Mapping of EU Member States' / regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy

Task 3

Case Study Report NORTE (Portugal)

Contract: RTD/F1/PP-03681-2015

December 13, 2016

INFYDE , SL

1. Short Regional Bioeconomy Profile

Name of the case region/country	NORTE
Member State	Portugal
GDP – Euro per capita (2014)*	13 900
Total ESIF Research & Innovation per capita per year*	73,15
Total H2020 per capita per year*	8,26
Value Chain Approach to the Bioeconomy**	Biomass supply and Waste; Biomass processing and conversion; Marine-based primary production; Forest-based primary production;
Thematic Focus of the Bioeconomy Approach**	Agro-Food; Marine resources; Crop Production; Fisheries and aquaculture; Food Processing; Waste as biomass
Research and Innovation Fields highlighted for the Bioeconomy**	Biology, Biotechnology, Chemistry, Life Sciences, Nano Technologies; Quality, Health, Security in Processing; Marine sciences; Natural Resources and Ecosystem Management, Environmental sciences
Bioeconomy Activity Level**	Middle
CASE STUDY SUMMARY	
Bioeconomy Approach	Marine resources, Agri-food, biomass
Bioeconomy Ecosystem	CEB. CiiMAR, IBB, CETAB, ESB, Fórum Oceano, Portugal Foods, INIAV, CCDR-N, DRAPN, ENERGYIN, etc
Bioeconomy Policy Support	NORTE 2020. Estratégia Regional de Especialização Inteligente; Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T); Joint Investment Plan of the Euroregion Galicia-North Portugal 2014-2020 (Plan de Inversiones Conjuntas de la Eurorregión Galicia- Norte de Portugal 2014-2020); Tourism Regional Agenda (Plano de Acção para o Desenvolvimento Turístico do Norte de Portugal)
Successful initiatives and Good Practices	SEACHANGE Project, EUROLEGUME, INIAV VAIRÃO Project
Main Needs, Gaps and Bottlenecks	"Transboundary Campus of Excellence", adequate regional structure and consortiums of permanent character, to increase the resourse concentration in key sectors in order to deploy the bioeconomy in both regional terms: strategic and operational.

* Source of the data: S3 – Regional Viewer: http://s3platform.jrc.ec.europa.eu/synergies-tool

** Data collected by this Study project in Task 1.

2. Regional Bioeconomy Ecosystem

2.1 Origin of Interest of the region in the Bioeconomy

According to the Regional Innovation Soreboard 2014, the Northern Portugal Region is a Moderate Innovator. However, the Region has strong potential for the bioeconomy deployment due to several internal factors like valuable natural assets, primary production, agro-food sector potential for new product development and marine resources exploitation. In the Joint Investment Plan for GNP Euroregion 2014-2020 (JIP 14-20) it is pointed out that Northern Region "has 399,200 ha declared as Red Natura 2000, which account for 18% of the region's surface area and 26% of the Natura 2000 Network of Continental Portugal" [1].

One more additional interest for the region consists of its landscapes and places declared as World Heritage, and this is the case of Duoro (2001)[2].

Within the Plano de Acção para o Desenvolvimento Turístico do Norte de Portugal, it is stated that the agrotourism represented around 11% in the Northern Portugal[3]. This in turn demonstrates the potential for the bioeconomy related sectors development and several policy instrument applications for the R&I Bioeconomy development. So far, the efficient resource management, environmental, primary sector and as well as Biotechnology University Research concerns, place on the regional R&D&I agenda challenges of magnitude but also new research lines and specialisation opportunities.

In the *Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T)* it is stated that in terms of economic specialisation, in the Northern Region detach the Agri-food industries and energy; in terms of scientific specialisation as bioeconomy related and with potential are Earth, Life and Environmental Sciences; finally, in terms of technological production specialization, among the highest index of specialisation is included also the biotechnology (1,53).

The Region interest in the Bioeconomy can be also observed from the diagnosis of *RIS3 Norte Portugal (EREI Norte)* that has been carried out. Therefore, from the evaluation of critical mass and the potential interaction between R&D&i capabilities and the Regional Economy one can observe that there is a high intensity of articulation between economic sectors such as Agriculture and Fisheries and Agri-

[1] Plan de Inversiones Conjuntas de la Eurorregión Galicia- Norte de Portugal 2014-2020, pp. 50

[2] http://advid.mercatura.pt/imagens/noticias/ADVID_Cluster_Vinhos_Inovwine_26-03-2012.pdf

[3] Data retrieved from INE (2007), GRÁFICO 6 Tipologia da oferta TER na Região Norte (2006) p. 47

food industry and Scientific area such as Agrarian Sciences and Earth, Life and Environment Sciences as well as Health. Likewise, there is a strong intensity of articulation between Forestry Sector and Agrarian Sciences and Earth, Life and Environment Sciences[4]. Additionally, in the diagnosis of the Norte Portugal RIS3 it has been identified as strength the fact that the Norte Portugal has "abundance of endogenous energy resources in multiple fields" and for the bioeconomy deployment it is the biomass and hydropower.

Finally, the stakeholder's participation in the Horizon 2020 projects justifies the interest of the region in Bioeconomy. In this context the University of Minho and IBMC can be highlighted[5].

2.2 Bioeconomy Stakeholders

The following entities are the main bioeconomy stakeholders in the NORTE region:

Entity	Bioeconomy related activities
Universities, Institutions and Research Centers	
Centre Of Biological Engineering https://www.ceb.uminho.pt/	**Research Lines:** – Industrial and Food B&B*; – Environmental B&B; – Health B&B;
Centre for Biotechnology And Fine Chemistry http://www.cbqf.esb.ucp.pt/en/	**Competences:** biosciences, analytical chemistry and engineering with application in areas such as: – The health and well being of the citizen; – The competitiveness of the agricultural and food systems
CIIMAR http://www.ciimar.up.pt/	**Member of the European Marine Board** **Research Lines:** o Aquaculture and Seafood quality; o Marine biotecnology; Global changes and ecosystems services;
Institute for Biotechnology and Bioengineering IBB http://www.ibb.pt/	**Thematic Areas:** o Industrial Biotechnology o Health Biotechnology o Agricultural Biotechnology

[4] EREI Norte. "Figura 11. Avaliação de massa crítica e de potencial de interação entre as capacidades de I&D+i e a Economia Regional (Elaboração própria com dados do INE (2011) e do MCES (2001-2012))", p. 28.

[5] European Commission (2016), eCORDA DATA. "". http://ec.europa.eu/research/horizon2020/pdf/country-profiles/pt_country_profile_and_featured_projects.pdf#zoom=125&pagemode=none

	○ Environmental Biotechnology and Chemistry
Centre for Research and Technology of Agro-Enviromental and Biological Sciences (CITAB) http://www.citab.utad.pt/	**Research**: - Sustainable agro-food chains - ***AgroBioPlant***; - Ecointegrity; - Biosystem Ingeneering;
Escola Superior de Biotecnologia da Universidade Católica (ESB) http://www.esb.ucp.pt/pt/projetos	**Scientific Services in Biotechnology:** - Food Security and Quality; - Post-harvest and Food Processing; - Food, Nutrition and Health; - Sustainability and competitiveness; - Environmental Quality and Technology; - Specialized services; - University-Business Partnerships
Instituto Nacional de Investigação Agrária e Veterinária, I. P. (INIAV) http://www.iniav.pt/gca/index.php?id=1113	**Area of competences:** Agriculture, Forestry and Rural Development **Research fields:** Agronomy and veterinary
Public entities	
CCDR-N - Comissão de Coordenação e Desenvolvimento Regional do Norte http://www.ccdrn.pt/	
DRAPN - Direção Regional de Agricultura e Pescas do Norte http://www.drapn.min-agricultura.pt/drapn/index1.php	
CLUSTERS and Associations	
Fórum Oceano http://www.forumoceano.pt/p28-associacao-pt	"125 members connected to many sectors of the Sea economy" and among bioeconomy related can be considered: Fisheries and Aquaculture; Marine Bioresources and Biotechnology, Seafood Conservation, Processing and Comercialization.
Cooperativa Agricola de Barcelos http://www.agribar.pt/	Country´s larger milk producer.
PortugalFoods - Pólo de Competitividade e Tecnologia Agroindustrial: Alimentos, Saúde e Sustentabilidade http://www.portugalfoods.org/en/about-us	○ "…is a "space" where these entities establish win-win relations with the end goal of producing and sharing knowledge in support of innovation and competitiveness" ○ "…is recognized throughout the industry, the Portuguese Ministry of Economics and the Ministry of Agriculture and Fishing as the main intermediary and developer of the Portuguese agrofood sector"
AIFF - Associação para a Competitividade das Indústrias da Fileira Florestal www.aiff.org.pt	**Projects:** - ***Projecto nº 4:*** "Observatório dos Recursos Florestais" - ***Projecto nº5:*** "Valorização da Biomassa Residual por Gaseificação, de Biorefinarias ou pela utilização de outras tecnologias innovadoras";
ADVID - Cluster dos Vinhos da Região Demarcada do Douro http://www.advid.pt/	***Strategic lines:*** - Impact of Climate Change on DDR Viticulture; - Zoning of the DDR Viticulture Potential; - Functional Viticulture Biodiversity; - Preservation of the Biodiversity of Vine Varieties; - Evaluation of the oenological suitability of grapes; - Sustainable Viticulture Production;

	– Streamlining the Implementation of Slope Vineyards; – Development of skills – Training and Marketing;
ENERGYIN http://www.energyin.com.pt/	**Among action lines:** o Offshore Energy o "Energies for Sustainable Development" – promoting of alternative energy carriers (biofuels, etc.) **Other areas:** o Biomass **Completed projects**: o BIOATLAS

* Biotechnology and Bioengineering (B&B)

Source: In order to identify the stakeholders, there have been consulted the following documents: NORTE2020, PORTUGALclusters (http://portugalclusters.pt/wp-content/uploads/2014/03/Apresentacao_PORTUGALclusters.pdf) as well as it has been performed an online searching according to key words related to clusters and research institutions in Norte Portugal.

2.3 Bioeconomy – strategies, plans and projects

Before listing and describing in the next chapters and subchapters the bioeconomy policy support, it should be underlined that all strategic documents and policies below mentioned involve instruments that are rather implicitly related to bioeconomy Precisely, it is the case of bioeconomy related areas such as aquaculture, fisheries, marine sciences, agri-food industry and energy. So far, any strategic document strictly dedicated to the bioeconomy in the Northern Portugal neither for the Euroregion (Galicia-Northern Portugal) was found. However, there were identified several bioeconomy related action lines and support instruments to bioeconomy related sectors as well as related projects. In addition, the region has many research infrastructures in order to deploy the R&I in bioeconomy.

It is important to mention a strategic project that concretely tackles the bioeconomy deployment: **'BioTecNorte – Underpinning Biotechnology to foster the north of Portugal bioeconomy'**. (see section 4.).

Strategies that make reference (rather implicitly) to bioeconomy related sectors:

- NORTE 2020. Estratégia Regional de Especialização Inteligente;
- Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T);
- Joint Investment Plan of the Euroregion Galicia-North Portugal 2014-2020 (Plan de Inversiones Conjuntas de la Eurorregión Galicia- Norte de Portugal 2014-2020);
- Tourism Regional Agenda (Plano de Acção para o Desenvolvimento Turístico do Norte de Portugal) making referense to Agrotourism;

Relevant projects (CEB)[6]:

- SEACHANGE PROJECT[7];
- BioTecNorte – Underpinning Biotechnology to foster the north of Portugal bioeconomy[8]
- Novel Anaerobes – Novel Anaerobes for a Biobased Economy[9]
- INIAV VAIRÃO[10];
- MultiBiorefinery – Multi-purpose strategies for broadband agro-forest and fisheries by-products valorisation: a step forward for a truly integrated biorefinery[11];
- RehaBioSys – Rehabilitation of Contaminated Natural Systems – Advanced Bioremediation towards Sustainability[12].
- REDVALUE – Technological Alliance to complete the forest and agroindustrial production cycle[13]

Other completed projects (clusters):

- BIOATLAS[14]

Doctoral programs (Universidad do Minho):

- DP BIOENG (N2020) – Doctoral Program in Bioengineering[15];
- DP Inov4Food (N2020) – Doctoral Program in Food Science and Technology, and Nutrition[16].

Research infrastructures:

- Escola Superior de Biotecnologia da Universidade Católica (ESB)[17];
- Instituto Nacional de Investigação Agrária e Veterinária, I. P. (INIAV)[18];
- CiiMAR[19];
- Centre for Research and Technology of Agro-Enviromental and Biological Sciences (CITAB)[20];

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[6] Data retrieved from The Centre of Biological Engineering (CEB). "Projects"
7 http://www.seachangeproject.eu/cefas-12
[8] https://www.ceb.uminho.pt/bng/Projects/Details/6040
[9] https://www.ceb.uminho.pt/Projects/Details/1444
[10] http://www.iniav.pt/gca/index.php?id=1591
[11] https://www.ceb.uminho.pt/Projects/Details/6052
[12] https://www.ceb.uminho.pt/Projects/Details/6041
[13] https://www.ceb.uminho.pt/Projects/Details/6041
[14] http://app.bioatlas.pt/Bioatlas/
[15] https://www.ceb.uminho.pt/Projects/Details/6054
[16] https://www.ceb.uminho.pt/Projects/Details/6055
[17] http://www.esb.ucp.pt/pt/projetos
[18] http://www.iniav.pt/gca/index.php?id=1113
[19] http://www.ciimar.up.pt/
[20] http://www.citab.utad.pt/

- UPTEC BIO supports start-ups in agri-food industry[21];

3. Bioeconomy Policy Support

3.1 General support framework

- **Northern Portugal 2020 RIS3** establishes the following (bioeconomy related) areas of specialisation[22]:
    - Marine Resources and Economy:
        - *Associated areas:* engineering and Marine Sciences;
        - *Research infrastructure:* CiiMAR, ESBUC, 3B´s, etc.
        - *Business base: Fishing* (612 companies, 2.650 workers and turnover = 19,5% of total national); Aquaculture has a real potential in the region (25 companies, 60 workers and turnover = 9,7% of total national);
        - *Tendencies:* Blue economy; Aquaculture; Maritime, Coastal and Cruise Tourism; Blue Biotechnology; Marine Mineral Resources;
    - Agro-environmental Systems and Food:
        - *Associated areas:* Biology and Biochemistry, Environmental Sciences, Earth Sciences, Chemical Processes Technology, Food Industries, Animal and Agricultural Production, Forestry and Hunting, Veterinary Science, Environmental Protection Technology, Materials (Wood Industries, Cork, Paper, Plastic, Glass and others);
        - *Research infrastr*ucture: UMINHO, CBQF (Universidade Católica, etc;
        - *Business base:* Wine industry turnover (€ 800 million), Viticulture turnover (close to € 120 M), etc.
        - *Tendencies regarding the FOOD*: sensory experiences, waste recovery through industrial biotechnology and biorefinery, Ecological packaging, biofuels, foods and beverages that promote beauty, etc.

- **Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T)** reveals that *in terms of technological specialisation*, energy and agri-food industries are among business areas with greatest economic density in Norther Portugal; *in terms of scientific specialisation,* the human capital is

[21] Polo de Biotecnologia do UPTEC. http://uptec.up.pt/uptec/polo-de-biotecnologia
[22] Information ans below statistical data retrieved from the NORTE 2020. Estratégia Regional de Especialização, pp. 30-106

concentrated in the following scientific areas: Earth, Life and Environmental Sciences*;* finally *in terms of production specialisation* and according to the POSTEP diagnosis results, Biotecnology registers 1,53 technological production specialisation index and the Environment registers 1,3 technological production specialisation index [23].

- **Joint Investment Plan for GNP Euroregion 2014-2020 (JIP 14-20)**[24] raises several clues for the joint actions in the Galicia-Norte de Portugal Euroregion and establish as first *Thematic Objective: the Research, development and Innovation* that aims "to promote the excellence of R&D&I processes and to promote the participation of companies in such processes, through the creation and strengthening of scientific and technological cooperation networks, the internationalization of the R&D&I actors, the technology and knowledge transfer towards the production sector and testing of new products and services".

Worth of notice is also the fact that according to ***the Tourism Regional Agenda 2015*** (Plano de Acção para o Desenvolvimento Turístico do Norte de Portugal) the Active Network Management, Natura and Biodiversity has incidence on the Rural Tourism.

3.2 Bioeconomy Policy Support

To interpret the bioeconomy policy instruments and support, there were basically explored the above mentioned strategic documents that implicitly tackle the bioeconomy:

- From the Joint Investment Plan for GNP Euroregion 2014-2020 (JIP 14-20), to achieve the first *TO: Research, development and Innovation*, for the Euroregión (Galicia-Northern Portugal) the following actions cab be detached:
  - ***Joint initiatives*** for academic, scientific and technological cooperation through the creation of ***Transboundary Campus of excellence*** (following the Campus do Mar); joint living labs, joint transboundary academic courses, etc.;
  - ***Internationalization of the R&D institutions*** of the Euroregion;
  - R&D&I private investment for the creation of new products and services.
- The **Northern Portugal 2020 RIS3** establishes actions lines oriented towards Bioeconomy related fields and among them Marine resources and Economy and Agro-environmental Systems and Food. In this sense a set of

[23] Cross-border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T). pp. 52-56
[24] Plan de Inversiones Conjuntas de la Eurorregión Galicia- Norte de Portugal JIP 2014-2020, p.131

instruments are going to be mobilized to implement the Northern Portugal 2020 RIS3. For instance, for the priority domain, Marine Resources and Economy and the IP 1.1, Specific objective: Increase scientific production of internationally recognized quality, are designated resources.

- As bioeconomy related, from the **Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T)** a set of prioritised actions can be detached:
    - ***STRATEGIC COLABORATION AREA: TAKING ADVANTAGE OF ENERGY FROM BIOMASS AND THE SEA*** – there are defined basically actions related to the valorisation of biomass from agriculture and forestry and economical appraisal of marine resources and assets, technologies for marine energy and energy from biomass[25];
    - ***STRATEGIC COLABORATION AREA: BOOSTING COMPETITIVENESS OF THE AGRI-FOOD AND BIOTECHNOLOGY INDUSTRIES*** – there are defined actions related to aquaculture, forestry, livestock, agri-environmental systems, fisheries, tourism and health sectors improvement through vanguard technologies and biotechnologies[26].

The **2014 - 2020 Rural Development Programme for Portugal Continent** emphasizes the support to farms and boost the agricultural areas through *quality schemes, agri-environment schemes (commitments) or organic farming (Natura 2000)*. These in turn can be considered as a strategic supoprt in order to deploy the bioeconomy and related sectors´ development (agriculture).

The organised and carried out interview gave the possibility to identify also several initiatives such as, for example, annually organised open days for agricultural producers to understand trends in the sector and especially research and innovation. In terms of support to farmers and precisely to ensure a knowledge transfer, there are financial aids to carry out experiments in plots.

During the interview with Quaternaire, it has been found that in Braga, 13 biotechnology companies have already been installed converting the region as reference in nanotechnology. This is an important step to boost the agro-food and biomedical sectors as well as clusters and thus in turn to deploy the bioeconomy in the region.

As knowledge transfer instrument as well as technology transfer and regional biotechnology development catalysator are the creation of spinoffs, among them

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[25] Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T). 7.1 STRATEGIC COLLABORATION AREA: TAKING ADVANTAGE OF ENERGY FROM BIOMASS AND THE SEA. p.73

[26] Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T). 7.2 BOOSTING COMPETITIVENESS OF THE AGRI-FOOD AND BIOTECHNOLOGY INDUSTRIES. p.75

Simbiente – Environmental Engineering and Management, Ltd[27]; SVinália – Soluções de Biotecnologia para a Vitivinicultura, Lda.[28]; Fermentum, Engenharia das Fermentações Lda.[29] Biotempo Lda[30]; AMBISYS, S.A.[31] etc. [32].

3.3 ESIF and H2020 resources for the Bioeconomy

Recently, the Commission gathered the "The top 10 beneficiaries, EC financial contribution granted in H2020" and it could be observed that from Northern Portugal are University Minho with 26 participants and with EC financial contribution that sums up € 7,93 million; UPORTO with 28 participants and with EC financial contribution that sums up € 7,30 million; and IBMC with 8 participants and with EC financial contribution that sums up € 7,42 million, among others[33].

Analysing the data revealed by the Centre for Biological Engineering, UMinho, in Northern Portugal, for various bioeconomy related projects, a mixed funding can be observed.

In the following table, some examples are presented:

Project title	Funding body	Funding Program	TOTAL Budget	Duration	Principal investigator
BioTecNorte – Underpinning Biotechnology to foster the north of Portugal bioeconomy ***NORTE-01-0145-FEDER-000004***	NORTE2020 ; COMPETE 2020 ; FEDER – Fundo Europeu de Desenvolvimento Regional ; CCDR-N – Comissão de Coordenação e Desenvolvimento	Programa Operacional Regional do Norte (Norte 2020) – Sistema de Apoio à Investigação Científica e Tecnológica – "Projetos	€3 498 352,00	2016 to 2019	Eugénio Campos Ferreira

[27] https://www.ceb.uminho.pt/Spinoffs/Simbiente
[28] https://www.ceb.uminho.pt/Spinoffs/Vinalia
[29] https://www.ceb.uminho.pt/Spinoffs/Fermentum
[30] https://www.ceb.uminho.pt/Spinoffs/Biotempo
[31] https://www.ceb.uminho.pt/Spinoffs/AMBISYS
[32] For more spinoffs see Centre of Biological Engineering, "Outcomes", "Spinoffs". https://www.ceb.uminho.pt/Spinoffs

[33] European Commission (2016), eCORDA DATA. "Portugal".
http://ec.europa.eu/research/horizon2020/pdf/country-profiles/pt_country_profile_and_featured_projects.pdf#zoom=125&pagemode=none

	Regional do Norte	Estruturados de I&D&I" (Aviso NORTE-45-2015-02)			
Novel Anaerobes – Novel Anaerobes for a Biobased Economy *323009*	EC – European Commission	ERC Advanced Grant	€ 986 471,00	2013 to 2018	Alfons Stams
MultiBiorefinery – Multi-purpose strategies for broadband agro-forest and fisheries by-products valorisation: a step forward for a truly integrated biorefinery *POCI-01-0145-FEDER-016403*	FCT – Fundação para a Ciência e a Tecnologia ; COMPETE 2020 ; FEDER – Fundo Europeu de Desenvolvimento Regional	Sistema de Apoio à Investigação Científica e Tecnológica (SAICT): Programas de Atividades Conjuntas (PAC)	€ 405 600,00	2017 to 2019	Eugénio Campos Ferreira

Sources: Information retrieved from Centre for Biological Engineering. Research. Projects. Research projects. The level of detail of the information as presented in the table behind is retrived from the CBE web-site. https://www.ceb.uminho.pt/bng/Projects

Also, according to 2014 – 2020 Rural Development Programme for Portugal Continent, 517 million EUR are planned to be allocated to the *Measure 8. Investment in forest area development and improvement of viability of forests*. Likewise, 489 million EUR will cover the *Measure 10. Agri-environment climate.*

*Besides, i*n terms of public support, for instance for *P5: Promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors*, indicative public allocations sum around 916.360.653 EUR[34].

[34] European Commission. "Factsheet on 2014-2020 Rural Development Programme for Portugal Continente". https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/pt/factsheet-continente_en.pdf

4. Successful Initiatives and Good Practices

4.1 SEACHANGE Project

The **SEACHANGE PROJECT** is developed within the The European Union's Horizon 2020 Framework Programme for Research and Innovation (H2020-BG-2014-1) and the EU Funding Programme - BG-13 H2020 Blue Growth: Unlocking the potential of Seas and Oceans. The total project budget from March 2015 until February 2018 is €3.494.876[35].

The project agglutinates a total of 17 partners from 9 European countries and consortium leader is Marine Biological Association from United Kingdom. Among Portuguese partners is CiiMAR (Porto).

Objective: The project "aims to establish a fundamental "Sea Change" in the way European citizens view their relationship with the sea, by empowering them, as Ocean Literate citizens, to take direct and sustainable action towards a healthy ocean and seas, healthy communities and ultimately a healthy planet"[36].

Results: Several deliverables are expected to be performed and among last - Deliverable 9.4 Gender Indicators and Action Plan.

At the current stage of the project, many promotional materials to disseminate and communicate on project, have been developed. Likewise, an important initiative is the new online course on "innovative ways to teach ocean literacy"[37].

4.2 INIAV VAIRÃO Project

The ***INIAV VAIRÃO Project*** is part of the INIAV Strategy within Polo de Vairão, Vila do Conde. Precisely, this project starts from the main concern that is food security. The projects is funded by INIAV funds and € 662,398.78 are from the ERDF OP.

According to the project, data, the laboratory equipment for biosafety "allows the development of multi-residue analytical methodologies and their validation and accreditation, in accordance with the requirements of ISO NP 17025), for the

[35] Information retrieved from SEACHANGE PROJECT website. Project Overview. http://seachangeproject.eu/
[36] SEACHANGE PROJECT website. Project Overview. http://seachangeproject.eu/
[37] See the announcement here. http://seachangeproject.eu/images/SEACHANGE/Media_Centre/SeaChange-Ocean-Literacy-Course-Flyer.pdf

analysis of residues in products of animal and vegetable origin" thus converting the INIAV Laboratory as of national reference for food security and in Official Control Plans[38].

The INIAV ***VAIRÃO Project*** can be considered as extremely important and crucial for the Portuguese agri-food sector allowing a higher level of confidence both inside and outside the country, developing international partnerships and promoting the research activities in the agri-food sector.

4.3 EUROLEGUME Project

The ***EUROLEGUME*** (Enhancing of legumes growing in Europe through sustainable cropping for protein supply for food and feed) Research Project is funded by the 7th Research Framework Programme of the European Union. The project involves 18 parteners from10 EU countries. From Portugal are involved the following entities:

- University of Trás-os-Montes e Alto Douro (UTAD) – Project coordinator;
- Frescura sublime – Unipessoal Lda. (FRESCURA SUBLIME) – North-Western Portugal;
- National Institute for Agricultural and Veterinary Research (INIAV) – South of Portugal – Algarve Region;
- Estirpe D'Honra, Ltd. (ESTIRPE)– North-East of Portugal

The project idea starts from the "role of legume in the human diet and nutrition" and the concerns related to their nutritional values and climate change impact on legume´s crop. Hence, the general ***objective*** of the project is *"sustainable use of Leguminous plants and soil resources in order to ensure European citizens with balanced and safe food, ensuring the high quality protein sources in their daily diet by increasing competitiveness and cultivation of legumes for food and feed"*[39].

To achieve this objective, there have been established a series of actions concentrated in a Research Plan where the creation of new legume genotype (faba bean, pea and cowpea) with high nutritional value (local genetic resources); new food products development and use of microbiological tools (sustainable legume cropping system), are among important actions to be performed[40].

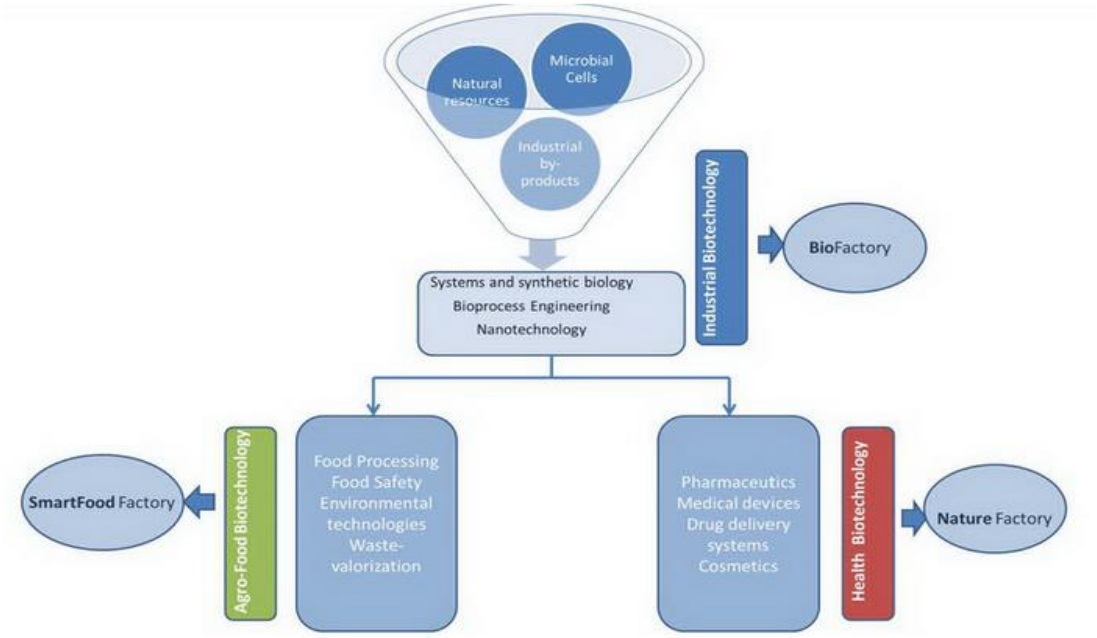
[38] INIAV VAIRÃO. http://www.iniav.pt/gca/index.php?id=1591
[39] EUROLEGUME. http://www.eurolegume.eu/
[40] EUROLEGUME. http://www.eurolegume.eu/

4.4 BioTecNORTE Project[41]

The project **BioTecNorte – Underpinning Biotechnology to foster the north of Portugal bioeconomy'** is funded by the national government and by the regional authorities, as well as by the ERDF within the 'Programa Operacional Regional do Norte (Norte 2020) – Sistema de Apoio à Investigação Científica e Tecnológica – "Projetos Estruturados de I&D&I'. It has an overall cost of 3 498 352 EUR and will be executed from 2016 to 2019. The project leader is the Centre of Biological Engineering (CEB in a PT acronym), a research centre located at the University of Minho (Braga). In 2006, CEB-UMinho was one of the founders of the Associated Lab Institute for Biotechnology and Bioengineering (IBB). Currently, CEB-UMinho has more than 350 researchers, including 130 researchers holding a PhD degree (100 integrated and 30 collaborators), of which 23 are faculty members of the University of Minho and 5 are faculty scientists.

CEB-UMinho has the ambition to be a reference research unit in Biotechnology and Bioengineering in Portugal and one of the best in Europe. The project foresees the following research activities planned under three research lines, namely: L1: The Bio-factory – Biotechnology as a key enabling technology for new processes, products and resource recovery; L2: The Smart food factory – Smart systems for a sustainable and environmental friendly food industry; L3: The Nature factory- innovative biopharmaceutics, medical devices, cosmetics and fine chemistry.

BioTecNORTE Project Structure



[41] Information retrieved from https://www.ceb.uminho.pt/Projects/details/6040

These research lines are closely related with NORTE 2020 Smart Specialization Strategy, and in line with the priority domains: - Advanced production systems; - Agro-environmental systems and food. It also complies with the emergent domains Health and Life Sciences, Mobility industries and Environment and Sea Resources and Economy. The project addresses 5 out of the top 10 scientific areas defined by Norte 2020, namely Chemical Engineering, Food Science and Technology, Biotechnology and Applied Microbiology, Biochemistry and Molecular Biology, and Environmental Sciences.

The Excellence of the scientific research developed at CEB-UMinho, with its close relation with RIS3 strategy for the North of Portugal, is expected to be an important contribution for the Consolidation of the Regional System of Innovation (CRI). The project aims at fostering northern bio-based-economy, by bringing value to resources, wastes and by-products, aligned with the circular economy and industrial symbiosis concepts.

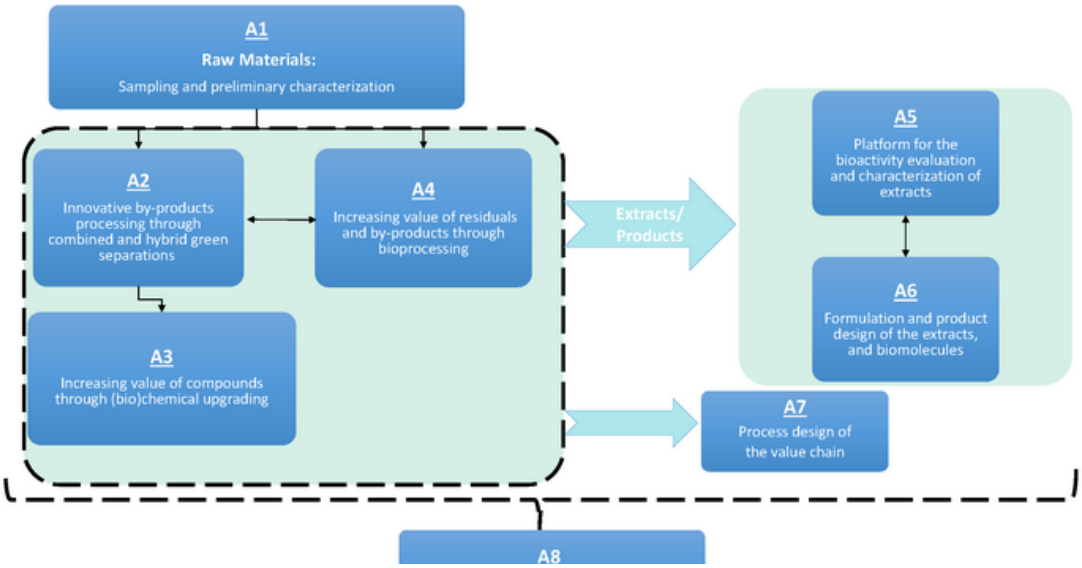
4.5 Multibiorefinery Project[42]

The project **Multibiorefinery** is funded by the national government as well as by the ERDF within the 'Sistema de Apoio à Investigação Científica e Tecnológica (SAICT): Programas de Atividades Conjuntas (PAC)'. It has an overall cost of about 3 million EUR and will be executed from 2017 to 2019. The project leader is the Centre of Biological Engineering (CEB in a PT acronym), a research centre located at the University of Minho (Braga). The project will be developed in a partnership with different institutions: Universidade de Aveiro, Universidade do Minho, NOVA.ID.FCT - Associação para a Inovação e Desenvolvimento da FCT, Instituto de Biologia Experimental e Tecnológica, Universidade Católica Portuguesa, Universidade de Coimbra.

MultiBiorefinery aims at fostering Portuguese bio-based economy by bringing value to forestry, agro-food, and fisheries wastes and by-products. This is a multidisciplinary scientific research and / technological development proposal submitted by a consortium of six research units with complementary expertise to create synergies that capitalize and optimize existing means and resources and to generate critical mass that will accelerate the production of knowledge and solutions to societal challenges, mainly in food sectors ensuring environmentally friendly practices. It is the goal to develop and use multi-purpose strategies and sustainable innovative technologies, namely industrial biotechnology and green chemistry, for by-products valorization towards a truly integrated biorefinery dealing with multiple feedstocks. A series of case study of by-products from forest (Eucalyptus globulus stumps and knots, and Pinus pinaster bark and needles),

[42] Information retrieved from: https://www.ceb.uminho.pt/Projects/Details/6052

agriculture (melon, winery and tomato by-products), and fisheries (fish bones, salt-cured codfish wastewater, cooking waters and head-space of cooking tanks from canning industry) will be transformed into added-value products using advanced cascading conversion technologies. The main end products will include biopolymers such as bacterial cellulose, and polyhydroxyalkanoates and a platform of biocompounds with biological activity, and even commodity chemicals and biofuels.



More specifically, MultiBiorefinery will concentrate on extracting and characterizing high value products, obtained by clean extraction techniques; developing novel chemical transformation and bioconversion processes; formulating adequate forms for the storage, use and delivery of functional and bioactive extracts; evaluating toxicity and bioactivity of extracted and formulated compounds, using chemical, enzymatic and cell-based pre-clinical assays; demonstrating 2 of the new processes at pilot scale; and developing activities of process and value chain design with a focus on mathematical modelling, allowing for in silico optimization and process design scale up and extension of the concept to other by-products/value chains.

MultiBiorefinery aims to contribute to stimulating some of the strategic axes of development embodied in the Portuguese Strategy for Smart Specialisation, notably the "Production Technologies and Process Industries" with particular emphasis on the "Green Chemistry" and "Industrial Biotechnology" subtopics. Also, its vision is aligned with the circular economy and industrial symbiosis concepts and the proposals of the resource-efficient Europe Flagship initiative under the Europe 2020 Strategy, supporting the shift towards a resource-efficient and low-carbon economy to achieve sustainable growth. One valuable aspect of this project is the commitment to training highly qualified human resources skilled to the challenges of the modern bioeconomy, and by the enrolment of PhD and Master students at all research units.

5. Needs, Gaps and Bottlenecks to Deploy the Bioeconomy

Speaking in territorial and precisely cross-border terms, for Euregion, Galicia – Northern Portugal, would be suitable to develop joint bioeconomy (R&I) related initiatives, common academic courses in bioeconomy related fields as well as bioeconomy consortiums configuration.

In this context, the ***JIP 14-20*** raises several clues for the joint actions in the Galicia-Norte de Portugal Euroregion. Hence and implicitly, one can assume that for the R&I in bioeconomy it is important to create synergies and strengthen common business and research networks as well as support frameworks in the Euroregion. Likewise, it should be put more emphasis on boosting the agricultural and livestock production and augment the critical mass for bioeconomy R&I. To these, it can be reiterated the need to create common living labs and "***Transboundary Campus of Excellence***"[43] that will promote innovation in Bioeconomy.

According to the **Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T)** a common ambition arises – "progress in R&D and its transfer to the production sector" that translates into 4 common challenges: (1) Win-win through cooperation, (2) Sharing resources, (3) Investing in intelligence, work, effort, and inclusion and (4) Trusting in ourselves[44].

Additionally, from the interview with specialists from INIAV and QUATERNAIRE it has been found that the biotechnology development at the regional level requires an "adequate regional structure"[45].

It has been also underlined the importance of consortiums of permanent character like AGRO-TECH that precisely guarantees the durability in terms of research and innovation in the Bioeconomy in the Region[46].

Finally, it can be also concluded that the problem of "dispersed cooperation" put in light the need for greater concentration in key sectors in order to deploy the bioeconomy in both regional strategic and operational terms.

[43] JIP 14-20, p.133
[44] Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T), p.61
[45] Interview with Quaternaire
[46] Interview with INIAV

6. Information Sources

Documents:

2014 – 2020 Rural Development Programme for Portugal Continent
Cross-Border Smart Specialisation Strategy of Galicia- Nothern Portugal (RIS3T)
Joint Investment Plan for GNP Euroregion 2014-2020 (JIP 14-20)
NORTE 2020. Estratégia Regional de Especialização
Plano de Acção para o Desenvolvimento Turístico do Norte de Portugal

Other Literature:

European Commission (2016), eCORDA DATA. "Portugal". http://ec.europa.eu/research/horizon2020/pdf/country-profiles/pt_country_profile_and_featured_projects.pdf#zoom=125&pagemode=none

European Commission. "Factsheet on 2014-2020 Rural Development Programme for Portugal Continente". https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/country-files/pt/factsheet-continente_en.pdf

Relevant websites:

ADVID – Cluster dos Vinhos da Região Demarcada do Douro. http://www.advid.pt/
AIFF – Associação para a Competitividade das Indústrias da Fileira Florestal. www.aiff.org.pt
Bioengineering IBB. http://www.ibb.pt/
CCDR-N – Comissão de Coordenação e Desenvolvimento Regional do Norte. http://www.ccdrn.pt/
Centre Of Biological Engineering. https://www.ceb.uminho.pt/
Centre for Research and Technology of Agro-Enviromental and Biological Sciences (CITAB). http://www.citab.utad.pt/
Centre for Biotechnology And Fine Chemistry. http://www.cbqf.esb.ucp.pt/en/
CIIMAR. http://www.ciimar.up.pt/
Cooperativa Agricola de Barcelos http://www.agribar.pt/

DRAPN - Direção Regional de Agricultura e Pescas do Norte.
http://www.drapn.min-agricultura.pt/drapn/index1.php
ENERGYIN. http://www.energyin.com.pt/ Institute for Biotechnology and
Escola Superior de Biotecnologia da Universidade Católica (ESB).
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Instituto Nacional de Investigação Agrária e Veterinária, I. P. (INIAV).
http://www.iniav.pt/gca/index.php?id=1113
INIAV VAIRÃO. http://www.iniav.pt/gca/index.php?id=1591
PortugalFoods - Pólo de Competitividade e Tecnologia Agroindustrial: Alimentos,
Saúde e Sustentabilidade. http://www.portugalfoods.org/en/about-us
SEACHANGE PROJECT website. Project Overview. http://seachangeproject.eu/

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