



Promoting stakeholder engagement and public awareness  
for a participative governance of the European bioeconomy



## Strategies for strengthened regional bioeconomies in Stara Zagora and Veneto

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## EXECUTIVE SUMMARY

Building on the outcomes of BioSTEP's 'living labs' activities, this report sets out roadmaps for the further development of the bioeconomy in two European regions: Stara Zagora in central-southern Bulgaria and Veneto in north-eastern Italy. For each region, the roadmaps outlined in this report examine the climatic and natural conditions, the sectors relevant for the bioeconomy, as well as the existing national and regional institutional and policy context. The roadmaps were developed in the context of two regional stakeholder processes and outline explicit actions that could support the further development of the regional bioeconomies.

In Stara Zagora, activities promoting the bioeconomy address the following issues:

- converting raw materials and waste products from the agricultural and industrial sectors into consumer goods;
- producing energy from renewable resources and reducing reliance on exhaustible sources;
- diversifying the range of food products grown in the region and improving their nutritional value and health effects;
- reducing pollution from waste products by increasing their recovery potential and recycling;
- conserving natural resources and reducing the adverse impacts of climate change.

In Veneto, activities promoting the bioeconomy address the following issues:

- conducting environmental impact assessments, as current practices do not internalise negative externalities or take a holistic approach;
- establishing a "bio Veneto" quality mark that would brand locally produced bioeconomy products;
- creating a hemp product chain network.

The roadmaps build on and contribute to the Smart Specialisation Strategies (S3) of Stara Zagora and the Veneto region, respectively. Both already include a focus on bio-based activities. Further-more, the measures outlined reflect on the lessons learned from BioSTEP and take into account concepts and tools for participative governance of the bioeconomy. They suggest various forms of participation that facilitate participatory design and implementation of the identified actions.

The two roadmaps conclude by suggesting further steps towards implementing the actions. Stara Zagora's roadmap document is open to being upgraded and enhanced. After the adoption of the actions outlined in the document, stakeholders are planning to develop a programme for priority implementation of the proposed biotechnological solutions. The actions set out for the Veneto region are not part of a comprehensive strategy document, but take the form of an action plan, which will be promoted by the participants of the Veneto living lab.

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## Abbreviations

<b>CLAN</b>	National Technological Clusters of Agri-Food in Italy
<b>EU</b>	European Union
<b>EXPO</b>	Exposition Universelle Internationale, Exposition Mondiale
<b>GMO</b>	Genetically modified organisms
<b>ICT</b>	Information and communication technology
<b>LCA</b>	Life Cycle Assessment
<b>LL</b>	Living Lab
<b>NGO</b>	Non-governmental organisation
<b>S3</b>	Smart Specialisation Strategies
<b>SPRING</b>	National Technological Cluster of Green Chemistry
<b>THC</b>	Tetrahydrocannabinol
<b>UNI EN</b>	Italian norm system
<b>WWTP</b>	Wastewater treatment plant

# 1 Introduction

Many countries and regions in Europe and internationally are developing bioeconomy strategies, aimed at supporting the transition to a more sustainable, bio-based economy and at ensuring national/regional engagement with future-oriented economic activities (European Commission, 2017a). Such strategies often build on cooperation among national/regional stakeholders and sometimes on engagement with citizen or consumer interests (Davies et al., 2016).

This report sets out bioeconomy strategies for two European regions: Stara Zagora in central-southern Bulgaria and the Veneto in north-eastern Italy. These strategies draw on BioSTEP's collaboration with regional stakeholders in the two regions, notably via 'living labs' which brought together regional stakeholders to discuss the future development of the regional bioeconomies.<sup>1</sup> For each region, the report examines the current conditions and future potential for bioeconomy development, including business sectors and capacities, as well as the existing national and regional institutional and policy context. It also proposes a series of concrete policy measures, which could support the further development of the bioeconomy in each region through greater and more targeted engagement of stakeholders and publics.

Furthermore, the measures outlined reflect on the lessons learned from BioSTEP and take into account concepts and tools for participative governance of the bioeconomy. They suggest various forms of participation that facilitate participatory design and implementation of the identified actions.

## ***Regional bioeconomy development within the EU***

The bioeconomy plays a significant role in the EU28's economy, accounting for around 8.5% of the EU workforce (European Commission, 2017b), and its importance is likely to grow in future as businesses, organisations and households take steps to operate and live more sustainably. Bio-based activities vary significantly across European regions and cut across traditional sectoral boundaries, involving primary producers (agriculture, forestry and fishing/aquaculture); energy manufacture, production and supply; and industrial sectors (notably chemicals, food and beverages, wood and paper, and textiles).

European regions also differ in terms of the structure and maturity of their bio-based activities. Over one third of European regions are estimated to have low bioeconomy maturity, meaning that they cannot fully exploit existing potential on their own and are hence slow to generate new bio-based economic, social and environmental benefits (Spatial Foresight et al., 2017). While some regional bioeconomies are driven by the availability of domestic natural resources, others have more complex primary/industrial value chains, or focus on industrial biotechnology, advanced R&D and knowledge activities.

In all regions, however, bioeconomy development clearly depends on building new relationships across sectoral, institutional and organisational boundaries as well as establishing trust relationships with consumers and citizens. There is not only a need for new cross-sectoral value chains among businesses, but also for new patterns of 'quadruple helix' cooperation involving businesses, research and education institutions, regulatory and policy bodies, hybrid entities (such as innovation centres), civil society and non-governmental organisations representing various citizen and consumer interests. BioSTEP's living labs supported the building of new relationships by bringing together a range of regional actors to discuss existing strengths, future opportunities and directions in a strategy-building process.

## ***Case study selection***

This report focuses on strategy-making activities in two European regions: first, Stara Zagora in central-southern Bulgaria and, second, the Veneto in north-eastern Italy. The following criteria were used to select the case study regions, drawing on project partners' analyses and experiences in BioSTEP's earlier work packages (Overbeek et al., 2016; Charles et al, 2016):

- The regions must have an existing bioeconomy strategy;

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<sup>1</sup> The detailed proceedings of BioSTEP's living lab activities in Stara Zagora and the Veneto can be accessed at: <http://www.bio-step.eu/results/living-labs/>

- The strategy's existing participants must be interested in working with BioSTEP to develop their strategy further, and also in widening and experimenting with new forms of participation to include new stakeholders and citizens or citizen-groups;
- The case studies must be drawn from different countries and macro-regions within the EU;
- The regional case studies should differ in terms of bioeconomy sub-sectors/themes and the maturity of bioeconomy development.

### ***Smart Specialisation Strategies***

The measures outlined in the report aim to build on and contribute to the two regions' existing Smart Specialisation Strategies (S3), both of which already include a focus on bio-based activities. In Stara Zagora, one of the themes of the existing S3 strategy is related to the bioeconomy, namely 'Industry for Healthy Life and Biotechnology', while, in the Veneto, two of the existing S3 themes are closely linked to the bioeconomy, namely 'Smart Agri-Food' and 'Sustainable Living'.

The S3 approach aims to support and target investment in innovation-oriented economic development, and is linked to the delivery of EU Cohesion policy programmes in 2014-20 (European Commission, 2017c). These strategies not only involve an analysis of the regional situation, but also – like the BioSTEP project – emphasise the co-creation of knowledge through a participative process among a wide range of stakeholders within the region. The strategy-building process brings people together with the aim of mobilising under-exploited regional knowledge and capacities, identifying the region's unique strengths and capacities, mapping important value dimensions in order to develop a shared vision and shared priorities (McCann and Ortega-Argilés, 2015). This open approach to stakeholder and citizen engagement is often challenging, especially in regions where these types of activities are relatively new and perspectives on novel technologies are diverse, as some of BioSTEP's activities have also shown (see Charles et al., 2016). Organisational support, knowledge and funding for broad-based engagement and strategy-building (e.g. provided by EU Cohesion policy<sup>2</sup> and, in a more limited way, by the BioSTEP project) can therefore be critically important in enabling such processes to continue and to be productive.

### ***Report outline***

This report provides an analysis of the regional bioeconomies of Stara Zagora and the Veneto, and outlines new strategic measures for both regions. Part A focuses on Stara Zagora, while Part B covers the Veneto.

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<sup>2</sup> Smart Specialisation Platform; URL: <http://s3platform.jrc.ec.europa.eu/>



## 2 Part A: Stara Zagora, Bulgaria

### 2.1 Introduction

The main objective of Stara Zagora's bioeconomy development strategy, elaborated in connection with its "Innovation Strategy for Smart Specialization," is to raise the living standard of the local population while protecting environment and resources. It is intended that this can be accomplished by integrating available natural and labour resources, using innovative technologies related to the production of tangible goods, and achieving sustainable development in terms of production and consumption.

The strategy lays out the main innovation pathways for bioeconomy development that can be taken in the region. Given the local consumer expectations, degree of producer participation, and business involvement, activities promoting the bioeconomy address the following issues:

- conversion of raw materials and waste products from the agricultural and industrial sectors into goods for consumption;
- producing energy from renewable resources and reducing reliance on fossil resources;
- diversifying the range of food products grown in the region and improving their nutritional value and health effects;
- reducing pollution from waste products by increasing their recovery potential and recycling;
- conserving natural resources and reducing the adverse impacts of climate change.

The bioeconomy development strategy shares some of the thematic directions of the region's Innovative Strategy for Smart Specialization for the 2014-2020 period, including: "Industry for Healthy Life and Biotechnology;" "Mechatronics and clean technologies;" and "New Technologies in creative and re-creative industries."

### 2.2 Approach

As in the Veneto region of Italy, a living lab approach was applied to elaborate a strategy document on the future development of the bioeconomy in the Stara Zagora region of Bulgaria. Two consecutive phases were implemented with stakeholders, with several meetings taking place in each phase of the living lab.

With assistance from local business support associations, a number of relevant local stakeholders were identified in the first place, namely local research institutes and academic institutions, regional state or non-governmental agencies, companies and individual bio-product producers, consultants, etc., with the aim of creating a network of people who would be willing to participate in or assist the process.

Naturally, due to personal or cultural perceptions, insufficient experience or other work-related reasons, some participants were reluctant to share their views and experience in this discussion and the overall participatory process. In this context, it needs to be acknowledged that the bioeconomy notion, sector and areas of activities are still relatively unknown among the local community.

But at the same time, experts - mostly from the local Thracian University, the regional business support organisations and the Joint Genomic Centre - positively contributed and helped analyzing the situation, e.g. by collecting useful data and information about the region's bioeconomy potential, by identifying business opportunities that could be developed, and by identifying relevant measures that could help strengthening the regional bioeconomy. Aspects such as health, environment, research, regional economy and other aspects related to the bioeconomy were discussed. Regrettably, it is to be noted that not much support was offered by the region's administration, though this has not created impediments for the overall process.

The living lab and its participatory process was useful also for the local people to better understand the need for the establishment of networks and closer cooperation and joint work between local authorities, research and education institutions, business support organisations, companies and producers, and other actors.

## **2.3 Status Quo and assessment of the national and regional institutional and legislative context**

### **2.3.1 The climatic and natural conditions in Stara Zagora and sectors relevant for the bioeconomy**

The Stara Zagora region is located mainly in Bulgaria's Thracian Plain and consists of 11 municipalities with 206 settlements (10 towns and 196 villages) with a total area of 5151 km<sup>2</sup> (4.6% of Bulgaria's territory) and a population of 352,468 people.

The region has a lot of valuable natural resources favourable to the development of agriculture, energy and industry.

The region is mostly flat and the soils in the area are fertile - cultivated area occupies more than 56% of Stara Zagora's farmland, whereas the average for Bulgaria is only 43%. Wooded hills (32.4% of the total area) and the accessible mountain relief are conducive to both forestry and tourism.

The climate is moderate continental, with a relatively mild winter and long spring as well as autumn seasons. The average annual air temperature is around 12-13° C. Annual rainfall averages about 450-550 mm. The soil and climatic conditions are very favourable for growing all types of temperate climatic zone crops including grains, oilseeds, vegetables and fruits. Of these, the grain crops (wheat and barley) are most important to the region as they feed the local population and provide fodder for livestock. Stable yields of soft and durum wheat would be a good basis for development of the food industry in the region.

Stara Zagora is famous for the cultivation of plants used in natural healing, including essential oils, particularly rose oil. This is due to the unique soil and climatic conditions in the Kazanlak valley, which are perfect for roses and allow for the production of the highest quality rose oil - an international quality standard. Bulgaria in general is known for quality medicinal crops – it is the leading country in Europe in the export of dried herbs.

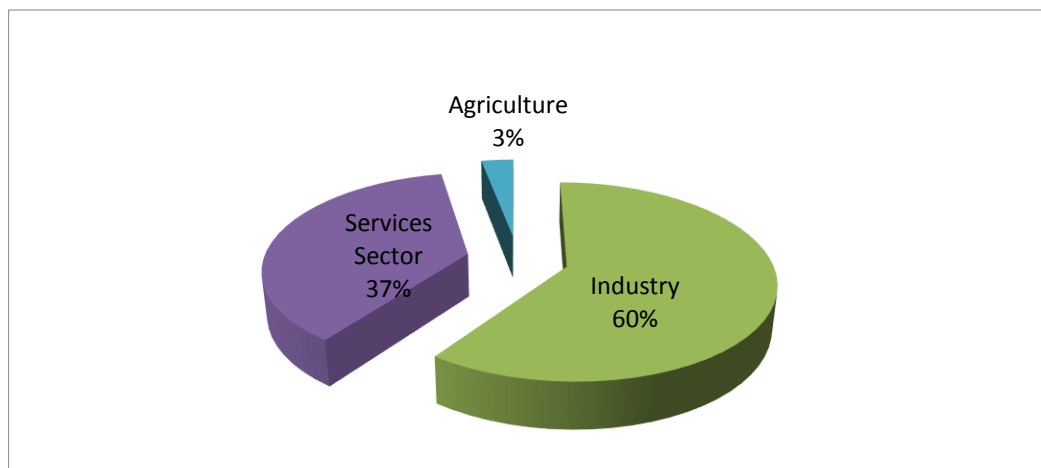
The specific conditions also favour the cultivation of cotton and durum wheat in the region of Chirpan. Cotton is key to the development of the textile industry, and the durum wheat offers an opportunity to produce and export pasta products. Further, conditions are excellent for the cultivation of fruit trees and vineyards - the region is famous for the production and export of branded high quality wines.

Another important asset for the region is the abundant availability of water resources - dams, canals, and other hydrotechnical facilities create favourable conditions for growing vegetables and rice. The region's mineral springs hold potential for balneotourism development.

In terms of transport and accessibility, the region is strategically located and benefits from a well-developed road infrastructure. Domestic and international motorways and railways pass through the region. The routes of three European transport corridors, which are the most used connections between the northern border of Bulgaria along the Danube and the southern border to Greece and Turkey, cross in the area. The Trakia and Maritsa motorways, which provide transportation of products, goods and communications in all directions, are important for production, business and the provision of consumer goods.

In the breakdown of the region's gross domestic product, industrial production is most important most with 60 per cent. The service sector accounts for another 37 per cent, with agriculture accounting for only 3 per cent of the region's economy (see Figure 1).

**Figure 1: Economy structure by sectors, in per cent (%).**

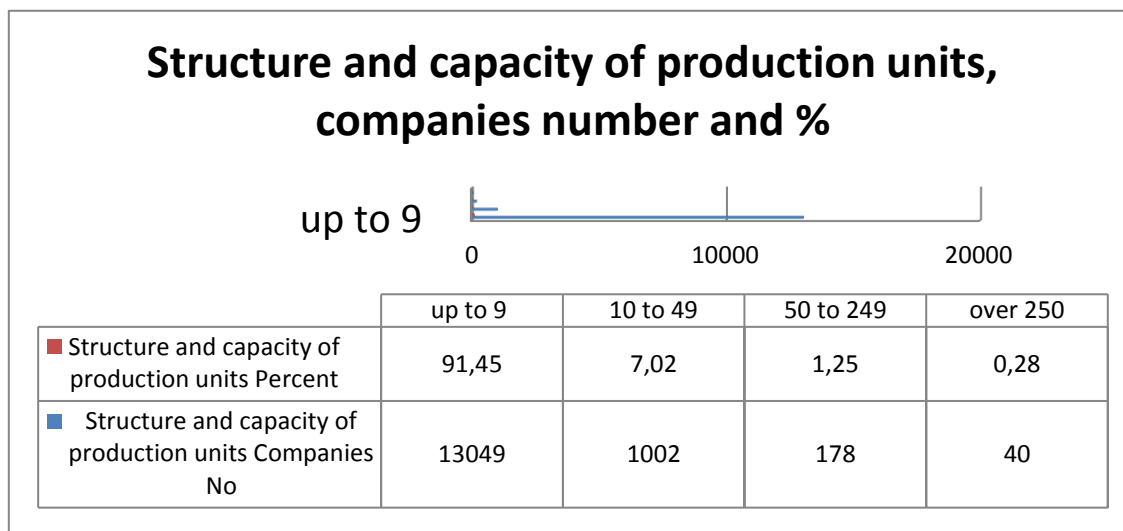


Source: own

In terms of gross added value, Stara Zagora benefits most from commercial enterprises, which account for over 30 per cent of revenues. Manufacturing enterprises account for roughly one-fifth, power generation and distribution for 13.5 per cent, and the mining industry for 6 per cent of the revenues. Dynamic developments in agriculture in recent years have caused that sector’s share of gross added value to increase steadily to 4 per cent.

An overview of the region’s production units and their capacity compared to their respective number of employees (Figure 2) shows that small businesses with up to 9 employees constitute the most common employer type in Stara Zagora with over 90 per cent. Next, there are over 1000 firms with 10 to 49 employees followed by about 200 companies that employ 50-249 workers. Forty enterprises have more than 250 employees. The region has sufficient and well qualified labour resources, which is of substantial importance for the development of new technologies.

**Figure 2: Structure and capacity of production units, companies – in number and per cent (%)**



Source: own

Foreign direct investment in the region is about EUR 600 million and is mainly concentrated (around 60 per cent) in mining energy complexes. The largest of these is the 600 MW coal fired power plant owned by US energy company AES in Galabovo (TPP AES Galabovo, built in 2011) that uses exclusively local lignites originating from the Maritza East Basin in South Bulgaria. By the end of 2015, cumulative foreign direct investment in enterprises in the non-financial sector in the Stara Zagora Region amounted to more than EUR 1 billion. In 2015, companies from the Stara Zagora region spent BGN 862.4 million on tangible fixed assets (Chamber of Commerce and Industry Stara Zagora, 2017).

This is a good prerequisite for bioeconomy development in the region, as the production of innovative bioproducts - and the introduction of innovative technologies as well as bioenergy, resource conservation and climate change adaptation - will require extensive investment from domestic and foreign stakeholders.

The intellectual capital of the region - essential for the introduction of innovative technologies, modernisation and diversification of production, and full use of natural resources - is uniquely available in the territory of Stara Zagora: Trakia University is an important scientific centre in the region. It focuses on six academic areas: medicine, veterinary medicine, agrarian sciences (animal husbandry, plant growing, fish farming and aquaculture), technical sciences, economics, and ecology/environmental science. Located near three cities - Stara Zagora, Yambol and Haskovo - the university attracts talent, but also publishes research in all fields. Other institutions contributing intellectual capital include the Institute of Rose and Essential Oil Cultures in Kazanlak, which researches rose and essential oil crop cultivation and technology, and the Field Crops Institute in Chirpan, which focuses on improving technologies for cultivation of arable crops. The local Agricultural Institute, part of Bulgaria's Agricultural Academy based in Sofia, conducts livestock breeding research aimed at improvement of livestock selection and technologies.

The combination - favourable soil and climatic conditions for the cultivation of a wide range of agricultural crops, sufficient resources, high energy security, well-developed industrial capacity, existing production and processing facilities, and the availability of highly qualified scientific experts from relevant academic and research institutions - forms a stable basis for bioeconomy development in the region. Stara Zagora is well situated to host the introduction of modern innovative technologies in the production and processing of bioproducts, development of new products, and deployment of zero waste technologies. It is also well-placed to increase the share of energy produced from renewable sources, reduce the dependence on non-renewable resources, and engage in climate change mitigation and adaptation. In 2016, Stara Zagora ranked second in GDP per capita (BGN 14 366) among Bulgarian states, after the Sofia - Capital region (Economic Yearbook of the Stara Zagora region, 2017).

Stara Zagora's bioeconomy development strategy is in line with that of the EU. It focuses on three main directions:

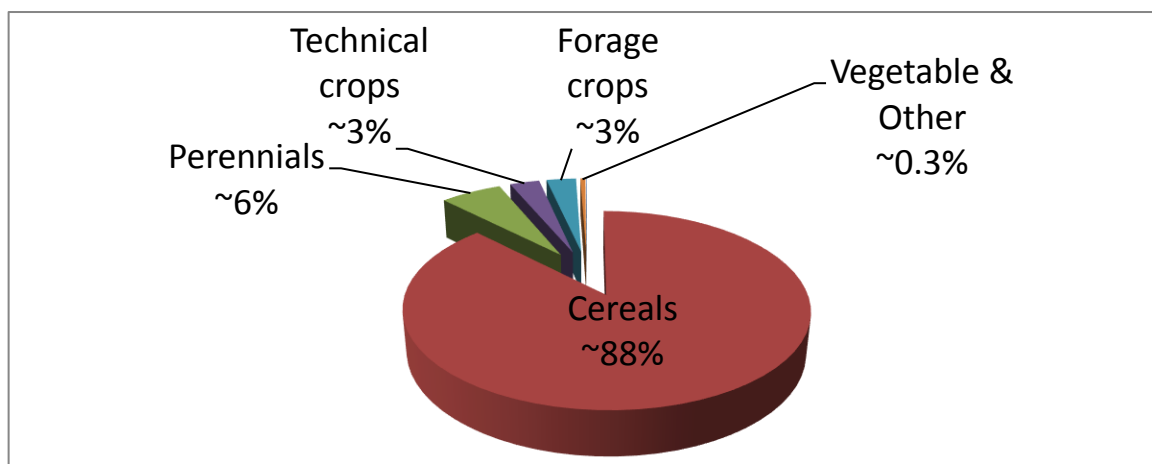
- investments in research, innovation and skills;
- enhanced policy interaction and engagement of stakeholders;
- strengthening of markets and enhancing competitiveness.

Following these directions, the bioeconomy will be based on the existing specific natural resources in the region and on the opportunities for introducing innovative technological solutions for the production of marketable products worldwide.

### **2.3.2 Regional potential for bioeconomy products**

Stara Zagora will develop its bioeconomy through a sustained intensification of primary production, transformation of its waste stream into value-added products, and improved use of existing resources.

The agricultural sector, which provides a livelihood for over 16 per cent of the region's population, plays an important role in the production of organic products in the region. Stara Zagora is one of the biggest and well-established plant-growing areas in Bulgaria, with grains – primarily wheat, barley, and corn (for food and animal feed) occupying 88 per cent of the arable land. Orchard fruits (especially cherries, apples, plums, and grapes) make up 6 per cent, oilseeds (sunflower and canola, also called “technical crops”) another 3 per cent, and other feed/forage crops a further 3 per cent (see Figure 3).

**Figure 3: Land use of arable lands, in per cent (%).**

Source: own

In the area of animal husbandry, the livestock raised in Stara Zagora are primarily cattle, followed by sheep, and pigs. Apiculture (beekeeping) also plays a significant role.

The primary product categories of the bioeconomy are biofuels, bioplastics, industrial parts, green chemicals, lubricants, home care, fiber, food and feed additives (BioSTEP D2.1 Database Bioeconomy Products and Processes). The Stara Zagora region features enough raw materials and opportunities for the production of bioproducts in these product categories, with applications particularly in food supply and industry.

### 2.3.3 Overview of existing policy strategies and instruments related to the bioeconomy at the national level

Production of bioproducts in Bulgaria must comply with all European Union Regulations on manufacturing, packaging, storage, and transport.

On the basis of the requirements and criteria for organic production laid down in EU Regulation 2092/91, two ordinances were adopted in Bulgaria: Ordinance No 22 of 4 July 2001 for the organic production of plants, plant products and foodstuffs of plant origin and labelling thereof, and Ordinance No 35 of 30 August 2001 on the organic breeding of animals and organic production of animal products and foodstuffs of animal origin and the labelling thereof.

These two ordinances

- fully reproduce the principles enshrined in European normative documents and aim to harmonise the national legislation with the EU one;
- set criteria for organically grown plants and animals;
- set criteria for foodstuffs from plants and animals grown organically;
- regulate the rules for importing organic products;
- control organic production via choice of certifying bodies, the requirements those bodies are subject to, their mode of registration and obligations, as well as allowed practices in production and importation of organic products;
- certify organic producers and importers;
- regulate labelling of organic products.

### 2.3.4 Overview of existing policy strategies and instruments related to the bioeconomy at regional level

Since Bulgaria's accession to the EU, all policies regarding organic production laid down in European normative acts are directly applicable in Bulgaria. Firms producing organic products must comply with the relevant sanitary and hygiene requirements as well as those on occupational safety and environmental impact. Manufacturers must implement a fully closed cycle as well as zero waste

technologies. Companies manufacturing new products have to be certified according to European organic standards. Only businesses or small companies that have been inspected, have met the requirements, and have been licensed to produce and distribute may sell products labelled as organic or “bio.” New bio-products in the food industry field have to be approved by the Bulgarian Food Safety Agency. Overview of existing policy strategies and instruments related to the bioeconomy at regional level

The Regional Administration of Stara Zagora, together with municipal and local governments, is developing a targeted policy to achieve some very important goals set out in the Stara Zagora Development Strategy 2014-2020:

- strengthening research activities, technological development and innovation;
- improving access to information and communication technologies;
- enhancing the competitiveness of small and medium enterprises, including those in the agricultural sector;
- supporting the transition to a low-carbon economy in all sectors;
- promoting adaptation to climate change, prevention and risk management;
- protecting the environment and promoting resource efficiency;
- promoting employment and supporting labour force mobility.

All of these goals are related to the mission and goals of the bioeconomy, with the development and introduction of innovative biotechnology solutions, diversification, and manufacturing of organic products.

## **2.4 Measures for supporting the development of the regional bioeconomy**

The overarching aim of the S3 approaches is to mobilise targeted investment and cooperation to ensure innovation in specialised sectors. When these are examined at a regional level, this requires focused economic development that is enabling and inclusive rather than disruptive and exclusive, linking to overall national and European strategies. In order to achieve the core elements of the S3, approaches recognise the need to centre developments around co-creation innovation pathways and the supporting knowledge pathways which are productive due to embedded participative process which extends to a wide range of stakeholders within the region and the relevant publics. Therefore mapping sectorial knowledge, capacities and expectations is an important element, alongside the identification of value dimensions that are important to stakeholders and publics. It is therefore important to note within the regional sectorial specialisation that a number of these objectives not only prioritise elements that relate to mobilising resources and funding pathways, but also how enabling aspects of co-creation innovation pathways that make the most of broad-based engagement and co-creation strategy-building activities.

Looking at the objectives related to bioeconomy development, these can differ by sector. In agriculture (plant-growing, forestry, livestock, aquaculture), the focus is on improvement of technologies for plant and animal growing, utilisation of the waste products, and bioenergy production. This is informed by stakeholder activities and public perceptions that often relate to wider sustainability principles and resource efficiency. In the industrial sector, the focus is on two areas: (a) the food and pharmaceutical industry, which aims to market organic products, food, beverages, and food supplements with a nutritional and healthy effect. This sector is informed by food and health professional stakeholders and wider public expectation and concerns related to safety, efficacy, choice and constructions of naturalness and wellbeing. The final area (b) is the mining and energy industry, which aims to use innovative technologies for the utilisation of waste and reduction of harmful environmental impacts. This final sector is informed by stakeholder activities and public perceptions that often relate to equity use of resources, climate change concerns and again the importance of wider sustainability principles and resource efficiency.

With all of the above elements, it is important to reiterate that within the Bulgarian regions the predominant driver for the implementation of S3 approaches is the development of competitive markets for bioeconomy products. Clearly, more opening up of the process and co-creation through

participation activities are needed, but the current work indicates there is a willingness to apply participative principles and adopt new approaches. The pilot work on the use of the living lab concept is therefore an important step in raising awareness on new approaches to facilitate the core participatory principles of co-creation within S3 approaches.

#### **2.4.1 Priority objective 1: Increase the production of plant raw materials by increasing production capacity, introducing combined agro-forestry systems, and increasing the efficiency of the agricultural sector**

Production capacity increases can be achieved by strengthening plants' adaptability and disease/pest resistance. Using less synthetic nitrogen fertilisers, increasing the nitrogen stock in the soil (raising the overall soil fertility) and an efficiency increase can also lead to a production increase. Additionally, these measures can contribute to decrease the rate at which soil and water are polluted with residual nitrogen compounds.

Specialised agricultural production has led to a sharp decline in the number of the crops grown, and to abandonment of crop rotation systems in favour of monocultures that use synthetic fertilisers, pesticides and herbicides. Activities that reverse this trend - such as expansion of mixed agro-production systems that combine the growing of grass, tree plant species and animals - would ensure a more efficient use of land and also diversify production, provide year-round (as opposed to seasonal) income for farmers, and offer better protection against natural disasters. This in turn would lead to higher competitiveness of the region's agricultural sector.

Activities:

- improving crop nutrition in the region using complex fertilisers and nanofertilisers with combined nutritional and protective effects;
- application of growth regulators (biostimulators, retardants, surfactants) to stimulate metabolic processes, application of inoculants to stimulate nitrogen fixation and increase biological nitrogen reserves in the soil;
- use of integrated pest management rather than traditional chemical pesticides only, as this allows for reduced number of treatments and retention of ecosystem complexity;
- maximising organic honey production, as the region has potential in this area given that Bulgarian honey is already widely known in Europe and elsewhere;
- expanding precision farming through the use of information and communication technology (ICT) systems in cooperation with local administration and authorities as well as local research institutes;
- introduction of combined agroforestry systems that lead to better crop diversification and better crop rotation systems – this includes expanding grassland/pasture and wooded areas to produce biomass for bioenergy purposes;

Upstream participation activities in the research design phases, as part of the wider S3 approaches in this sector, can help to map different visions of agricultural systems and show how complex markets may be affected by the development of bioeconomy-oriented agricultural options. Embedded stakeholder participation in planning, result interpretation and impact review will help to map possible opportunities and threats. Wider engagement with publics and representative NGOs should also lead to a great understanding of consumer and citizens agricultural visions and these visions should help to inform research planning and technology development. Developing adverse effect assessments, including social and human protection aspects that are again informed by a participation mechanisms may help to develop trust relationships in a sector that has previously been affected by a diminished trust relationship due to a lack of engagement around the early developments in biotechnology, such as GMO technologies.

The above activities shall be implemented in cooperation with Trakia University, the regional agriculture directorate and the Field Crops Institute.

Expected results:

- an increase in the volume of agricultural production in the region due to the activities' positive impact on plant productivity;
- an improved system of soil utilisation to optimise production factors

- increased economic efficiency of, and added value for, enterprises in the agricultural sector and the processing industry;
- improved the socio-economic status and living standards of the local rural population.

#### **2.4.2 Priority objective 2: Introducing innovative biotechnology solutions for production of food products, nutritional supplements, beverages, food flavourings, and cosmetics**

In the area of food production, adding extracts of seeds or plants containing biologically active substances has proven to increase the nutritional value and health effects of these foods. Given its history with essential oils and other varieties of natural food/cosmetic additives, Stara Zagora is a prime region for growth in this area.

Activities:

- manufacturing of food supplements from plant extracts containing biologically active substances (polyunsaturated fatty acids, vitamins, amino acids, flavonoids, prebiotics, electrically activated enriched and structured water, etc.) with proven antioxidant, detoxifying, immunostimulating and other curative action for use in bakery, dairy, meat, canned food, and beverages;
- production of organic cosmetic products (creams, lotions, gels, shampoos, etc.) that contain essential oils for use in relevant pharmaceutical applications, as well as perfumery, cosmetics, and aromatherapy.

Expected results:

- expanded production facilities that manufacture additives containing biologically active substances for use in food products;
- expanded production facilities that manufacture products enriched with essential and other oils for perfume, cosmetics, and aromatherapy;
- correlating increase in “healing tourism,” i.e. tours of essential oil production locations and agricultural regions associated with herbs, medicinal plants, etc.

#### **2.4.3 Priority objective 3: Production of bioproducts from waste materials of wood processing as well as plant and livestock cultivation; production of biomass on grasslands and in the forestry sector**

Forms of engagement that can facilitate co-creation will be particularly valuable for this sector. Investment in developing and / or applying new models of participation that are able to build relationships as the innovation process proceeds is needed and there appears to be opportunities to do this. In terms of novel processes the development of living lab models will facilitate both civil and industrial participation. This form of participation will help to map possible opportunities and threats and should bring in public voices and representation from NGOs. The on-going nature of the living lab and the building of a relationships between such diverse groups of stakeholders, as a living lab process develops, is likely to be productive as well as being seen to be a duty to engage particular in sectors such as this, focusing on health and wellbeing.

Using waste materials from plant production and forestry (including crop residues and post-logging wood remnants) as a source of biofuel for energy production improves the region’s energy independence and reduces reliance on fossil fuels.

Activities:

- production of biofuels, biodegradable non-toxic oils, and biodegradable plastic materials from crop residues, particularly those of cereal, feed/forage, and oilseed crops as well as forestry wood wastes and some livestock waste materials;
- production of bioconcentrates, bacterial protein, mineral supplements and other bio-products from mushrooms and algae;
- production of organic fertiliser as well as humic and fulvic acids from livestock waste, for use in the agricultural sector.



Expected results:

- reduced dependence on exhaustible energy sources;
- improved utilisation of residual biomass from the agriculture;
- a new system for production of bio-additives from waste biomass that can in turn be used in animal husbandry;
- improved soil fertility and crop productivity;
- economic efficiency improvements at existing processing facilities, and an increase in added value to their owners.

As with the agriculture production of plant raw materials, upstream participation activities in the research design phases relating to biomass utilisation would help explore different visions of resource use and constructions of sustainable energy production and material recycling. Wider stakeholder participation in this area, particularly when creating bioeconomy innovation pathways, could be supported by communication strategies and awareness raising through exhibitions and multimedia tools. New partnerships could be facilitated by bioeconomy strategy focus group activities. Some of these strategy activities could also facilitate the participation of different, particularly industrial, stakeholders. Using a number of participatory approaches should also inform environmental assessment activities related to this bioeconomy opportunities, such as Life Cycle Analysis and Environmental Impact Assessments.

#### **2.4.4 Specific objective 1: Reducing pollution from the industrial sector through recovery and recycling of its waste products**

The production of energy from, and mining of, fossil fuels in the Stara Zagora region produces harmful industrial waste and gas emissions. Innovative technologies that enable recovery and recycling of these wastes would e.g. help mitigate climate change, preserve natural resources, and improve quality of life. Many of the waste products from industries and households can be used as raw materials for various purposes.

Waste from mining and production of electricity from coal - primarily fly ash from coal-fired power plants - contains components that can be used in the metals industry (aluminium), the building sector (bricks, cement, concrete, other composite mixtures), and as fertiliser.

Organic parts of the waste from households and wastewater treatment plants (WWTP) can be used as compost and fertiliser, as well as for biofuel in electricity generation. Sludge from WWTPs can be treated through biological, nanotechnological and other methods to be used as a fertiliser in agriculture.

Expected results:

- improvement of fossil energy production technologies;
- the volume of overall waste in the region is reduced, some of it (compost, fly ash) is turned into new products;
- more efficient operations due to e.g. reduced expenditure on waste removal/disposal lead to higher added value in the relevant industrial operations.

#### **2.4.5 Specific objective 2: Ecosystem preservation and correlating conservation of natural resources through reduction of erosion and land loss**

The soil in the mountain and foothill areas of Stara Zagora features heavily sloping terrain and is therefore subject to water and wind erosion. In heavy rainfall and floods, the most fertile surface layer with the highest humus content is washed away, which is associated with reduced fertility and production capacity.

Activities:

- use of polymer products and geostabilizing systems to combat erosion, to strengthen the shores of water reservoirs (dams, rivers, canals), coastal buffer strips to deal with intense rainfall, and floods;
- construction of safety drainage and flood prevention facilities in settlements, for removing excess water during floods to prevent soil erosion as well as damage to crops and buildings.

Expected results:

- preservation of important ecosystems and resources;
- reduced the risk of adverse consequences from severe rainfall, flooding and other natural disasters.

### **2.4.6 Specific objective 3: Mitigation of greenhouse gas emission from the region's livestock operations**

Scientific research has shown promise for livestock dietary strategies that decrease enteric methane production from forage-based diets, as well as other management practices that improve the efficiency of feed conversion with less methane production. Adding more oils to feedlot diets has been shown to accomplish this, as have specific feed additives that enhance rumen function.

Activities:

- employing technologies for animal waste storage and removal that reduce livestock operations' net greenhouse gas emissions, such as biodigesters and biogas generating facilities that convert livestock fecal matter into electricity;
- optimising animal nutrition and adjusting the ratio between feed components to decrease ruminant flatulence, which is a significant source of the greenhouse gas methane contributing to climate change – new methods in this area include manipulating bovine and ovine methanogenesis by adding volatile fatty acids or other products to reduce the amount of methane released;
- adding remnants from the distillation of essential oils, aromatic and flavouring plants to the feed of ruminant animals can reduce flatulence and possibly increase milk production – given the availability of such oil products from the region's aromatics industry, this offers relevant synergies;
- implementation of animal breeding techniques that focus on varieties with specific genotypic and phenotypic characteristics conducive to increased productivity, disease resistance, and meat quality.

Expected results:

- decreased greenhouse gas emissions from animal husbandry;
- improvement in meat quality as well as more efficient management of the ruminant lifecycle – particularly beef cattle.

## **2.5 Conclusions and outlook**

Stara Zagora's regional development strategy prioritises "dynamic development of the economy through innovation, technological upgrading and enhanced competitiveness." The main objective is to create regional clusters in the agricultural sector and the processing industry, by vertically integrating intensive agricultural production operations and the related processing capacities. Such vertical integration can also create new jobs - the ultimate goal is to increase the competitiveness of the region and maximise the amount of added value produced within the region.

The stronger development of a bioeconomy incentivises the creation of small and medium enterprises, as these are more flexible and open to new innovative technological solutions. More of such enterprises offer new jobs and thus reduce the unemployment rate that is typically high in rural areas in the current trend of urbanisation. Using the region's unique intellectual capacity, i.e. the extensive knowledge base of the local university and research institutions, is key to fostering new innovations – the main goal here is a collaboration between educational institutions, research and development units, and businesses. To that end, the principles underpinning the strategic development framework of the Stara Zagora region are:

- partnerships between institutions, stakeholders, and civil society groups when implementing strategic development actions;

- coordination within and among the various levels of authority and management units responsible for achieving strategic development objectives.

The bioeconomy development will be carried out with the active participation of political and administrative bodies at all levels (regional, municipal, local). Participants will set up a working group comprising various stakeholders: political representatives, administrative bodies, academics and researchers, business owners, representatives from the corporate sector (trade associations and local chambers of commerce), and consumer groups.

In cooperation with the regional governor's administration and municipalities, this working group shall deploy an information campaign to popularise the bioeconomy concept and the advantages of bioeconomy-related processes and businesses for the region. This campaign aims to spread information about the advantages of organic production and the region's unique potential for it, along with associated opportunities for entrepreneurship, to various audiences. All legislative proposals will be discussed at all levels to reach optimal solutions.

Stara Zagora's proposed development strategy is open to being upgraded and enhanced. The objectives, tasks and activities envisaged will be supplemented according to the specific requirements and concrete opportunities that present themselves during the ongoing implementation process – this allows for incorporation of the latest scientific findings or research outcomes in the relevant fields. After the adoption of the bioeconomy strategy, stakeholders will develop a programme for priority implementation of the proposed biotechnological solutions, taking into account resource availability, budget and potential for external financial assistance, and availability of scientific and technical personnel.

## 3 Part B: Veneto, Italy

### 3.1 Introduction

Veneto is home to biotech companies, universities, research centres, centres for technology transfer, and companies that are engaged in research activities related to the bioeconomy. Hence, there is a strong interest among regional authorities, policymakers, industry and partly civil society in exploring and implementing new bioeconomy-related business opportunities.

Environmental awareness of all stakeholders is also increasing, leading to an increasing demand for bio-based businesses that have fewer negative environmental and social impacts. Bioeconomy sectors in which local investors are potentially interested include sustainable agriculture, nutrition and “health food,” innovative food processing methods, green building, energy efficient design and of new (but also existing) buildings, development of new zero-waste materials, and power generation from alternative sources - particularly re-use of production waste, municipal waste and biomass.

Bioeconomy industries already exist in the region, with agriculture (organic and conventional) as well as industries that require biological resources making up a significant portion of the Veneto economy. The close link between bioeconomy and innovation has enabled the development of diversified and novel markets, generating new businesses and jobs.

Particularly in recent years, bio-based supply chains have emerged within which the products, co-products and by-products are all used – the sectors where this is most prominent for Veneto are agriculture, the agro-food industry, agro-chemicals, forest products industry, and energy.

Beyond this strong interest of multiple stakeholder groups in a local bioeconomy, the region is an interesting case study because it is one of the regions in Europe with an own Smart Specialisation Strategy<sup>3</sup> on the EU’s Smart Specialisation Platform.<sup>4</sup> Being a member of this platform increases synergies with various Italian national and EU-level programmes, to the extent that they involve the promotion of bioeconomy policies. Veneto’s strategy has four defined areas – smart agri-food, sustainable living, smart manufacturing, and creative industries – of which the first two are more closely associated with the bioeconomy.

Efforts to channel growth in these areas toward a sustainable direction will involve reconstructing value chains to return more of the added value produced by the bioeconomy to the base of the supply chain (farmers). This base is currently stifled by industry standards in pricing, size, product quantities and agricultural techniques that are difficult to reconcile with environmental sustainability and proper land management. Current organic standards are insufficient in this regard, as they focus on agronomic procedures rather than the environmental context of organic agriculture - such as the value of biodiversity conservation. Moreover, small farmers are not taking advantage of large-scale distribution channels and are struggling to reach the final consumer even if they have an excellent product. There is a recognition in this region that participatory approaches are needed for the implementation of the Smart Specialisation Strategy approach. New participation methods, such as Living Lab approaches, could be knowledge pathways which extend to a wide range of stakeholders and build capacity.

The focus of BioSTEP’s activities was to connect local stakeholders via a focused discussion aiming to collect information and define a set of actions that would overcome the hurdles to bioeconomy growth in the Veneto region. Section 3.4 of this report details these actions, and how they can help foster the region’s bioeconomy with cooperation of policymakers and other stakeholders.

The venue for connecting relevant people was a so-called “living lab,” an open innovation platform where stakeholders related to the bioeconomy from various institutions (universities, research organisations, non-governmental organisations, businesses, private citizens policymakers, etc.) participate in focus groups and brainstorming sessions, concept mapping and in-depth interviews to conclude possible policy actions that could promote the region’s bioeconomy. For the Veneto region,

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<sup>3</sup> Smart specialisation strategy – Veneto, URL: <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/smart-specialisation-strategy-veneto>

<sup>4</sup> Registered countries and regions in the S3 Platform, URL: <http://s3platform.jrc.ec.europa.eu/s3-platform-registered-regions>

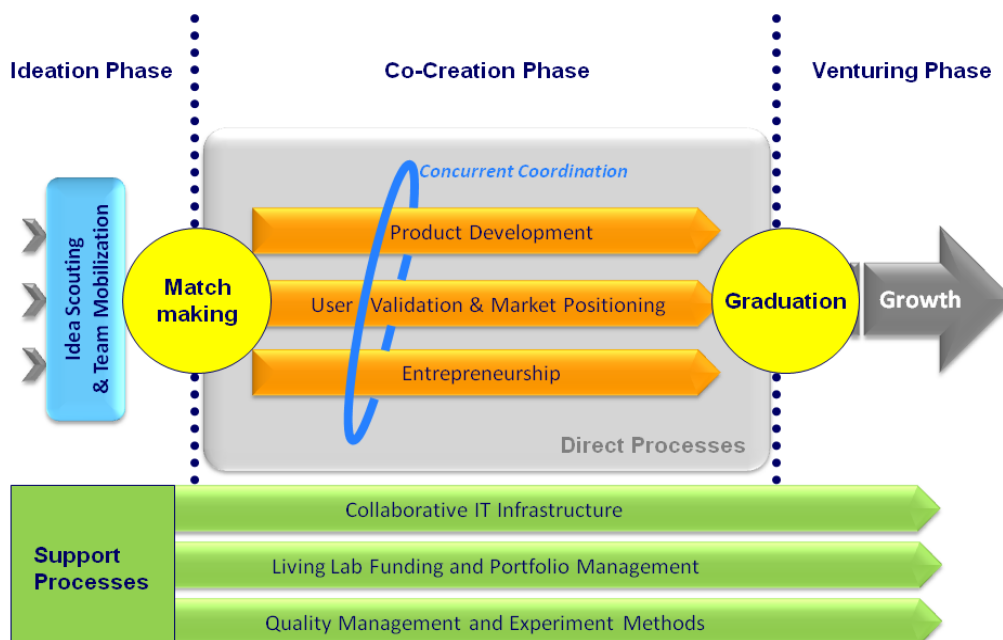
this process resulted in guidelines developed by the living lab working group for bioeconomy development that the regional government is currently considering.

### 3.2 Approach

Living labs are experimental facilities that allow companies, researchers, government and end-users (citizens, consumers) to discuss and develop new technologies, applications, products, services and business models. They are designed to encourage innovation in situations where enterprises' research and development must evolve together in a shared and active laboratory, rather than being pursued separately and sequentially. Methods used to engage with stakeholders and publics, through communication channels, policy workshops, are valuable methods and serve specific purposes. However, with a growing emphasis on upstream engagement activities, embedding stakeholder participation in research planning and the innovation pathway that can be facilitated by the types of process such as living labs are seen as important new opportunities. As the BioSTEP exploration of the role and value of participation has revealed, wider involvement of different publics and NGOs representations should lead to informed and hopefully more social robust research planning and technology development. So the application of the living lab approach within BioSTEP served to render both the process of policymaking and the development of sustainable economic business models more participative. Distinctive features of the living labs approach include the centrality of the end user, who identifies and expresses needs and functional requirements.

Often described as innovation “incubators,” living labs require collective IT infrastructure, quality management, fundraising and grant management processes targeted towards the earlier ideation and co-creation phases of the process (Katzy, 2012). This phase can be followed by the standard investment process after a project (in our case the networked bioeconomy business model) “graduates” from the living lab and is taken over by venture capital and institutional investors (see Figure 4).

**Figure 4: Living lab business excellence model**



Source: Katzy, 2012

The first living lab sessions held in Veneto explored the possibility of building a cooperative network among the region's various bioeconomy actors – business people and other professionals, researchers, cultural associations. The main hurdle proved to be cultural, given that most businesses in north eastern Italy are small or medium sized and often family-run. The stakeholders' working group

highlighted the need to create a network of actors relevant to the bioeconomy and to consolidate relationships with related actors such as university researchers. This is needed to initiate a dialogue between the producers and those researching their production processes – the result will be better vertical and horizontal integration of the supply chain for products of the bioeconomy, with the aim of building a certified chain from the producer to the consumer.

Stakeholders pointed out the importance of interaction among members of niche markets (e.g. makers of local organic products), to ensure that such actors are not dwarfed by their standardized, conventional counterparts but become more resilient through a cooperative network. To that end, bioeconomic sectors should be restructured in order to facilitate the usually less-powerful actors such as small-scale producers (independent farmers and breeders) and consumers having more market power.

Selection of the participants of the Veneto region's living lab began with recruitment from a comprehensive list of individuals interested in discussing the bioeconomy at the regional and national level. The group was then expanded according to a snowball sampling procedure. Participants were contacted first by phone, then through a one-on-one interview. If they demonstrated interest, they received a formal invitation to participate in the first living lab meeting – this event involved about 20 people, employed the consensus method as its participatory process, and aimed to outline a set of policies that can enhance the region's bioeconomy. The assembled stakeholders engaged in a dialogue on various topics, including issues most relevant to the bio-business sector, the need for networking among bioeconomy actors, and the potential for cooperation with their counterparts in the conventional (non-bio-) economy. Each living lab meeting was attended by the same group of stakeholders.

That final group included about 20 members of the building and construction industry, small farmers from the Veneto region's mountains/high plains, a large company that processes cereals and oilseeds, a research institution focused on hemp cultivation, and representatives from other consortia and associations.

The discussions held at the Veneto region's first living lab led to various conclusions about how to characterise the bioeconomy to consumers and the public at large. Several aspects of characterisation were highlighted as important for enhancing the "image" of the bioeconomy:

- The bioeconomy as ethical: Social harmony and fairness is becoming ever more important to consumers. Emphasizing a collective approach to production as well as consideration of workers' rights and the social benefits of short supply chains (keeping products and jobs within the local community) can engage many consumers who care about these issues.
- The bioeconomy as environmental: Tapping into a preference for protecting the earth's resources, businesses in the local bioeconomy can showcase factors like reduced packaging, dematerialization of products, sustainable logistics and using the concept of a circular economy.
- The bioeconomy as healthy: Since local niche markets can more easily cater to small groups of consumers with special needs, the bioeconomy is important and useful to people with specific health concerns such as food intolerances or allergies.

Stakeholders concluded that educational initiatives are the most important first step, as they help inform consumers about the above and other benefits of the bioeconomy. Participants suggested developing regional and provincial education projects for this purpose.

Living lab participants also noted a need for education in the other direction, i.e. producers and members of the bioeconomy learning more about their consumers and the source of demand for their products. In particular, it was noted that local producers need to understand how much consumers are willing to pay for the above attributes, since they cost more to produce – this is true not only for bio/organic food but also natural cosmetics, low-emission vehicles, green energy, etc. There are major commercial implications of the "willingness to pay" for products that are bio/organic/naturally derived: stakeholders seek to match supply with demand and to identify the right balance between the need to have a diversified basket of products and to have a short and low-impact product chain. Better understanding of consumers' preferred distribution methods would help in this regard, as modern options range from large-scale distribution to cooperative purchasing groups to farmers' markets and online shopping. Living lab participants from academic institutions and public bodies that collect

consumer data can be most useful here, as they have access to the relevant information and have expertise necessary for compiling the right information.

The discussion also highlighted conflicting notions around what constitutes “bio” or “eco” in terms of food and other products, noting that food produced in a conventional agro-food model can still meet the requirement of some organic standards while some organic food is not necessarily environmentally friendly because it requires the excessive use of water or (natural) fertilizers. The issue of labelling and certification was highlighted as relevant in that context, as “bio” or “organic” labels and certifications can denote different aspects of the bioeconomy to differing degrees. The Veneto region is already creating local labels for sustainable food and clothing, but an overall “bioeconomy” certification would be new and helpful.

### **3.3 Status Quo and assessment of the national and regional institutional and legislative context**

#### **3.3.1 The climatic and natural conditions in Veneto and sectors relevant for the bioeconomy**

In Italian, “bioeconomy” encompasses the sustainable production of renewable biological resources and the conversion of these resources and their waste streams into value added products such as food, feed, bio-based products and bioenergy. This is based on longer, more sustainable and locally-routed value chains. It also represents an opportunity for Italy to enhance its competitiveness and role in promoting sustainable growth in Europe and in the Mediterranean basin. As stated in the RIS3 strategy of Veneto, the smart specialisations closest to bioeconomic development are “smart agrifood” and “sustainable living”.

As far as the climatic / natural conditions are concerned, the region - mainly a flatland - borders the Mediterranean Sea on the east. It is bounded by the Alps to the north, the Po’ river in the south, and Lake Garda to the west. Relevance of the region’s terrain for the bioeconomy can be summarised as follows:

- Being a plain with a highly industrialised area in the centre, pollution is an issue. Emission control technologies are closely linked to the region’s development.
- Although the region’s northern mountain part has pine forests, most of the region is cultivated (crops, vineyards, fruit trees etc.). This renders development of supply chains associated with forest products (e.g. wood pellet production or vegetable fibres from trees) rather controversial.
- The abundant access to water in the form of the ocean, rivers and lakes holds promise for a future “blue” growth-based bioeconomy involving e.g. sustainable aquaculture.

One aspect of the Veneto region’s agricultural history that was discussed at length in the living labs is hemp farming. This hardy, tenacious plant integrates well into existing crop rotations and was historically planted in Italy – especially in Veneto. However, from 1950-1970 landowners progressively abandoned hemp farming – although hemp can be used for making flour and oil, with the latter even used as fuel grade oil, cheaper fuels supplanted hemp with the rise of fossil sources. Currently, 85 per cent of hemp used in Italy (hemp seed used in foods, fibre used in textiles and the construction industry,<sup>5</sup> and oils used in cosmetics) is imported. Opportunities for reconstructing a local hemp supply chain were explored in the living labs, with resulting measures discussed in Section 3.4 below.

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<sup>5</sup> In the world of green building, panels made of hemp fibre provide excellent thermal and acoustic insulation. Hemp fibres can also be used as a wood substitute where light material is required, such as Ikea’s assembly furniture.

### 3.3.2 Overview of existing policy strategies and instruments related to the bioeconomy at the national level

#### National Bioeconomy Strategy

The Italian National Bioeconomy Strategy (Agenzia per la Coesione Territoriale, 2016) was part of the implementation process of the National Smart Specialization Strategy, focusing on “Health, Food and Life Quality” and “Sustainable and Smart Industry, Energy and Environment.” Its development and implementation complies with Italy’s National Sustainable Development Strategy<sup>6</sup>, the goal of which is to reconcile environmental sustainability with economic growth.

Two strategic plans, targeting the agrifood and biobased economy, are the pillars of the National Bioeconomy Strategy. They were the result of a participatory process involving representatives from the public and private sectors and are thus generally considered “bottom-up” plans that are mainly industry-driven (Imbert et al., 2017).

The Bioeconomy Strategy was launched by the Italian Presidency of Council of Ministers, the Italian equivalent of the Prime Minister's Office. Coordinated by Italy’s Ministry for Economic Development, several ministries are involved in its implementation: Agriculture; Food and Forestry; Education, University and Research; Environment, Land and Sea Protection; and the Ministry for Territorial Cohesion. The Conference of the Regions and the Autonomous Provinces of Italy is also involved, as are National Technological Clusters of Green Chemistry (SPRING) and Agri-Food (CLAN) for Italy.

#### Other relevant national policy strategies

In 2014, an environmental annex called “Measures for promoting the green economy and limiting the excessive use of natural resources” was added to Italy’s existing Stability Law<sup>7</sup> (Gazzetta Ufficiale, 2015), entering into force on 2 February in 2016. This annex focuses on the green economy and the circular economy, including bioeconomy-related approaches. It led to green public procurement by establishing minimum environmental criteria for new public sector purchases, using labels and certifications (Emas, Ecolabel, Environmental Footprints, Made Green in Italy, etc.) as well as incentives for the purchase of recycled materials. The annex created a Natural Capital Committee to monitor public procurement in this regard, as well as national biomass consumption and the impact of public policies on natural resources and on ecosystem services conservation.

The committee builds on Italy’s national action plan for public procurement which was approved on 11 April 2008 and updated 10 April 2013 (Gazzetta Ufficiale, 2015) - that document had already defined commodity categories, targets, and the methods by which procured items were to be considered “green.” In 2016 the environmental elements of the public procurement action plan were further reinforced via a new code of public contracts (Decree 18/04/2016, n. 50) that sets minimum environmental criteria for applicants participating in public tenders. Italy became the first government to adopt a compulsory commitment to green public purchasing via this altered code of public contracts.

With regards to waste, the “National Program for Waste Reduction” (Ministero dell’Ambiente, 2013) defines measures for biodegradable waste, valorisation of agro-industry byproducts and food waste minimization. Specifically regarding composting, a decree of Italy’s Presidency of the Council of Ministers on 7 March 2016 (Gazzetta Ufficiale, 2016) defines the requirements for the Italian regions in terms of organic waste to be composted.

Italy’s “National Energy Strategy” and “National Plan for Climate and Energy” are relevant to the bioeconomy to the extent they deal with bio-energy’s potential, limitations and impacts.

The National Biodiversity Strategy, adopted in October 2010, aims to merge and integrate biodiversity conservation targets and sustainable resource use within sectoral policies. Italy is still in the process

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<sup>6</sup> La Strategia Nazionale italiana per lo sviluppo sostenibile, URL: <http://www.agenziacoesione.gov.it/it/S3/Bioeconomy.html>

<sup>7</sup> Legge di stabilità, URL: <http://www.gazzettaufficiale.it/eli/id/2014/12/29/14G00203/sg>



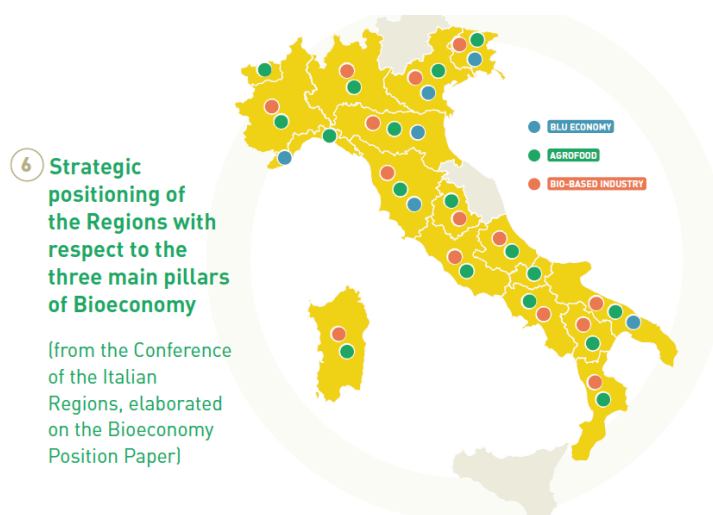
of ratifying the international biodiversity treaty known as the Nagoya Protocol,<sup>8</sup> although measures to comply with it have already entered into force at the EU level.<sup>9</sup>

With respect to consumer policies, Italian law (Law 28/2012) requires non-reusable shopping bags to be biodegradable and compostable as laid down by the standard UNI EN 13432:2002. In 2014, the law was further strengthened by the introduction of penalties for infringements (legislative decree 91/2014) (Imbert et al., 2017).

Italy's National Research Plan 2015-2020, defined by the Ministry for Education, University and Research, sets up National Technological Clusters to foster permanent dialogue between public research institutions and enterprises. Clusters relevant to the bioeconomy include agrifood, green chemistry, smart factories, blue growth and energy – the latter two are just now being established

### 3.3.3 Overview of existing policy strategies and instruments related to the bioeconomy at regional level

**Figure 5: Regional green public procurement**



Source: Conference of the Italian Regions

Green public procurement measures play an important role in Italy (Hermann et al., 2011). Besides the national initiatives mentioned above, there are regional and local green public procurement measures, the most well-known of which is probably that of Milan city during EXPO 2015 (EXPO, 2014). The Conference of Regions and Autonomous Provinces announced in 2016 that it would support demand for bio-based products through public procurement (Imbert et al., 2017).

In the Veneto region, several pioneering businesses use biomass as a feedstock for fuel production. The Italian energy company Eni, for example, runs a biorefinery in the Veneto region that produces biodiesel. Businesses including the firm's subsidiary Eni Trading & Shipping have implemented a procurement scheme for palm oil, which only procures oil that complies with the International Sustainability & Carbon Certification (ISCC), one of the voluntary schemes recognised by the European Union.

The private sector and trade associations, such as Assobioplastiche, contributed to local demand for bio-based products through their involvement in the cluster initiatives SpringCluster and AgriFood Cluster (Imbert et al., 2017).

<sup>8</sup> Nagoya Protocol, on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, available online at <https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf>

<sup>9</sup> See EU Regulation 511/2014 "on compliance measures for users of the Nagoya Protocol Arising from their Utilisation in the Union"

### 3.4 Measures for supporting the development of the regional bioeconomy

The overall outcome of the discussions in the living lab is that participation mechanisms such as the living lab approach are needed to be an essential part of ensuring successful development of Smart Specialisation Strategy approach for bioeconomy development. Within this activity it was deemed that policymakers must involve the public in the development of the regional bioeconomy. Complementary to the living lab process, stakeholders thus planned a dedicated series of actions aimed specifically at education – cooperating institutions will include schools, universities, and research centres. In addition, stakeholders plan to organize further events to inform the public about the bioeconomy, such as trade fairs, open days, and info days. Actors involved in the promotion of educational activities could be public bodies (regional government, municipalities, etc.), educational institutions, manufacturing companies, and local chambers of commerce which are in contact with relevant small and medium enterprises. It is recognised that with limited resources, it is important to build on good practices and lessons learnt. Cooperation and promotion in this case entails signing agreements to cross-publicize and endorse relevant events, issuing regional calls for proposals, and jointly developing local projects. These activities can be promoted through social networks and communities – this often produces a chain reaction, as events are often covered by local media (TV, radio, newspaper, internet, exhibits, and social media), making the concept of bioeconomy better known (more pervasive in everyday life).

All of the measures that resulted from Veneto's living lab meetings are attempts to involve the public in regional bioeconomy development through education and consultation. The following sections describe and highlight some of the specific measures, related to different policy areas.

#### 3.4.1 “Bioeconomy in everyday life” exhibition in Padua

The most concrete educational initiative undertaken in the Veneto region under the auspices of the BioSTEP project was an exhibition on “Bioeconomy in everyday life” at Padua's Fenice Green Energy Park. For eleven days in May 2017, pre-schoolers, primary school children, and high school students received guided tours through exhibits on nature, technology and green energy. In all, 44 school classes experienced the exhibition - 1040 people took guided tours. More information on the exhibit – part of a series of similar events in different regions – is available in BioSTEP Deliverable D4.2.

#### 3.4.2 Hemp product chain development

Due to Veneto's history of hemp growing described in Section 3.3.1, its many uses in areas of nutrition, textiles, building and constructions industries, and local efforts to cultivate hemp for biomass<sup>10</sup>, living lab participants endeavoured to promote multi-functional hemp cultivation by establishing a hemp-specific “regional innovative network” involving a programme of activities and projects under the auspices of the Veneto region's Department for Innovation. Although all involved participants concluded the region has a high potential for revenues from increased hemp cultivation, efforts to create the regional innovative network have not yet succeeded – for two reasons:

- Italy's Ministry of Health issued a new law (No. 214 of 2017) concerning the levels of THC (Tetrahydrocannabinol) in agricultural products. The law is not clear on allowed THC levels for hemp, so local stakeholders are concerned they may be subject to fines for working with a plant that contains THC. A hemp-specific provision of this law, which will clear up the confusion, is expected to be published in February or March of 2018.
- There are required parameters for the type of “regional innovative network” stakeholders are pursuing, among them that it join different economic sectors with a common focus – a project could start in the agricultural arena but also engage the mechanics sector for example. A new network focused on hemp does not do this. Further, Veneto's regional government recently approved a network that deals with the circular economy, of which some entities that would be involved in a hemp product chain network are part – the regional government specifies that members of existing networks must work through those, rather than creating and joining a

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<sup>10</sup> See the activities of the Belluno project at [www.canapicoltura.it](http://www.canapicoltura.it)

new network. These networks are re-assessed every two years, and the first project of the existing network is ending in 2018 – the director of the regional department for innovation suggested that stakeholders interested in creating a hemp product chain network wait until then, and meanwhile share and define ideas. This timing coincides with the publication of the legal provisions around THC content as well.

### **3.4.3 Environmental impact assessments**

Living lab participants agreed that there should be changes in how the Veneto region (and other regions, even at the EU level) conduct environmental impact assessments, as current practices do not internalize negative externalities or take a holistic approach. There were suggestions for common indicators, with life cycle assessment (LCA) being seen as an important metric. Living lab participants proposed that the regional government takes the outcome of the living labs workshops during an official round table on the subject of impact assessments into consideration – the living lab output provided much of the material for that round table, which occurred in May 2017. The director of Veneto region's research and innovation department informed stakeholders that the suggestions for environmental impact assessment reform will be the subject of discussion at the next national roundtable on this issue.

### **3.4.4 Land use policies**

The Italian implementation of an EU Directive that requires new industrial facilities should be built on existing industrial sites rather than as greenfield projects (and the Italian law that implements it) is in principle a good idea because it conserves e.g. agricultural land - but the living lab discussions revealed that local implementation in the Veneto region has too many exceptions to promote the bioeconomy. Living lab participants have thus gotten involved in providing recommendations to the regional government concerning the local implementation of this law. Specifically, professors and researchers of the University Ca' Foscari of Venice as well as a former member of parliament from Montebelluna formulated recommendations to the regional government on this issue.

### **3.4.5 Bioeconomy label**

In the living labs discussions, participants floated the idea of a "bio Veneto" quality mark that would brand locally produced bioeconomy products. The regional government would have to approve this brand, after which the living lab participants would be able to engage small and medium enterprises (which represent the vast majority of firms in the Veneto region) to adopt this branding and thereby increase their exposure to new markets and to gain name recognition. Developing the brand would entail including products certified as organic or "bio" under other certification systems in a computerised database that also serves as a networking platform. A local "made in Veneto" label already exists, but stakeholders would like to extend the range of what this label covers. In the living lab discussions, participants had many ideas for what criteria to add that would represent a local and sustainable product. On the production side, the label would signify bio-based producers and/or an ethically based supply chain.

Stakeholders have been in touch with regional offices about this, having described the proposal to the director of the Veneto region's research and innovation department.

## **3.5 Conclusions and outlook**

Although the outcomes from the living lab process appeared to be positive and well received, unfortunately, there appears to be no immediate funding opportunities to organize a follow up of the living lab. However stakeholders who attended living lab meetings are becoming facilitators in local areas and are spreading information and knowledge thanks to the skills developed during living lab meetings. They are involving their contacts, citizens and bioeconomy stakeholders, informing and educating them through events, seminars or during their business meetings. Each stakeholder is weaving a network of contacts at local and provincial level and each of them is the link for connecting people with the networks of other stakeholders. The living lab experience gave them the input to

develop action locally and to activate a cascade system that will be able to grow. This may hopefully lead to follow up activity and when parties are ready to boost their ideas they will be able to identify contact points and apply for new call for proposals at regional and at European level.

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