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### **4.5.3 Apprenticeship System**

In June 2014 Forema, part of Niuko - the largest training company of the Confindustria scheme, participated in the Focus Group in Dortmund, where ThyssenKruppSteel shared its successful experience in applying the GT VET sustainable module to its apprentices.

After being included as silent partner in November 2014, Forema, the Region of Veneto and Confindustria Veneto SIAV designed the Action Plan in order to

transfer the three Green Star modules Energy, Waste and LCA within the regional apprenticeship training module “Social and civic competences-advanced”.

The implementation steps:

1. Compliance check by the Region of Veneto
2. Selection of the levels to be tested according to the time schedule of the course
3. Formal approval of the testing by the Region of Veneto
4. Identification of the apprentices group and selection of the trainer
5. Delivery of training (8 hours)
6. Impact evaluation questionnaire.

### Features of the training program

Within the 40 hours advanced course for social and civic competences, 8 hours in May 2015 were dedicated respectively to:

- Energy Levels 1 and 2: 4 hours
- Waste Level 1: 2 hours
- LCA Level 1: 2 hours

The 17 participants were aged 18-29 years old. They work for industrial companies in the Province of Padua, pertaining to *different sectors*. As the apprenticeship programme is a general one, it was deemed necessary to involve companies, not exclusively from the automotive cluster. The methodology used is a face-to-face seminar, including short debates among participants and trainer.

The modules contributed to develop the competence “To work in the company by contributing effectively and proactively, by taking responsibility and autonomy according to the tasks and the role assigned.” More in detail, the targeted knowledge (K) and skills (S) are:

- Rules on the protection of health and safety in the workplace (K)
- Types of organisational models (K)
- Adopt behaviours that promote energy efficiency and environmental sustainability in compliance with current regulations(S)
- Identify the roles and the functions of a company's organization (S).

Apprentices were asked to provide feedback through a questionnaire, whose results are described in chapter 4.6. Moreover, an informal feedback was provided by the trainer.

### Conclusions

The lower levels of the modules (1 and 2) are *applicable to a wide range of industrial sectors*, are well balanced in terms of timeframe in order to raise awareness about the content and to fit within the general training programme. The contents were particularly appreciated both from apprentices and the trainers as they are immediately applicable on the job, although impact in the short and medium run depends from the company organisational habits.

## 4.6 Impact Evaluation: Results of the Green Skills Implementation

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The evaluation result presentation will focus only on evidences coming from the Action Plan implementations and therefore (see the GREEN STAR evaluation design in chapter 4.3.2) on GREEN STAR modules *potential* impact for institutions and training providers based Action Plans, on the one hand, and on in-company training modules ex-post impact for company-based Action Plans. It is however quite easy to understand that, in coherence with GREEN STAR aims and objectives, the evaluation carried out on Action Plans implemented in companies has been quite challenging and its results deserve more attention than those concerning Action Plans implementation in institutions and training providers.

Beginning with **institutions and training providers'** questionnaires on recipients *potential (perspective) use* of training modules contents, the main evidences for the three sub-modules are the following:

- **Energy module** (which has been delivered by three providers, two Italian and one Romanian, all in all 62 respondents): Module contents were considered *new* by students while employed (also apprentices) affirmed they largely knew them; anyway, module contents appeared to be quite interesting, clearly understood in their core-topics and supported both by clear presentations and by a right module duration. Module perspective usefulness was judged, both by employed (also apprenticeship) and students, as mainly depending on individual jobs and responsibilities but respondents believed contents were in any case quite useful for *finding* a job even if "important but not necessary" for their professional future.
- **Waste module** (delivered by one provider, Italian, all in all 15 respondents): Among respondents, all of them apprentices, the module contents were rated as "mostly *already known*" but largely coherent with their jobs and generally interesting. The module duration was considered "right" and its usefulness was judged as relevant for the professions/occupations in general but also quite useful for the actual jobs of the recipients in particular. To master module contents was believed as giving "*in theory* a competitive advantage" compared to *colleagues* who did not attend the *module* but more companies' interest on module topic is needed.
- **LCA module** (delivered by 3 providers, all Italian, all in all 51 respondents): The module contents were largely new both for students and employed; they have been generally judged as *interesting* and with the right duration (although for employed more time was needed). Contents perspective usefulness was rated (again) as mainly depending on individual jobs but, in general, basics knowing about LCA was considered useful and quite important even if not necessary for professional future (students) or in the actual working position (employed). Nonetheless, basics on LCA are

considered to give a “competitive advantage” compared to *colleagues* who did not attend the *module* (but this was less *true* for apprenticeship).

In conclusion, what emerges from questionnaires on the perspective use of module contents is – trying to generalise the three different modules – that, on the one hand, *students* tend to consider the *knowledge* of modules contents as important for their professional future but cannot prove this assumption with *reality data* coming from direct work experience. On the other hand, employees’ more or less positive opinion about the perspective use of module contents largely depends on individual jobs (positions, responsibilities, etc.) and on respondents working experiences (which are generally limited for apprentices and progressively increase for the other responding employed).

Moving now to **company-based Action Plan implementation** (three companies were involved, one for each project country), some common *impact* evaluation evidences<sup>26</sup> may be here summarized as a starting point:

- The Action Plans contents almost totally coincide, with the exception of one company, with the adaptation of the GT-VET training modules (Waste and Energy) or of a new GREEN STAR LCA module: In general, training modules have been delivered – with different recipients composition and quantity in each company – to employees who, because of their positions and responsibilities, seem to be able to support, foster and facilitate the Action Plan implementation outcomes both from individual to company level and from immediate to intermediate and long-term perspective.
- Long-term outcomes (which are considered in Contribution Analysis approach as the *real* impact of Action Plan implementation) appear to be quite significant in terms of (mainly potential: see below) profile and strategic relevance although their verification has been partial because the time-span between the Action Plans implementation conclusions and their evaluation was, also due to GREEN STAR closing deadline, shorter than needed.
- Long-term but also, partly, intermediate outcomes have quite different contents and profiles (see table below). They include, depending on each Action Plan and related company, elements concerning not only training direct recipients but also the company level (as a whole or as specific units or departments). The single company balance between these two *components* mainly depends on the possible integration between Action Plan and other company-based interventions (already implemented or under implementation) which cover technological, organisational or process issues and are oriented to the achievement of the same Action Plan outcome(s).
- The variables, in each company, intervene between the Action Plan implementation and its outcomes *production* increase by number and relevance passing from immediate to intermediate to long-term outcomes. This trend, combined with the observation for which Action Plan training modules contents are generally introductory and basics (although quite

<sup>26</sup> Remember that the term *impact* is here used within the methodological framework of the Contribution Analysis approach illustrated in chapter 4.3.2.

- consistent in duration for levels 3-4), *causes* a progressive diminishing of the training modules contribution when passing from immediate to intermediate and above all long-term outcomes.
- The assumptions and risks accompanying each Action Plan *theory-of-change* (see below for detail) are not banal and expected. In fact, they *de facto* modify, through a re-definition and a critical re-shaping, the absolutely linear and direct structure that, at least conceptually, represents the *results chain* which links the Action Plan outputs with its different levels of outcomes.
  - Also each Action Plan *alternative explanations* (again: see below for details) aimed at putting under examination and discussion the Action Plan assumptions describing the way the Action Plan itself should operate for producing the expected outcomes, give evidence (together with the already mentioned “influencing factors”) of the high complexity, characterising the relationship between each Action Plan (both for implementation and results), its company context and the internal and external intervening actors and stakeholders system.

The table below is containing each Action Plan *Theory of change* and specifically the *results chain* characterising each Action Plan. It makes clear, for each company, the *hypothesized* links between Action Plan outputs (deriving from its implementation) and its different *level* of outcomes (where final or long-term outcomes are, as already highlighted, those which mostly identify *impacts*).

Outputs	Short-immediate outcomes	Medium/ inter- mediate outcomes	Long-term/ final outcomes
<b>Company A (LCA)</b>			
Meetings and lessons; documents; analysis report; training attendance (company employees and customers' employees); external consultants and technicians participation	Increase of both companies and customer employees' knowledge/understanding of LCA method contents and benefits; customer's acquisition of documented evidences concerning its product environmental sustainability	Customer's order acquisition by the company (the customer is the one involved in the Action Pan	New customers and/or orders acquisition and therefore company's turnover's increase

Outputs	Short-immediate outcomes	Medium/ intermediate outcomes	Long-term/ final outcomes
<b>Company B (Energy)</b>			
<p>Level 1-2 module trained employees; Level 3-4 trained employees; training hours delivered for each module level; level of satisfaction for training; trainees self-perceived learning achievements</p>	<p>Energy consumption reduction of 312 MWh equivalent to 22.065 Euros saving which is around 9% of 2014 total energy cost (due to new technological solutions); increase of training recipients skills and knowledge in energy saving and energy efficient use; training recipients direct involvement in the implementation of efficient technological and production processes</p>	<p>Consolidation of energy consumption reduction by 9% a year; training recipients active contribution in optimising gas and electrical consumption; training recipients increase of activation and involvement in generating new ideas for reducing energy waste</p>	<p>Further consolidation of energy consumption reduction by 9% a year; increase of efficiency in production processes and therefore of general company competitiveness; increase of company revenue generation capacity</p>

Company C (Waste)			
Level 1-2 module trained employees; Level 3-4 trained employees; number of training hours for each module level; level of satisfaction for training; trainees' self-perceived learning achievements	Increase of training recipients knowledge and understanding of waste management complexity and of environmental impact of workplace activities (also at individual level); adoption of environment friendly working practices (at individual level)	Improvement in waste elements classification (individual and organisation/unit level); involvement of trained employees (4 levels module) in the definition of waste management improvement actions (supporting and integrating <i>environmental technicians</i> who until now have been the only responsible for improvement actions)	Improvement of Waste Quality Audit results (after vs. before training); reduction/ diminution of spill situations in fluid waste areas; diminution of no/ incorrectly labeled materials numbers in waste storage areas; increase in waste management proposals number from trained employees to environmental technicians (as a consequence of an improvement of knowledge and awareness about waste management; correctness and compliance to existing norms and regulations)

**Table 20** Outputs and outcomes of the training modules

The table here below shows the most important results of Contribution Analysis (CA) approach application to the three company-based Action Plans are presented. The table, a key-table for Action Plan *impact* evaluation, shows – as partly already introduced - that short-immediate outcomes have been largely achieved with a relevant Action Plan contribution while intermediate and long-term outcomes have been reached by one Action Plan or company and with a lower, as expected, Action Plan contribution (the other two implementations were concluded from a too short time for a sound intermediate and long-term outcomes evaluation): In fact, *time is needed to catch impacts because time is needed to produce them.*

	Short- immediate outcomes	Medium/ intermediate outcomes	Long-term/ Final outcomes	Notes
<b>Company A (LCA)</b>	Achievement <sup>27</sup> : 5 Action Plan contribution <sup>28</sup> : 100%	Achievement: 5 Action Plan contribution: 50%	Achievement: 2 Action Plan contribution: 30%	Action Plan implementati on concluded in May 2015
<b>Company B (Energy)</b>	Achievement: 3 Action Plan contribution: 100%	Achievement: too early for this type of outcome Action Plan contribution: NA	Achievement: too early for this type of outcome Action Plan contribution: NA	Training module level 1-2 delivered by 6/2015; level 3-4 delivering to be concluded by 11/2015
<b>Company C (Waste)</b>	Achievement: 5 Action Plan contribution: 100%	Achievement: too early for this type of outcome Action Plan contribution: NA	Achievement: too early for this type of outcome AP contribution: NA	AP implementati on concluded in July 2015

**Table 21** Outcome achievement and Action Plan (AP) contribution

Within the implemented evaluation approach (see chapter 4.3.2), the internal *tightness* of the results chain (and therefore the possibility that, for each Action Plan, the envisaged chain really turns into reality) is, on the one hand, based on some assumptions which should make the chain *sound* and plausible and, on the other hand, is at the same time challenged by risks, alternative explanations and influencing factors which may *interfere* with the chain operation and, more specifically, with the Action Plans *implementation mechanisms* producing the different levels of outcomes. All these elements are therefore crucial parts both of the evaluation model and of its application results.

Beginning with *assumptions*, related to each level of *results chain*, they may be divided in the following groups (we consider them as a whole without making explicit the Action Plan they refer to):

- Assumptions regarding training recipients motivations, involvements, attitudes, interests in *translating* training achievements in working processes and contexts;
- Assumptions regarding the existence of organisational conditions able to support the outcomes progressive generation;
- Assumptions regarding the *coherence* between training contents, company's contexts and processes (both general and specifically linked to training contents), training recipients roles and responsibilities;

<sup>27</sup> From 0 (Absolutely no) to 5 (Totally).

<sup>28</sup> From 0 to 100%.



- Assumptions regarding the integration of training modules within a wider company strategy focused on training contents as well;
- Assumptions regarding the possibility that each outcome level may in short time produce tangible evidences of its benefits for the company.

Moving to *risks*, again related to each level of *results chain* (and therefore *counterbalancing* assumptions), some of them, in particular those linked to immediate and intermediate outcomes, correspond – in a negative way – to assumptions regarding the (non) existence of individual and/or organisational conditions or requisites able to support the expected outcomes *production*. In addition, for intermediate and long-term outcomes, risks may be mainly found in intervening variables and factors external to the company; these factors typically regard public policies influence, the role of competitors, modifications in company's provision or destination markets, customers' decision taking logics and timings.

Individual, organisational and external contexts levels are also, together with the possible interrelations among them, the *places* where *alternative* (to the proposed *results chain*) *explanations* for the outcomes production may be found. These *alternative explanations* refer to elements other than the Action Plans (and therefore other than training modules) which may have *caused* or *co-caused* the different outcomes. For this reason, all the identified explanations (their identification being a crucial part of the Contribution Analysis approach) are focused on elements which are relevant for the outcome production but are (for GREEN STAR) different from training contents. Examples of such elements, which strictly depends on modules topics, are the following: Already introduced (or being under-introduction) technical and process innovations produce energy saving effects whose entity do not depend on employees skills and knowledge (for energy module); training recipients' professional backgrounds already include energy saving and efficiency skills (for energy module); final energy consumption reduction is produced by technology and/or process innovations only (for energy module); training recipients of LCA use skills coming from their direct co-operation with employees who already use LCA or from individual studies (for LCA module); customers' orders do not include LCA results in their decision making processes (LCA module); national or EU level obligations in using biomaterials *necessarily* bring new customers (LCA module); every-day work with experienced and environment responsible colleagues develops correct waste management knowledge and skills (waste module); an increase in management and supervisors control on waste management provokes correct behaviours and practices in *blue collars* (waste module); risks of being fined (or having been fined) for incorrect waste management produces more severe company internal regulations and monitoring (waste module).

These *alternative explanations* are obviously linked with the Action Plans *implementation mechanisms* aimed at producing the different outcomes. Looking for a common synthesis to the three Action Plans, these mechanisms were the following:

- training modules participation (with differences in-depth for levels 1, 2, 3 and 4 trainees and for trainees profile and company *role*) develops in recipients (mainly company's employees but also, in one company,

- external subjects such as customers) specific learning achievement and/or awareness concerning the module’s main topics;
- after training, employees (especially those involved in levels 3-4 modules) implement working behaviours and practices coherent with training contents and able to positively integrate with other company policies and/or interventions focused on the same issues; in alternative, after training, training recipients are (simply) better informed or aware about specific aspects developed in the module;
- after being trained employees (or others) behave or operate in a way coherent with training contents, a number of mainly organisation based positive outcomes related to training topics occur (related to waste management, energy consumption reduction and LCA: for detail see above these *positive* outcomes).

Action Plan implementation mechanisms and the alternative explanations above are both conditioned by some *influencing factors* which partly look like the *risks* already illustrated and partly are *original*. These influencing factors emerged from the *field* may, again, be grouped in individual, company (or specific *internal* unit or divisions: processes, technologies, products or services), contexts (external: policies, markets, competitors, cultural processes) and relational level factors.

In conclusion, the table below tries to keep together the three variables which played the *evaluation game* and its main results presented:

1. Action Plan ownership (a training provider, an institution, a company)
2. GT-VET (or new) training modules general objectives (skilling, re-skilling or up-skilling)
3. Progressive levels of Action Plan related (expected and actual) outcomes.

	<b>Kind of skilling</b>	<b>Immediate outcomes</b>	<b>Intermediate outcomes</b>	<b>Long-term outcomes</b>
<b>Training providers</b>	Skilling or re-skilling		X	X
<b>Institutions</b>	Skilling or re-skilling	X	X	X
<b>Companies</b>	Up-skilling	X	X	

Considering the two outcomes (impact) evaluation *logics* which have been used in *GREEN STAR*, it may be concluded that:

- the outcome evaluation which covered training providers and institutions-based Action Plans included all the expected outcomes (although with some differences between training providers and institutions) but evidences, being based on recipients self-perceptions, are quite partial and incomplete;
- the outcomes evaluation referred to company-based Action Plans showed, not only because of the project time constraints, a concentration of Action Plan related outcomes on immediate and intermediate terms but with evidences coming from a quite sound evaluation process.

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## Green Skills: Future Relevance and Policy Recommendations

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It is widely recognised that the opening to a green economy would lead to new frontiers in labour markets, highlighting the great growth prospects and the possibility of eco-Europe becoming a world leader in the industry sector, consequently creating opportunities for new jobs of quality. The Parliament, on 12 December 2013, in its resolution "Eco-innovation - and jobs growth through environmental policy" proposed special recommendations for a socially responsible transition towards high-quality green jobs. Member States should make use of the European Social Fund for programmes aimed at up-skilling, training and retraining employees. The Commission and the Member States are invited to intensify their actions for the full implementation of the proposal in the context of the 2020 Strategy and to build a common vision on the different strategic opportunities that eco-innovation provides for the future. At national level Member States are advised to develop strategies to align the skills of the workforce with the opportunities offered by the sector of green technology. This is by examining the different sub-sectors and their needs for skilled labour, recommending promotion of the creative and innovative potential of young people to contribute sustainable development and improving their access to finance. Cooperation between Ministries and politics at any level is encouraged also to periodically monitor the implementation of relevant policies and to support regional partnerships for growth, innovation, employment and equal opportunities between women and men as well as cross-border initiatives.

The European Commission supports a plan of action invoking green SMEs about the possibilities of growth and the reduction of production costs from the transition towards a green and resource energy efficient economy (European Commission, 2015). It lays down a set of objectives and initiatives taking into account the results obtained from the public consultation (Green Action Plan held in the fourth semester of 2013) to be implemented at European level under the 2014-2020 multiannual financial framework. The Green Action Plan for SMEs



proposes to exploit the business opportunities that the transition to a green economy offers, by improving productivity and driving down costs in European SMEs through resource efficiency.

Priority is given to the creation of an economy based on knowledge and innovation; it should be more resource efficient, greener and more competitive and conducive to social and territorial cohesion through the achievement of a high occupancy rate. These development initiatives introduce a new system of economic growth based on a reduced use of materials and the reuse ("circular economy"), gradually replacing their previous model based on the "take-make-consume and dispose".

The ambitious program suggested by the Commission shows a significant potential for creating new jobs in the production of energy from renewable sources, energy efficiency, waste and water management, air quality, restoring and preserving biodiversity, climate change adaptation and the development of green infrastructure. The Commission provides a number of tools to enable SMEs to initiate a smooth transition to the green market, offering tools of support at both national and European level. It encourages:

1. Provision of European SMEs practical information, advice and support on how to streamline its management with a favourable cost-benefit ratio
2. Promotion of efficient mechanisms of transfer of green technology
3. Facilitation of access to finance in order to achieve improvements in relation to the resources and energy efficiency in SMEs.

Do these kinds of promotion already support the GREEN STAR approach? The following issues are also a ground for the project activities:

1. Promotion of all forms of eco innovation, including "eco-innovation not technological"
2. Promotion of partnerships between businesses, knowledge and skills for green entrepreneurship
3. Better use of the role of clusters in support of eco-innovative SMEs.

The European Commission states that action by the EU should focus its attention on competency gaps to be filled, on the anticipation of change, on the transaction and promotion of mobility, on the incentive to create new jobs and, finally, on increasing the quality of the data through:

1. Overcoming systemic obstacles that hinder collaboration in the value chain between sectors and between countries and business start-up and cooperation between them, facilitating the creation of models of service businesses and the reuse of materials, products and waste
2. Promotion of intersectional collaboration in order to promote circular economy
3. Promotion of a greener European internal market
4. Facilitating access to international markets by green entrepreneurs
5. Promoting the adoption of technologies for efficient resource management in partner countries through cooperation with European SMEs.

The European Economic and Social Committee (EESC, 2014) has issued its opinion in response to the Commission's communication, which expresses the

commitment to transform the idea of a *circular economy* into reality in order to eliminate waste.

The Committee, confirming the advantages resulting from the development of a green economy and the important goals of "Strategy 2020" that can be achieved through it, puts the focus on the relationship between the vision of public and private entities, advancing the idea of a consensual transaction in the transition to a 'circular economy, through coherent and effective policies at European, national and regional level and with the involvement of all of civil society.

The Committee supports the proposals of the Action Plan for green SMEs and green initiatives to support employment, and calls for the implementation of concrete measures and guidelines to support SMEs to become more sustainable and environmentally friendly, identifying the achievement of this innovation facilitated by the EU application of predetermined criteria in identifying specific areas of action.

The Committee recognises a primary role in education and training as a prerequisite for lasting interaction with the world of work and business; offering the provision of assistance and tutoring to micro, small and medium enterprises through networks and centres of excellence and the funding and support for training, which would allow higher growth in national and international markets.

A key element of the measures proposed in green skills was the funds made available by the EU in the various sectors and how their use can be made efficient and specifically aimed at the creation of such targets. National policies would have the task of making the learning of this knowledge economically accessible to the subjects already entered the world of work, both for the students, encouraging them to undertake the study of disciplines that can provide them with high-level skills on reducing emissions of carbon dioxide.

The GREEN STAR approach is evidently based on the European policies and strategies described previously: GREEN STAR gives attention to the SME, cluster and value chain related improvement of green skills, based in a regional development of human resources within partnership between companies, public authorities, educational and vocational institutions as well as research institutions. Taking into account the GT VET training module and integrating the knowhow of its main actors GREEN STAR turned out to be a respectable practice example for cross-sectoral cooperation on green skills.

The obtained results give evidence to the basic European orientation and the GREEN STAR project approach. The GT VET training module was adapted (energy submodule), modified (waste submodule) and completed (LCA submodule) to fulfil the demands of the automotive supplier industry. Within this further development the transfer was conducted from a big company training module to SMEs and their regional clusters, from the steel industry to the automotive supplier industry, and from mechanical and electrical maintenance occupations to heterogeneous other professions. GREEN STAR showed on the one hand the necessity of the best available technologies for energy reduction, the importance of biodegradable materials but also on the other hand, that this has to go conjointly with a human resources improvement of green skills and the awareness of green production and behaviour. This embeds also the involvement

of the customers and their purchase decisions by improving their green awareness, as showed by the Action Plan of API.

Moreover, the application of the green content to the whole learning chain (school -apprenticeship – higher technical education – continuous training – company) was particularly relevant in Italy, where most of the content to enhance green skills were before simply not included in apprentices training programmes, nor in continuous training for small companies. The integration of these contents in the learning chain ensures anticipating future skills requirements and it also fosters cooperation among different stakeholders within the chain.

The use of GT VET approach, where different levels of content correspond to different levels of competences, was particularly also effective in each of the GREEN STAR Action Plans considered.

Finally, a very positive result is represented by the validation of the submodules content and approach also in clusters and industries not directly pertaining to the automotive suppliers, therefore it is opening the application of outcomes to a wider range of sectors.

Against this background the GREEN STAR experience fosters and underlines the following (mainly existing) policy recommendations:

- The relevance of cross-sector cooperation between big companies and SMEs
- The relevance of regional clusters and partnerships, within and beyond single industry sector clusters, not only in form of the so called Triple Helix (public authorities, companies, research institutions) but also by integrating the customers, civil society in a common social innovation process and eco-system
- The given possibility and added value of transfer of innovation processes (from GT VET to GREEN STAR)
- The need to combine technological improvement for greener production processes and products with human resources improvement of green skills
- The need to involve committed, concerned and capable stakeholders, coherently with the objectives, in order to achieve impact results. Therefore, not only direct target groups (e.g. companies) shall be implicated, but also stakeholders of the learning chain (schools, apprenticeship institutions)
- The relevance of the work-based learning approach to facilitate the transfer of knowledge immediately applicable to production processes.

Based on the results of GREEN STAR and the personal experience of the involved project partners the authors underline the necessity of funding for innovation development and transfer activities. Based on regional and cross-sectoral cooperation in Europe, embedding all the relevant regional actors and stakeholders, a European platform for exchange, research and development has to be provided.

## References

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