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Alpine Space

INNOBIOVC

REPORT

VCG DATABASE UPDATED

Deliverable D.1.2.3

Summary

This report elaborates upon the updated VCG database (at least 100 entries added) with relevant links created by PP.

Version 0.1. 06/09/2024

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DELIVERABLE DESCRIPTION

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WORK PACKAGE: WP1. Rolling out the enhanced Innovation Express Scheme for establishing cross-regional value chains. ACTIVITY 1.2: Engaging relevant stakeholders in the development of new value chains.
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Quality of information

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REVISION HISTORY			
Version	Date	Modified by	Comments
0.1	06/09/2024		The first draft was shared among consortium partners.
Final			

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This project is co-funded by the European Union through the Interreg Alpine Space Program.

LIST OF ABBREVIATIONS

CBE	Circular Bioeconomy
CBE JU	Circular Bio-based Europe Joint Undertaking
IECS	Innovation Express Call Scheme
LGCA	Lombardy Green Chemistry Association
PLA	Polylactic Acid
SAT	Sustainability Assessment Tool
S3	Smart Specialization Strategy
TRL	Technology Readiness Level
VCG	Value Chain Generator
VCG.AI	Value Chain Generator AI
WP1	Work Package 1

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EXECUTIVE SUMMARY

The InnoBioVC report, Deliverable D.1.2.3, provides project partners with an overview of updates for the VCG database and links created. Six partner regions (Upper Austria, Slovenia, Bavaria, Baden-Württemberg, Lombardy, and Switzerland) contributed to the updated database, which was upgraded by 725 companies. A total of 25 BioLinks - connections between residuals and by-product producers with converting technologies and products - were defined. The process involved assisting project partners in selecting the most promising value chains and involving key stakeholders in their development through applications for the IES Call.

This work has identified several systemic barriers that impede scaling up the circular bioeconomy. Circular bioeconomy practices are poorly integrated into regional industrial and financial structures and are off the radar of most companies, banks, and investors. Funding for programs designated for use in Innovation Express does not extend beyond TRL +7, leaving large companies and commercialization efforts underfunded. Banks remain reluctant to finance circular bioeconomy projects and continue to focus on the renewable energy sectors, (such as solar and wind), with well-established business models. The deployment of technology developed in one region and its effective use in another often remains outside the scope of cross-border collaboration mechanisms. The problem described extends beyond the InnoBioVC and reflects a wider European challenge to maintain leadership in circular bioeconomy, especially in the face of growing competition from the US and Asia. While competitors advance, Europe continues to keep the circular economy stuck in research labs.

InnoBioVC initially focused on supporting projects through Innovation Express, with measures to strengthen cross-border value chains. However, the weak integration of the circular economy in industrial and financial structures required targeted actions to scale the circular bioeconomy. InnoBioVC proposed three key recommendations for immediate implementation.

Recommendation 1: Direct engagement with companies to develop bankable business cases for circular bioeconomy. Discussions should be organized one-on-one format in order to allow companies to work on concrete business cases. The goal is to develop bankable projects and investments.

Recommendation 2: Continue the debate with funding agencies on new funding programs adapted to the industrialization and commercialization of circular economy solutions. The focus should be on supporting investments beyond TRL 8.

Recommendation 3: The active involvement of banks and investors for scaling up the circular bioeconomy. Staying in the public sphere of financing cannot turn Europe into an industrial power in the circular bioeconomy. Banks and private investors must move from observers to actors. Thus, we suggest calling an initial meeting with the banks and defining financial mechanisms and products for a circular economy.

InnoBioVC partners are ready to continue driving actions forward and will present its findings and recommendations at the Steering Committee meeting on October 7, 2024.

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1. METHODOLOGY

Anteja supported project partners in identifying technologically and commercially viable circular value chains. The Value Chain Generator (VCG.AI) was rolled out for this purpose. The VCG.AI automates the design of the circular value chains identified. It leveraged 550 circular business models (BioLinks), 250 types of residuals, and a dynamic technology database to define business-viable solutions for transforming residuals and waste into new materials and products. BioLinks matches companies that hold residuals, suggests technology that converts those residuals into new materials and products, and defines markets for these new products.

Data analysis was part of Activity 1.2. of Work Package 1 (WP1) – Rolling out the enhanced Innovation Express Scheme for establishing cross-regional value chains. This was scheduled for the period 1, 1-9. The data analysis followed a framework for uncovering circular value chains that have the potential to be implemented in a certain region: INPUT – TECHNOLOGY – MARKET (BioLinks).

The process begins by identifying industries that produce residuals and waste which have the potential to be converted into new materials and products. These industries are capable of providing steady, reliable, and large-scale material flows, while being geographically concentrated to minimize costs and carbon emissions. This process integrates conversion technologies transforming these materials into new products. Anteja worked with potential Innovation Express applicants, providing them with assessments of their proposed solutions, focusing on supply, technology, and market dynamics to gauge overall business feasibility.

2. INNOBIOVC DATABASE UPDATE OVERVIEW

2.1. Total Data

The VCG Database update includes 725 companies collected from six regions/clusters of the InnoBioVC. From upper Austria, 188 companies were collected. From Slovenia, Anteja provided 216 companies. From Germany, Chemie Cluster Bayern provided 149 companies and Heilbronn WFG 69. The Lombardy Green Chemistry Association provided 34 companies, and the School of Engineering and Architecture of Fribourg Switzerland provided 69. The project partners would like to understand options for forming circular value chains for the companies provided. The table below provides a breakdown of the number of companies collected from each region and cluster. The map provides spatial dispersion of the provided companies.

Table 1: Breakdown of companies collected by region and cluster

InnoBioVC Project Partner/Cluster	Region	Number of Companies
Business Upper Austria	Upper Austria	188
Anteja	Slovenia	216
Chemie Cluster Bayern	Bayern	149
WFG Heilbronn	Baden Wurttemberg	69
Lombardy Green Chemistry Association	Lombardy	34
School of Engineering and Architecture of Fribourg	Switzerland	69
Total		**725**

Source: Project partners

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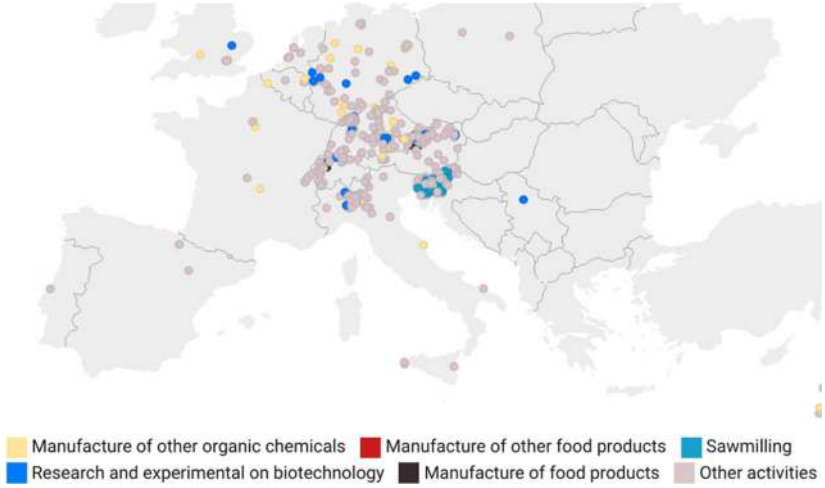
Below is the spatial dispersion of the provided companies. The companies in the regions of Slovenia, Upper Austria, and Lombardy are obviously clustered; while the companies in the German regions are more dispersed.

Figure 1: A map of the locations of all the companies under the project



Source: VCG.AI

2.2. Industrial structure

Table 2 highlights the most represented NACE codes in all the InnoBioVC clusters combined, providing insight into the sectors which are most suitable for integrating circular value chains. The manufacturing of other food products (10.89) leads with 50 companies, indicating a strong potential for integrating circular processes in the food industry. The manufacturing of other organic basic chemicals (20.14) is another key sector, with 39 companies contributing to bio-based circular processes. Other sectors, such as the saw milling and planning of wood (16.1) and the research and experimental development of biotechnology (72.11), are well-represented, highlighting opportunities for waste valorization and bio-innovation.

Table 2: Breakdown of the top 5 most represented NACE codes in the InnoBioVC database

NACE Code	Sector Description	Number of Companies
10.89	Manufacturing of Other Food Products	50
10.70	Manufacturing of Bakery Products	33
20.14	Manufacturing of Other Organic Basic Chemicals	31
16.1	Sawmilling and Planning of Wood	26
72.11	Research and Experimental Development	24
Total		**185**

Source: Project partners

In the Slovenia cluster, the wood processing industry is the most represented, with 50 companies producing wood and cork products and 14 producing furniture, reflecting the country's abundant forest resources. Upper Austria, by contrast, is dominated by the food processing industry, led by bakery and confectionery, followed by meat and beverages, highlighting its reliance on agricultural products. Baden-Württemberg shows a strong

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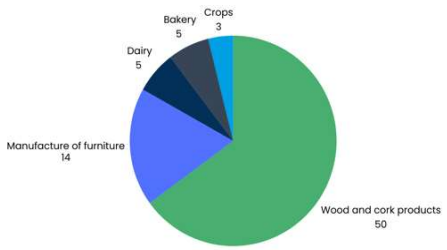
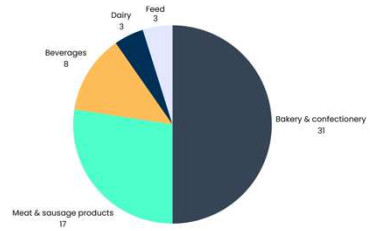
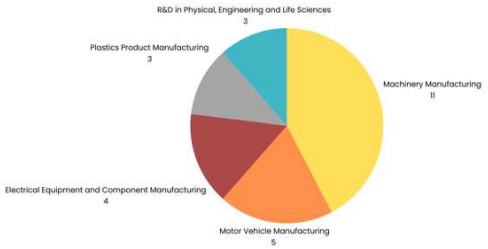
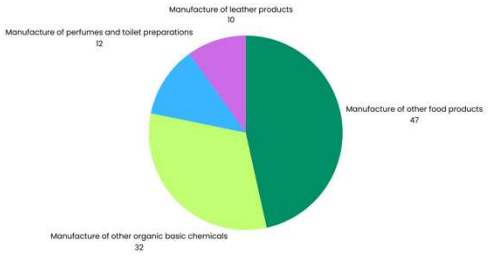
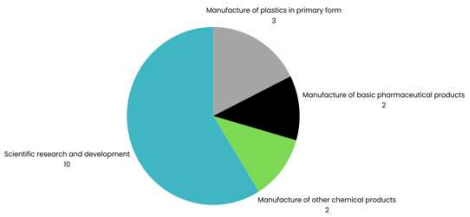
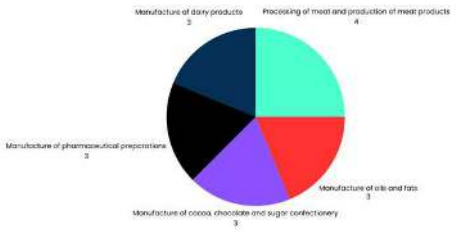
focus on manufacturing, particularly in machinery and motor vehicles, supported by complementary sectors like electrical equipment, plastics, and R&D, creating a synergistic ecosystem. In Bavaria, food production is the leading industry, with 47 companies, while chemical manufacturing, including organic basic chemicals (32 companies) and perfumes (12 companies), plays a significant role, underscoring the region's diverse industrial base. The Lombardy cluster emphasizes scientific research and development, with 10 companies, alongside a smaller presence in plastics, pharmaceuticals, and chemicals, positioning it as an innovation-driven hub. Finally, Switzerland displays a broad industrial distribution, with its largest segment being meat processing (4 companies), followed by dairy, oils, fats, pharmaceuticals, and confectionery, each with 3 companies, reflecting its balanced focus on food and pharmaceutical production.

Table 3: Breakdown of the most represented industries by region

Slovenia	Upper Austria	Heilbronn
		
Bavaria	**Lombardy**	**Switzerland**
		

Source: Project partners

3. LINKS CREATED

Altogether 25 BioLinks across partner clusters were defined. The BioLinks highlighted their potential in leveraging advanced technologies, local feedstock/residuals providers, and opportunities for circular value chains[1]. The potential for utilizing clean technologies for new circular value chains is high. In the Bavaria and Baden-Württemberg Clusters, 13 circular value chain solutions were defined. Both regions stood out with the largest number of BioLinks due to their robust options for applying advanced technologies. For the Lombardy region, three BioLinks were presented. This region exhibits a lot of potential with its local technology capabilities. In the Slovenia and Upper Austria regions, nine BioLinks were defined. Both regions show a strong presence of feedstock providers with limited options for utilizing locally developed technologies to transform feedstock into value-added products.

The table below presents cumulative data for each region, detailing company participation in circular value chains. The "Number of BioLinks" column highlights the prioritized potential circular value chains specific to

[1] Switzerland's data was included at the end of the project and was not part of BioLink definition.

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each region. The "Companies with feedstock" column represents the number of companies capable of supplying feedstock in the region, including residuals, byproducts, and biomass. "Technology providers" indicates the number of companies offering technologies to support circular value chains, while "Local tech providers" reflects the availability of technology solutions within the region. The “Offtakers/buyers” show potential number of companies in the region that can offtake the products produced in the prioritized circular value chains.

Table 4: Key data on the potential for circular value chains in InnoBioVC regions.

Region	Number of BioLinks	Companies with feedstock	Technology providers	Local tech providers	Offtakers/ buyers
	Number				
Upper Austria	5	44	13	0	46
Slovenia	4	63	18	0	43
Baden-Württemberg	6	11	28	2	41
Bavaria	7	89	21	3	79
Lombardy	3	0	13	5	9

Source: VCG.AI

Bavaria and Baden-Württemberg stood out with the largest number of BioLinks due to their robust industrial structure options for applying advanced technologies. In Baden Wurttemberg six BioLinks were defined across agriculture, food and beverages, chemicals, pharmaceuticals, construction, automotive, and machinery. Key examples include converting automotive seat waste into insulation, producing plastics from lactic acid fermentation of dairy by-products, and using winemaking and dairy residues for biochar production. Additionally, whey residues from the dairy industry present strong potential for protein production.

The Baden-Württemberg leads in the options of technology applications followed by Bavaria and Lombardy. All three regions have a strong and diversified industry that allows valorization and market applications for, both, production of residuals and by products. For example, Lombardy exhibits a potential with its strong technology capabilities, among them plastics manufacturing from lactic acid fermentation, manufacturing of pharmaceuticals from organic acid production, and production of chemicals from agriculture residuals. The versatility of PLA is evident in its application in various sectors, including automotive and packaging, which are integral to the economy of the Alpine region. The same goes for the availability of regionally available technologies.

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Figure 2: PLA circular value chains potential Baden-Württemberg

Source: Report Deliverable D.1.2.2

Upper Austria discussion emphasized the circular options for food companies in the region. The Food Cluster in Upper Austria is composed of a significant number of bakeries where the size and capacity of this industry allows it to provide a significant quantity and quality of organic waste for the fermentation process, which converts this waste into valuable organic acids. These acids are raw materials for pharmaceutical production. While Upper Austria is home to bakery and pharma companies, the region currently lacks a processing facility for fermentation which can be sourced from other consortium regions.

Figure 3: Potential for a circular solution – bakery

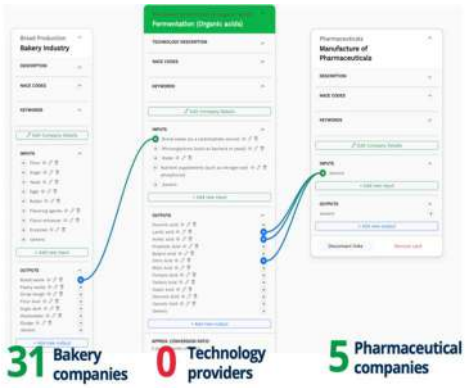
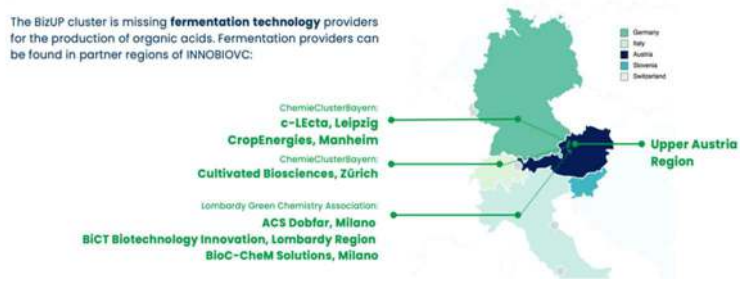


Figure 4: Gaps in the technology aspect can be filled with cooperation from other InnoBioVC regions



Source: Report Deliverable D.1.2.2

When it comes to feedstock the Bavaria stands out with a significant number of companies that can provide feedstock (89) for the proposed BioLinks, followed closely by Slovenia (63+). The Lombardy Cluster has no companies listed as feedstock providers according to the provided data; however, as a highly developed industrial region, there are many feedstock providers in the region. The Bavaria Cluster again has a strong market presence with 79+ companies that can offtake products in the proposed BioLinks for the region, followed by Austria with 46+ and Baden-Württemberg with 41+. The data for Lombardy is based on technology providers and does not reflect capacity for offtake based on the InnoBioVC data.

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4. INNOVATION EXPRESS DISSUSSIONS

As part of the INNOVATION EXPRESS CALL 2024 for Circular Bioeconomy, selected circular value chains were presented. Furthermore, meetings with potential applicants were organized. For example, the modular process for the bioconversion of residues into protein- rich biomass using microalgae was discussed during such an event. The participating research partner was looking for partners in the field of biomass utilization. The process is of high interest, since the availability of related technology has been proven and the project can provide field tests in a real operational environment. The next step would include the business model that considers the investment in the decentralized process, including coordination and logistic aspects of the solution. Another example focused on a research and innovation project on reducing hydrocyanic acid levels in flaxseeds to use in commercially food safe products. The research partner was looking for companies to supply residues such as apricot kernels, as well as for companies looking for new applications for currently generated residues.

Both cases involve research and innovative actions driven by research partners. The issue of why companies are not interested in taking the lead or being primary applicants in projects intended to be funded under Innovation Express was discussed. To ensure company engagement, a more targeted approach was tested, such as one-on-one conversations with the companies. This approach started to show results and pointed to three things. First, current programs suggested for Innovation Express focus on innovation research, with research partners traditionally taking the lead. Second, larger companies under high regulatory pressure to make more sustainable supply chains are not considered applicants. Third, SMEs are a major industrial part of the InnoBioVC partnership but are largely unaware of the business part of the circular economy.

Project partner discussions clarified that approaches to circular transformation require much more one-on-one talks with targeted companies and specific measures beyond R&D, such as prioritization of circular value chains for cluster actors and organizing supply chains. Significantly, clusters can facilitate technology transfer and support investments that can benefit the regional industry.

The project partners also attempted to engage with banks. While banks are interested in green projects, they continue focusing on the renewable energy sector (such as solar and wind) where well-established business models exist. Efforts spent within the project revealed limited demand investments in circular bioeconomy projects. One reason is that banks often do not fully understand the broader range of new technologies beyond bio energy production.

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5. CONCLUSIONS

The updated VCG database has expanded to include 725 new entries and corresponding BioLinks. This marks a substantial advance for the circular bioeconomy in the partner regions. The InnoBioVC initiative has pinpointed 25 BioLinks as key opportunities to forge new value chains by transforming residuals and by-products into economically valuable resources. These BioLinks underscore the potential of local feedstocks through the use of cutting-edge conversion technologies and diverse market applications to establish resilient circular value chains across these regions.

Our work has identified several systemic barriers that impede scaling up the circular bioeconomy in Alpine Space. Foremost among these is the chronic underfunding of projects above TRL 7 and the limited engagement of banks. Coupled with outdated approaches to facilitating circular bioeconomy initiatives, the industrialization process is not advancing. This is not just a regional problem—it mirrors a broader European challenge. While the US and Asia make aggressive strides in investing in circular solutions, Europe risks being left behind by confining circular economy breakthroughs to academic research without the necessary push toward commercialization.

The INNOBIOVC project outlines three actionable recommendations: (i) Direct engagement with companies to develop bankable business cases for circular bioeconomy initiatives; (ii) advocating for enhanced funding mechanisms that go beyond TRL 8 to enable the practical implementation of circular technologies within individual regions and across borders; and, (iii) the active involvement of banks and investors for scaling up the circular bioeconomy.

INNOBIOVC partners are committed to pushing these changes forward; ensuring that the circular bioeconomy moves from concept to commercial-scale reality both in the Alpine Space and throughout Europe.

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