



PR5

Blueprint & Policy Recommendations

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1. Introduction

The Blueprint document shortly gives the context of ByP4Dev, outlines the main objective and target groups of the blueprint and policy recommendations. It also includes a roadmap for stakeholders, identifying challenges, opportunities and recommendations for actions on how to better integrate the ByP4Dev expert profile in the educational system.

At the end main conclusions are summarised, stressing that most attention should be drawn to the awareness raising and spread of knowledge as well as more operational actions.

2. Byp4Dev Context

2.1. The by-products valorization importance

Becoming the world's first climate-neutral continent by 2050 is the greatest challenge of our times for the EU. In this framework, the bio-based industry plays a crucial role, with special focus on the bioeconomy in the agri-food sector.

EU relies as well as a specific R&D agenda related to Bio-based products. This agenda concludes that a shift to biological raw materials and biological processing methods could save up to 2.5 billion tons of CO2 equivalents per year by 2030, increasing markets for bio-based raw materials and new consumer products. Private sector is moving towards a more sustainable industry in Europe. Circular bio-society in 2050, a report from Bio-based Industries Consortium, establishes a sustainable and competitive bio-based industry in the EU enabling a circular bio-society by 2050. According to "The Strategic Innovation and Research Agenda (SIRA 2030) for a Circular Bio-based Europe Realizing a future-fit circular bio-society in Europe", the promotion of bioeconomy can create 400 000 new green jobs by 2035 in rural and coastal areas. This new challenge, besides the need for technological advances, needs to rely on new professionals which can valorize the by-products and waste from the agri-food sector into new, innovative and high added value bio compounds.

2.2. The byp4Dev profile

ByP4Dev project main objective is related to improve the development of bio-based sector through the creation of a new professional profile, the by-products and wastes valorisation in agri-food sector expert, thus, the design of a common curriculum and a learning approach that will allow professionals from this sector to meet the needs and opportunities that bio-based labour market offers is at the core of this project.

During the ByP4Dev project consortium has developed the **expert profile in by-products and wastes valorization in agri-food sector** adapting the [ECVET model](#) as a framework that facilitates the validation, recognition and accumulation of work-related skills and knowledge acquired from one country to another and promotes transnational mobility and access to lifelong learning by making it easier for EU citizens to gain recognition for their training, skills and knowledge in another EU country.

This expert profile is addressed to different **target groups**:

Direct target group:

- Professionals of agri-food sector (technical profiles).
- Vocational training students, graduates, masters in the agro-industrial and forestry sector.
- Agro industrial entrepreneurs.

Indirect target public:

- The agro-industry sector (including forestry sector): SME associations, business organizations and Clusters.
- The Educational sector: vocational training centres, organizations involved in adult education, universities - the Regional supporting services: business incubators and accelerators, regional development agencies.
- Policymakers: local, national and European public authorities responsible for the definition of policies for employment and training.

The **result** of ByP4Dev expert profile is nowadays materialized in a complete training course, available on-line in a **MOOC**, giving access to the complete curriculum that guides the students to gain an in-depth understanding of the situation regarding the prevention and generation of waste and by-products, the importance of their valorisation using suitable methods and the value chain of biomass and bio-based products. As well as main biocompounds that can be obtained from the by-products of different crops, or circular business models and their scaling, or the importance of multidisciplinary teams and circular ecosystems.

After completing the training course, the students will:

- Be equipped with knowledge and skills to facilitate the transition to the bio-based society.
- Have access to new job opportunities related to bioeconomy sector.
- Know how to generate added value products and processes.

The **training course** is structured in 6 modules (as it is detailed in table 1) with 26 training units, offering a total of 55 training hours with access to: additional contents, videos, recommended reading, best practices and evaluation questionnaires.



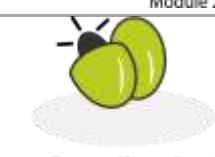



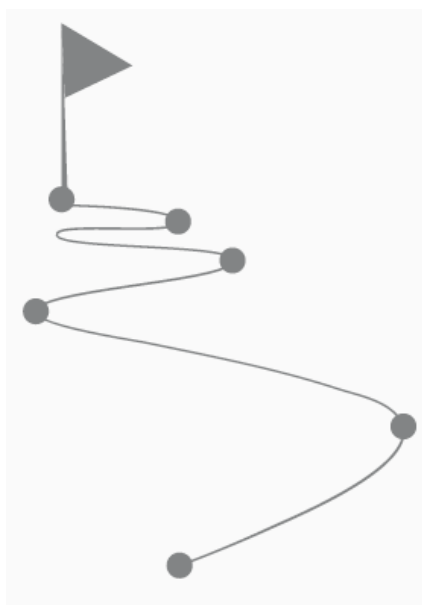
MODULE	UNITS
 Introduction Module 1	<ul style="list-style-type: none"> – Unit 1.1. Introduction – Unit 1.2. Environmental Impact – Unit 1.3. Circular Economy – Unit 1.4. Circular Mindset
 Trends & Markets Module 2	<ul style="list-style-type: none"> – Unit 2.1. Global facts, market & trends in by-products – Unit 2.2. European, National and Regional legal frame, Strategies and Policies – Unit 2.3. Supply chains and value added of biomass and by-products – Unit 2.4. RD&i in Bioeconomy and by-products valorization
 Crop, livestock and agrifood industry by-products Module 3	<ul style="list-style-type: none"> – Unit 3.1. Introduction – Unit 3.2. Open field and greenhouse cultivation and domestic animals – Unit 3.3. Food production
 Main valorisation technologies Module 4	<ul style="list-style-type: none"> – Unit 4.1. Introduction – Unit 4.2. Bioprocesses – Unit 4.3. Thermal methods – Unit 4.4. Extraction and distillation methods – Unit 4.5. Mechanical separation methods
 Main biocompounds and holistic solutions for utilisation Module 5	<ul style="list-style-type: none"> – Unit 5.1. Introduction – Unit 5.2. Real cases
 Business strategies Module 6	<ul style="list-style-type: none"> – Unit 6.1. From Business model to Circular Business model – Unit 6.2. Marketing for Circular models – Unit 6.3. Business Plan & Financial Planification – Unit 6.4. Scale-up – Unit 6.5. Project Team – Unit 6.6 Start-up – Unit 6.7. Industrial Property and Patents – Unit 6.8. Circular Ecosystem

Table 1 – Byp4Dev Training course structure

3. Blueprint: description, objective and process

3.1. Objective

A **Blueprint** is a policy recommendation, a framework for strategic cooperation between key stakeholders in a given economic sector, that can stimulate investment and encourage the uptake of proven concepts and methods



The objective is to involve the key policy makers & stakeholders for the recognition of project learning outcomes as well as for supporting the integration of by-product valorisation skills into occupational standards.

Aims for the blueprint and policy recommendations are as following:

- To create awareness about the need to acquire new skills in by-products valorisation processes.
- To promote (regionally, nationally) the profile and the associated skills.
- To promote the integration of the profile in the regional/ national educational system.

Blueprint target audience are educational institutions, educational policymakers, business organizations with training competence.

3.2. Blueprint process

Blueprint has been elaborated through 5 stages:

1. **Engaging a group of stakeholders.** After the stakeholder mapping was done, all partners actively worked on the integration process to all relevant stakeholders. This task was coordinated within **Project Result (PR) 1**.
2. **Defining the scope.** It was agreed to define that the scope is to foster the integration of the **expert profile** as well as the training in bio-based agri-food sector in the educational system.

3. **Researching.** During the elaboration of PR1, all partners carried out stakeholder surveys (a total of 106 stakeholders participated), organized focus groups in each of 5 partner countries, where a total of 35 professionals took part.
4. **Designing the blueprint.** All the gathered inputs from the research process were analysed, condensed, and integrated in the blueprint tool.
The blueprint/ recommendations are structured in **3 pillars**: Awareness creation, training, and legal framework.



AWARENESS CREATION.

The aim is to create awareness and inform blueprint target audience to understand the opportunities, challenges and potential of by-product valorization and the need to acquire knowledge and skills to extract all the potential of this new sector (bio compounds, molecules, technologies, etc.)



TRAINING

The aim is to identify barriers and opportunities about the possibility to develop training activities in the different stages of educational system (vocational training, lifelong learning, university).



LEGAL FRAMEWORK

The aim is to identify barriers and opportunities related to the existing legal framework for the expert profile integration in the educational system

5. **Distributing, re-testing and re-defining.** After the delivery of 1st draft of the blueprint, it will be distributed to its target audience and if needed will be revised according to the comments of target audience.

4. Roadmap: Challenges, opportunities and recommendations for action.

In following tables (one table per each pillar), a roadmap is provided how different stakeholders can possibly solve the identified barriers/ challenges of integration of the new expert profile in the educational system. On the one hand, the tables are analysed by 3 types of stakeholders – policy makers, educational organisations and Regional Innovation Agencies, Business Associations, Research Centres and Big Companies, and on the other hand, the tables reflect the main barriers and challenges these stakeholders should deal with. Tables also contain recommendations for actions with a proposed timing for the implementation - short term, mid-term, or long term.



Pillar 1 - AWARENESS CREATION

Stakeholder	Barriers/Challenges	Recommendations for action	Timing
Policy Makers	There is a need for support, awareness, and coordination for SMEs	Provision of specific support programmes for SMEs related to agri-food sector valorisation by development agencies, regional governments, or other policy makers	Mid Term
	Farmers often don't know they have a by-product with high potential value	Implementation of farmer awareness plans coordinated by public authorities related to agroindustry, business development and educative system (agroindustry)	Short Term
Educational organisations (vocational training/secondary schools/university)	Lack of knowledge about the new technological opportunities and methods in by-product valorisation	Implementation of farmer awareness plans by organising transfer of knowledge from the new generation to the older ones	Mid Term
Regional Innovation Agencies, Business Associations, Research Centres and Big Companies	Lack of mass-impact initiatives to motivate entrepreneurs and SMEs	Improved communication in social networks and dissemination in viral scenarios	Short Term
	Economic challenges force everyone to focus on core business - no time and effort to think 'out of the box'	Promotion of industrial symbiosis and networks	Short Term Mid Term
	Insufficient awareness about the opportunities that by-product valorisation can offer, and that financial assistance and support is given to producers	Distribution and sharing of knowledge by SMEs and associations as a connecting entity	Mid Term
	Valorisation practices are always from large companies with R&D&I departments	Transferring research results to SMEs from pilot projects and development of prototypes	Mid Term



Pillar 2 -TRAINING

Stakeholder	Barriers/Challenges	Recommendations for action	Timing
Policy Makers	Lack of legal knowledge on by-products valorisation	Public authorities in charge of business and industrial development could activate cooperatives and associations as a linking agent and disseminate this knowledge	Mid Term
	Lack of specific study plan on valorisation processes at no necessary formal education plan	Public authorities related to agroindustry educative system could elaborate Specific Educational Plan for the promotion of the valorisation of agri-food by-products	Mid Term
	High costs related to technology equipment (such as high-tech laboratories, processing machines) or complex logistic requirements that make difficult the practical training compared with digital training	Public Authorities in charge of Lifelong Learning policies and other educative systems could allocate more funds for infrastructure in an educational level and innovative solutions on companies and other research facilities	Mid Term
	Curriculum development work is often slow	National board of education and/or similar agencies, universities and schools could ensure on a national and organizational level that the necessary valorisation skills are included in suitable training programs	Mid Term
	The current training programmes are not updated with today's technological possibilities offered in by-product valorisation	To increase financial support for educational development	Mid Term
Educational organizations (vocational training/secondary schools/university)	Lack of skilled teachers about the by-product valorisation	Educational institutions could provide teachers with professional development opportunities - attendance of seminars, forums, courses etc.	Short Term
	Complexity of the phenomena in focus; by-product valorisation and	Breaking down complex phenomena into competence goals that can be achieved in a limited time. For	Short Term

	<p>circular economy. Utilisation of by-products in the most sustainable and economically profitable way requires a lot of understanding and many skills</p>	<p>example, learning a single technology is a clear competence goal. Understanding the composition of a particular biomass can also be a clear task. For example, ByP4Dev training materials is organised in a way that the study modules and units can be used separately, depending on the desired competence</p>	
	<p>Number of degree students, in general, might decrease because of changes in the financing model. Not enough applicants for new or even existing programmes</p>	<p>To develop continuous education. Focusing micro credentials on by-product valorisation</p>	<p>Mid Term</p>
<p>Regional Innovation Agencies, Business Associations, Research Centres and Big Companies</p>	<p>There is insufficient information to be able to assess which of these activities included in the agrifood sector have a waste that is profitable</p>	<p>Research Centres and Innovation transfer offices could define different viable business models</p>	<p>Short Term</p>
	<p>Lack of knowledge about the opportunities of by-product valorisation as a source for entrepreneurship</p>	<p>To integrate entrepreneurial opportunities offered by the by-product valorisation processes of the agri-food sector into the different programmes for the promotion of entrepreneurship at regional level</p>	<p>Mid Term</p>



Pillar 3 LEGAL FRAMEWORK

Stakeholder	Barriers/Challenges	Recommendations for action	Timing
Policy Makers	To have a specific study plan on valorisation processes at different educational levels (VET, University, Master)	Public authorities related to agroindustry educative system could develop Specific Educational Plan for the promotion of the valorisation of agri-food by-products	Mid Term
	Impossibility to bring together all the knowledge linked to by-product valorisation processes (due to the large number of existing options) in the framework of current formal education	Public authorities related to agroindustry educative system could open up educational processes to business. For example, through the promotion of dual vocational training	Mid Term
	The multidisciplinary necessary to manage by-product valorisation processes that require knowledge linked to different areas (engineering, business, legal, chemical, biotech etc.)	Public authorities related to agroindustry educative system could generate a transversal educational programme that brings together all this necessary knowledge (for example: general master's degree), or the generation of more vertical specific and complementary educational programmes that give rise to the training of the different profiles necessary in the valorisation processes	Mid Term
	Lack of official certificates of expert profiles in this area in different educational stages (vocational training, degree, etc.)	Public Authorities in charge of Lifelong Learning policies and other educative systems could provide integration of the expert profile in by-products in the list of vocational training offer, or integrate it in other more general training courses	Short term
	Very long certification/licensing process for including the profile in the study course	Policy makers could assess the certification process and if possible, make it easier and shorter	Mid Term
	Lack of a collective regional / national strategy, with the need of involvement of the legal authorities, to analyse the status	Increased financial support for investigation and investment in the creation of value-chains and	Mid Term

	<p>of each step of the supply-chains regionally and create real opportunities to create value-chains that can bring actual value to the markets with the rest of stakeholders (byproducts producers, collecting companies of residues, treatment companies and buyer industries of the transformed by-products Increased financial support for investigation and investment in the creation of value-chains and foster entrepreneurship in this area Mi</p>	<p>foster entrepreneurship in this area</p>	
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5. Blueprint main conclusions

Developed blueprint enlightens some of the gaps that bio-based agri-food sector is facing to become more developed. To include new professional profile in the educational system a clear and common understanding about the profile is needed as well as the importance of it. ByP4Dev consortium's work through surveys, focus groups and discussions have showed that one of the most important challenges are lack of knowledge and understanding about the bio-based sector, bioproducts, valorisation options etc. The knowledge and understanding are lacking among all types of stakeholders – policy makers, educational institutions, companies and their supporting organisations.

The Blueprint developed by ByP4Dev project among other is recommending to strengthen mutual cooperation among stakeholders, promote industrial symbiosis and networks, spreading the knowledge and transferring already gained results.

In terms of training, blueprint is recommending more midterm and long-term actions, ranging from daily support for teachers up to increase of financial support for educational development.

Analysing the legal framework, blueprint stresses the challenge of very long preparation/certification/licensing process of new training courses. For that not only policy makers could take recommended actions, but also educational institutions could work more proactive to build cooperations to ease the process.

Identified challenges approves that there is a need for the recognition of project learning outcomes as well as a supporting the integration of by-product valorisation skills into occupational standards. The well-educated our companies and professions will be, the better development of bio-based agri-food sector and its valorisation can be reached.

Pillar 1 -AWARENESS CREATION			
Stakeholders	Short term	Mid Term	Long Term
Policy makers	Implementation of farmer awareness plans coordinated by public authorities related to agroindustry, business development and educative system (agroindustry)	Provision of specific support programmes for SMEs related to agri-food sector valorisation by development agencies, regional governments, or other policy makers	
Educational organizations (vocational training/secondary schools/university)		Implementation of farmer awareness plans by organising transfer of knowledge from the new generation to the older ones	
Regional Innovation Agencies, Business Associations, Research Centres and Big Companies	Improved communication in social networks and dissemination in viral scenarios	Distribution and sharing of knowledge by SMEs and associations as a connecting entity	Promotion of industrial symbiosis and networks
		Transferring research results to SMEs from pilot projects and development of prototypes	
	Promotion of industrial symbiosis and networks	Promotion of industrial symbiosis and networks	

Pillar 2 -TRAINING			
Stakeholders	Short term	Mid Term	Long Term
Policy makers		Public authorities in charge of business and industrial development could activate cooperatives and associations as a linking agent and disseminate this knowledge	
		Public authorities related to agroindustry educative system could elaborate Specific Educational Plan for the promotion of the valorisation of agri-food by-products	
		Public Authorities in charge of Lifelong Learning policies and other educative systems could allocate more funds for infrastructure in an educational level and innovative solutions on companies and other research facilities	
		National board of education and/or similar agencies, universities and schools could ensure on a national and organizational level that the necessary valorisation skills are included in suitable training programs	
		To increase financial support for educational development	
Educational organizations (vocational training/secondary schools/university)	Educational institutions could provide teachers with professional development opportunities - attendance of seminars, forums, courses etc.	To develop continuous education. Focusing micro credentials on by-product valorisation	
	Breaking down complex phenomena into competence goals that can be achieved in a limited time. For example, learning a single technology is a clear competence goal. Understanding the composition of a particular biomass can also be a clear task. For example, ByP4Dev training materials is organised in a way that the study modules and units can be used separately, depending on the desired competence		

Regional Innovation Agencies, Business Associations, Research Centres and Big Companies	Research Centres and Innovation transfer offices could define different viable business models	To integrate entrepreneurial opportunities offered by the by-product valorisation processes of the agri-food sector into the different programmes for the promotion of entrepreneurship at regional level	
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Pillar 3 –LEGAL FRAMEWORK

Stakeholders	Short term	Mid Term	Long Term
Policy makers	<p>Public Authorities in charge of Lifelong Learning policies and other educative systems could provide integration of the expert profile in by-products in the list of vocational training offer, or integrate it in other more general training courses</p>	<p>Public authorities related to agroindustry educative system could develop Specific Educational Plan for the promotion of the valorisation of agri-food by-products</p> <p>Public authorities related to agroindustry educative system could open up educational processes to business. For example, through the promotion of dual vocational training</p> <p>Public authorities related to agroindustry educative system could generate a transversal educational programme that brings together all this necessary knowledge (for example: general master’s degree), or the generation of more vertical specific and complementary educational programmes that give rise to the training of the different profiles necessary in the valorisation processes</p> <p>Policy makers could assess the certification process and if possible, make it easier and shorter</p> <p>Increased financial support for investigation and investment in the creation of value-chains and foster entrepreneurship in this area</p>	