LAND
BRANDENBURG

MASTER PLAN FOOD INDUSTRY

UPHEAVAL MAKES FOR A FRESH START – A NAVIGATOR FOR TRANSFORMATION

THE GERMAN CAPITAL REGION
excellence in food industry

Master Plan for the Cluster Food Industry Brandenburg

Upheaval makes for a fresh start – A navigator for transformation

Contents

1 Introduction

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In the course of the ever-changing framework for the agriculture and food industry, the decision was made to perform a critical review of the 2014 Master Plan for the Cluster Food Industry Brandenburg. This review looked closely at which elements are still relevant, which have been integrated into a new context, and which aspects need to be reconsidered in the face of changing circumstances.

The Master Plan was updated between July 2021 and April 2022. All players[1] within the Cluster were invited to participate in every stage of the Master Plan development with the aim of providing them with a regionally relevant orientation framework and guideline for the ongoing transformation.

In the course of the review process, four fields of action and two cross-sectoral topics were identified, which are described in the following strategy paper and underpinned with appropriate measures. The following fields of action and cross-sectoral topics are considered interdependent rather than in competition with each other:

- Field of action 1:
  Sustainable value creation system
- Field of action 2:
  Sustainable production of animal based food
- Field of action 3:
  Food trends and technologies
- Field of action 4:
  Climate-adapted production from farm to fork
- Cross-sectoral topic 1:
  Skilled workforce for the transformation
- Cross-sectoral topic 2:
  Internationalisation

The SWOT analysis updated in Chapter 4.4 outlines the opportunities and challenges that determine and shape the way in which measures are implemented. In the spirit of the “Strengthen strengths” approach, the recommendation is for the players within the Cluster to prioritise their activities and build on the existing potential within the region. Nevertheless, the weaknesses still have to be taken into account and ultimately transformed into strengths.

Attention must also be paid to the growing risks for the agriculture and food industry in Brandenburg posed by increasing price volatility, extreme weather events, demographic change, pandemics, and – as is currently the case with Russia’s war against Ukraine – global crises. This is all calling for companies to adopt strategies to increase their own resilience.

The Master Plan for the Cluster Food Industry aims to provide answers to important questions about the future. Especially created by industry players for industry players, it incorporates the agreement of the players from companies, associations, chambers, scientific institutions and administrations on new fields of action and measures to be worked on together over the years to come. The Master Plan therefore represents the working basis for all players interested in innovation and cooperation within the Cluster Food Industry Brandenburg.

1 In the spirit of non-discriminatory language, the word ‘players’ is intended to encompass all genders in this Master Plan. It also includes all forms of enterprises, scientific institutions, legal and non-legal entities, as well as associations along the entire value chain.

2 The Cluster Food Industry Brandenburg

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2.1 The strategic framework for the Cluster

The food industry is **one of the main pillars of industry in Brandenburg**. It is against this background that the state government is focusing on the development of strong Cluster structures across the state in its Regional Innovation Strategy (innoBB 2025 plus). The aim here is to promote continuous improvements in terms of both the competitive edge and innovative strength of local businesses.

Updated in 2019, the innoBB 2025 plus has a structuring influence on the work carried out across the Cluster Food Industry. It complements the Joint Innovation Strategy of the States of Berlin and Brandenburg (innoBB 2025) to form a strategic framework of innovation policy for the four Brandenburg-specific Clusters, setting out guidelines for **expanding and opening up innovation efforts and prioritising sustainable innovation**. Brandenburg's innovation strategy addresses cross-Cluster topics such as digitalisation, the establishment of real-world laboratories and test fields, Work 4.0 in the context of skilled labour, and start-ups, new businesses and spin-offs, all while emphasising the importance of **cross-Cluster activities**.

2.2 Tasks and goals of the Cluster

The Brandenburg Cluster Food Industry covers the **entire value chain of the agriculture and food industry** "from farm to fork" and connects relevant industrial sectors with the region's food science potential.

The Cluster Food Industry includes all companies, scientific institutions and intermediaries[2] in the value creation system, with food processing, feed production and beverage production companies right at the heart. Agricultural companies occupy a key position in the Cluster Food Industry with the aim of creating closed value chains and strategic cooperations.

Cluster Management supports the various players in the Cluster by providing networking opportunities, acting as a general driving force, and serving as a neutral moderator alongside a wide circle of associations and institutions.

Knowing that many innovations arise at the interfaces between the sectors, **cross-sectoral cooperation with the eight other Clusters** is recognised as an opportunity to shape the transformation of Brandenburg's agriculture and food industry. In line with the open innovation approach of innoBB 2025 plus, cooperation between the sectors will be promoted in various formats:

- Bioeconomy and Circular Economy | Cluster Plastics and Chemistry
- Climate Protection and Sustainability | All Clusters
- Regionality and Rural Development | Cluster Tourism
- Logistics | Cluster Transport, Mobility and Logistics
- Sensors and Analytics | Cluster Photonics
- Energy Efficiency | Cluster Energy Technology

2.3 The Master Plan as a navigator for transformation

The focus of current and future political and social frameworks within the agriculture and food industry is determined by a variety of factors, including climate, environmental and nature protection, healthy and affordable nutrition, and crisis resilience. Society is also – quite rightly – calling for higher social standards. Social trends lead to corresponding consumer trends, and disruptive innovations can bring about fundamental changes to market conditions and existing business models. At the same time, food is an essential basis of human life and thus also serves to secure social harmony and cohesion. It is therefore essential to ensure it is permanently affordable across the whole spectrum of society.

These challenges are all the greater since Brandenburg's agriculture and food industry will be increasingly confronted with production risks in the future (price volatility, extreme weather conditions, demographic change, changes in working and living environments, pandemics, political crises,

2 Intermediaries include administrations, chambers, associations, networks, business development agencies and trade unions.

negative consequences of geopolitical disputes). Companies are faced with the task of aligning themselves with all of these challenges and securing their competitiveness in the long term. If they are to successfully meet the complex challenges ahead, players within the Cluster need strategies to increase their own resilience[3].

It is with all of this in mind that the players within the Cluster are working with the support of Cluster Management to further develop the **common vision of a sustainable agriculture and food industry** in Brandenburg. The updated Master Plan supports the implementation of this common vision (see the first puzzle pieces of a common picture of success in Chapter 8). It is the strategic working basis and design tool of the Cluster for the cooperation of business, science, administration and economic development of the State of Brandenburg. The Master Plan lays the foundations for the Cluster's work over the coming years and is conceived with the basic understanding that the changes ahead represent a real opportunity. The expected transformation of the agriculture and food industry is to be answered with new business models, cooperations and strategic alliances.

The ongoing development of a sustainable agriculture and food industry results in increasing demands on all players and, in some cases, will lead to fundamental and lasting change. It is against this backdrop that players within the Cluster have established the objective of embarking on this transformative path together as part of the update process. The further development of Brandenburg's agriculture and food industry into a system that will continue to treat ecological and social resources with real appreciation in the future while also ensuring the economic competitiveness of the industry is understood as a common narrative (helpful sustainability concepts can be found in the appendix under 9.1).

3 The term "resilience" describes the quality of being able to handle stressful situations.

3 The changing agriculture and food industry – political and social frameworks

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Numerous international, national and regional legal standards and requirements have a significant influence on shaping not only the industry's framework for action, but also wider developments across Brandenburg.

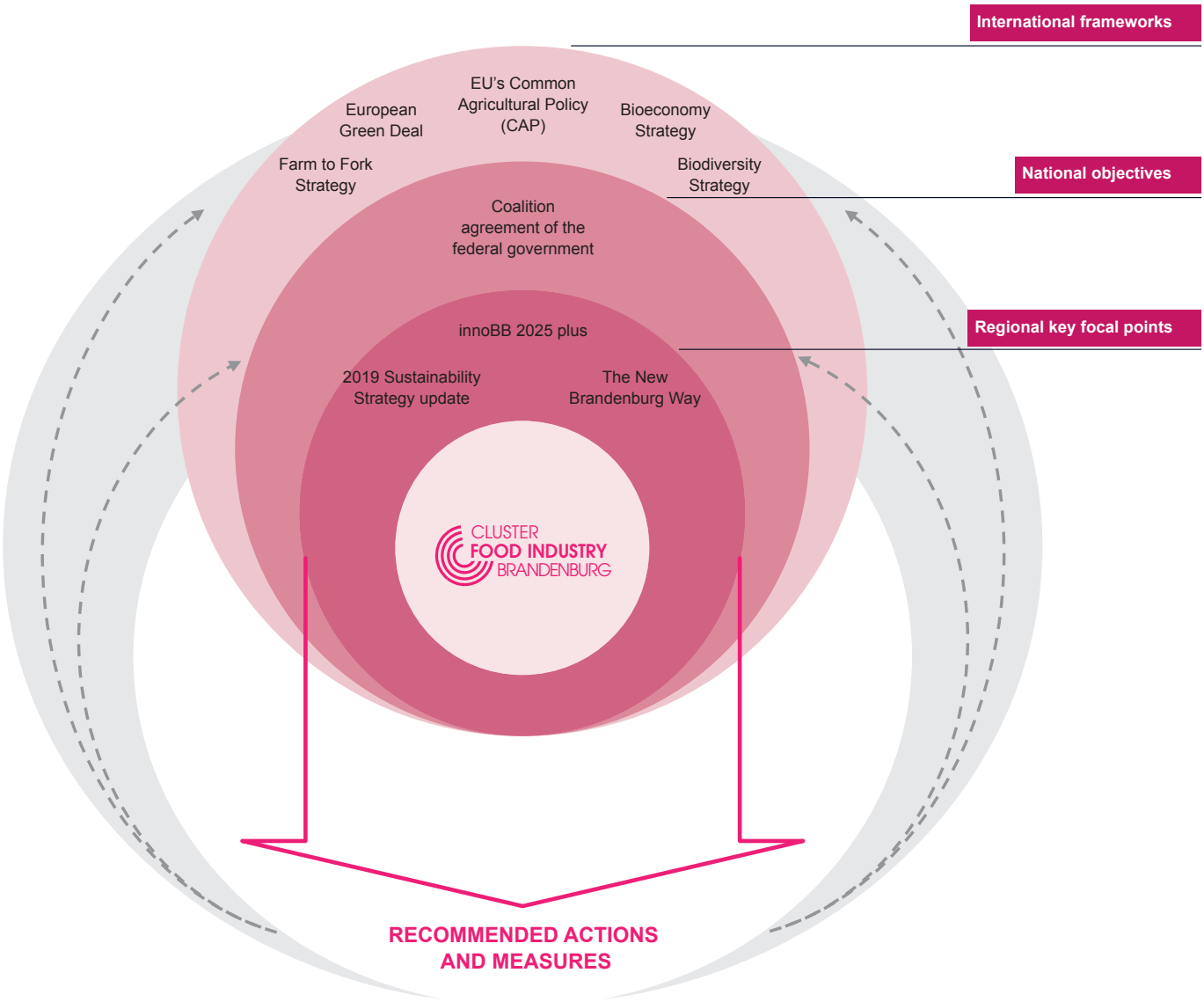

Figure 1: Frameworks and their impact on recommended actions and measures

3.1 International frameworks

The Brandenburg Cluster Food Industry is currently facing new challenges due to global crises, the most notable of which currently being the Russian war of aggression against Ukraine – a major international primary producer in the food industry. It remains difficult to foresee what the medium- to long-term consequences of these events will be – not only for the world's food supply, but also for regional Clusters such as the Brandenburg food industry. Even beyond the war against Ukraine, rapid price increases on a wide range of commodity markets are presenting major challenges for Brandenburg's food industry. Through their involvement in the Cluster Food Industry, players can work together to increase their resilience through innovation initiatives.

The actions undertaken by players within the Cluster keep them in line with the UN's Sustainable Development Goals (SDGs), which were adopted by all member states in 2015. This universal call to action aims to end poverty, protect the planet and ensure that all people can live in peace and prosperity by 2030[4].

This reference framework provides a global blueprint for a better and more sustainable future and is the guiding light for all UN member states to steer sustainable development on the basis of these goals (see excursus on exemplary SDGs for each field of action in appendix under 9.1).

With the European Green Deal, the EU Commission has launched a growth strategy that, taking into account the SDGs, should enable climate neutrality in Europe while improving the well-being of all citizens by 2050. Achieving this goal relies on every sector to make a significant contribution. The Farm to Fork Strategy describes how the transition to climate-neutral agriculture and a fair, healthy and environmentally friendly food system is to be shaped. This is right at the heart of the European Green Deal and is intended to make a significant contribution to the social and economic change in Europe towards a sustainable economic system. More specifically, it provides for 25 per cent of agricultural land to be farmed organically by 2050[5], the use of pesticides to be halved, and the use of chemical fertilisers and animal manure to be reduced by 20 per cent. In addition to the Farm to Fork Strategy, the Biodiversity Strategy adopted in 2018 is yet another pillar on the path to a more sustainable agriculture and food industry. This strategy aims to increase biodiversity in Europe by 2030 by means of a specific package of measures. Both of these approaches are complemented by the Bioeconomy Strategy, which notably envisages the increased use of secondary and waste streams from agriculture and food processing, thereby bringing together consumers and businesses at all stages of the value chain to jointly shape a sustainable and competitive food system[6].

Introduced in 1962, the Common Agricultural Policy (CAP) is financed by the EU and provides both the framework for agricultural policy in the member states and the basis for national legislation[7]. In a bid to make agriculture sustainable while also ensuring food security for the European population, the CAP provides for an extensive range of measures to support European agricultural companies.

3.2 National objectives

In the coalition agreement of the SPD, FDP and Bündnis90/Die Grünen of 2021[8], the German government agreed on a stronger convergence of economic development and ecological responsibility. Protection of the environment and nature should form an essential part of political action, with the expectation that this will be reflected at national level in corresponding laws and regulations impacting the agriculture and food industry.

4 United Nations (2021): https://sdgs.un.org/goals [Accessed on: 9 March 2021]

5 European Commission (2020): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

6 European Commission (2021): https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en [Accessed on: 9 March 2021]

7 European Commission (2021): https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en [Accessed on: 9 March 2021]

8 Coalition agreement between SPD, Bündnis 90/Die Grünen and FDP (2021): Mehr Fortschritt wagen. Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit [Dare to make more progress. Alliance for Freedom, Justice and Sustainability] | https://www.bundesregierung.de/resource/blob/974430/1990812/04221173eef9a6720059cc353d759a2b/2021-12-10-koav2021-data.pdf?download=1 [Accessed on: 11 March 2022]

Furthermore, existing national laws and strategies influence the actions of the agriculture and food industry:

Laws and strategies

- **Federal Climate Protection Act** (KSG)[9] (including reduction of greenhouse gases by at least 65 per cent by 2030 compared to 1990)
- **National Bioeconomy Strategy**[10] (with guiding principles notably including the contribution to sustainable, climate-neutral development with biological knowledge and responsible innovations and to a sustainable, circular economy with biogenic raw materials)
- **German Sustainability Strategy**[11] (which aims to shape a future in which nature and the climate are protected, fewer people suffer hardship, and society comes together)
- **National Strategy against Food Waste**[12] (with the targets of halving per capita food waste in Germany at retail and consumer level by 2030 and reducing food waste generated along the production and supply chain, including post-harvest losses)
- **Arable Farming Strategy 2035**[13] (in times of climate change, the arable farming strategy is intended to highlight options and approaches for sustainable – i.e. ecologically compatible, economically viable and socially oriented – arable farming. These include promoting greater social acceptance, ensuring the supply of high-quality food, feed and biogenic raw materials, strengthening environmental protection and resource conservation, preserving biodiversity in the agricultural landscape, extending the contribution to climate protection, adapting arable farming to climate change, and increasing social acceptance of this type of farming)

3.3 Regional key focal points

State-specific strategies that both build on and complement the international and national framework serve to influence the agriculture and food industry in Brandenburg:

- **Coalition agreement of the Brandenburg state government**[14] (this aims to continue to develop regional production and process agricultural products, expand organic farming, provide guidance for farms, preserve biodiversity, develop animal-friendly husbandry systems, and make environmentally and climate-friendly changes for modern, efficient and competitive agriculture)
- **innoBB 2025 plus innovation strategy**[15] (this focuses on strong networking right along the value chain as well as the cross-sector Master Plan within the capital region; It also aims to develop the location into a European hub for a sustainable agriculture and food industry to increase competitiveness)

9 Federal Ministry of Justice (2022): https://www.gesetze-im-internet.de/ksg/BJNR251310019.html; Federal Climate Protection Act (KSG) section 3, paragraph 1 [Accessed on: 17 March 2021]

10 Federal Ministry of Food and Agriculture (BMEL) (2022): https://www.bmel.de/DE/themen/landwirtschaft/bioeokonomie-nachwachsende-rohstoffe/nationale-biooekonomiestrategie.html [Accessed on: 11 March 2022]

11 Press and Information Office of the Federal Government (2022): https://www.bundesregierung.de/breg-en/issues/sustainability/germany-s-national-sustainable-development-strategy-276504 [Accessed on: 11 March 2022]

12 Federal Ministry of Food and Agriculture (BMEL) (2022): https://www.bmel.de/DE/themen/ernaehrung/lebensmittelverschwendung/- [Accessed on: 11 March 2022]

13 Federal Ministry of Food and Agriculture (BMEL) (2022): https://www.bmel.de/DE/themen/landwirtschaft/pflanzenbau/ackerbau/ackerbaustrategie.html [Accessed on: 11 March 2022]

14 Coalition agreement between SPD, CDU, Bündnis90/Die Grünen (2019): Zusammenhalt, Nachhaltigkeit, Sicherheit – Ein neues Kapitel für Brandenburg [Cohesion, sustainability, security – A new chapter for Brandenburg] | https://www.brandenburg.de/media/bb1.a.3833.de/Koalitionsvertrag_Endfassung.pdf [Accessed on: 11 March 2022]

15 Ministry of Economic Affairs, Labour and Energy of the State of Brandenburg (2019): innoBB 2025 plus. Regional Innovation Strategy of the State of Brandenburg | https://mwae.brandenburg.de/media/bb1.a.3814.de/Broschuere_innoBB_2025_plus.pdf [Accessed on: 11 March 2022]

- **Brandenburg Sustainability Strategy**[16] (this describes measures to combat climate change and its effects, to adapt land use, and to promote agroforestry systems as agricultural, environmental and climate protection measures)
- **Brandenburg Eco Action Plan**[17] (goals of the Eco Action Plan include sharing knowledge of organic farming, implementing operational restructuring measures and expanding networking infrastructure)
- Landesbauernverband Brandenburg e.V.: **The New Brandenburg Way**[18] (this comprehensive strategy paper advocates the strengthening of a functioning rural area as a living and social community and focuses on securing the livelihood of the agriculture and food industry in the context of both political and social market requirements)
- **Berlin Nutrition Strategy**[19] (this focuses on healthy foods and the expansion of regional market relations between Berlin and Brandenburg)
- **Brandenburg Skilled Workforce Strategy**[20] (this pursues the overarching strategic goals of securing the demand for skilled workers in the State of Brandenburg and ensuring that Brandenburg is an attractive place in which to live and work)
- **Brandenburg Nutrition Strategy** (under development, as of March 2022)
- **Brandenburg Bioeconomy Strategy** (under development, as of March 2022)
- **Brandenburg Climate Plan** (under development, as of March 2022)
- **Brandenburg Climate Adaptation Strategy** (under development, as of March 2022)

16 Ministry of Agriculture, Environment and Climate Change of the State of Brandenburg (MLUK) (2019): Sustainability Strategy for the State of Brandenburg | https://mluk.brandenburg.de/mluk/de/ueber-uns/agrar-und-umweltpolitik/nachhaltigkeit/nachhaltigkeitsstrategie/# [Accessed on: 11 March 2022]

17 Ministry of Agriculture, Environment and Climate Change of the State of Brandenburg (MLUK) (2021): Ökoaktionsplan Brandenburg 2021–2024. Eine Landesinitiative zur Stärkung der ökologischen Land- und Lebensmittelwirtschaft in Brandenburg [Brandenburg Eco Action Plan 2021–2024. A state initiative to strengthen the organic agriculture and food industry in Brandenburg] | https://mluk.brandenburg.de/sixcms/media.php/9/Oekoaktionsplan-Brandenburg.pdf [Accessed on: 11 March 2022]

18 Landesbauernverband Brandenburg e.V. (2020): Zukunftsperspektiven für die Landwirtschaft 2030. Der neue Brandenburger Weg. Schritte zu einem Zukunftsvertrag für die Land- und Ernährungswirtschaft in Berlin und Brandenburg [Future prospects for agriculture in 2030. The New Brandenburg Way. Steps towards a pact for the future for the agriculture and food industry in Berlin and Brandenburg] | https://lbv-brandenburg.de/2-uncategorised/180-der-neue-brandenburger-weg [Accessed on: 11 March 2022]

19 Senate Administration for the Environment, Mobility, Consumer and Climate Protection (2022): https://www.berlin.de/sen/verbraucherschutz/aufgaben/berliner-ernaehrungsstrategie/artikel.874707.php [Accessed on: 17 March 2020]

20 Ministry of Economic Affairs, Labour and Energy of the State of Brandenburg (MWAE) (2022): Fach- und Arbeitskräftestrategie des Landes Brandenburg. Fachkräfte bilden, halten und für Brandenburg gewinnen [Brandenburg Skilled Workforce Strategy. Educating, retaining and attracting skilled workers to Brandenburg] | https://mwae.brandenburg.de/media/bb1.a.3814.de/Fach_und_Arbeitskräftestrategie_Bbg_Langfassung_2022_03_11.pdf [Accessed on: 17 March 2020]

4 The Cluster Food Industry – fit for the future?

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The Cluster Food Industry covers the development, production, processing and distribution of food and feed. This includes all companies, scientific institutions and intermediaries that operate along the value chain, drive innovation, provide services, research and teach or contribute in some other way to development. In this way, the Cluster is not limited to just one industry, but rather takes into account all relationships and interactions between players in the production of beverages, food and feed.

4.1 Company/industry structure

The industries represented by the Cluster employ more than 58,000 people in over 3,100 companies along the entire value chain. Generating more than 9.5 billion euros in turnover, they account for more than 9 per cent of the total turnover of the Brandenburg economy[21]. This makes the food industry the Cluster with the highest turnover and levels of employment in Brandenburg.

Food processing, feed production and beverage production companies can all be found right at the heart of the Cluster. Within the approximately 850 companies, more than 17,000 employees subject to social insurance contributions (SvB) are responsible for a turnover of some 3.3 billion euros.

This equates to around 200,000 euros per SvB, putting productivity in Brandenburg's food industry on a par with the overall productivity of the German economy and above the average for Brandenburg's economy of 158,000 euros per SvB[22]. The food industry is characterised by its diverse corporate structure, with start-ups and traditional businesses, small and medium-sized enterprises as well as nationally and internationally active corporations all contributing to the success of this Cluster. These companies are represented across all regions and so represent a real stabilising factor – especially in rural areas.

Compared to the German average of 63 ha[23], the agricultural businesses in the State of Brandenburg enjoy a significantly higher average land size of 242 ha[24].

4.2 Research landscape

The capital region of Berlin-Brandenburg boasts an exceptionally high density of nationally and internationally renowned research institutions, not to mention a large number of universities, technical colleges and non-university research institutions, which are all crucial to the Cluster Food Industry.

A significant competitive advantage here is the wide variety of research areas, with areas of expertise ranging from classical agricultural sciences through to food technology research and nutritional sciences. Furthermore, there is also considerable potential to be found in locally based research areas that are not directly related to the Cluster Food Industry (such as artificial intelligence, sensor technology and photonics). This gives rise to a whole host of opportunities for inter- and transdisciplinary cooperation that creates overarching synergies.

The range of university and non-university institutions listed below serve to highlight the diversity of the scientific landscape in the capital region.

21 Ministry of Economic Affairs, Labour and Energy of the State of Brandenburg (MWAE) (2022): 2021 annual report on outcome and impact monitoring. Cluster Food Industry Brandenburg

22 Ministry of Economic Affairs, Labour and Energy of the State of Brandenburg (MWAE) (2022): Development and significance of the Brandenburg-specific Clusters Food Industry, Plastics and Chemistry, Metal Industry and Tourism in the State of Brandenburg 2011–2020. Monitoring report

23 Federal Statistical Office (2021)

24 Office for Statistics Berlin-Brandenburg (2021)

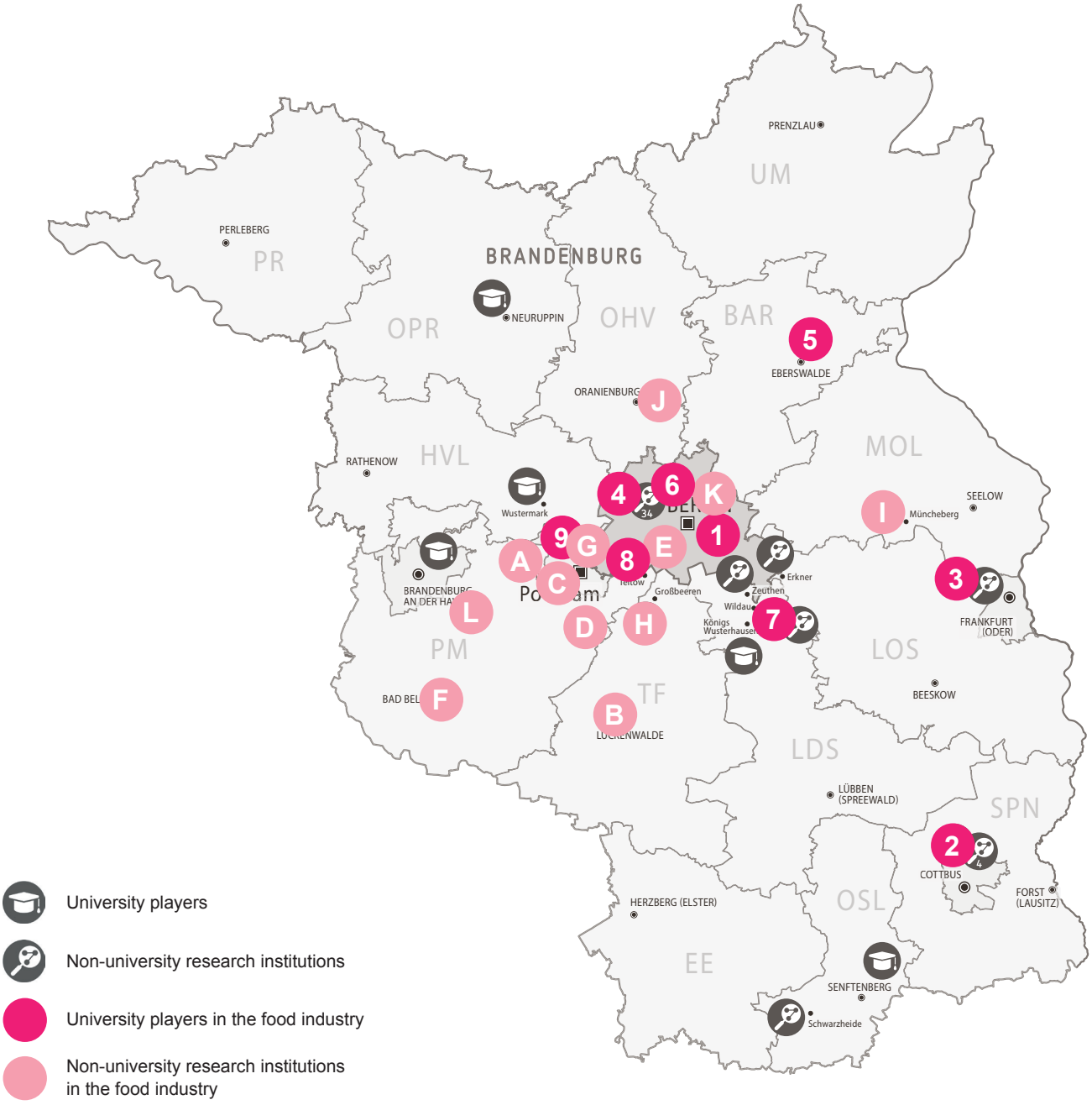

Figure 2: University players and non-university research institutions in Brandenburg

Table 1: Universities and technical colleges with Cluster links in the capital region, including a selection of their specialist key focal points

University/technical college	Regional focal points (selection)
1 **Berliner Hochschule für Technik** www.bht-berlin.de/en	**Department V with key focal points of:** ■ Biotechnology ■ Horticultural phytotechnology, landscape architecture, open space management ■ Packaging technology ■ Food technology
2 **Brandenburg University of Technology Cottbus-Senftenberg** www.b-tu.de/en	**Global Change and Transformation Processes research profiles:** ■ Research Center Landscape Development and Mining Landscapes (FZLB) ■ Centre for Sustainable Landscape Development (ZfNL)
3 **European University Viadrina, Frankfurt (Oder)** www.europa-uni.de/en	**Chair of Public Law, Administrative, European, Environmental, Agricultural and Food Industry Law with the research areas of:** ■ Agricultural, digital and data protection law ■ Food industry law ■ Climate, energy and environmental law
4 **Freie Universität Berlin** www.fu-berlin.de/en	**Department of Veterinary Medicine with Cluster links:** ■ Animal nutrition ■ Virology ■ Microbiology and animal diseases ■ Food safety and hygiene ■ Animal welfare, animal behaviour and laboratory animal science
5 **Eberswalde University for Sustainable Development** www.hnee.de	**Departments with Cluster links:** ■ Forest and environment ■ Landscape use and nature conservation ■ Sustainable business
6 **Humboldt-Universität zu Berlin** www.hu-berlin.de/en	**Thaer Institute of Agricultural and Horticultural Sciences with key focal points of:** ■ Agricultural economics ■ Crop and animal sciences
7 **Technical University of Applied Sciences Wildau** www.th-wildau.de/en	**Department of Engineering and Natural Sciences:** ■ Biosystems engineering/bioinformatics ■ Logistics and supply chain management

8 TU Berlin www.tu.berlin/en	**Chair of Food Chemistry with specialist fields of:** ■ Brewing ■ Food colloids ■ Food biotechnology ■ Food chemistry (analytics and toxicology)
9 University of Potsdam www.uni-potsdam.de/en	**Institute of Nutritional Science with key focal points of:** ■ Health sciences ■ Nutritional diseases

Table 2: Non-university research institutions with Cluster links in the capital region, including a selection of their specialist key focal points

Research institution	Regional focal points (selection)
A. German Institute of Human Nutrition Potsdam-Rehbrücke (DIFE), Potsdam-Rehbrücke www.dife.de/en	■ Obesity and diabetes ■ Nutrition and ageing ■ Food choices
B. Frankenförder Forschungs-gesellschaft mbH, Luckenwalde www.frankenfoerder-fg.de	■ Agriculture ■ Veterinary medicine ■ Nutrition
C. Fraunhofer Institute for Applied Polymer Research (IAP), Potsdam-Golm www.iap.fraunhofer.de/en.html	■ Biopolymers ■ Life science and bioprocesses
D. IGV Institut für Getreidever-arbeitung GmbH, Nuthetal www.igv-gmbh.de/en	■ Protein analytics ■ Special crop inspections ■ Mycotoxin formation on plants ■ Processing properties of flour ■ Detection methods for enzymes in plant-based raw materials ■ Method development in trace analysis
E. Institute of Agricultural and Urban Ecological Projects (IASP), Berlin www.iasp-berlin.de/en/home-en	■ Nutrition (health-promoting and techno-functional) ■ Biogenic raw materials ■ Animal welfare ■ Urban green space

F. Institute for Food and Environmental Research e.V. (ILU), Bad Belzig www.ilu-ev.de/en	■ Food technology ■ Food chemistry ■ Biochemistry ■ Biotechnology ■ Food technology ■ Environmental research
G. Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Potsdam www.atb-potsdam.de/en	■ Precision agriculture in crop production and animal husbandry ■ Food and feed quality and safety ■ Material and energetic use of biomass
H. Leibniz Institute for Vegetable and Ornamental Crops (IGZ), Großbeeren/Erfurt www.igzev.de/en	■ Functional plant biology ■ Plant organisms and microorganisms ■ Genomics and bioinformatics in horticulture ■ Plant quality and food security ■ Horticultural systems of the future
I. Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg www.zalf.de/en	■ Agriculture for healthy soils and biodiversity ■ Agriculture in climate change ■ Agriculture and digitalisation ■ Agriculture in transition
J. Milchwirtschaftliche Lehr- und Untersuchungsanstalt Oranienburg e.V. (MLUA) www.mlua.de	■ Optimisation of product quality and improvement of analytical quality assurance ■ Food law ■ Dairy technology and process engineering
K. Versuchs- und Lehranstalt für Brauerei in Berlin (VLB) e.V. www.vlb-berlin.org/en	■ Beer and grain production ■ Raw materials (brewery) ■ Biotechnology and water ■ Instrumental beer and beverage analysis ■ Spirits, analysis technology and sensor technology ■ Management and logistics
L. Teaching and Research Station for Animal Breeding and Husbandry e.V. (LVAT) Groß Kreutz/Ruhlsdorf www.lvatgrosskreutz.de/	■ Experimentation in animal production ■ Demonstration of practically applicable results

4.3 Networks and associations

In addition to the scientific institutions, a range of other bodies also contribute to the overall success of the Cluster, including networks, associations, chambers, economic development agencies and trade unions.

Examples of these include:

Fördergemeinschaft Ökologischer Landbau Berlin-Brandenburg e.V.
This non-profit association for the promotion of organic agriculture in Berlin-Brandenburg (or FÖL for short) is the central point of contact in the metropolitan region for consumer information, public relations and market development on the subject of all things organic. At the same time, the association acts as an active lobby for producers, processors and traders, and also represents the social network of the local organic movement.

www.bio-berlin-brandenburg.de/

Gewerkschaft Nahrung-Genuss-Gaststätten, Landesbezirk Ost
This food, beverages and catering union (NGG) is the oldest trade union in Germany. For more than 150 years, the NGG has been committed to representing the interests of its members.

ost.ngg.net/

Handelsverband Berlin-Brandenburg e.V.
The Berlin-Brandenburg trade association (HBB) represents the retail sector in Berlin and Brandenburg. Around 1,000 trading companies across the region have joined forces to become part of the association on a voluntary basis, meaning the HBB represents more than 85 per cent of the market shares in the retail trade of both federal states. The membership structure ranges from the classic Berlin *Späti* newsagents through to owner-managed medium-sized companies, large department stores and supermarket chains.

www.hbb-ev.de/

Cottbus, Frankfurt (Oder) and Potsdam Chambers of Crafts
The region's Chambers of Crafts represent members (skilled crafts enterprises, employers and employees) vis-à-vis the public and politicians. They pick up on future trends and offer a wide range of solutions through education, training and ongoing development.

www.hwk-cottbus.de/
www.hwk-ff.de/
www.hwk-potsdam.de/

Cottbus, East Brandenburg and Potsdam Chambers of Commerce and Industry
As an industrial sector, the food industry or food economy comprises the areas of the economy that deal with the commercial production, processing and trade of food or foodstuffs. Companies in the food industry are particularly important to the region and are thus supported in various legal and economic issues.

www.cottbus.ihk.de/
www.ihk-ostbrandenburg.de/
www.ihk-potsdam.de/

Landesbauernverband Brandenburg e.V.
The Landesbauernverband Brandenburg e.V. represents the interests of agriculture in the State of Brandenburg. Competitive and sustainable agriculture is the basic prerequisite for a vibrant and attractive rural area.

www.lbv-brandenburg.de/

pro agro – Verband zur Förderung des ländlichen Raumes in der Region Brandenburg-Berlin e.V.

pro agro is the association for the promotion of rural areas in the Brandenburg-Berlin region. Since 1992, it has been committed to the agriculture and food industry, as well as rural and nature tourism. The association focuses its core efforts on the following tasks:

- Networking of companies and institutions in the agriculture and food industry and marketing of regional products from Brandenburg and the capital region
- Qualification and marketing of rural and nature tourism offerings in rural areas

www.proagro.de/

Wirtschaftsvereinigung der Ernährungsindustrie in Berlin und Brandenburg e.V.

This trade association for the food industry (WVEB) coordinates, bundles and represents the interests of one of the largest industries in the capital region. It networks a whole host of industrial sectors, from breweries to confectionery manufacturers, and works to establish competitive working and economic conditions for companies.

www.wveb.de/

4.4 SWOT analysis

The Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis has firmly established itself as an analytical tool and offers added value in the context of regional economic activities for the internal and external review of a target-performance comparison. While the strengths and weaknesses aspects notably analyse internal conditions (related to the Cluster players), opportunities and threats map the external conditions (corporate environment).

The starting point of the SWOT analysis for the preparation of the Master Plan from 2014 was a previous in-depth analysis carried out by the AFC Consulting Group[25]. This is what forms the basis for the revision and further development of the current SWOT analysis (Figure 3).

In addition, research was initiated from which studies, surveys, articles and other publications, as well as statistics (in particular the Berlin-Brandenburg Statistics Office and the statistics of the Federal Employment Agency), could be identified. Further research was also carried out on Chapter 3 with regard to international, national and regional political frameworks. The fields of action and measures described in the following chapters can be derived from the analysis.

25 ZukunftsAgentur Brandenburg GmbH (2012): In-depth analysis of the Cluster Food Industry Brandenburg – Final Report

STRENGTHS

- Consolidated SME numbers
- Future-oriented change through buoyant start-up activity
- Quantitatively and qualitatively extensive raw material potential
- Above-average area of holding and well-developed management structures
- Good conditions for trend economies and future-oriented economic activity (bioeconomy, circular economy, sustainability)
- Large sales/marketing region for products
- Renowned research institutions with strong conditions for knowledge transfer and recruitment of academic specialists
- Established network and Cluster structures with cross-Cluster activities

WEAKNESSES

- Core weaknesses of the small and medium-sized business culture:
  - Low equity capitalisation
  - Low R&D expenditure by companies
- Low-yield industry in industry comparison
- Lack of external innovation drivers in the region to further develop manufacturing processes and product marketing (e.g. mechanical engineering)
- Existing collaboration potential in the research landscape is only used to a limited extent
- Small-scale structure of the industry also affects the potential to establish modern risk and crisis management

OPPORTUNITIES

- Topical themes can be mapped well:
  - "Organic"
  - "Healthy diet"
  - "Regionality and freshness"
  - "Sustainability"
- Sales markets:
  - Increased for organically produced and healthy foods
  - Outstanding location advantage for Berlin and neighbouring Eastern European countries
  - Increasing expansion of alternative distribution channels (e-commerce, direct sales, specialised trade, own branches, farm shops, etc.) in a bid to supplement existing sales markets (bulk consumers, food retail)
- Increasing networking options along the value chain

RISKS

- Price/cost volatility:
  - Pandemics/animal diseases
  - Climate change and crop failures
- Regulatory framework
- Declining milk production
- Declining meat production
- Supply bottlenecks due to economic conditions or market disruptions
- Demographic change: projected population decline to 2.17 million inhabitants by 2040 and growth-inhibiting decline in purchasing power
- Skills shortage: increasing shortages of skilled workers and seasonal support staff
- Increasing concentration in the food industry and in trade creates price and cost pressure for SMEs

Figure 3: Overview SWOT analysis of the Master Plan for the Cluster Food Industry Brandenburg

About the strengths

The food industry in Brandenburg is characterised by **a solid number of SMEs**. As described in Chapter 4.1, the business landscape and the number of employees (subject to social insurance contributions) have stabilised[26,27]. What's more, a **future-oriented change** can be observed for the entire industry **through the buoyant start-up activity**, which in turn provides major impetus on topical themes (such as digital agriculture) for the region[28].

The core strengths also include a **qualitatively and quantitatively extensive raw material potential**[29], which on the one hand is indispensable for the production of food and beverages, and on the other hand also guarantees product quality and variety in the future. Other notable factors are the comparatively **high land sizes** and the predominantly **well-trained management structures** in the agricultural companies, which represent excellent foundations for strategic alliances between agriculture and the food industry, as well as for innovation projects.

International, national and regional strategies (cf. Chapter 3) create a strong basis and a binding framework for action for **future-oriented economic activity** (e.g. bioeconomy, circular economy, and sustainability).

The geographical proximity to Berlin – and in particular to neighbouring Eastern European countries – results in a large sales and marketing region for products of the agriculture and food industry. Experimental and stylish urban consumer environments offer plenty of scope for new business models with corresponding sales arguments.

Immediate urban-rural relationships are strengths in the region that can be developed.

The Berlin-Brandenburg capital region is a leader in terms of the density of its research landscape. This complements the strength of a growing start-up scene as an innovation driver and thus the competitiveness of the industry as a whole[30,31,32]. It also results in versatile opportunities for knowledge transfer and the recruitment of (academic) professionals.

Another strength is established network and Cluster structures, which are characterised by increasing cross-Cluster activities and are complemented by established associations (such as the state farmers' association)[33].

The strengths are to be further developed within the framework of the following fields of action:

- Portfolio of measures to revitalise the innovation system
- Field of action 1: "Sustainable value creation systems"
- Field of action 3: "Food trends and technologies"
- Field of action 4: "Climate-adapted production from farm to fork"

26 Ministry of Economy, Labour and Energy (MWAE) (2017/2018/2019/2020/2021): Annual report on outcome and impact monitoring. Cluster Food Industry Brandenburg

27 Bundesvereinigung der Deutschen Ernährungsindustrie e.V. (2021): BVE Annual Report 2020/21, p. 25 | https://www.bve-online.de/presse/infot-hek/publikationen-jahresbericht/bve-jahresbericht-ernaehrungsindustrie-2021 [Accessed on: 11 March 2022]

28 Deutscher Bauernverband (2021): Bundestag Election 2021 – Electoral Period 2021 to 2025. Core concerns of the German Farmers' Association for a modern and diverse agriculture in Germany (abridged version), p. 4 | https://www.bauernverband.de/fileadmin/user_upload/dbv/positionen/2021/Kernanliegen/31_Mai_Kernanliegen_DBV_Kurzfassung.pdf [Accessed on: 11 March 2022]

29 See footnote 27, p. 70

30 Ministry of Economy, Labour and Energy (MWAE) (2021): https://mwae.brandenburg.de/de/ern%C3%A4hrungswirtschaft/bb1.c.478829.de [Accessed on: 28 October 2021]

31 See footnote 15, p. 7

32 Federal Ministry of Education and Research (BMBF), Federal Ministry of Food and Agriculture (BMEL) (2020): National Bioeconomy Strategy, p. 25 | https://www.bmel.de/SharedDocs/Downloads/EN/Publications/national-bioeconomy-strategy.pdf?__blob=publicationFile&v=2 [Accessed on: 11 March 2022]

33 See footnote 15, p. 7

About the weaknesses

The strengths are contrasted by weaknesses that need to be developed into new strengths in the future. Some weaknesses can be addressed particularly well, while other challenges represent "basic structural problems" based on cross-sectoral experience. This includes low capital resources within the industry[34] and the associated difficulty in engaging in larger-scale research and development (R&D) projects.

With a lack of external innovation drivers for the further development of manufacturing processes in the region, examples include machine and plant manufacturers that could generate new value creation for the region outside the industry. The limited use of the existing cooperation potential with the research landscape[35] is notably due to the capital resources of SMEs. The potential of a joint monitoring concept in terms of modern risk and crisis management (for example, in relation to climate, pandemics, animal diseases) is not sufficiently exploited due to the small-scale nature of the industry[36].

The weaknesses are to be further developed into strengths within the framework of the following fields of action:

- Portfolio of measures to revitalise the innovation system
- Field of action 3: "Food trends and technologies"
- Cross-sectoral topic 1: "Skilled workers for the transformation"
- Cross-sectoral topic 2: "Internationalisation"

About the opportunities

As explained in the previous chapters, four topical themes in particular can be identified as opportunities for the food industry in Brandenburg. They are not only closely related to each other, but also serve to shape developments in the 21st century like hardly any other concepts[37,38,39]. The topics "organic", "healthy nutrition", "regionality and freshness" and "sustainability" are therefore well represented in the region[40], and are notably referenced in state and federal policy strategies (cf. Chapters 3.2 and 3.3).

Regional economic opportunities arise in particular through (new) sales markets. With a view to a more consumption-conscious society, this is an increasing sales market for organically produced and healthy food[41]. The geographical location advantage of the State of Brandenburg with its proximity to the capital Berlin is just as much a part of this as increasing alternative distribution channels and business models. The latter complement existing sales markets such as bulk consumers and food retailers and are based on channels including e-commerce, direct sales, own branches and farm shops.

The opportunities are to be exploited within the framework of the following fields of action:

- Portfolio of measures to revitalise the innovation system
- Field of action 1: "Sustainable value creation systems"
- Field of action 2: "Sustainable production of animal based food"
- Field of action 4: "Climate-adapted production from farm to fork"

34 ZAB ZukunftsAgentur Brandenburg GmbH (2014): Brandenburg hat Geschmack. Masterplan für das Cluster Ernährungswirtschaft Brandenburg [Brandenburg has taste. Master Plan for the Cluster Food Industry Brandenburg], p. 8

35 See footnote 34, p. 8

36 See footnote 34, p. 9

37 See footnote 34, p. 19

38 Research Institute of Organic Agriculture (FiBL) (2021): Sustainability and Quality of Organic Food | https://www.fibl.org/fileadmin/documents/shop/1405-lebensmittelqualitaet.pdf [Accessed on: 6 December 2021]

39 Bundesvereinigung der Deutschen Ernährungsindustrie e.V. (2021): BVE Annual Report 2020/21, p. 58 ff.

40 Federal Ministry of Food and Agriculture (BMEL) (2021): Eco-Barometer 2020 | https://www.bmel.de/SharedDocs/Downloads/DE/Broschueren/oekobarometer-2020.pdf;jsessionid=6699C9ECC9D0CAC02DC8961A10C05768.live832?__blob=publicationFile&v=12 [Accessed on: 6 December 2021]

41 Federal Ministry of Food and Agriculture (BMEL) (2019): Future strategy for organic farming. Incentives for more sustainability in Germany, p. 19

About the risks

The opportunities are countered by challenges and risks that need to be further mitigated in the next Master Plan period. The COVID-19 pandemic[42] has made market participants even more aware of the risks, which has contributed to the volatility of prices. Such risks include pandemics and animal diseases[43], environmental factors that are difficult to calculate (climate change, crop failures, declining milk and meat production) and regulatory framework conditions[44] (taxes, energy prices, European/federal/state policy directives). This results in further risky potential supply bottlenecks due to economic conditions or market disruptions. Another risk is the reduction of milk and meat production, which is currently still well developed in Brandenburg.

Demographic change is leading to increasing bottlenecks in the labour market. These future developments can already be predicted now due to falling numbers of school leavers. Added to this is the increasing cross-sectoral competition for skilled workers and employees. A decline in supply is also expected for seasonal support staff. With the projected population decline to 2.17 million, an additional growth-inhibiting decline in purchasing power is to be expected, especially in the regions further away from Berlin[45,46].

Another risk is the competition for limited shelf space in the highly concentrated food retail sector, which puts SMEs in particular under great price and cost pressure. This is also important for Brandenburg's agriculture and food industry, as the majority of food reaches the end consumer via the stationary retail trade.

The risks are to be minimised within the framework of the following fields of action:

- Portfolio of measures to revitalise the innovation system
- Field of action 2: "Sustainable production of animal based food"
- Field of action 3: "Food trends and technologies"
- Field of action 4: "Climate-adapted production from farm to fork"
- Cross-sectoral topic 1: "Skilled workers for the transformation"

42 Also known colloquially as the coronavirus pandemic as a worldwide outbreak of the infectious disease COVID-19 ("coronavirus") and associated global economic consequences.

43 See footnote 27, p. 26

44 See footnote 28, p. 2

45 Office for Statistics Berlin-Brandenburg (2015): Population forecast for the State of Brandenburg – 2014 to 2040, p. 11 | https://download.statistik-berlin-brandenburg.de/434327a891b6f5f6/362d76bf26d9/SB_A01-08-00_2015u00_BB.pdf [Accessed on: 11 March 2022]

46 Expert interviews on the Master Plan

5 A fresh start for the Cluster – the road to the new Master Plan

5 A fresh start for the Cluster – the road to the new Master Plan

The strong involvement of players in the entire participation process illustrates the spirit of optimism in the Cluster. On the way to a more sustainable agriculture and food industry, a common understanding is needed to systematically address the necessary changes and developments. The fields of action and cross-sectoral topics are the core of the Master Plan and form the orientation framework for future projects between the players within the Cluster. In a bid to bring together all players and pool their perspectives and expertise, the following process was rolled out.

The exploratory phase involved sifting regulatory framework conditions and political trends at European, national and regional levels and superimposing these in a matrix. The next step was all about identifying intersections, which were bundled by topic and transferred into fields of action, taking into account the still relevant thematic strands of the previous Master Plan. The drafts of the fields of action and cross-sectoral topics were further developed with the Cluster Management during a workshop and critically reflected upon in the course of 15 expert interviews. This stakeholder workshop offered the opportunity to substantiate the fields of action and to outline initial proposals for measures.

Two follow-up online surveys ensured that stakeholders who had not participated in the workshop due to the pandemic were also able to contribute their perspectives. The formulated fields of action and cross-sectoral topics along with the proposed measures were made available to the industry online for a two-week period each. The present fields of action and cross-sectoral topics can thus be seen as a joint effort that has emerged through the close involvement of the Cluster players throughout the entire process.

The Master Plan is based on the assumption that the vision of a more sustainable agriculture and food industry in Brandenburg in 2030 can be notably achieved through strong innovation projects. To this end, approaches to measures are outlined in the fields of action, which can be initiated or further developed in joint projects.

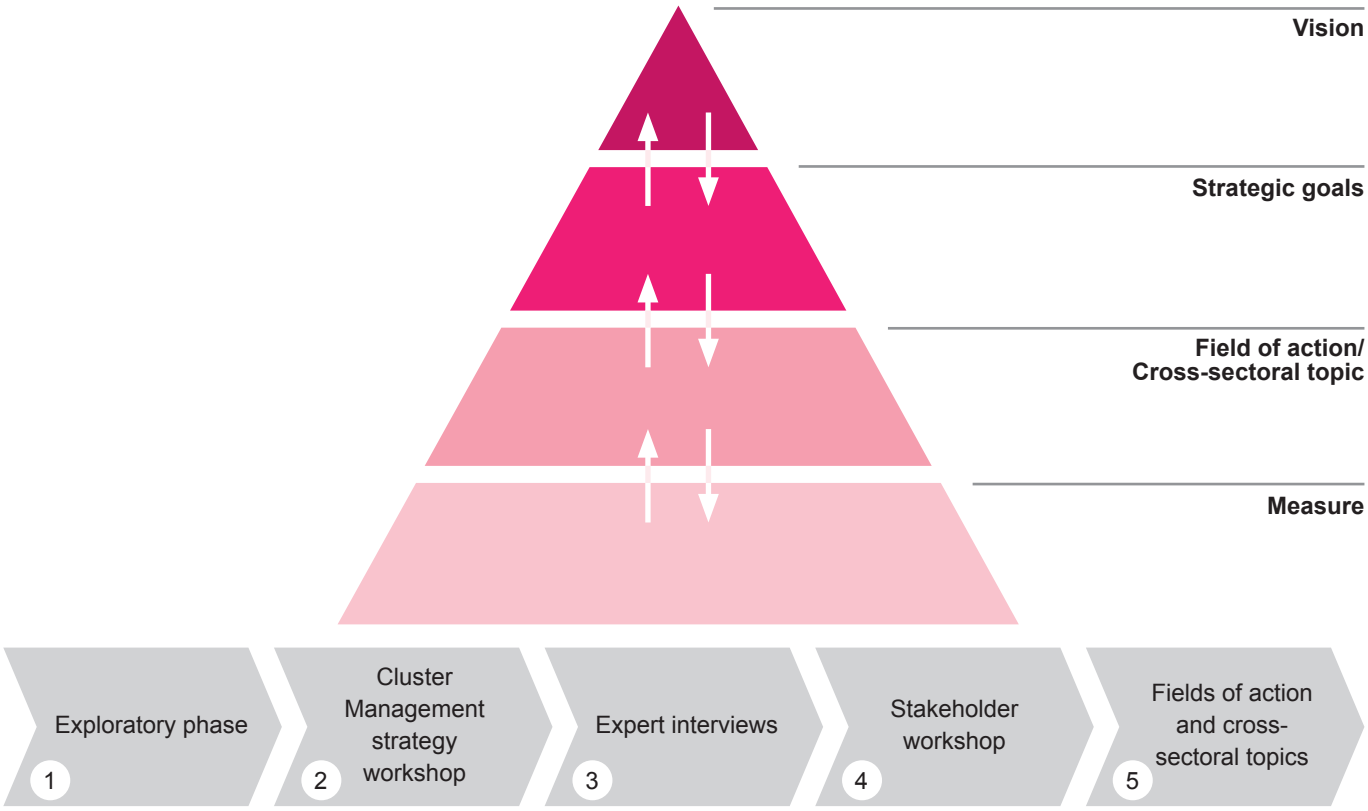

Figure 4: Participation process

6 Fields of action and cross-sectoral topics

6 Fields of action and cross-sectoral topics

Based on the participatory process described in Chapter 5, the suggestions of the food industry players in Brandenburg were taken up and consolidated into four fields of action and two cross-sectoral topics (as shown in the following diagram) with particular development potential for the Brandenburg Cluster Food Industry.

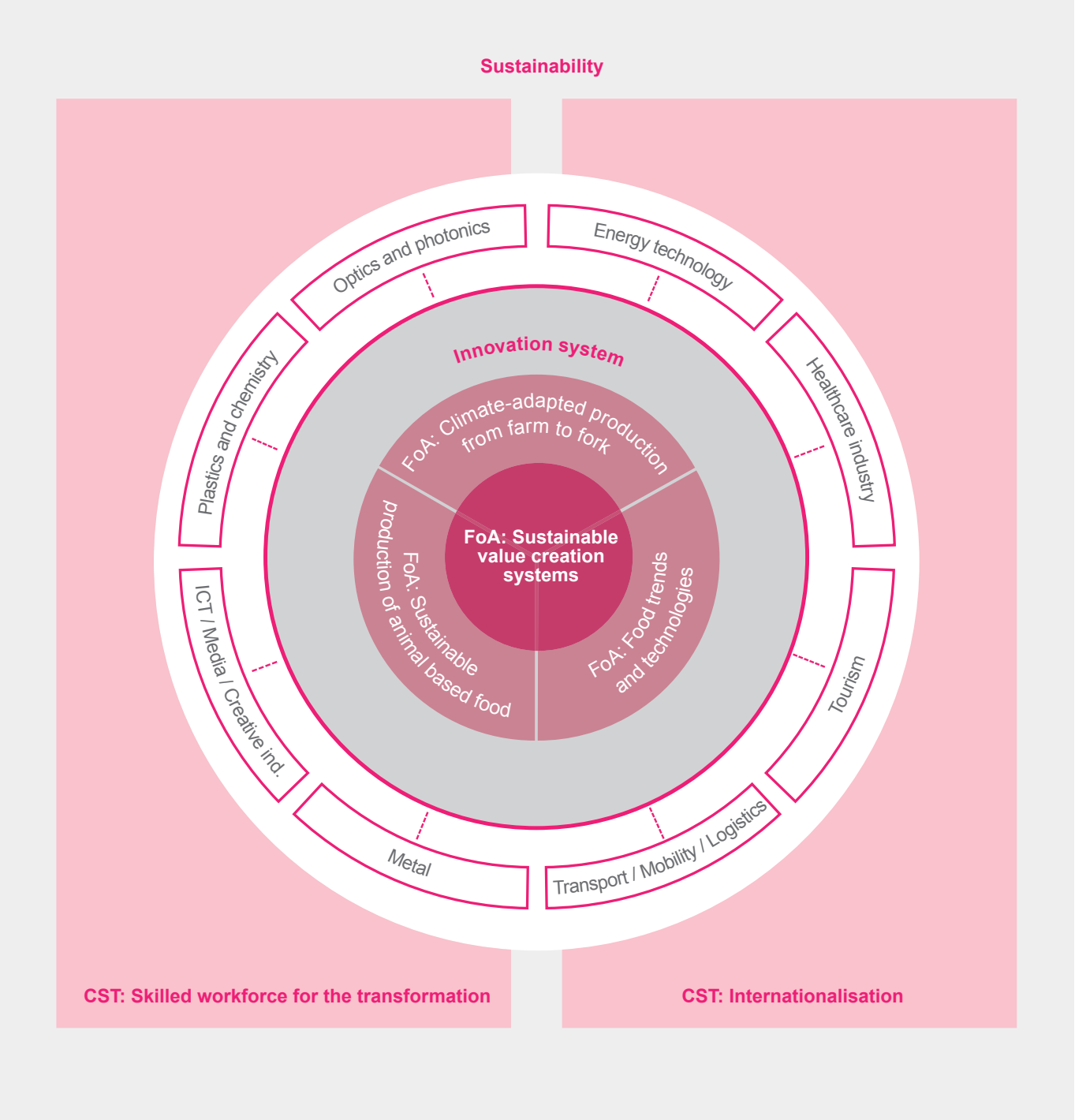

Figure 5: Classification of the fields of action and cross-sectoral topics in the overall system of the Cluster Food Industry

6.1 Innovation system as the basic understanding of cooperation in the Cluster

The social challenges are manifold and range from a stable and sustainable energy supply to new mobility concepts and environmentally friendly food production. In order to find suitable answers to complex questions in the capital region, innoBB 2025 plus recognises the need for an innovation policy adapted to change[47]. This not only broadens the understanding of the concept of innovation, but also increasingly focuses on process, service and technical innovations. In the sense of a future-oriented location policy, it also gives priority to sustainable innovations and refers to their necessity in order to ensure the achievement of climate goals. Furthermore, an internationally oriented innovation system is needed to further increase the attractiveness of the capital region. Only the cross-border transfer of knowledge enables marketable innovations along the entire value chain and strengthens the capital region in international competition.

Intensifying cross-sectoral cooperation is a key pillar of innoBB 2025 plus in addition to being crucial for the food industry in order to successfully master the transformation to a more sustainable agriculture and food industry in Brandenburg. The management of the complex challenges and problems of the players can be tackled more effectively by taking a more holistic approach. Numerous stakeholders are looking at the same issue and generating innovative approaches to solutions based on diverse backgrounds and focal points.

Both now and in the future, innovations will increasingly take place at the interfaces between economic sectors. There is a notable focus on topics such as digitalisation and skilled workers, which are highly relevant for all Clusters. The aim is to reinforce cooperation within the industry as well as with players from outside the industry in a bid to strengthen the innovative power of the Cluster players by means of knowledge and technology transfer.

When it comes to the development of new products, technologies and business models, start-ups often play an important role. The attractive market environment for new businesses in the capital region also benefits the development of the Cluster Food Industry. Numerous synergies result from the networking of start-ups with the established economy, research institutions and cross-Cluster networks. The expertise of the research institutions as well as the experience and existing trade relations of the companies can ideally complement new business ideas of start-up projects. Against this background, the integration of start-ups from the food industry itself, but also from other Clusters, into the innovation system of the Cluster Food Industry is to be further supported.

Open innovation processes are often associated with a loss of intellectual property, thus it is important to focus attention on the opportunities and added value afforded by open, cross-sectoral cooperation. New requirements for (more sustainable) products, processes and services do not stop at industry boundaries; on the contrary, different competences are needed to live up to the various complex challenges. Particularly in the development of sustainable innovations, the consideration of all players along the entire value chain plays a central role, as selective sustainability approaches will not be able to make a significant contribution to the sustainable development of the entire industry.

Through supported systematic cooperation both along the entire value chain and beyond the boundaries of its own industry, an inspiring innovation system is created that produces marketable innovations and successfully places them on the market.

The upcoming challenges presented by the transformation of the agriculture and food industry are effectively addressed with the help of cross-sectoral problem-solving communities. This is an essential part of the Cluster's self-image.

47 See footnote 15

Measures to shape and stimulate an innovation system

- Shape open innovation approaches
- Moderate scope for opportunity and the associated processes
- Develop target-group-focused and application-oriented platforms
- Consolidate multi-stakeholder communication
- Intensify urban-rural cooperation
- Bring players from agriculture and the food industry closer together
- Build cross-sectoral problem-solving communities

6.2 Field of action 1: Sustainable value creation systems

The development of regional value chains was already identified as a relevant field of action in the Master Plan for the Cluster Food Industry from 2014. In this context, associations such as pro agro e.V. and the Fördergemeinschaft Ökologischer Landbau Berlin-Brandenburg e.V. have been able to make vital contributions. The 2020 initiative of the Brandenburg Farmers' Association (LBV), "Future prospects for agriculture in 2030. The New Brandenburg Way", takes up this point and notably deals with the question of how a sustainable supply system can succeed in the capital region[48].

Increasing demands towards climate neutrality and a more sustainable orientation of the industry increase the complexity of food supply. The aim is to establish a functioning closed-loop system in the capital region that will not only think of value creation in linear chains in the future, but will develop it in holistic systems. With this in mind, cooperations along the value chains (vertical), at individual stages of the value chain (horizontal) and across Clusters should be used to develop new products, processes and business models.

In view of the increasing scarcity of resources, the priority goals in this field of action are to make existing value chains more sustainable, to set up new value chains, and to make them more circular in an overall system on the basis of the strong availability of primary and secondary raw materials in the State of Brandenburg[49].

Regionality

The more sustainable orientation of Brandenburg's agriculture and food industry system begins in the field and extends through all stages of the value chain to the end customer. The demands on the part of consumers and politicians to design processes and products in harmony with nature and in a socially responsible manner are constantly increasing. An essential lever for a more sustainable orientation of the value chains in the agriculture and food industry in Brandenburg lies in their further regionalisation.

With the focus on regional material cycles, there are opportunities to close production and supply chains locally and to make them more carbon-efficient due to the shorter transport routes. At the same time, regionally oriented systems can increase economic value creation in Brandenburg and contribute to the strengthening of rural areas.

48 Landesbauernverband Brandenburg e.V. (2022): https://www.neuer-brandenburger-weg.de/ [Accessed on: 5 October 2021]

49 Johannes Rupp, Hannes Bluhm, Prof. Dr. Bernd Hirschl; PD Dr. habil. Philip Grundmann, PD Dr. habil. Andreas Meyer-Aurich, Vivienne Huwe, Philip Luxen (2020): Nachhaltige Bioökonomie in Brandenburg. Biobasierte Wertschöpfung – regional und innovativ. Ministerium für Landwirtschaft, Umwelt und Klimaschutz des Landes Brandenburg [Sustainable bioeconomy in Brandenburg. Bio-based value creation – Regional and innovative. Ministry of Agriculture, Environment and Climate Change of the State of Brandenburg] | https://mluk.brandenburg.de/sixcms/media.php/9/nachhaltige-biooekonomie.pdf [Accessed on: 10 May 2022]

In a bid to promote the regionalisation of the value chains in Brandenburg's agriculture and food industry, particular importance should be attached to on-site processing. Both the production of raw materials and further processing within the region can be intensified by interlinking existing value chains and developing new ones. Regional and supraregional cooperative relationships between producers and the hospitality industry/gastronomy should be established or expanded further.

The premise of regionality also includes regional product placement. The urban area of Berlin, for example, has a comparatively high proportion of stylish consumer environments with a sustainable consumption consciousness. Innovative concepts in close cooperation with the trade are needed here to break new ground in regional marketing.

Shorter distances and fewer intermediate steps between production, processing and consumption not only take sustainable development into account, but also simplify the traceability of the product, which is becoming increasingly important due to the growing demand for more production transparency. The use of digital technologies is gaining in importance here, as transparency must also be seamlessly guaranteed against the background of increasingly complex value creation systems.

Circular economy – bio-based and circular

In addition to regionality, sustainable value creation systems are also characterised by greater recycling and a focus on bio-based materials. The bio-based economy represents a change from an economy based on fossil resources to one based on renewable raw materials. This results in considerable future potential for the agriculture and food industry as the core of the bioeconomy.

According to the brochure published in 2018 by the Brandenburg Ministry of Agriculture, Environment and Climate Protection (MLUK), Brandenburg is already a bioeconomy state and, as such, a source of inspiration for other regions. Nevertheless, it is important to further promote interdisciplinary networking and knowledge transfer in order to raise the potential of the Brandenburg bioeconomy[50].

Players within the agriculture and food industry are increasingly addressing the question of how residual and side streams can be used more profitably in the sense of a circular bioeconomy. In this context, for example, the return of urban organic residual materials to the agricultural cycle is a desirable outcome for the Cluster players. Ultimately, rather than being thought of as waste, organic residues should be considered an increasingly valuable raw material for a new product.

The recycling of organic waste along all stages of the supply chain is a decisive factor in making value creation systems sustainable. The aim should therefore be to put organic waste to a higher-value use.

The identification of suitable residues and the necessary valorisation of nutrients enable the development of new business models: whether functional food from pea fibres[51], food recycling into high-quality feed[52] or biodegradable packaging made from plant fibres[53], examples from the region show that the potential applications of bio-based residues from food production are diverse and industry-independent.

While the efficient utilisation of biogenic resources is desirable for economic reasons, it can also make a significant contribution to mitigating global warming. As such, it represents an important link to the fourth field of action in the Master Plan.

In order to create the necessary transparency and interaction between the market participants, a digital biomass platform is being discussed for Brandenburg, which is intended to bring together biomass from the region for the region and thus meet the supply and demand needs in a meaningful way. On this basis, new value chains can be created quickly within the state, which will advance the circular bioeconomy through the development of bio-based and circular value chains as a central thematic strand in the field of action.

50 See footnote 49

51 Emsland Group (2022): https://www.emsland-group.de/aktuelles/2020/1012-kooperation-zwischen-emsland-group-und-fuji-oil [Accessed on: 30 March 2022]

52 Hagemann Dienste GmbH: https://www.hagemann-dienste.de/lebensmittelrecycling_verwertung-nach-und-nebenprodukte/ [Accessed on: 30 March 2022]

53 Zelfo Technologie GmbH (2021): https://www.zelfo-technology.com [Accessed on: 8 November 2021]

Within the scope of creating a holistic approach, the instrument of the biomass platform also offers the opportunity to involve players from different value chains and stages in a bid to fan out the linear orientation of the previous economic approach through stronger cascade use and integration of circular use systems.

Digitalisation

Sustainable value creation systems can contribute to protecting the environment, thereby increasing animal welfare, biodiversity and efficiency on farms across Brandenburg. To this end, digital techniques can be tested and used in a target-oriented way. As can be seen from the "Digital Brandenburg" platform, the ongoing digitalisation of Brandenburg's agriculture and food industry offers excellent opportunities for making value chains more sustainable. Regional Agriculture 4.0 examples are quite remarkable[54] in terms of demonstrating that the industry is streets ahead of others. Digital processes are also finding their way into processing plants and constantly evolving, as exemplified by the regional Stadt-Land-Fluss project[55], which aims to establish data- and AI-supported value chains in the area of regional food systems.

With the opportunities in mind, it is important to anticipate the risks and challenges in a bid to actively shape them. Data protection, data sovereignty and data security, a comprehensive digital infrastructure in rural areas, and the compatibility of different systems all represent fields of activity[56] in a bid to make sustainable value creation systems a reality via efficient digitalisation.

54 Brandenburg state government: https://digitalesbb.de/wp-content/uploads/2020/10/MLUK-Digitalisierung-der-Landwirtschaft-4.0.pdf [Accessed on: 22 September 2021]

55 SIBB – Verband der Software-, Informations- und Kommunikations-Industrie in Berlin und Brandenburg e.V. (2022): https://www.sibb.de/stadt-land-fluss [Accessed on: 8 December 2021]

56 Brandenburg state government: Zukunftsstrategie Digitales Brandenburg [Digital Brandenburg Strategy for the Future] | https://digitalesbb.de/wp-content/uploads/2019/08/190529_Broschüre_A4_Gesamtstrategie_web.pdf [Accessed on: 6 May 2022]; DLG e.V.: Digitale Landwirtschaft – Chancen. Risiken. Akzeptanz. Ein Positionspapier der DLG [Digital Agriculture – Opportunities. Risks. Acceptance. A Position Paper from the DLG] | https://www.dlg.org/fileadmin/downloads/landwirtschaft/themen/ausschuesse_facharbeit/DLG_Position_Digitalisierung.pdf [Accessed on: 6 May 2022]

Measures in field of action 1: "Sustainable value creation systems"

Cooperations should lead to the development of new products and business models along the value chains (vertical), at individual stages of the value chain (horizontal) and across Clusters. The field of action occupies a central position in the Master Plan and integrates necessary measures from other fields of action for the development of sustainable solutions.

- Strengthening processing and refinement in the region
- Enabling central identification and valorisation of existing biomass
- Facilitating agreements and stakeholder exchanges in the supply chain
- Engaging management for concrete value chains
- Developing innovative concepts for regional product placement
- Strengthening the use of digital methods and processes
- Expanding training opportunities and support for the development of sustainability strategies and their implementation
- Supporting risky model projects
- Supporting applications, exemptions/preliminary approvals or temporary approvals for experimental farms to enable small-scale real-world laboratories and demo projects
- Expanding start-up scholarships in the agriculture and food industry
- Facilitating access to relevant skills and resources
- Supporting effective communication of sustainability measures

6.3 Field of action 2: Sustainable production of animal based food

Animal husbandry and the processing of animal products are currently walking a special tightrope of their own. Price-driven markets on the one hand and a change in social awareness for more sustainability on the other require fundamental system changes in the industry. Societal expectations for sufficient consideration of ecosystem services are increasing the pressure for new concepts. This is where major market uncertainties and long depreciation periods for livestock facilities make cooperative and innovative approaches necessary.

In Brandenburg, slaughtering, meat and milk processing are all important industries, with one in three euros being generated in these sectors. Together with feed production, they account for 44 per cent of the revenues of the food industry. Animal husbandry has declined in recent decades; however, based on the current low livestock density in Brandenburg[57], the region offers an advantageous framework for a more sustainable design of animal based food production.

Even though meat consumption is decreasing and alternative diets are on the rise, the carnivorous diet is set to remain the dominant diet in Germany for the foreseeable future[58]. From the point of view of the Cluster players, it is desirable to objectify the emotionally charged public discourse more strongly so that an unrestricted and constructive look can be taken at the qualitative and sustainable production of animal products and the measures necessary for this.

The following measures in the respective thematic strands were identified in the Master Plan process as suitable instruments to promote more sustainable animal based food production in Brandenburg in the long term.

Animal-welfare-friendly husbandry and monitoring systems

The criteria include the health, natural behaviour and well-being of the individual animal[59]. With this in mind, husbandry geared towards this goal and the accompanying monitoring not only focus on the physical integrity of the animal, but also strive to maintain the health of the farm animal holistically and in the long term. Consequently, monitoring systems are to be used and further developed in order to check concepts for their viability and to clarify their (also monetary) added value.

Animal welfare barns

As their name suggests, animal welfare barns are designed to take the aspect of animal welfare into account, with innovative constructional measures that make them both animal-friendly and low in emissions. The model projects of the European Innovation Partnership “Beef” within the framework of the EIP-AGRI (European Innovation Partnership for Agricultural Productivity and Sustainability)[60] demonstrate that innovative barn concepts can contribute to a greater collective effort in terms of animal welfare, emission reduction and economic efficiency[61]. Innovative overall concepts are developed within the framework of this partnership that address structuring, animal welfare, emission reduction, sustainability and public relations. With a view to the long tradition of cattle farming in Brandenburg, the region offers a strong basis for scaling up similar projects through systematic support in the area.

57 Heinrich Böll Foundation, Bund für Umwelt und Naturschutz Deutschland and Le Monde Diplomatique (2021): Fleischatlas [Meat Atlas] 2021

58 Statista GmbH (2021): https://de.statista.com/infografik/24000/anzahl-der-vegetarier-und-veganer-in-deutschland/ [Accessed on: 20 September 2021]

59 Federal Institute for Agriculture and Nutrition (BLE) (2021): https://www.landwirtschaft.de/diskussion-und-dialog/tierhaltung/tierwohl-was-heisst-das-konkret [Accessed on: 16 November 2021]

60 Ministry of Agriculture, Environment and Climate Change (MLUK) (2022): https://eip-agri.brandenburg.de/eip-agri/de/ [Accessed on: 10 January 2022]

61 Eip-Rind e.V. (2022): https://www.eip-rind.de/ [Accessed on: 3 January 2022]

Use of medication

Antibiotics are used in livestock farming to stabilise animal health and ensure bacterial infectious diseases can be treated effectively. In view of increasing antibiotic resistance of individual bacterial strains, Brandenburg stakeholders recommend further optimising the use of antibiotics through innovative approaches and more targeted dosing. Quality assurance systems such as “QS Quality and Safety”, which record and document antibiotic use in poultry and pig farms, are in place to support health management[62].

As company examples from Brandenburg show, individual animal monitoring can help to control the use of medication more precisely[63]. Innovative technologies and processes for maintaining and promoting animal health support farmers in making their livestock farming more sustainable, so their development and use could form part of a corresponding subsidy.

Regional slaughtering

Regional slaughtering infrastructures shorten transport routes, reduce greenhouse gas emissions caused by logistics, and contribute to animal welfare due to shorter transport times. As already outlined in field of action 1, sustainable value creation systems are characterised by further processing within the region. Following this approach, slaughtering and further processing will represent core elements of Brandenburg’s future meat production and rearing. While successful pilot projects in Brandenburg demonstrate mobile slaughtering and pasture killing,[64] this method is unsuitable for the slaughter of large livestock.[65] Consequently, in order to increase the share of regionally processed meat products on the shelves of the capital region, regional slaughterhouses and processing capacities would have to be increased. In this context, approaches developed in the Cluster context can contribute to incorporating sustainable innovation management into the envisaged utilisation strategy in a bid to increase acceptance in the area, among other things. The vision of a sustainable value creation system can serve as a common thread that paints a holistic picture and unites all players – from farmers to NGOs – behind it.

Feed

Sustainable feed production is a fundamental prerequisite for the production and processing of sustainable animal based food. Various parameters (including origin, cultivation system, and carbon balance) are relevant for assessing the sustainability of feed use. In this context, the subject of using soya feed from classic countries of origin such as Brazil and Argentina is under critical discussion.

According to the experts interviewed, regionally produced and optimised feeds comprising clover grass and lucerne, among others, offer added value for animal nutrition as a domestic source of protein. This is reflected in animal health, in the reduction of the carbon footprint, as well as in soil health through the expansion of crop rotation. The selection of suitable and climate-resistant forage plants can be given special attention in field of action 3.

The recycling of residual materials is of particular importance in this context. Organic by-products and those from food production are valuable, nutrient-rich raw materials for the production of feed. It is also possible to ensure the utilisation of side streams via insect-based feed production. The state is already home to a number of projects and initial business models that can be expanded in this regard. The development of bio-based value chains for the production of sustainable feed should be considered in field of action 1, as considerable (plant) residue utilisation could be triggered via the development of feed.

Type of feeding

Feeding management represents a considerable cost factor in animal husbandry, including factors such as appropriate ration calculations, animal-friendly feeding system, and corresponding checks. Automated and customised technologies can help save time and avoid incorrect dosing, so solutions such as these contribute both ecologically and

62 QS Qualität und Sicherheit GmbH (2022): https://www.q-s.de/ [Accessed on: 3 January 2022]

63 dropnostix GmbH (2022): https://www.dropnostix.com/de/ [Accessed on: 3 January 2022]

64 Ministry of Agriculture, Environment and Climate Change (MLUK) (2022): https://mluk.brandenburg.de/mluk/de/aktuelles/presseinformationen/detail/~03-03-2022-zifog-bescheid-fuer-projekte-am-institut-fuer-fortpflanzung-landwirtschaftlicher-nutztier [Accessed on: 16 March 2022]

65 For a slaughterhouse to be profitable, 150,000 pigs or cattle must be slaughtered annually. https://www.proplanta.de/agrar-nachrichten/agrar-wirtschaft/mehr-schlachthoefe-fuer-die-region-berlin-brandenburg_article1620378615.html [Accessed on: 22 November 2021]

economically to the sustainability of farms. Automated feed mixing systems, such as that of a start-up from Oldenburg for the dairy industry, increase the efficiency of personnel, energy and resources in the feeding process[66]. Furthermore, these systems offer the possibility to adjust the type of feeding down to individual animals and thus increase the overall animal health in the herd.

Recycling of slaughterhouse waste

The opportunity of closed material cycles in the region could also be made possible through the production of animal meal from slaughterhouse waste in addition to the production of feed. A promising project at the Fraunhofer Institute for Factory Operation and Automation (IFF) in Magdeburg demonstrates that the vital nutrient phosphate can be extracted from slaughterhouse waste[67]. Animal fats can also be produced from slaughterhouse waste, which is used on a large scale in the application field of sustainable speciality chemicals. This serves to exemplify the numerous recycling options for slaughterhouse waste and promotes the regional circular economy through the development of corresponding value chains.

Alternative meat sources

Offers of alternative meat sources (goat, sheep, game) serve to support the diversification of the individual diet, while consumption of regional fish products can support the development and scaling of sustainable combined production and farming systems such as aquaculture and aquaponics products.

So-called hybrid products can also be counted among alternative meat sources, whereby the meat reduction can be achieved by adding high-quality plant components and thus contribute to a resource-saving meat production. A Brandenburg company demonstrates how innovation development, testing new products and teaching sustainable closed-loop and aquaponic technologies can be brought together in a single business model[68].

Measures in field of action 2: "Sustainable production of animal based food"

With the knowledge of society's expectations of future-oriented animal husbandry and processing of animal raw materials, new approaches are to be developed that are groundbreaking in terms of climate protection, animal welfare and earning opportunities in rural areas.

- Supporting animal welfare-friendly husbandry and monitoring systems
- Promoting the development of regional slaughtering infrastructures
- Increasing the proportion of feed from regional sources
- Expanding bio-based residual material utilisation for feed production
- Developing the utilisation of slaughterhouse waste further
- Developing innovative business models with alternative meat sources, and demonstrating regional value creation opportunities

6.4 Field of action 3: Food trends and technologies

When it comes to achieving market penetration, technological developments call for a corresponding adaptability in terms of their application. Social trends and their associated consumption characteristics can accelerate these developments, and an increasing openness to new diets and a changing consumer consciousness are opening up new

66 Smart Premix GbR (2021): https://www.uni-hannover.de/fileadmin/Dezernat4/SG43/Publikationen/Technologie-Informationen/MWK_ti_3_2021_2111_Web.pdf [Accessed on: 22 November 2021]

67 Federal Ministry of Education and Research (BMBF) (2022): https://biooekonomie.de/akteure/interviews/phosphor-aus-tiermehl-gewinnen [Accessed on: 22 November 2021]

68 Smartfish UG (2021): https://www.technofisch.de/index.php/eberswalde-entwicklung-lehre-aquaculture-aquaponics.html [Accessed on: 17 September 2021]

business opportunities for an otherwise rather traditional industry. The “Food trends and technologies” field of action is characterised in part by diametrically opposed trends. Classic approaches meet disruptive trends (in-vitro meat), vertical farming meets environmentally friendly free-range cultivation, and fresh produce meets the latest trends in the convenience sector. These seemingly contradictory and opposing trends are not only to be worked on in parallel through the Cluster work in the capital region but can also be combined if necessary.

Alternative and health-promoting protein sources

Scientific studies point out that, in view of diversified dietary strategies, the relevance of animal proteins for a balanced diet must be put into perspective[69]. An exclusively and consciously designed plant-based diet can also ensure a nutrient-rich diet and makes a valuable contribution to climate protection due to the lower carbon balance.

Alternative protein sources are steadily gaining importance in this context and their specialisation is becoming increasingly important[70]. As a result, nutritionally relevant proteins can also be obtained from plant sources such as pseudocereals and legumes, as well as from other alternative sources such as insects, fungi or algae.

The plant-based diet is particularly popular right now and is gaining more and more followers nationwide. In fact, some 7.5 million people in Germany now go without meat, and this number is rising[71]. This remarkable trend has opened up a significant market for new substitute products and the raw materials they require, hence alternative regional protein sources such as lupins or peas are currently of great importance, as they can be used today to produce the food of tomorrow.

Major EU projects such as LEGVALUE and TRUE, which seek to identify potential[72] and develop business models for alternative protein sources with Brandenburg’s participation, are serving to illustrate the relevance for the region. The response to events such as those organised by the Innovationsakademie Berlin-Brandenburg[73] on the topic of “Alternative protein sources” confirms just how important they are for the Cluster.

The optimisation of the nutrient content and product formulation plays a significant role in the qualitative development of meat substitutes. As the trend booms, offers become more diverse and consumers more selective. For the LOHAS (Lifestyle of Health and Sustainability) target group found in the capital in particular, qualitative aspects, such as the amount of additives, play a decisive role in the purchase decision in addition to taste[74].

69 Open Science – Life Sciences in Dialogue (2021): https://www.openscience.or.at/hungryforscienceblog/pflanzliche-alternativen-zu-tierischen-produkten/ [Accessed on: 19 August 2021]

70 Landwirtschaftsverlag GmbH (2021): https://www.topagrar.com/schwein/news/alternative-proteinquellen-werden-immer-wichtiger-9569325.html [Accessed on: 9 August 2021]

71 Statista GmbH (2021): https://de.statista.com/themen/2636/fleischverzicht/#dossierKeyfigures [Accessed on: 9 August 2021]

72 Wirtschaftsförderung Land Brandenburg GmbH (WFBB) (2021): https://ernaehrungswirtschaft-brandenburg.de/de/news/leguminosen-als-quelle-fuer-pflanzliches-protein [Accessed on: 9 August 2021]

73 Wirtschaftsförderung Land Brandenburg GmbH (WFBB) (2022): https://innovatives-brandenburg.de/de/kalender/innovationsakademie-biooekonomie-berlin-brandenburg-2021 [Accessed on: 5 January 2022]

74 Verband für Unabhängige Gesundheitsberatung e.V. (2022): https://www.ugb.de/lebensmittel-im-test/lohas-korrekt-konsumieren/ [Accessed on: 16 March 2022]

Thanks to the broad knowledge base of regional competence bearers and their established cooperations with economic players in and around Brandenburg, the joint development of innovative foods based on alternative protein sources holds great potential. In addition to plant proteins, the consumption of insects is also gaining in importance here, and social acceptance of this could be further increased through innovative approaches. In fact, promising business models[75] from Brandenburg show that the market for insect-based feed is there. The higher-value utilisation and development of novel insect-based foods could benefit from the experience gained in the feed sector and be promoted through a systematic exchange of experience.

Healthy, seasonal and regional products

The return to regional and less processed products is a trend that has been emerging for some time and has intensified due to the pandemic. The cocooning effect triggered by COVID-19 is regularly seen in crises and is particularly pronounced in this case. As people choose to retreat into their own private space, home cooking has experienced a real renaissance[76]. Both the focus on regional products and the choice of natural yet preprocessed foods (clean convenience) have already triggered a change in purchasing behaviour. So-called superfoods from the region – i.e. foods with a high nutrient content such as linseed and sea buckthorn – are increasingly in demand[77]. There has also been a marked increase in openness to new products made from regional raw materials such as hemp[78]. The importance of regional food continues to grow in gastronomy as well. The trend towards traditional regional dishes (local food), which has been prevalent for several years, is complemented by an increased interest in special taste experiences (local exotics) and a growing demand for healthy vegetarian and vegan food[79].

Alternative forms of packaging and packaging reduction

Packaging protects food from environmental influences, contamination and damage while also carrying important information. Its purpose is to improve the shelf life of food, which is clearly an important function. At the same time, packaging must increasingly be recyclable or disposable with low levels of pollutants. The discourse on the rising amount of waste is leading to a steady increase in the demand for less elaborately packaged or unpackaged food.

The practicality of suitable value chains for packaging optimisation and reduction is being researched at several institutes such as the Fraunhofer Institute for Applied Polymer Research in Potsdam-Golm or also within the framework of a working group at the University for Sustainable Development in Eberswalde. The interdisciplinary approach is based on the guiding principle of the circular economy and involves all necessary players in the projects from the very beginning[80].

Nevertheless, logistics, self-service and convenience offerings will not be able to do without packaging in the future. Technology providers, raw material suppliers, processors and members of the retail trade should all sit down together to find a way to reduce packaging in general and ensure any necessary elements are designed to be recyclable or else contain an increasing recyclate content. As a moderator and facilitator of processes such as these, the Cluster Food Industry Management, particularly in cooperation with the Cluster Plastics and Chemistry, can support companies in the creation of cross-industry value chains and the necessary technology transfer.

Food technology developments

New and reinterpreted technologies support the agriculture and food industry in producing food that meets current and future consumer demands.

75 EntoNative GmbH (2021): https://www.tenetrio.de/ueber-uns/foerderung/# [Accessed on: 23 August 2021]
76 news aktuell GmbH (2021): https://www.presseportal.de/pm/53417/4912232 [Accessed on: 25 August 2021]
77 NAHhaft e.V. (2021): https://www.klimateller.de/magazin/detailansicht?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Bnews%5D=1388&cHash=8ab8ba66dbb6403b33d458d5de1e4d3a [Accessed on: 18 October 2021]
78 Zukunftsinstitut GmbH (2021): https://www.zukunftsinstitut.de/artikel/health-trend-hanf-cannabis/ [Accessed on: 18 October 2021]
79 Cf. Hanni Rützler, Wolfgang Reiter (2021): Food Report 2022, Zukunftsinstitut
80 University for Sustainable Development (HNEE) (2021): https://www.hnee.de/de/Fachbereiche/Landschaftsnutzung-und-Naturschutz/Team/Wissenschaftliche-Mitarbeiter/Dr.-Melanie-Krger/Arbeitsgruppe/Arbeitsgruppe-Verpackungsreduktion-in-der-Lebenswirtschaft-E11350.htm?redak=0 [Accessed on: 2 September 2021]

Old processes such as fermentation are currently being reinterpreted with the aim of exploiting their trend potential, as well as changing texture and taste. The further development of such technologies can also reduce the use of technological additives in processed foods in a bid to achieve a "clean label". Clean label consumers prefer food with minimal additives and prefer short and comprehensible ingredient lists[81]. Clearer labelling practices are also preferred, as these can transparently show the more sustainable production of the product. Innovative formats that bring producers and customer requirements together to initiate joint food technology projects for product developments in the sense of the clean label claim can represent profitable approaches in this regard.

The use of functional ingredients allows a food to be upgraded to what is known as a functional food. In this context, it is always important to take into account the strict European regulatory framework that exists to protect consumers[82]. Not to be confused with functional foods are (regional) superfoods, which naturally have a particularly high amount of micronutrients and/or secondary plant ingredients that are said to have an added health-promoting value. In view of the existing or presumed market potential of both groups, it seems advisable to initiate studies focused on the capital region to achieve a target-group-oriented product development with the appropriate players from science and business, provided that the corresponding market potential allows it.

The focus on the development of innovative and nutritious food – for example, from residual materials – effectively brings together the aspects of regionality, health and sustainability while also intersecting strongly with field of action 1. Best practice examples such as the vegetable bread made from pomace developed as part of Nutriact[83] make an excellent blueprint for initiating and supporting similar approaches in a targeted manner.

Innovative production and cultivation systems

From algae cultures and insect breeding to vertical and indoor farming, the diversification of food is producing new forms of cultivation that represent exciting concepts – particularly for the sustainable orientation of rural and urban areas. Although many cultivation systems such as algae cultures are still in their infancy, they offer huge potential for the regional and global agriculture and food economy[84]. Start-ups from Brandenburg provide an insight into how business models based on innovative cultivation systems can specifically promote sustainable development in rural areas[85]. The support, networking and communicative accompaniment of such innovation drivers can help to form successful cooperations for market penetration.

Measurement technologies/sensor technology

All along the supply chain, there are multiple applications for technological processes in automation, quality assurance and loss reduction. Continuous technology adaptations and new developments can lead to optimisations in the areas of cultivation and harvesting (e.g. analysis of the optimal degree of ripeness and thus the exact harvesting time), automation and process control (e.g. non-invasive inline controls) in both processing and logistics (e.g. product-oriented storage and transport). Here, the innovation system that has already been successfully implemented, along with all its cross-connections to relevant Berlin-Brandenburg Clusters such as Photonics and ICT, Media and Creative Industries, can help to bring together thematically oriented problem-solving communities and to moderate the innovation process in a targeted manner.

81 Lebensmittelverband Deutschland e.V. (2021): https://www.lebensmittelverband.de/de/lebensmittel/werbung/clean-labels [Accessed on: 2 September 2021]

82 European Commission (2022): https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32015R2283 [Accessed on: 15 March 2022]

83 Wirtschaftsförderung Land Brandenburg GmbH (WFBB) (2021): https://ernaehrungswirtschaft-brandenburg.de/de/news/gemuesebrot-aus-trester [Accessed on: 18 October 2021]

84 Deutsche Algen Genossenschaft eG (2021): https://www.deutsche-algen.de/ [Accessed on: 3 September 2021]

85 Carbon Biotech Social Enterprise Stiftungs AG (2021): https://carbonbiotech.eu/ [Accessed on: 14 September 2021]

Measures in field of action 3: "Food trends and technologies"

Innovative technological developments make it possible to serve consumer trends with new products and processes in raw material production and food processing. Appropriate measures are to be developed with regional expertise in science and business and against the background of special market potential in the capital region.

- Encouraging the use of alternative protein sources
- Developing innovative products based on diversified diets
- Optimising the nutritional content and formulation of meat substitutes
- Strengthening insect-based food and feed development
- Driving the development of innovative and nutritious foods from residual materials
- Developing new value chains for systematic packaging reduction
- Promoting innovative cultivation and production systems
- Developing and scaling traditional manufacturing processes further

6.5 Field of action 4: Climate-adapted production from farm to fork

Climate change is already having an impact on the agriculture and food industry. One of the ways in which this can be seen in Brandenburg is through the rise in the frequency of droughts, and the vulnerability of agriculture to seasonal weather fluctuations has increased as a result[86]. It is already becoming apparent that agricultural production in Brandenburg will consequently become more cost-intensive and the competitiveness of Brandenburg's agricultural producers will be jeopardised. In the supply chain, processing companies may therefore find themselves contending with the increasing risks associated with raw material security.

The requirements with regard to climate adaptation and environmental protection are necessitating new approaches to resource management in Brandenburg's agriculture and food industry. Technical, but also organisational and systemic innovations can support the measurability of climate and environmental protection measures and increase resource efficiency and competitiveness.

Climate-adapted farming systems

Greenhouse gas emissions from biological processes cannot be completely avoided[87]. While agriculture is set to remain one of the main emitters of greenhouse gases in the future, it can still contribute to carbon storage with sustainable

86 F.-W. Gerstengarbe, F. Badeck, F. Hattermann, V. Krysanova, W. Lahmer, P. Lasch, M. Stock, F. Suckow, F. Wechsung, P. C. Werner (2003): Studie zur klimatischen Entwicklung im Land Brandenburg bis 2055 und deren Auswirkungen auf den Wasserhaushalt, die Forst- und Landwirtschaft sowie die Abteilung erster Perspektiven [Study on climatic development in the State of Brandenburg until 2055 and its effects on the water balance, forestry and agriculture as well as the derivation of initial perspectives], p. 63

87 Science Media Center Germany gGmbH (2021): https://www.sciencemediacenter.de/alle-angebote/research-in-context/details/news/emissionen-aus-nahrungsmittelproduktion-allein-reichen-um-15-ziel-zu-gefaehrden/ [Accessed on: 14 September 2021]

land use and thus actively influence climate-change-related processes and changes. These changes require new and adapted plant varieties, along with adjustments to sowing and harvesting times, crop rotations and irrigation methods.

In light of this, processes and crops that enable site-appropriate use are gaining in importance. These include agroforestry systems, peatland conservation practices and permaculture. The climate-adapted design of crop rotations, the increase of humus content in agriculturally used soils, the introduction of new crops and varieties, and the active integration of compensation areas all serve to highlight the broad spectrum of climate-adapted cultivation systems.

When it comes to allowing farmers to develop and implement individual adaptation and coping strategies, knowledge building and transfer are of particular importance. Strengthening the climate and environmental competences of Brandenburg farmers by creating a common basis for innovation can help to adapt regional agriculture to changing weather conditions.

As well as helping to network knowledge carriers and interested parties for systematic peer-to-peer learning[88] in a results-oriented way, Cluster activities can also bring existing support services for the development of individual adaptation strategies and implementation plans into the area through effective communication.

Resource efficiency

The efficient use of natural resources is fundamental to the agriculture and food industry in view of limited availability and economic risks. In addition, climate policy objectives of the industry contain corresponding targets for the reduction of carbon.

Renewable forms of energy are to replace fossil fuels and energy sources in the medium and long term, both in agriculture and in the food industry. The reduction of fuel consumption in agriculture can only be achieved with a systemic change in the fuels used, not modern drive technologies alone[89]. The same applies to the upstream and downstream sectors. Subsidies for hybrid and alternative drives for agricultural machinery, delivery fleets and storage fleets notably support companies in the selection of suitable technologies and provide assistance for individual integration into their own operations.

The use of organic residues for heat and power generation also represents an important lever on the way to a carbon-neutral agriculture and food economy. It is essential for pioneering and at the same time practicable approaches and technologies for climate-friendly and sustainable biomass production and use to find their way from the laboratory to the farm. In cooperation with the emerging Leibniz Innovation Farm at the Leibniz Institute of Agricultural Engineering and Bioeconomy e.V. Potsdam (ATB)[90], sustainable agriculture, the regional production of healthy food and the use of residual materials for a variety of bio-based materials and energies can be linked, researched and demonstrated in the future. Through cross-sectoral networking, the Cluster can make an important contribution to turning the showcase into a widely used transfer centre and thus to advancing the bio-based circular economy in Brandenburg.

Digitalisation

Digitalisation provides agriculture with opportunities to use resources more efficiently and sustainably. In terms of smart and innovative farming approaches, it can contribute to making food production more sustainable. Automation and digital tools support the food industry in networked production, the use of resource-optimised processes, and information management. Application examples from Brandenburg illustrate[91] that the use of electronic components and their sensible networking are already helping to optimise processes.

The approaches and possible applications are diverse and therefore require the systematic networking of knowledge carriers and available infrastructures across the state. In cooperation with regional partners, such as the Institute for Food and Environmental Research (ILU), the Digital Agriculture Communication Hub (DiLan) at the ATB or the DigiFood

88 Describes an equal learning situation in which colleagues exchange knowledge, ideas and experiences to learn both with and from each other.

89 H. Eckel, R. Hörner, P. Pickel, J. Rathbauer, G. Reinhold, E. Remmele, R. Stirnimann, N. Uppenkamp (2020): Fuel use in agriculture

90 Leibniz-Institut für Agrartechnik und Bioökonomie e.V. (ATB) (2021): Unterwegs im Bioökonomieland Brandenburg [On the road in the bioeconomy state of Brandenburg] (atb-potsdam.de) | https://www.atb-potsdam.de/de/aktuelles-und-presse/news/news-detailseite/unterwegs-im-biooekonomieland-brandenburg [Accessed on: 17 November 2021]

91 State Chancellery of the State of Brandenburg (2021): https://digitalesbb.de/2019/07/17/projekte-der-digitalisierungsstrategie-von-der-milchkanne-bis-zum-kartoffelfeld/ [Accessed on: 23 November 2021]

project, the Cluster Food Industry contributes to knowledge transfer. This helps to strengthen the innovation system along specific thematic strands and thus promote targeted competence building in the region.

Climate-adapted food processing

Climate-adapted food processing includes measures ranging from increasing energy efficiency to recycling process water and recovering waste heat.

Considering the wide range of measures, tried-and-tested tools can help to analyse the status quo of savings opportunities and to develop individual reduction strategies on this basis. In addition to offers from the business development agencies and local chambers of industry and crafts, the VDI's Centre for Resource Efficiency[92], for example, provides useful guides and can increase resource efficiency in companies with the help of process-related strategies and measures. The bundling of information regarding essential tools of different knowledge institutions and an initiated exchange of experience on the advantages and disadvantages of the respective tools could be effective measures within the framework of Cluster activities to specifically support the climate adaptation of Cluster players and to develop cooperative innovation projects.

Measures in field of action 4: "Climate-adapted production from farm to fork"

The requirements regarding climate adaptation and environmental protection are necessitating new approaches to resource management. Technical, but also organisational and systemic innovations should help to enable the measurability of climate and environmental protection measures and to increase resource efficiency and competitiveness.

- Developing and consolidating climate-adapted farming systems further
- Exploring and scaling old and new processes in real-world settings
- Intensifying peer-to-peer learning – intensifying dialogue within the industry
- Strengthening climate and environmental competences in companies
- Establishing regional lighthouse projects
- Strengthening alternative drive systems
- Driving forward innovative energy management systems
- Continuing the use of organic residual materials for heat and power generation
- Developing and implementing individual reduction strategies

92 VDI Zentrum Ressourceneffizienz GmbH (2021): https://www.ressource-deutschland.de/ [Accessed on: 15 November 2021]

6.6 Cross-sectoral topic 1: Skilled workforce for the transformation

Over the next eleven years, the Brandenburg economy will have around 161,000 fewer skilled workers[93] available than today[94]. The personnel situation in companies in the agriculture and food industry has also already changed significantly, as it becomes increasingly difficult to recruit skilled workers and trainees. By 2030, the food industry will have to replace about 25 per cent of its skilled workers due to age[95] while also contending with the growing cross-sectoral competition for skilled workers and falling school-leaver numbers. The increasing shortage of staff on the labour market represents a new, previously unknown dimension for the industry, with Cluster players describing the situation as extremely tense and the Achilles' heel of growth.

The agriculture and food industry faces particular challenges in attracting trainees and skilled workers due to industry-specific framework conditions[96], with the situation exacerbated by shift and night work, physical exertion and few clear opportunities for development.

Increasing shortages of skilled labour require new strategies in the agriculture and food industry, which can only be implemented on an individual farm basis to a limited extent. Cooperative approaches should make it possible to increase the attractiveness of the food industry as an employer and support it with its transformation in terms of new job profiles. The concept of a good job is not only about pay, but also about appropriate working hours, occupational health and safety, health management, equal opportunities, family friendliness and work-life balance, as well as the opportunity to participate in decisions.

The industry is crying out for a real charm offensive and the identification of unmistakable unique selling points and added values in a bid to attract young people in particular. What's more, there is also a growing opportunity to attract career changers to the agriculture and food industry, as the offers put forward by numerous continuing training providers[97] show that the industry is gaining in importance for people from outside the field.

Possible further training and development opportunities must be more strongly highlighted and the valuable contribution of the agriculture and food industry to a climate-neutral economy in Brandenburg must be made clear. The changes in the industry are leading to new job profiles and thus also to new target groups that need to be reached. New stories are needed to redefine the image of the increasingly digitalised industry alongside the current transformation process to create future-proof images in people's minds.

But any potential to arise from business succession is not without increasing challenges. Through targeted cooperation, start-ups can combine their business models with the existing resources (staff, customer base, facilities) of established companies in the agriculture and food industry, and mediation and support projects should be communicated more transparently.

The joint design of a participatory corporate culture, as well as integrated sustainability and innovation management systems, helps to promote personal responsibility and creativity

93 The agriculture and food industry relies on quite a significant number of (foreign) seasonal staff and workers. Successfully shaping the transformation to a more sustainable agriculture and food economy requires skilled workers and academic leaders, which is why this Master Plan in the sense of innoBB 2025 plus is primarily concerned with attracting, retaining and developing skilled workers for the industry.

94 WifOR (2019): Opportunity for vocational education and training: Skilled labour requirements for the professionally qualified, p. 4

95 Wirtschaftsförderung Land Brandenburg GmbH (WFBB) (2022): http://fis-brandenburg.de/fis/cluster/ernaehrungswirtschaft/daten-kompakt/ [Accessed on: 10 March 2022]

96 G. Hampel, M. Putzing, F. Schiemann, A. Wagener, C. Welker (2018): Skilled labour requirements in agriculture in the State of Brandenburg until 2030

97 DLG e.V. (2021): https://dlg-akademie.de/landwirtschaft-fuer-quereinsteiger/ [Accessed on: 20 December 2021]

among employees while also providing a valuable tool for positioning the company for the future.

Measures in cross-sectoral topic 1: "Skilled workforce for the transformation"

Increasing shortages of skilled labour call for new strategies in the food industry, which can only be implemented on an individual farm basis to a limited extent. Cooperative approaches should make it possible to increase the attractiveness of the food industry as an employer and support it with its transformation in terms of new job profiles.

- Strengthening sustainable and innovative corporate cultures
- Promoting participation and interaction of workers through regional networks
- Accompanying reputational enhancement of the industry
- Strengthening the value of the food-producing sector
- Identifying development and training opportunities
- Promoting options for career changers
- Attracting graduates and potential founders for business succession

6.7 Cross-sectoral topic 2: Internationalisation

International cooperation has the potential to increase the competitiveness and resilience of the agriculture and food industry in Brandenburg. The continuation and expansion of measures for the international networking of competences and capacities should help to create synergies and translate them into international innovation projects.

Challenges do not stop at state borders. Thus, problem-solving communities also generate a higher added value if they do not only work in one region, but strive for targeted networking with international networks and initiatives (sector-relevant networks can be found as examples in the appendix under 9.3). The knowledge-based transformation towards a more sustainable agriculture and food industry in Brandenburg can be supported by access to thematically relevant impulses, best practice examples and project approaches in an international context. The opportunities that can open up through the international networking of competence centres and experts must be made transparent and communicated in a way that is appropriate to the target group.

Innovations are bound to take place whenever people come together. International knowledge transfer is also already well practised by the Cluster, with players taking an active role in the design and implementation of a whole host of pioneering events, including the four International Bioeconomy Conferences in Potsdam between 2016 and 2020[98] and in the cross-Cluster exchange format of the Bioeconomy

98 Federal Ministry of Education and Research (BMBF) (2022): https://biooekonomie.de/themen/biooekonomie-in-den-bundeslaendern/brandenburg [Accessed on: 17 January 2022]

Round Table with Lower Austria[99]. The thematically oriented launch of platforms such as these will continue to play a central role in the future with a view to the diverse innovation topics in the Cluster and will be carried out in close cooperation with trusted partners such as the Enterprise Europe Network (EEN). In cooperation with relevant EEN contact points across the capital region and in other European countries, regional needs can be ideally combined with international issues in defined regions and translated into action-field-specific formats. Initiated contacts can be supported with the regional EEN contact partners on the road to a joint innovation project. In addition to content-related advice on the modalities of suitable funding programmes, strong network management is also needed to coordinate international partners in a project. Alongside promoting the application for EU projects, further accompaniment and support for international project management could lower the inhibition threshold for participation in international cooperation networks.

Against the backdrop of global value chains and networks, the international visibility of the industry is also gaining in importance and can decisively determine the future competitiveness of the Cluster players. A benchmarking study is one of many helpful instruments that can make the potential of Brandenburg's agriculture and food industry more visible in international competition. The insights gained can contribute to further intensifying the Cluster's internationalisation activities and specifically advancing its international profile in already pronounced thematic fields such as the bioeconomy or alternative protein sources.

Measures in cross-sectoral topic 2: "Internationalisation"

International cooperation has the potential to increase the resilience of the food industry. Measures for international networking of competences and capacities should help to create mindsets and synergies for international innovation projects.

- Communicating the added value of international cooperation to target groups
- Initiating cross-border innovation formats on a thematically oriented basis
- Supporting international project and network management
- Benchmarking with selected target countries: assessing Brandenburg's strengths and weaknesses in an international comparison

99 Wirtschaftsförderung Land Brandenburg GmbH (WFBB) (2022): https://ernaehrungswirtschaft-brandenburg.de/de/kalender/biooekonomie-stammtisch-biobasierte-verpackungen-gemeinsam-mit-niederoesterreich [Accessed on: 24 January 2022]

7 Influence of current geopolitical developments (war in Ukraine) on the Master Plan

7 Influence of current geopolitical developments (war in Ukraine) on the Master Plan

As a strategic document, the Master Plan is geared towards a long-term perspective and takes into account the current and expected future framework. Russia's war of aggression against Ukraine is influencing agriculture and food markets worldwide and thus has massive consequences for the food industry in Brandenburg. The consequences of this remained to be seen at the time of the preparation of the Master Plan and could not be directly taken into account in the fields of action since the participation process was already complete. Nevertheless, various measures in the Master Plan already address the long-term challenges associated with the war and will be outlined accordingly.

The war in Ukraine primarily affects the commodity and energy markets. Existing supply chains are in danger of breaking down and rising costs cannot be imposed on the market to a sufficient extent. Russia and Ukraine are largely absent as exporters with a substantial share of the world market for grain and oilseeds for an indefinite period, and massively rising energy prices are having an impact along the entire supply chain from fertiliser production to food retail.

Global developments on the markets are affecting companies in the food industry in Brandenburg in the same way. Foreign trade with Russia and Ukraine is comparatively low[100]; however, price developments have a strong influence on liquidity. Furthermore, the limited budgets in private households means a further increase in price sensitivity is to be expected. The Master Plan already takes into account the many challenges associated with its measures. In addition to political measures to support businesses in the short and medium term, the Cluster Food Industry is examining which measures in the area of innovation need to be strengthened and which further measures need to be taken up.

Increasing work is being done in the Cluster Food Industry to increase the resilience of companies internally and in the context of entire value chains. Field of action 1 (sustainable value creation systems) takes up the supply chain issue and also addresses the goal of a more efficient circular economy with the stronger regionalisation of value creation systems.

The regional food industry cannot be decoupled from global price developments, but it can become more robust in the face of market disruptions.

The production and processing of animal products are resource-intensive. New concepts in field of action 2 (sustainable production of animal based food) for the use of energy and raw materials can contribute to competitiveness. From more effective, regional feed production to innovative management systems in animal husbandry and new processing and utilisation methods, levers for increased profitability must be found.

In field of action 3, the players in the Cluster Food Industry are committed to actively using food trends and technologies to improve existing production systems and develop new business models. Even if there is no connection to the war in Ukraine in the narrower sense, a diversified range of offers can reduce operational and market risks. Furthermore, the increased use of residual and side streams, as well as the development of alternative packaging solutions, are target-oriented in the long term.

With field of action 4 (climate-adapted production from farm to fork), the players are already focusing on reducing dependence on fossil energy sources. In addition to the use of organic residual materials for heat and power generation and the use of alternative drive systems, innovative energy management systems are to be promoted above all.

100 Federal Statistical Office (2022): Brandenburg Foreign Trade 2021

8 Outlook and vision for the future

8 Outlook and vision for the future

The industry is experiencing a significant upheaval and is challenged more than ever to dare to do something new. The underlying participation process for updating the Master Plan has made it clear that the Cluster players in Brandenburg have long since started on their transformative path. Over the coming years, it is going to be particularly important to redefine the idea of cooperation. Agile communication channels need to be established through cross-sectoral, vertical, horizontal and interdisciplinary cooperation, new technologies and processes need to be developed, crucial key technologies need to be conceptually combined and fresh innovations need to be brought into application quickly and unbureaucratically.

This requires supporters at all levels, close cooperation in the implementation of the diverse activities and a strong vision under which the players can unite. The framework for action has been set out in this paper and initial ideas for the future have been sketched out. Ultimately, it is a working document that is designed to be questioned, expanded and implemented. The transformation is a real work in progress with the Master Plan serving as a guiding compass along the way. It is intended to develop a dynamic in the Cluster that transforms good ideas into marketable innovations and makes the image of a more sustainable agriculture and food industry 2030 in Brandenburg a reality.

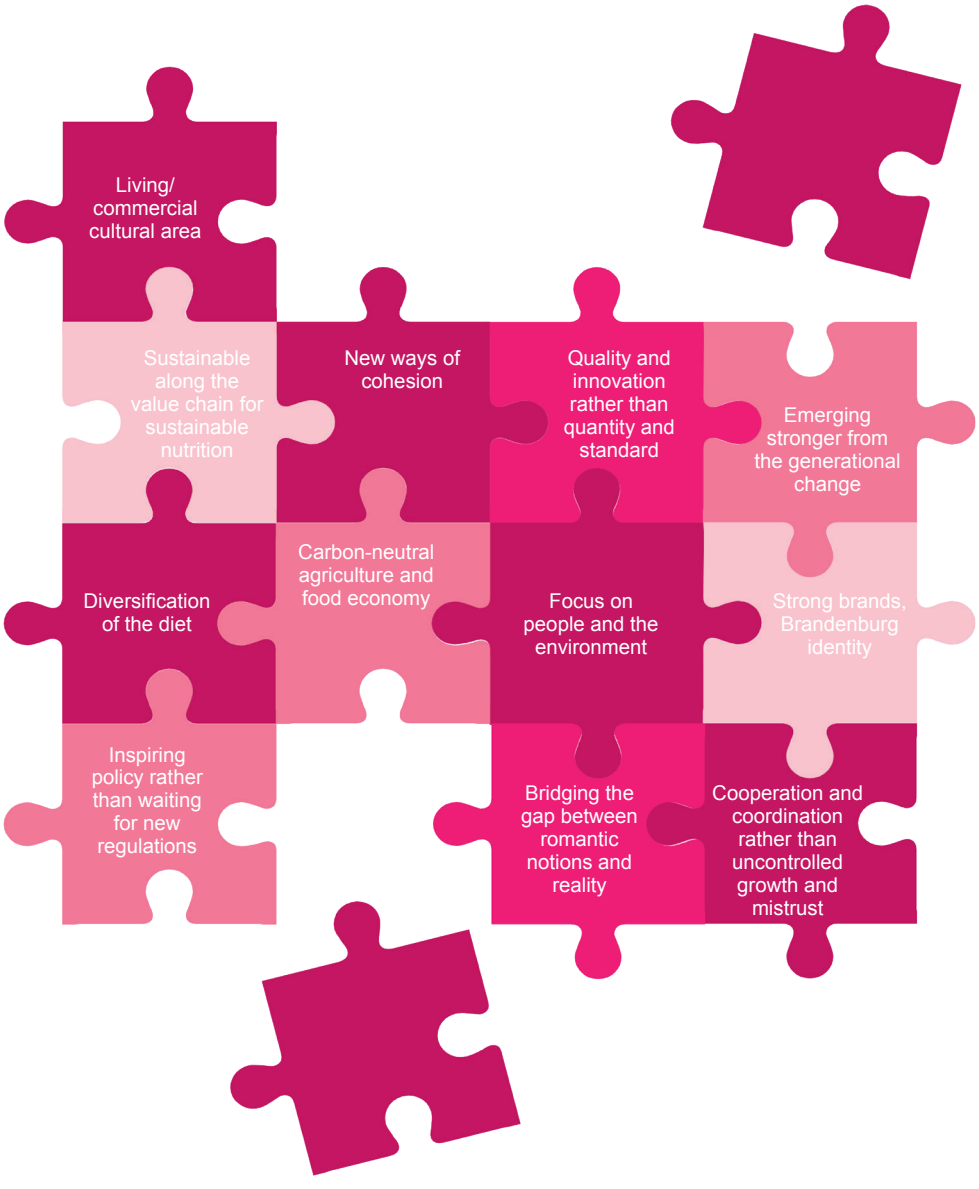

Figure 6: First puzzle pieces of a common vision for the future in the Cluster Food Industry

9 Appendix

9 Appendix

9.1 Excursus: Sustainability concepts

The three-pillar model of sustainability – economy, ecology and social – represents the foundation of sustainable development; however, this still has to be supplemented by the strategies of efficiency, sufficiency and consistency in order to achieve sustainable and holistic economic activity. There is a need for complementary principles aimed at reducing the amount of material and energy to an ecologically and socially sustainable, durable and transferable level[101].

- Sufficiency: a reduced consumption of resources such as materials and energy, achieved through more sustainable production and a change in consumer behaviour – a counter-project to the throwaway society.
- Efficiency: The focus here is on increasing productivity, with the aim of achieving similar results with less resource input.
- Consistency: The principles of nature and processes are transferred, and the establishment of recycling systems for reuse is a central field of action here.

The principles make it clear once again that sustainable development must also involve a social rethink that critically questions current consumer behaviour and the associated product life cycles, and is not only about transforming industrial or technological processes.

9.2 Examples of key SDGs and their relation to the fields of action in Brandenburg

The transformation of Brandenburg's agriculture and food industry into a sustainable system could also take this frame of reference into account in order to systematically document the change and make it visible. In a downstream process, it is recommended to identify key SDGs for all fields of action and cross-sectoral topics, to assign them to the measures already defined, and to develop further measures to address them adequately for each field of action.

Innovation system as the basic understanding of cooperation in the Cluster

Building resilient infrastructure, supporting inclusive and sustainable industrialisation, and promoting innovation

Promoting durable, inclusive and sustainable growth, full and decent employment for all

FoA 1: Sustainable value creation systems

Ensuring sustainable production and consumption patterns

Making cities and human settlements sustainable, inclusive and safe

FoA 2: Sustainable production of animal based food

Protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainable management of forests, combating desertification, halting and reversing soil degradation, and halting the loss of biodiversity

FoA 3: Food trends and technologies

Ensuring health and well-being at any age

FoA 4: Climate-adapted production from farm to fork

Taking urgent action to combat climate change and its impacts

101 Dr Iris Pufé (2014): Sustainability

9.3 Relevant networks in an international context

Integration into international networks is a valuable instrument for participating in international knowledge and technology transfer with a thematically oriented approach. Some networks are listed here as examples that are important with regard to the key focal points in Brandenburg.

Refresh Community of Experts

refreshcoe.org/

The community actively promotes a community approach to tackling the problem of food waste. It offers a wealth of information on food loss and waste in the EU along with tips on how to reduce it, as well as a special area where users can find and exchange information on proven solutions and innovative new approaches.

The European Bioeconomy Network

eubionet.eu/

The European Bioeconomy Network (EuBioNet) is a proactive alliance of EU-funded projects working to promote, communicate and support the bioeconomy. Its main objectives are to maximise efforts; increase knowledge sharing, networking and learning from each other; and to coordinate joint activities and events.

Smart Farming

ec.europa.eu/eip/agriculture/en/news/smart-farming-thematic-network

Smart AKIS is a Horizon 2020 thematic network that aims to promote the adoption of smart farming technologies in European agriculture. It aims to bridge the gap between practice and research in identifying and delivering new smart farming solutions to meet farmers' needs.

Global Roundtable for Sustainable Beef

grsbeef.org/

The Global Roundtable for Sustainable Beef (GRSB) is dedicated to promoting, supporting and communicating continuous improvements to the sustainability of the global beef value chain through leadership, science, engagement and multi-stakeholder collaboration. The GRSB envisions a world in which beef is a trusted part of a thriving food system, where the beef value chain is environmentally sound, socially responsible and economically viable.

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Upheaval makes for a fresh start – A navigator for transformation

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A GROWING COMMUNITY

The Cluster Food Industry is the platform for all players in the food industry across the capital region. It connects the entire value chain “from farm to fork” with other relevant industrial sectors as well as the scientific potential of the region. In doing so, it contributes to ongoing growth through innovation and value creation. All companies, scientific institutions, associations and networks are invited to become active partners within the Cluster Food Industry.

Grow with us! Get in touch and become a partner in the Cluster Food Industry!

www.ernaehrungswirtschaft-brandenburg.de/en

Wirtschaftsförderung
Brandenburg | WFBB

Wirtschaftsförderung
Land Brandenburg GmbH (WFBB)
Babelsberger Straße 21
14473 Potsdam
www.wfbb.de

Contact:
Dr Detmar Leitow
Tel.: +49 331 730 61-227
detmar.leitow@wfbb.de

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