

Smart Chemistry Specialisation Strategy



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Research
and innovation

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1. Introduction



Innovation is crucial for the sustaining of competitiveness of the chemical industry, which is also at the root of all other industries. Chemical innovation provides Europe with raw materials and consumer products and leads to the development of advanced materials and advanced process technologies that enable more flexible production with more efficient use of energy, feedstock and water. Regions play an important role in the promotion of the chemical industry, which has strong regional roots often organised in large settlement areas or chemical parks. Chemical regions have a long tradition in organising efficient structures for triple helix cooperation between industry, science and administration in terms of clusters and networks. These cooperation structures have been used in a bottom up process defining the innovation priorities. They are the basis for future implemen-

tation of Regional Innovation Strategies. The development and implementation of Regional Innovation Strategies following the smart specialization approach is a new challenge for chemical regions. The European 'Smart Chemistry Specialisation Strategy – S3Chem' INTERREG EUROPE project aims to improve the implementation of RIS based on the exchanging of good practices which have been identified and adopted to specific conditions in the different partner regions. This interregional cooperation helps to organise a more efficient and more focused use of European Structural Investments Funds. For this purpose the S3Chem project brings together regional and local authorities concerned with the chemical industries from Germany, Poland, Italy, Spain, Belgium and the Netherlands.

8 Institutions from 6 EU Member States



- Ministry of Economy, Science and Digitalisation Saxony-Anhalt, DE (Lead Partner)
 - isw Institute for Structural Policy and Economic Development, DE
 - Mazowieckie Voivodeship, PL
 - Province of Limburg, NL
 - Regione Lombardia, IT
 - IDEPA Asturias, ES
 - ACCIO Catalonia, ES
 - Public Service of Wallonia, BE
- The S3Chem project addresses the Regional Innovation Strategies in the partner regions.
- **Saxony-Anhalt:** Regional Innovation Strategy Saxony-Anhalt 2014-2020 with focus on Lead Market Chemistry and Bioeconomy
 - **Mazovia:** Regional Innovation Strategy for Masovia up to 2020
 - **Limburg:** RIS3 Zuid with Focus on Chemistry & Materials Cluster
 - **Lombardy:** Regional Innovation Strategy of Lombardy Region 2014-2020 with focus on Green Chemistry and Bioeconomy
 - **Asturias:** Regional research and innovation policy (Asturias RIS3 2014-2020) with focus on Sustainable Materials
 - **Catalonia:** The Research and Innovation Strategy for the Smart Specialization of Catalonia (RIS3CAT) with focus on chemical sector for Green Economy
 - **Wallonia:** Strategy for Intelligent Specialization of Wallonia with focus on ERDF Axis 2: INNOVATION 2020

The first phase of the project implementation was dedicated to the interregional learning process among the project partners and preparing the im-

plementation of the lessons learned from the cooperation. The exchange of experiences was the core of the interregional learning process and builds the main driver for achieving policy change. Within the implementation of the project, the interregional learning process was organised as an integrated process with focus on the identification, analysis and exchange of knowledge and practices in the field of the RIS with focus on the chemical sector. In order to transform the findings from interregional learning into actions, regional action plans were prepared at the end of the learning phase. The action plans provide details on how the lessons learnt from the cooperation will be implemented within the regions. They specify the nature of the actions, their timeframe, the stakeholders involved, the costs and funding sources. Each action included in an action plan was derived from the project's learning and in particular from the interregional exchange of experience. The second phase of the project will serve monitoring the implementation of the action plans. The objective is to transfer the lessons learnt from the project into the policy instruments addressed. In two cases the good ideas discovered during phase 1 in a partner-region will first need to be tested in another region before being rolled out. For this purpose partners from Asturias and Saxony-Anhalt will use pilot actions as supporting instrument of the action plan implementation.

2. Regional Action Plan Implementation

2.1. Saxony-Anhalt Regional Context

Saxony-Anhalt is one of the 16 federal states of Germany, located in the Eastern part of Germany and in central Europe. The neighbouring regions are Saxony, Thuringia, Lower Saxony, and Brandenburg. Despite

the fact that Saxony-Anhalt has no external borders, Poland and Czech Republic are not far. The area of Saxony-Anhalt is approximately 20,452 km² and the federal state has a population of 2.19 million inhabitants. The federal state is subdivided into 14 administrative units consisting of 11 rural districts and three urban municipalities. The three biggest cities in Saxony-Anhalt are Halle (Saale) (238,158 inhabitants), the capital city Magdeburg (236,831 inhabitants), and Dessau-Roßlau (79,855 inhabitants). Saxony-Anhalt has good infrastructure in the sciences, consisting of seven academic facilities and several research institutes, including the Fraunhofer, Helmholtz, and Max Planck institutes. Around 55,000 students throughout the state are enrolled and involved in building the base of academic work and research. Saxony-Anhalt is a region with urban and industrial centres and rural areas. Small and medium-sized enterprises (SMEs) and trade play a decisive role in economic development. Over 99% of companies are small or medium-sized enterprises (SME). They are the largest employer in the state, employing 3/4 of all employees and accounting for 2/3 of all sales. In Saxony-Anhalt the chemicals and plastics industry ranks among the leading industrial sectors and acts as a supplier for many downstream industries, constituting a pillar of local added value. With over 23,000 employees in over 200 companies and turnover of more than EUR 9 billion, the chemicals and plastics industry ranks among the most important economic sectors in Saxony-Anhalt.

Strategies

As early as 2009 Saxony-Anhalt presented a Regional Innovation Strategy identifying cluster potential, objectives, measures, and activities. The Regional Innovation Strategy for the period of 2014-2020 is based on this existing strategy, verifying the results and developing more approaches according to the requirements of the European Commission in the area of structural funds. Saxony-Anhalt adopted the "Regio-

nal Innovation Strategy Saxony-Anhalt 2014-2020" on 18 February 2014 with a view to strengthening the innovation capacity of companies as well as the potential for innovation in science, research, and development by facilitating improved collaboration. Based on existing competences in the sciences and the economy, 5 important leading and growth markets in Saxony-Anhalt were chosen as critical to the capacity to face future global challenges and megatrends like demographic change or climate change. The Lead Markets with the most future potential in Saxony-Anhalt are Energy, Mechanical and Plant Engineering and Resource Efficiency, Health and Medicine, Mobility and Logistics, Food and Agriculture, and Chemistry/BioEconomy. The state of Saxony-Anhalt wishes to encourage intelligent and socially integrative growth in these future markets over the coming years in order to create competitive and high-quality workplaces in the state. Further development is pursued under the guidance of a steering group as well as a Lead Market Working Group coordinated by the RIS Office under the authority of the Ministry of Economy, Science, and Digitalisation.

Action Plan measures

Action 1: Improvement of funding conditions of the directive "Research and Development" in the framework of the RIS

The improvement of funding conditions for the directive "Research and Development" has taken several inspirations from interregional exchange of experience, with a focus on the improvement of funding instruments. An in-depth analysis has been completed in Saxony-Anhalt of implementation of the "R&D" Directive for the Chemistry and Bioeconomy Lead Market. Interviews with several beneficiaries and the programme secretariat have been organised to understand strengths, weaknesses, and the need for action. A major shortcoming has been identified in the red tape burden caused by com-

plicated financial reporting requirements, particularly those related to administrative costs. Furthermore, the limited funding, with its ceiling of EUR 400,000 per beneficiary, has been criticised as not allowing for the implementation of larger projects. During the interregional learning process, Saxony-Anhalt was particularly interested in the experiences of other regions with the application of a flat rate for administrative costs. Several regions such as Lombardy and Catalonia already apply such flat rates. Higher funding amounts are also available in these regions. The Lombardy region in particular finances pilot projects with up to EUR 5 million. These experiences have been taken into account in Saxony-Anhalt in the revision of the funding directive. The Ministry of Economy, Science, and Digitalisation of Saxony-Anhalt revised the "Research and Development" funding directive throughout 2017, incorporating experiences from interregional learning as part of the S3Chem Project. The R&D Directive is an ERDF-funded directive, which is the main tool for implementing the promotion of innovation within the Lead Markets for the Regional Innovation Strategy. EUR 140 million of ERDF funds are available for the funding period 2014-2020. By mid-2017 43 projects had been funded with an amount of EUR 23 million in the Chemistry and Bioeconomy Lead Market, which represents the second largest lead market with a share of 25% of all projects funded. The revised funding directive was published on 29 December 2017. The Ministry of Economy, Science, and Digitalisation Saxony-Anhalt monitors the implementation of the R&D directive and assesses the impact of the improved funding conditions. A special focus is given to innovation projects in the Chemistry and Bioeconomy Lead Market. Compared to mid-2017, seven additional innovation projects have been funded in the Chemistry and Bioeconomy Lead Market.

Action 2: Organisation of a yearly conference of innovation stakeholders from the Lead Market Chemistry and Bioeconomy



The organisation of a conference of innovation stakeholders from the Chemistry and Bioeconomy Lead Market draws inspiration from the interregional exchange of experience and focuses on improving stakeholder involvement and governance. In the course of this analysis, the governance structure of the lead market has been described, which relies on regular meetings of the Lead Market Working Group. These meetings are organised every 3-6 months by the Ministry of Economy, Science, and Digitalisation of Saxony-Anhalt. Important innovation stakeholders from industry and science participate to discuss the implementation of the RIS, the fine-tuning of the roadmap, and the recent activities of the clusters and networks. A major shortcoming has been identified in the composition of participants in these meetings, which involve more or less the same people, while companies are underrepresented. During the interregional learning process, Saxony-Anhalt was particularly interested in the experiences of other regions with the organisation of events intended to engage a larger audience in discussions about the implementation of the RIS. Lombardy, for instance, organises an annual conference to present results from in-

novation projects funded by ERDF. Catalonia was very active in organising several mid-size events to discuss thematic questions with a group of innovation stakeholders from industry and science. Saxony-Anhalt decided to organise a large conference for the lead market in November 2018 in Quedlinburg. This conference was organised in close cooperation with the chemistry/plastics cluster in Central Germany, the bioeconomy cluster, and the Fraunhofer Research Institute IMWS. During this meeting, the current progress of the implementation of the RIS was presented and several companies and research institutes presented their ongoing research. A large area for presentation of posters was provided to all interested stakeholders. The meeting was successful in bringing together a large group of innovation stakeholders from the lead markets and attracting companies as well. The organisation of the annual conference will improve the governance of the policy instruments of the RIS, with a focus on chemistry and bioeconomy. The intensive contact and consultation with a larger group of stakeholders is important to ensure lively further development and the successful implementation of the RIS by the end of the funding period. The conference as allowed for stakeholders to be included who have not been involved in this process thus far. As part of phase 2, the Ministry of Economy, Science, and Digitalisation of Saxony-Anhalt planned to organise a similar conference in 2020. The conference was intended to follow the same approach of giving a platform for discussion of the implementation of the RIS in the Chemistry and Bioeconomy Lead Market, to present ongoing research activities, and to promote networking among innovation stakeholders. A similar conference could not take place in 2020 due to the pandemic crisis but is planned for the future.

Action 3: Pilot Action: Transparent Presentation of ERDF funded innovation projects for the Lead Market Chemistry and Bioeconomy

As part of the S3Chem Project the partners have intensively discussed measures for presenting and disseminating the results of ERDF-funded innovation projects. Comprehensive information about the regional innovation projects helps improve understanding of how the Regional Innovation Strategy has been implemented. It provides detailed information about the regional innovation landscape by highlighting innovation priorities and competent innovation stakeholders. Saxony-Anhalt has focused its work in the S3Chem Project on the improvement of the funding directive “Research and Development”. More than 50 projects related to Chemistry and Bioeconomy have been funded so far. However, there is no way to easily access information about these projects. The ERDF Managing Authority publishes a long list of beneficiaries listing all ERDF-funded projects (currently more than 1600). It is almost impossible to identify projects funded by a single funding directive (e.g. R&D). On the other hand, partners such as Asturias and Limburg have implemented a very transparent approach to presenting and describing in detail a single innovation. This information is easily accessible on their websites for external stakeholders and the interested public audience. Based on the identified weaknesses in Saxony-Anhalt and the good practices in Limburg and Asturias, Saxony-Anhalt would like to establish a similar approach to ensure the transparent presentation of innovation funded projects in Chemistry and Bioeconomy. All funded projects should be described with relevant information on the innovation topic and a description of the activities, partners, duration, and funding amounts. This information should be made available online and in the form of a short brochure. It should be available in German and English. The elaboration of the brochure has been supported by the INTERREG EUROPE program with a pilot action in order to test the approach under restrictions and

requirements in Saxony-Anhalt with a view to using this approach for all lead markets in Saxony-Anhalt. An overview of innovation funded projects in Chemistry and Bioeconomy has been elaborated in German and English and is available on the project website. Furthermore, the English version will be actively communicated to the S3Chem Partners and other chemical regions, e.g. from the European Chemical Regions Network.

2.2. Mazovia

Regional Context

Mazovia is the largest, richest, and most competitive region of Poland. The area of Mazovia is 35,558 km², constituting 11.4% of the country. The capital city of the voivodeship is Warsaw, which is also the capital of the country and a leading exporter and importer on a national scale. The region's trading partners include representatives both from the EU and from outside the EU Community – mainly Eastern Europe and Asia. The main advantages of Mazovia are: the largest economic potential among the voivodeships of the country (having generated over 22% of total GDP), high growth rate, and largest expenditure on activities in the area of research and development (R&D). People, including highly qualified staff, create enormous potential. Access to the best research centres and academic centres is also important, including the largest number of universities in Poland (94 academies and universities) and the opportunities offered by the capital city of Warsaw. Almost all industries have developed in Mazovia. The leading ones are the transportation, electronics, fuel, chemical, food, and machinery industries. The petrochemical industry is also developing dynamically in Mazovia, as exemplified by the Płock refinery, which is the largest in the country. The following areas cannot be overlooked: the energy and energetics, iron and steel, precision, paper, clothing, textile, printing and metal industries, including weapon tools and techno-

logies. Finance and insurance, telecommunications, and IT services, as well as the R&D activities mentioned above, are developing successfully. There are also numerous institutions performing research and development activities in various fields (including photonics, optoelectronics, biomedicine, biotechnologies, and nanotechnologies). One in five investors coming to Poland invests capital in the Masovian voivodeship. In the process of supporting the economic development and innovation of the region, the Mazowieckie Voivodeship Autonomous Government, in consultation with the private sector, offers foreign entrepreneurs and investors a number of facilities. The possibility of adapting the field infrastructure to investment needs, as well as the use of structural programs and European Union support for external investments in cooperation with a local Masovian entrepreneur make it easier.

Strategies

The chemical industry is relatively strongly represented in Mazovia, as one of the leading activities among regional enterprises next to the ICT sector. The Mazowieckie Voivodeship is responsible for about 26% of the total domestic production of chemicals, chemical products, and pharmaceutical substances and medicines, as well as approximately 14.5% of the total value of these products sold nationwide. The S3Chem project has contributed to the integration of the chemical industry environment through meetings. It has also had a strengthening effect on the entrepreneurial discovery process. Because the Regional Innovation Strategy applies until 2020, the results of the project will be included in the work on updating this document.

Action Plan Measures

The Action Plan included three actions consistent with RIS in 2020 and fits within the long-term policy for supporting innovation by focusing on regional smart specialization – high quality of life, food safety, intelligent management systems, and advanced business ser-

vices. The implementation of the Action Plan was coordinated by the Office of the Marshal of the Mazowieckie Voivodeship in Warsaw, which is responsible for the Policy Instrument. Clusters, Business Environment Institutions, and Research Institutes were also involved and supported the activities.

Action 1: Building a competitive advantage of Mazovian SMEs in the chemical industry by supporting their activities with integrated pro-innovation services provided by competent BEIs (MSODI project)

The main activity with regard to Action 1 was the first call for proposals (first grant call) that started in late July 2019 and ended in mid-December. The main institution responsible for Action 1 was the Office of the Marshal of the Mazowieckie Voivodeship. It was responsible for participating in all activities, financing all costs, and coordinating all activities in this action. The main focus of this activity was to support accredited Business Environment Institutions (BEIs) in the form of grants, which will then be used to create new services enabling the development of Small and Medium Enterprises (SMEs). Another goal was to increase the quality of support available to SMEs in the form of pro-innovation consulting services. The role of SMEs is crucial in the evaluation of the task. Only with their feedback will it be known whether the quality of service of BEIs has improved. During the first call for proposals, 9 applications from BEI were received, four of them did not pass the formal assessment, the remaining five were subject to substantive assessment. This allowed the amount of funding involved in the project to be determined, which is more than EUR 5,000,000.00. The implementation of the projects will be preceded by the process of signing Grant Agreements, which will take place in September 2020. Meetings with the BEIs and regional enterprises (regional stakeholders) also occurred regularly throughout 2019 – at least once every quarter. Moreover, as a part of this activity one networking event was conducted

and the concept of organizing a series of subsequent meetings was developed. One of these meetings will be held strictly for the chemical industry. A supplementary call for proposals for this action is planned in late 2020/early 2021. The inspiration for this activity was taken mainly from Limburg (the Netherlands), where a unique ecosystem exists for open innovation. Action 1 is already partially implemented – the call for proposals (grant call) took place in the second half of 2019 and implementation will be continued throughout the year 2020 with agreements being signed and services being developed by BEIs. Additionally, three networking meetings are predicted to be held in 2020 and again in 2021, with one meeting in 2022. Their main task is to create an attractive cooperation space for stakeholders of the innovation process – in this case through direct meetings between representatives of companies, R&D centres, and BEIs. In 2020, one of these meetings will be conducted only for the chemical industry.

Action 2: Internationalization of clusters with the participation of chemical industry companies

Every year (from 2019 to 2022) the Mazowieckie Voivodeship announces a call for proposals for Mazovian NGOs competing for the execution of a public task in the area of „Supportive activity economic development, including the development of entrepreneurship”. Task: „Support and development of clusters and cluster initiatives and strengthening their competitive position on the market, including promoting cooperation between the sphere of science and business”, in the form of supporting the implementation of the task. This activity was planned for the cluster initiatives (formally non-government organizations), Mazovian enterprises, and regional R&D centres, which are the stakeholders for this action. As part of the competition, funding was awarded to five cluster initiatives for five public

tasks at over EUR 40,000.00. The implementation of these five tasks took place from May to December 2019. In the internationalization process it is important to identify entities ready to engage in international cooperation. Thanks to the competition, some of the clusters were able to identify partners in other EU regions for whom cooperation with Mazovian clusters was beneficial. In addition, mapping the potential and development level of the clusters helped to increase their attractiveness for foreign investors. It has become possible to facilitate international contacts between entrepreneurs, their clients, and R&D institutions. Additionally, internationalization of clusters has helped build long-lasting contacts and constant flow of information, which in turn has influenced the level of trust among their stakeholders from the public and private sectors. In 2020, due to the SARS-CoV-2 pandemic, the Management Board of the Mazowieckie Voivodeship was forced to decide to withdraw from the open competition of offers for this public task. Mazovia, like Wallonia (Belgium), wants to emphasize the need to support the development of clusters, especially in stimulating the emergence of new sources of growth and innovation in the regional ecosystem. The announcement of the competition for completion of the public task mentioned in Action 2 was finalised in 2019. This activity, planned for the cluster initiatives, Mazovian enterprises, and regional R&D centres helped to internationalise the clusters that decided to take part in the competition of bids. With the funding awarded they were able to modify their international development strategy. As a result this action helped find entities ready to engage in international cooperation that can yield long-term benefits, such as access to new markets and new knowledge, inspiration for joining longer-term partnerships, and most importantly, research and innovation.

Action 3: Increasing the activity of research and development chemical industry companies.

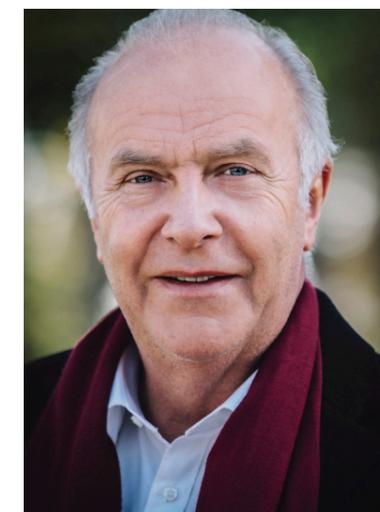
The main activity of this action was a call for proposals financed from the European Regional Development Fund (ERDF) for the specific objective 1.2 Research and development activities of enterprises of Regional Operation Programme of Mazowieckie Voivodeship. Type of projects financed: research and development project, also dedicated to chemical industry. The call took place from the end of October 2019 to mid-January 2020. The Mazowieckie Voivodeship was the institution responsible for formulating the principles of cooperation financing tools. The Mazovian Unit of EU Programmes Implementation announces the competition and selects projects on its behalf. The institution is responsible for financing the costs of promotional and information activities with its own budget and using its own communication channels. The 54 applications submitted underwent formal and then substantive evaluation – 32 of them passed the formal assessment. The results of the call for proposals were announced on 9 June 2020. Funds in the amount of almost EUR 1,000,000.00 will be allocated to the implementation of two projects:

- 1) R&D works on skin care, mucous membranes and nail care products by the company 4MASS.
- 2) Development of vitamin K2 production technology based on the mechanisms of biosynthesis and organic synthesis by the company Vitasynth.

The action was separately budgeted and assessed for chemical industry companies to guarantee real impact in this thematic area. The implementation of selected projects should start in the second half of 2020, and their monitoring will last until 2023. Mazovia, like Wallonia (Belgium), aims to bring SMEs and research centres together, which will help strengthen the ability of the R&D sector to respond to areas useful for SMEs. Funding was granted to two companies and will be used to develop unique products for the cosmetic and pharmaceutical industries. R&D processes provide a

lot of information for the business. The opportunity to constructively question them and relay feedback from clients gives the ability to understand consumer wants and needs better. This leads to increased focus on growth areas and limits the time spent on products that are not popular among clients, which ultimately improves the efficiency of the company. It can also lead to a boost in brand recognition, which most of the time is a desired outcome for companies. Selected projects will be implemented during 2020, and their monitoring will take up to 2023.

2.3. Limburg



*Ruud Burlet,
Regional Minister
for Sustainability
and Environment
(Limburg NL)*

“I am convinced that we need more of S3Chem-like policy oriented inspiration from other state of the art European regions, because the future of our ecosystem lies in the international connections it will establish. Bright together, profit together!”

Regional Context

Limburg is the southernmost province of the Netherlands. With the province squeezed between the borders of Belgium and Germany, a lot of economic activity in Limburg has a connection with neighbours. To support the transition of Limburg to a

knowledge society, facilitating entrepreneurship and innovation is one of the core tasks of the provincial government's economic policy. New industries, such as the service industry or the transition to high performance materials via fine chemistry, are an increasingly important economic base for Limburg. Innovation is defined as the renewal of Limburg-based firms, leading to new products, services, or organisational forms. SMEs are a specific target group of innovation policy. Limburg encourages cooperation between firms and knowledge centres within the region and with the neighbouring regions. The chemical sector (with annual turnover of EUR 13 billion and 6,000 to 7,000 direct jobs) is a crucial element in the industrial landscape of the province. The province of Limburg answers to global and regional challenges with answers provided by the Brightlands ecosystem. Brightlands is a combined effort to create synergies and knowledge transfer between local/regional players through the development of several campuses. Campus development is at the centre of the regional economic strategy and is intended to match the national policy. Important campuses in Limburg are the Chemelot Campus in Geleen (chemical production and service companies) and the Maastricht Health Campus (research and development around cardiovascular diseases and chronic diseases, public health, and primary care). Together with the Heerlen Smart Services Campus (focusing on smart services solutions based on data science, services design, and social impact) and Greenport Venlo (supporting business and innovation around horticulture, agriculture, manufacturing, and logistics); these four campuses are integrated under the name Brightlands.

Action Plan Measures

The basis for the S3Chem project was the joint interest of partners in each other's Regional Innovation Strategies. Partner regions in S3Chem, however, differ quite strongly in terms of size, governance structures, competences, and legal authority. This limits

the transferability of lessons learned in other regions. However, for Limburg, it was very helpful to see how other partners opened specific calls for proposals for chemicals-related projects (Lombardy, Saxony-Anhalt) because the Operational Programme "Zuid" only had generic calls. Action 1 puts these lessons learned into practice. Furthermore, some of the site visits to other regions were of great interest, in particular those to Re-light Italia (Rho- Milan, Lombardy), INCAR - CSIC (Oviedo, Asturias), and the Industrial and Technological Park (Płock, Masowia). An additional interest for Limburg was to see if and how effective bi- or multilateral co-operation between stakeholders can be established. In that sense, the dissemination events in Lombardy (May 2017), Catalonia (October 2018), and Saxony-Anhalt (February 2019) were very helpful. Our Action 2 extends one such co-operation between stakeholders from two S3Chem regions to involve regional industry and SME's in Limburg.

Action 1: Optimizing the final 'call for proposals' for biobased-circular economy

The Operational Program ERDF South Netherlands uses tender calls for proposals for the selection of projects to be funded. A part of the total ERDF budget is allocated to each call. The OP South aims for qualitatively strong projects. The Programme Secretariat (Stimulus) and the triple helix organisations in the individual parts of the South Netherlands programme area offer assistance and guidance to project applicants. Once the deadline for submitting proposals has passed, the Programme Secretariat checks the submitted proposals for completeness. Complete proposals are then assessed and ranked by an independent Panel of Experts. The Management Authority (the Province of North-Brabant) bases grant decisions on this ranking. The lead time from the closing of the call to the grant decision is approximately 3 months. However, no specific budgets are assigned to specific top sectors. Con-

sequently, project proposals from the chemical/bio-economy sector have to compete with project proposals from the other top sectors. The problem of not having specific measures or funds for the chemical sector is described in our analysis reports. Experiences from other regions (Lombardy, Saxony-Anhalt) suggest that dedicated funds for the chemical sector are advantageous. There are two main reasons that have led to this Action that already started at the end of 2018. First, the ongoing monitoring of OP South showed several top sectors to be lagging behind in terms of project generation. Their share of programme funding received is limited. After the last call for proposals in 2018, keeping in mind that only one final call for proposals remained in 2019, the initiative was raised to dedicate this final call exclusively to lagging top sectors. Second, experiences from S3Chem partner regions with calls dedicated to specific sectors (such as the chemical/bio-economy sector) have been favourable. This applies to Lombardy and Saxony-Anhalt in particular. Together, these reasons lead the Supervisory Committee of OP South to recommend focusing the final call for proposals exclusively on three top sectors: biobased-circular economy, logistics, and maintenance. For each of these themes the prerequisite of crossover with another (inter)national top cluster was to be maintained. Total funding of EUR 5 million was made available for each sector. For biobased-circular economy (with specific subthemes "biomass as feedstock" and "carbon circularity in products") a tender-based call opened from 3 December 2018 to 13 March 2019 (for both other themes the call was open until 7 June 2019). Individual SMEs or knowledge centres could apply for funding under this call, which contributes to strengthening the innovation system in the South of the Netherlands. Other companies and cluster organisations could also apply, provided SMEs are demonstrably part of the project and the project results will contribute to

strengthening the innovation system in the South of the Netherlands. Action 1 has been successfully implemented as 10 projects from the biobased-circular economy sector were submitted for a total of EUR 8.3 million. Seven projects were granted EUR 4.9 million and five of these projects included the participation of Limburg stakeholders. With this action we managed to successfully influenced the ERDF OP South Program.

Action 2: Development and implementation of Confidens mini programme



The co-operation between Brightlands Materials Center (BMC) in Limburg and Fraunhofer IMWS in Saxony-Anhalt is a direct result of the S3Chem project. The organisations were introduced to each other following the site visit of partner regions to the Brightlands Chemelot Campus in September 2016. By organising the meetings in Limburg as part of the S3 Chem project, stakeholders of both regions got to know each other and their know-how in the chemical sector. BMC and IMWS were both looking for new developments, and by talking further, also as part of S3Chem events in Barcelona and Halle (D), they discovered that they could enforce each other's developments by cooperation. BMC and IMWS believe that combining their capabilities will bring the development of fiber-reinforced 3D printing a significant step forward, and will also further

strengthen the connection between the Province of Limburg and the Sachsen-Anhalt region, as well as different parties within both regions. Therefore, a mini programme entitled 'Confidens' (Continuous fiber reinforced 3D printing with sensing opportunities) has been developed since early 2018 in order to support this cooperation between two stakeholders of S3Chem. The mini program consists of different research activities carried out by Brightlands Materials Center (BMC) in cooperation with different industrial and R&D partners in the broader South Netherlands region, particularly Limburg, and focuses on different aspects or different applications of the technology. Within the overall framework of the Confidens mini programme, BMC shares the expertise gained in the activities with IMWS Saxony Anhalt in order to accelerate technology development and industrial application. Over a period of three years, the Confidens project aims on the one hand to achieve the creation of the high-level knowledge needed to attract industrial partners, ultimately leading to new job creation, and on the other hand the support of companies in the Province of Limburg with this knowledge, in order to produce new applications acquiring at least five new industrial partners for BMC. Through this action, Limburg has definitely influenced the ERDF Program (OP South). The ERDF program needs to be seen as a facilitator of cross-border cooperation through the ERDF funding. Confidens, as a spin-off from S3Chem project activities, is the first project that responds to the goal originally set by the ERDF program OP South to also finance cross-border projects within this ERDF Program OP South. The development and the approval of Confidens influenced the policy on the importance of cross-border projects within the current ERDF program. It is the first step towards a policy change of the ERDF program of the next program period towards carrying out more of these projects under the South ERDF Program framework

in the future. The new RIS3, approved in April 2020, also supports this mission. The Province of Limburg will monitor the implementation of the Confidens Mini Program throughout the rest of the project period of S3Chem.

2.4. Lombardy

Regional Context



Lombardy Region is located in the North of Italy, in the heart of the most prosperous area of Europe. With around 10 million inhabitants, distributed over an area of approx. 24,000 square km, Lombardy's gross domestic product (GDP) is EUR 368 billion, about 22% of Italy's GDP, and its production system is one of the most developed in Italy and in Europe. The Region lists 815,956 registered enterprises (about 16% of the national total), concentrating a staggering figure of 37.2 businesses per km², mainly consisting of micro, small and medium-sized enterprises. Entrepreneurship in Lombardy is widespread and dynamic, showing an international standard in innovation, development, and technology. The manufacturing industry in Lombardy is rather diversified in terms of productive specialization in many sectors: mechanical, electronics, metallurgy, textiles, chemicals and petrochemicals, pharmaceuticals, food, publishing, fashion, footwear, and furniture. Lombardy is the most chemical region in Italy hosting 31% of the Italian chemical industry (local units) and 41% of Italian chemical employees and is among the top five regions in the Europe. Lombardy also has a high-level research infrastructure characterized by specialisation in various technical and scientific disciplines and including skills and research groups of international ranking.

Strategies

The growth of the Lombardy regional economy is based on entrepreneurial freedom and cultural, scientific, and technological innovation; it is fostered by the implementation of targeted and transversal actions, such as support of globalization and technology, innovation of financial management, and access to credit. Lombardy strategy increases the commitment to support research and innovation policies and encourages the creation of a context useful to develop ideas, projects, and innovative enterprises. As part of the S3Chem project, Lombardy focused on the policy instrument "RIS - Regional Innovation Strategy of Lombardy Region 2014-2020" and on Green Chemistry and Bioeconomy. The S3Chem Project has contributed to improving the RIS and the Eco-Industry Work Program supporting the setup and development of new projects related to chemistry, bioeconomy, and circular economy. The RIS provides the basis for ERDF regional innovation funding and a real interregional learning process has been started, learning from the best practices shared by other regions, in particular: bioeconomy and circular economy planning, involvement of the territory through a public consultation, the regional Clusters commitment defining the Regional Innovation Roadmap on Circular Economy, and the establishment of a Regional Observatory on Circular Economy and Energy Transition. Lombardy Actions have been funded with Regional and POR ERDF resources.

Action Plan Measures

Action 1: Improvement of RIS3 through its Eco-Industry (green chemistry and bioeconomy) Work Programme, supporting the setting and the developing of new projects.

The Lombardy Region planned the future of research and innovation choosing a distinctive and inclusive approach that places people and their needs at the centre of all choices. Many regional experiences have influenced Lombardy RIS3 WPs policy instruments. The Public Consultation Process in Lombardy was inspired by the

activities of Asturias during a large consultation aimed at identifying innovation potential in the area of sustainable materials, integrating all important companies and research entities in this process. The Regional Innovation Roadmap on Circular Economy has been inspired by the regions Catalonia and Saxony-Anhalt. Both regions have implemented a detailed bottom-up innovation roadmap analysis to identify innovation topics developed in close cooperation with existing clusters for chemistry and bioeconomy. The Regional Observatory on Circular Economy, activated in Catalonia, has been re-created in Lombardy in order to implement the roadmap and discuss the results applied to the circular economy. It is comprised of working groups with different regional stakeholders. A Public Consultation (survey) on "Strategy for Sustainable Development on Bioeconomy and Circular Economy" was published on the Lombardy Region Open Innovation Platform from 25 September to 11 November 2019. The consultation concentrated on a brief description of the content and the exploitation of the results, with the objective of involving citizens in the design of the roadmap. It was addressed both to Lombardy and European subjects; at the end of the consultation 2,298 people participated, including around 30 foreigners. The results of the consultation are conveyed in the Regional Innovation Roadmap on circular economy planned in collaboration with the Lombardy Smart Factory Technological Cluster and Finlombarda, which will serve to identify future investments in science and technology. The regional programming framework has been reoriented to focus on changing the local productive system to incorporate policy learning process in the results of initiatives/projects and involving many stakeholders (inter-cluster Group the R&I Regional Forum and the "Mirror Group" in the validation of the roadmap) and the final document was approved by the Regional Government and published in May 2020. The roadmap includes the lesson learned from the Covid-19 emergency that

is generating tremendous impacts globally and, in particular in the Lombardy Region. Circular economy can play an important role in these situations and the roadmap highlights some specific priorities to be pursued to make the regional system more robust, resilient, and faster in the economy restarting phase. This roadmap will also contribute to the definition of the Smart Specialization Strategy of the Lombardy Region 2021-2027, within which the results achieved in terms of Circular Economy will also be valued. The implementation of the roadmap and the discussion of its results have been managed by a Regional Observatory on circular economy active on 3 levels: Institutional (identifies general strategies), Technical (technical-scientific support), Operative (proposals, collaborations and initiatives through 7 Working Groups). Starting March 2019, the "Roadmap on circular economy group" held 7 meetings and a workshop organized in July which involved many Lombardy stakeholders (clusters, universities, businesses, and circular economy experts).

Action 2: Enhancement of cooperation between Industry and Research awarding Lombardy excellences.

The promotion and dissemination of R&D projects has been designed through the new section of the OIP – Open Innovation Platform for the description of ERDF-funded innovation projects. Inspired by the activities implemented in Asturias, where IDEPA has published a detailed list with all information on funded projects in an easily accessible and transparent way, the Lombardy platform uses the same transparent presentation of the funded innovation projects supporting related dissemination and communication activities. Furthermore, it promotes Lombardy RIS and its priorities between companies and research entities. The knowledge about ongoing innovation initiatives helps the creation of new projects and new partnerships among relevant stakeholders. It also increases the liability of innovation policy and the accountability of policymakers

and the managing authority to researchers and public opinion. Based on the good results obtained with the call "Agreements for Research and Innovation", the strong demand of the local research system, and following the example of S3chem partners, Lombardy opened the call "Hubs for Research" from January 2019 to March 2019, the last of three calls for proposals ("R&D for Aggregations" and "Agreements for Research and Innovation"), which is drawn from the continuous demand for large cooperative R&D projects funds. 76 projects were presented by partnership among enterprises and research entities, and after the selection procedure the list with 33 funded projects was published in October 2019; these 33 projects were funded between January and March 2020. Finally, the "NUCLIS Program" in Catalonia and the "Stimulus" model in Limburg contain some interesting features that Lombardy could develop in future calls, such as opening to international partners. The promotion and dissemination of R&D projects through the Open Innovation Platform obtained the selection of 140 project summaries from all the ERDF/ROP (POR/FESR) Axis 1 R&D projects, which better show how Lombardy calls support local excellences. At the moment they are placed on a "test platform" in order to allow some insights regarding new European privacy legislation. The call for proposals "Hubs for Research and Innovation" has been funded with a total contribution of EUR 114.5 million from public resources (EUR 94.7 million from ERDF/ROP - POR/FESR) thanks to a call initially funded with EUR 70 million, plus a subsequent refunding of EUR 44.5 million that involved more than 200 partners: 45 large companies, 102 MPMI, 57 research organizations, and 80 small companies, including five innovative startups. 33 projects of excellence have been selected in the sectors of Sustainability, Health and Life Science, Advanced Manufacturing, Connectivity and Information, Smart Mobility and Architecture, Nutrition, Culture and Knowledge. New challenges and new experiences have arisen since the

implementation of the action plan defined within the project; the approach of Lombardy Region policies has been influenced in order to get closer to citizens and become more suitable for new environmental challenges. A public consultation was carried out through the Open Innovation Platform with a bottom-up perspective in order to collect useful ideas and indications for planning concrete actions, reviewing Lombardy Region public policies, and investigating citizens' perception and knowledge of strategic issues such as responsible consumption and production, sustainable cities, and the role of public administration.



The recent emergency health situation caused by the spread of the Covid19 virus, which strongly affected Lombardy, has suddenly accelerated the application of some issues that emerged from the survey, such as smart-working and digitalization of processes, and the development of new sections of the Regional Open Innovation Platform in order to respond to the Covid19 emergency and promote containment strategies. Focusing on citizenship participation processes, the Lombardy Government used the Open Innovation Platform to start a consultation aimed at entrepreneurs and workers, asking them to share their smart-working experience, highlighting the critical issues encountered, emergent needs, tools used, and any best practices carried out; to trace and map the spread of the virus; to define and expand the so-called "Phase 2" and "Phase 3"; to

support the management of primary activities, such as school and work. The relevance of Sustainable Development has driven the Lombardy Region to dedicate the 2020 edition of two important competitions to "research and sustainability" themes: First, "Lombardy is Research", awarded every year during the annual Research Day, which assigns EUR 1 million to an international researcher for results achieved in a specific area. The award is aimed at implementing research and development projects in the region and is awarded by an international jury composed of many globally important scientists (event postponed to 2021 due to Covid19 Emergency). Second, the "Regional Student Prize" awarded every year to a group of secondary school students for a research and innovation project on the theme "Environmental Sustainability and Quality of Life" and in the strategic area "Improvement of people's quality of life, in harmony with the development of the production system and the transition to new development models". The 2020 edition is dedicated to sustainable development in order to encourage the interest of Lombardy students in science in service to the environment (2020 Edition canceled due to Covid19 Emergency). Another key theme for Regional Government is Research, therefore Lombardy has focused its 2014-2020 EU programmes on the "Call for strategic research, development and innovation projects aimed at strengthening Lombardy's research & innovation ecosystems as international hubs" in order to promote projects characterized by high innovation applied to industrial research and/or experimental development with particular added value and relevance in terms of strengthening the competitive capacity and attractiveness of the territory. The projects respond to sustainable development strategies by providing new circular economy solutions and will also create a leverage effect on the Lombardy industrial and research system: starting with the EUR 114,500,000 invested by the Lombardy Region, private companies

and research bodies will invest the same amount as co-financing, helping to strengthen both the industrial research system and Lombardy's competitiveness on a national and international level.

2.5. Asturias

Regional Context

Asturias, located in the northwest of the Iberian Peninsula, is a region of 10,604 square kilometres and 1 million inhabitants. It is one of the 17 Autonomous Communities that make up the Spanish State. With 354 km of coastline, it has two ports: the goods port of Avilés and the port located in Gijón, El Musel, which is the principal bulk-carrier port of the Spanish port system. The Asturian population and economic activities are grouped in the central metropolitan area of the region. The strong industrial activity contrasts with its extraordinary natural beauty. It is renowned as a Natural Paradise, which is reflected in its major extension of the natural landscapes located in the wings of the territory (30% protected areas, 20% reserve of the biosphere). Asturias has a GPD per capita of EUR 22,789 (source National Statistical Institute - INE 2018) Industry plays an important role in the economy and contributes to 22.52 % of the Asturian Gross Value Added. The process industries represent 37% of industrial turnover and 27% of industrial employees (source INE 2018).

	Companies	Employees	Turnover in thousands EUR
Process industries	292	13,469	4,999,344

Major multinational groups have industrial sites in the region, some of which have a strong international influence: ArcelorMittal (steel), Asturiana de Zinc (Zn), Saint Gobain Cristalería (flat glass), DuPont (fibers and plant-protection products), Bayer (aspirin and veterinary products), Linpac Packaging (food pa-

ckaging), and CEASA (paper pulp). Asturias is home to the only steel plant in Spain, servicing the entire steel production process. Furthermore, ArcelorMittal has an acclaimed R&D Centre in Asturias. The Asturiana de Zinc plant in Asturias is the largest electrolytic zinc plant in the world. The sector also has a group of medium/large companies with considerable strength that are characterised by their deep-rooted link to the land, whilst simultaneously undertaking diversified and globalised activity. The main exporters are Industrial Química del Nalón (carbo-chemical products) and Tudela Vegín SA (cement).

Strategies

The Economic Development Agency of Asturias (IDEPA), a public entity dependent on the Region, elaborated the Regional Strategy for Smart Specialisation (Asturias RIS3 2014-2020) and is in charge of its deployment, assuming the Technical Secretariat. As part of Asturias RIS3, IDEPA initiated a participative process for the elaboration at the end of 2016 for a Research and Innovation Agenda in the regional priority Sustainable Materials. The regional challenge we want to face is to develop ideas based on scientific evidence to boost the use of residues as a raw material in the process industry, minimising the impact in a way that makes business sense. During the S3CHEM project phase 1, we have completed a roadmap for Sustainable Materials in Asturias, identifying the main regional value chains of sustainable materials: waste-technologies-process industry markets.

See good practice at Interreg Europe website. Roadmap for the regional agenda of sustainable materials www.interregeurope.eu

On 28 and 29 March 2019, a two-day event was organized by IDEPA in Covadonga (Picos de Europa). About 30 people attended, representing research and science, regional administration, politicians, unions, lea-

ding companies, and experts. Funded and supported by JRC under the Science Meets Regions initiative, we followed the Innovation Camp Methodology. The goal was to identify common proposals to be transferred into innovation and environmental policies, and notably to complete the Sustainable Materials Agenda and assess the opportunity to promote a regional Circularity Hub.

Asturias Innovation Camp
<https://sciencemeetsasturias.es>

Action Plan measures

Action Plan implementation is coordinated by IDEPA (Regional Ministry of Employment, Industry and Tourism), which is the owner of the Policy Instrument and holds the Technical Secretariat of Asturias RIS3, in cooperation with the Regional Ministry of Environment, the Chemical and Process Industries Cluster of Asturias (IQPA), and University and Technological Centres. COGERSA, the public company in charge of urban waste management in Asturias, became a partner for the implementation of the pilot action.

Action 1: Testing an R&D infrastructure network for waste treatment at the service of process and chemical industry as part of a Circularity Hub

This pilot was inspired by the Brightlands Chemelot Campus Institutes and its open innovation models and the Competitiveness Poles of Wallonia and how they promote project generation. This pilot action (with a budget of EUR 32,500.00) plans to prototype the running of a comprehensive waste recovery pathway focused in one value chain: biomass waste-carbon conversion technologies-process industry markets. This pilot action, in the context of S3Chem, gives a main role to the chemical industry in the circular economy. The prototype to be tested will support the deployment of the thematic priority Sustainable Materials of the Asturias RIS3 strategy, facilitating the

design of future programmes in service of the circular economy, related to R&D infrastructures, public-private cooperation, and industrial symbiosis in the chemical and process industries. COGERSA, acting as a new partner, will supply waste inputs for valorisation process industry, acquire minor equipment required for linking dots in the selected value chain, and participate in R&D&I projects in collaboration with the chemical industry. Throughout the first quarter of 2019, IDEPA promoted the elaboration of an inventory of regional public or private R&D infrastructures, collecting suitable pilot plants (sizes ranging from laboratory to industrial demonstrators) and singular equipment for waste valorisation. In January 2020 IDEPA launched a platform with regional public or private R&D infrastructures for waste valorisation. These infrastructures have been grouped around comprehensive waste recovery pathways as nodes of a future Circularity Hub in Asturias. The search offers other filters such as markets, technologies, added value, and scalability of the infrastructure.



Asturias Paradise Hub 4 Circularity ASPH4C

During the first half of 2020, Cogersa carried out a public bidding process to acquire a pilot-scale shredder to prepare waste for its characterization and use in pilot plants for recovery purposes. The equipment was received on November 17th, 2020. In parallel, Cogersa and Idepa have been working together since September 2019 to develop three proposals based on industrial symbiosis for waste recovery (waste from Asturias) with a number of facilities within the Astu-

rias process industry. One of the proposals was well received by one of the most important facilities in the region, and since mid-March 2020 the team has collaborated to develop a collaborative consortium for a highly innovative waste recovery project involving three waste production sectors and three treatment technologies. The concept of this project fits with the recent trend called „chemical recycling“. The proposal was finally submitted to the renowned Spanish program MISIONES CDTI. The project has included several pieces of pilot equipment, including a crusher recently acquired by Cogersa, an HTC reactor coupled online with the Cogersa incineration plant (very innovative), and another piece of pilot equipment inventoried by IDEPA as well as additional pilot plants, as the consortium involves organisations operating in other Spanish regions.

Asturias Paradise Hub 4 Circularity.
Comprehensive waste recovery pathways
www.interregeurope.eu

Action 2: Tools to facilitate success of R&D projects by Pre-empting the R&D phase with the socio-economic viability of the projects

The challenge of the transition towards a circular economy approached with the recovery of industrial and urban waste has legal and socio-economic aspects to consider during the early R&D phases. Apart from the technological risk that accompanies any R&D project, waste recovery projects have certain circumstances that also determine their viability, including the social distrust generated by its immediate impact on the environment or subsequent implementation at industrial scale. The communication of the R&D projects is presented as an opportunity to guarantee their execution and social acceptance. The MANIFESTO referred to in the General Recommendations of the final brochure of S3Chem suggests that compa-

nies agree to a communication protocol with stakeholders to show the environmental aspects of R&D proposals in advance. On the other hand, Fraunhofer CEM Halle (stakeholder involved in S3Chem project meetings) has established a workgroup of the IMWS in Halle to evaluate material chains from an economic, ecological, and social perspective. This initiative has also been inspiring for us. IDEPA has reviewed the existing literature and drafted an abridged protocol for industrial R&D trials which involves informing society about the measures that are carried out and the benefits this entails for Asturias, giving citizens a leading role in the transition towards a circular economy. The protocol will particularly help R&D environmental projects financed by public funds (through competitive calls from OP ERDF) achieve success by ensuring their societal viability. The work is also devoted to use by internal evaluators developing a questionnaire to assess the environmental and socio-economic aspects of the proposal.

2.6. Catalonia

Regional Context

Catalonia is one of the densest regions in Europe. With a surface area equivalent to 0.7% of the EU, it has 1.5% of the EU population (7.6 million inhabitants) and a Gross Domestic Product (GDP) per capita of EUR 32,121. The total GDP is EUR 242,313 million, which represents 23.7% of Spanish GDP (data from 2018). Catalonia also has a diverse and dynamic industrial economy predominantly with SMEs, where industry contributes to 21% of the Catalan Gross Value Added (GVA). Half of the Catalan economy has either a direct or indirect relationship with the industrial sector, which is innovative, dynamic, and diversified. Together with industry, trade and tourism are important activities. In the industrial sector, the food, automotive, chemical and plastic products, life sciences, and ICT industries make the biggest contribution to indus-

trial turnover. Up to 29% of industrial employees work in the food sector while about 12% of industrial employees work in the chemical industry. The chemical industry is diversified and includes pharma, cosmetics, refining, energy, and specialty chemical products. According to data published by the State's Ministry of Economy and Competitiveness, foreign investment in Catalonia reached a total of EUR 23,195 million in the period 2014-2018. Catalonia makes up 30.3% of all investments in Spain in 2018. Catalan exports reached EUR 71,624 million. In Catalonia 1.52% of companies conduct Research, Development, and Innovation (RDI), and 54.6% of companies are innovative.

Strategies

The Catalonia 2020 Strategy (ECAT 2020) is based on the priorities of Europe 2020, and is the roadmap of the Catalan Government for relaunching the economy and reorienting the productive sectors through a more intelligent, sustainable, and inclusive economic model. ECAT 2020 established objectives and provided a stable framework to guide public policies for competitiveness towards the year 2020. The strategy focused mainly on measures that have a direct and measurable impact on priority areas such as employment, training, social cohesion, innovation and knowledge, entrepreneurship, internationalization, and green economy. In addition, the Regional Innovation Strategy for Smart Specialisation of Catalonia (RIS3CAT) is the result of the analysis of the different production sectors and has identified seven strategic sectors: Food and drink, Chemicals, Energy and Resources, Industrial Systems, Design-based industries, Industries related to sustainable mobility, Health Industries, and Cultural and experience-based industries, to lead the transformation of the Catalan economy towards the objectives of the Europe 2020 Strategy.

Action Plan Measures

Catalonia has focused its Action Plan on the improvement of the RIS3CAT with special emphasis on RDI programmes and the chemical industry. The initiatives proposed are aimed at helping to improve the competitiveness and internationalization of Catalan companies by reinforcing available instruments such as grants for collaborative and international research projects. In addition, a pilot plan has been requested to create the conditions and the confidence necessary to generate interregional projects. Another initiative, following lessons learned from the Lombardy Open Innovation Platform, proposes Managing Risks and Opportunities through the improvement of the RIS3-MCAT Platform (by introducing references to the chemical industry and its stakeholders). In this respect, participation in the Chemicals Thematic Area from the S3 Platform Industrial Modernisation is key to being able to meet the objectives of the Action Plan. The implementation of this Action Plan will be jointly coordinated by the Regional Ministry of the Vice-Presidency and the Ministry of Economy and Finance of the Catalan Government, which is responsible for the management of ERDF. Clusters, associations, research centres, and universities have actively participated throughout the project and have supported this initiative.

Action 1: Managing and improving R&D programmes

The collaborative R&D programmes in Catalonia funded by ERDF have more than 10 years of experience with good results both in terms of companies and centre participation and in the quality of the projects funded. Initially, the projects were limited to Catalan companies and technological centres, but subsequently some collaboration agreements were established with other countries and regions with the aim of helping to increase the global and international competitiveness of companies.

The collaborative R&D programmes are made up of companies that collaborate with agents of the R&D system in technological innovation projects. These are R&D projects, of high technological risk and with a strong ability to generate externalities in Catalonia, which could not only be carried out exclusively with private funds due to the high associated technological risk. The projects evaluate the generation of employment and industrial investments, as well as the maintenance of the scientific and productive activity of Catalonia and the participation of scientific and technological agents in the R&D activities that they include.

The collaborative R&D programmes are coordinated and managed by ACCIÓ. For funding technological projects should contribute to the following:

- Increase private investment in R&D.
- Improve the technological capacity of companies in Catalonia, especially with regard to transversal facilitating technologies.
- Improve the positioning of companies in the leading sectors in the international market.
- Align the strategic actions of RDI agents and companies.

The collaborative R&D programmes have two types: the local “Nuclis”, made up of Catalan companies with partners in Catalonia, and the international “Nuclis”, made up of Catalan companies that collaborate with international partners with the aim of building synergies and strategic complementarities with other countries and regions in the priority areas of the RIS3CAT.

In the course of the learning process of the S3Chem project, Catalonia has been particularly interested in discovering the capabilities, knowledge, and areas of interest of the regions that make up the consortium. Through this project, we have found multiple com-

mon themes in chemistry and circular and bioeconomy and opportunities to find synergies for common developments in practically all participating regions. As part of the S3Chem project, other regions such as Limburg and Saxony-Anhalt explained how they approach their calls for proposals for collaborative R&D programmes funded by ERDF. The main approaches that differ from Catalonia/ACCIO are the thematic focus for calls for proposals and that the calls do not have a deadline (open calls until funds are fulfilled). This second approach is not going to be explored due to restricted rules concerning calls in Catalonia/Spain where it is compulsory to have deadlines. The lesson learned that ACCIO will try to implement is the thematic focus approach that Limburg has developed in calls such as “Calls for Proposals/Open Innovation”. In addition, the agreement signed between the regions of Limburg and Saxony-Anhalt to develop a 3D Printing Hub has also inspired us to explore other possibilities, other instruments, and new ways of collaboration. Among the best practices that will be studied for incorporation in future calls are the specialization by scope RIS3CAT, as in the case of Limburg, and the communication of the results such as the cases of Asturias and Lombardy regions. To finance collaborative research projects with high technological risk that respond to market needs, ACCIO will develop the following: to integrate lessons learned from “thematic calls for proposals” in calls for Catalan Specific Programmes from RIS3CAT and executed by ACCIO (Nuclis or Innovation Vouchers, for example); to build synergies and strategic complementarities with other countries and regions in the priority areas of the RIS3CAT; to boost the participation of chemical companies in programme calls from the policy instrument addressed. Furthermore, this will also help identify other opportunities for cooperation with other interregional instruments or other collaborations, creating balanced frameworks for cooperation among regions and among companies. The following

aspects and indicators will be measured: no. of Companies involved, no. of Technological/Research centres involved, no. of Projects presented with special emphasis on chemistry and circular and bioeconomy, no. of Projects funded with special emphasis on chemistry and circular and bioeconomy. The data will be collected on an annual basis once the grant call cycle (presentation of projects and evaluation) has been completed. At the end of the implementation, a compendium of success stories will be made and communicated to the members of the S3Chem project. During 2019, agreements were maintained with other regions and countries for the development of research projects. During the year 2020 the possibility of establishing other agreements is being studied. New lines of grants for business R&D projects in the circular economy have been announced. This call has been made jointly between ACCIÓ and ARC (Catalan Waste Agency). The results of this call are that: 16 projects presented, 10 of which were approved. 69% of the participating companies were SMEs. It involved a mobilization of EUR 5.09 million.

Action 2: Engaging Externally

This action aims to explore intra and interregional synergies to develop new ideas and projects, in particular to include the chemical sector in the new RIS3CAT strategy. It will also boost the participation of the Catalan chemical sector in the S3Platform of Industrial Modernization at chemistry and the bio and circular chemical economy. The chemical sector is the third largest sector in Catalonia and is also part of the value chain along with other industrial systems. Chemistry is fundamental in fields such as energy, water, food, health, materials, and some emerging technologies. Therefore, applications and cross-sector developments need to be explored, with a focus on new technologies, digital transformation and disruption, as well as unique projects that will help to transform the industry and make it more efficient,

more sustainable, and more innovative. In addition, industry and chemical science play a key role in the transition to a bio and circular economy, providing innovative and sustainable solutions to make this transformation possible. Among the planned actions, we can highlight the improvement of the RIS3CAT by introducing the chemical sector in a specific way and not in a generic way to the Pillar 1 sector “Energy and resources” through the support of Catalan agents of chemistry. During the S3Chem project, a stakeholder group was created in Catalonia with representatives from clusters, associations, companies, universities, and technology and research centres that have been actively involved in discussions and in the project. A series of seminars were designed to discuss topics of interest to the chemical community and to bring new technologies into contact with the needs of the industrial sector. As a result of these seminars, specific projects have emerged between research centres and companies. This action will need to focus on the need to specifically include the chemical sector in the next RIS3CAT Action Plan and to visualize its results through platforms. Other promotional actions will also be carried out through the Chemicals Thematic Area of the S3 Platform Industrial Modernisation, as well as promoting and visualizing chemical projects through the circular economy observatory, promoting participation in the Circular Economy Hot Spot, and the catalogue of circular economy technological solutions. The Action Plan of the RIS3CAT 2021-2026 and the initiatives developed through S3 Platform will be measured. There were S3Chem Specialized Seminars on specific topics like synthesis and catalysis processes, surfaces, bioeconomy and circular economy, materials, textile, the chemistry of batteries and substitution of chemical products in the textile industry. About 450 people and companies have participated in these seminars; they have materialized some projects that are still under development. Other activities for the promotion of chemical circular

and bioeconomy were the Circular Economy Hotspot Catalonia 2021 (15-18 November 2021, Barcelona), Circular Economy Observatory, update Sector report on Circular Economy in Catalonia, technological solutions within circular economy, project visualization on the platform RIS3-MCAT <http://ris3mcat.gencat.cat/#/>, and EXPOQUIMIA 2020- International meeting of chemistry, trade fair, and congress (14-17 September 2021, Barcelona).

2.7. Wallonia

Regional Context

Belgium is a federal State consisting of three regions: Brussels, Flanders, and Wallonia. The regions have a substantial degree of autonomy, making the Belgian State one of the most advanced federal states in the world. Wallonia has an area of 16 844.3 km² which represents 55.2% of the Belgian territory. Wallonia has 3,645,243 inhabitants; namely 31.72% of the Belgian population. Chemical and life sciences sectors represent the number two industrial activity in Wallonia, representing nearly 25% of the turnover of the entire Walloon manufacturing industry. The pharmaceutical industry and basic chemistry account for 70% of the sector in Wallonia. It represents:

- more than 28,318 direct jobs and 65,000 indirect jobs
- turnover of EUR 11 billion
- large investments in infrastructure averaging EUR 500 million/year
- EUR 22.8 billion in exports, or 44% of total exports

The sector is a source of development of the region. A significant number of investments and research projects relate to biopharmaceutical or green chemical production. Wallonia meets favourable conditions for the development of this sector at the forefront of innovation, thanks in particular to its geographical location at the crossroads of Europe and the quality of its

human resources. At the Walloon level, the S3Chem project is carried out by the Economic Policy Department within the Competitiveness and Innovation Department. All the Walloon partners concerned by the topic (administrations, federations, poles, research actors, etc.) are involved.

Strategies

As part of this INTERREG project, each region has identified a public policy or tool that is benchmarked. In Wallonia, it is the smart specialization strategy 2014-2020 (S3) and the clustering policy that is linked to it. The Walloon Government has put a clear focus on resource efficiency and circular economy since 2009 through its regional development plan, the Marshall Plan. Building on this experience, the smart specialization strategy (S3) adopted by the Walloon Government aims at further developing the competitive advantages of the chemical industry in Wallonia, particularly of green chemistry, notably through its Greenwin Cluster dedicated to green chemistry and sustainable materials. Furthermore, in its Regional Policy Declaration, the Walloon Government identified the Circular Economy as a priority aiming at supporting the development of its industry.

Action Plan Measures

Action 1: Improvement of the governance of S3 within the current ERDF programme

Since the beginning of the S3Chem project and the successive analyses we have conducted, we have realized that the Walloon beneficiaries active in the chemical sector did not have a clear idea of the S3 concept. Therefore, this first action focuses on the governance of S3 and how we can improve stakeholder's ownership of the S3 concept. Three different steps in this action were put in place, each one strengthening and feeding the others. The first one consisted of improving communication on innova-

tion projects financed by the ERDF in Axis 2 with the organization of a thematic event in 2020. We aim to bring together the stakeholders regarding axis 2 Innovation 2020 to discuss the impact of ERDF funding on the different S3 domains, with a special focus on the chemical sector oriented toward companies. Experts from European networks (European Chemical Regions Network, European platforms related to the Vanguard Initiative, etc.) will be invited to work on the concept of S3 and openness to Europe. Second, within the S3Chem project we studied how the S3 was taken into account in the selected projects, specifically: how the S3 guides ERDF reporting, the work of the Department of Structural Funds, and functional administrations programming, from the selection to project completion. When looking at the S3 appearing at the level of the annual reports, we concluded that S3 was not always well integrated by the beneficiaries. Indeed, it turns out that S3 elements were not only present in the section provided for this purpose but were also diluted throughout the activity reports of the portfolios analysed. Therefore, our objective is to extend this S3 section in annual reports and assist beneficiaries to be more specific on this topic. For this purpose, a collaboration is in place with functional directories of the public service of Wallonia to clarify the questionnaire concerning S3 in project monitoring. Finally, like in Wallonia, most regions have started evaluating their ERDF programming. The evaluation of Axis 2 in Wallonia was planned for mid-term for the projects to be more advanced. Our goal is to introduce the S3 and Chemistry thematic areas in the evaluation of the ERDF Axis Innovation 2020. The objective of this action is to prepare some evaluation questions in collaboration with the evaluator mandated by the Structural Funds Department. The results will be used to improve monitoring of ongoing projects and current programming.

Action 2: The development of a platform of knowledge, able to identify a value chain and put Walloon stakeholders active in the sector of chemistry / bio-economy in relation.

Wallonia aims to develop a knowledge platform able to identify a value chain and put Walloon stakeholders active in the sector of chemistry/bioeconomy.

With this platform, Wallonia's objectives are:

- Valuing the socio-economic data of a territory;
- Connecting innovation domains with a compilation of studies and cartographies (value chains), feeding of intermediary actors or development of directories allowing the precise identification of technological competencies;
- Data Mutualization: Providing up-to-date, reliable, and shareable data, in order to allow the partners to develop projects within and between territories and within and between sectors. This tool aims to be more integrative so as not to be the fact of a particular pole.

For this purpose, Public Service of Wallonia is collaborating with SOWALFIN, the Walloon company for financing and guaranteeing small and medium-sized enterprises, in the creation of CRAFT platform. This platform is used to host and assess the socio-economic data of a region. This makes it possible in particular to showcase the skills of economic actors, as well also to look for skills. The official launch of the platform was planned for September 2020.

3. Conclusion and Outlook

With the beginning of the structural funds programme period 2014-2020 each region was obliged to develop a Regional Innovation Strategy which sets the basis for innovation funding following the smart specialisation strategy approach. Initial discussions have shown that many different solutions and funding instruments have been developed in the regions and there was a high interest to exchange these experiences with the objective to learn from each other. In all partner regions from Poland, the Netherlands, Italy, Spain, Belgium and Germany especially the promotion of innovation in the chemical industry has a high priority, as the chemical industry has a long tradition and is an important industry sector in all these regions. Consequently, S3Chem project aimed to improve the implementation of the Regional Innovation Strategies with focus on chemical related topics in an interregional cooperation and learning process between public authorities from 7 chemical regions. The learning process within the first three years of the project showed how different the regional backgrounds are and at the same time how many similarities exist. In the course of the exchange of experience, the project was able to identify 15 Good Practices in the regions. 10 of them are even in the Interreg Europe database. These Good Practices, insights from site visits and interregional working group meetings and the stakeholder input were finally used to create the regional action plans, the guideline for the second project phase. Now the project is almost at the end of the second project phase. The phase of putting the plan into practice. And it has been quite successful. Out of the 7 policy instruments addressed in the action plans 5 could be influenced already. Here, more than EUR 5.2 million of funds could be influenced. With a project budget of EUR 1.9 million, this implies a leverage effect of 2.7. But, such a successful cooperation must not come to an end. The project partners already di-

scussed possibilities to cooperate after the project end and new project ideas for the upcoming funds period. Therefore, indeed it is our goal to continue the cooperation of these strong European chemical regions.

IMPRESSUM

Editor:

Ministry of Economy,
 Science and Digitalisation
 Saxony-Anhalt
 Hasselbachstraße 4
 39104 Magdeburg / Germany

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Thanks to all project partners



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Government of Catalonia



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Contact

Lead Partner
Ministry of Economy, Science and Digitalisation Saxony-Anhalt
Hasselbachstraße 4
39104 Magdeburg / Germany
phone: +49 391 567 4452
web: www.mw.sachsen-anhalt.de
email: catrin.gutowsky@mw.sachsen-anhalt.de

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