



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



Case studies of regional bioeconomy strategies across Europe

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EXECUTIVE SUMMARY

This report provides a summary of issues raised in the four regional case studies: Scotland, South-West Netherlands, Saxony-Anhalt and Veneto. It examines the ways in which the bioeconomy has been defined in regional strategies and the ways in which those regional strategies have been initiated and implemented in the four regions. Each of the regions has a distinctive approach, specialising around the particular assets and strengths of the region and its core stakeholders. Typically, regional strategies have been developed by regional government or by stakeholder groups sponsored by those governments, and hence the main objectives have been to promote economic development through the application of developments in the bioeconomy. A primary driver of strategy development has been the need to respond to the requirements of the EU smart specialisation strategies.

Whilst all of the strategies have been led to some degree by regional government of some form, most have also sought to develop more inclusive stakeholder groups to develop and implement the strategies. These groups vary in their level of formalisation, but generally seek to bring together representatives from business, government and research/education. These groups have not tended to involve other stakeholders from civic society and the wider public, but have primarily drawn together those organisations with direct involvement in economic development in the bioeconomy.

A specific focus has been to identify the level of engagement with the wider public across the four case studies. Despite there being different rationales for engagement with the public, the main emphasis has been placed on an instrumental rationale – improving levels of trust through the provision of information – with a lesser normative objective of addressing the ethical right of the public to be involved in decision-making. There has been no real attempt to involve the public in contributing lay knowledge to better understand how the bioeconomy may be implemented. A general issue with these case studies has been the focus on the commercial exploitation of life sciences technologies, led by public agencies with a very limited experience of constructive engagement with the wider public.

The final section of the report examines examples of stakeholder engagement in the broader sense and draws out good practice examples. These predominantly focus on engagement of business and research communities.

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Abbreviations

BbD	Biobased Delta
BBSRC	Biotechnology and Biological Sciences Research Council
BSBEC	BBSRC Sustainable Bioenergy Centre
CoR	Committee of the Regions
CoSLA	Convention of Scottish Local Authorities
CSOs	Civil society organisations
CSS	Chemical Sciences Scotland
EAFRD	European Agricultural Fund for Rural Development
EFIB	European Forum for Industrial Biotechnology
EPRC	European Policies Research Centre
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
GMO	Genetically Modified Organism
GVA	Gross Value Added
HEI	Higher Education Institution
IB	Industrial Biotechnology
IBioIC	Industrial Biotechnology Innovation Centre
IBTI	Integrated Biorefineries Initiative
KETs	Key Enabling Technologies

LISAB	Life Sciences Advisory Board
NGO	Non-Governmental Organisation
RIAG	Renewable Industries Advisory Group
RIS	Regional Innovation Strategy
RIS3	Research and Innovation Strategies for Smart Specialisation
SAMS	Scottish Association for Marine Sciences
SEAB	Scottish Energy Advisory Board
SIBDG	Scottish Industrial Biotechnology Development Group
SIBE	Scottish Initiative for Biotechnology Education
SMEs	Small and medium-sized enterprises
UK	United Kingdom
WISO-Partner	Wirtschafts- und Sozialpartner

1 Introduction

1.1 Aims of this document

Many regions across Europe have been in the process of developing bioeconomy strategies in recent years. Some of these have been developed as part of wider regional economic development and innovation strategies in addressing the call from the European Commission for smart specialisation strategies¹. Others have emerged more from science or sustainability policy objectives. The form these strategies have taken is therefore diverse as the objectives are varied. The objectives also contribute alongside national and regional policy contexts to differences in the nature of the governance of these strategies and the culture of stakeholder and public engagement.

The aim of this report is to provide a synthesis and summary of four regional case studies (listed in the annex) to enable common themes and differences to be drawn out. This report examines four examples of regional bioeconomy strategies in terms of the nature of engagement, which publics and stakeholders have been involved in the different aspects of the strategies, and what lessons can be drawn from the experiences of these regions.

Four regions were examined: Scotland (UK), South-West Netherlands (The Netherlands), Saxony-Anhalt (Germany) and Veneto (Italy). The regions varied in terms of status and range of powers, the forms of strategies adopted, the industrial sectors or technologies identified and stage of development (see box 1).

¹ European Commission (2012) Connecting Smart and Sustainable Growth through Smart Specialisation, Publications Office of the European Union Luxembourg.

Infobox 1: Portraits of the four regions

Scotland

Scotland in the UK is a small nation of 5.3 million people with its own parliament and extensive autonomous powers. Industrial and innovation policy is led by Scottish Enterprise, a government agency, which sponsors various industrial leadership teams, one of which was the originator of a plan for industrial biotechnology. Scottish policy works within a UK national framework for science and technology, but has its own distinctive elements. There is a limited tradition of public engagement in economic development policy in Scotland.

South-West Netherlands

Three provinces in the South-West Netherlands (Zeeland, Noord-Brabant, Zuid Holland) have come together to develop the Bio-Based Delta strategy for the bioeconomy. With a total population of around 7.5 million these three provinces together account for over 40% of the Dutch population, and have significant scientific and industrial resources in chemicals and life sciences. The provinces have limited powers and the bioeconomy policy largely draws on provincial responsibilities in economic development promotion and physical planning.

Saxony-Anhalt

Saxony-Anhalt is a federal state located in central Germany. It covers a total area of 20,451 km² and has a population of 2.2 million inhabitants. The region produces most of German bioethanol and has a highly developed chemical industry, plant research and plant breeding companies, which provide opportunities for the development of the bioeconomy. In 2014, the state government of Saxony-Anhalt adopted a Regional Innovation Strategy that sets out a number of measures for the development of the bioeconomy and identifies the sector as one of the lead markets in the region.

Veneto

The Veneto is a region of nearly 5 million people in the North East of Italy focused around its capital Venice. Veneto has a strong interest in the bioeconomy and universities, research centres and centres for technology transfer, together with companies present in the region are engaged in research activities related to biotechnology, biostructures and biosystems. Veneto ranks sixth amongst the Italian regions in terms of numbers of biotech companies. The Regional Government has been developing its regional smart specialisation strategy, which has prioritised the bioeconomy.

1.2 Methods

The following criteria were used to select the four case study regions:

- There must be an existing strategy, which is being implemented in the region.
- The strategy's existing participants must be interested in working with BioSTEP and in engaging in dialogue with non-participants (including NGOs/CSOs).
- A number of different stakeholders must already participate in the strategy. The strategy must already be co-produced in cooperation between stakeholders at least from the worlds of policy, business and research. Other actors (i.e. NGOs/CSOs and individual citizens) may have so far participated by being informed or consulted, rather than as co-producers of the strategy.
- The regional case studies should cover a diverse range of countries and regions across the EU.
- The regional case studies should cover different aspects of the bioeconomy e.g. both the 'old' bioeconomy (various biofuels) and the 'new' bioeconomy (refined biomaterials with a higher degree of value added).

In each region, a bioeconomy strategy was identified and desk research was undertaken to identify and obtain documents relating to the strategy and its implementation, as well as documents concerning the national framework for the bioeconomy and stakeholder engagement. A set of stakeholders and relevant publics were identified in each case. Interviews were held with 12-15 representatives of stakeholders including key actors involved in the development of the strategies and representatives

of the wider public. The interviews explored how different stakeholders have been able to be involved in the design, implementation and review of the strategy, and sought to draw out the potential benefits and challenges of broad-based participation in such strategy development. In some of the cases, questionnaires were also used. Finally, a regional event was held for wider discussion with a group of stakeholders. The regional events explored the perceptions of engagement among those already participating in designing and implementing bioeconomy strategies and also among those actors that represent other groups that are usually not involved in the process. The regional events addressed the following research questions:

- Why would participants want to engage with others in relation to a bioeconomy strategy or activities in the region? What are or would be the benefits and challenges?
- Who do participants engage with now in relation to the bioeconomy? Who else might they engage with?
- How should different people and organisations be involved? What structures or support would be needed to allow this to happen?

1.3 Overview of this report

This report provides a summary of the issues raised in the four regional case study reports, but without duplicating the full content to be found there. First, it examines the ways in which the bioeconomy was defined in each of the regions as they varied in the extent to which their strategies covered the whole of the bioeconomy – in some cases more than one strategy is involved. The report then focuses on the leadership of the strategy and examines the main institutions driving the strategy and the governance structures that have been developed to provide that leadership through the implementation phase. The objectives of the strategies are also summarised.

For each case, the nature of the stakeholders involved in the strategy is identified in terms of a broad set of categories. A particular focus of this study is on the role of the public and a section examines the extent to which the public has been involved, and how this has been done. In all four case studies there has been limited public engagement however.

Finally, the report examines possible examples of good practice in stakeholder and public engagement.

2 How is the bioeconomy defined in regional strategies?

The concept of the bioeconomy is broad and embraces a variety of technologies and industrial sectors and accordingly the four case study regions had different and distinctive approaches to the bioeconomy. Scotland and South-West Netherlands were relatively more focused on bio-refining, whilst the Veneto and Saxony-Anhalt took a broader and more diffuse perspective. Table 1 summarises the approaches in the four regions. The thematic focus refers to the aspects or sub-sectors of the bioeconomy which have been selected for prioritisation in each of the regions, and which have been the aim of the strategy. The strategic context refers to the strategy document which covers the bioeconomy.

Table 1: Overview of thematic focus and strategic context in the four regions

Case study	Thematic focus	Strategic context
Scotland	Industrial biotechnology	Scottish National Plan for Industrial Biotechnology
SW Netherlands	Biorefining of biomass for building materials & chemicals	Biobased Delta Strategy
Veneto	Any bioeconomy activity	S3 Strategy for Smart Agrifood & Sus-

		tainable Living
Saxony-Anhalt	Chemistry Agriculture Biomass for energy Biorefining from wood biomass	Regional Innovation Strategy for Saxony-Anhalt

In the South-West Netherlands (Zeeland, Noord-Brabant, Zuid Holland) the focus is on the refining of biomass (e.g. sugar beet) to produce a variety of building materials and chemicals. The core idea is to develop refineries similar in principle to petro-chemical refineries, but instead of using petroleum as the feedstock to develop a range of other chemicals products, bio materials such as plant material is used using biotechnology processes into useful chemicals. A central refinery in which organisms break down the biomass into chemical products can be at the heart of a complex or cluster of companies making use of different output streams to produce a range of products. The strength of Dutch agriculture and chemicals processing provides a platform for the development of such a bio-chemicals sector, whilst nationally, and in other regions, alternative bioeconomy sectors are developing such as in biogas and biomaterials.

The Scottish case also focused on the industrial biotechnology sector and National Plan for Industrial Biotechnology, which emerged from a chemicals industry group with an emphasis on the development of a biorefinery. Other bioeconomy interests in Scotland were supported through parallel strategic frameworks, so for example there were separate biogas initiatives supported as part of energy strategies. Scotland has other interests in biotechnology for human health and cloning of animals, but these were seen as part of a life sciences strategy.

In the Veneto, the bio-based sector has been identified as a strategic element of the smart specialisation strategy as part of the areas of specialisation on Smart Agrifood and Sustainable Living. These include sustainable agriculture, energy efficiency, new materials and bioenergy. However, the bioeconomy can be seen as partially underpinning all four sectors of specialisation in the strategy as these are broad transversal themes rather than sectors defined by their underpinning technologies. Therefore, the strategy does not seek to define the bioeconomy but rather to support any bioeconomy activity that fits with the main themes which are in themselves broad and inclusive.

Saxony-Anhalt also defined the bioeconomy through its regional innovation strategy and took a broad approach incorporating chemistry, agriculture, biomass for energy and biorefining from wood biomass. This approach fits with existing regional strengths in agriculture, plastic processing and chemicals as well as a policy desire to strengthen renewable energy use.

3 Which institutions are driving the bioeconomy strategies?

The strategies examined in this report were developed at the regional level rather than by national government. Typically, regional level strategies relating to specific industry sectors are produced to support economic development either by a regional tier of government or by regional level business leadership bodies. National government strategies often have a broader set of objectives such as priorities for national science and technology investment and hence a wider set of government actors. At the regional scale though the focus is often narrower and the key institutions are likely to be those concerned with economic development. Such strategies are also often linked into the requirements of EU regional development funding which requires the development of Smart Specialisation Strategies for Regional Innovation, and would usually again be led by economic development bodies, but involving input from the private sector, particularly around the concept of the entrepreneurial discovery process. This process proposes that ideas for the prioritisation of sectors and regional industrial investments should come from entrepreneurs and reflect the opportunities available to the region rather than copying the actions of other regions.

As the cases focused on regional strategies for the development of the bioeconomy sector, it could be expected that the strategies were developed at the initiative of some form of regional government, and this was broadly the case. Three of the strategies were initiated directly by regional or provincial governments with one, in Scotland, being initiated by an industry body established by a government

agency. In all cases **the primary aims were economic development and the application of bio-sciences to the development of new economic activities.**

Strategies tended to be developed in a top down manner by regional peak organisations – even in the case of Scotland where the strategy emerged from business it was a Scottish-wide body that was established by government to develop a Scottish strategy.

Table 2: Key driving institutions and expected funding for strategies

Case study	Driving institutions	Funding
Scotland	Chemical Sciences Scotland (industry body)	Funding to be identified for each project, but including higher education, skills and foreign direct investment support
SW Netherlands	Three Provincial governments	Funding sought for each project from private sector and national government
Veneto	Regional government	ERDF-led
Saxony-Anhalt	Regional government	ERDF-led

In the Netherlands, the Biobased Delta strategy was established by the provinces of Zeeland and Noord-Brabant using their provincial funds. The project, BbD, takes the form of a cluster board bringing together companies to create consortia in developing economic development projects, such as biorefineries.

Both the Veneto and Saxony-Anhalt strategies as Regional Innovation Strategy (RIS)/smart specialisation strategies were developed as a requirement of EU regional funding, as such strategies were conditional for the continued access to European Regional Development Funds to support innovation at a regional level. Again, the aim of these strategies was to support the development of business opportunities.

Scotland was a somewhat different case as the strategy emerged from an industry association, Chemical Sciences Scotland (CSS). The association is one of fifteen current industry leadership groups established by Scottish Enterprise, a development agency, and each are tasked with providing strategic leadership for their sector in Scotland. All are led by industry representatives and also include representatives of Scottish Enterprise, other public bodies and stakeholders such as universities. CSS led the development of the Industrial Biotechnology plan although with the active support of Scottish Enterprise. In setting out to develop a plan for industrial biotechnology, CSS was responding to a national initiative at UK level in which an Industrial Biotechnology Innovation and Growth Team was tasked with identifying opportunities for IB and developing suitable strategies and policies, producing a 2009 report on 'Maximising UK Opportunities from IB in a Low Carbon Economy'.

In all cases then the strategy was initiated by regional government or related organisations with a focus on economic development, and so the main focus of the strategies was the desire of the region to develop commercial applications of the bioeconomy. The objectives of the strategies will be explored in more detail in section 5.

4 What forms of governance have been used to establish bioeconomy strategies?

In developing regional strategies to support particular industries or technologies, regions have a range of options open as to the kind of governance that can be used to establish those strategies. Here, governance can mean the establishment of particular governance structures such as boards

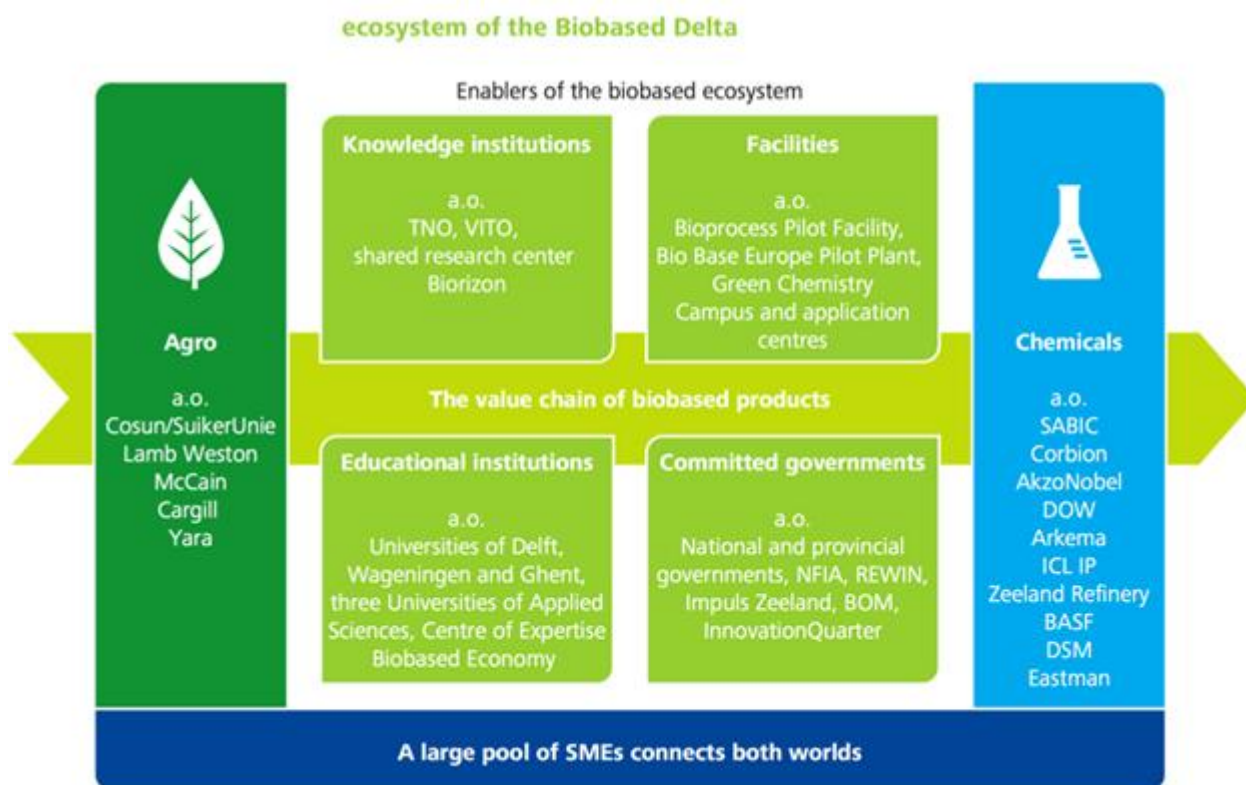
and agencies, which draw upon a membership from different stakeholder groups. Alternatively, governance can also refer to a set of processes linked with public or stakeholder engagement.

In three of the four regions, specialist bodies have been established to coordinate bioeconomy strategies or their implementation. However, these bodies were examples of a generic type that was often established for a number of priority sectors and was not specific to the bioeconomy. In the case of Scotland there were a number of industry leadership groups, of which CSS, which launched the bioeconomy plan, was just one.

Table 3: Governance structures

Case study	Governance structure for bioeconomy	Key partners
Scotland	Scottish Industrial Biotechnology Development Group	Chemical Sciences Scotland, Scottish Enterprise, other Scottish public bodies
SW Netherlands	Biobased Delta Foundation	Provincial governments, private sector
Veneto	Regional government	Regional and municipal governments, universities, research centres, business.
Saxony-Anhalt	Working Group on Lead market "Chemistry and BioEconomy"	Ministry for Education and Economy

In the Dutch case, the main institutional actor seems to be the cluster board, the Biobased Delta Foundation. Whilst this was initially led by the public sector, over time more private sector organisations have become involved, and the board has become formalised, taking on foundation status to enable it to receive research grants. The board takes a lead in setting the agenda on the bioeconomy, identifying the projects to be supported, although funding has to come from other sources, notably the public sector.

Figure 1: Stakeholders in BbD, the Netherlands

Source: <http://www.greenchemistrycampus.com/en/news/deloitte-biobased-delta-globally-competitive-to-valorize-sugars-into-biobas>

In the case of Scotland, Scottish Enterprise suggested that stakeholders interested in IB should get involved in the Chemical Sciences Scotland industry leadership group. A working group was established called the Scottish Industrial Biotechnology Development Group (SIBDG) with representation from business and academia and this developed the Industrial Biotechnology Innovation Centre in parallel with the development of the Scottish National Plan for IB. SIBDG continues to support the development of the IB sector and the implementation of the plan, although its status is that of a voluntary association. The implementation is supported by Scottish Enterprise however and actions are implemented with the support of funding from Scottish Enterprise and other public bodies.

A key element of the Scottish plan was the establishment of the Industrial Biotechnology Innovation centre (IBioIC). Again, this was not a uniquely bioeconomy institution, but was part of a wider Scottish initiative to create a network of innovation centres serving different industries. The SIBDG applied to the Scottish Funding Council (for university funding) with university partners to establish the IBioIC and was successful in obtaining core funding. IBioIC has ten academic members and around fifty industrial members of different forms. IBioIC supports the work of the SIBDG particularly in terms of implementing programme themes such as skills development and research facilities.

In the Veneto, the bioeconomy is being supported by the regional government, although there is also a National Technological Cluster for Green Chemistry established by the National Ministry of Education, Universities and Research and bringing together a variety of public and private stakeholders. This national cluster, SPRING (for Green Chemistry), at the moment is managed by private industries as it is waiting for funding from the National Ministry and so it does not have active involvement from the Veneto region. Furthermore, Veneto Region as well as other Regional Governments in Italy have been required by the European Commission to adopt a common guideline concerning bioeconomy development and to elaborate regional calls for proposals. To this aim there are new projects at the national and European level as Governments are working on new clusters, one of which is on the bioeconomy.

The development of the bioeconomy sector in Saxony-Anhalt also remains a regional government initiative and is part of the RIS developed by the region, so no new governance bodies have been established yet to bring together stakeholders. However, the WISO Partner Advisory Council that deals with EU funds and comprises scientific associations, NGOs, CSOs as well as other associations, was involved in the development process of the RIS. In addition, the BioEconomy cluster with its more than 90 regional partners from industry and science is a key stakeholder within the regional bioeconomy and is strongly involved in the development and implementation of the RIS. It is a legal platform for the organisation and financing of joint activities, founded on 18 October 2012² within a cluster competition started by the Federal Ministry for Education and Research. Geographically, the BioEconomy cluster covers the states of Saxony-Anhalt (Südharz timber region, chemical triangle) and Saxony (Leipzig, Dresden) and is concentrated around its centre at the Leuna chemical site.³ The objective of the cluster is to develop the cluster region of Central Germany into an international model region for the bioeconomy.⁴

These models of development, both the regional government strategy and the creation of cluster-oriented bodies to involve the private sector, are common approaches for the development of sectoral or cluster innovation strategies and are typically used by regions to implement the new smart specialisation strategies required by the European Commission. The European Commission requires regions to identify priorities through a process of entrepreneurial discovery. Whilst this process is not made explicit, many regions have determined that this means drawing on the private sector in the development of strategies through various stakeholder groups, and often cluster-type associations have been in existence for a number of years, even if not always in the bioeconomy area. These then are obvious forms for regions to adapt to develop bioeconomy strategies.

5 What are the objectives of regional bioeconomy strategies?

All four cases of regional bioeconomy strategies have emerged from economic development objectives – the bioeconomy is seen as a means of creating new economic activities that will create economic value and employment, either replacing or extending existing activities in the region. All four regions are seeking to stimulate regional innovation, but **these strategies focus primarily on the exploitation of new biotechnology science rather than the development of new science.**

Across the four cases, the emphasis was on bringing firms together to develop collaborative projects for technology exploitation, to develop skills within the workforce, and to shape new supply chains. There was little focus on the direct funding for research or of considerations of the regulation of new processes or organisms. In Scotland, the development of an Industrial Biotechnology Innovation Centre had implications for the attraction of external funds for research, but even there the primary role of the centre was to facilitate the exploitation of technologies rather than the development of new science. In Saxony-Anhalt support for science was anticipated, but it is not clear if this has been delivered yet.

² <http://en.bioeconomy.de/bioeconomy-e-v/>, accessed on 30 August 2016.

³ <http://en.bioeconomy.de/leading-edge-cluster/cluster-region/>, accessed on 12 August 2016.

⁴ Ibid.

Table 4: Main objectives and themes of the strategies

Case study	Main objectives	Key themes
Scotland	Increasing the uptake of IB in business, including the development of a biorefinery, leading to employment and output growth	Industry engagement Biorefinery facility Skills Innovation centres
SW Netherlands	To promote the refining and conversion of biomass to usable products	Developing biorefining of sugar beet Bioeconomy pilot application projects Attracting research funding
Veneto	Smart Specialization Strategy	Smart Agrifood, Sustainable Living, Smart Manufacturing, Creative Industries
Saxony-Anhalt	Increasing the competitiveness of SMEs in the region (by innovation) and generating smart, sustainable and socially inclusive growth	Health and medicine, chemistry and bioeconomy, food and agriculture

The Scottish National Plan for Industrial Biotechnology has a focus on the transition from an oil-based economy to a bio-based economy and a greater use of bio-based products. The Plan is expected to be delivered through four key themes:

- Industry engagement – helping to increase awareness and uptake of IB;
- Biorefinery/biochemicals – scoping out the potential for a biorefinery/biochemicals facility as the cornerstone for sustainable manufacturing in Scotland (including the development and implementation of a roadmap towards a Scottish Biorefinery);
- Skills – helping to address any skills shortages/barriers to developing IB;
- Innovation Centres – developing Scotland-based biotech innovation centres and positioning Scotland as a leading hub for IB innovation.

These themes have specific measurable objectives in terms of increasing the numbers of companies in IB, increasing turnover, employment and contribution to gross value added and in this Scotland was more explicit than the other case study regions (see table 5).

Table 5: Example of target-setting. Targets for the Scottish Plan for IB

	Key Statistics 2013	Targets for 2025
Companies actively involved in IB	43	200
Estimated turnover	£189m	£900m
Direct employees	1,103	>2,500
GVA contribution	£61m	>£250m

Source: Chemical Sciences Scotland (2014)

In the Veneto, the strategy is not fully implemented, and so far there has been no call for proposals for projects under the strategy. It is intended that this will be promoted through public private partnerships, and through the stimulation of public programmes to promote R&D and to develop bio-based supply chains.

The Saxony-Anhalt strategy is focused on enhancing the competitiveness of SMEs in the region, and generating smart, sustainable and socially inclusive growth and promoting innovation, through the BioEconomy cluster. Currently, the Ministry for Education and Economy in Saxony-Anhalt is working on a Road Map for the RIS implementation.

The Dutch case, the Biobased Delta (BbD), aims to promote refining and conversion of biomass into products such as building materials and chemicals, including bulk, platform and specialty chemicals, fuels and polymers. The aims will be delivered through a set of specific projects including a sugar beet-based biorefinery, a biopark and a green campus. Some of these projects are under development such as the Biopark Terneuzen and the bio-based Innovation Garden, although the biorefinery is yet to be developed.

6 Which stakeholders have been involved in the strategies and how?

All of the four case studies saw government and business working together to develop the bioeconomy sector, often seen as a triple helix of business, government and research/universities. These triple helix groupings were most explicit where new institutions were formed, as in Scotland and the Netherlands, although even in other cases where regional government led there was still an involvement of business in the strategy process.

In the case of the Netherlands, the BbD cluster board includes governmental bodies (the economic departments of the three provinces, the regional development companies REWIN and Impuls, some municipalities), several knowledge institutes and expertise centres (CoE BBE), and companies from the agro and chemistry sectors (ZLTO, DSM, Caribion, Sabic, Dow, Cargill, Suiker Unie).

The Scottish Industrial Biotechnology Development Group had a similar set of stakeholders involved as the Netherlands: businesses, government organisations, academic and research organisations, but without NGOs or local government. Business representatives include both large and small firms, representatives of the core biotechnology and the wider chemicals industry. A number of academic institutions are represented through both individual scientists and through the Industrial Biotechnology Innovation Centre, which itself represents university and company members. On the government side, the main representation is from the economic development domain with Scottish Enterprise, Highlands and Islands Enterprise and Skills Development Scotland, however other sectoral interests are also represented such as Zero Waste Scotland and the Forestry Commission. Engagement in the SIBDG implied involvement in working groups focused on the development of particular strands of the strategy, developing projects such as the IbiolC, and developing a response to the strategy from their own organisations. Several of the government agencies had been collecting data to support the feasibility of projects as part of their own internal activity.

The Saxony-Anhalt bioeconomy cluster has also been mainly driven by business and science, alongside the regional government. Expert contributions were collected in two stages through individual, questionnaire-based interviews with universities and research institutes, business, technology transfer institutions or chambers and cluster representatives and roundtable discussions with academics. NGOs and other civil society groups have had little or no engagement.

The Veneto bioeconomy strategy was intended to be the outcome of a participatory process involving public and private institutions, the business world and academia, as well as representatives of civil society. It was not possible, however, to identify the specific participants involved.

Table 6: Stakeholders involved in regional strategies

Case study	Regional Government	Business	University	Local government [✓]	Other government	NGOs	Citizens
Scotland	✓	✓	✓		✓		
SW Netherlands	✓	✓	✓			✓	
Veneto	✓	✓	✓	✓			
Saxony-Anhalt	✓	✓	✓				

In most cases, stakeholders have become engaged through some form of committee, steering group or board, which had been developed to develop the strategy, especially those stakeholders from government and business.

Overall, then, all the regions drew upon a core set of businesses, regional government agencies and research organisations on developing their strategies, but with limited involvement of NGOs and civil society. This latter group are discussed in more detail in the next section.

7 What has been the role of the public in the strategies to date?

Public engagement has been limited in the development of bioeconomy strategies in the four regions. This section explores the reasons for this, and the nature of the engagement that has taken place. There are several rationales for public engagement, which can be grouped around three main headings⁵:

Instrumental – ‘public engagement seeks to improve trust and reduce conflict’ responding to a deficit model in which the lack of trust by the public is due to their lack of information about new developments in science and technology.

Substantive – in which lay knowledge from the public is incorporated into the decision making process to improve the way in which technologies are adopted and used from a societal perspective.

Normative – suggests that the public have an ethical right to be involved in decision-making which affects society and depends upon public funding.

The case studies largely find that the rationale for public engagement is from an instrumental perspective, with some element of normative perspective as well, but there was little evidence of substantive engagement.

⁵ Identified by Ribeiro, B.E. and Millar, K. (2015) Public engagement in the bioeconomy: outlining an analytical framework for BioSTEP, BioSTEP working paper, University of Nottingham.

Regional bioeconomy strategies tend to combine attributes of two different policy domains. They bring together activities related to biosciences with regional economic development strategies. These two domains have different traditions and expectations around public engagement. In the biosciences the development of novel technologies raises ethical and regulatory issues which are of public concern, and hence there has been a desire from policymakers and the public for a transparent debate on those questions and the use of various forms of public consultation. However, regional economic development strategies, although subject to public scrutiny by elected representatives, have not had a tradition of public engagement beyond expert groupings. The nature of regional economic strategies is such that they focus on the provision of infrastructures, skills development and support to companies, all relatively routine policies, but might direct such support towards particular industries represented in the region. In this context regional agencies are not usually selecting the specific technologies being used by companies and universities. Although the strategies may raise specific ethical issues (such as resources allocation, or setting social priorities) these are rarely addressed by regional policymakers through some form of public engagement. Ethical issues raised by the nature of the technology have tended to be reviewed separately through a national regulatory perspective focused on technology impact assessment. Hence there has been limited ethical assessment or regulatory drivers for public engagement around regional economic strategies, and there is a perception among regional policymakers that there is limited expertise which could be provided by the general public in addition to that provided by the existing set of regional partners.

Since the 1990s, and the encouragement by the European Commission of regions to develop regional innovation strategies and more recently smart specialisation strategies, regional bodies have been encouraged and supported to engage in stakeholder consultation. Good practice guidance has been provided⁶, and experience exchanged between regions; however this has tended to focus on engagement with businesses, especially SMEs, universities and the research base, as well as other parts of the public sector. In our understanding of the implementation of RIS3 projects, there has been little or no emphasis on outreach to the wider public, even as part of a communications strategy.

So, when regional economic development bodies seek to develop regional bioeconomy strategies, they typically lack the wider experience of public engagement, yet the focus on the bioeconomy raises challenges in terms of the expectations of wider public consultation. These tensions appear to different degrees in the four case studies.

In the case of Scotland, the National Plan for IB has so far not involved the general public, or any NGOs, in its design or implementation. At the same time, some other strategic documents in Scotland, in other sectors related to IB, have been developed through consultations with the wider public (as well as a broad range of different stakeholders). The focus of the engagement is mainly instrumental though.

As already noted, the plan has involved a range of government bodies, which in some senses represent wider public interests, such as Zero Waste Scotland, but the focus has remained with those bodies that have a direct stake in biotechnology. Local authorities, for example, have not been involved, despite being involved in a wider set of bioeconomy issues both locally (biogas initiatives for example) and at a European scale (through for example the Committee of the Regions).

So far, the IB plan has been published on the Scottish Government website, but has not been a focus of any kind of wider public consultation or exhibition reaching out to the general public. NGOs seem to have played a very passive role in the bioeconomy in Scotland. Although there was strong lobbying against GM crops in the past, the main environmental NGOs expressed little interest in the Plan for IB and were unwilling to be interviewed as they had had no engagement with the plan and had nothing to say.

The Dutch example seemed to have more engagement with the public, both through information campaigns and through the involvement of NGOs. There was, however, some ambivalence about the

⁶ European Commission (2012) Guide to Research and Innovation Strategies for Smart Specialisations (RIS3), <http://s3platform.jrc.ec.europa.eu/documents/20182/84453/RIS3+Guide.pdf/fceb8c58-73a9-4863-8107-752aef77e7b4>

role of NGOs. Board members felt they could contribute through local knowledge, but often delayed implementation of projects and had little impact in biobased projects as they were more interested in other themes such as the circular economy and renewable energy. NGOs also tended to see the issues as too complex for the general public and discussed the impacts of the bioeconomy internally rather than seeing themselves as a means of stimulating wider debate. The public have been informed to some degree by exhibitions and information campaigns, but have not been involved in any discussion of the regional strategy, the exception being some students who were involved in some of the projects.

A similar finding was obtained in Saxony-Anhalt, where there was little awareness of the preparation process of the RIS although part of the NGOs and civil society expressed interest in contributing to the development and implementation of the strategy. Public engagement activities by the regional ministry were limited to the provision of information through formal channels. Associations concerned with landscape and rural life that might be affected by the bioeconomy had had little engagement and in some cases were unaware of the regional innovation strategy and its plans. Some public dissemination was done via articles in the magazine „Hier + jetzt – Impulsmagazin“, published by the Ministry for Science and Economy. So far, there have been three issues – two in 2015, one in 2016, but readership is low as measured by the online platform, with only 5,295 clicks until early July 2016. Alongside this magazine, there were a number of online publications on governmental web pages. However, it seems that the impact of these types of online dissemination is very limited.

In the Veneto, the general public have never been directly informed by a specific campaign on the bioeconomy. People were informed to some degree by exhibitions or just by products available on market, but have not yet been involved in any discussion of the regional strategy. The concept of the bioeconomy is still not very widespread.

At the moment, since no specific calls nor guidelines are available in the Veneto, the bioeconomy is growing as a result of innovative stakeholders, and the increasing market demand of such products and services. The involvement of actors at different stages has led to a process of interactive learning. Stakeholders improved the strategy (even if all of them saw the strategy in terms of their own needs) and the strategy also improved individual and aggregate knowledge. This has enabled the sharing and the exchange of knowledge. The involvement of interested organisations also helped companies to face challenges and to improve relations between companies.

8 Perspectives on challenges and opportunities for engagement in the bioeconomy?

Although public engagement in the four cases was limited, there were still some examples of stakeholder engagement which could be seen as good practice or which lead to suggestions about how practices can be improved. This section pulls out these examples of good practice, which will be further developed in a subsequent good practice report (BioSTEP Deliverable 3.3).

There are **limited experiences of good practices in public engagement** across the case studies, although all of the regions seem to have developed good practices in engagement with a set of core triple helix stakeholders.

The Dutch case has the clearest examples of good practices:

- There is a good example of a triple helix organisation with multinationals and self-organisation of entrepreneurs. This includes nine clusters that are initiated and organised by BbD partners (the clusters include: packaging materials, infrastructure, green building materials, agro, natural colours & coatings). The objective of the clusters is to organise network events and to support the biobased business cases by developing bio-based 'showcases'. Each cluster has its own working approach, depending on the drive and preferences of the participants. For example, the coordinator of the 'agro' cluster organised six inspiration meetings in which people with an agricultural, chemical and science background meet and exchange ideas in smaller groups and develop a long list of bio-based business ideas and potential opportunities.

- There is a focus on small and medium-sized enterprises (SMEs). The regional development agencies develop, with SMEs, farmers, knowledge institutes and chambers of commerce, projects and business cases for valorisation (packaging, fibres, algae, painting and coatings, infrastructure, construction); SMEs cooperate with the CoE BBE, and with large companies at the Green Chemistry campus. The regional development agencies REWIN and Impuls gave vouchers to entrepreneurs to improve their business plans and their market orientation, and organise open days for entrepreneurs. Furthermore, the cluster board developed incubators for biopolymers and paints, and regularly organises crossover meetings to give entrepreneurs the opportunity to get in contact with other sectors.
- The municipality of Bergen op Zoom is positioning itself as a creative city to attract innovative entrepreneurs in the bio-based economy in order to become less dependent on the employment structure of current multinationals. Therefore, it took part in the Green Chemistry campus, acts in their management as launching customer for public procurement (see below) and for their local green infrastructure (bridge at Halsteren is partly made with grass berm piles). Furthermore, together with students from the University of Applied Sciences AVANS, it develops and applies bio-based solutions – for noise insulation and catering – in their local pop music building Gebouw-T. They also support in showing the bio-based collection at local places and in regional events that attract many visitors, e.g. in the nature visitor centre nearby the local hi-hostel, and at the central square (planned), in the yearly events Brabantse Wal day and Delta Innovation Days for citizens to learn more about local products. In the local park, they inform the inhabitants on bio-based solutions for wet nature plant preservation. Also other municipalities nearby (Raamsdonkveer and Geertruidenberg) try to highlight bio-based activities in their locality by organising prizes among sustainable entrepreneurs.
- The province of Zeeland has developed a **tool for raising awareness of the possibility of sustainable bio-based purchases**. Buyers of the provinces, municipalities and the national government/EC have a tool to formulate criteria for acquisition or tenders.
- BbD has shown their biobased collection in the Dutch design week. Moreover, artists were involved who made **artistic ‘prototypes’ of consumer products** from the available bio-based material. In addition to enhancing the relationship between arts and innovation, the Dutch Design week also created public exposure as around 200,000 people visit the Dutch Design week.
- CoE BBE has developed **modules for primary education, secondary education**, i.e. the training centre in Terneuzen **and tertiary education**, i.e. the MOOC, which has been followed during three years by 1,600 students from 13 countries.

Good practice in Scotland is focused on the manner in which the strategy was developed through a consultative process of key stakeholders, and the creation of the Industrial Biotechnology Innovation Centre. Scottish Enterprise over many years have supported industry cluster groups and these groupings, led by industry, have been encouraged to develop sectoral strategies. In the case of the Chemical Sciences Scotland group this led to the SIBDG and the IB strategy. The strategy development process itself involved a process of consultation with the key stakeholder group in order to identify priorities and targets.

A specific outcome of the SIBDG was the Industrial Biotechnology Innovation Centre. The Scottish Government though the Scottish Funding Council had established the principle of innovation centres, bringing together universities with industry partners around networks that stimulated the adoption of new technologies and the development of skills. The SIBDG bid for an innovation centre focused on IB and this is now seen as the main vehicle for wider engagement through the universities, links with schools and young people, and potentially with the wider population. This wider engagement strategy is, however, in its early stages of development.

While there was limited involvement of CSOs, NGOs and the wider public in the development of the RIS in Saxony-Anhalt, the strategy was developed based on a broad consultation process that was targeted at key stakeholders from science, industry and policy. The following four good practices have been identified for this case study:

- In Saxony-Anhalt, the WISO Competence Center was involved in the development process of the RIS. Various members of the WISO Competence Center are part of the Monitoring Committee of the European Structural and Investment Funds (ERDF, ESF and EAFRD) of Saxony-Anhalt, which main goal is to ensure the optimal use of financial resources. These are: economic partners, trade unions, social actors, women's organizations, environmental organizations, local authorities, partners in the agricultural sector and rural areas as well as universities, research institutions and educational institutions that contribute with their specific expertise.⁷ The composition of the WISO partners reflects the different aspects and themes of the Funds.⁸
- The **Mittelstand I3 Initiative** of the Ministry of Science and Economy in Saxony-Anhalt supports small and medium-sized enterprises to innovate, invest and open up new international markets. Different partners in the region such as chambers of commerce and crafts, associations, banks and research institutions offer technical (e.g. advisory assistance programs) or financial support for innovation or investment. "Cross Innovation in the Creative Industries" is one of examples of the key areas of innovation. It is a new approach that promotes future projects between the creative and other industries, so-called cross-innovations. The aim is to pool of expertise, develop common strategies for the development of new, innovative products and services or the improvement of market access. The cross-sector-innovation processes are stimulated through cooperation between companies from different sectors and cooperation between science and industry. Networks of SMEs as well as companies in other industries, universities, colleges, academic institutions, local authorities and trade associations are funded.⁹
- The Fraunhofer Center for Chemical-Biotechnological Processes (CBP) in Leuna closes the gap between laboratory and industrial implementation. By providing infrastructure and technical equipment, it enables partners from research and industry to develop and to scale biotechnological and chemical processes for the use of renewable materials on the commercially relevant level. The Fraunhofer Center participates in and organizes various exhibitions and events. For example, during the Green Week in 2016, it showed how renewable raw materials could be used sustainably: as materials, platform chemicals or bio-based polymers.¹⁰
- The BioEconomy cluster has developed a study programme on industrial biotechnology, with emphasis on the bioeconomy, at the Martin Luther University in Halle. It starts in the fall semester of 2016. Currently, members of the cluster are trying to initiate training programs for chemical workers in the field of biotechnology.

In the Veneto, three good practice projects are identified: the Consortium Center of Sedico, EDILEGNO and the Ex Meta Bio-building cluster.

- The Consortium Center of Sedico in Belluno is a training agency of the Belluno Craftsmen Union that deals with the deepening and the refinement of the preparation of artisans and their staff, the organisation of courses for the employed and unemployed, the design and delivery of service training, professional qualification for young people, and guiding them to the world of work. This Cooperative group in the province of Belluno is trying to identify all possible uses for hemp, wool, dairy products and wood (for green building and biomass). They are

⁷ <http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/wer-sind-die-wiso-partner/>

⁸ <http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/>

⁹ Ministerium für Wissenschaft und Wirtschaft Sachsen-Anhalt (c2014) Hier ist Mittelstand Mehr Wert. Mittelstandsoffensive Sachsen-Anhalt I3 – Wachstum durch Innovationen, Investitionen und Internationalisierung, www.wirtschaft-in-sachsen-anhalt.de OR http://www.unternehmen-und-gruender-in-sachsen-anhalt.de/fileadmin/SOM/SOM_Allgemein/Downloads_und_Uploads/Printprodukte_MW_MLV_Co/Mittelstandsoffensive_Sachsen-Anhalt.pdf

¹⁰ <http://www.cbpfraunhofer.de/>

seeking commercial channels to valorize the product. Hemp needs only a short crop cycle and compared to corn it does not impoverish the ground, but enriches it and does not require herbicides or pesticides. The most interesting business is for nutraceuticals as a dietary supplement, because it is rich in Omega 3, and for cosmetics and even food. Sheep farming has a widespread problem of illegal waste wool. The project aims to restore this waste and identify new markets such as for carpet making, etc. The Consortium is promoting the concept that when a sheep farmer is instructed on how to raise sheep in the right way, and how to shear them properly, this can enhance the quality of the wool. Hemp, wool and wood are three materials that also have potential in green building as they are bio-products with potential for thermal insulation

- EDILEGNO is a business operating in the carpentry, timber house and construction sector. This sector is going through a period of substantial innovation and growth, thanks to its commitment to delivering structures that are not only extremely resistant to earthquakes, but also more energy efficient and environmentally friendly. The development of technology, materials, experimentation and knowhow, have all contributed to the possibility of building real earthquake-resistant and eco-friendly housing with the help of renewable sources.
- The Ex Meta Bio-Building Cluster in the Veneto convened all the companies of the sector to a series of meetings to propose project ideas and collaboration. The 'Stock Market' for example lasted two days and 250-300 companies participated: businesses had the chance to get to know about new materials and build links with other companies. The bio building cluster also delivered thousands of hours of training and workshops.

9 References

European Commission (2012) Connecting Smart and Sustainable Growth through Smart Specialisation, Publications Office of the European Union Luxembourg

European Commission (2012) Guide to Research and Innovation Strategies for Smart Specialisations (RIS3), <http://s3platform.jrc.ec.europa.eu/documents/20182/84453/RIS3+Guide.pdf/fceb8c58-73a9-4863-8107-752aef77e7b4>

Ministerium für Wissenschaft und Wirtschaft Sachsen-Anhalt (c2014) Hier ist Mittelstand Mehr Wert. Mittelstandsoffensive Sachsen-Anhalt I3 – Wachstum durch Innovationen, Investitionen und Internationalisierung, www.wirtschaft-in-sachsen-anhalt.de OR http://www.unternehmen-und-gruender-in-sachsen-anhalt.de/fileadmin/SOM/SOM_Allgemein/Downloads_und_Uploads/Printprodukte_MW_MLV_Co/Mittelstandsoffensive_Sachsen-Anhalt.pdf

Ribeiro, B.E. and Millar, K. (2015) Public engagement in the bioeconomy: outlining an analytical framework for BioSTEP, BioSTEP working paper, University of Nottingham.

<http://www.greenchemistrycampus.com/en/news/deloitte-biobased-delta-globally-competitive-to-valorize-sugars-into-biobas>, accessed on 30 August 2016.

<http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/wer-sind-die-wiso-partner/>, accessed on 23 August 2016.

<http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/>, accessed on 23 August 2016.

<http://en.bioeconomy.de/leading-edge-cluster/cluster-region/>, accessed on 12 August 2016.

<http://www.cbp.fraunhofer.de/>, accessed on 23 August 2016.

10 Annex: Regional case studies

- Scotland
- South-West Netherlands
- Saxony-Anhalt
- Veneto

Scottish case study: National Plan for Industrial Biotechnology

July 2016

David Charles, Sara Davies, Steve Miller, Keith Clement

EXECUTIVE SUMMARY

This report presents the regional case study of the bioeconomy strategy in Scotland. It takes as its central case the development and implementation of the Scottish National Plan for Industrial Biotechnology, which is the main initiative in the bioeconomy in Scotland. The plan emerged from an industry leadership group for the Scottish chemicals industry, supported by Scottish Enterprise as the economic development agency for Scotland. The plan was developed by a development group with representatives from industry, government agencies and universities, and was launched in 2013. Four thematic programmes are currently being implemented (development of a biorefinery, industry engagement, innovation centres with universities and skills development) each supported by a task force drawing on stakeholders.

There has been no direct public engagement in the development of the plan, although the documentation of this plan, and a number of parallel initiatives from Scottish public bodies has been made public over the web. No NGOs were involved in discussions, although they seem to have little direct interest or knowledge of industrial biotechnology, and have chosen to pursue other interests. The partners in the national plan for IB also have limited expertise in public engagement, and it has largely been left to the universities and firms to publicise their activities and develop direct forms of engagement. So far the universities and a new Industrial Biotechnology Innovation Centre have been most involved, but mainly through dialogue within the education sector. The challenge of greater engagement with the wider public remains, and is illustrated by a UK national engagement exercise using a citizens' jury which found that the public had very little understanding of industrial biotechnology, had some concerns about such novel technologies, but had positive attitudes to job creation and carbon emission reductions.

1 Introduction

1.1 Study focus

There is no single overarching bioeconomy strategy in Scotland, but instead the bioeconomy loosely covers a number of areas of strategy development in Scotland. The Scottish chemicals and life sciences industry together with Scottish Enterprise and the Scottish Government have however prioritised the concept and sector of 'industrial biotechnology' (IB). This is closely associated with the long development and investment in the Life Sciences sector (identified as one of the growth sectors in the Scottish Economic Strategy and documents on smart specialisation) and Chemical Sciences (as an already established large strategic asset in Scotland), also encompassing the development of renewable energy and sustainable technology¹¹.

¹¹ The Scottish National Plan for Industrial Biotechnology sees IB as being positioned 'at the interface of chemical, life sciences and engineering' and applied across a wide range of sectors including energy and food and drink. It is defined as 'the use of biological resources for producing and processing materials into desired intermediate and final products including energy and high value chemicals'.

This case study therefore primarily focuses on the Scottish National Plan for Industrial Biotechnology¹², although taking account of several other strategies closely linked to it (particularly the Biorefinery Roadmap for Scotland, but also, e.g., the Strategic plan for the Chemical Sciences in Scotland or the Scottish Life Sciences Strategy).

1.2 Research design

The study involved desk research based on official documents and policy reports, semi-structured interviews with Scottish participants, a workshop for interested parties, and qualitative data analysis.

1.2.1 Stakeholder interviews

Interviews were requested with a range of stakeholders who were involved in the development of the strategy or were in the broad bioeconomy and also with representatives of civic society. 13 interviews were completed with 14 people, mainly on a face-to-face basis, although one was conducted by telephone. six interviews were with representatives of Scottish government agencies, two were with university representatives, four were from a business background, and there was one local government councillor representing civic society. A number of NGOs were contacted and asked if they would be willing to be interviewed but all refused on the basis that they had no views on the Scottish IB strategy or had no expertise in the field.

All interviews were undertaken on a basis of confidentiality and anonymity.

1.2.2 Regional event

A regional workshop was held at the University of Strathclyde in Glasgow on the 27th June 2016. This meeting raised a number of questions which had emerged from the interviews and focused on three main themes:

- Why engage with stakeholders?
- Who should be involved in regional bioeconomy strategies?
- How should different people and organisations be involved in regional bioeconomy strategies or activities?

Invitations were sent out to a mailing list comprising those involved in interviews, others identified by local stakeholders as being involved in the bioeconomy, and EPRC's mailing list of the Scottish economic development policy community. 12 participants registered for the workshop and 8 attended and contributed to a very informative and active discussion. All the participants represented Scottish government or university bodies and all had some direct interest in the industrial biotechnology sector or its policy impact.

2 The background of the strategy

2.1 Regional policy context

Scotland's bioeconomy reflects its overall economy as a curious mixture of the traditional and the high tech. Scotland's peripheral location in the UK and Europe, and the extreme sparsity of population in much of its territory is illustrated by large areas with marginal agriculture and wilderness, with small pockets of industry including the most successful export industry, whisky. Yet in the central belt of Scotland there are also extensive old industrial areas, formerly based on heavy engineering and

¹² Scottish Enterprise (2013) National Plan for Industrial Biotechnology – Towards a Greener, Cleaner 2025. November 2013, Glasgow

which continue to experience reconversion. Newer industries, though, are also represented through the oil-based economy of the East coast, and concentrations of high technology and global finance in Edinburgh, Glasgow and the other cities.

Life sciences have emerged in a number of areas, arising in part from the strong higher education sector, and from other specialist research institutes – world leading developments such as the world's first cloned sheep (first mammal cloned from an adult cell) have stimulated the emergence of a small group of biotechnology firms in Scotland. Other parts of Scotland's more traditional industries have sown the seeds of a wider set of bioeconomy firms: bioenergy is a growing sector based on the use of food waste and the by-products of the whisky industry; new opportunities are being recognised in the marine sector along the Western coastline and islands; and a well-established chemicals industry includes large pharmaceutical companies and refining operations with the potential for new bio-based operations.

The bioeconomy has a natural role in the wider economic strategy of the Scottish Government, given its emphasis on renewable energy (and hence bioenergy), its emphasis on high technology, science-led development drawing on university research, and support for export oriented sectors such as chemicals and whisky.

Scotland has potential for the development of the bioeconomy based on a number of potential feedstocks, although there is some debate about the scale and availability of various feedstocks, and hence the scale of biorefining that could take place:

- Scotland has considerable forestry, although small relative to Scandinavian countries, and much of the current output is already dedicated to existing markets. There may be a potential for slightly increased extraction but economically and environmentally some material needs to be left on site to stabilise and replenish soils.
- There is increasing interest in alternative use of food waste, but there is considerable and growing capacity for anaerobic digestion to convert food waste to biogas, which means this would not be available for other forms of biorefining.
- Whisky byproducts in the form of draff and pot ale can be used in bioprocessing and Scotland has considerable production levels of whisky. Much of this material was previously used by agriculture as fertilizer, but at a cost to the whisky industry, whereas new applications to produce biofuels generate revenues instead.
- Future potential is offered by marine algae as Scotland has very large potential growing sites on the West coast with a combination of an extensive and convoluted coastline, relatively shallow water and relatively warm water from the Gulf Stream. There has been little exploitation of this source yet and remains at the proof of concept stage.

The principal institutions for economic development in Scotland include the Business Directorate of the Scottish Government, the two economic development agencies – Scottish Enterprise and Highlands and Islands Enterprise – and their related specialist agencies such as Scottish Development International (responsible for international investment). A set of institutions related to the research and higher education sector including the Advanced Learning and Science Directorate, the funding body Scottish Funding Council, the Scottish Chief Scientific Advisor, and a set of UK national bodies funding research across the whole of the UK, such as Research Councils UK.

The Scottish strategy is set in the context of a UK-wide approach to the bioeconomy and industrial biotechnology, which has been developing over the past decade. A UK Industrial Biotechnology Innovation and Growth Team (IB-IGT) was established by the then Department of Business Enterprise and Regulatory Reform in November 2007. This was tasked with identifying opportunities for IB and developing suitable strategies and policies, and produced a 2009 report on 'Maximising UK Opportunities from IB in a Low Carbon Economy'¹³, also known as IB-2025. The Government accepted its

¹³ IB-IGT (May 2009) 'IB 2025 Maximising UK Opportunities from Industrial Biotechnology in a Low Carbon Economy.' Available from <http://webarchive.nationalarchives.gov.uk/20090609003228/http://www.berr.gov.uk/files/file51144.pdf>

recommendations¹⁴ and established an IB Leadership Forum, investing in a series of facilities, networks and grant schemes¹⁵. Significant national funding has been made available for academic research in IB through the Biotechnology and Biological Sciences Research Council (BBSRC), notably through its strategic plan of 2010-15, 'The Age of Bioscience'¹⁶. Funding for IB research has increased to £30 million and BBSRC has established the BBSRC Sustainable Bioenergy Centre (BSBEC) at a cost of £24 million, and the Integrated Biorefineries Initiative (IBTI Club).

More recently, the UK government has emphasised the use of the bioeconomy to create opportunities from waste as feedstock¹⁷.

Whilst these policy initiatives have been generally developed through fora involving scientists and business representatives, there has been some parallel work on public dialogue. One example of this was the Sciencewise Expert Resource Centre (Sciencewise-ERC) funded by the Department for Business, Innovation and Skills. Sciencewise ERC undertook a number of dialogue projects from 2005, one of which was focused on public perceptions of IB in late 2008, and fed into the IB-IGT report of 2009. This study which used a citizens' jury methodology found very little knowledge of IB in the general population and some fear of the unknown and a mistrust of government and industry. The main concern raised was over the use of GM technologies, although there was enthusiasm for replacing fossil fuels and the economic benefits of possible UK leadership in IB technologies¹⁸.

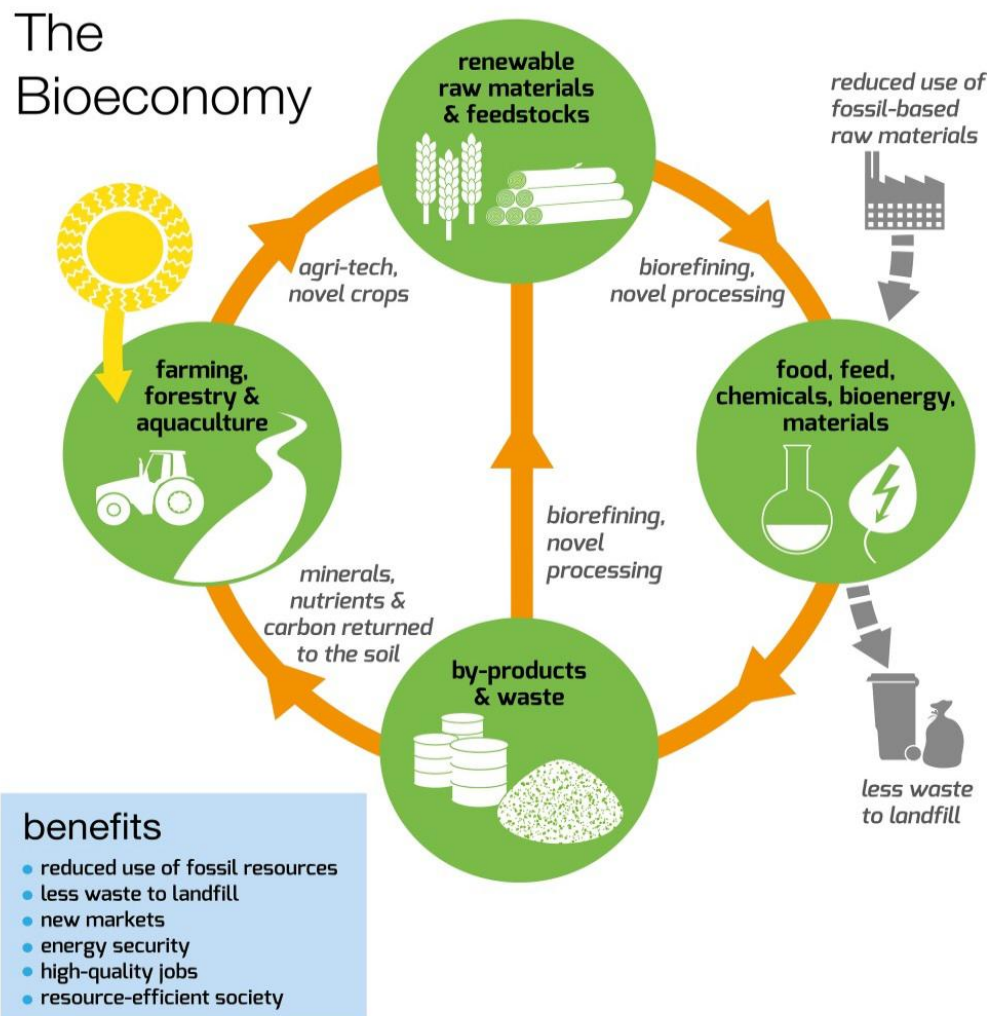
¹⁴ BIS (June 2009) 'Government Response to the Industrial Biotechnology Innovation and Growth Team Report to Government.' Available from https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/policy/UK_Government%20Response%20to%20the%20Industrial%20Bioetchnology%20IGT%20report.pdf

¹⁵ Technology Greenhouse Ltd (2011) Financing Industrial Biotechnology in the UK, Research paper, NESTA, London.

¹⁶ BBSRC (2010) 'The Age of Bioscience: Strategic Plan 2010-2015.' Available from: <http://www.bbsrc.ac.uk/documents/strategic-plan-pdf/>

¹⁷ HM Government (2015) Building a High Value Bioeconomy: Opportunities from Waste, BIS, London. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408940/BIS-15-146_Bioeconomy_report_-_opportunities_from_waste.pdf

¹⁸ Opinion Leader (2009) Public perceptions of Industrial Biotechnology A report prepared for the Department for Business Enterprise and Regulatory Reform (BERR) and Sciencewise. Available from <http://www.sciencewise-erc.org.uk/cms/assets/Uploads/Project-files/final-report.pdf>

Figure 1: Waste-based bioeconomy

BioVale. © 2015 All rights reserved.

2.2 Strategy development

The Scottish National Plan for Industrial Biotechnology was launched in November 2013.

Biotechnology was identified as one of the Scottish 'key industries' and comprised one of the pilot clusters launched by Scottish Enterprise in as early as 1997. This led to an extensive industry consultation and research and mapping phase, which culminated in the development of a cluster strategy and funding support from Scottish Enterprise. 'Biotechnology: A Framework for Action', a cluster strategy for Scotland, was formally approved by the Scottish Enterprise Board in 1999, and the Board supported investment of up to £38 million for the period 1999-2004 to deliver the Strategy.¹⁹

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http://www.scottish.parliament.uk/S4_EuropeanandExternalRelationsCommittee/Meeting%20Papers/Papers_for_webpage.pdf

From 2004 Scotland supported biotechnology through an Intermediary Technology Institute for Life Sciences, which supported market analysis, IP commercialisation and provided funds for projects. This scheme was closed in around 2010.

In 2009, the UK launched its Industrial Biotechnology strategy document IB2025 – ‘Maximising Opportunities from Industrial Biotechnology in a Low Carbon Economy’, which outlined the UK’s ambition for sustainable growth within the emerging bioeconomy. As part of this launch a roadshow was undertaken with a presentation in Scotland. However the leader of the roadshow was criticised for the presentation being too Southern England focused and there was concern in the audience to develop a Scottish dimension – a number of companies and academics at the time were interested in IB.

Scottish Enterprise suggested that stakeholders interested in IB should get involved in the Chemical Sciences Scotland industry group. A working group was established called the Scottish Industrial Biotechnology Development Group (SIBDG) with representation from business and academia and this developed the Industrial Biotechnology Innovation Centre in parallel with the development of the Scottish National Plan for IB.

Related strategic developments, in other countries, taking place since then are also likely to have had an impact upon strategic thinking in this area in Scotland as well. The Scottish IB Plan notes that ‘further strategic documents have since²⁰ been published – both in the US and EU – underlining the growing global importance of IB in achieving sustainable economic growth across a range of sectors’²¹.

In February 2012, Scottish Enterprise appointed Frontline to provide evidence on the contribution that IB makes to Scotland’s economy. This research, estimating the total economic contribution of the sector, based on available company and sectoral data, aimed to inform the development of a National Industrial Biotechnology Development Plan.²² The resulting report (‘Economic contribution of industrial biotechnology in Scotland’) used a variety of sources, including previous research commissioned by Scottish Enterprise, as well as information from members of the Industrial Biotechnology Development Group, and estimated that on an annual basis, IB contributes £61 million to Scottish GVA and supports 1103 full time equivalent jobs.

Other potential drivers for the development of a National Industrial Biotechnology Development Plan possibly included:

1. Increased awareness of the growth potential of IB, both nationally and internationally.

The Plan²³ notes that IB ‘has the potential to enable society to live more sustainably and businesses to compete more effectively’ and overall ‘offers the opportunity for sustainable growth in the future’. It sees the transition from an oil-based economy to a bio-based economy as holding the potential to transform businesses, the market place, and ‘our world as a whole’.

2. Increased understanding of the regional strengths and opportunities in the sector.

The perceived regional strengths (acknowledged in the Plan) include, among others: (i) academic excellence, (ii) presence of a range of leading companies in the field, (iii) ‘compact geography’ and abundant natural (marine and terrestrial) resources, and (iv) leadership (wherein the establishment of an industry-led Scottish Industrial Biotechnology Development Group and leadership groups across chemical sciences, life sciences and energy are seen as having been instrumental in establishing Scotland’s IB credentials and in developing the National Plan for IB).

²⁰ Since 2009, the launch of the IB2025

²¹ Scottish Enterprise (2013)

²²

<http://www.evaluationsonline.org.uk/evaluations/Browse.do?ui=browse&action=show&id=506&taxonomy=BUI>

²³ Scottish Enterprise (2013)

Overall, although IB was seen to be 'still in its infancy in Scotland', it was recognised that 'the foundations for a strong and vibrant industry' were present and so putting Scotland at the forefront of IB development was seen possible and necessary.

3. Preceding or parallel development of other related strategies, including:

- Platform for Growth – A strategic plan for the Chemical Sciences in Scotland 2012²⁴, which, among other things, emphasised the importance of developing IB and bio-based raw materials and chemicals as regional KETs. With regards to this 'emerging field' of IB, the plan noted Scotland's 'world-class skills' and encouraged greater uptake of bio-based processes through the Industrial Biotechnology Development Group²⁵.

The plan was developed through support and involvement of a wide range of stakeholders, including the Scottish Government, government agencies²⁶, trade and professional associations²⁷, as well as businesses, academic and educational institutions and 'interested others', and envisaged to continue partnership with all interested organisations.

- 'Scottish Life Sciences Strategy 2011 – Creating Wealth, Promoting Health', and 'Scottish life sciences strategy – achieving critical mass for sustainable growth' 2010, which, among other things, recognised the value of applying life sciences beyond healthcare and the need to promote industrial biotechnologies such as synthetic biology to develop greener sources of base chemicals.

The documents resulted from an industry-led series of consultations and discussions with almost 200 members of industry, academia, other research providers, NHS Scotland, policymakers as well as the wider biotechnology community. In order to develop and deliver the strategy, the Scottish Life Sciences Advisory Board was created, including stakeholders from industry, universities, research institutions, NHS Scotland, financial institutions, the Scottish Government and the Scottish Enterprise network.

2.3 Aims and objectives

The Scottish National Plan for Industrial Biotechnology aims to transform the competitiveness and sustainability of industries in Scotland by developing and applying IB within the emerging bioeconomy. The mission is to grow IB related turnover in Scotland to £900m by 2025.

Focus is put on the transition from an oil-based economy to a bio-based economy and a greater use of bio-based products. The Plan is expected to be delivered through four key themes:

- Industry engagement – helping to increase awareness and uptake of IB;
- Biorefinery/biochemicals – scoping out the potential for a biorefinery/biochemicals facility as the cornerstone for sustainable manufacturing in Scotland (including the development and implementation of a roadmap towards a Scottish Biorefinery);
- Skills – helping to address any skills shortages/barriers to developing IB;
- Innovation Centres – developing Scotland-based biotech innovation centres and positioning Scotland as a leading hub for IB innovation.

²⁴ An update to the 2007 Chemical Sciences sector strategy

²⁵ The Plan also mentioned the establishment of the Industrial Biotech Development Group 'to develop a cohesive approach for Scotland' as one of the 'achievements to date'

²⁶ Scottish Enterprise, Scottish Development International, Scotland Europa, Skills Development Scotland, Scottish Funding Council, the Scottish Environment Protection Agency

²⁷ Including the Chemical Industries Association, Royal Society of Chemistry, Institution of Chemical Engineers, Chemistry Innovation, Biosciences KTN, Cogent, National Skills Academy for the Process Industries, Health & Safety Executive, Interface, ScotCHEM, the Scottish Manufacturing Advisory Service

Among other things, the Plan outlines Scotland's key strengths and challenges in the sector, as well as key milestones to measure progress, looking at targets for 2015, 2020 and 2025.

Table 1: Targets for the Scottish Plan for IB

	Key Statistics 2013	Targets for 2025
Companies actively involved in IB	43	200
Estimated turnover	£189m	£900m
Direct employees	1,103	->2,500
GVA contribution	£61m	->£250m

Source: Chemical Sciences Scotland (2014)

Implementation of the Plan (in particular, its key theme 'Biorefinery/biochemicals') led to the development of the **Biorefinery Roadmap for Scotland**. The document (2015) presents the next step in meeting the goals set as part of the National Plan for IB, supporting the aim to develop cost-effective technologies to convert sustainable feedstocks into high value chemicals, biofuels and other renewable products for a range of industries. It sees biorefining crucial for driving Scotland's low-carbon agenda and contributing to the country's emerging bioeconomy.

3 Overview of actual participation in the strategy

3.1 Actual participation in the strategy's design

The origins of the Scottish National Plan for Industrial Biotechnology was in the industry group Chemical Sciences Scotland. CSS was set up as one of several industry bodies in Scotland with membership from companies, academics and government with the aim to develop appropriate policy responses and industry initiatives to promote their industry. The industry group established a number of task sub-groups in order to develop specific initiatives and one of these sub-groups was defined around industrial biotechnology – this was seen by the chemical industries as a potentially significant new process for transforming chemical refining with a switch of feedstock from petroleum to biomass.

The Scottish Industrial Biotechnology Development Group (SIBDG), a working group of Chemical Sciences Scotland, a cross-sectoral collaboration between industry, academia, and the public sector, among others, included representatives from Ineos, GSK, Sasol, Ingenza, Celtic Renewables and the *Chemical Industry and Biodiscovery Knowledge Transfer Networks*. The work was strongly supported by the Scottish government.^{28,29}

²⁸ <http://www.specchemonline.com/articles/view/scotland-sets-industrial-biotech-target#.VoK3XxV97IU>

²⁹

http://www.heraldscotland.com/business/13132565.Plan_to_help_firms_tap_into_lucrative_biotech_sector/

Infobox 1: Other relevant strategic documents in Scotland

- Zero Waste Plan (2010). A forerunner in articulating an ambition for a zero waste society; recognised waste as a resource and set out some of the most ambitious national recycling targets globally.
- Safeguarding Scotland's Resources programme (2013). A Scottish Government programme to reduce waste and create a more productive and circular economy. Part of the Zero Waste agenda and economic strategy. Commits to actions with an immediate impact in Scotland's resource consumption – encouraging a reduction in the amount of raw material consumed by wasting less and using the finite resources more efficiently.
- A Low Carbon Economic Strategy for Scotland: Scotland – A Low Carbon Society (2010). Is an integral part of the Government's Economic Strategy and a key component of the broader approach to meet Scotland's climate change targets and secure the transition to a low carbon economy in Scotland.
- Scotland's Economic Strategy (2015³⁰). Is significantly focused on sustainable economic growth and a drive towards a low carbon and circular economy. Articulates the Scottish Government's support for economic growth focused on six Growth Sectors, including Life Sciences and Energy (incl. renewables).
- 2020 Routemap for Renewable Energy in Scotland (2011³¹ and 2013). Among other things, stress Scotland's massive green energy potential and call for a better use of biomass. Contain a sectoral routemap for Bioenergy and Energy from Waste and put focus on 'second generation' biofuels made from materials such as landfill, agricultural or forestry waste and marine algae.
- Scotland Can Do (2013). An enterprise and innovation strategy, among other things stressing that Scotland has been 'recognised as the best place in the UK to start a life science business'.
- Paper on Key Enabling Technologies (2014). Marks out IB as one of Scottish KETs. Emphasises key strengths in the IB domain³², concluding that IB 'is likely to become a key element of the Scottish economy in the coming years'.

The creation of such an industry-led IB development group and the establishment of leadership groups across chemical sciences, life sciences and energy is noted to have been 'instrumental in establishing Scotland's IB credentials' and in the development of the National Plan for IB, as well as in its delivery. The Plan is based on work that Scottish Enterprise has done with two 'industry leadership groups' made up of academics, actors from industry and public sector bodies working together on industry growth opportunities: Chemical Sciences Scotland and Life Sciences Scotland.

In a similar vein, the Biorefinery Roadmap for Scotland is an industry-led document that was prepared by the SIBDG, supported by Scottish Enterprise.

Despite a number of public bodies being involved in the development of the strategy, some were not included despite having some relevance. Scottish Renewables for example was not involved in the strategy, but has been focused on other strategies including the 2020 Routemap for Renewable

³⁰ And previous versions

³¹ An update to the Scottish Renewables Action Plan 2009

³² E.g., academic strengths, a clear IB strategy endorsed by industry and academia, as well as strengths and opportunities in the areas of biofuels, sustainable chemicals from waste, biomass and marine sources, biorefining and chemical and pharma manufacturing base 'looking to move into IB'.

Energy in Scotland, and the Heat Policy Statement³³. Scottish Renewables contributes to the development of the renewable energy sector, including bioenergy, through membership of two Industry Leadership Groups::

- The Renewable Industries Advisory Group (RIAG)
- Scottish Energy Advisory Board (SEAB)

RIAG and SEAB are two of the 15 Industry Leadership Groups, alongside Chemical Sciences Scotland, the Life Sciences Advisory Board (LISAB) and others.

Individual citizens and community representatives

The National Plan for IB has so far not involved the general public or any NGOs in its design or implementation. At the same time, some other strategic documents in Scotland, related to IB, are noted to have been developed through consultations with the wider public (as well as a broad range of different stakeholders).³⁴

As already noted the plan has involved a range of government bodies which in some senses represent wider public interests, such as Zero Waste Scotland, but the focus has remained with those bodies that have a direct stake in biotechnology. Local authorities for example have not been involved, despite being involved in a wider set of bioeconomy issues both locally (biogas initiatives for example) and at a European scale (through for example the Committee of the Regions).

So far the IB plan has been published on the Scottish Government website, but has not been a focus of any kind of wider public consultation or exhibition reaching out to the general public. There is however interest among some of the industry and government stakeholders for wider engagement, and hence an interest in how BioSTEP can help raise public interest through an exhibition linked to the European Forum for Industrial Biotechnology in Glasgow in October 2016.

NGOs seem to have played a very passive in the bioeconomy in Scotland. Although there was strong lobbying against GM crops in the past, the main environmental NGOs expressed little interest in the Plan for IB and were unwilling to be interviewed as they had had no engagement with the plan and had nothing to say.

³³ The Heat Policy Statement (2015), 'Towards Decarbonising Heat: Maximising the Opportunities for Scotland', is a statement for future policy direction regarding the transition to low-carbon heat. It covers heat demand and reduction, heat networks and storage, and heat generation. Only the last one is really of relevance to the bioeconomy. The document does refer to power generation from biogas and biomass.

³⁴ For example, the Strategic plan for the Chemical Sciences in Scotland was developed through involvement of a wide range of stakeholders, including trade and professional associations, educational institutions and 'interested others'.

A large public consultation in 2009-10 involving 160 members of the UK public in three workshops, preceded by 41 stakeholder interviews (with scientists, engineers, social scientists, religious groups, NGOs, consumer groups, industry, funding agencies and government) aimed to elucidate the opinion of different groups on the topic of Synthetic Biology. A specific report was prepared by the Scottish Science Advisory Council on the Opportunities of Synthetic Biology for Scotland (September 2014), and a number of groups and individuals were consulted during its development.

The consultation paper 'Making things last – Consultation on creating a more circular economy in Scotland' (August 2015) (as the first step in preparing a circular economy strategy for Scotland) explores the priorities for building a more circular economy, building on Scotland's progress in the zero waste and resource efficiency agendas. The proposals have been informed by a period of debate in Scotland in the first half of 2015. In this context, a number of reports for discussion were published, and workshops and events with different groups were organised.

In addition, the consultation paper 'Securing the Benefits of Scotland's Next Energy Revolution' (2010) sought views on how Scotland and its local communities could benefit fairly from renewable and low carbon energy sources.

3.2 Actual participation in the strategy's implementation

The National Plan for IB is stated to be delivered by the Scottish Industrial Biotechnology Development Group³⁵, working through Chemical Sciences Scotland, across industry and other partners³⁶.

The Plan invites all stakeholders across private, public and academic sectors to work in partnership towards its delivery.

It foresees to 'engage more organisations within Scotland through targeted interventions and programmes of activities' and mentions several ways to promote such engagement.

For instance, 'Industry Engagement' as one of the Key Themes of the Plan aims to ensure that organisations have access to IB information to inform decision making and, through a programme of company engagement, to raise awareness of the benefits of applying IB in business across all relevant sectors.

A number of regional or national entities are mentioned in the Plan as working towards the delivery of specific themes of the strategy.

For example, the Chemistry Innovation Knowledge Transfer Network³⁷ is tasked with developing an approach on how a Network of Innovation Centres for IB should operate. Furthermore, it is envisaged that the Skills Topic and sub-groups of Chemical Sciences Scotland and Life Sciences Scotland will collaboratively develop skills programmes and activities with delivery partners including the National Skills Academy for the Process Industries, the Sector Skills Council and Skills Development Scotland. Industrial partners are also involved into the delivery of the 'Skills' theme of the Plan³⁸.

A Scottish Innovation Centre for Industrial Biotechnology, establishment of which was envisaged in the Plan, was launched in January 2014 (**IBioIC** – Industrial Biotechnology Innovation Centre), and plays a central role in the implementation of the IB strategy.

Set up to bridge the gap between education and industry across the life and chemical sciences and renewable energy sectors, IBioIC helps to stimulate the growth and success of the IB industry in Scotland. The Centre is at the hub of industry, policy makers, NGOs and academia, promoting commercial application for new technology and offering support for projects that 'bring biotechnology closer to industrialisation'. IBioIC is currently supported by more than 25 companies and has the commitment of 13 Scottish HEI partners.

A Governing Board, responsible for formulating and implementing the Centre's policies, as well as the Commercial and the Scientific Advisory Boards, apart from industry and HEI members, include observers from Scottish Enterprise and Highlands and Islands Enterprise. Along with 'supporters and stakeholders', industry, academia and funding bodies, IBioIC activities aim to engage with professional groups and the public.

In addition, development and implementation of a roadmap towards a Scottish Biorefinery was envisaged in the National Plan for IB as an important tool of delivering its objectives. The resulting **Biorefinery Roadmap**, similarly to the Plan, invites all stakeholders across private, public and academic sectors to work in partnership on its implementation.

³⁵ Scottish Enterprise (2013)

³⁶ https://consult.scotland.gov.uk/zero-waste-delivery/making-things-last/user_uploads/making-things-last.pdf

³⁷ A UK-wide Knowledge Transfer Network, as Scotland's vision 'to create a world leading centre for enabling and promoting the commercialisation of IB across a range of sectors important to the UK economy' is aligned with that of the UK strategy

³⁸ For instance, it is noted that industrial partners are closely involved in the design of courses for industrially relevant IB MSc and PhD programmes and host student placements to ensure the ongoing relevance and benefit to companies and students (Scottish Enterprise (2015) The National Plan for Industrial Biotechnology 2015-2025 – Building on Success)

The document specifies the different entities that are expected to contribute to implementing each of its Key Actions. Institutions expected to lead in the implementation include, e.g., IBiolC, Scottish Enterprise, Highlands and Islands Enterprise, Scottish Development International, as well as Chemical Sciences Scotland, Forestry and Timber Technology Industry Leadership Group, Zero Waste Scotland, Seaweed Industry Association, Scottish Association for Marine Science, Knowledge Transfer Network; support from the Industrial Biotechnology Development Group is also expected.

In line with the National IB Plan, the Roadmap further defines the importance of industry engagement for the future of the bioeconomy and to the benefit of society.

Individual citizens

The National Plan for IB and the Biorefinery Roadmap do not allocate any direct role to individual citizens (or to civil society stakeholders) in the implementation. Despite this, some of the measures outlined in the National Plan for IB target the wider public, notably:

- Measures covered by the ‘Skills’ theme, envisaging a programme of targeted training and development;
- Marketing and communication measures as ‘underpinning activities’, which aim to support awareness and understanding of the benefits and opportunities presented by IB.

In addition, some of the regional initiatives contribute (directly or indirectly) to promoting broader public participation in the delivery of the Plan’s objectives. One may note in this regard:

- Public engagement initiatives by IBiolC and the Scottish Association for Marine Science (SAMS).
- The Scottish Initiative for Biotechnology Education (SIBE), which promotes engagement with biotechnology through interactions with the scientific community, school students, teachers and the general public. SIBE is comprised of science communicators at the University of Edinburgh who develop educational resources, run biotechnology workshops in schools, organise public science events, and train researchers to communicate their research to schools and the public. Partners and funders include, among others, Scottish Government and SAMS.
- Powering the Future, an interactive exhibition in Glasgow’s Science Centre (opened December 2015), which aims to encourage an informed debate on how best to ensure a secure, affordable and low carbon energy supply.
- Public education and awareness raising activities by the Highlands and Islands Enterprise, which recognises the need to raise public awareness of renewable energy development and the opportunities and challenges it presents. The initiatives include, e.g., a renewable energy toolkit made available in every primary school in the region and the Big Green Challenge debating competition.³⁹

Otherwise, some other regional strategic documents related to IB foresee the role of the wider public in the implementation and envisage measures targeting individual citizens⁴⁰.

³⁹ Scottish Government (2011) 2020 Routemap for Renewable Energy in Scotland. Edinburgh 2011.

⁴⁰ For example, the Scottish Life Sciences Strategy notes that achieving its vision requires a combined effort from all parts of society, including companies, the public sector, the research community as well as ‘the people of Scotland’. To help in implementing the strategy, a Life Sciences Alliance across industry, academia and public sector organisations was established, and it is noted that it needs ‘to engage on a broader front’ with the society.

A Public Engagement Strategy ‘Low Carbon Scotland’ was developed in 2010, addressing the objectives set in the Climate Change (Scotland) Act 2009. It aimed to inform people in Scotland about the climate change targets, encourage them to contribute to the achievement of those targets and identify actions needed for this.

Overall though engagement with the public is left to individual members of the strategy group. Scottish Enterprise do not see public engagement as part of their responsibility, but see this as something that should be led by the universities, IBiolC and the companies. Even then though public engagement is primarily seen as communication rather than consultation.

3.3 Actual participation in the strategy's review

The National Plan for IB identifies a series of short and long-term milestones to measure the progress, setting targets for 2015, 2020 and 2025. The Roadmap defines a set of key actions to be realised by 2017 as well as beyond 2017. The measures proposed tend to focus on economic outcomes such as the growth in the sector in terms of value added and employment as well as the achievement of particular deliverables such as the biorefinery.

The ongoing review of the strategy will be undertaken by Chemical Sciences Scotland and the SIBDG in conjunction with Scottish Enterprise, so this involves the same set of stakeholders as noted above. There are no plans at present for the involvement of different groups in the review of the strategy. In 2016 a review was carried out comparing 2015 targets with actual outcomes. After just two years of the strategy the then modest targets for growth in turnover and numbers of companies involved in IB were achieved.

4 Reflection on possible participatory approaches

According to the Plan, engagement of different stakeholders may help to 'respond to new opportunities as they arise' and ensure that IB 'will deliver maximum benefits to companies and society' and 'secure a more sustainable future for our industries'.

The Roadmap similarly notes that 'only by joining forces' of stakeholders across private, public and academic sectors would it be possible to 'grow a sustainable and vibrant biorefinery industry for the future benefit of society and the economy'.

Views from interviewees were mixed over the benefits of wider participation in the regional bioeconomy strategy. It was accepted by all that the current participants in terms of core bioeconomy firms, universities and government agencies should be centrally involved in the development and implementation of the strategy. Some interviewees saw the need for a broadening of the stakeholder base, identifying the need to gain greater public understanding and support for the developments. This included for example through education to help stimulate the enthusiasm of young people who would be needed to form the next generation of employees in the growing sector. It was also acknowledged that any future biorefinery project would need public acceptance when it came to planning applications.

However, there were some concerns that there were risks and challenges to wider engagement. One problem was over the lack of public understanding of the technology and the risk that raising awareness might lead to public fears connected with previous debates on GMOs. Scotland has a policy of not permitting the planting of GM crops, and whilst it is recognised that industrial biotechnology is different in nature, there were concerns about potential negative responses at a time when the nature of the technology and potential applications was still under development. A second concern was over possible negative responses from businesses in related sectors which might consider IB as a competing technology. One interviewee explained he was looking to gradually involve other firms once the implications and opportunities were clearer, to avoid a knee-jerk negative reaction. A final issue was that it was a difficult technology to explain to the public and many of the existing stakeholders were unsure how to get the message across. In the regional event there was considerable discussion over different strategies to connect to the public

A key potential stakeholder that could help to build a link to the wider public is the local government sector, whether through individual local authorities and councillors or through the Convention of Scottish Local Authorities (CoSLA). For example Councillor Tony Buchanan from East Renfrewshire was elected to be a delegate to the Committee of the Regions on behalf of CoSLA and as a consequence is now Vice President of the CoR's Commission for Natural Resources (NAT) which has a specific focus on the bioeconomy. More generally local authorities have interests in waste management and disposal and hence the circular economy, as well as in job creation in the rural economy where opportunities exist for new bioeconomy activities. However there seems to have been little direct input from local authorities into discussions on the plan for IB.

As one interviewee stated, 'I think there should be wider consultation and participation. I think that at the moment... it tends to be industry-led [and] therefore private sector-led. And therefore people will be wary of it when it comes to something that may potentially be on their doorstep.'

5 Outlook/prospects with regard to the further development/implementation of the regional strategy

It is expected that the current national Plan for IB will continue to be implemented and targets through to 2025 have recently been re-confirmed. No significant changes in direction or programme have been announced.

Each of the task groups within the SIBDG continue to work on their thematic objectives, with members drawing on their own resources to implement the plan. So, for example, public bodies involved such as the Forestry Commission Scotland are commissioning research that will help to implement the plan. Overall the core objective remains to attract investment into a biorefinery, and this is underpinned by support for skills, industry engagement and links with universities.

In terms of wider engagement, this responsibility is left for the different partners in SIBDG to implement, but is not a central objective of the plan.

IBioIC, along with other regional and national entities, is expected to continue implementing measures that aim to engage different stakeholders into IB. For example, on 28-29 January 2016 IBioIC organised its 2nd Annual Conference⁴¹. It showcased IBioIC's activities and provided networking opportunities to facilitate further collaborations, attracting over two hundred bio-based professionals, academics and students from across the UK.

Furthermore, IBioIC, along with Scottish Enterprise, the Scottish Exhibition & Conference Centre, Glasgow City Marketing Bureau and partners such as the Knowledge Transfer Network and Innovate UK, will support the ninth European Forum for Industrial Biotechnology and the Bioeconomy (EFIB)⁴² that will take place in Glasgow on 18-20 October 2016. The event is expected to attract stakeholders committed to a shift towards renewable, biologically-based manufacturing, bring potential European business to Scotland and increase visibility of Scottish business opportunities. It is also expected to stimulate collaborative projects between Scottish and European organisations and institutions, allowing Scotland 'to further rise as a world leader' in IB.

IBioIC has some wider engagement activity with schools and university students. The new Scottish Curriculum of Excellence for students from 5-18 includes some elements of the bioeconomy, and IBioIC is sending out PhD students, all trained in engagement, out to schools to discuss the bioeconomy.

⁴¹ The first Annual IBioIC conference (22 January 2015) is noted to have been a success, providing a multidisciplinary forum for industrialists, educators, students and researchers to meet, present and discuss the impact of IBioIC and demonstrate the possibilities for Scottish IB

⁴² EFIB is a leading annual event in Europe for IB and the bioeconomy. It brings together a broad range of stakeholders throughout the bio-based community (including policy makers and industry experts) to discuss the key issues in the IB and bioeconomy fields.

Wider engagement is difficult though. Potential approaches include Scotland's Futures Forum, an initiative of the Scottish Parliament to address new developments and stimulate debate. There are opportunities to target the mass media, but limited expertise and knowledge within the IB community. There is no real discussion of a more constructive engagement though and concerns that in many other arenas such as planning there is a degree of engagement overload among community organisations, which then focus only on their top priorities.

A final opportunity is that Scotland is a model demonstrator region for sustainable chemicals, as part of an EU programme, and this may facilitate greater learning and experience of engagement through benchmarking with other regions.

List of references

BBSRC (2010) 'The Age of Bioscience: Strategic Plan 2010-2015.' Available from:

<http://www.bbsrc.ac.uk/documents/strategic-plan-pdf/>

BIS (2009) 'Government Response to the Industrial Biotechnology Innovation and Growth Team Report to Government.' Available from

https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/policy/UK_Government%20Response%20to%20the%20Industrial%20Bioetchnology%20IGT%20report.pdf

Chemical Sciences Scotland (2007) The Formula for Success A strategic plan for the Chemical Sciences in Scotland, CSC/Scottish Enterprise. Available from [https://www.scottish-enter-](https://www.scottish-enter-prise.com/~media/se/resources/documents/sectors/chemical%20sciences/chemical%20sciences%20scotland%20strategy%20formula%20success.pdf)

[prise.com/~media/se/resources/documents/sectors/chemical%20sciences/chemical%20sciences%20scotland%20strategy%20formula%20success.pdf](https://www.scottish-enter-prise.com/~media/se/resources/documents/sectors/chemical%20sciences/chemical%20sciences%20scotland%20strategy%20formula%20success.pdf)

Chemical Sciences Scotland (2015) The Biorefinery Roadmap for Scotland. Available from

http://www.sdi.co.uk/~media/sdi_2013/sectors/chemical%20sciences/biorefineryroadmapforscotland.pdf

European Parliament (2014). Horizon 2020: Key Enabling Technologies (KETs), Booster for European Leadership in the Manufacturing Sector European parliament, Brussels.

[http://www.europarl.europa.eu/RegData/etudes/STUD/2014/536282/IPOL_STU\(2014\)536282_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2014/536282/IPOL_STU(2014)536282_EN.pdf),

Frontline (2012) Economic contribution of industrial biotechnology in Scotland, Available from:

<http://www.evaluationsonline.org.uk/evaluations/Browse.do?ui=browse&action=show&id=506&taxonomy=BU1>

HM Government (2015) Building a High Value Bioeconomy: Opportunities from Waste, BIS, London.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408940/BIS-15-146_Bioeconomy_report_-_opportunities_from_waste.pdf

IB-IGT (May 2009) 'IB 2025 Maximising UK Opportunities from Industrial Biotechnology in a Low Carbon Economy.' Available from

<http://webarchive.nationalarchives.gov.uk/20090609003228/http://www.berr.gov.uk/files/file51144.pdf>

Opinion Leader (2009) Public perceptions of Industrial Biotechnology A report prepared for the Department for Business Enterprise and Regulatory Reform (BERR) and Sciencewise. Available from <http://www.sciencewise-erc.org.uk/cms/assets/Uploads/Project-files/final-report.pdf>

Scottish Government (2013) Zero Waste, Safeguarding Scotland's Resources: Blueprint for a more resource efficient and circular economy, Scottish Government, Edinburgh.

<http://www.gov.scot/Resource/0043/00435308.pdf>

Scottish Enterprise (2013) National Plan for Industrial Biotechnology – Towards a Greener, Cleaner 2025. November 2013, Glasgow

Scottish Enterprise (2015) The National Plan for Industrial Biotechnology 2015-2025 – Building on Success, Scottish Enterprise, Glasgow.

Scottish Government (2010) A Low Carbon Economic Strategy for Scotland: Scotland – A Low Carbon Society, Scottish Government, Edinburgh.

<http://www.gov.scot/resource/doc/331364/0107855.pdf>

Scottish Government (2010) Scotland's Zero Waste Plan, Scottish Government, Edinburgh.

<http://www.gov.scot/Resource/Doc/314168/0099749.pdf>

Scottish Government (2011) 2020 Routemap for Renewable Energy in Scotland. Available from

<http://www.gov.scot/Resource/Doc/917/0118802.pdf>

Scottish Government (2013) Scotland Can Do, Becoming a world-leading entrepreneurial and innovative nation, Scottish Government, Edinburgh. <http://www.gov.scot/resource/0043/00438045.pdf>

Scottish Government (2015) Scotland's Economic Strategy March 2015, Scottish Government, Edinburgh. <http://www.gov.scot/Resource/0047/00472389.pdf>

Scottish Government (August 2015) Making things last – Consultation on creating a more circular economy in Scotland, Scottish Government, Edinburgh.

Scottish Parliament (2013) European and External Relations Committee, Agenda and Papers, 7th February. Available from

http://www.scottish.parliament.uk/S4_EuropeanandExternalRelationsCommittee/Meeting%20Papers/Papers_for_webpage.pdf

Scottish Government (2009) Renewables Action Plan, Scottish Government, Edinburgh.

<http://www.gov.scot/resource/doc/278424/0083663.pdf>

Technology Greenhouse Ltd (2011) Financing Industrial Biotechnology in the UK, Research paper, NESTA, London.

Participative governance in the Biobased Delta (NL)

August 2016

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EXECUTIVE SUMMARY

This report presents the regional case study of the bioeconomy strategy in the south-western region of the Netherlands. It takes as its central case the development and implementation of the Biobased Delta (BbD) strategy. The BbD strategy was formed in 2010 by the Dutch provinces of Zeeland and Noord-Brabant, followed by the province of Zuid-Holland in 2014.

Currently, bioeconomy development in the BbD is at an initial stage. There is a general focus on developing the triple helix organisational structure; establishing the involvement and participation of government, businesses (particularly from the agro and chemicals sectors) and research institutions (universities). As of 2016, the BbD initiative aims to shift the main driving force from policymakers to industry partners.

Research undertaken amongst bioeconomy stakeholders for BioSTEP indicates that the BbD strategy has numerous examples of good practice in terms of how actors seek to involve stakeholders. However, NGOs in the region show limited interest in participating in initiatives relating to the bioeconomy; other topics are higher on their political agendas. The participation of citizens in the strategy is largely based around information campaigns and publicity.

Looking forward, three actions are identified which could improve participative governance in the BbD region: more upscaling towards the market; greater policy urgency; and better societal involvement.

1 Introduction

1.1 Study focus

In 2010, the Biobased Delta strategy was formed by the Dutch provinces of Zeeland and Noord-Brabant to stimulate the bio-based economy of the southwest of the Netherlands, thereby making the south-western region one of the front running regions in the bio-based economy in the Netherlands⁴³ (Figure 1). The region large agricultural, horticulture and chemical sectors, an advantageous geographic location (along the Antwerp-Rotterdam axis), and provides a setting for collaboration between multinationals, small and medium sized businesses (SMEs), knowledge institutions and government agencies. The provinces of Zeeland and Noord-Brabant anticipated that these regional conditions would be favourable for kick-starting the Dutch bio-based economy.

In 2016 over 150 entrepreneurs and many governmental agencies, research institutes and educational organisations participate in the Biobased Delta (BbD) initiative. The focus of the initiative is to realise bio-based innovation by organising a crossover between the agricultural and chemical industries located in the region.

⁴³ <http://biobaseddelta.nl/pagina/english>

Figure 1: Location of the south-western region in the Netherlands

Previous research undertaken for the BioSTEP project (Overbeek *et al.*, 2016) shows that broader forms of participation (societal groups rather than governments, knowledge institutes and industries in triple helix organisations) at regional level are limited in Europe. This is also the case in the BbD in the Netherlands. It might be assumed that broader forms of participation with more stakeholders and citizens would correlate with better opportunities for success (impact).

These opportunities or necessities depend on several contexts. Therefore, it is important to take account of the many views on the bioeconomy in terms of:

- **The sub-sectors and their impacts** - it has been explained (Hasenheit *et al.*, 2016) that the impacts of biofuels could be both positive and negative, while those of biomaterials (advanced generation of biomass) are more often considered to be positive. This might imply divergent action perspectives for stakeholders.
- **The phases of development** - it has been noted that some of the studied regions in Europe are at an initial or developing phase, whilst others are in phases of acceleration towards the market with more tangible results (Overbeek *et al.*, 2016). In the latter case, it may be easier to involve societal groups than in the initial/developing phase when the results are less tangible.
- **The types of stakeholder organisations and citizens involved** - although the triple helix between government, business and research institutions has been recognised, governance is restricted to the lower rungs on the ladder of participation, and focuses only on public initiatives (De Bakker *et al.*, 2016). This implies that the government is the *de facto* leading actor in public initiatives, in which the roles of citizens and stakeholders have been determined. However, the public has a strong potential role to play in receiving education and information, participating in open dialogue, and co-producing public knowledge. Less attention has been given to businesses and citizens as leading actors of private initiatives, in which the roles of the government have been determined. The roles of the government will change, but are still important to facilitate, direct or initiate private initiatives (Overbeek & Salverda, 2013).

Furthermore, forms of stakeholder engagement also depend on governmental strategies to stimulate national economies, i.e. strategies which focus on developing potential future markets, sectors and/or technologies, and strategies which boost the country's capacity to adapt smoothly to changing circumstances. In the Netherlands, the latter strategy of a "learning economy" (WRR, 2013) has been followed, which emphasises education for the population and a focus on regional centres of expertise that have lasting ties with the communities around them. One of the regional centres of expertise is focused on the bio-based economy and is located in the case study region.

To identify and to compare good practices between regions in Europe, the BbD case study region can be seen as:

- focussing both on biofuels and on biomaterials,
- in an initial or developing phase, and
- working with businesses in the lead, facilitated by the provinces, and including a regional Centre of Expertise for the BioBased Economy (CoE BBE).

The structure of this report is as follows. In Section 2, the background of the strategy in the Biobased Delta is analysed on the basis of desk research. In Section 3, the research methods (interviews, and a survey during a regional public event) are explained. The results of the interviews and the regional public event are explained in Section 4 and 5 respectively. In the final Section, 6, current and possible participatory approaches are reflected on.

1.2 Research Design

This study involved desk research based on official documents and policy reports, semi-structured interviews with participants, a workshop for interested parties, and qualitative data analysis.

See Section 3 for full information on research methods.

2 The Biobased Delta strategy background

2.1 The regional policy context

The Dutch national bio-based policy is mostly driven by economic objectives, as strategic and environmental legislation was mostly already in place at the time it was initiated (Biomass Research, 2016). A more-or-less full implementation is being pursued. This includes the implementation of a national policy, an implementation agency, R&D programme and regional and local implementation. A range of Dutch public research programmes have been instigated for research on biomass production and conversion into fuels, energy, chemicals and biomaterials. Bioenergy (biogas/anaerobic digestion, combustion and gasification) is profiting most from this support, while bioplastics and other biomaterials are emerging application fields (Biomass Research, 2016). The main investments in the south-western region were also in bioenergy. There is currently greater interest in investing in biomaterials, green chemistry, packaging, the construction industry (panels, berm grass poles) and infrastructure (crush barriers) (Kwant *et al.*, 2016). Most bio-based products involve the exploitation of industrial niches, such as natural fibres for construction material and sports equipment, bio-based plastics, plant-based colourants and bio-based cleaning products.

2.2 Strategy development

The Biobased Delta (BbD) initiative was set up as an informal collaboration of the provinces Zeeland and Noord-Brabant in 2010 and was financed by their provincial funds. It was concluded that the province of Zeeland could better initiate bio-based activities together with its neighbouring province of Noord-Brabant, as opposed to doing this alone (Buck Consultants, 2010). The provinces joined forces into one cluster cooperation in 2010, followed by the province of Zuid-Holland in 2014.

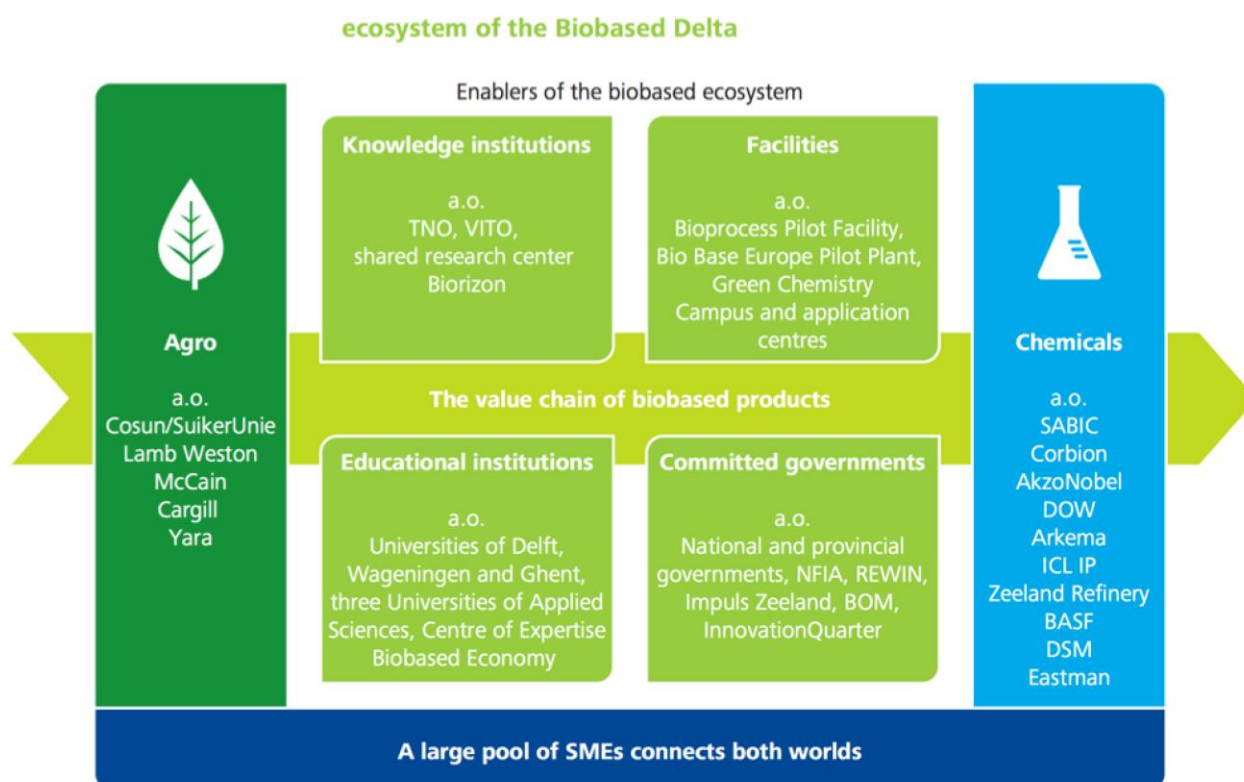
The cluster board BbD aims to support preconditions for the development of business, human resources and a good infrastructure. The cluster board became a foundation in 2014, in order to be-

come eligible for research project funding. It has responsibility for the main agenda – creating connections, identifying topics for consideration, building consortia, and enabling entrepreneurs to create connections (between small companies, between small and large companies, between companies and knowledge institutions and between authorities and financiers). The cross-sectoral aspect of the regional agenda resulted in small-scale bio refineries, new crops, new methods for pre-treating substances (proteins), and new inventions and areas of application.

Currently, bioeconomy development in the BbD is at an initial stage. There is a general focus on the triple helix organisation structure, and a search for public funding for research and development. The triple helix in the BbD includes government bodies (the economic departments of the three aforementioned provinces, the regional development companies REWIN and Impuls, some municipalities), several knowledge institutes and expertise centres (CoE BBE), and companies from the agricultural and chemistry sectors (ZLTO, DSM, Caribion, Sabic, Dow, Cargill, and Suiker Unie, for example).

The development agency REWIN seeks to bring businesses from agriculture and chemistry together. The municipality of Bergen op Zoom is seeking to diversify its employment structure by supporting new bio-based innovation. From 2010 until 2015, government agencies were the main driving force behind the BbD initiative. Now that the organisational structure is in place, the BbD initiative aims to shift the main driving force from policymakers to industry partners. This transition is already taking place: over 150 entrepreneurs are actively involved with BbD as of 2016. Figure 2 illustrates the ‘enablers’ of the BbD.

Figure 2: Overview of the enablers of the Biobased Delta



Source: Deloitte, 2015, p.12

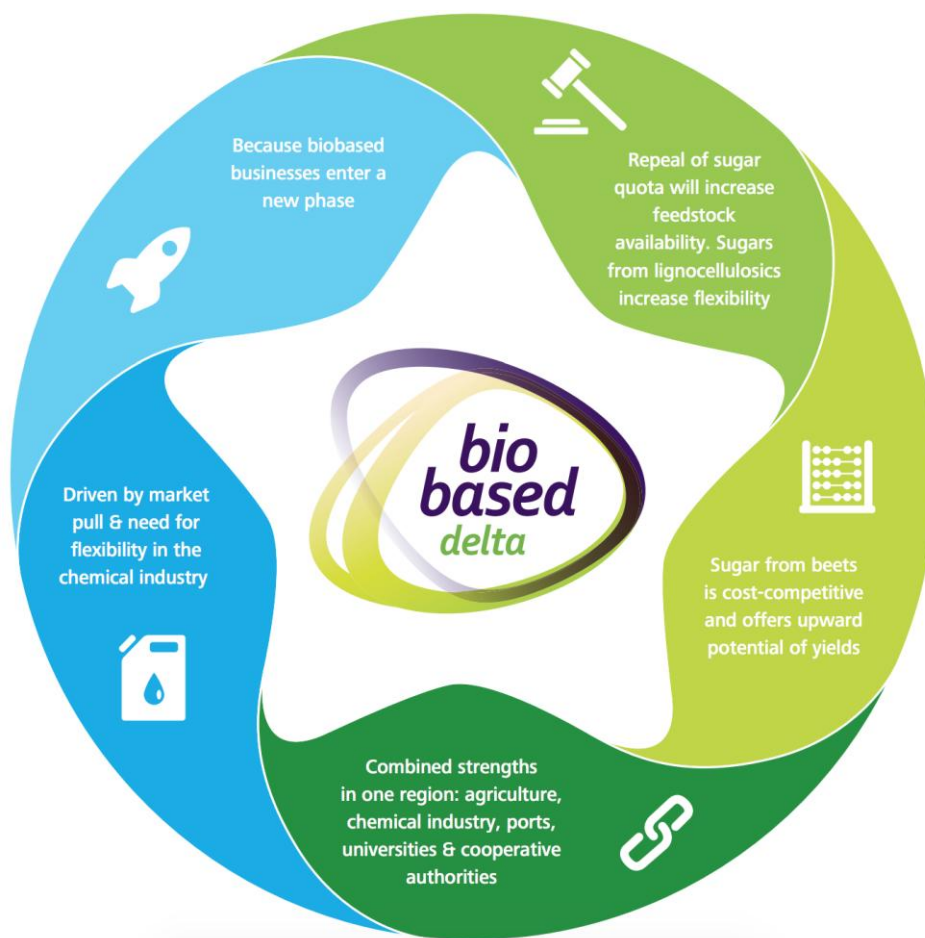
2.3 Aims and objectives

The Biobased Delta (BbD) initiative aims to promote the refining and conversion of biomass to usable products such as building materials and chemicals, including bulk, platform and speciality chemicals, fuels and polymers. Despite the favourable conditions of several agro and chemistry sectors and a well-developed infrastructure in the region, these sectors historically have little common ground on which to build new, explicitly bio-based activities. Therefore, BbD provides a focus for bioeconomy

activities in the region by organising a common business agenda, 'Agro meets Chemistry', in which many R&D institutes and firms in the region can express their willingness to participate in bio-economic activities (Biobased Delta, 2013).

Over the next five years, large scale production is expected to become better established within the market, in particular from the bio-refinery of sugar beet as a major activity in the bio-based economy (see Figure 3). Some products will be of the second generation type, derived from sugar beet pulp, which is produced as a by-product of sugar refinery. The sugar itself will be used in bio-based products.

Figure 3: The sugar beet bio-refinery business case

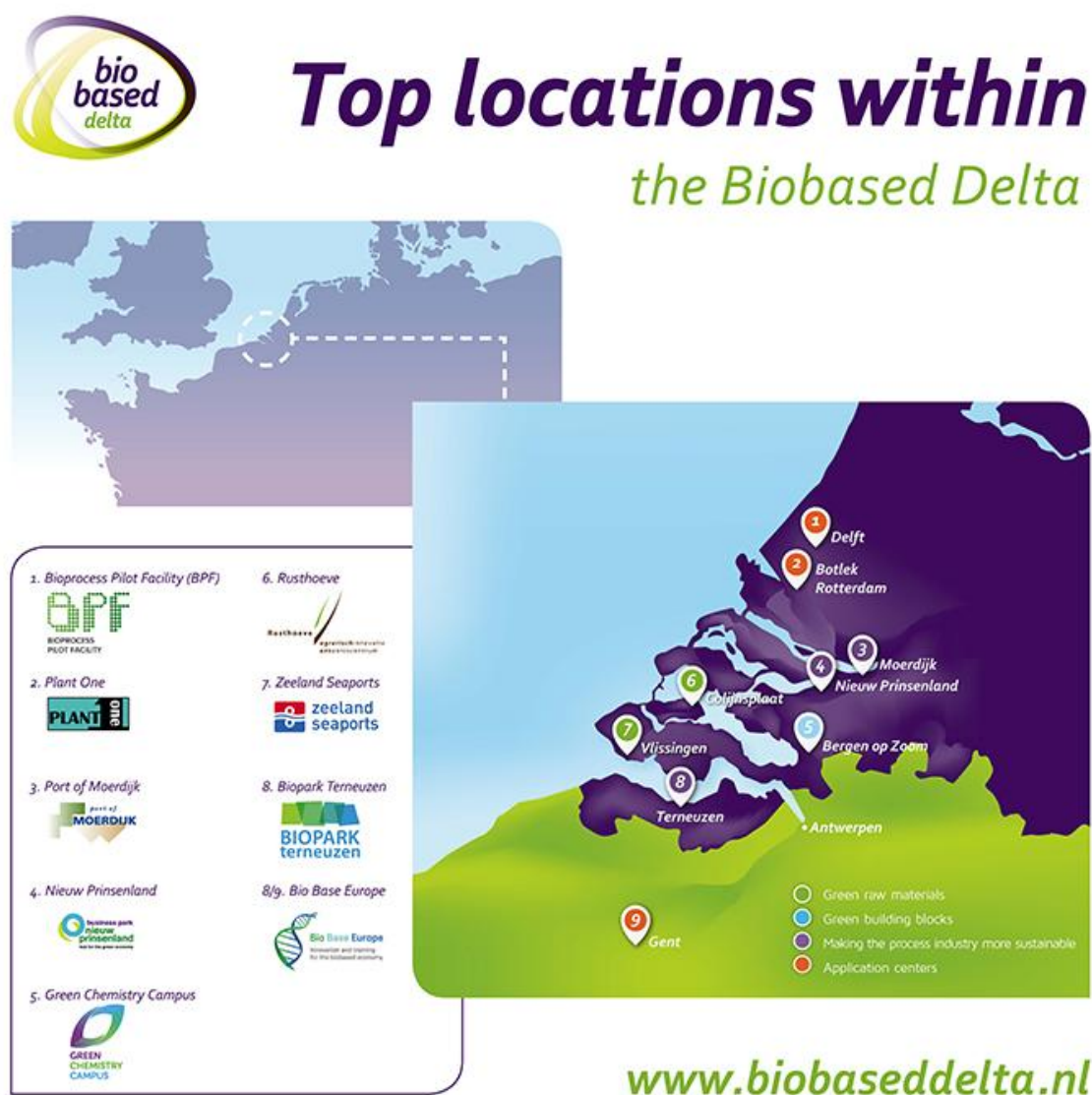


Source: Deloitte, 2015, p.17

Figure 4 shows the locations of the main bio-based projects. For example, Biopark Terneuzen is an industrial area that connected to a neighbouring greenhouse complex, which enables CO₂ and heat waste from the agro and chemical companies to be used in the greenhouse complex, to support the cultivation of fruit, flowers and vegetables. Other bio-based initiatives developed in this area include using the growth of algae to for water sanitation applications, and the arable farming location Rusthoeve (the BioBased Innovation Garden). This garden has 64 small plots to grow different types of crops that are potentially valuable to the bio-based economy. Tests are run with these crops in the nearby laboratory. The Bio Based Europe training centre also provides information about the bio-based economy to students, businesses, public bodies and other organisations. The centre offers

training, education, networking events, expositions and extension.⁴⁴ In addition to the projects presented in Figure 4, BbD also develops application centres for bio-polymers, natural fibres (already operational) and colourants respectively. In these application centres, tests can be run to develop new projects and visitors can see and experience bio-based products.

Figure 4: Overview of the main bio-based projects in the Biobased Delta region



The drivers for developing the BbD strategy in 2010 were (1) the valorisation for the economic case for sugar beet derived feedstock (Deloitte, 2014), and (2) interest from the provinces in supporting the economic base. After its initiation, a task force of regional and national government actors concluded that the economic structure in the region was coming under pressure (Taskforce Economische Structuurversterking, 2014). Established companies and multinationals were filing for insolvency, downsizing and/or relocating production. Recent closures in the region had resulted in a loss of jobs. Therefore the task force concluded that the best course of action would be to opt for a transi-

⁴⁴⁴⁴ <http://www.bbetc.org>

tion to a circular economy, with the bio-based economy as one of the three top innovative clusters. For the BbD, this will give rise to the accelerated adoption of three lines of action: sugar and lignin; strengthening of the knowledge infrastructure; and boosting entrepreneurship. However, despite the task force conclusion that it would be best to transition to a circular economy, this strategic choice was only given a prominent place in the provincial policy of Noord-Brabant (Provincie Noord-Brabant, 2015), and not in the other participating provinces (Provincie Zeeland, 2015; Provincie Zuid-Holland, 2015).

3 Research methods

3.1 Stakeholder interviews

There was strong interest amongst institutional bioeconomy stakeholders in the Biobased Delta region to participate in the BioSTEP project. None of the stakeholders which were contacted refused. The reasons for this result are twofold. Firstly, there is a mutual interest, because the interviewees would like to learn more from the other regional strategies in order to further develop participative governance. Secondly, given the initial development phase of the bio-based economy and the type of questions that are difficult to answer by citizens, institutional stakeholders were targeted.

Lists of prospective interviewees were developed through desk research focussing on relevant organisations in the region, and on contact referrals from the Director of the cluster board. The number of stakeholders was based on their divergent and convergent opinions to get a complete picture so far.

In total, interviews were held with 13 institutional stakeholders in the BbD in February and March 2016. They were representative of the following organisational types:

- Business organisations (2);
- Public bodies & hybrid agencies (4);
- Innovation (4): knowledge institutes, projects and regional development organisations; and
- Environmental (3): nature and environmental federations.

Furthermore, the following three BbD locations were visited:

- the Green Chemistry campus (location 1 in Figure 4);
- the Natural Fibre Application Centre (STAPPER) (near location 3 in Figure 4); and
- Biopark Terneuzen (location 8).

The relationship between institutional stakeholders and the cluster board is categorised as follows: (1) a member of the cluster board (responsible for the strategy); (2) a member of a working group (helping with the implementation); (3) a bilateral contact (lobbyist); or (4) none (consultant) – see Table 7.

Table 7: Interviews undertaken

Stakeholder	Relation with the cluster board Biobased Delta				Total
	Board member/ partner	Working group member	Lobbyist	None	
Business	2				2
Public & hybrid	4				4
Innovation	4				4

	Relation with the cluster board Biobased Delta				
Environmental		1	1	1	3
Total	10	1	1	1	13

Source: authors

3.2 The regional public event

A meeting with the cluster board of BbD was planned in May 2016, to discuss the results of the interviews. However, due to a change of directors this was unable to go ahead within the project research timeframe. Due to time constraints, in accordance with BbD, the 'Delta Innovation Days' event in Bergen op Zoom on May 27 2016 was selected as an alternative public event to talk with bioeconomy stakeholders, including citizens. This event was organised by the province of Noord-Brabant to present local innovation themes to citizens. Bio-based innovations were one of the innovation themes to be presented.

During the Delta Innovation Days event the cluster board Biobased Delta informed the public about concrete, tangible examples of bio-based products and processes, such as the development of bio-plastic from potato starch. Many people attended the public event, and a share of them went to the BbD kiosk to inform themselves about the opportunities of bio-based products. In support of this report, a survey was developed for these visitors. Each was asked five questions about their awareness and involvement with bio-based products and processes.

4 Actual participation in the strategy

4.1 Existing participative governance practices

Table 7 summarises the relation of the 13 interviewees with the development of the strategy. Most participate in decision-making committees or were consulted on the strategy and are involved in implementing the strategy by funding certain actions, being responsible for implementing them or taking part in projects funded by certain actions. Furthermore, they participate in committees overseeing the strategy and its instruments. The interviewed environmental NGOs have bilateral contacts with the cluster board or participate in a working group on green chemistry. The environmental consultant and the NGOs were able to describe their experiences with the bio-based investments during a long period of twenty-five years under different frames of sustainability and governance.

Since the BbD strategy is quite informal, interviewees were asked to explain their perspectives via a SWOT-analysis and the good practices they have perceived. Some good practices are locally organised with a wider set of stakeholders; in particular with students of the University of Applied Sciences in Breda and Vlissingen and with citizens in the municipality of Bergen op Zoom. Those issues are elaborated on in Section 4.2. Both NGOs and members of the cluster board were ambivalent about the participation of environmental NGOs. Board members noted that although NGOs might contribute through their local expertise, they also have the potential to delay the implementation of projects and hence affect economic development perspectives. Moreover, board members stated that most NGOs show little interest in the bio-based economy; other topics are higher on their political agendas.

The consequence of limited participation is that discussion about the development of the bio-based economy remains relatively confined to policy silos. Moreover, the cluster board mainly has many contacts with business-to-business (B2B) companies, but very few any with business-to-consumer (B2C) companies. They try to change this situation by asking brand-owners of B2C companies for their preferences for including bio-based plastics in their products. In addition, NGOs tend to discuss the impacts internally, because they consider the bioeconomy to be too complex an issue for citizens to fully engage with without action-based perspectives. Rather, they tend to prefer other more societal objectives on their agenda which offer citizens action perspectives, such as the use of renewable energy resources and recycling perspectives that contribute to the circular economy.

Citizen participation in bioeconomy policy and strategy

The participation of citizens in the strategy is largely based around information campaigns and publicity. This includes, for example, the visit of the royal family who discussed the bioeconomy, and the exhibition of bio-based products in Bergen op Zoom. Furthermore, the expertise centre CoE BBE targets the education of young people about the bioeconomy, in particular students at the Universities of Applied Sciences in Breda and Vlissingen. Citizens are not involved in reviewing or evaluating the strategy.

To sum up, governments, business (multinationals and SMEs), education and research institutions formally participate in the strategy's design, implementation and review. The BbD strategic approach is that businesses and entrepreneurs lead in developing the bio-based economy of the south-western region. NGOs are consulted but do not participate in BbD. Moreover, citizens are informed about bio-based products but do not participate in the strategy's design, implementation or review. An exception is students who are involved in the implementation of diverse projects.

4.2 Benefits/opportunities of participatory approaches

To gain further understanding into participative governance in the BbD case, interviewees were asked to explain their views of the bio-based economy in the BbD region, to highlight good practices in participative governance, and to highlight issues regarding the improvement participative governance.

Overall, interviewees highlighted the importance of the participation of businesses and entrepreneurs in particular, but also recognised the importance of involvement from government, education and research. Entrepreneurs are seen as being able to develop and implement bio-based start-ups and shape bio-based business cases; larger business such as multinationals can start their own bio-based pilots. Moreover, multinationals can support entrepreneurs and start partnerships with them. In this perspective, government, education and research also play an important role in facilitating the development of business cases through subsidies, shaping the future bio-based workforce and developing new bio-based insights.

The benefits of BbD bioeconomy organisation, and examples of good practice:

- Good triple helix organisation, involving multinationals and entrepreneurs: the Province of Noord-Brabant invests in supporting the bio-based economy, using a part of its budget from having sold the energy company Essent (in an investment fund, development of the Green Chemistry campus, Centre of Expertise of BBE, and in business development).
 - ➔ *Good practice:* Nine clusters focus on a specific bio-based application or materials which are initiated and organised by BbD partners. These clusters include: packaging materials, infrastructure, green building materials, agro, and natural colours & coatings. These clusters organise networking events and support bio-based business prospects by developing bio-based 'showcases'. One group participating in the cluster for green materials meets twice a year to share recent developments, to organise projects and events, and to network. In smaller settings, showcase projects are organised. One interviewee highlighted that each cluster has its own working approach, depending on the drive and preferences of the participants. For example, the coordinator of the agro cluster organised six meetings in which people with an agricultural, chemical and science background met to exchange ideas in smaller groups, and developed bio-based business ideas and leads.
- A focus on small and medium sized enterprises (SMEs): the regional development agencies work to support businesses, and pursue dialogue with knowledge institutes and chambers of commerce in order to support SME-focussed projects and business cases. SMEs are encouraged to cooperate with the CoE BBE, and with large companies at the Green Chemistry campus. Interregional cooperation with Ghent facilitates bids for European public funding.
 - ➔ *Good practice:* Attention to market orientation. The regional development agencies REWIN and Impuls gave vouchers to entrepreneurs to improve their business plans and their market orientation, and organised open days for entrepreneurs. Furthermore, the cluster board developed

incubators for biopolymers and paints, and regularly organises crossover meetings to give entrepreneurs the opportunity to get in contact with other sectors.

- ➔ *Good practice:* A set of diverse pilots have been launched such as: (1) using eggplant waste products as building material; (2) the cultivation of algae in greenhouses; (3) the use of bio-based materials for street furniture, consumer goods (see Photo 1) and asphalt; (4) using bio-based material to pot tomato plants in greenhouses, thereby making the waste from the greenhouse 100% organic, and (5) the use of algal treatment to sanitise water.
- City marketing to inform inhabitants about the bio-based economy:
 - ➔ *Good practice:* The municipality of Bergen op Zoom has positioned itself as a creative city to attract innovative entrepreneurs in the bio-based economy, in order to become less dependent on employment for multinationals. Therefore it has a presence in the Green Chemistry campus and it acts in support of public procurement for local green infrastructure (for example, the bridge at Halsteren is partly made with grass berm piles). Furthermore, together with students from the University of Applied Sciences AVANS, the municipality has been developing and applying bio-based solutions (for noise insulation and catering) in the local music building Gebouw-T. It also supports the display of the bio-based collection at local venues, through regional events which attract many visitors, and in the yearly events 'Brabantse Wal day' and 'Delta Innovation Days' for citizens to learn more about local products. In the local Anton van Duinkerken park, local inhabitants are informed about bio-based solutions for the preservation of wild flora. Other municipalities (Raamsdonkveer and Geertruidenberg) also try to highlight bio-based activities in their localities by organising prizes among sustainable entrepreneurs.

Photo 1: Biobased plant pot displayed during Delta Innovation Days



Source: authors

- System for public procurement / preferred bio-based purchase initiative:

- ➔ *Good practice:* The province of Zeeland has implemented a policy for sustainable bio-based purchases by developing a tool. Buyers from the provinces, municipalities and the national government can use this tool to formulate criteria for acquisitions or tenders. In addition, SMEs who would like to sell their goods are invited to follow the criteria.
- Collaboration with artists: the relation between BbD and design is well developed because artists are interested in new, creative solutions. Moreover, they are interested in differentiated products, (i.e. as opposed to the idea that products should be identical); this characteristic can lend itself to bio-based production.
 - ➔ *Good practice:* BbD exhibited its bio-based collection during the Dutch design week. Moreover, artists were involved who made artistic ‘prototypes’ of consumer products from bio-based materials. In addition to enhancing the relationship between the arts and innovation, the Dutch Design week also resulted in public exposure. Around 200,000 people attended.
- Targeted education: the cluster board reaches a broader audience through targeted education by the CoE BBE at the university of applied sciences AVANS and Hogeschool Zeeland.
 - ➔ *Good practice:* CoE BBE has developed modules for primary education, secondary education (i.e. the training centre in Terneuzen), and tertiary education (i.e. the MOOC⁴⁵, which has been followed over 3 years by 1,600 students from 13 countries).
- Risk management: Zeeland has parks with holiday homes, some of which function as an experimental garden for bio-based products. Biobased materials have been also used to renovate a house and have been applied in the interior of specific buildings, i.e. the CoE BBE at the University of Applied Sciences, the province Noord-Brabant, and the incubator centre.

Opportunities:

- There is a good case in north-western Europe for the further development of sugar beet-based feedstocks (Deloitte, 2014). The COSUN (sugar beet factory) has a good design and a good cascading principle to use waste streams and soil fertility for biomaterials and biogas.
- Biobased processes could be solution for the circular economy. They could therefore be reframed as a means instead of being an objective in themselves.
- More could be done with local horticultural farmers to reuse waste streams locally. This might improve the sustainability perspective and image of local entrepreneurs.
- There have been suggestions that the provinces and municipalities could make widespread use of waste composters (biofermenter) and associated infrastructure. This approach to waste management would improve citizens’ awareness of the bioeconomy.

4.3 Difficulties/challenges of participatory approaches

Some interviewees highlighted that a downside of the business-centred approach is that businesses and especially entrepreneurs want to achieve benefits from their investments in the near future, while the shaping of a bio-based economy demands high investments and a long time horizon. A respondent from the cluster board noted that if the success rate of the bio-based business cases in the near future is low, participants might lose their faith in bio-based development and terminate their bio-based initiatives.

The board members and partners of BbD that were interviewed noted that the participation of citizens is challenging, because most citizens are uninformed about bio-based production and that it is rather complex to explain. Board members anticipate that the useful participation of citizens would first require substantial investment in communication activities. Until now, the BbD has decided to invest mainly in the development of bio-based products by organising communication between businesses, and between business, research, education and government. Since 2014, more steps have been

⁴⁵ Massive Open Online Course

taken towards engaging citizens and consumers. This is done through various projects for participating stakeholders, which are presented below. Moreover, the BbD tries to involve specific B2C companies such as Ikea and Lego as these socially responsible brand owners could benefit from switching to bio-based products, and they have experience in communication with consumers.

Challenges in the BbD bioeconomy:

- Biobased development is still an internal discussion: the cluster board mainly has contacts with B2B firms, but fewer with B2C firms. In addition, NGOs discuss the impacts of bio-based activities predominantly internally with other environmental organisations, i.e. with other provincial organisations about biorefineries (in the Rotterdam harbour) and sustainable forestry-based opportunities to produce lignocellulose, and with other national organisations.
- Bio-based activities are still heavily subsidy driven, and are unable to attract critical amounts of private investment: some public investment strategies have not been well prepared (for example, entrepreneurs were unwilling to co-finance the training centre bio based Europe in Terneuzen). A 'boulevard of broken dreams', as expressed by one interviewee, has been caused by high expectations from management created through a subsidy culture, which has established too many unrealistic promises. There has been too little added value in developing bio-based products.
- There remain risk and unpredictability in innovation: this includes public policy instability. Chemistry companies impose unrealistic conditions regarding the replacement of oil-based products with bio-based alternatives.
- Many projects remain at an initial stage, and are difficult to upscale: environmental organisations consider themselves 'greenwashed' if they are asked to promote such activities without a follow-up plan or realistic prospects for upscaling.
- There is an absence of a broader societal focus encouraging citizens and non-governmental organisations to buy in to the bioeconomy.

Challenges:

- Challenges are presented by current low oil prices which ensure that oil-based materials remain economically attractive.
- Many multinational chemistry branch enterprises in Zeeland decide not to invest in the regional bio-based economy; there is a lack of public budget from the province of Zeeland and its municipalities. Governments will stop pushing if other initial players (multinationals) stop their support.
- It can be difficult to demonstrate the value of bio-based products to the circular economy.

4.4 Main improvements to increase participative governance

Based on the SWOT analysis and the good practices identified, in the interviews three main improvements to increase participative governance to realise a stronger bio-based economy have been identified:

1. More upscaling towards the market

Many bio-based experiments remain at an initial stage without upscaling (renovation of holiday homes, houses). Many initial ideas are mediocre. Ideation is an important phase to get better ideas, entrepreneurship and innovations. The cluster board is in the process of developing ongoing ideas to stimulate more business development and B2C enterprises, which see a market need to buy the semi-finished bio-based products. One of the major hurdles in developing new bio-based solutions is the lack of adequate knowledge of the bio-based industries (B2B) of the applications; and, vice-versa, lack of awareness in downstream industries (B2C) regarding new materials. Cross-sectoral knowledge exchange and joint development is therefore essential.

2. Greater policy urgency

There is a need for a policy which declares that the use of bio-based products will be more often required. There is potential for European and national governance to show better leadership through legislation. The current example of policy regarding the use of plastic bags in France and Italy, was identified by interviewees as a highly relevant to the Netherlands.

3. *Better societal involvement*

The city marketing in Bergen op Zoom and participation in the Dutch Design week were considered by the interviewees to be too small in scale and scope to have a significant effect on public familiarity with the bioeconomy. Connecting with citizens demands more effort and a sense of urgency to get bio-based products accepted. Due to a lack of capacity, environmental NGOs focus mainly on large scale issues, i.e. sustainable biorefineries, which are of lower interest to citizens. Interviewees from nature and environmental organisations foresee that promoting and discussing small scale issues at a local level is more appealing to citizens.

5 Discussion and conclusions

5.1 Triple helix perspective

The main issues of participatory governance are *whom* will be involved, as well as *how* they will be involved. While a triple helix formation consists of governments, research and businesses, a quadruple helix also involves societal organisations (i.e. *whom*). During this ideation phase of the bioeconomy, the main concern of BbD is to ensure that more businesses become involved in the triple helix organisation. This concerns several types of businesses. One of the major hurdles in developing new bio-based solutions is the lack of adequate knowledge of the bio-based industries (B2B) of the applications; and, vice-versa, lack of awareness in downstream industries (B2C) regarding new, bio-based materials. Thirdly, it is also a challenge to maintain large sized chemicals sector businesses as investors. Many such entities are branches of multinational companies that are uncertain when it comes to investing in the regional bio-based economy of BbD.

To consider how actors will be involved, there is a public perspective, in which the government has the lead, and a private perspective, in which citizens and/or businesses have the lead. The government could facilitate, direct or initiate the private initiatives. The BbD cluster is currently mainly focused on businesses (B2B) in a triple helix formation of governments, research and businesses. The shortcomings of the triple helix formation are not only that representative societal organisations are hardly involved in the participative governance (quadruple helix), but also that frontrunner citizens themselves are missing (multi-actor perspective).

5.2 Elaboration of the multi-actor perspective

The multi-actor perspective offers a useful framework to analyse how citizens and their representative organisations can be connected more intensively than in a triple helix perspective (Figure 5). The multi-actor perspective builds on the welfare mix schemes, which distinguish between state, market, community and third sector actors (Avellino & Wittmayer, 2015, based on Evers & Laville, 2004 & Pestoff, 1992).

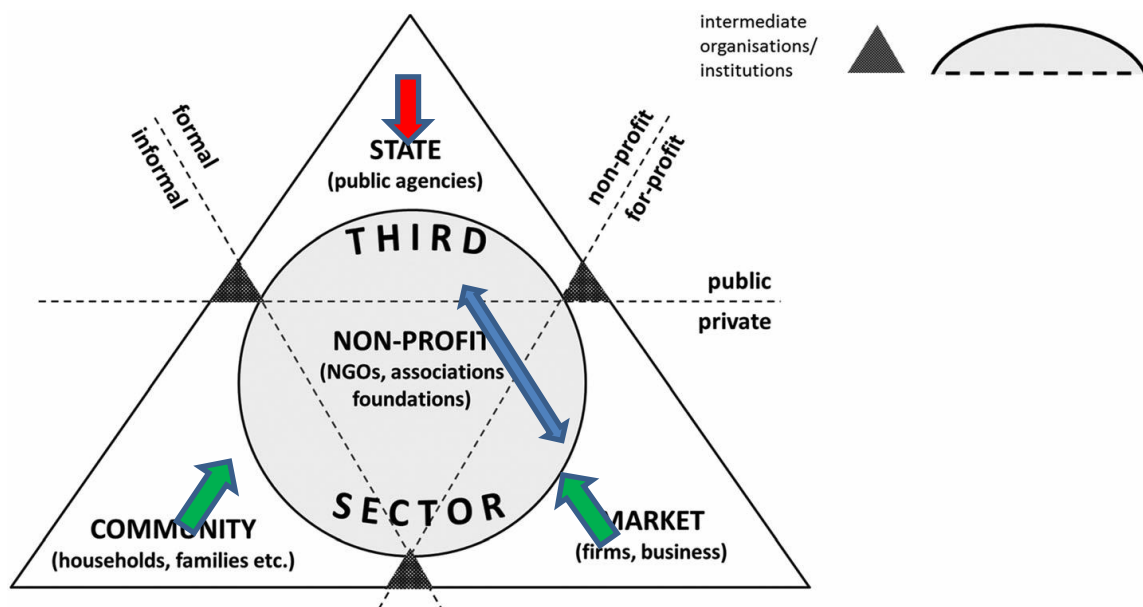
Western societies have increasingly outsourced public welfare-based services to the market, resulting in a wide variety of 'public private partnerships' and widespread neoliberal discourses in which state bureaucratic logic and/or economic market logic is increasingly applied to all dimensions of life and society (Avellino & Wittmayer, 2015). The cluster organisation BbD as a triple helix organisation can be seen as an example of this phenomenon in that it focusses on the state and the market. In the BbD the third sector is also involved, mainly through knowledge and innovation, while the role of the community is minimal. Innovative governance mechanisms occur within and between the relevant actors in typical learning arrangements, such as hybrid organisations, multi-actor networks and/or cross-sector partnerships. In Figure 5, the red arrow in the triangle shows a public perspective, and

the green ones a private perspective. The blue arrow shows the organisation of the BbD cluster, which mainly relates to the relations between the state and the market.

To secure more support from citizens, it would be necessary for Figure 5 to have more arrows on the left side, i.e. more attention to societal objectives. Further, more support from local producers would be indicated through more arrows on the right side (i.e. more attention for arable farmers who produce local biomass). Furthermore, more horizontal arrows signifying collaboration could be included (i.e. cooperation between the cluster board and citizens, and between local producers and societal and environmental NGOs).

Community members could play an active role in furthering the bio-based economy in the south-western region. However, the potential role of citizens has not yet been fully explored due to the state and market orientation of BbD. In this structure, citizens are predominately seen as actors which need informing, rather than as actively engaged stakeholders. Regional environmental federations have already suggested that citizens' initiatives to become more sustainable. Citizens are generally perceived as preferring to contribute to societal challenges by creating their own solutions; it is understood that citizens are interested in knowing more about the personal benefits of using bio-based products. Furthermore, environmental federations aim to cooperate more with local stakeholders, in particular with higher education (students who are the future inhabitants) and with entrepreneurs who contribute to sustainable development (farmers).

Figure 5: The multi-actor perspective in the Biobased Delta



Source: Avellino & Wittmayer, 2015, p.9.

No specific future plans were mentioned by cluster board members to include broader stakeholder interests in the future development or implementation of bio-based products and processes. However, the shortcomings of not including societal organisations, frontrunner consumers and citizens are strongly connected with desired improvements to increase participative governance to realise a bio-based economy. Furthermore, societal organisations could be invited to support greater policy urgency in bio-based product use, both from an integrated sustainable development perspective in rural areas with decreasing populations (i.e. Zeeland), and from a resource efficiency perspective.

Finally, the findings of the survey in Annex I indicate that citizens do have an interest in the consumption of biomass-based products and would like to deliver an active contribution to the bio-based economy. Therefore, frontrunner citizens and societal organisations could be invited to develop more integrated societal perspectives to engage citizens to choose bio-based solutions; in particular, to buy bio-based products from local biomass producers and to re-use biomass waste streams (organic

waste). Government can not only facilitate these private initiatives, but can also direct or initiate them by highlighting societal needs.

List of references

- Avelino, F., Wittmayer J. (2015): Shifting Power Relations in Sustainability Transitions: A Multi-actor Perspective. *Journal of Environmental Policy and Planning*. 17 (2015) 6.
- Biobased Delta (2013): Biobased Delta Op weg naar een topregio. Openbare samenvatting Businessplan Biobased Delta.
- Biobased Delta (2015): Biobased business in West-Brabant. De successen van drie jaar business development.
- Biomass research (2016): The Biobased economy and the bioeconomy in the Netherlands. Biomass research report 1601. Wageningen.
- Buck Consultants (2010): Bio als Basis. Kader, kansen en keuzes voor een Biobased Economy Zeeland. Nijmegen.
- De Bakker E., Ribeiro B., Millar K., Beekman V. (2016): Actors and network activities in the bioeconomy: Reflections on guidelines for participatory approaches. Deliverable 2.4 of BioSTEP.
- Deloitte (2014): Opportunities for the fermentation-based chemical industry.
- Deloitte (2015): The Biobased Delta; Where Agro Meets Chemistry
- Evers, A., Laville J-L., (2004): Defining the third sector in Europe. In: A. Evers & J-L Laville (2004) The third sector in Europe. Cheltenham: Edward Elgar.
- Hasenheit M., Gerdes H., Kiresiewa, Z., Beekman, V. (2016): Summary report on the social, economic and environmental impacts of the bioeconomy. Deliverable 2.2 of BioSTEP
- Kwant K., Hamer A., Siemers W., Both D. (2016): Monitoring Biobased Economy in Nederland 2015. Rijksdienst voor Ondernemend Nederland.
- Overbeek, M.M.M., Salverda, I.E. (2013): De energieke overheid : visies op netwerkend samenwerken voor een groene en veerkrachtige economie. Den Haag : LEI Wageningen UR, Rapport / LEI Wageningen UR 13-084.
- Overbeek G., de Bakker E., Beekman V., Davies S., Kiresiewa Z., Delbrück S., Ribeiro B., Stoyanov M., Vale M. (2016): Review of bioeconomy strategies at regional and national levels. Deliverable 2.3 of BioSTEP.
- Pestoff, V.A. (1992): Third sector and co-operative services. From determination to privatization. *Journal of Consumer Policy*, 15 (1), p. 21-45.
- Provincie Noord-Brabant (2015): Beweging in Brabant. Bestuursakkoord 2015 – 2019. Den Bosch.
- Provincie Zeeland (2015): Krachten bundelen. Coalitieakkoord 2015 – 2019. Middelburg.
- Provincie Zuid-Holland (2015): Zuid-Holland: slimmer, schoner en sterker. Hoofdlijnenakkoord 2015 – 2019. Den Haag.
- Provincie Zeeland, Noord-Brabant, Limburg (2013): Smart Specialisation Strategy. The art of combination and cooperation. RIS3 ZUID.
- Taskforce Economische Structuurversterking (2014): Delta-regio in de hoogste versnelling Actieplan Economische Structuurversterking. Bergen op Zoom.

APPENDICES

APPENDIX I: Research findings from the regional event

During the Delta Innovation days the cluster board of Biobased Delta informed the public about concrete, tangible examples of bio-based products and processes and let them experience bioplastic from potato starch. During the event, we spoke with 15 citizens about the Biobased Economy and asked them to fill in a survey. There was not much debate about the possible consequences of the bio-based economy in Noord-Brabant and Zeeland. Visitors were mainly interested in the opportunities of bio-based products, which is in line with the initial phase of development. Two thirds of the respondents were older than fifty, and one thirds were younger.

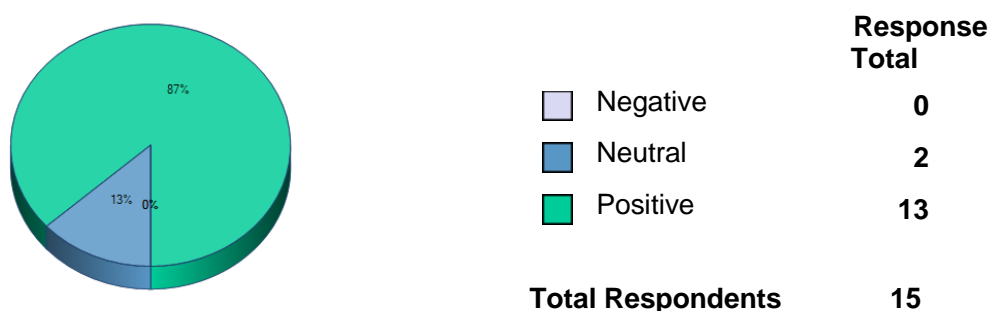
Below we present the findings of the survey, which give an impression about the awareness of citizens with the bio-based economy. Given the small number of respondents mostly older than fifty years, the results are only indicative for the visitors of the public event.

- Are you familiar with bio-based economy?



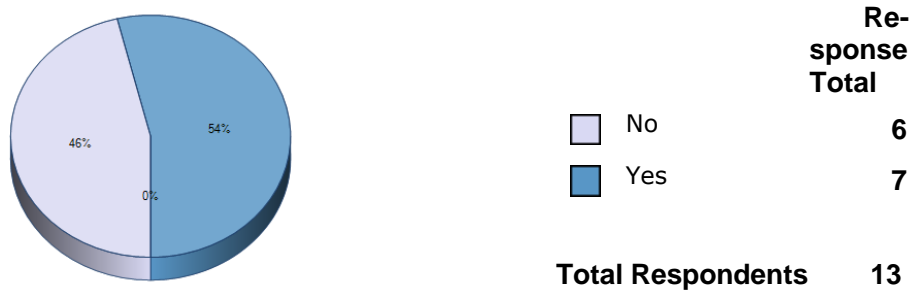
The results show that many visitors had never heard of the bio-based economy. They considered the presented images and experiences done by BbD partly (40%) or strongly (47%) informative.

- What is your opinion about the bio-based economy?



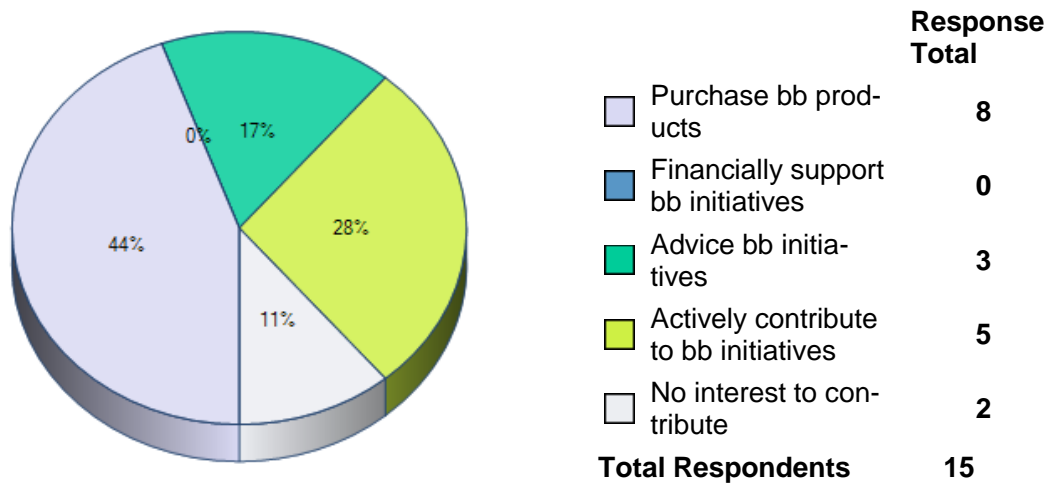
Generally most respondents have a positive opinion about the bio-based economy.

- Would you like to know more about the bio-based economy?



Half of the respondents would like to know more about the bio-based economy.

- Would you like to contribute to the bio-based economy? If so how?



The findings show that visitors are interested to buy bio-based products and would actively contribute to bio-based initiatives. The interest for an active contribution fits well with the practical interest to contribute to renewable energy solutions at home (using solar panels and sustainable sewage systems, and developing locally adjusted landscape gardens).

German case study: The Regional Innovation Strategy in Saxony-Anhalt

August 2016

Marius Hasenheit, Zoritz Kiresiewa, Stefan Kah

EXECUTIVE SUMMARY

This report presents the regional case study of the bioeconomy strategy in Saxony-Anhalt, Germany. It takes as its central case the development and implementation of the Regional Innovation Strategy (RIS). Saxony-Anhalt's RIS was developed by the federal government of Saxony-Anhalt in concert with stakeholders from the policy, business and research domains, and was adopted in 2014.

During the development of the RIS, opportunities for stakeholder involvement were varied; the government of Saxony-Anhalt set up the consultation and development process in a way that allowed broad participation. However, actual participation was led by the involvement of business and science actors. Civil Society Organisations and Non-Governmental Organisations have been less involved; some were not aware of the preparation process of the RIS. Beyond the integration of key stakeholders, there was limited public participation.

Policymakers have continued to involve stakeholders since the finalisation of the strategy in 2014, particularly in context of the five lead markets, one of which is chemistry and bioeconomy. The research undertaken for BioSTEP indicates that the RIS is useful, but should be seen as an ongoing process. There are barriers to the greater participative involvement of a broader range of bioeconomy stakeholders, such as thematic inconsistency regarding the bioeconomy as an economic area, and a lack of communication mechanisms and platforms. Looking forward, the prospects for better participative governance hinge largely upon communicating better awareness of the bioeconomy linked to jobs and economic growth, and securing the greater involvement of CSOs, NGOs and citizens.

1 Introduction

1.1 Study focus

Saxony-Anhalt is a federal state located in central Germany. It covers a total area of 20,451 km² and has a population of 2.2 million inhabitants. The region produces the majority of German bioethanol. It has a highly developed chemical industry, plant research and plant breeding companies (Overbeek *et al.*, 2016), which provide opportunities for the development of the bioeconomy.

In 2014, the state government of Saxony-Anhalt adopted a Regional Innovation Strategy that set out a number of measures for the development of the bioeconomy and identified the sector as one of the lead markets in the region. Although it has been demonstrated that the bioeconomy domain in the region is dominated by stakeholders from industry, policy and science (Overbeek *et al.*, 2016), CSOs and NGOs were also involved in the development phase of the strategy. Thus, Saxony-Anhalt is an interesting case study in terms of the participatory approach used in the development of this strategy. Another sound argument for selecting Saxony-Anhalt as a case study is that from a participatory viewpoint, the eastern counties are interesting in the sense that the civil society organisations have only developed since the 1990s.

1.2 Research design

In order to investigate the participatory process in more detail, semi-structured interviews with representatives of organisations which have participated in the development, implementation and/or monitoring/review of the Regional Innovation Strategy have been conducted. The findings of the interviews are summarised in Section 4.

2 Background of the Regional Innovation Strategy

2.1 Regional policy context

Democratic/participatory traditions in Saxony-Anhalt

In Germany, institutional direct democracy – such as a referenda at the national level – is not practiced. However, the country is organised as a federal state. The individual states (*Länder*) do have forms of direct democracy in forms of initiatives and referendums (Schiller, 2011). These instruments are also used at the local level, in the municipalities.

In Saxony-Anhalt, instruments of direct democracy have been implemented gradually since the GDR was accessioned to the Federal Republic of Germany in 1989/90 (*ibid.*). During this time, coal mining was abandoned in the southeast of Saxony-Anhalt (Dessau-Bitterfeld-Wittenberg), which had major economic impacts on the area (De Soto, 2000). Until then, the region was not only well known for coal, but also for its chemical industry (Halle-Leuna). In the 20th century, both industries were linked by chemical usages of coal. The north and the area surrounding the state capital Magdeburg are characterised by agriculture. The area near Magdeburg, the *Magdeburger Börde*, is well known for its humus-rich soil. These agricultural and industrial traditions shape much of the understanding of bioeconomy in Saxony-Anhalt.

Thus, economic actors and traditional uses of biomass have shaped the understanding of bioeconomy, while instruments of direct democracy and institutional participation have been implemented relatively recently. Additionally, there is a strong focus on the potential economic prospects of the bioeconomy from local policy makers. All these factors seem to imply a rather top-down approach for bioeconomy in Saxony-Anhalt. However, the Regional Innovation Strategy includes comments and text blocks about an ambitious approach for participation.

Since there are agricultural traditions in Saxony-Anhalt, the aspects of bioeconomy that include the harvest of crops are inherently included. Additionally, in the process of extending renewable energies, the use of biomass for energy production has increased. Because of the region's history in the chemical industry, there are also projects using wood for chemical processes, where drop-in-solutions are preferred to exchange the resource basis while maintaining the processes.

Hence, the group of actors in Saxony-Anhalt who are interested in bioeconomy consist of industry, agriculture and science stakeholders. Additionally, there are policy makers who aim to foster innovations and investments in bioeconomy.

2.2 Strategy development

The federal government of Saxony-Anhalt developed the Regional Innovation Strategy mainly in cooperation with stakeholders from the policy, business and research domains.

The involvement of experts was carried out in two stages:

- Phase I: individual, questionnaire-based interviews with universities and research institutes, business, technology transfer institutions or chambers and cluster representatives.
- Phase II: six roundtable discussions with academics.

In addition, a public stakeholder consultation was conducted with 146 stakeholders (34% industry, 37% science, 6% policy and public authorities, 23% clusters and technology transfer institutions). The objective of the public stakeholder consultation was to draw up visions and targets for the poten-

tial thematic priorities of the Regional Innovation Strategy. In addition to the stakeholder consultation, six stakeholder workshops were organised in order to identify focus areas and to foster cooperation between science and businesses. Hence, civil society did not have a significant role at these workshops. On 27 February 2012, the parliamentary groups and WISO partners⁴⁶, including CSOs and NGOs, were consulted. The WISO Partner Advisory Council deals with EU funds and comprises scientific associations, NGOs and CSOs, as well as other associations.

Besides this, various working groups were created for all five lead markets identified in the strategy (see Section 2.3). These groups consist mainly of business stakeholders, their associations (Chamber of Industry and Commerce), scientists (to ensure the inclusion of innovations) and actors who 'translate' between science, policy and economy ('Intermediaries').

The scope and the content of the Regional Innovation Strategy were presented during a kick-off event *Zukunftsdialog Sachsen-Anhalt* on 11 October 2012 in Magdeburg. Industry and civil society organisation representatives were invited to comment on the strategy and give recommendations for its further development.

In February 2014, the cabinet adopted the strategy. The Ministry for Science and Economy guided all stakeholder processes, which took place before the Regional Innovation Strategy was adopted. However, other government departments dealing with innovation were involved too.

2.3 Aims and objectives

The overall objective of the RIS is to strengthen Saxony-Anhalt's position in international competition. In particular, the objectives focus on increasing the competitiveness of SMEs in the region, and generating smart, sustainable and socially inclusive growth. The RIS focuses on the following lead markets:

1. Energy, mechanical and plant engineering, resource efficiency;
2. Health and medicine;
3. Mobility and logistics;
4. Chemistry and bioeconomy; and
5. Food and agriculture (Ministerium für Wissenschaft und Wirtschaft des Landes Sachsen-Anhalt-2014).

3 Research design and methods

The research methodology for this report included desk research, selection of interviewees, semi-structured interviews, data analysis and report writing.

3.1 Stakeholder interviews

In total, contact was made with 58 representatives of organisations who participated in the development and implementation of the RIS (first via email and then by phone). 11 interviews took place over the phone and two written answers were received. Although efforts were made to ensure a balanced mix of representatives of different organisations that participated in the development, implementation and monitoring/review of the RIS, policymakers and research organisations are slightly underrepresented.

⁴⁶ <http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/>

Table 8: Interviews undertaken

	Region Saxony-Anhalt
Regional/local policy-makers	1
Business associations	3
Science/research organisations	2
CSOs/NGOs	5
Hybrid bodies	2
Total	13

Source: authors

3.2 Regional event

The regional workshop ‘The Regional Innovation Strategy Saxony-Anhalt – Chances and Opportunities of Participation’ took place on 1 June 2016 in Halle, Saxony-Anhalt. It was linked to the 5th Bioeconomy Conference in Halle. This conference sought to address new issues and develop fresh insights into bio-based value chains and socioeconomic aspects of bioeconomic development. In 2016, special attention was placed on the development of the bioeconomy in Belgium, the Netherlands and Luxembourg.

A variety of methods were used to invite the relevant actors to the workshop. During the interviews, the interviewees were informed about the workshop and invited via email. Afterwards, potential participants were reminded by phone. Additionally, all potential interviewees who had no time for an interview (WISO partners etc., totalling around 70 people) were invited via mail. As there was only very limited feedback, about 160 actors (mostly research, policy and CSOs) working in the bioeconomy field in Saxony-Anhalt were invited.

Despite efforts to promote the event and the interest garnered from such actions, only a limited number of people confirmed their attendance. Many stakeholders could not participate in the event due to staff and financial shortages: a challenge stressed by many stakeholders (particularly NGOs and CSOs) in the interviews. As such, four participants (one representative of a CSO, two researchers with backgrounds in chemistry and biorefineries and one representative of the Bioeconomy Council in Bavaria) attended the workshop.

The discussion on the development of a strategy and the role of stakeholder engagement was more general, and not exclusively focused on the Regional Innovation Strategy, since the participants of the workshop were not involved either in the development or in the implementation of the strategy. Despite the lack of in-depth insights into the actual process accompanying the development of the strategy, there was widespread consensus that broad and active participation is crucial for holistic policymaking. With regard to the situation in Saxony-Anhalt, the representative of a CSO pointed out that there are quite a few opportunities for engagement in Saxony-Anhalt (e.g. WISO Partner Advisory Council), but ‘the work is very administrative and it is simply too much for small organisations’. Furthermore, networking in Saxony-Anhalt is very difficult, since there are many strategies in place and the ongoing discussions overlap significantly.

Additionally, the participants challenged the composition of the Regional Innovation Strategy, noting that the strategy already covers too many different aspects. A representative of a research institute questioned the necessity of covering social aspects that have been covered under other ongoing strategies, such as the strategy on sustainable development. Various participants pointed out that the target group for the strategy was not clear. It was agreed that the language of the RIS is too technical for the general public, whilst it provides only a limited amount of depth for key actors. However, the participants generally concluded that the strategy is useful.

Other major comments received during the workshop:

- It is very difficult to deal with traditional thinking and to communicate new ideas among citizens (e.g. farmers in Saxony-Anhalt). The promotion of new ideas is even more challenging when the discussion focuses on bioeconomy-related topics.
- It is important that the measures identified to foster the development of the bioeconomy sector in Saxony-Anhalt are funded in order to avoid a strategy only existing on paper.
- It is important to use the strategy as a basis for the development of new research & innovation projects/activities.
- There is potential to introduce social games (*Gesellschaftsspiel*) to enhance the participation of stakeholders and the public. In doing so, it is crucial to start an open discussion without setting the direction of the discussion (e.g. local people brainstorming about the future development of a community).
- The general public and many stakeholders do not realise that they are or will be affected by the bioeconomy.
- There is a lack of vision about the bioeconomy, its opportunities and challenges.
- Job creation, especially for young people, is a crucial point for some of the workshop participants, interviewees and other stakeholders.
- The creation of research networks (SMEs and research institutions) should be fostered.
- There is a need to communicate with the general public; for example, through associations (CSOs) which have regional and local groups and great potential as vehicles for information dissemination and diffusion.
- EU funds (such as European Structural and Investment Funds) are not used to an appropriate extent in Saxony-Anhalt.
- There is a heterogeneity of views and opinion about the benefits of the bioeconomy.
- Some participants considered that following an initial phase of 'euphoria', the phase of 'realisation' has begun, which still shows some prospects for the bioeconomy.

4 Overview of actual participation in the strategy

Different groups of stakeholders had the opportunity to shape the Regional Innovation Strategy in different stages: design, implementation and to some extent review, monitoring and evaluation. During these stages, different tools were applied to allow such participation. The inclusiveness of the strategy varied significantly between these various techniques and stages.

Information about the strategy was placed prominently on web pages by the press offices of the relevant ministries. However, there was only very limited interest in the local media to report on ongoing processes.

4.1 Actual participation in the strategy's design

The opportunities for stakeholder involvement were varied and set up in a way that allowed broad participation (see Section 2.2). Yet, actual participation has been skewed towards business and science actors, while policymakers had a steering role. CSOs and NGOs have been less involved; some have not been aware of the preparation process of the RIS.

Business and science actors have been the key drivers of the strategy. Amongst businesses, larger firms were more active, while it has been felt that some SMEs are less likely to engage in innovation-related activities. Amongst some industry interviewees there was little knowledge of the extent or impact of the participation of other actors such as NGOs/CSOs and the wider public. Some felt that NGOs did not participate very actively.

Since the bioeconomy offers opportunities to maintain rural jobs and economic growth and because of its impacts on landscape, one could expect the participation of several CSOs and associations working in the field of landscape management and rural jobs – such as the Women’s Association Sachsen-Anhalt e.V. or the Regional Association for landscape preservation Sachsen-Anhalt e.V. However, the findings of the interviews show that these organisations were underrepresented. Three of the interviewed NGOs/CSOs were unaware of the existence of Saxony-Anhalt’s RIS and in two cases the theme bioeconomy is not part of their field of activity. These include associations that work on topics that are related to the bioeconomy – such as rural development or part-time farming. Only the research in the context of this study made them aware of the participatory opportunities. In contrast to these findings, one representative of a NGO who did not want to be interviewed claimed to be very well integrated in the development and implementation of the RIS.

Beyond the integration of key stakeholders, there was limited public participation. Some dissemination was done via articles in the magazine ‘Hier + jetzt – Impulsmagazin’,⁴⁷ published by the Ministry for Science and Economy. Until now, there have been three issues – two in 2015 and one in 2016. On the online platform, there were 5,295 clicks until early July 2016.⁴⁸ Alongside this magazine, there were a number of online publications on governmental web pages. However, it seems that the impact of these types of online dissemination is very limited. Instead, more traditional media with a broader scope, such as local/regional newspapers, could have played a more important role. It was felt by some that the development of other *Land* strategies (e.g. on sustainability or digitisation) has been organised better in terms of media presence.

4.2 Actual participation in the strategy’s implementation

Policymakers have continued to involve stakeholders since the finalisation of the strategy in 2014, particularly in context of the five lead markets, one of which is chemistry and bioeconomy. The responsible ministry will present a major publication towards the end of 2016 and organise exchange workshops as well as working groups at lead market level. Ideally, there will be a balance between online activities (including virtual online meetings) and offline offers including printed documentation.

In spite of limited involvement in the creation of the RIS, several interviewees from NGOs/CSOs showed interest in participating in implementation processes. However, as during the design phase, interviewees highlighted capacity issues as potential obstacles.

Another very important issue with regard to the opportunities of participation, is the expected impact. One stakeholder who wished to remain anonymous stated:

“We had a very limited influence as an actor. We got a draft to comment. Nobody has an influence.... What only count is what is important for the EU. Okay, the RIS is at least not harmful, but it won’t have an impact at all. Such historically grown economic structures cannot change through a policy document.”

4.3 Actual participation in the strategy’s review

No information about participation in the strategy’s review is yet available. The strategy only contains information about the implementation of the strategy. A roadmap for its implementation is currently under development.

5 Reflection on possible participatory approaches

Many stakeholders highlighted that the RIS is not a ‘dead paper’ but is rather an ‘ongoing process’. Since projects and programmes are still being developed, there remain many possibilities for participation. Some interviewees noted that there are several participatory measures planned in the future, such as more thematically-oriented working groups and workshops (see Section 4.2). Thus, the

⁴⁷ <http://www.unternehmen-und-gruender-in-sachsen-anhalt.de/maerkte/ImpulsmagazinHierJetzt>, accessed on 12 August 2016.

⁴⁸ <https://www.yumpu.com/de/sachsenanhaltnw>, accessed on 12 August 2016.

planned activities have a strong focus on participation of stakeholders, but not the public or civil society.

There are limitations in the design effectiveness of participatory processes when it comes to integrating NGOs, CSOs and the public. Even if there are events where these groups could participate, these are not well communicated. However, this lack of public and civil participation was not of great concern to many interviewees. One actor stated that because NGOs participate at the national and EU level, there is no need for such participation at the regional or local level ('Why do the same thing five times?').

On the other hand, the ministries cannot be held responsible for the fact that NGOs do not have sufficient capacities to read all public publications and attend the events they are invited to. However, participation offers could be designed in a way that makes it easier for NGOs and CSOs to participate, as they are often run by volunteers and have limited resources. So-called 'NGO-friendly' participatory processes could be encouraged by offering summaries of publications, or through financial compensation for attendance.

Furthermore, policy-media relationships should be fostered in order to cover the lowest form of participation – informing the public. It is not sufficient to inform stakeholders about participatory processes in the context of the strategy on governmental web pages – even if they are placed prominently. Instead, media actors should be contacted and invited proactively. The information of the wider public is especially important in the context of ensuring sufficient qualified staff in the bioeconomy. It can help to raise awareness of, and create interest, in career opportunities in the field, especially at non-academic levels.

The stakeholders interviewed suggested potential actions to facilitate participation of different stakeholder groups:

"I could imagine a campaign focused on the link between the craft sectors and the bioeconomy. Because citizens are interested in jobs, and it is better when these sectors are sustainable. But it is still too early for such a campaign."(representative of the industry sector)

"There is a great deal of interest in participation among the associations.[...]. Especially in rural areas there are still substantial reservations about citizen participation (mainly by local authorities and majors) - but at the same time there are enormous opportunities. If municipal issues get more transparent, people get active – and if you use the right participatory tools... This could be of further advantage for the authorities"(representative of a CSO)

5.1 The benefits/opportunities and difficulties/challenges of participatory approaches

Benefits

- The strategy copes potentially with the expectations and needs of the stakeholder who participated.
- Unintended results can be potentially avoided.
- Boundaries and communication between stakeholders last longer than the participation process itself and deliver potentially long-term benefits.

Challenges

- Public awareness of the bioeconomy is low.
- Resources for participation, especially for NGOs/CSOs, are very limited.
- There is a risk of duplicating participatory processes in a system of multi-level governance (e.g. EU – Germany – Saxony-Anhalt).
- Participatory fora (e.g. WISO) can be too large and thematically too broad.
- Information on participatory opportunities is available, but this is not sufficiently actively communicated.

- There is a risk of reliance on new media instead of more traditional channels, resulting in underrepresentation of particular groups.
- Where people work in a close circle (on very local levels or in close groups), participants tend to agree with the majority or follow hierarchies. In these cases, participation can be undermined.
- There is a risk of not (sufficiently) involving certain groups, therefore certain measures should be undertaken to avoid this. The high number of voices and opinions creates an increasing need to facilitate the discussions and balance different interests.

List of references

De Soto, Hermine G. "Contested landscapes: reconstructing environment and memory in postsocialist Saxony-Anhalt." *Altering states: Ethnographies of transition in Eastern Europe and the former Soviet Union* (2000): 96-113.

Ministerium für Wissenschaft und Wirtschaft des Landes Sachsen-Anhalt 2014: Regionale Innovationsstrategie Sachsen-Anhalt 2014-2020. Magdeburg. URL: http://www.e-fi.de/fileadmin/Innovationsstudien_2015/StuDIS_14_2015.pdf, accessed on 12 August 2016.

Overbeek G., de Bakker E., Beekman V., Davies S., Kiresiewa Z., Delbrück S., Ribeiro B., Stoyanov M., Vale M. (2016): Review of bioeconomy strategies at regional and national levels.

Schiller, Theo. "Local direct democracy in Germany—varieties in a federal state." *Local direct democracy in Europe*. VS Verlag für Sozialwissenschaften, 2011. 54-74.

<http://www.unternehmen-und-gruender-in-sachsen-anhalt.de/maerkte/ImpulsmagazinHierJetzt>, accessed on 12 August 2016.

<https://www.yumpu.com/de/sachsenanhaltmw>, accessed on 12 August 2016

<http://www.europa.sachsen-anhalt.de/eu-fonds-in-sachsen-anhalt/partner/wiso-partner/>, accessed on 31 August 2016.

APPENDICES

APPENDIX I: Information on the regional event

Practical information

Date: 1 June 2016

Time: 1.00 pm - 4.00 pm

Location: Leibniz Institute of Agricultural Development in Transition Economies (IAMO), Halle

Title: The Regional Innovation Strategy for Saxony-Anhalt – Chances and Opportunities of Participation

The regional workshop was linked to the Bioeconomy Conference in Halle (Saale), organised by IAMO and the Bioeconomy Cluster e.V.



Chancen und Herausforderungen von Partizipation am Beispiel der RIS & Bioökonomie in Sachsen Anhalt

Workshop im Rahmen der Bioeconomy Conference in Halle (1.-2. Juni 2016)

Datum: Mittwoch, 1. Juni 2016 (13:00 – 16:00)
Ort: Leibniz Institute of Agricultural Development in Transition Economies (IAMO),
 Theodor-Lieser-Str. 2, 06120 Halle (Saale)

Anspruch: Dieser Workshop möchte die, für die Bioökonomie und die Regionale Innovationsstrategie (RIS) relevanten, Akteure zusammenbringen. Insbesondere sollen die Potenziale und Herausforderungen von Beteiligungsprozessen bei der Entwicklung relevanter Strategien eruiert werden. Dabei sollen Erfahrungen ausgetauscht und Ideen/Vorschläge kurz vorgestellt und diskutiert werden. Der Erkenntnisgewinn soll den laufenden RIS-Prozess, sowie andere partizipative Prozesse positiv beeinflussen. Zudem werden die Ergebnisse in das EU-geförderte Projekt [BioSTEP](#) aufgenommen.

Bitte registrieren Sie sich:
 per Email an marius.hasenheit@ecologic.eu & zoritza.kiresiewa@ecologic.eu
 sowie über die [Bioeconomy Conference - Anmeldung](#)

Programm:

13.00 - 13.15	Empfang & Kaffee
13.15 - 13.45	Begrüßung & Vorstellung des BioSTEP-Projekts sowie Interviewauswertung – <i>Zoritza Kiresiewa, Marius Hasenheit, Ecologic Institut</i>
13.45 - 14.45	Offene Diskussion zu folgenden Themen: <ul style="list-style-type: none"> • Meinungs austausch zur Partizipation bei der Entwicklung der Regionalen Innovationsstrategie (RIS) – inkl. Vorteile und Nachteile von Beteiligungsprozessen • Langfristige Möglichkeiten und auch Herausforderungen bezüglich einer breiten Beteiligung der Öffentlichkeit (bzgl. nötiger Struktur und Motivation)
14.45 - 15.15	Kaffeepause
15.15 - 15.40	<ul style="list-style-type: none"> • Erfahrungsaustausch bezüglich effektiver Partizipations-Methoden
15.40 - 16.50	Zusammenfassung der Ergebnisse – <i>Zoritza Kiresiewa, Marius Hasenheit, Ecologic Institut</i>
15.00 - 16.00	Lockere Abschiedsrunde & Feedback zum Workshop und zum BioSTEP-Projekt

Kontakt:



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Italian case study: The Veneto Smart Specialisation Strategy

August 2016

Chiara Bianchini

EXECUTIVE SUMMARY

This report presents the regional case study of the bioeconomy strategy in the Veneto region, Italy. It takes as its central case the development and implementation of the Smart Specialisation Strategy. The main aims of the Smart Specialisation Strategy centre upon connecting and networking the various areas of the bioeconomy to attain an integrated system of supply chains.

The strategy was prepared by an expert working group. Stakeholders across a range of different bioeconomy sectors in the Veneto region participated in the design of its Smart Specialisation Strategy. The general public (citizens) were not directly involved in the development of the Smart Specialisation Strategy. Members of the public have been informed, to a degree, through exhibitions and other platforms for the dissemination of information, but have not yet been involved in direct discussion of the regional strategy.

Promoting an economical, sustainable and ethical participatory model is considered to be difficult. BioSTEP workshop attendees identified negative elements and barriers such as a tendency for some stakeholders to avoid cooperation or to agree on clear targets. Interviewees and workshop attendees underlined the fact that broad engagement depends largely upon a facilitating political environment, as well as implementing mechanisms to inform stakeholders about involvement in the strategy and policy development.

1 Introduction

1.1 Study focus

The BioSTEP project (www.bio-step.eu) aims to promote the participative governance of the European bioeconomy by engaging key stakeholders and societal groups. The focus of WP3.2 of BioSTEP is on regional good practice examples of participative governance; in particular, the participation of non-governmental organisations (NGOs) and citizens. Veneto has a strong interest in the bioeconomy and universities, research centres and centres for technology transfer, together with companies present in the region are engaged in research activities related to biotechnology, biostructures and biosystems.

Veneto ranks sixth amongst the Italian regions in terms of numbers of biotech companies. The Veneto region is an interesting case study because the bio-based sector at regional level has strategic importance in accordance with the Smart Specialisation Strategy (of the Veneto region); this in turn increases synergies between various national and EU policies.

The close link between the bioeconomy and innovation has enabled the development of diversified and novel markets, generating new business and jobs. In recent years in particular, regional bio-based supply chains have been created, within which the products, co-products and by-products constitute an eco-sustainable system.⁴⁹ Sectors such as agriculture, the agro-food industry, chemi-

⁴⁹ Region of Veneto (2015) Smart Specialisation Strategy [<http://www.regione.veneto.it/web/attivita-produttive/Smart-Specialisation-Strategy>]

cals for agriculture, woodworking and energy are amongst the traditional sectors that constitute regional manufacturing assets.

The Veneto Regional Smart Specialisation Strategy has four defined areas of specialisation, two of which are more closely associated with the bioeconomy; smart agrifood, and sustainable living.

At the same time, specific elements of the bioeconomy are also mentioned as important within the two other areas of specialisation; smart manufacturing, and creative industries.

The Veneto region aims to invest in areas of bioeconomy specialisation including, in particular: sustainable agriculture, nutrition and health food, innovative food processing, green building, sustainable production, advanced design and technology, the energy efficiency of existing buildings and the development of new materials, and the generation of energy from alternative sources, in particular through the re-use of waste and biomass.

Smart agrifood

Among the four fields of specialisation indicated above, smart agrifood is the single main framework for the development of the bioeconomy. The Venetian food industry has great potential to develop in research and innovation.

The smart agrifood specialisation demonstrates clear strengths:

- Strong diversification of high quality products
- Enhancement of traditional products
- A strong link with the regional territory

The scope of the smart agrifood specialisation is summarised in Table 9.

Table 9: The scope of the smart agrifood specialisation

Specialisation	Traditional sectors	Specialisation cross-sectors	Enabling technologies	Drivers of innovation	Development trajectories
Smart agrifood	Agriculture Livestock Food Fishing Industries	Packaging Energy Chemistry Biomedicine	Biotechnology Advanced materials Nanotechnology	Environmental sustainability Energy efficiency	Sustainable agribusiness Nutrition, health and food safety Intelligent management of natural and energy resources Processes of innovative and sustainable transformation

Sustainable living

The sustainable living specialisation in the Veneto region emphasises that quality of life and living is closely connected to the surrounding environment, the preservation of the natural ecosystem and the development of sustainable and energy efficient buildings (e.g. zero-energy buildings). In this context, the inclusion of the specialisation in the Smart Specialisation Strategy supports research and development in processes promoting environmental protection, the reduction of pollution, the optimisation of the waste cycle, the design of new energy-efficient building materials, and the development of new actions and policies addressing climate change and its effects.

Table 10: The scope of the sustainable living specialisation

Specialisation	Traditional	Specialisation	Enabling tech-	Drivers of	Development
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	sectors	cross-sectors	nologies	innovation	trajectories
Sustainable living	Building Furniture	Energy Forestry biomedical Chemistry	Advanced materials Nanotechnology	Environmental sustainability	Buildings and sustainable cities

Smart manufacturing

The smart manufacturing specialisation links strongly to the bioeconomy, in particular in the development of new bio-based products and processes, as well as from the point of view of energy efficiency. In this sense, the bioeconomy connect various areas of industrial specialisation within the region. The smart manufacturing specialisation includes a strong technological component and connects with various industrial sectors through supply chain linkages and technological interdependence. The importance of the bioeconomy is evident in industries such as in packaging, refining and the processing of materials.

A main aim of research and innovation in this area is to introduce new technologies into the regional manufacturing base, whilst also developing a 'clean and green' sustainable industrial production system. The use of new materials, together with ICT systems and nanotechnology, is integral to smart manufacturing; enabling technologies are recognised as being capable of transforming current resource-intensive and expensive industry practices into those constituting a (more) circular economy.

Table 11: The scope of the sustainable living specialisation

Specialisation	Traditional sectors	Specialisation cross-sectors	Enabling technologies	Drivers of innovation	Development trajectories
Smart manufacturing	Mechanical components Mechatronics Mechanical engineering Precision mechanics	Agriculture Building Packaging Biomedicine Manufacturing	Advanced materials ICT Nanotechnology	Energy efficiency Design	Production and sustainable processes Design and advanced production technology

Creative industries

Finally, within the creative industries specialisation, the bioeconomy is also significant. The creative industries are characterised by a continuing need for restructuring and modernisation in relation to numerous factors, such as continuous and increasingly rapid technological advances, innovation in materials, commercial competition and changes in the cost of production.

Despite this, the creative industries specialisation is often thought about in terms of conventional manufacturing and traditional industry sectors, such as fashion and its accessories, furniture, and sporting products. At first glance, these industries do not exhibit evident links with the bioeconomy. However, a closer inspection of the products and processes involved reveals links to the bioeconomy. This includes, for example, research aimed at developing new materials such as special and composite fibres, and the creation of bio-based materials.

Biotechnology and nanotechnology can contribute have the existing and increasing potential to play a more significant role in furthering these industries. The growing use of new materials also signifies innovation in production processes. Going forwards, industry processes will be driven by environmental sustainability criteria to an increasing extent.

Table 12: The scope of the creative industries specialisation

Specialisation	Traditional sectors	Specialisation cross-sectors	Enabling technologies	Drivers of innovation	Development trajectories
Creative industries	Footwear Clothing Tanning Smithing Ceramics Stained glass Fashion	Agriculture Mechanics Chemistry Biomedicine	Advanced materials ICT Advanced manufacturing systems Biotechnology Prototyping Nanotechnology Treatments on fabric	Design Creativity	Innovative materials and biomaterials

Therefore, in the light of the technical and scientific specialisms present in the Veneto region, it can be seen that the bioeconomy underpins many of the synergies between industry specialisms and, more generally, the economic system.

1.2 Research design

The study involved desk research based on official documents and policy reports, semi-structured interviews with Scottish participants, a workshop for interested parties, and qualitative data analysis.

Stakeholder interviews

Interviews were requested with a range of stakeholders who were involved in the development of the strategy or were in the broad bioeconomy and also with representatives of civic society.

Regional workshop

A regional workshop event was held as part of the BioSTEP project. The aim of this event was to gain feedback from Veneto bioeconomy stakeholders regarding participative governance in the regional bioeconomy. The event took place on 24 June 2016 at the Regional Association of Chambers of Commerce of Veneto (Unioncamere del Veneto - UCV). 25 people (originating in Veneto) attended, representing several sectors interested in the bioeconomy. These included agrofood, dairy, and green construction, trade associations. The latter included Veneto Agricoltura, the consortia for timber and green building, and a consortium representing firms in fields such as wool, hemp, dairy, agrofood, timber, nutraceuticals, biofuels, biomaterials and bioplastics.

2 Background of the strategy

2.1 Regional policy context

National strategies and the policy context

Italy is currently engaged in projects concerning the conversion of industrial sites in crisis into biorefineries, for the production of bio-based and biomedical products from renewable resources. This kind of activity has positive effects in terms of employment, environmental protection, and in terms of the profitability of products and of integration with petroleum chemical products.⁵⁰ Furthermore, it has the potential to lead to increased competitiveness. Integrated biorefineries can also facilitate the production of chemicals from renewable or raw materials. The production of biomass – such as hemp cultivation - has also proven to have positive effects on environmental remediation processes.

Box 1: National Technological Cluster of Green Chemistry (SPRING)

The Ministry of Education, University and Research (MIUR) approved the establishment of a National Technological Cluster for Green Chemistry in December 2012. The cluster was initially made up by Novamont, Versalis, Biochemtex and Federchimica. 100 stakeholders belonging to the private and public world are currently members, and many research organisations are leaders in biomass processing. The Veneto region is one of eight Italian regions which support and make up the cluster. The organisations CNR (the National Research Council), CREA (the Council for Research in Agriculture and Agrarian Economic Analysis) and ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) are part of the cluster.

The name of the cluster is SPRING - Sustainable Processes and Resources for Innovation and National Growth. Its aim is to encourage the growth and the development of bio-based industry, taking socio-economic and environmental aspects into consideration. Further aims are to stimulate growth, research and investment in new technologies, and to be the main interlocutor for local, national and European institutions involved in the area.

The interaction between companies, universities, research centres, institutions rural actors is the prelude to create new local supply chains and to strengthen existing measures channelling resources to create common objectives.

SPRING acts in order to:

- use renewable resources as raw materials;
- create biorefineries (to develop products like biochemicals and biomaterials);
- develop and to optimise innovative technologies through research and development;
- produce new bio-based materials;
- contribute to the design of policies at all territorial levels;
- develop new models of innovation and of supply chain;
- focus studies on specific sectors; and to
- organise training sessions periodically.

Cluster SPRING provides support to private and public stakeholders to develop pilot projects; to organise and take part in international initiatives and workshops; and to promote technological transfer and specific activities for SMEs and innovative start-ups. The cluster is managed primarily by business and industry associations.

⁵⁰ Novamont (undated) The Potential of the Bioeconomy Crisis in Europe and in Italy, p.2. Available at: <http://www.camera.it/temiap/2014/04/04/OCD177-99.pdf>

The bioeconomy is not a sector, but it is at the crossroads between many different industries. According to a study by the Research and Study Centre of Intesa Sanpaolo on Eurostat data, the bioeconomy in Italy is worth EUR241 billion and about 1.6 million jobs (2011 figures).⁵¹ In the European rankings, Italy's bioeconomy is a close third, behind Germany with a production value of EUR330 billion and France with a value of EUR295 billion. Italy is followed by Spain with EUR186 billion and the United Kingdom at EUR155 billion.

Business bioeconomy actors in the Veneto region

The Veneto region, as well as other regions in Italy, has been required by the European Commission to adopt a common guideline concerning bioeconomy development and to elaborate regional calls for proposals. The regional government is not the only actor supporting the development of the bioeconomy; it is also shaped by stakeholders and SMEs.

Firms in the region constitute the single biggest group of bioeconomy actors. Based on an analysis of business data elaborated by IRPET (Regional Institute for economic Planning of Tuscany) and derived from the Venetian ACCREDIA⁵² database of 'biological operators', in Veneto there are a total of 2,041 bioeconomy firms (see Annex I for full details of ATECO business categories).⁵³

2.2 Strategy development

One of the broad aims underpinning Italy's bioeconomy development plans is to further the transition from a product-based economy to a system-based economy, along with a cultural change towards increased economic and environmental sustainability. The change would be based on the efficiency of the use of resources that go beyond the use of renewable energy, but considering also raw materials and local waste. It has been estimated that every euro invested in research and innovation for bioeconomy, in a context of adequate support policies, at national and at local level as well, will have an important return in bio-based sectors as it is estimated to be equal to 10 euros within 2025.^{54,55}

The regional government of Veneto is working in order to strengthen regional strategies concerning the bioeconomy. Citizens represent the end users of these strategies. The National Technological Cluster of Green Chemistry (SPRING), in collaboration with the Italian Association Assobiotec, the Veneto Region and the Ministry of Environment are the main actors aiming to develop and implement national and local strategies for the bioeconomy.

The broad intention amongst current actors is to involve universities, centres of public and private research and consumer associations to a greater extent, so as to widen the audience of actors involved in bioeconomy policy development. The ultimate goal in terms of stakeholder engagement is to reduce fragmentation and to maximise opportunities among the various stakeholders (particularly the chemical industry); in other words, 'the creation of new opportunities and approaches, such as good practice guidelines and further action which could facilitate the complementarity of investment.'

The Veneto region can play a key role in the establishment of bio-based industries by providing a favourable business environment and the necessary political framework, through the implementation of specific actions in order to contribute to the growth innovative technologies. Veneto is an interesting case study because there is an emphasis on the broad inclusion of groups or industries in the strategy. The main actions and tools to set out the strategy are:

- Implementation of public-private partnerships for the diffusion of technological innovation in the field of bio-based economy;

⁵¹ Fumagalli, S and Trenti, S (2014) A first attempt to measure the biobased economy. Available at: http://www.group.intesasnpaolo.com/script/sir0/si09/contentData/view/Bioeconomy_Ottobre%202014.pdf?id=CNT-05-00000023F746&ct=application/pdf

⁵² www.databio.it

⁵³ ATECO is Italy's national version of the European nomenclature, Nace Rev. 2

⁵⁴ Novamont (undated) *Ibid.*

⁵⁵ European Commission (2012) Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions; Innovating for Sustainable Growth: A Bioeconomy for Europe, SWD(2012) 11 final, COM (2012) 60 final

- Promotion of regional policies and instruments to stimulate R&D activities and the development of wholly bio-based supply chains.⁵⁶

2.3 Aims and objectives

The main aims of the Smart Specialisation Strategy centre upon of connecting and networking the various areas of the bioeconomy to attain an integrated system of supply chains. The reduction and re-use of industry waste outputs is also important, driven by environmental factors. It is considered to be increasingly necessary and appropriate to address the issues related to climate change by implementing direct actions to protect the environment. Specific aims under this objective are the development of sustainable production processes, site remediation, improving energy efficiency, developing clean energy production, and promoting the sustainable use of natural resources.

Drivers of the Smart Specialisation Strategy

One of the main strategic drivers is the imperative for more efficient use of natural resources, energy and materials. Citizens and stakeholders are a major driver in shaping the demand for more sustainable, renewable bio-based products, but supply is limited by the response speed of enterprises in technological, economic and financial terms. In addition, the public sector (regional and national governments) play a fundamental role in governing incentives facilitating the supply side. The public sector also contributes by strengthening the demand side through coordinated programmes of green public procurement.

3 Overview of actual participation in the strategy

3.1 Actual participation in the strategy's design

Stakeholders across a range of different bioeconomy sectors in the Veneto region participated in the design of its Smart Specialisation Strategy. The strategy was intended to be the result of a collective learning and participatory process, in which public and private institutions, the business world, academia, and representatives of civil society took part.⁵⁷ Regional actors such as companies, universities, research centres, trade associations and consumers were invited to make their contribution 'to the creation of an inclusive multi-level governance structure and to the identification of regional needs'.⁵⁸ The strategy was prepared by an expert working group. In the process of design and preparation, 'strong relationships with the best Italian research centres operating in various bioenergy-related areas' were created.⁵⁹ The strategy paper was approved by the technical-scientific committee of the Agency, which includes representatives of major agricultural associations.

The main actors responsible for the development of the strategy, and strategic decisions, were the regional governments and municipalities. Rules are set out by the European Union and are given in a precise way; municipalities implement them, and the State also plays an essential role. The role of the national government is to ensure that regional governments adhere to EU legislation, and to check that guidelines and operative procedures are correctly applied. The Veneto region (and the other Italian regions) are working to implement clusters under the smart specialisation agenda. The Member States transpose and also implement their own rules.

The general public (citizens) were not directly involved in the development of the Smart Specialisation Strategy. Members of the public have been informed, to a degree, through exhibitions and other platforms for the dissemination of information, but have not yet been involved in any discussion of the regional strategy.

⁵⁶ Survey - Interview to Veneto Region

⁵⁷ Regione del Veneto (2015) www.regione.veneto.it/web/attivita-produttive/Smart-Specialisation-Strategy

⁵⁸ *Ibid.*

⁵⁹ www.venetoagricoltura.org/basic.php?ID=1058

At present, since neither specific calls nor guidelines are available, the bioeconomy is growing thanks to initiative and entrepreneurialism of stakeholders and their skills, as well as the increasing market demand of such products and services. The involvement of actors at different stages is ongoing thanks to a cascade effect. Stakeholders improved the strategy (even though stakeholders generally view the strategy from the point of view of their own individual positions within the bioeconomy). The strategy development process itself also improved the knowledge of individuals involved, enabling the sharing and the exchange of information. Organisational stakeholders contributed to the development of Veneto's Smart Specialisation Strategy as they partly lobbied and lobby decision-makers in project selection committees.

The Smart Specialisation Strategy of Veneto underpins a framework for guiding and assisting local SMEs who have already embarked on the path of the bioeconomy or that use it as a new address to diversify existing production. So the first actors responsible for developing and deciding on their own strategy were, managers, internal staff of the project, external consultants and sample selected companies on the territory, people who had and have a little bit of foresight.

Benefits of stakeholder participation

The consultation process for the design of the Veneto regional Smart Specialisation Strategy stimulated communication between stakeholders. The involvement of interested organisations allowed also served to improve relations between companies. The benefits resulting from the participation of a wider range of organisational stakeholders in the strategy particularly those from different industry sectors, include the promotion and development of synergies.

3.2 Actual participation in the strategy's implementation

The Smart Specialisation Strategy contains a detailed account of the preparation process, including the methods through which different stakeholders were consulted. These included online consultations, thematic workshops and specific in-depth sessions, and were attended by representatives of universities, research centres and the regional administration. These stakeholders contributed to the strategy development and refinement as well as to its outcomes.⁶⁰

Another action foreseen in the strategy concerns training and information. Information dissemination actions would involve all regional stakeholders (including 'institutional stakeholders', 'technical and economic stakeholders' and 'stakeholders in the system of knowledge') as well as promoting a professional community of those professionally involved in the agriculture and energy sectors, supporting knowledge exchange and dissemination.

3.3 Actual participation in the strategy's review

There is no official review of the Smart Specialisation Strategy; Italian regions are coordinated by the national government, which is directly in contact with the Commission and is working to align Italian industrial development with national and European directives. There is no information regarding any possible business involvement in ongoing consultation.

4 Reflections on possible participatory approaches

The scope of optimal stakeholder participation

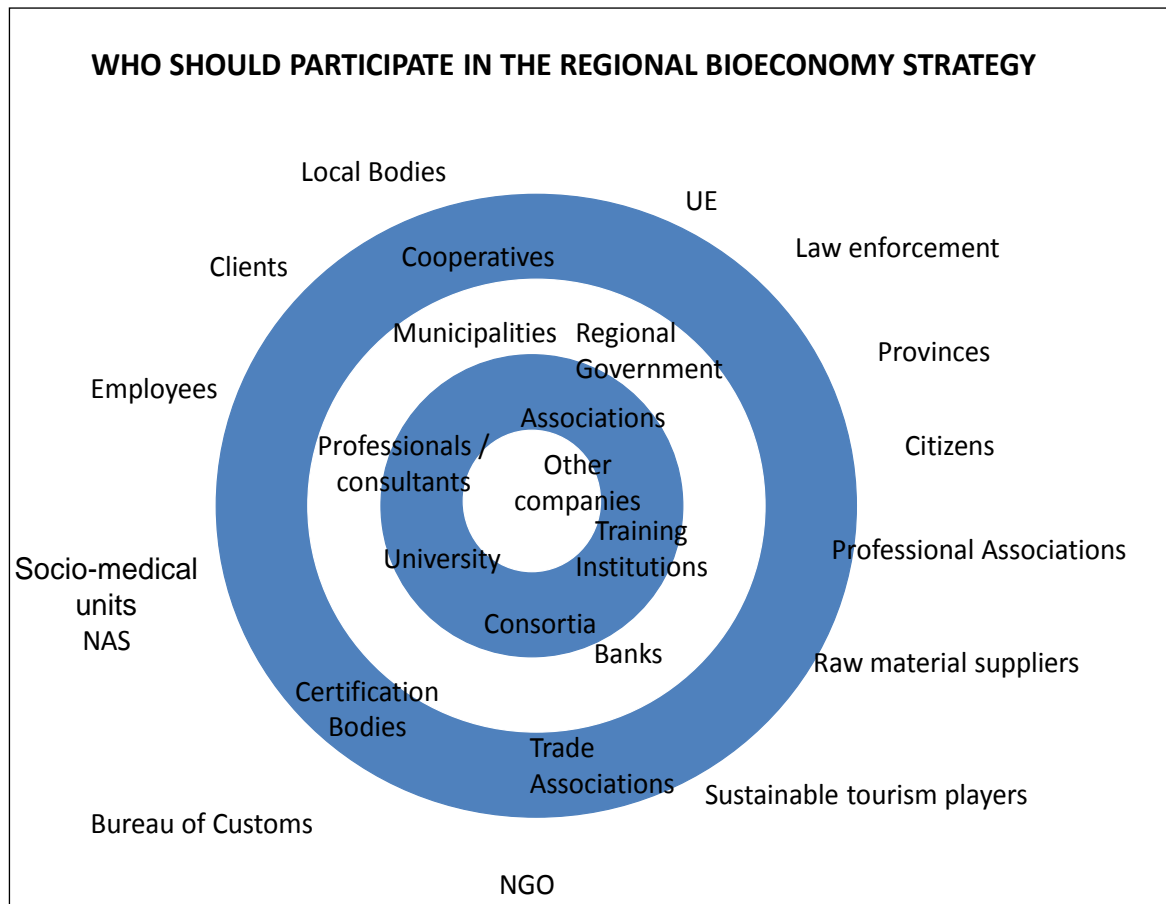
The Veneto regional event served as platform for the discussion of future possible participatory approaches to stakeholder engagement in the bioeconomy.

Amongst stakeholders already involved in the Smart Specialisation Strategy, there is a consensus that for a stronger regional bioeconomy strategy it is important to involve a broad range of actors at different levels through a systematic approach to fostering participation (Figure 6). Frequent communication facilitates the involvement of a broad range of stakeholders in a societal dialogue, in order to ensure that legitimate societal concerns are taken into account. The outcomes of public debates will

⁶⁰ For example, p. 66 presents the timeline of the whole 'entrepreneurial discovery' path for the RIS3

assist the Veneto Region in formulating appropriate and effective programmes of measures to foster its regional bioeconomy.

Figure 6: Regional workshop feedback on strategy participation



Almost all of the workshop stakeholders who are not participating in the regional strategy agreed that the main drivers for the development of the strategy are: the regional government; trade associations (who should involve companies and artisans); the education community (responsible for ensuring that the workforce has access to training for qualifications); and civil society.

Citizen involvement

The importance of involving individual citizens was less unanimously agreed upon; doubts were expressed by some regarding the utility of involvement from citizens not directly involved in the bioeconomy in Veneto. The involvement of citizens, according to a few of the interviewed, would lead to difficulties in resolving opposing opinions. Some respondents believed that providing direct feedback on strategy or policy is not a task of citizen, and that the goal should be to inform the public about the bioeconomy.

However, most interviewees and workshop attendees believed that citizens represent an opportunity to ensure that bioeconomy strategies become feasible.

Challenges and opportunities in stakeholder engagement

Stakeholders were of the opinion that, within the Veneto region, there is latent interest amongst bioeconomy stakeholders in being engaged to a greater extent, but that this must be done the right way. The challenge now is to find a way to network stakeholders and to identify the right targets. This is partly due to cultural characteristics regarding the openness of individuals and organisations; it is

important to provide users and stakeholders with information and to develop actions such information campaigns for the public, individual consumers, the education sector, young people, etc.

The participation of a wider range of organisational stakeholders in the strategy would increase the economic welfare of the Veneto region. A successful bioeconomy strategy aimed at developing the market should include a range of components which can contribute to success.

BioSTEP workshop attendees identified negative elements and barriers such as a tendency for some stakeholders to avoid cooperation or to agree on clear targets. It was recognised that the absence of an efficient management structure inhibits the management of a network of stakeholders.

Promoting an economical, sustainable and ethical participatory model is considered difficult. Only through a networked approach will the Veneto region have the chance to connect bioeconomy stakeholders. A web-based network can facilitate better communication, data sharing and discussion of proposals; most importantly, by informing users. By working together it would be easier to support innovation in the bioeconomy.

Structures and methods to encourage participation

Interviewees and workshop attendees underlined the fact that broad engagement depends largely upon a facilitating political environment, and that in Veneto at present a well-defined and updated regional strategy is not perceived to be in place by all stakeholders.

There is also the need to have mechanisms to inform stakeholders about the possibilities of becoming involved in the strategy and policy development. Sufficient financial resources are required for all of this. Stakeholders require mentoring or support and facilitation in the construction and in the maintenance of the network. They agreed that there must be a regulatory framework and facilitating synergies.

5 Outlook/prospects with regard to the further development/implementation of the regional strategy

The Regional Association of Chambers of Commerce of Veneto (*Unioncamere del Veneto*) together with the other Italian BioSTEP partner, AGHETERA, is spreading information concerning the project and the concept of the bioeconomy in order to promote the exchange of technical and scientific knowledge relating to the bioeconomy to entrepreneurs, policymakers, scientists, NGOs, stakeholders and other actors in the Veneto region. The aim is to foster the development of bioeconomy.

UCV is collecting information from users in order to start a brainstorming-concept mapping-action planning process (consensus methods) and, most of all, to create a network in Veneto for bioeconomy. The aim of this network is to systematise and strengthen the existing, still weak and fragmented supply chains that are developing around various bioeconomy 'cores'. As a first result of the BioSTEP project, UCV is working on a new 'regional innovative bioeconomy network of enterprises',⁶¹ an example of aggregation and business development in Northern Italy, which focusses on the bioeconomy. A Regional Innovative Network is an aggregation among companies and public and private entities, which are present in the region but not necessarily territorially contiguous, operating in innovative industry areas. They are able to develop a set of initiatives and projects relevant to the regional economy, though not necessarily limited to a specific field of production (i.e. open to a multi-sectoral dimension). To this end it would be useful to begin to spread the concept of bioeconomy through information campaigns addressed not only to manufacturers, importers or retailers, but also to final consumers.

Individuals and stakeholders that will be part of this network will also have the chance to take part in a living lab.⁶² The aim of the living lab is to reconstruct supply chain strategies in order to stimulate

⁶¹ <http://bur.regione.veneto.it/BurVServices/pubblica/DettaglioLegge.aspx?id=275529>

⁶² The aim of living labs is to provide new ways of involving users in product (services) development and the necessary 'lab' infrastructure to do so. Living labs do not develop products, but they bring developers and users together. In short, they are intermediaries for collaborative innovation.

discussion with real actors, in order to explore and define the concrete decisions they face, what they expect from other bioeconomy (and other industry) actors, and what results are expected based on the behaviour of individual actors. In doing this, it is important to define what each actor is committed to do to initiate economic activities; to understand which goals are pursued; and to outline the feasible actions (for example, through the use of literature reviews, focus groups, etc.). Once the working method is defined, the living lab approach has the potential to support the emergence of new business models as it is essential to support and make the bioeconomy sustainable in the long run.

To implement the Smart Specialisation Strategy in the Veneto, it is important to help companies to change their mind to see the value of bio-based industry development, to specialise and to innovate. It is also important to inform users about the new opportunities that are in the market, the implications for the environment, and the implications for the health of consumers in the use of certain materials or substances which could be replaced with materials of renewable origin.

UCV and AGHETERA are aiming to get a pilot action and/ or a working group that supervises the development of the agreement reached at political level, concerning regional bioeconomy development.

In order to include a broader range of stakeholder interests in the future development of the bioeconomy, UCV and AGHETERA also wish to bioeconomy growth in concert with trade associations and the Veneto regional government, through information campaigns which aim:

- to promote responsible consumption;
- to promote a bioeconomy for regional 'bio-purchasers' (such as canteens, schools, manufacturers of furniture, chemical manufacturers, energy providers);
- to promote the bioeconomy across a range of stakeholder types; and
- to promote the use of bioplastics.

APPENDICES:

APPENDIX I: Stakeholder interviews

Through desk research, UCV mapped the Veneto bioeconomy and grouped companies and stakeholders by sector and related sectors. Using a per province approach, stakeholders were informed about the BioSTEP project and the activities it entailed. Contacts were informed first by mail to invite their feedback concerning the Smart Specialisation Strategy, the market, and (most importantly) the problems faced in the Veneto region with regard to participative governance.

One hundred contacts were selected and invited to contribute to the research exercise. These invitees were targeted in order to ensure representation from a range of bioeconomy-related industry specialisms; green building, biofuels, biomaterials, timber, and bioproducts. There was significant interest in participating in the BioSTEP project, and not only from institutional stakeholders. Despite this interest how, not all stakeholders were able to complete the BioSTEP questionnaire due to a lack of time. Moreover, the questionnaire was aimed at stakeholders already participating in the development of bioeconomy strategies, but unfortunately this accounted for a minority within the region.

Stakeholder interviews were undertaken with 18 individuals. 15 of them completed the WP3.2 survey. The relatively modest numbers of completed surveys was due to some invitees feeling that participation in the development of bioeconomy strategies was not particularly relevant to them. UCV collected 15 surveys from mid-February to April 2016 from the following stakeholder types:

- 3 institutional stakeholders
- 5 trade associations and consortia
- 1 science and technology park
- 5 firms (2 biobuilding, 1 biofuel, 2 biomaterials)
- 1 individual; a former director in the bioeconomy

APPENDIX II: Regional workshop

The Italian Regional Event took place on June 24 2016 at UCV. Thanks to promotional efforts and communication with the most interested stakeholders, 32 people registered for the event. Of these, 25 people attended. They represent several sector involved and interested in bioeconomy (agrofood, dairy sector, green building, Trade Associations, Veneto Agricoltura, Consortia for timber and green building and Consortium that represent several companies and several fields like: wool, hemp, dairy, agrofood, wood, old and ancient professions that are part of our cultural heritage and that, despite the progress, could be the first to provide raw materials that have been not yet taken into consideration and that at the moment are discarded and not reused), nutraceuticals, biofuel, biomaterials and bioplastics.

The agenda of the day was as follows:



Promoting Stakeholder Engagement and Public Awareness for a Participative Governance of the European Bioeconomy

EVENTO REGIONALE PROGETTO BioSTEP
"Plasmiamo insieme la Bioeconomia"

24 giugno 2016 ore 9.00
Sala Europa via delle industrie 19/C

Programma

9.00 - 9.30 Registrazione

9.30 - 9.40 Presentazione del progetto BioSTEP
dott. Filippo Mazzariol Unioncamere del Veneto

9.40 - 9.50 Presentazione dati economici input output
dott. Manfredi Vale AGHETERA

9.50 - 10.05 Un approccio innovativo allo sviluppo dell'impresa: *La rete d'impresa per la bioeconomia*
dott.ssa Marin rete SCIADRA

10:05 – 11.35 Processo partecipato per definire forme e modalità della rete

- *prof. Giovanni Bertin Università Cà Foscari*
- *dott.ssa Stefania Porchia Fondazione Cà Foscari*

11.35 – 12.00 **Pausa caffè**

12.00 – 13.00 Discussione e conclusioni







APPENDIX III: The bioeconomy base in the Veneto region

The number of bioeconomy-based firm in the Veneto Region has been estimated by IRPET. This table, which describes the Veneto economy, refers to the year 2013 and consists of 37 entries, that describes the trade between 37 economic sectors into which the 96 NACE categories are grouped into the Veneto Region. There being NACE categories dedicated exclusively to the bioeconomy, the sample was defined starting from the list of certified companies is available from the Venetian AC-CREDIA database (www.databio.it). The data indicate that **in Veneto today there are 1,989 certified bioeconomy organic companies from various certification bodies.**

Within the regional scenario, however, the macro-sectors of **Biochemistry and Bioplastics** are also known, then certified companies **have been added 52 companies in these sectors.** It was then created a database in which are gathered the main information of the companies in order to better delineate the profile of the bioeconomy in the Veneto and compare it with the economic profile of the region.

Relationship data Table I/O inputs of the Veneto Region and the categories NACE. Relevant sectors for the bioeconomy'

I/O ENTRIES	DESCRIPTION	ATECO CATEGORIES
1	Agriculture, forestry	01,02
2	Fishing	03
3	Mining and quarrying	05,06,07,08,09
4	Manufacture of food products, beverages and tobacco	10,11,12
5	Manufacture of textiles, wearing apparel and leather and related products	13, 14, 15
6	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	16
7	Manufacture of paper and paper products	17, 18
8	Manufacture of coke and refined petroleum products	19
9	Manufacture of chemicals and chemical products	20
10	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21
11	Manufacture of rubber and plastic products	22
12	Manufacture of other non-metallic mineral products	23
13	Manufacture of basic metals	24, 25
14	Manufacture of computer, electronic and optical products	26
15	Manufacture of electrical equipment	27
16	Manufacture of machinery and equipment n.e.c.	28
17	Manufacture of motor vehicles, trailers and semi-trailers	29, 30
18	Other manufacturing	32,33
19	Electricity, gas, steam and air conditioning supply	35
20	Water supply; sewerage, waste management and remediation activities	36, 37, 38, 39
21	Construction	41, 42, 43
22	Wholesale and retail trade; repair of motor vehicles and motor-cycles	45, 46, 47
23	Transportation and storage	49, 50, 51, 52, 53
24	Accommodation and food service activities	55, 56
25	Publishing, audiovisual and broadcasting activities	58, 59, 60
26	Telecommunications	61

27	Information service activities	62, 63
28	Financial and insurance activities	64, 65, 66
29	Real estate activities	68
30	Legal and accounting activities	69, 70, 71
31	Scientific research and development	72, 73
32	Other professional, scientific and technical activities	74, 75
33	Administrative and support service activities - Public administration and defence; compulsory social security	77, 78, 79, 80, 81, 82, 84
34	Education	85
35	Human health and social work activities	86, 87, 88
36	Arts, entertainment and recreation	90, 91, 92, 93
37	Other service activities	94, 95, 96