



Final Report

Public Part

## Project information

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## Executive Summary

In the project Greening Technical VET (GT VET) a pilot training module on green skills has been developed which is supposed to accelerate the implementation of industry-relevant qualifications in company related training and national VET systems continuously. It contains four elaborated sub-modules on topics directly relevant to green skills and ecological awareness: Energy, Waste, Noise, and Raw Materials. This European training module will help to obtain identical European learning outcomes in the field of green skills and sustainable awareness within technical VET (focussing on preventing pollution and securing occupational health and safety). The module was adapted and tested within four steel companies (ThyssenKruppSteel, TataSteel, ArcelorMittal Poland and Acciai Speciali Terni) and member states (Germany, United Kingdom, Poland, and Italy). All steel companies are GT VET project partners, along with research institutes in the respective countries (“tandem approach”). The partnership in general is composed of different competences and perspectives: the research institutes with their scientific knowledge, the steel companies with their practical knowhow, the European associations with their dissemination and exploitation possibilities, and the associated partners with their national and regional relevance for VET are composing a partnership that guaranteed high quality performance and cumulative added values for all the involved partners and areas.

**Why this project?** For global competitiveness of European industries, a short term implementation of new mandatory skills within VET systems (national and industry related) is crucial. The project thus aimed to investigate systematic on-going and short termed training pathways by focusing on skills for ecological sustainability, which are a key for the global competitiveness of all European industries. In this respect, a model for an industry driven and run European sustainable training module has been developed in correspondence with the national VET systems.

**How did we proceed methodologically?** All steel companies are embedded and engaged in European environmental legislation activities via contact points and networking in Brussels. European directives are transferred and “translated” into company directives and strict corporate targets (often going beyond formal European directives and national legislation): ensuring a high influence of environmental related instructions on everyday work and every maintenance routine of the electrical and mechanical technicians (the chosen pilot training target group). With the described partnership we identified and anticipated in work package 2 (WP2) the impacts of ecological legislation in everyday work of skilled workers both for today and future. Independent of the different VET system of the member states, VET practices and learning outcomes needed to be evaluated with respect to ecological skills, expertise and awareness. In WP2, the consortium has conducted an industry driven analysis of current and future job requirements concerning green aspects (ecological sustainability, health and safety) of technically skilled workers in the steel industry in each of the four represented member states. On the basis of desktop research, interviews and workshops with the environmental and health and safety departments of the steel companies, comprehensive national reports have been delivered which are the bases of the WP2 summary report.

In WP3, each national VET system of the participating member states has been analysed with regard to its future industry needs (of WP2). With each VET system

having different regulations and institutional frameworks, an analysis of the existing curricula of two main apprenticeships and regulated professions (industrial mechanics and electrical technicians) and its implementation possibilities for the identified skills has been done. The concrete realization of VET in the different training venues has also been investigated – interviews and workshops with the training department in steel companies (target group: trainers), environment and other technical departments, e.g. health and safety (target group: managers), recently graduated apprentices, vocational schools (target group: teachers), the chambers of industry (representatives of VET), other VET relevant institutions at regional level provided this information. Again, a summary report has been delivered on the basis of national reports.

**The main results** of WP 2 and 3 showed a varied set of curricula, policies and practices, which is indicative of different levels of skills, competence and knowledge across the case study countries. Within the companies, varied practice was evident and, given the lack of centralised guidance and policy, it can be concluded that the significance according to environmental topics differs greatly, mainly based on the importance given to such issues by section managers. A closer cooperation between VET institutions and the companies was recommended. In particular, learning content must be relevant, specific and applied to company practice. For the development of the training module, a main didactical consideration of the initial project idea proved to be inappropriate: The module should not be constructed as a pure eLearning tool, but it should consist of a series of smaller sub-modules or cases, training should be applied role-specifically, with numerous examples of applied learning provided, and supplemented by the use of projects and applications of tools.

The next key step of the project was the development of the European training module for “greening” technical professions of the steel industry (WP4). This European training module has been developed as a comprehensive “continuous progressing training module” of all participating and further interested steel companies. It helps to keep the qualification of the (future) technicians up-to-date and up-to-future and to stimulate the short term implementation in the national VET systems. Based on the results of WP2 und 3 and a first definition of a European standard concerning green skills and green awareness in technical profession, a training module (consisting of different work related cases or smaller modules and a handbook) has been developed as a blueprint for each member state. The training departments of the steel companies have developed the four sub-modules, assisted by the research institutions.

This training module was then piloted in all participating steel companies and related VET institutions on regional level (WP5). Every company tested the sub-module they had previously developed. As a second step, the other sub-modules were cross-tested. In accordance with testing feedback, the product was adapted and modified to fit the requirements of both the companies and member states as well as possible.

A central methodological approach was to discuss the results of the respective work packages promptly on a common sectoral and European level, taking feedback from external experts for the project proceeding and product development into account (WP6). All in all four European workshops have taken place, each one focusing on the results of a distinct work package, from 2 to 5. The workshops have concentrated on defining a European standard of the expected learning outcomes and have

provided input for the subsequent work packages. Participants of these workshops on European level were representatives of the involved steel companies, the social partners (EUROFER, industriALL), national and European VET experts.

The main result of these efforts is a European Framework Module on Green Skills, its sectoral integration, which will be run further by ESTEP (the European Steel Technology Platform), with an ECVET approach, as a basis for continuous adjusting of the existing module against the background of new skills demands.

**Dissemination** has started right at the beginning of the project. During the first year of the project, a project flyer has been developed in English, Italian, German and Polish language. A website is online (<http://www.gt-vet.com>) which informs the public about the project and keeps interest groups up to date with the latest steps. The website is and will be a central instrument to disseminate and exploit the project results after the project. Furthermore, the project and its results have been presented and discussed publicly on a variety of occasions, e.g. during the meetings of ESTEP (European Steel Technology Platform) Working Group 5 "People" and the training group of the Sectoral Social Dialogue Committee on Steel SSDCS, the European Steel Day 2011 and 2012 in Brussels, the OECD/CEDEFOP conference 2012 "Skills for a low carbon future" in Paris, a workshop of DG EAC 2012 on VET excellence, and at the meetings of the European steel council on jobs and skills development in Brussels (first half of 2011). Basically, all public dissemination is done via printed products by every partner and via website worldwide.

**The final conference** was conducted under the participation of representatives of all the relevant European institutions for the development of green skills: OECD/LEED, DG EAC, DG Employment, the social partners EUROFER/ESTEP and industriALL, EUROFOUND, and The Greens/European Free Alliance. All the European representatives stated that the GT VET approach is the right concept for pushing green awareness with generic, specific, essential and transversal skills using new ways of learning and training pathways off the classroom and improving sectoral and cross-sectoral cooperation between companies. A flexible and easily integration in education and training programs, in schools/VET institutions and companies is guaranteed as well as a responsive and short-termed integration of new skills - coming from continuously and rapidly changing (production) technologies - into the workplace, the shop-floor.

**The social partners** have played a central role in this project. They have shared the responsibility of valorisation (dissemination and exploitation), supported by the steel companies and research institutions. Intensive dissemination has been organised especially by EUROFER, the European Steel Association. Exploitation has been started on the basis of dissemination activities and an exploitation plan. Quality monitoring and product evaluation (WP9) has been conducted from the beginning of the project, with each European project workshop being assessed on the basis of a quality plan delivered by the responsible partner. During the second year of GT VET, product evaluation has become the focus of evaluation; especially, feedback to the training module development has helped the consortium refine this central product of the project.

**The future:** After the funding phase of the GT VET project by the European Lifelong Learning Program *the European Framework Module on Greening Technical VET will be run and developed, disseminated and exploited continuously by the Working Group "People" of the European Steel Technology Platform ESTEP.*

Using the example of the steel industry and the VET of industrial mechanics and electronic technicians, the module and its process of implementation was and is used for continuous adaptation within the steel industry and also for transfer to other technical VET professions and production industries. Therefore, the module (with their distinct sub-modules, allowing a very purposeful transfer) and its tested implementation process are a blueprint for short term implementation and updating of new skills in European industries and into the VET system.

While the primary target audience was and still is the European steel industry (with the European steel employers' organisation EUROFER and the European metalworkers federation IndustriALL being project partners of GT VET), a secondary audience are neighbouring industries in which the introduction of green skills is also becoming more and more relevant. Short and long term target groups are pupils, apprentices (initial VET) and skilled workers (continuous vocational training). These end-users are reached directly by the intermediary target groups of the project and the VET system: HR-Managers and training departments of production companies on the sectoral side and national (legislative) agencies of VET and vocational schools and official training institutions at the national and regional level.

All in all the GT VET concept has to be seen as a basis and an outlook for more flexibility and practicability of VET and a focus on generic, specific and transversal skills - looking on job transformation to ensure a smooth transition in the different member states, done by a closer cooperation between companies and VET institutions (esp. schools) and getting VET closer to user needs. The GT VET concept could be a basis for more innovation at the shop-floor, for the workforce, for improving productivity of resources: *to improve work place innovation and platforms for exploring the idea of driving innovation* - binding all different actors from different fields to build up *skills alliances* (sector skills councils, sector alliances) oriented at different occupations and/or sectors, even cross-sectoral as well.

The future perspective of a green skilled industry depends on three things: recognition, investment in finance and skills (governments, companies, etc.) and visions/illustrations/objectives (e.g. reports/papers from the European Commission, green projects and alliances).

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# 1. Project Objectives

The main objective of the project was to develop a sustainable industry-driven European VET module for an on-going and short termed introduction of environmental or “green” skills. This is being piloted by the development of a training module on awareness and skills for a greener production and industry.

Therefore, the consortium has analysed how environmental legislation determines the everyday work of skilled workers (which are the main target group of the GT VET product) today and in the future using the example of the steel industry (which is the community with primary interest in the success and outcomes of the project).

Research and reporting on the impacts of European directives and the reflection of green issues within four European Steel companies and national VET Systems has also been realised. After developing a European Training Module of greening technical VET, an adaption and pilot testing process took place in the four steel companies involved and embedded in four different national VET systems, but in each case with respect to the defined European learning outcomes. The activity oriented training module is structured in such a way that it can be integrated into each national system of VET or used in addition to the existing system of VET (by matching the demands of industry with the VET system).

One long-term objective of the project, which will be a focus of the exploitation activities, will be to inform and motivate neighbouring industries to make use of the GT VET outcomes (the module itself as well as the supporting products and process recommendations) in order to develop the green skills of their respective skilled workers staff.

All in all the main GT VET objectives were:

- The timely and responsive **implementation** of new mandatory skills within VET systems (national and industry related);
- To investigate the scope for the development of ongoing and responsive training pathways by **focusing on skills for environmental sustainability**;
- To develop a model of an **industry driven and run European sustainable training module** and to match the demands of industry with the VET system;
- To identify and to anticipate **impacts of environmental legislation in everyday work** of skilled workers, both for today and future;
- To develop a **European training module** to obtain identical European learning outcomes in the field of green skills and sustainable awareness within technical VET (focusing on preventing pollution and securing occupational health and safety);
- **To adapt and to test the module** within four steel companies and member states (United Kingdom, Poland, Italy and Germany);
- To use the example of the steel industry and the VET of industrial mechanics, electrical and electronic technicians for **adaptation and transfer to other technical VET professions and production industries**;

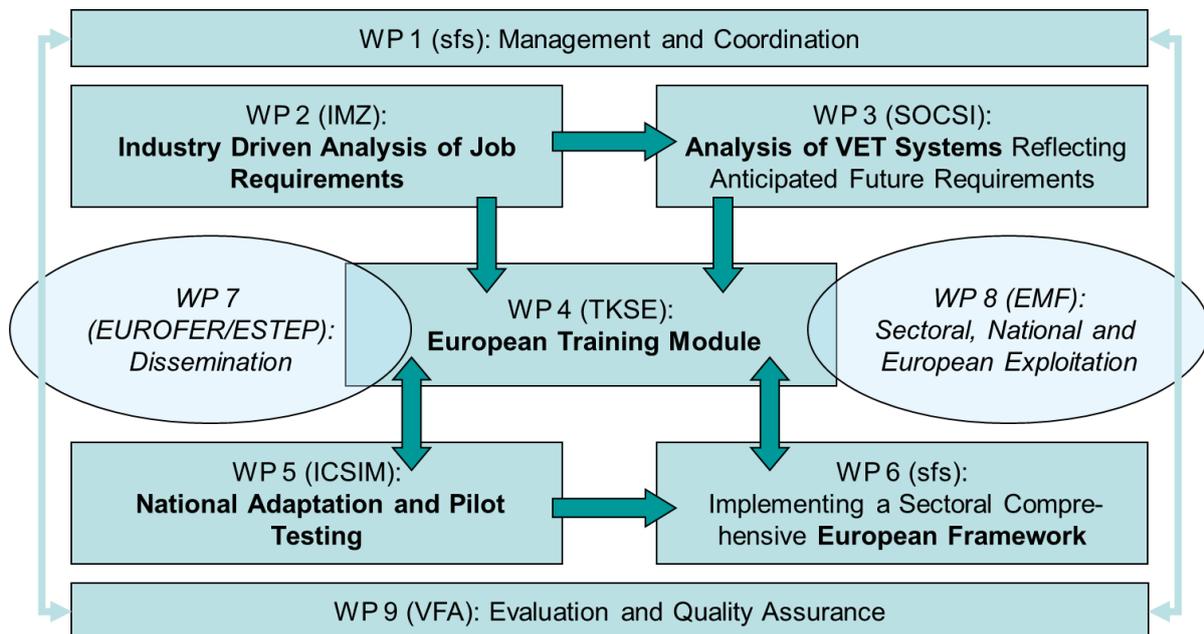
- To produce a **blueprint** for the implementation (process) of new skills for the industry sector and the appropriate VET systems.

## 2. Project Approach

### The work programme:

The work programme was carried out by research institutions and a strong involvement of steel companies, accompanied by the European social partners and the involvement of VET system relevant associated partners. The programme was organised on a decentralised and work sharing basis, with main responsibilities attributed to organisations that are best suitable and have the expertise to undertake specific pieces of work. Research institutions were responsible for the research driven work packages, assisted and supported by the practical knowledge of the steel companies. The training departments of the steel companies developed and tested the training sub-modules, assisted by the research institutions. The social partners shared the responsibility of valorisation (dissemination and exploitation), supported by the steel companies and research institutions.

Work packages had precisely defined goals and they were clearly separated, development work packages (WP) were consecutively arranged (results of WP 2, 3, 4, 5 have been milestones for the subsequently following activities), while a parallel European framework (WP6) discussed and challenged the results shortly after and before every following work package on a European level. This work programme approach was proven to be very effective and efficient.



### Surveys:

Surveys played an essential role especially concerning the development and testing of the module (WP2 to 5).

For the industry driven analysis of job requirements (WP2), the research institutes and training departments of the steel partners have conducted interviews and workshops with the environmental and health and safety departments of the steel

companies. Objectives were the identification of current and future job requirements for skilled workers, respectively working conditions, critical situations and appropriated acting and behaviour on the one hand and - based on these results - the definition of qualification requirements for skilled workers concerning green awareness and skills (including health and safety). The research has been a coordinated effort of the whole consortium, including research questions definition, methodological discussions, analysis and reporting.

In WP3 each national VET system of the participating member states has been analysed, asking how it meets the identified future industry needs (of WP2). Each involved VET system has different regulations and institutional frameworks (e.g. Germany: dual system, Italy: regional authority responsibility of vocational training, UK: “voluntary” system and regulation through different laws and responsibilities, Poland: national responsibility by the ministry of national education).

Using the example of two main apprenticeships and regulated professions (industrial mechanics and electrical technicians) in every represented member state, an analysis of the existing curricula and its implementation possibilities for the identified skills has been done. As green issues are usually a minor topic of VET practice, we have evaluated the concrete realisation of VET in the different training venues (company, training centres, and vocational school). Here, interviews and workshops at regional level have been conducted, with support of the training departments of steel companies, environment and other technical departments (primarily health and safety), recently graduated apprentices, vocational schools (target group: teachers), and the chambers of industry.

The objective was to learn about concrete training practice in the member states concerning green awareness and green skills development in relation to the identified future job requirements and to propose or identify first outlines of a training module to bridge the identified gap between future job requirements and current education and training practice.

The results of industry requirements and their reflection in the VET systems provided the basis for the module development (WP4) and the European workshops (WP 6: European Framework).

The pilot version of the European Training Module was developed, adapted and tested in the involved steel companies. Beneath training sessions of the developed sub-modules as well questionnaires, interviews, workshops and presentations of the training results were made with participation of trainees, apprentices, trainers, teachers (from secondary/technical and vocational schools), (production and training) managers. Based on their practical experience and assessment the sub-modules were improved and further developed.

### **The evaluation strategy:**

Quality assurance was guaranteed by an experienced consultancy in European VET projects and evaluation as well as by embedding every partner in the quality assurance plan (project documentation). The aim of the GT VET – Quality and Evaluation Plan was to ensure that all the project activities planned, and approved by the financing authority EACEA, are executed in a way that serves best the declared objectives and makes best use of available resources and partnership’s expertise.

The evaluation of the GT-VET project was a continuous process covering the whole project period. The core objectives of the project evaluation were:

- To contribute to the maximisation of the effectiveness and efficiency of the project
- To identify problems – put forward solutions / improvements
- To ensure the quality of the project outcomes
- To assess its progress and estimate its impact
- To inform stakeholders/ interested public
- To contribute to the effective communication and exploitation of results achieved.

The partner responsible for the evaluation was working at two levels:

- Process evaluation
- Product evaluation, related to the content and quality of GT- VET project outcomes.

In general, the evaluation was based on qualitative and quantitative data which is acquired from:

- Monitoring data and documents
- Participation at the partners' meetings
- Questionnaires
- Interviews / group discussions.

The results show very good progress of the project and a high level of satisfaction of the consortium in all areas. Strong points explicitly named during the evaluation were informative meetings, a productive working atmosphere, a high-level consortium, the effectiveness of work done, the possibility to discuss every problem with every partner, a good organisation and thorough preparation of meetings, clear planning and a strong commitment of the partners.

### **Dissemination and exploitation strategy and activities:**

Dissemination and exploitation were mainly done at the European Steel Technology Platform (ESTEP), the Sectoral Social Dialogue Committee Steel (SSDCS) and the activities of the social partners EUROFER and EMF/industriALL. A dissemination plan was developed, outlining the range of activities that ensure the awareness of the project and its results at a regional, national and European level, even after the lifespan of the project.

Every participating partner undertook and will undertake its own dissemination: the steel companies to other sites of the company in other regions, the universities and research institute to the scientific community, the social partners on their regular events (ESTEP Working Groups and Steering Committee, industriALL meetings, and European Sectoral Social Dialogue).

The project and its progress are represented on the web and on the partners' homepages. A project flyer has been printed and distributed from the beginning of the project in four languages (German, English, Polish and Italian).

European conferences and project reports summarised the results and set the framework for an ongoing discourse in the steel sector for European dissemination and also exploitation beyond the lifetime of the project.

The actual project results were presented during European conferences (Skills Council, OECD/LEED Green Skills, GD EAC workshop on vocational excellence, ECVET pilot project results, and others), starting the dissemination and exploitation to stakeholders of VET, the steel industry as a whole, and other relevant manufacturing industries. The final results were discussed on the high level final conference which took place in the European Economic and Social Committee (EESC) building - with participation of high representatives from OECD/LEED, DG Education and Culture, DG Employment, European trade union industriALL, European Steel Technology Platform ESTEP, European Foundation for the Improvement of Living and Working Conditions and a Member of the European Parliament), moderated by a member of the Consultative Commission on Industrial Change CCMI Bureau. The project has followed an inherent valorisation right from the beginning by direct involvement of all industry key actors and the associated involvement of VET responsables. A comprehensive European dissemination and exploitation within the steel sector and within other production industries has been secured by relevant partners and their European, sectoral, national and regional platforms. Project progress is reported at the meetings of the Working Group "Training" of SSDCS and the Working Group "People" of ESTEP. Within ESTEP, a cross dissemination to the technical working groups (especially "Planet") is being done regularly. Moreover, SSDCS and ESTEP as steel specific organisations are an integrated part of other European networks. They have the ability and will continue to disseminate the progress to other European Technology Platforms, Social Dialogues and European and national events.

The project partner EUROFER has most of the European steel companies and national steel federations as members and (merged global union) industriALL is representing 50 million workers in 140 countries, more than 100 affiliated organisations from all countries across Europe, taking responsibility for the mining, energy and production sector (including energy production, mining, manufacturing of metals and metal products, shipbuilding, automotive, aerospace, mechanical engineering, electronics, chemicals, rubber, pulp and paper, building materials, textiles, garments, leather and footwear and environmental services). With their committees and networks it is secured to reach a high numbers of recipients. Within the ESTEP, EUROFER and industriALL activities the project is announced as much as possible.

The short term target groups of GT VET are same as the long term target groups, but in a broader sense. Long term addressed target groups (end-users) are former apprentices (primary VET) and skilled workers (continuous vocational training): first of the steel industry, second of other production industries; first for industrial mechanics and electronic technicians, then for other technical occupational images. The end-users are reached directly by the intermediary target groups of the project and the VET system: HR-Managers and training departments of production

companies on the sectoral side and national (legislative) agencies of VET and vocational schools and official training institutions at the national and regional level.

The future apprentices are reached by companies, vocational schools and other regional VET institutions (e.g. chambers of commerce), which are integrated in hierarchies and networks that can be used to transfer the project results to the legislative and the political discussion. Other way round national VET agencies could improve the relevant occupational curricula and several technical VET pathways.

The project results and its products are published on an on-going own website. EUROFER and the inherent national steel federations (especially the German and the Polish Steel Platforms, which were integrated in the project as associated partners) did and will transfer the results to the employers, where industriALL and national metal workers unions will pass them as well on to the steel industry and other industries they are involved (aerospace, automotive, ICT, lifts, mechanical engineering, non-ferrous metal, shipbuilding, white goods).

### **Added value of the approach:**

The main added value of the approach used can be seen in the direct involvement of those players who have to implement and sustain the project outcomes in the long run – the steel industry partners. The direct involvement of the social partners is also a main asset, which has already brought excellent dissemination results (project presentations at the ESTEP working group 5 “People” and at the European Steel Day, European steel council on jobs and skills).

The developed module will be run and updated continuously by the European steel industry beyond the project. The intensive involvement of four international steel companies, the European (ESTEP, Sectoral Social Dialogue Committee Steel SSDCS) and national steel sector platforms as well as the social partners (EUROFER, EMF) secures an orientation on industry requirements not only for the whole innovation process but for the sustainable exploitation and *continuous and further development* of the produced European training module. The flexible and simple integration of the sub-modules in the national VET curricula and systems in the member states might have a proactive role to improve the development of educational innovations with their perspective, the implementation and exploitation of new VET modules and the short term implementation process of industry driven qualification requirements.

The involvement of the steel industry and stakeholders of the VET system on a regional, national, European and sectoral level is a strong guarantee that the relevant impacts of the project will be sustained further on.

From a methodological point of view, a strong point of GT VET is the involvement of external experts during the work package related discussions and the decision to invite VET system representatives (vocational schools, VET authorities) to national workshops, because the success of the European module will partly depend on the motivation and competence of the industry and the VET system to cooperate with each other.

### 3. Project Outcomes & Results

The main objective of the project was to develop a sustainable industry driven and coordinated European VET module for an ongoing and short termed implementation process of new skills. In the first year of the project the consortium has provided an excellent ground by analysing the relevant industry requirements and their reflection in the VET systems of the involved member states. On this ground the pilot module was developed, tested and modified in the second year. The methodological approach of involving the target groups, steel companies, training and research institutions as well as VET representatives and social partners secured and is securing a “social innovation process” the embedding of all the relevant stakeholders and the implementation and exploitation as well as the sustainability of the training module beyond the project’s lifetime. Therefore, the GT-VET Training Module on Greening Technical VET will be distributed, run and further developed by the Working Group “People” of the European Steel Technology Platform ESTEP. The flexibility and simple integration of the sub-modules of the European Training Module guarantee the integration into the national VET systems and company related education and training programmes. They are building the suitable ground for a transfer and modification of the training contents to other industries and other occupation profiles.

#### **Main results of the industry driven requirements (WP2)**

##### *Environmental (and related health and safety) Legislation and Company Implementation*

Knowledge centers for environmental issues could be found in all major steel companies. They have European contact points or bureaus and they are engaged in “environmental networking” in Brussels. A “translation” of legal requirements into procedural instructions and handbooks and good practice examples for “application-oriented diffusion” of environmental legislation have been developed (“every employee has to understand the message”). Strict corporate targets (“no accidents”) are exceeding legal requirements to some extent (from complying to improving) and there is a steering approach through highly diversified target figures on company, plant and department level, ensuring a high influence of environment-related instructions on everyday work.

##### *Responsibility for environmental (and related health and safety) issues*

Responsibility is taken by distinct departments for environmental issues and occupational health and safety. Hybrid working groups meet and define implementation pathways (1) to comply with new legal directives and (2) to integrate new requirements into training (VET, further training). But different levels of autonomy of plants could be found, e.g.: ThyssenKruppSteel Europe (TKSE) plants have recently installed their own environmental representative. A common “culture” of shared responsibility regarding environmental issues is aimed at as well as skilled workers are more and more considered as responsible for “green performance”.

### *Environmental/green aspects of skilled work within the plant (Electrical Technicians and Mechanical Technicians)*

Environmental regulations influence basically every maintenance routine; they are extensively integrated in VET and further training, plant protocols and operational instructions. In addition “green projects” to improve environmental performance are undertaken. Training more and more resembles everyday work (integrative learning approach, autonomous problem solving and reflection as pedagogic concepts gaining importance).

### **Main results of the VET reflections on the industry driven requirements (WP3)**

Clearly, there are a varied set of curricula, policies and practices, which is indicative of different levels of skills, competence and knowledge across the case study countries. Within the companies varied practice was evident and given the lack of centralised guidance/policy, it can be inferred that the emphasis accorded to environmental matters differs, based on the importance placed on such issues by section heads. The GT-VET project required a clear definition of green skills from which to work; this definition was formulated bottom-up to reflect the specificity of the steel sector and top-down to incorporate wider ‘green’ policy imperatives (such as those deriving from EU 2020 strategies).

Wider recommendations, common to a number of cases, were that there should be greater co-operation between companies and schools/colleges on (green) skills development, so as to ensure a clear, coherent and consistent message. More particularly, school content must be relevant, specific and applied to company practice. Further, it is important that in-company training programmes are reinforced by wider campaigns and information distribution.

In terms of module delivery, a series of smaller modules was postulated to be run over the course of the apprenticeship training. The focus of the introductory module should be basis knowledge like relevant environmental legislation and its impact upon and application to the steel industry. Modules on specific practice could then ensue. The main consideration was that such training should be applied and role-specific, with numerous examples of concrete learning provided, and supplemented by the use of projects and applications of tools, such as life cycle or productions process assessment. It was also suggested that critical incidents could be documented and form the basis for analysis – students could work out what went wrong in a situation and how it could have been prevented through the identification of the appropriate actions at each stage. These are deemed to be essential for effective learning by the trainees themselves. An emphasis on consequences of behaviour – the ‘why’ as well as the ‘what’ – and the implications for individuals, the organization and society should be included.

### **Main results of the European Training Module (WP4)**

Based on the background of the industry requirements (WP2) and their reflection within different VET frameworks (WP3), a first definition of European standards concerning green skills and awareness in technical professions was made, as well as a new framework for the development of the first pilot training module.

### *Change of the module format*

Instead of developing the planned pure e-learning tool, with limited practicability for and adaptability to the currently existing training programs of the participating steel companies and the national vet systems, the consortium produced a comprehensive training module on green skills, including parts of digital elements (CDs, videos). The new version

- raises more awareness of the workers on environmental and related health and safety issues;
- allows the companies to offer their apprentices and employees the “green skills” training module in a more flexible way, including face-to-face learning situations and self-conducted projects;
- is structured in such a way that it can be simply and flexibly integrated into each national system of VET or used in addition to the existing system of VET (by matching the demands of industry with the VET system).

The change was necessary because of the results of the workshops and interviews within work package 3: the training departments of the companies, representatives from vocational schools and not at least the trainers, teachers trainees themselves (in every involved member state) strongly advised the consortium to produce not an e-learning tool (which is of no interest for the target group) but a training module with concrete relevance to the workplace, not only giving information and inputs but setting activating tasks to the trainees. Furthermore, following the results of WP 3 research, the European training module

- was more thematically differentiated than foreseen in the original project planning: it consists of four different thematic sub-modules (energy, raw material, waste, noise)
- and address learners on different, subsequently following learning levels (basic information, background and coherences, professional practical knowledge/ competencies, process know-how).

The training module itself was produced as a digital and printable handbook, involving didactical tools such as theoretic inputs and practical work, self-organising work, questionnaires, and digital media (video). Therefore, not the training module as such was changed, but a new target group oriented and targeted format was chosen, enriched by different sub-modules (more concrete themes) and a stronger workplace and more flexible VET system implementation. This is why the way the training is delivered to the apprentices, workers, and students as well as to the trainers and teachers had to be adapted as well.

The advantages of this kind of comprehensive training module instead of an e-learning are obvious: the training module (and parts of it) could be more easily implemented and adopted to the companies and VET institutions training programs and to different training frameworks and arrangements, it is more user friendly in the sense of raising awareness of the trainees by encouraging trainers and trainees to self-organised and workplace near activities, the learning level “process know-how” is conceptualised as a self-organised activity on creative workplace innovation on “green effects”, ECVET credit points could be given in relation to the VET system

related national curricula. These effects could not be given by a pure e-learning tool, which especially does not ensure the relation of the training to the workplace and the awareness of green issues to this extent.

### *Definition of green skills*

Related to the three differentiations for green skills (O\*NET Classification) GT VET is dealing with the increase of green skills for existing occupations<sup>1</sup> (embedding both generic and technical skills)<sup>2</sup>. When using the term green skills GT-VET focuses more on environmental sustainability. But there are clear benefits in terms of social and economic sustainability, too. As skills are acquired and then applied by individuals in different contexts, skills become green when they are applied in green contexts. Our point of reference is with respect to the context of the European steel industry and its green requirements concerning legislation, innovation and stakeholders perspectives – both for now and the foreseeable future. In addition to the analysis of relevant documents the following definition is also a result of interviews and workshops with steel and VET experts within the framework of the GT-VET project.

Green skills for technical VET in the European steel industry are technical skills and appropriate awareness to prevent and reduce negative impacts on the individual and environment (neighbourhood, employees, air, water and ground) caused or initiated by operations and work in and around steel production. Green skills aim to equip skilled workers with competencies for ecologically and environmentally sustainable behaviour whilst maintaining high health and safety standards.

This comprises knowledge, abilities and attitudes:

- to save and reduce input of resources, particularly energy and raw materials.
- to prevent and reduce emissions, pollution and noise.

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<sup>1</sup> The other two are: green enhanced skills occupations (green skills that significantly change the work and worker requirements) and new and emerging green occupations (unique work and worker requirements, resulting in the generation of new occupations, entirely novel or 'born' from an existing occupation). (Source: Green Skills Agreement Implementation Plan 2010-2011. Ministerial council for tertiary education and employment. June 2010, page 3. For a comprehensive definition of occupational categories on green skills see also: Dierdorff, E., Norton, J., Drewes, D., Kroustalis.C., Rivkin, D. and Lewis, P. (2009) Greening of the World of Work: Implications for O\*NET®-SOC and New and Emerging Occupations. A Report for U.S. Department of Labor Employment and Training Administration Office of Workforce Investment Division of Workforce System Support Washington, DC. The National Center for O\*NET Development, February 12, 2009).

<sup>2</sup> Generic skills - the possession by an individual of the qualities and competencies required to meet the changing needs of employers and customers and thereby help to realise his or her aspirations and potential at work (CBI, Qualified to compete. Creating a world class qualifications framework, CBI, London, 1998).

Technical skills - the skills needed to perform the tasks required to produce a good or service, often involving analysis, evaluation or the application of machines or technological systems. Examples of technical /specific green skills include knowledge of sustainable materials, carbon 'foot printing' and environmental impact assessment skills

(Cedefop (2010), Skills for green jobs, developing a low-carbon economy depends on improving existing skills rather than specialised green skills, Briefing Note, July 2010 - [http://www.cedefop.europa.eu/EN/Files/9024\\_en.pdf](http://www.cedefop.europa.eu/EN/Files/9024_en.pdf)).

- to utilize, store and dispose waste materials in a manner that conforms with best practice environmental procedures and understands the consequences of nonconformity.
- to understand the value, impact and lifecycle of resources and materials.
- to keep track of current standards and best available techniques.

### *Development of the training module*

Based on the results of the industry requirements and its reflection on the VET systems, an activity oriented learning approach the European training module was developed as a workplace and activity based learning sequence (with smaller sub-modules and action-oriented green skills projects) supported by digital media (e.g. power point-presentation for teachers, videos). For the pilot version principal environmental concerns that derive from the steel production process were identified as sub-modules (energy, raw materials, waste, and noise) and developed in new or enriched existing projects with green aspects. The module shapes knowledge, abilities and attitudes in broadly understood green awareness. Learning outcomes were defined to be tangible and raise awareness. The content is workplace related and relevant for steel production and its further processing. Cognitive and manual learning as well as learning by doing were combined, useful work pieces which foster sustainable learning were created and learning is action oriented. A set of didactic methods were incorporated in the module to facilitate the knowledge transfer and spice up learning process. The more complex didactics are they were oriented towards activities. Learning impact was based on critical events (including which kind of misconduct led to negative impacts). Beneath practical parts all contents are convenient to be used at different learning facilities (school, company work place, training areas). The module promotes cooperation between all learning venues (vocational school, training centre, production site).

The main topics (energy, raw materials, noise and waste) deriving from the actual demands of the involved companies were developed in sub-modules of four different learning or knowledge levels (see the following matrix). These levels are subsequently following each other, improving the level of self-learning and learning outcomes step-by-step. The specific learning contents and activities are oriented at typical situations and matters close to the workplace and company requirements. Each level of each sub-module develops knowledge to a deeper (and more industry relevant) level. While level 1 and 2 are more input oriented (with self-learning and group work as well), especially level 3 and 4 are based on own activities, tasks and projects of the trainees.

**Matrix of learning areas and levels**

	<b>Level 1:</b> Basic information	<b>Level 2:</b> Understand background and coherences	<b>Level 3:</b> Professional practical knowledge/competencies	<b>Level 4:</b> Process know-how
<b>Industry related main topics</b>				
Save and reduce input of resources: <b>Sub-module Energy</b>	Introduction of each issue: Easy access to the very basics combined with examples of the steel industry	Exercises stronger linked to industrial issues/cases		Professional experience in industry to be reflected
Save and reduce input of resources: <b>Sub-module Raw Materials</b>				
Prevent and reduce emissions pollution and noise: <b>Sub-module: Noise</b>				
Utilize store and dispose of waste materials: <b>Sub-module Waste</b>				

The development was based on the different demands and priorities for green skills in the involved steel companies and the related national VET systems. Therefore the pilot sub-modules show some European relevant similarities as well as national relevant specifications:

While the sub-modules “Energy” (Germany, TKSE) and “Waste” (UK, TataSteel) are quite similar in the target group and learning place orientation and straight in line with the GT VET targeted professions electronic and mechanical technicians, the sub-module “Noise” (Poland, ArcelorMittal Poland) was at level 1 and 2 targeted at students of middle and technical schools, but the contents are easily transferrable to training with apprentices and workers (see results of the cross-national test - work package 5). The sub-module “Raw Materials” (Italy, AST) is quite different, because the qualification level is rising from level 1 (unskilled workers) continuously to top managers (level 4). Therefore this training sub-module could not be transferred to the other countries and companies and had to be improved basically for the European Framework Module (see results of the cross-national test - work package 5 – and the outcomes of work package 6).

**Target Group Level within the Sub-modules**

<b>Industry related main topics</b>	<b>Level 1:</b> Basic information	<b>Level 2:</b> Understand background and coherences	<b>Level 3:</b> Professional practical knowledge/ competencies	<b>Level 4:</b> Process know-how
Save and reduce input of resources: <b>Sub-module Energy</b>	pupils / starting apprentices	apprentices (lower level)	apprentices (higher level)	professionals
Save and reduce input of resources: <b>Sub-module Raw Materials</b>	no previous knowledge	professionals	middle managers	top managers
Prevent and reduce emissions pollution and noise: <b>Sub-module: Noise</b>	middle school students	technical school students (higher than middle school)	workers	specialised workers
Utilize store and dispose of waste materials: <b>Sub-module Waste</b>	apprentices / students	apprentices / students	apprentices / students	apprentices / students

**Main results of national adaptation and pilot testing (WP5)**

Each sub-module was evaluated during **national and cross national testing**:

- First the developed sub-modules were tested by integrating them in the existing VET activities of the involved companies and countries in which the specific sub-module was developed (national testing).
- After the national evaluation a cross national testing of all the sub-modules was carried out in all the participating companies and countries by interviews, group discussions and workshops with the already involved stakeholders (of WP2, 3, and 4) (cross national testing).

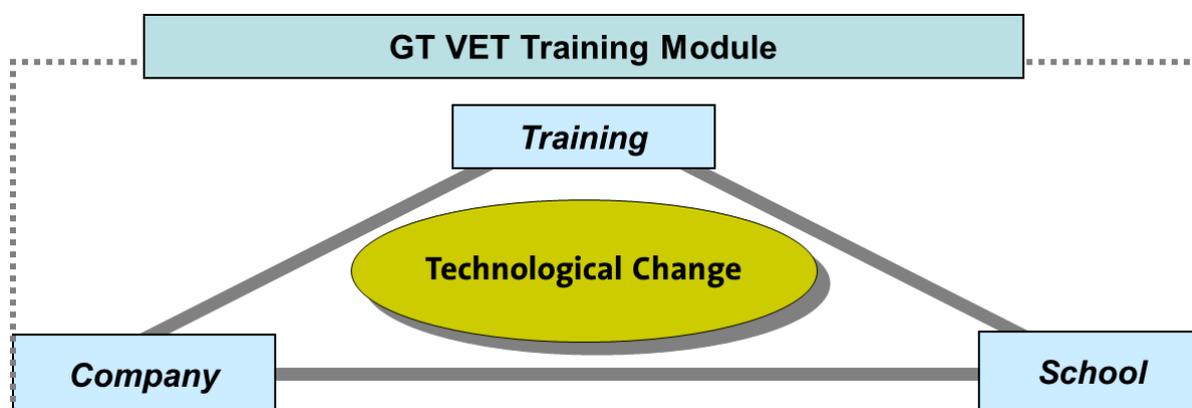
In the national in-depth tests under real conditions the learning level/modules were integrated in the normal education and training program of the companies and schools, by using (given) leeway and (depending on the “cultural” background of the companies) more or less) oriented at the following structure:

- Level 1 and 2: background and context information for the electrical and mechanical technicians in a more “class room” atmosphere
- Level 3: different tasks for electrical and mechanical technicians
- Level 4: project work if possible in cooperation with the workers and management of production areas

Teachers of middle, technical or vocational schools were integrated or informed and asked to create additional and deepening theoretical and practical background inputs.

The results of both tests showed that the sub-modules fit to the training program of the companies and schools and create a clear added value:

- The module (and its sub-modules) improves through its work place relevant practical knowledge and the activity based approach the awareness and skills for environmental awareness through self-reliant work, reduction of resources and saving of money.
- The teaching and learning model or profile could be a good image for new teaching and learning profiles encouraging “green” activity and responsibility of the learners/trainees/workers.
- By stressing explicitly this background the trainees and the trainers voted for an integration of these kinds of modules in the traineeship.
- The trainers (steel company) and teachers (vocational and secondary schools) will use (relevant parts of) the training module in their regular training program (even for continuous training).
- The developed GT VET training module is seen as a link for short-termed reaction to technological changes and responsive integration of work place related new skills demands in vocational education and training in both company training and VET system.
- Therefore a (much more) close cooperation between companies and vocational schools in Initial VET is necessary.



The GT VET training module on green skills and its learning methods fit to the other learning contents, methods and phases of the general training program:

- Of the company: Could be implemented in the regular apprentices program of the sites
- And the vocational school: could be used as a practical example of the steel industry for the education of other technicians and production industries.

The sub-modules energy, waste and noise can be introduced easily into schools as well (that came out of the school tests in Poland). From a (vocational) school perspective (dual system in Germany), the module is particularly appropriate since in

the final exams (for instance of the chambers of commerce and *industry* in Germany) environmental awareness of students has become an important evaluation criterion (e.g. economic use of materials). This was supplemented by the operational, company related side (dual systems). Although many trainees attend various courses they aren't aware of issues of environmental awareness in context of the subject (electrical/mechanical technician) because it is not explicitly mentioned in the descriptions.

The main findings of the test phase show that the GT VET module is a link for short-termed reaction to technological changes. The topics and didactic methods are approved, effective and attractive – also in a sense of increasing ecological awareness and green behaviour both at workplace and in private life. The practical knowledge obtained in the module was evaluated very highly, the content is important for the professional work of trainees. The module offers valuable exercises as well as methodological teaching solutions (variety of individual and group work, presentation of results obtained during group work to the rest of the group), even the interactivity of the theoretical inputs could be improved by media based inputs (video, animations, etc.). The module is deemed necessary to train the partial lack of green awareness and will increase in the future "green" awareness of production processes and work processes in the company by giving a greater emphasis on the steel industry.

The flexibility of the module (different sub-modules, learning/knowledge levels) is shown by its possible combination with and integration in different learning arrangements, time schedule and content arrangement – for both educational and training programs / curricula of companies and the VET system.

The detailed assessments of the cross-national tests has been used to improve the sub-modules and their integration in the European Framework Module and the companies' activities and VET systems as well as new themes and sub-modules beyond the lifespan of the project:

*Energy (Germany):* This sub-module could be incorporated into company training programs and VET institutions easily (for initial and continuous VET as well). It provides ample examples of delivery methods with examples and templates that could be used at individual and group levels. Furthermore, the approach is conducive to behavioural and overarching cultural change as the module requires trainees to consider energy savings within the work environment, with society, the home and for encouraging their colleagues. It also encourages trainees to calculate energy consumption and savings thus allowing allocation of responsibility which in turn increases understanding. Knowledge and awareness of the target group about environmental issues of the steel industry is improved by the training: high engagement, awareness raising, enthusiasm was risen especially by finding more efficient solutions on the work place (saving money, work place innovation), a new view on the production process, and change of conscience and behavior (including correction of behaviour of others). The added value of the training module was seen by trainers and trainees because of

- Focus on the workplace experience, implications
- Own responsibility, own project planning and conducting

- Improvement of context knowledge, comprehensive approach for learning and training, generic understanding, identification of parameters for change
- Fostering workplace innovation (bottom-up)
- Improvement of the existing cooperation between company and vocational school (on the regular basis of cooperation: meetings twice a year, bilateral contacts).

Concerning the teaching and learning methods it was accentuated:

- Improvement of self-responsibility, the profession of the trainees in general
- The way teaching took place was relevant to improve awareness for green skills: theoretical inputs (small) and extensive self-organised learning, group and project work
- High engagement and enthusiasm was important (challenge: to keep this at everyday work)
- Fostering key qualifications, ability to critically check existing situations, planning and management of project, presentations
- Subsequent concept, increasing perspective of the workplace, easy start, increasing demands, challenges: basic information → deepening background → practical implications → production process relevance
- Trainees learn much more about the workplace and the related production process,
- Win-win situation with the management and the workers of the production site,
- New perspective on existing structures, breaking up existing of existing processes.

The module energy fits very well to the education and training program; energy is connected to the other modules as well (waste could be used for energy production, noise reduction through energy reduction, etc.). A “Learn-learn-learn” situation for trainees, trainers/trainers, workers/management of involved production sites was created, which was one of the best appreciated impulses during the project because it brought together actors from different systems with different interests.

*Raw Materials (Italy):* The sub-module is focused around operational practice and activities, thus does seem to be suitable for the target group specified i.e. individuals responsible for operation at workshop level. The information provided in the module is quite theoretical and as such the basic information content is adequate and it is backed by substantial information about best practice relating to specific processes. However, active learning elements are missing as well as a closer orientation at the contents of the targeted workers (electric/electrical and mechanic technicians). Especially metallurgy itself stands in focus, meaning the actual steel production process, which is relevant background knowledge but only marginally concerning the industrial mechanics and maintenance. Anyway, it was said by the trainees, that raw

materials are only marginally an issue that could be integrated and illustrated within the other sub-modules.

Nevertheless, an indirect reference was made to the training: the transfer of knowledge about *steel* production could help the trainees to classify their work in the production process and lead to more understanding. Further, it highlights the work in the company as well as their own share/part within the production process. All in all the sub-module has to be improved in the direction an understanding of impact to encourage cultural change in the work place.

*Noise (Poland)*: The approach for the sub-module is, again, a bit different because it addresses secondary and middle/technical school student (level 1 and 2), while level 3 and 4 are company related trainings. However, the contents of level 1 and 2 could be easily transferred to in-company trainings as well. Overall, the participants confirmed that noise hardly constitutes a conscious perceived issue with the trainees in the company. This was due mainly to the lack of awareness; even though such noise protection areas in the works are clearly marked and strict noise, health and safety regulations are applied. In addition, the responsibility to act environmentally conscious is as lower than with waste and energy conservation. But overall, it became clear that a greater awareness must be created regarding to the issue of noise in an environmental context.

The module was considered appropriate because noise is a commonplace tangible measure (e.g. decibels, vibration of equipment), so that project work/exercises would be possible (e.g. strategy development to reduce noise). But it was pointed out that the module could be shortened in time (if needed) and connected stronger to the production process as well as other issues (e.g. energy).

*Waste (UK)*: This sub-module was rated as ‘very good’, with highly relevant content and a sound range of learning methods deployed, logical fit with other modules, covered at college (induction) as well as onsite, some of the content – Level 4 – deemed to be set at too high a level for apprentices’ needs/role requirements. Compared with the legal situation of waste legislation in other countries a modification to the national situation is necessary, but an implementation of the UK-version is not considered as problematic. For instructors/trainers two primary goals were important: creating a first awareness of trainees in order to mediate in-depth knowledge, even if they are trained in different disciplines or will work in various fields after their apprenticeship. It is not just a matter to impart knowledge, but also to achieve a change of mentality.

A critical remark was made to the term “waste”. Ultimately, the whole production process is a cycle in which *all* substances discharged and must be recycled. Taking this into consideration, there are no “waste” anymore but materials to be recycled. Consequently, this term is outdated or misleading in terms of new technologies and legislation.

The module was deemed necessary to train the partial lack of awareness of waste materials by trainees through practical projects. To integrate the module into the apprenticeship various training structures are possible. One suggestion was to start with the basics in the first year, to impart the next two levels in the course of the training and at the end of the training to carry out a project work. This is to ensure the

principle "from simple to complex content", the general "philosophy" of GT VET. Furthermore, it is also possible to complete the first two levels in vocational schools and anything else on the operational stage. In addition, during the fourth level new company related project tasks should be set to cope with current operational problems.

In this context tangible measurement and documentation of changes are non-negligible elements. As a result it helps to show trainees in a transparent way how their behaviour may affect the production maintenance process e.g. within a project. This causes – as not only the experience of GT VET shows - a greater awareness as a purely theoretical training.

### **Main results of implementing a sectoral comprehensive European framework (WP6)**

The development of a common sectoral and European view and the implementation of a framework for the continuous development of the training module beyond the project lifespan were initiated from the beginning of the project. A sustainable implementation and further development of the training module of GT VET and the continuous integration of industry demands for green skills on the background of a European future standard of green awareness and skills for the steel industry was the main objective.

This was mainly done by four European workshops discussing and comparing the results of work packages 2, 3, 4 and 5 and as well on the final conference guaranteeing a common sectoral and European level:

- WP 2 and 3 concentrated on defining a European background and standard of the expected learning outcomes
- WP 4 and 5 aimed at a framework for an on-going European module development and implementation in the regular VET activities of the European steel companies
- At the final conference the relevance, transfer and further development of the GT VET module was discussed from different European perspectives and stakeholders.

The following workshops on the European level with representatives of steel companies, social partners (EUROFER, EMF/industriALL), national and European VET experts, as well as organisations referring to green aspects in the steel industry were undertaken:

- Workshop Industry Driven Requirement (Gliwice, Poland, July 2011)
- Workshop VET System Reflections (Cardiff, UK, November 2011)
- Workshop European Training Module (Duisburg, Germany, April 2012)
- Workshop National Adaptation (Terni, Italy, September 2012).

In addition as a kind of sum up and outlook the final conference was held in February 2013 at the European Economic and Social Committee Building in Brussels.

The main result of this work package was not only a discussion of the different cultural VET systems but also of the different company “cultures”. It seemed that the training of the companies is very much related to the different VET approaches and national systems:

- In Germany the dual system is dominating the education and training of the companies very much, even there is a strong emphasis on a closer integration or consideration of company related skills demands and practical orientation at the workplace (combining practical company related training with secondary vocational education) within the curricula of the vocational schools.
- In the UK a strong training approach / orientation done by special sectoral skills councils and training institutions is visible (focus on vocational training).
- In Poland a school related basic learning (with a focus on theoretical input) is visible for the first two levels of the training module (basic learning, context understanding) followed by practical experience related inputs within the company and tasks at level 3 and 4 of the module.
- In Italy a strong knowledge hierarchy is evident; each level is oriented at a higher worker level. This depends on the strong influence of the company, even in the development of the module.

The different “cultural frameworks” should not be seen as differences and constraints to integrate the related sub-modules in other national or company VET frameworks. In the contrary: This different approaches show the wide variety of integrating possibilities (verified through the test results in the other countries). Even the management orientation of the original Italian sub-module “raw material” shows that the managers have to be integrated in the development of green skills as well, e.g. taking the right decisions on the best available techniques (BAT) for a greener production process.

However, the main product of the project and this work package is the European Framework Module, integrating as a first basis four sub-modules with related ECVET points. Anyway, the four sub-modules and the general framework have to and will be developed continuously, coordinated within the activities of the Working Group “People” of the European Steel Technology Platform ESTEP (related to ESTEP’s other Working Groups, esp. “Planet”, and projects like “Ultra-Low Carbon dioxide (CO<sub>2</sub>) Steelmaking – ULCOS”: [www.ulcos.org](http://www.ulcos.org)). ESTEP - as almost the only European Technology Platform with a human resources oriented working group - will take care of the continuous implementation of this sectoral comprehensive European Framework Module and use its European platforms with other European industries for the dissemination and exploitation of GT VET to other industries and the worldsteel association.

### **Main results of dissemination (WP7)**

Dissemination was organised in close correspondence with exploitation, mainly organised by both social partners, EUROFER and EMF/industriALL, with participation and support of every GT VET partner. EUROFER coordinated this work package (WP 7) in cooperation with the European Steel Technology Platform ESTEP and the Sectoral Social Dialogue Committee in the European Steel Industry SSDCS

for the dissemination of the project and its results. EUROFER/ESTEP established and manages the website and coordinated the advisory board meetings (ESTEP WG 5). Within ESTEP, a cross-dissemination to the technical working groups (especially “Planet”) has been pursued as well as to the ESTEP steering committee.

A dissemination plan as well as first dissemination activities were implemented at the beginning of the project, outlining a range of activities that ensure the awareness of the project and its results at a regional, national and European level: steel companies, VET institutions/organisations, steel universities and research institutes, national and European steel related associations and platforms were targeted as well as the international discussion (e.g. OECD/CEDEFOP conference in Paris 2012). A dissemination list was developed summarising and monitoring every dissemination activity of the project partners outside the project.

Dissemination was a regular topic of each partner meeting, monitoring actual and further dissemination and ensuring further development of the dissemination activities. At the end of the project the dissemination and exploitation activities were handed over to ESTEP WG 5 “People”. This working group will disseminate, exploit and further develop the European Training Module GT VET within the sector and organise its transfer to other industries. A first proposal for a transfer of innovation project was already made for the Italian SME automotive sector, the integration of GT VET results are secured by the participation of TUDO sfs in EdilMap, a Lifelong Learning Program funded project concerning the acknowledgement of non-formal and informal green skills in the constructions sector in Italy.

Major public deliverables are or will be available (in its final version) on the website ([www.gt-vet.com](http://www.gt-vet.com)) and the ADAM database: (<http://www.adam-europe.eu/adam/project/view.htm?prj=6755>):

- Project flyer (German, English, Polish, Italian), report “Industry Driven Analysis of Job Requirements”
- Reports on “Industry Driven Analysis of Job Requirements” (national reports and European summary)
- Reports on “VET Reflecting Industry Requirements” (national reports and European summary)
- Articles (OECD/ CEDEFOP "Skills for a low carbon future", Stahl und Eisen, International Labour Process ILP: Developing green jobs and skills in the transition from high to low carbon economies: An international comparison, Greening Steel Work)
- European Strategy Papers mentioning GT VET: High Level Round Table for the European Steel Industry, VET excellence for green growth.

Apart from this, dissemination was conducted as foreseen in the proposal, with additional high-level dissemination opportunities (European Steel Days, OECD/CEDEFOP and ILP conferences, DG EAC workshops, Workplace Innovation conference) taken by different consortium members which increased the visibility and acceptance of the project and its results.

Therefore, a comprehensive dissemination and exploitation within the steel sector und within other production industries has been achieved by the consortium through

their European, national and regional platforms, including all national steel platforms as well as all relevant VET institutions and steel related universities, research and training institutions.

The majority of European steel companies and national steel federations are informed through the project partners EUROFER (more than 500 steel production sites in 23 EU Member States) and industriALL (with 75 affiliated organisations from 34 countries across Europe). With their committees and networks they have secured to reach a high numbers of recipients. On the ESTEP, EUROFER and industriALL websites the project has been announced.

The project partners ensured already the optimal use of the results for their own company and institution, and their involvement in other associations, organisations and platforms, during and beyond the lifetime of the project. Every participating partner undertook its own dissemination: the steel companies to other sites of the company in other regions, the universities and research institute to the scientific community, the social partners on their regular events (ESTEP: Working Groups, Steering Committee, EMF/industriALL: regular meetings and specific activities like Skills Council, European Sectoral Social Dialogue).

EUROFER/ESTEP, in close cooperation with industriALL (former EMF), prepared and arranged the final conference (in cooperation with TUDO sfs). The project results and the training module with its distinct sub-modules were presented at the final and public European conference with VET stakeholders, social partners, the steel industry as a whole, and other relevant manufacturing industries attending. A high level round table panel discussed “Green Skills Relevance for the Competitiveness of the European Industry”. The panel participants were:

- Cristina Martinez (Organization for Economic Co-Operation and Development – OECD/LEED)
- Alison Crabb (DG EAC - Vocational education and training; Leonardo da Vinci)
- Peter Kerckhofs (EUROFOUND European Foundation for the Improvement of Living and Working Conditions)
- Fernando Vasquez (DG Employment, Social Affairs and Inclusion, European Commission)
- Bart Samyn (European Trade union - industriALL)
- Bertrand de Lamberterie (ESTEP)
- Jean Lambert (Member of the European Parliament, Greens/European Free Alliance).

All European representatives stated that the GT VET approach is the right concept for

- pushing green awareness with generic, specific, essential and transversal skills
- new ways of learning and training pathways off the classroom

- a flexible and easily integration in education and training programs, in schools/VET institutions and companies as well
- sectoral and cross-sectoral cooperation between companies
- and: a responsive and short-termed integration of new skills - coming from continuously and rapidly changing (production) technologies - into the workplace, the shop-floor.

Based on the GT VET concept as an outlook the following future oriented requirements or suggestions were made:

- more flexibility and practicability of VET and a focus on generic, specific and transversal skills
- looking much more on job transformation to ensure a smooth transition in the different member states, done by a closer cooperation between companies and VET institutions (esp. schools)
- getting VET closer to user needs and drive innovations processes by this
- using the GT VET concept for more innovation at the shop-floor, for the workforce, for improving productivity of resources: to improve work place innovation and platforms for exploring the idea of driving innovation.
- to bind all different actors from different fields to build up skills alliances (sector skills councils, sector alliances) oriented at different occupations and/or sectors, even as cross-sectoral
- encouraging a better sectoral and cross-sectoral cooperation between companies: green skills have to be extended for all industries and all kind of staff – white and blue collar as well as all levels of management: all have to have knowledge about green developments and technologies and the ability of greening their work
- pushing the development of the green skills approach further with proactive sector led proposals, focusing as well on the local and regional level because that is where the drives comes from
- to enlarge investment on skills development in general.

The future perspective of a green skilled industry depends on three factors: recognition, enormous investment in finance and skills (governments, companies, etc.) and visions/illustrations/objectives (e.g. reports/papers from the European Commission, projects etc.). Ministries and authorisations have to be taken into account in order to deliver and anticipate skills. Green Deals (like in the UK) have to be made. Anticipation to offer demand related training is necessary. Green skills are transversal in covering all levels and all jobs, on the shop floor, but in management as well, posing future challenges for the companies with regard to the establishment of a common “mind set” for green awareness.

## **Main results of exploitation (WP8)**

An on-going exploitation of the project results and the further development and adaptation of the European Framework Module is ensured by the Working Group “People” of the European Steel Technology Platform ESTEP. Additionally, all the project partners and involved representatives of the national steel platforms and VET institutions will exploit the results of GT VET beyond the project life span within their local, national and international activities.

Beneath the transfer of GT VET results to other recent European projects the partners are involved (e.g. EdilMap, ULCOS) a first innovation transfer project has been applied for in which the products – in case of approval - will be transferred to the automotive industry. Contacts to other production industries have been established, with active participation of the construction industry and the cement industry in the final conference as well as the chemical and crafts sector within a national green skills conference.

All in all exploitation activities have been and will be carried out at the same level as the dissemination activities: Within the steel sector, exploitation is being facilitated by the European associations and platforms involved in the project (ESTEP, industriALL, EUROFER, Social Dialogue), by the steel companies involved and by the research institutions. ESTEP WG 5 will distribute and further develop the project results within its regular activities. At national level, the steel platforms will contribute to the exploitation of the project. On a national and regional level, the involved steel companies will use their influence and participation in the VET system to assure maximum awareness and uptake of the project results. This includes the capability of the GT VET module to transfer the example of electrical and mechanical maintenance technicians to other professions as well as to other production industries.

Exploitation at a European level will be achieved by embedding other sites of the participating steel companies which all have subsidiaries and production sites in several European member states. Other steel companies, other steel producing regions (e.g. in Czech, Spain) will be reached by ESTEP and EUROFER and their affiliated organisations. The produced European and adapted national training modules will be promoted to non-participating countries both within and without the steel industry as well.

EUROFER and the inherent national steel federations will transfer the results primarily to the employers’ side; whereas industriALL and national metal workers unions will pass them on primarily to the unions of the steel industry and other industries they are involved in (aerospace, automotive, ICT, lifts, mechanical engineering, non-ferrous metal, shipbuilding, white goods).

The proposed formal integration in **national VET systems** could be a much more complicated and lengthy process. But as declared during piloting and testing the GT VET sub-modules (or parts of it) in its recent state could be easily and flexible integrated in the national and companies related VET systems:

- In **Germany** it is done by given leeway of the existing curricula and the given learning targets of the analysed professions. The Dual System provides also the possibility of a close cooperation between vocational schools and companies.
- In **Italy** all sub-modules can be integrated in the curricula of the schools due to their autonomy. According to the law, schools are allowed to modify up to 35% of

their Education Plan to upgrade contents and methodology in the perspective to respond to new training needs coming from territory, companies and stakeholders.

- In **Poland** integration with the national VET system could take place by including into school programs, as part of ecological education and training. Also a strong cooperation between the steel company and the region encourages schools and pupils to implement industry related topics in the learning paths.
- In the **UK** this would require the engagement of the sector skills council (SEMTA) and the involvement of the appropriate standards authorities.

Based on the calculation of the ECVET framework and other ECVET pilot projects for the GT VET sub-modules the following distribution of credit points were developed:

#### European Framework Module: ECVET Credit Points

Topics form GT-VET definition	Derived contents	basic information	understand background and coherences	professional practical knowledge/ competencies	process know-how	
Save and reduce input of resources	energy	10%	20%	30%	40%	100%
		0,5	1	2	3	6,5
	raw materials	10%	20%	30%	40%	100%
		0,5	1	2	3	6,5
Prevent and reduce emissions pollution and noise	noise	10%	20%	30%	40%	100%
		0,5	1	2	3	6,5
Utilize store and dispose of waste materials	waste	10%	20%	30%	40%	100%
		0,5	1	2	3	6,5
Total ECVET Points	%	10%	20%	30%	40%	100%
		2	4	8	12	26

#### Calculation Basis:

200 training days a year = 60 credit points

about 20 training days for each sub-module are foreseen. That makes about 10% of a whole training year or about 6 credit points per sub-module.

The credit points could be inserted in the two or three years lasting general/formal education and training program for apprentices.

Due to the flexibility of the European Training Module and its sub-modules this kind of distribution allows the flexible integration of credit points into every VET arrangement, even within a two or three years apprenticeship of initial (IVET) or a continuous vocational education and training (CVET) programs.

## Main results of evaluation and quality assurance (WP9)

Evaluation and quality assurance efforts have accompanied the GT VET project throughout its whole lifetime, making use of a number of instruments outlined in the guidelines described in the Quality and Evaluation Plan.

The main aims of the evaluation of GT VET have been to

- deliver ongoing evaluation services (suggestions, critical remarks, interim reporting, etc.) to support quality of implementation,
- deliver technical support to tools and questionnaires development for the evaluation of the test and cross test trainings in the four participating countries,
- provide horizontal evaluation of the developed training materials,
- evaluate every partners meeting, using contributions of all participants,
- prepare a final evaluation report.

Ten core results can be taken from the final evaluation report:

1. **Identification of training needs:** Training materials of GT VET have been developed according to the real needs of the four steel companies in four European countries. This has been achieved in cooperation with the training departments of the four participating steel companies, especially during the preparatory work for the test trainings. A core result has been to foresee four different levels of training for each sub-module and to shift from an e-learning to an action learning approach.
2. **Adjustability of training materials:** The whole training material has been developed according to the needs of four levels of qualifications/occupational profiles. Additionally, it ensures an easy and feasible adaptability to the specific needs of every type of steel plant and education and training program. The training materials address the main general environmental issues of the steel industry and could include new ones such as lifecycle assessment and new upcoming EU regulations.
3. **European added value:** The training materials cover the two main EU steel production technologies of steel products for many common applications. Therefore, the European Training Module represents an outcome of significant European value that can be useful for every steel plant all over Europe.
4. **Testing:** All training materials have been intensively tested. All partners have been involved in the preparation, execution and evaluation of the tests and cross-tests. The pilot tests have been evaluated (questionnaires, workshops, quality criteria) by the participants, the trainees, trainers/managers of training, and the evaluator of the project. The results of the different test trainings have been considered in the final version of the European Module.
5. **Participants' satisfaction:** All evaluations of the pilot tests identified a clear positive satisfaction degree of both, participants and trainers, concerning the content and the concept of the trainings. There have been differences in the satisfaction degree identified according to the thematic content of the sub-

modules. Similar differences have been identified according to the different levels of participants (levels 3 and 4 showed higher degree of satisfaction because of action oriented learning).

6. **Outcome of the training:** All tests, according to the opinion of the participants, show a clear improvement of knowledge, awareness, and sensitisation regarding the different environmental aspects in the steel production, after the training.
7. **Matching trainees' needs:** Training materials have responded well to the needs of the trainees. There have been some exceptions of this general assessment: in some cases, level 1 materials have been rated by some trainees as “nothing new” or as “too general”. A suggestion for future activities is to accelerate the route towards levels 3 and 4.
8. **Trainers' feedback:** All trainers involved stated that they intend to integrate the GT VET training module into other modules/courses already covered at their companies/schools. The majority of the trainers recommend to continuously adapt and, if possible, even enlarge the training module in the future. Trainees and trainers made some interesting suggestions for the improvement of the training materials, e.g. to differentiate tasks for electrical and mechanical technicians in the module at levels 3 and 4. Additionally, a close involvement of workers and the management level specific production areas in the preparatory phase of training activities should be considered (mainly in levels 3 and 4).
9. **Innovative capacity:** The project achieved all the innovative elements that had been stated in the project proposal. The evaluator especially identified the following two innovative elements: (1) Training materials have been developed within a very close and direct involvement of steel plants in cooperation with VET experts. This ensured that training concepts and contents were responsive to concerns and designed to produce viable solutions. (2) The GT VET partnership found an appropriate solution to the challenge of achieving simultaneously, two technically “incompatible” objectives, a) adaptation of training materials to the concrete needs of specific steel plants, and b) development of training materials with European added value, which means adaptable people with different skills and educational profiles, working in different European regions.
10. **Management and coordination:** The management and coordination system was effective. This assessment is supported by the following arguments: (1) All project partners have been asked and have expressed their views at the end of every partner meeting and at the end of the project, concerning management and coordination of GT VET, and their assessment was always positive. (2) It was a challenging task to develop a coherent training module with (normally competing) industry partners from four different countries. This difficulty has been overcome with effective and flexible solutions (e.g. bilateral and extra meetings whenever necessary) of the management system. (3) All project activities (meetings, final conference, deliverables of work packages, financial management) have been properly covered (preparatory work, supporting material, minutes, documentation) by the coordinator organisation (TU Dortmund / sfs).

## 4. Partnerships

The partnership was including and using different competences and perspectives: the research institutes with their scientific knowledge, the steel companies with their practical knowhow, the European associations with their dissemination and exploitation possibilities, and the associated partners with their national and regional relevance for VET. Together these partners were composing a partnership that guaranteed high quality performance in relation to practicability and a cumulative sectoral, national and European added value for the benefit of all participating and further interested institutions, organisations and stakeholders.

The four participating steel companies directly benefit from the developed training module: managers and trainers of training departments, managers of technical, safety and health departments, apprentices and workers (industrial mechanics and electronic technicians). The participating steel companies become aware of future requirements in green issues and the necessity of and possibility of short term implementation of new skills.

Furthermore, European representatives of other steel companies and social partners have been informed at the regular meetings of ESTEP and SSDSC. Representatives of European (e.g. CEDEFOP) and national (e.g. BIBB Germany) VET agencies as well as national steel industry associations (e.g. National Steel Platforms of Poland and Germany) were informed about the project results and invited to European workshops and conferences. On a regional level, stakeholders of VET (vocational schools, chambers of industry and training departments of steel companies) were involved in the module development and the VET system related research and dissemination activities.

The steel companies (and their training departments) were directly involved in the research and development process of the project; being represented in the project partnership, participating in workshops and interviews, in the development and pilot testing of the training module.

In the development and pilot testing of the training module, the regional VET partners (steel company and VET institutions) worked closely together.

National VET stakeholders will continue to be integrated in the exploitation and exchange on the further definition and development of common European standards of learning outcomes concerning green issues in technical VET. National institutions and agencies dealing with VET as well as unions and employers organizations will continuously be invited to give advice on the project progress and the concrete outcomes and results.

*The strong industry related partnership was the guarantee for the continuous running of the GT VET European Framework Module after the project lifetime: ESTEP will be the basis for the future dissemination, exploitation and much more: the continuous development and improvement of the module – run and driven by industry demands.*

## 5. Plans for the Future

After the funding phase of the GT VET project by the European Lifelong Learning Programme, the European Framework Module on Greening Technical VET will be run and developed continuously by the Working Group “People” of the European Steel Technology Platform ESTEP. Since 2013 both (scientific and company related)co-ordinators of GT VET are the elected chairman (Veit Echterhoff from ThyssenKruppSteel Europe) and vice-chairman (Antonius Schröder, Technische Universität Dortmund – sfs) of this working group. The GT VET approach on greening technical VET and the steel industry became also part of the new Strategic Research Agenda of ESTEP, integrated into a social innovation perspective.

On this foundation and institutionalisation the European Framework Module will be continuously developed, disseminated and exploited:

- **Continuous management and coordination** in close cooperation with the members of the working group (steel companies, research institutes, steel universities, steel platforms and associations) and the social partners (EUROFER, industriALL, Sectoral Social Dialogue Committee Steel /Training), national and European VET experts, as well as organisations referring to green aspects in the steel industry.
- **Continuous development** of the European training module as a comprehensive “continuous progressing training module” driven by the demands of the steel industry, by integrated new qualification demands, new sub-modules and training methods.
- **Continuous efforts** for the short-termed and responsive integration of steel industry related qualification demands in the national VET systems, adapting the European training module in steel companies and in VET institutions on the regional level (in each relevant member state).
- **Development of a sectoral agreement** on the acknowledgement of ECVET within the steel industry: The further improvement of the European Framework Module will be interrelated with the elaboration of credit points and their acknowledgement. To ensure the mobility and transfer of approved learning outcomes the development of a sectoral agreement on ECVET will be an objective to be launched in WG5 of ESTEP, maybe done by a social dialogue project.
- **Continuous active dissemination** of the project within ESTEP, the Sectoral Social Dialogue Committee Steel /Training, at conferences on VET and / or HR development, to the scientific community and of course to the national VET responsible institutions of the member states.
- **Continuous proceeding and improvement of the GT VET website**, covering all the relevant information, activities and plans for the future, integrated more interactive elements like social media blogs and e-learning parts (if accepted and used by the target groups).

- **Continuous active exploitation** of the GT VET concept and module on the sectoral, national and European level within the steel industry and to other industry sectors:
  - Within the industry by transferring the module to other sites of the involved and other steel companies
  - using the dissemination platforms of ESTEP, EUROFER and industriALL as well as the activities of the research institutes
  - supporting existing and forthcoming skills development platforms like Skills Councils (as advised in the High-level Round Table on the future of the European Steel Industry, Draft 2013)
  - by already approved or advised projects on
    - transfer of this innovation (concept) to other sectors (GREEN STAR, *currently in evaluation*) and other occupations and continuous vocational training CVET (to be done),
    - social innovation (large scale FP7, Social Innovation: Driving Force of Social Change SI-DRIVE – policy area “education” and “sustainability”, *currently in negotiation phase, to start in 01/2014*) and workplace innovation (The European Workplace Innovation Network – euwin, *already started and funded*),
    - the development of sustainable innovations (public private partnership SPIRE Sustainable Process Industry through Resource and Energy Efficiency [www.spire2030.eu](http://www.spire2030.eu), Ultra-Low Carbon dioxide (CO<sub>2</sub>) Steelmaking ULCOS [www.ulcos.org](http://www.ulcos.org), CASI – Public participation in developing a common framework for assessment and management of sustainable innovation).

In all these activities and projects, members of the GT VET consortium (especially ThyssenKruppSteel and Technische Universität Dortmund – sfs) are already engaged or even play a leading part. For the listed objectives and activities, in addition to own resources of the involved members of ESTEP WG5, future funding schemes like “Erasmus for All” and “Horizon 2020” will be checked and used as well as the public-private-partnership “SPIRE 2030” to sustainably develop the European Framework Module GT VET.

## 6. Contribution to EU policies

The project is in line with the objectives of European lifelong learning policy by having created an innovative and updating VET module, improving the European VET system by sustainable, short term and industry driven pathways between industry and national VET systems, securing a correspondent exchange from a European level to the national VET systems, embedding an excellent basis for valorisation of the training module and its pathways / implementation procedures to other steel companies and production industries, to other member states and to other professional occupations.

On the other hand, the project refers to basic European strategies and guidelines: Implementing new skills for new job demands (new skills for new high-skilled workers in the steel industry), being complementary with the Lisbon strategy by taking the greening of the steel industry as a European competitive advantage and refocus the steel or production industry as a key industry of the European competitiveness (the EU 2020 strategy paper outlines ecological sustainability as crucial for the competitiveness of the European industries in global markets), the industry and job oriented implementation of the EU environmental directives (IPPC, GHS, REACH, etc.) and national guidelines and recommendations.

The third relevance area regards the steel industry itself, referring to the main challenges stated already at the Warsaw conference 2007 “recruitment and training”: recruitment and attracting of young employees by offering high-skilled, safe and healthy jobs to overcome the demographic change in an ecological oriented production industry, offering continuous developing training modules for future oriented skilled workers in correspondence with the VET system and stimulating a short term implementation of industry required qualifications, in relation to already existing or planned activities (e.g. the German Federal Institute of VET is stimulating and funding sectoral VET on sustainable development ).

In order to overcome some limitation because of VET system imminent constraints (e.g. teachers have no time or interest of integrating the sub-modules, lack of financial resources) companies, industry association as well as public authorities (e.g. ministries, regional and local authorities) should be aware of integrating modules like GT VET not only in the training programs of metallurgical companies, but also in the national vocational training program. The idea of GT VET should be propagated and show the benefits of raising pro-environmental awareness in a systematic way, on the basis of the continuation and expansion of issues from foundations gained in schools till the professional career. The module should be integrated in existing VET systems both at national and steel companies’ levels. Wider recommendations were made upon a greater co-operation between companies and vocational schools in the way that school content must be relevant, specific and applied to company practice. Further, it is important that in-company training programs are reinforced by wider campaigns and information distribution.

In line with the objectives of lifelong learning, by creating an innovative and continually developing VET module, GT VET is improving the European VET system by

- developing sustainable, immediate and industry driven pathways that fit between industry and national VET systems,
- securing a correspondent exchange from a European level to the national VET systems,
- embedding valorisation possibilities to other steel companies and production industries, to other member states and to other professional occupations.

The European training module, which has Europe-wide application and is run by the European steel industry, with correspondent pathways to the national VET system, will anticipate actual and future industry needs (thus tackling a lack of short term implementation of industry required new skills, improving cooperation between industry and VET system, etc.). In terms of concrete skills the module aims at improving the green skills and awareness for technical professions in the steel industry. In line with the Lisbon agenda, the EU 2020 strategy and the European environmental directives GT VET aims to contribute to the European VET systems as a basis for lifelong learning pathways and industry competitiveness by making production and industry as a whole greener.

To foster this approach, the GT VET consortium formulates the following **key policy recommendations**:

1. The VET systems should be **flexible and give leeway to include modules** of VET with industry driven demands systematically and in immediate and responsive ways, to be integrated in different institutions (secondary and vocational schools, company oriented vocational education and training) for different reasons (general education, initial vocational education and training, further vocational training to adjust missing competences).
2. **Overarching European wide learning objectives** on green skills should be defined for all technical occupations to foster bindingly cognitive and empirical learning as well as awareness building in close relation to everyday work, the workplace challenges, in cooperation with national VET institutions and systems; based on an industry related **European definition of green skills**: reflecting the specificity of the industry sectors and top-down to incorporate wider 'green' policy imperatives bottom-up (such as those deriving from EU 2020 strategies).
3. The European Credit System for Vocational Education and Training ECVET should be implemented as soon as possible providing the basis for a **European wide and accepted certification** of the training module contents, also giving leeway to integrate and acknowledge small modules like GT VET into formal education and training programmes.
4. The **cooperation and involvement** of enterprises and social partners as well as stakeholders of VET institutions like vocational schools and chambers of industry should be improved **at the regional level**, where people live, work and learn.
5. The New Skills for New Jobs initiative focused on 19 industries, but the European steel industry was not considered. However, this project follows the direction of this European flagship initiative. Not only the new economy, but also the "traditional" production industries like the steel industry with its high-technology

based production processes and products should be considered in **European advanced manufacturing** activities to a much greater degree (because industry is still a backbone of European competitiveness).

**For further questions, please refer to**

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