of competency' within which green skills could be factored.

11.2 Employers:

Employers in Spain recommended training the current workforce with established workers who possess green skills. Employers in the UK, however, remarked that there is a lack of people with green skills to be able to pass down.

In Romania, employers recommended theoretical and practical courses with certification, as did employers in Spain. Some employers in Italy also saw the advantage of certification, although others considered on-site 'know-how' to be more useful, and for all education to be rooted in its application in work situations.

In Italy and the UK, employers were concerned with the longevity of education, with an employer in Italy suggesting compulsory refresher courses and round-tables for comparison, and an employer in the UK suggesting qualifications to ensure techniques learned on training courses are being maintained. In the UK there is a perceived strain on employers to keep the workforce updated, in a situation where skills are behind standards, especially in new technologies and markets like district heating.

Employers in Turkey considered VET education unable to keep up with the rapidly training industry, and instead advocate for companies providing training as per project needs, ideally with the assistance of universities.

Uniquely in the UK, employers described a situation wherein many workers possess green skills, such as an awareness of resource efficiency and installation, but they do not consider such skills as 'green'. Here there is a need to challenge 'green' stereotypes and demonstrate the already fundamental green skills in an individual's day-to-day life.

11.3 Policy makers:

There was a range of recommendations for where and how training might occur, across all countries. Being trained on-site was a recommendation by policy makers across several countries, with the mention of 'on-site hubs' (UK); 'on-site training periods' (Italy); and following similar on-site models for training as are applied to subjects such as security (Turkey). In terms of delivery, policy-makers in Turkey voiced a necessity to focus on 'quality training activities' delivered by a national strategy. In Romania, respondents advocated for training by employers, similarly in Spain policy-makers considered the role of the supervising manager to verify green. However, in Italy policy-makers suggested 'more internships and work experience in large companies' to be conducted by the workers themselves.

In the UK, policy-makers considered the only way a worker can currently prove they have updated their green skills is through vocational qualifications. However, policy-makers commented on their current work to upskill the workforce through funding programs and activities, such as upskilling through the Mayor's Construction Academy, and the 'sustainability supply chain school' – an online self-assessments which then guides workers to where they can fill-in subject gaps in their knowledge.

12 Responsible stakeholders for new entrants' curriculums

12.1 Educators:

Educators across all countries typically identified policy-makers and governmental bodies as the key responsible stakeholders for new entrants' green skills curricula. In the UK, Turkey, and Italy, policy-makers were an important stakeholder, although in Italy educators commented that many are ill-informed regarding green skills. Turkish, Spanish and Romanian educators identified Ministries of Education/Education Departments as a major stakeholder for change – owing to their role as the prime controller of the curriculum in Turkey as well as for didactic frameworks and allotted teaching hours in Romania. Governmental incentives have influenced the demand for green skills in the UK, while in Turkey, the public plays a key role in pressuring politicians and other high-level decision maker to think environmentally.

Employers were identified as key stakeholders by educators in the UK and Italy, as well as the market demand for a certain environmental product or installation. In Italy, the company recruitment processes can influence demand in certain job profiles, while in the UK, employers chosen as 'trailblazers' design standards in apprenticeships. One educator in the UK explained the need for 'industry employers and industry associations' to cooperate to ensure 'fit for purpose training'.

12.2 Employers:

Employer in Italy and Italy indicated that the market is an important stakeholder for change. An employer in Turkey outlined a process whereby public demand will influence policy makers which will in turn pressure change in curriculum at ministerial level. Similarly in Italy, employers discussed being receptive to feedback generated by customers.

Employers in Romania, Spain, Italy and Turkey named education departments, ministries and governments as key stakeholders, with employers in Turkey mentioning the influence other departments – such as the environment agency – could have upon education.

In the UK, employers believed it to be typically 'up to them' to develop training needs with their student – 'as no one else is doing it'. Subsequently, company-specific processes leave students with non-transferable skills, with one employer stressing the need for a national

programme of certified skill levels. In Romania however, employers argued that they should be more involved with deciding which competencies are included within curriculums.

12.3 Policy makers:

Policy makers in Turkey, Spain, Romania and Italy identified decision-makers within the government and in particular departments and ministries of education as key stakeholders. Another common response from policy-makers was the power of market demand, as per participants from the UK and Italy.

In the UK, policy-makers also identified employers – who are responsible for setting apprenticeships – as a key stakeholder. Participants here explained the significance of profession bodies in charge of regulating and qualifying professional work as a stakeholder for encouraging green skills education, with policy-makers in Romania similarly commenting on the link between curriculum content and the requirement of occupational standards.

13 Responsible stakeholders for upskilling of current workforce

13.1 Educators:

Educators in the UK, Turkey and Italy identified key stakeholders for the upskilling of the current workforce at governmental level, particularly the Ministry of Labour in Turkey, and the possibility of the government forcing proof of green skills before signing contracts in the UK. There was some concern in Italy that current VET providers are not trained sufficiently to provide for the skills need of the existing workforce.

In Spain and Romania, however, educators placed responsibility on employers and companies to upskill their own workforce. In the UK, employer involvement is at times limited by existing renewable schemes, such as the Microgeneration Certification Scheme (MSC) for electricians, viewed by educators as 'expensive and laborious' for small businesses especially.

Educators in the UK and Italy also identified responding to market demand as vital, as well as responsible stakeholders within upon buildings regulation and the setting of continuous professional development requirements.

13.2 Employers:

Employer participants in the UK and Italy acknowledged that the workforce themselves have a responsibility to keep 'up to speed' with new developments, however in these countries, as well as Romania, employers see it as part of their collective responsibility to upskill workers.

In Turkey, Italy and the UK, policy makers were identified as being key stakeholders for the upskilling of the workforce, to reflect market demand (UK); to provide examinations to uphold standards (Turkey) and to implement with existing frameworks such as the Italian Order System (Italy). Employers in the UK heating industry underscored that lack of controls is impacting the sector, and that upskilling must work with national regulators.

13.3 Policy makers:

Generally, policy-makers identified employers as the key stakeholder for upskilling the workforce in green skills, particularly in Spain, Turkey, the UK and Romania. Other stakeholders suggested by policy-makers were market demand (UK); government institutions (Turkey); educational institutions (Romania) and individual administrations and managers (Italy).

14 Further comments

Not all participants in all countries provided further comments, so these are presented on a country-by-country basis.

14.1 Educators:

Educators in the UK wished to further signify the importance of green skill education during early education and at earlier stage than it is currently. They suggested some schools may be reticent to teach green skills projects as it 'differs from traditional school subject' and may experience a separation in theory and job applicability with A-Level and T-Level courses, respectively.

Educators in the UK also commented on the importance of formal training for apprenticeships and pushing to tackle environmental problems progressively, such as meeting 'code 5 – 6 on the green scale via building regulations'.

Educators in Turkey wished to stress the centralization of the VET system within the Ministry of National Education, and that this system may have 'more important' problems than green skills.

An educator in Italy asserted that the 'green' slogan can cause sectorialization in design research, while another asserts that more must be done to consider roles such as builder and electrician as less separate, from design stage to construction. Another educated recommended green skills education to refer to UNI TS 11300 standards.

14.2 Employers:

In the UK, employers wished to add that perceptions of 'green' need to change. One employer spoke of the need to communicate the benefits of green techniques in terms of saving, while another abandoned 'green' in order to speak in terms of 'financial and environmental value and also human wellbeing'. Another suggested 'lunch and learn' sessions to be an effective education tool.

A district heating employer stressed their sector as in need of greater consideration in terms of training and upskilling, especially in light of the government's projected growth forecast for the industry.

An employer in Italy voiced a need for the 'diffusion' of skills in construction and eco-design with targeted university courses and greater sectoral involvement.

14.3 Policy makers:

In the UK and Turkey, policy-makers were interested in this field of research and keen we continue.

A policy-maker in the UK warned that upskilling a workforce usually takes 18 months in the UK, a notoriously difficult undertaking as cycles and technologies change.

Another UK policy maker described how the term 'green skills' has greater currency in other European countries, and that 'modernisation or modern methods' is more widely used in the UK.

15 Conclusions

Participants across all countries identified a general trend of an increased or increasing importance and demand for green skills in the construction industry, often attributed to a greater awareness of global environmental issues from consumers and within the sector.

Provision of green skills education for entrants to the sector varied between countries. In the UK, green skills were an aspect of National Vocational Qualification Level 3, and provided at a varying levels in Italy, Spain and Romania. Responses from participants in Turkey suggested that VET provides little to no green skills education. In terms of upskilling the workforce, participants from several countries noted the discrepancies created by company size – smaller companies lacking the resources or financial motivation to train workers in green skills. Participants from all countries considered that more could be done to improve curriculums in terms of green skills content.

In the UK participants stressed the importance of green skills matching the market demand for products, technologies and techniques. Green skills are lacking in installation, commission, decommission and maintenance, and there is an issue with companies training their workers with non-transferrable skills. Participants advocated specialist courses;

embedding green skills in day-to-day practice; green skills within continued professional development; and earlier introduction of subject in schools. The UK more often uses 'modern methods' and 'sustainability' than the term 'green skills'.

Similarly in Italy, there is some confusion as to what green skills entail, where to some it suggests secularization rather than collaboration. Green skills are often only handled superficially or at degree level, to which participants suggested specialised courses, round tables and on-site experiences. At governmental level, state incentives promote speculation rather than directed investment, and policy-makers themselves often possess skills not inherent to the environmental sector, which inhibits the potential for green skills dissemination.

In Romania, occupational standards guide the green skills content in many, but not all fields, and there is room for specialisation of both courses and education providers. Here, employers decided to be more a part of the education process and deciding the competencies for green skills certification

However, in Spain, participants in general did not think a green skills an important aspect, despite a general global awareness, with some small companies believing their impact on the environment to not warrant change in their practices. The general view was that education and provision of green skills was the role of the government.

Similarly in Turkey, where again environmental issues are general are understood, the same does not apply to specific occupational skills. Here the education ministry is a key stakeholder in the control of curriculum content, however participants voiced concern that the country's economic system would lead to cost as a priority, rather than the environment.

All involved countries indicated that the government, policy-makers, employers and the demands of the market and consumers to be key stakeholders responsible for ensuring the education or upskilling of individuals in skills which reflect consumer needs, within frameworks which ensure regulations are enforced, standards are withheld, and the challenge of keeping up with rapidly changing technology is met.

16 Additional Information

Additional information – where provided – is presented on a country-by-country basis.

16.1 Italy

Building Information Modelling (BIM) technology is poorly developed and disseminated in Italy, but was raised as important during interviews. BIM technology consolidates and visualises all information for a construction, and allows for collaboration between different parties as the structure is built. Currently, the IFC certification is the only guarantee of BIM

proficiency, but the skills to operate the technology could become crucial as its use becomes more widespread.

Another aspect which emerged from the interviews is the knowledge and use of the UNI / TS 11300 standard³ – a six part methodology for determining the energy performance of buildings and a key basic green skill for all within the sector.

The ‘Italian Ordering System’ was also discussed within the interviews – legislation with the aim of guaranteeing quality of work carried out by professionals through the enrolment of individuals to a register. The system could function within education in decision making and evaluating skills.

16.2 Romania

The Romanian project authors wished to highlight the following report and portal as useful additional information:

<http://www.agir.ro/buletine/1007.pdf>

http://ec.europa.eu/dgs/education_culture/repository/education/policy/vocational-policy/doc/brugescom_en.pdf

16.3 Spain

In Spain there is substantial debate on the effectiveness of actions such as a \$90 billion stimulus package from the Obama administration, but little empirical research to gauge market demand. Tailoring policy to demand may also mitigate the negative employment effects traditionally associated with environmental regulation.

‘Skills for Green Jobs: A Global View’¹ explains that effectively dealing with transformation of existing jobs and structural change can result in job creation. Carbon-intensive industries expected to lose jobs, and the transformation towards a greening economy must account for and prepare skills development and transition.

16.4 UK

The Analysis of the National Status Quo research report produced by the Build Up Skills Programme in 2012 revealed that training provision was limited by continuously emerging technologies, and fewer specialist courses were being provided as a result of low interest. Other obstacles identified as a risk to 2020 energy efficiency targets included: lack of funding, low levels of market awareness of the agenda and fragmented policy frameworks’.

Since this report, the construction industry was able to tap into emerging markets such as district heating, amidst an increase in funding as per schemes such as the Mayor’s

¹ STRIETSKA-ILINA, Olga, et al. Skills for green jobs: A global view. Geneva: International Labour Organisation, 2012.

Construction Academy and the Construction Skills Fund. Interest in green skills continues to fluctuate.

The Supply Chain Insight Group's Trust and Certainty report in 2015 advocated training courses and assessments in energy efficiency and sustainability. Around this time, lack of consumer understanding of the benefits of environmental construction and unpopular government schemes caused the construction industry to not invest in green potential.

Supplementary interviews conducted in Oman and Brazil showcased that employers situated in both the UK and overseas generally agree that green skills are important in construction. In particular, respondents overseas mentioned safety skills as key green skills. Furthermore, interviewees mentioned that universities and courses were provided within their companies offering the necessary skills required from the workforce.