

STATE STRATEGY FOR A SUSTAINABLE BIOECONOMY BADEN-WÜRTTEMBERG

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Baden-Württemberg

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MINISTRY OF THE ENVIRONMENT, CLIMATE PROTECTION AND THE ENERGY SECTOR

Imprint

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Dear Readers,

A sustainable economy demands that we treat our limited natural resources responsibly. Apart from being finite, fossil fuels negatively impact our environment and climate. The bioeconomy can help us to solve many of the complex challenges related to our need for and use of raw materials. Unlike most other areas of sectors of research and technology, the scientific and economic areas of the bioeconomy seek to bring economic, environmental and social considerations in harmony with one another. This is also why this is one of the fastest-growing economic sectors, both in Europe and across the globe.

The state government of Baden-Württemberg sees great potential in a sustainable and circular bioeconomy, represented by the launch of the state's research strategy "Establishing the bioeconomy in the system" back in 2013. This strategy holds the potential to overcome climate change, ensure food security and to satisfy consumption needs as well as industrial demand, all in equal measure.

In order to apply the knowledge that has been generated on this topic, the state government initiated the cross-sectoral, state-wide strategy titled "Sustainable Bioeconomy Baden-Württemberg". In so doing, it is promoting the essential transformation towards a resource-efficient circular economy based on renewable energies and biological resources.

Through this strategy, Baden-Württemberg is pursuing the following objectives:

1. Biological innovations will allow renewable and recyclable raw material sources to be utilized, helping to reduce greenhouse gas emissions, conserve the consumption of natural resources and strengthen biodiversity.
2. Baden-Württemberg is to become a pioneer state for sustainable and circular forms of economic organization. Through this, the state government seeks to create an economy based on a climate-neutral foundation while also moving into innovative economic sectors with supply chains that are largely based within local regions within the state. One essential element includes creating attractive and future-oriented employment opportunities in rural areas.

Reliable and innovation-friendly basic conditions will help local businesses take advantage of the potential held by robust growth markets and innovative technologies. Examples include new production systems and conversion processes for biomass, innovations for various sections of the food supply chain, and fine/special chemicals produced with biotechnology or with the help of microorganisms. The state government is also focusing on circular economy management for nutrients and raw materials through the highly efficient use of byproducts, residual matter, waste, sewage and CO₂ as resources.

This strategy has been developed in cooperation with the relevant stakeholders. Thanks to the early incorporation of all relevant actors, the cooperation partners were able to achieve broad agreement diverse topics, focus areas and objectives as well as to identify the key research and development tasks and critical conflicts of interest. This strategy is open to different technologies and it does not rely on any particular raw materials, processes, technologies or usage models. It also continues to be developed on the basis of supportive monitoring.

The state government is certain that its strategy “Sustainable Bioeconomy Baden-Württemberg” will contribute to developing local expertise in the future-oriented sector of the “sustainable circular bioeconomy”, to supporting scientific and business actors from Baden-Württemberg by raising awareness of them internationally, and to increasing their competitiveness within international markets. We would like to thank everyone who participated in and aided us in developing the strategy and all those who continue to support this process for the well-being on our state.



A handwritten signature in black ink, appearing to read "Peter Hauk".

Peter Hauk MdL
Ministry of Rural Affairs and
Consumer Protection



A handwritten signature in black ink, appearing to read "Franz Untersteller".

Franz Untersteller MdL
Minister of the Environment,
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I. A sustainable bioeconomy for Baden-Württemberg

1 Introduction

The way we currently organize our lives and our economy is based, in large part, on the consumption of finite fossil resources is not sustainable. The continued and, in some areas, increasing use of fossil resources is responsible for a large share of today's greenhouse gas emissions and for ever-more critical levels of climate change. The Earth's ecosystems are being overwhelmed by carbon compounds such as plastics that are either very slowly or non-biodegradable and often not recycled or sorted for safe disposal. At the same time, their incursion into food chains also endangers the planet's biodiversity as well as our health. The reality of increasingly scarce resources is undermining our ability to supply an ever-growing global population with food, resources and energy.

One potential solution for these issues is to use and incorporate the principles of a bioeconomy within our economic processes and society - through the "Life Sciences" - and moving towards the implementation of a sustainable circular bioeconomy. Based on the definition provided by the Bioeconomy Council of the German Federal Government, the bioeconomy is understood as a method of economic organization that provides products, processes and services across all economic sectors through the generation and use of knowledge-based biological resources, procedures and principles within the framework of a sustainable economic system.

The transition over to this sort of economic system demands supportive political agenda-setting. This necessitates the introduction of political and economic incentives as well as a change in the way society thinks.

With this aim in mind, political strategies aimed at implementing the bioeconomy at the EU and federal level were developed and presented in 2010, 2012 and 2013. Regional and locally conditions can, however, only be taken into account within regional strategies. Baden-Württemberg managed to position itself very early on based on the state's very own research strategy titled "Setting up the bioeconomy in the system" created by a strategy group at the State Ministry for Science, Research and Arts.

Within the Coalition Agreement for the 16th Legislative Period, the governmental parties agreed to cooperate with the private sector in an interdisciplinary manner and on the basis of the research strategy to assess the broad-based application of the potentials and technology impacts offered by innovative biotechnology processes and approaches - excluding the creation of genetically modified organisms - and to advance the recovery of raw materials using biolog-

ical methods. Moreover, all of the existing and planned activities for biologically based economic organization are to be bundled and coordinated within the policy strategy “A sustainable bioeconomy for Baden-Württemberg”.

Through this, the two responsible state ministries, the Ministry of the Environment, Climate Protection and the Energy Sector and the Ministry of Rural Affairs and Consumer Protection, have laid out the state’s policy strategy that paves the way for creating a sustainable, knowledge-based bioeconomy and for developing it further. The results of the research strategy “Setting up a bioeconomy in the system” will be taken into consideration as well as those from a broad-based participatory process addressing the issue areas of “A sustainable bioeconomy for rural areas in Baden-Württemberg” and “A bioeconomy in industrial and urban spaces”, with the inclusion of recommendations for action identified by stakeholders from the private sector and civil society.

The creation of financial measures will be incorporated into the constitutionally prescribed consolidation line set by the public authorities and developed in accordance with the possibilities of sustainable financial policies. Sustainable financial policy calls for the responsible handling of financial resources in a way that does justice to multiple generations. In order to implement new measures or expand on existing ones, space for maneuver must initially be created by way of reallocation, primarily among existing programs and within the framework of existing funds. Decisions as to the provision of funds required for implementing the state strategy “A sustainable bioeconomy for Baden-Württemberg”, or for the reallocation of existing funds, will be made in the framework of future budgetary consultations, and in consideration of the basic budgetary conditions.

2 Opportunities and drivers of a sustainable bioeconomy

The bioeconomy is envisioned to be one of the primary drivers of innovation for the coming years. It can contribute to bringing about a systemic transformation in the way goods are produced, used and either recycled or converted into energy at the end of their life cycle. A bioeconomy creates new methods for how to dispose of food products as well as how to produce products and energy. It not only provides new opportunities for addressing environmental and climate protection but also holds enormous potential for creating attractive, environmentally friendly jobs in the rural, urban and industrial spheres.

The state government has identified long-term opportunities and potential offered by the bioeconomy for Baden-Württemberg in the following areas, in particular:

- **Environment:** A sustainable bioeconomy contributes to minimizing the effects of climate change, to preserving ecosystems and biodiversity, to promoting the sustainable use of renewable resources and, ultimately, to the sustainable development of our state by respecting environmental limits.
- **Economy and society:** The sustainable bioeconomy can unlock new opportunities for the economy. It can contribute to maintaining and generating employment, investments, innovative food supplies and new, environmentally friendly products. At the same time, the bioeconomy has the potential to increase added value in agriculture and forestry as well as across rural areas in general.
- **Social transformation:** The sustainable bioeconomy creates incentives and inspiration for a transformation in the way we think - abandoning a linear mentality for circular approaches and actions.

3 The foundations of the sustainable bioeconomy

The Bioeconomy Council of the German Federal Government describes the “bioeconomy” as “the knowledge-based creation and use of biological resources, processes and principles” with the aim of “providing products, procedures and services in all economic sectors in the framework of a future-oriented economic system” (Bioeconomy Council, Development of the National Research Strategy for Bioeconomy 2030, 2016).

Drawing from this very technical definition, the Bioeconomy Council has reoriented the focus in its most recent proposition: “Accordingly, the topics of ‘sustainable agriculture and food systems’ will continue to remain essential. Additionally, the Bioeconomy Council is settings its focus on the current economic and social issues of ‘digitalization, bio-based and sustainable cities, resource conservation, the bio-based circular economy and sustainable consumption” (Bioeconomy Council, Propositions for designing bioeconomy policies, 2018).

Today, the term bioeconomy has turned into a policy strategy for developing economic systems as well as resources and climate protection measures globally across all policy areas and levels (OECD, G7, EU, individual countries and federal states), with the additional inclusion of ethical and social considerations.

Against this background, the state government defines the “bioeconomy” as the knowledge-based creation and use of biological resources, processes and principles that are used to help supply and utilize products and services across all economic sectors within the framework of a future-oriented economic and social system.

This definition of bioeconomy has been left broadly formulated on purpose. Along with agriculture and forestry, with their associated upstream and downstream sectors, it also includes the environmental economy and all areas that make use of Life Sciences.

The state government sees more in the bioeconomy than just a strategy for replacing fossil resources. Rather, a sustainable bioeconomy aims at the intelligent management of natural resources and (regional) material flows that provide people with food and animals with feed as well as substances and raw materials used to create products and generate energy. Through this process, such material flows are organized and oriented in a way that optimizes their integration into the circular economy of recycling. Along with plants and classic “renewable raw materials”, the bioeconomy also includes other forms of life such as animals, fungi and microorganisms (biotechnology). It considers the functional aspects of biology and metabolism, biological systems and additional system functions. Biological knowledge, system understandings and the link between biology and technology are also part of the resources that fall under the bioeconomy.

A “sustainable bioeconomy” for Baden-Württemberg is oriented towards and makes a contribution to the state’s principles and goals of sustainability and the United Nations’ targets for sustainable development.

The EU has also presented its ideas for how to “understand the ecological boundaries of the bioeconomy” in its current action plan and considered sustainability factors as one of three pillars of its bioeconomy strategy (EU COM 2018).

Integrated within value-added chains, the aim of this is to implement the requirements from the sustainability strategy, as a quality component, into the individual steps of the supply chain from one end to the other and, as such, to make this part of corporate quality management.

4 Objectives and principles of the state strategy

The state strategy “A sustainable bioeconomy for Baden-Württemberg” aims to generate ideas and inspiration for achieving the establishment of a sustainable method of economic organization in Baden-Württemberg based on biological resources. This will contribute to the state’s sustainable development in accordance with the existing sustainability targets. The bioeconomy will be perspectiveally developed in a way that is open to all forms of technology, without defining any specific raw materials, processes or usage methods, allowing for additional issues areas to be addressed on the basis of evaluations. In order to initiate the necessary transformation, basic conditions will need to be beneficially designed and suitable initiatives will initially need to be supported in specific areas.

Against this background, the state strategy is pursuing the following objectives:

Objective 1:

The state strategy aims to use innovative biological concepts to identify renewable or recyclable raw material sources. This will significantly reduce the use of fossil resources and permanently minimize dependence on energy and raw material imports.

Objective 2:

The state strategy aims to achieve a reduction in greenhouse gas emissions in Baden-Württemberg in order to protect our natural resources and contribute to conserving our state’s biodiversity.

Objective 3:

Through this state strategy, Baden-Württemberg will turn into a role model for the transformation towards sustainable economic organization based on a circular economy.

Objective 4:

The state strategy aims to strengthen rural areas in Baden-Württemberg by increasing regional added value on the basis of innovative bioeconomy solutions and by creating attractive, future-oriented jobs.

Through implementing these objectives, the state government observes the following principles as a framework for the sustainable bioeconomy:

- Food production takes priority in terms of land use.
- Regulations regarding the preservation of biodiversity and nature environments are taken into consideration.
- The forms of utilization that exhibit high potential for adding economic, environmental and social value are always to be prioritized. Following food production, this also specifically includes material and energy uses based on agricultural and forestry production that are not cultivated for purposes of food production, such as multi-year cultures, along biomass and its components, that are not intended or not needed for feeding people or animals.
- The basic conditions of the sustainability approaches are to be assessed from early on for all developments - in the planning phase as well as through an on-going basis during development and introduction into the market.
- Whenever possible and prudent, coupled, cascade and circular usage concepts are to be applied, with priority given to the overarching objective of the most efficient forms of use.
- Biomass for electricity consumption should generally entail the very last step in a series of various usages.

The measures derived from these objectives should target areas in which

- there is lack sufficient incentives at the upper levels or the regional conditions for the state of Baden-Württemberg have not adequately been outlined,
- structural changes and transformation processes are required,
- or sustainable developments and innovations could be promoted or implemented in a targeted manner.

The “State Strategy for a Sustainable Bioeconomy” does not aim to replace any individual technical policies; rather, it seeks to support cross-sectoral cooperation and the interdisciplinary involvement of social actors. Biological resources are to be more profoundly integrated within the value-added chains for industrial and energy products.

At the same time, opportunities are to be created to utilize organic waste and waste water as raw material sources, along with bio-based methods and biological processes, and to efficiently and affordably exploit non-renewable, abiotic raw materials as well as to recover these from industrial, consumer and energy products. This should bring about a raw material transformation based on the EU objective of “closing the loop”, in the course of which as many raw materials as possible are increasingly fed back into circular economies and with as much value as possible at a high cascade level (without downcycling) in consideration of environmental and economic criteria.

In order for this to succeed,

- the economy, science and society must act with greater force as a single system, creating hitherto inexistent links between value-added chains and, at the same time, returning other products and materials into the circular economy at the end of their life cycles while retaining as much value as possible;
- new value-added chains and networks across all sectors of the economy must be developed with new production and logistics processes as well as products;
- material flows between rural, urban and industrial areas must be optimized so that a greater degree of inclusion into the circular economy can be achieved for raw materials and foods across these three areas.
- qualified jobs must be created in order to utilize regional biological resources and them into products locally.
- Legal obstacles to the bioeconomy system being considered must be identified and assessed in terms of the extent to which adjustments to existing laws are possible, if needed, and the extent to which any necessary developments targeting the relevant laws could be initiated by the state.

A sustainable bioeconomy centered on utilizing regional biogenic material flows and transforming them into products locally will lead to heightened demand for well-qualified professionals. Creating these jobs in rural areas is a key principle in the process of implementing the state strategy.

As a global economic and high-tech hub, Baden-Württemberg is already known for developing efficient, energy-saving and environmentally friendly technology. Through its state strategy, the government of Baden-Württemberg therefore seeks to become a role model for sustainably developing a bioeconomy, from both a technological and social perspective as well as at the national and international level.

The adaptation of the latest cultivation methods for biomass as well as innovative bio-based materials and products along with processes of biological raw material extraction and production can serve as exemplary paths towards a climate-neutral, sustainable economy.

5 Creating the state strategy – The strategy platform for a sustainable bioeconomy

Important cornerstones of the state strategy have been developed in the scope of a strategy development processes in cooperation with stakeholders from society. This participatory process included actors from the areas of primary production and trade, the manufacturing sector, science, social partners, non-governmental organizations as well as the financial and banking sectors. The heart of the strategy platform was comprised of eight thematic working groups divided into two specific branches. This participatory strategy process created opportunities to make a regional contribution to the development of the State Strategy for a Sustainable Bioeconomy together with the relevant stakeholders and experts in Baden-Württemberg.

The dialog process encompassed two branches:

- **The bioeconomy in rural areas**

Under the guidance of the Ministry of Rural Affairs and Consumer Protection, this branch addressed the topics of “efficient and environmentally friendly generation and sustainable provision of biomass by agriculture and forestry and their processing into high-quality traditional and innovative products along with subsequent marketing options”. One focus area here was the exploitation of auxiliary flows and residual material from biomass production and processing in the sense of coupled and cascade usage.

- **The bioeconomy in urban and industrial areas**

Under the guidance of the Ministry of the Environment, Climate Protection and the Energy Sector, this branch incorporated into the overall system the use of biological waste, waste water and CO₂, as well as the possible applications offered by biological processes, methods and principles in the industrial, commercial and municipal sectors aimed at environmental protection, the mitigation and climate change and resource conservation. To add greater focus, emphasis was also turned to the B2B area.

From October 2017 to October 2018, over 100 experts worked on various recommendations for action. Additionally, areas were identified that required clarification on the basis of scientific studies. A board comprised of speakers from the working groups and representatives from the responsible departments accompanied and networked the work conducted by the groups in both divisions.

The state organization BIOPRO Baden-Württemberg, financed by the Ministry of the Environment, Climate Protection and the Energy Sector and the Ministry of Rural Affairs and Consumer Protection, was responsible for implementation of the participatory process in both divisions. In order to discuss the bioeconomy in sufficient depth and in consideration of sustainability, both divisions considered technological aspects as well as socio-economic and environmental factors.

II. Areas of action, strategic approaches and measures

In order for Baden Württemberg to take advantage of the opportunities offered by bioeconomy, the state government has set clear focus areas through the measures outlined below (subdivided into six action areas).

6 Bioeconomy within state policies and administration

6.1 ACTION AREA: SUPPORTIVE FRAMEWORK FOR A SUSTAINABLE BIOECONOMY

Objective: Develop and instrumentalize a sustainable circular bioeconomy to promote the state's sustainable development and identify potential obstacles and support options offered by the state's policies and its administration.

6.1.1 LINKING SUSTAINABILITY AND A BIOECONOMY

The state government will give added support to measures that contribute to the sustainability objectives set out by Baden-Württemberg (e.g., potential contributions offered by a biowaste refinery to the sustainability objective of promoting recycling through municipal waste). This contribution to sustainability should be identifiable and measurable using the corresponding indicators. These are not yet in place for Baden-Württemberg and should therefore be developed. Additionally, quantifiable targets must be identified to allow for the bioeconomy to be constructively developed over the long term.

Measure 1 (objective and indicators):
The state government will develop qualitative targets with quantifiable indicators for a sustainable bioeconomy in order to be able to effectively measure the contribution that a sustainable circular bioeconomy is making to the existing sustainability objectives.

6.1.2 THE “SUSTAINABLE BIOECONOMY” ADVISORY BOARD

Implementing and further developing the “State Strategy for a Sustainable Bioeconomy” requires that information is shared among individual disciplines as well as experts. This was already taken into consideration by the board of experts while drafting the state strategy and it should shape future transformation processes in Baden-Württemberg. To this end, the State Government will establish an advisory board that bundles together existing experts that will provide counseling in relation to the implementation and further development of the Strategy. An exchange of ideas about the risks and opportunities for ecosystems, biodiversity, climate change mitigation and land use should also take place within this framework.

Measure 2 (advisory board):

The State Government will establish the “Sustainable Bioeconomy” Advisory Board to provide support for the implementation and further development of the State Strategy for a Sustainable Bioeconomy.

6.1.3 LEGAL FRAMEWORK

The development of a sustainable and circular bioeconomy will be subject to the positive as well as negative influence of numerous regulations and norms from various legal areas and strategic approaches at the national and EU level. Additionally, due to the innovative nature of biological production in many areas, some aspects of the bioeconomy either have not been sufficiently considered in numerous regulations or they could even be prone to having unintended inhibiting consequences. For example, to guard against the outbreak of certain animal epidemics, such as mad cow disease, and to ensure the preservation of hygienic requirements governing primary materials for feed, livestock feed is strictly regulated (which can also include insects used to produce animal feed). This currently inhibits the development of insect biotechnology for chemical raw materials on the basis of biowaste (the natural food source for certain insects). As such, support must be provided to stakeholders for compliance with the diverse and often complex regulations, which can have direct or indirect impacts on the bioeconomy. In cooperation with the German Federal Government and the EU, experimental approaches such as “regulative innovation zones” or “clearing houses” can serve as reference points for specific optimizations and promote a sustainable bioeconomy.

Measure 3 (legal) framework:

Baden-Württemberg will use the approach “regulatory innovation zones” to assess which conditions could inhibit or promote the development and dissemination of a sustainable circular bioeconomy in Baden-Württemberg and how these basic conditions can be further developed in a targeted manner.

The implementation of biological innovations in companies and municipalities is generally connected to corresponding approval procedures. In the future, existing forms of consultation provided by the responsible approval bodies should be expanded to provide for a broader range of qualified support persons.

Measure 4 (consultation of companies/clearing houses):

Baden-Württemberg will analyze the optimal ways for companies and municipalities to access consultation with regard to the legal framework, authorization processes and re-request procedures when implementing biological innovations in their production and business processes.

6.1.4 COOPERATION AT THE STATE LEVEL AND REPRESENTATION OF REGIONAL BIOECONOMY AREAS AT THE FEDERAL AND EU LEVEL**Measure 5 (supra-regional involvement):**

Baden-Württemberg will develop the sustainable bioeconomy as a regional approach and become actively involved in exchanges with other regions addressing consideration for and implementation of regional conditions in efforts to introduce and further develop supra-regional initiatives at the federal and EU levels, such as within the German Federal Government/state councils, technical ministry conferences and the German Federal Council as well as in exchange with the German Federal Government and the EU.

6.1.5 PUBLIC PROCUREMENT IN BADEN-WÜRTTEMBERG

Public procurement serves the function of a role model. Greater focus will be placed on the integration of sustainable bioeconomy products and services within public procurement.

Measure 6 (public procurement):
This measure involves assessing how the aspects of the sustainable circular bioeconomy can be integrated within the scope of public procurement.

6.1.6 IDEA COMPETITIONS FOR INNOVATIVE BIOECONOMY SOLUTIONS

Baden-Württemberg is a leading hub for research and innovation, where many talented individuals come up with many innovation solutions and products. This potential should be linked to the development of a sustainable circular bioeconomy in Baden-Württemberg and used to solve current challenges. To this end, idea competitions addressing current issues will be opened for applications, such as for bio-based sustainable packaging alternatives, with the targeted aim of initiating a transformation in the packaging industry and in retail.

Measure 7 (idea competitions):
Baden-Württemberg will announce and open applications for idea competitions addressing current issues, with the aim of introducing innovative bioeconomy solutions and products.

7 Thematic actions areas

7.1 ACTION AREA: A SUSTAINABLE BIOECONOMY IN RURAL AREAS

Objective: Secure the supply of raw materials for a sustainable circular bioeconomy and exploit future-oriented opportunities for creating added value and employment in rural areas.

Strategic approaches and measures

With their natural resources and expertise, rural areas serve as more than mere suppliers of raw materials for industrial processes. They can add impetus to the development of a sustainable bioeconomy by implementing decentralized bioeconomy approaches. The potential offered by the bioeconomy to create new sectors in peripheral areas outside of metropolitan regions should be highlighted here. These can make a significant contribution to increasing added value and to create knowledge-based, attractive job opportunities. The objective is for a large portion of the steps along the value-added chain to be created in rural areas, which can generate positive effects for the overall supply chain and for employment in these rural areas.

This action area seeks to promote the efficient, sustainable use of available natural resources while also considering the preservation of biodiversity as well as the conservation of soil and forest functions. The permanent regional supply of raw material quantities and qualities for traditional and newly created sustainable bioeconomy markets should be ensured while also maintaining environmental boundaries. For the area of forestry, the preservation and creation of locally suitable, natural, healthy, productive and stable forests across all forest ownership types will serve as a basis for future generations to structure and act on their environments.

7.1.1 SUSTAINABLE GENERATION AND SUPPLY OF BIOLOGICAL RESOURCES

As a basis for raw materials in the bioeconomy, maintaining a diverse array of species and genetic variability within different plant types, along with special cultivation systems and methods, is the cornerstone for sustainable agriculture and plant production in forestry. The resources soil, water and nutrients, which are essential for the bioeconomy, must be intelligently and sustainably managed so that the future requirements and needs of society can be satisfied without overburdening the capacities of our ecosystems or putting pressures on bio-diversity. In this context, integrated and organic farming each offer their own respective advantages and should therefore be developed into a beneficial mix. While organic farming is limited in terms of yields, it offers additional social benefits within the system approach. Regardless of the natural performance, the regional added-value potential of cultivation systems within agriculture and sustainable, natural forestry should be exploited the best way possible. Integrated as well as segregated approaches for locally suitable land use systems should be used in this context. Key focus areas include: genetic variety, biodiversity, valuable ingredients and the functionality provided by (crop) plants; ecosystem services; GHG reductions and CO₂ capture; and resistance, regenerative ability and the multi-functionality of land use systems.

Measure 8 (land use systems of the future):

Baden-Württemberg will promote applied research and development on the efficient generation and supply of regional biomass in consideration of the aspects sustainability, the preservation of biodiversity and climate change mitigation, which will also address any new requirements, demands and markets that arise.

Measure 9 (analysis of potentials):

In order to assess the potential for sustainable useful biomass, scenarios will be developed outlining future demand for regional biomass in Baden-Württemberg and this will be analyzed in light of environmental and sustainability considerations.

7.1.2 FOOD SUPPLY SYSTEMS AND FOOD OF THE FUTURE

The demographic transition, an increase of nutrition-related illnesses and changing life habits and conditions are important social challenges that must be overcome through the development of a sustainable circular bioeconomy. Baden-Württemberg is promoting healthy and balanced nutrition as well as the reduction of food waste through its “Nutrition Strategy for Baden-Württemberg”. Additionally, the food and nutrition industries are essential economic sectors of the bioeconomy with a large degree of innovative prowess and a high potential for adding value. They are especially important for Baden-Württemberg due to the state’s prominent food industry as quality and the individual added value of the product can have a positive impact on purchasing decisions. At the same time, the sale of high-value-creating regional foods can boost incomes for family-run farms.

specific objectives:

- innovative, needs-based food supply concepts of the future,
- healthy, regional foods of the highest quality,
- reducing environmental stress factors and waste (from producers through to the consumers),
- innovative products and solutions that contribute to economic growth, especially among small and medium-sized enterprises in the commercial sector (SMEs),
- improving the competitiveness of Baden-Württemberg’s food industry,

Measure 10 (food supply systems and food of the future):

Baden-Württemberg is specifically promoting applied research and development into consumer-oriented productions and process innovations along the value-added chain for food. The focus of these efforts rests on issues such as technical and digital innovations in the area of traceability systems for the origin, hygiene, safety and shelf life of foods as well as improving the systems food processing.

7.1.3 DIGITALIZATION IN AGRICULTURE AND FORESTRY

Digital options in the areas of agriculture and forestry offer enormous opportunities for promoting efficient and effective biomass generation as well as bioeconomy value-added chains. These digital options, such as from the areas of sensor technology, networks and robotics, enable the implementation of real-time systems and the fusion and analysis of information (smart production and conversion), which can provide even greater production and decision-making support for consumers when paired with the Internet of Things, cloud computing, big data, artificial intelligence applications and blockchain technologies (digital production and conversion).

Moreover, these digital options ensure that value-added chains based on the bioeconomy become even more transparent and allow for traceability, supported by closed networking among the value-added chains. Such networking also promotes more efficient and effective logistics within these value-added chains. This is especially relevant for biomass-based value-added chains since biomass is a perishable good that often faces conditions which are not favorable for transport. To this extent, digital options allow for biomasses to be produced and processed in a manner that is more environmentally friendly and, as such, enjoys greater acceptance from society. This is not only associated with logistical benefits but also due to biomass production methods that are more friendly to the environment and nature due to the reduction of chemical pesticides. These characteristics can also be relevant in terms of inter-national competitiveness.

Furthermore, one attribute that should not be underestimated is the fact the digital options raise the attractiveness of jobs within value-added chains based on the bioeconomy, which can help overcome the potential shortage of skills and future employees in this industry.

This will require the implementation of the necessary research and technological infrastructure as well as the associated education and training facilities for the bioeconomy and technology.

Measure 11 (digitalization in the areas of agriculture and forestry):

In the scope of the activities in the area of “Agriculture and Forestry 4.0 - sustainably digital”, Baden-Württemberg will take advantage of the dynamic developments and innovations offered by digitalization to increase resource efficiency across the entire process chain and to promote innovative applications and business models. This approach is oriented in line with the specific operational and business structures present in Baden-Württemberg. A link to the digitalization of material flow management will also be set up.

7.1.4 INTELLIGENT RAW MATERIAL AND MATERIAL FLOW MANAGEMENT

Providing an uninterrupted flow of raw materials with a constant level of quality is essential for most industries. This presents a challenge for bio-based process chains as raw materials from the agricultural sector can, for example, be seasonally unavailable during certain harvest cycles. It is therefore essential to implement clearly defined usage concepts that allow for and ensure a continuous supply of biogenic raw products and materials for process industries in the needed amounts and required level of quality. Suitable concepts for harvests, de-centralized processing, logistics and warehousing must be developed to achieve this, to minimize post-harvest losses and to ensure that the quality of the biomass is maintained during storage and processing. Interface management, stakeholders and quality requirements must all be organized, economic efficiency must be verified and standardized quality parameters must be agreed on.

Measure 12 (intelligent raw material and material flow management):

Baden-Württemberg will support innovation initiatives that contribute to the efficient mobilization of regional biogenic raw materials in consideration of residual waste, auxiliary flows and biowaste from primary production and processing as well as to intelligently organize supplies using digital and biological innovations.

Measure 13 (information platform for knowledge and biogenic raw materials in rural are-as):

Baden-Württemberg will develop a concept for a digital information platform aimed at facilitating exchanges of knowledge as well as for the supply and demand of raw materials from agriculture and forestry. The aim of this is make biogenic raw products and materials, which are needed for industrial uses yet so far left underutilized, usable as a basic material for high-quality value creation.

7.1.5 PROMOTING THE INTELLIGENT USE OF BIOLOGICAL RESOURCES

Recent chemical, thermal and biotechnology-based conversion processes have allowed for the production of new materials and bio-based platform chemicals with the potential to re-place fossil resources and offer new, superior characteristics. A number of these processes do, however, remain limited to scope of laboratory or pilot projects. Demonstration facilities and concepts for their implementation are needed in order to conduct further testing, evaluations and optimizations. Moreover, the broad integration of engineering and production processes, such as within integrated bio-refinery concepts, call for links to be established among different sorts of expertise along with cooperation between actors across new networks. Cooperation between the area of research and development and consumers as well as a connection between economic sectors and industries is required in order to effectively implement circular economy concepts and coupled usage as well as to actually succeed in bringing new materials and products onto the market.

Measure 14 (pilot/demonstration facilities):

For the purpose of demonstrating the feasibility and potential for further developing the comprehensive processing of biological resources into innovative products, Baden-Württemberg will support the creation of pilot and demonstration facilities. These facilities will serve as role models for future decentralized, modular “bio factories” located in rural areas. The existing funding guidelines will be extended for this purpose. The focus here rests on ligno-cellulosic crops, auxiliary flows and residual waste along the agricultural and forestry value chains as well as valuable content and functionalities offered by plants.

With its forests and the renewably managed wood that they provide, Baden-Württemberg boasts the ideal conditions for wood exploitation for use as a material. The timber construction companies located in the state are a major driver of innovative developments and generate ideas for the rest of Europe. The increasing use of wood as a raw material, such as for construction, can help replace CO₂-intensive resources such as steel and cement. When sustainably harvested and efficiently used in products with long life cycles, wood can make a significant contribution to reducing CO₂ in the atmosphere.

The State Government is embracing this development through its timber construction Offensive and its hardwood technical center, paving the way for new ideas and approaches.

Measure 15 (promoting the use of wood as a material):

In order to promote the increased use of wood as a material, Baden-Württemberg will launch a timber construction offensive and establish a technical center for hardwood.

7.1.6 FURTHER DEVELOPING THE NUMBER OF BIOGAS FACILITIES

Accounting for around 8 percent of gross electricity generation, the biogas facilities in Baden-Württemberg provide a reliable contribution to our renewable energy supplies (as of 2018). Over half of this total falls to the 950 agriculture biogas facilities found in the state. With the expiration of the guaranteed EEG bonus, a major decline in biogas facilities is expected started in 2021 along with a fall in biogas production capacities in Baden-Württemberg. At the same time, land for biomass production will also become available, meaning that the relevant stakeholders must identify which areas (food, feed, fiber or fuel) offer the most effective use in the spirit of the sustainable bioeconomy. The following are some examples of initiatives that will be executed and supported:

- Developing practical strategies for maintaining and increasing economic manure fermentation as a contribution to mitigating climate change
- Developing and assessing scenarios of supplying bioenergy for various end uses (heating, mobility, electricity)
- Developing innovative use concepts for residual waste/fermentation products from biogas facilities
- Creating conversion concepts and technologies that can use diverse raw materials for decentralized small-scale production of products such as basic chemicals, fiber and manure

Measure 16 (expanding the inventory of biogas facilities):

Baden-Württemberg will develop a concept for the future-oriented, economically efficient and environmentally friendly expansion of its stock of biogas facilities following the expiration of the guaranteed EEG bonuses. The objective is to help existing biogas facilities become essential elements in bioeconomy-based value-added chains on a broad scale by promoting efforts such as the diversification of input materials and product palettes, making energy supplies more flexible and boosting energy efficiency.

7.1.7 REGULATORY AND FUNDING POLICIES FOR RURAL AREAS

Innovations in rural areas have the potential to contribute to the creation of a sustainable bio-based economy in Baden-Württemberg. Success in this area depends on numerous factors, such as common agricultural policies, energy and climate policies, tax regulations and market and price developments, just to name a few. The competitive disadvantages of bioeconomy methods and products that exist in the face of the current market conditions can, in part, be off set by intelligent regulatory and funding instruments. The first step involves analyzing how effective incentives for making investments into innovation production systems and processes can be put in place. Examples of such incentives could entail investment subsidies or remuneration for ecosystem services, CO₂ storage, resilience to effects of climate change, environmentally friendly cultivation methods on moorland, for integration into the circular economy or for increasing the sustainability of bio-based products and materials.

Measure 17 (regulatory and funding policies for rural areas):

Baden-Württemberg will specifically further develop its regulatory and funding instruments for rural areas in the context of the bioeconomy. To promote bioeconomy innovations in rural areas, idea competitions for start-ups, pioneering projects and flagship initiatives will be opened for applications and funding guidelines will be created or adjusted, if needed. The main focus of this will be innovative production systems, circular bio-based products and materials and innovation business models along the agricultural and forestry value chains as well as their implementation in rural areas.

7.2 ACTION AREA: A SUSTAINABLE BIOECONOMY IN INDUSTRIAL AND URBAN AREAS

Objective: Support the development and dissemination of dedicated biological innovations in the area of raw materials, methods, products and services to promote the sustainable development of the economies, municipalities and companies.

7.2.1 “BIO FACTORY” PILOT/DEMONSTRATION FACILITY

Biological processes and methods can be used to recover useful raw materials contained in waste and waste water. This will contribute to the creation of a true circular economy. Based on research and pilot projects conducted in close coordination with industry, Baden-Württemberg will support researchers and businesses in exploiting intelligent bio-refineries, smart fermentation processes, biocatalysis and biological metal recovery as innovative forms of raw material supplies. This will include the establishment of “Bio Factories” as real laboratories and pilot facilities.

The following technology fields will serve as the focus for urban and industrial areas:

Separation and enrichment processes in intelligent bio-refineries based on:

- industrial and municipal waste water,
- biological waste,
- waste, residual substances and byproducts from industry.

Synthesized materials and CO₂ recycling via smart fermentation and biocatalyst with:

- e.g. micro-algae, bacteria and fungi
- biologically inspired technology (e.g., the application of enzymes, artificial photosynthesis).

Measure 18 (pilot/demonstration facilities):

Baden-Württemberg will specifically promote the research and development of pilot and demonstration facilities with the objective of turning biologically inspired methods into a model for a sustainable bioeconomy in modular “Bio Factories”.

7.2.2 TECHNOLOGY DEVELOPMENT FOR EXTRACTING INORGANIC RAW MATERIALS

The principles of biological metal extraction (biomining), such as via plant hyper accumulation and bacterial processes (bioleaching, biooxidation, bioabsorption, etc.) or enzyme-based approaches, can tap into metalliferous deposits with low concentration levels (such as in mining dumps) as well as into the secondary raw material sources that are increasingly accumulating in urban and industrial areas, such as electronic scrap or slag. The State of Baden-Württemberg recognizes an important method here for future supplies of crucial high-tech raw materials, for which there are no concentrated storage facilities in Baden-Württemberg (any longer). Additionally, these approaches can be turned into an instrument for soil restoration.

Measure 19 (technologies for inorganic material extraction):

Baden-Württemberg is increasingly promoting innovative technological developments and pilot measures aimed at raw material extraction and the preservation of resources by way of biological processes (biomining). In so doing, the state is contributing to the supply of critical raw materials and the circular economy applied to valuable metals.

7.2.3 CO2 RECYCLING (WITH BIOTECHNICAL/BIO-INSPIRED TECHNOLOGY)

Biological systems use the special chemical/physical characteristics of carbon for energy and material cycles, which is mainly driven by solar energy. We human beings merely copy this as a linear process by inputting more and more fossil carbon sources and emitting CO₂ - with the well-known consequences for world's climate. Today's economic services in the form of energy generation and synthesis processes are based on the chemistry of carbon. In order to maintain this, this focus area will introduce CO₂ recycling and the circular economy.

Measure 20 (bio-CO₂ recycling):

Baden-Württemberg will establish a development hub for biotechnological/bio-inspired CO₂ recycling in cooperation with applied researchers and industry, which will contribute to achieving the 2030/2050 climate protection targets.

7.2.4 BIO-PLASTICS

Many open questions remain surrounding bio-plastics and biodegradable plastics with regard to their suitability for recycling, biodegradability and overall environmental value. Initiatives at the EU level as well as those being undertaken by the private sector have created a necessity to provide political support for the topics of biologically based plastics and to provide appropriate environmental guidance by establishing a framework.

Measure 21 (plastics for packaging):

Baden-Württemberg will address the issue of “plastics in the sustainable bioeconomy”. In order to do so, the state will broaden the dialog with the areas of research and industry. Machine building, the chemical industry and trade will be addressed in particular in order to initiate a transformation, especially in the packaging industry.

Measure 22 (developing recycling methods for bio-plastics):

Baden-Württemberg will tackle the issue of “plastics in the sustainable bioeconomy” as well as the use of bio-based alternatives by working with municipalities, public waste removal providers and private waste removal businesses to assess how to identify and implement recycling methods specifically for bio-plastics.

7.2.5 FUNDING PROGRAMS FOR INDUSTRIAL AND URBAN AREAS IN THE STATE

The transformation towards a sustainable and circular bioeconomy undertaken by companies goes hand in hand with changes in their core processes. That makes this transformation highly complex and demands a cautious approach. Analyzing existing potential and possibilities for implementation demand expanding know-how and making additional investments into the core business at the beginning. Companies should therefore have access to direct and long-term support for efforts related to the bioeconomy.

Measure 23 (funding programs for companies):

Baden-Württemberg will set up a funding program for companies with the aim of opening up space for a sustainable bioeconomy within the economy by providing financial support and consulting via “Bioeconomy Scouts”.

Baden-Württemberg will fund incentives for in-company bioeconomy investments and technological developments in areas that promote the bioeconomy, in addition to expanding funding mechanisms already in place. A contact point for technical funding consultation serving companies will also be established on the basis of existing structures.

7.2.6 COLLECTIVE INNOVATION PROCESSES THROUGH SECTORAL DIALOG

One important element in promoting a sustainable bioeconomy in companies is the exchange of ideas and experience among them. In this context, contact information for technical experts can be shared and cooperation can be promoted. Concepts cannot, however simply be copied from one company to the next as the production processes and infrastructure used by one company, even in the same industry, will never be identical to that of another. Despite that, this form of intra-industry dialog can serve as a source of inspiration. One idea here is establishing dialog forums for various sectors, such as the automobile industry, machine and facility engineering, environmental technology, the chemical and pharmaceutical industries and the textile industry.

Measure 24 (industry dialog):

By building on existing networks, Baden-Württemberg will develop concepts for how to initiate and strengthen the exchange of knowledge and experience for the area of a sustainable bioeconomy within an industry.

7.2.7 COLLECTIVE INNOVATION PROCESSES FROM CROSS-INDUSTRY INNOVATIONS

While exchanges at the company level within a given industry certainly makes sense for disseminating established approaches, disruptive innovations are better stimulated through collective innovation processes through the channel of cross-industry exchange. Such inter- and trans-disciplinary networking can promote technology exchanges in areas that would not be obvious at first glance (e.g., digitalization and newspapers \square e-paper). One important factor for such cross-industry innovations among companies also involves the integration of external research and development.

Measure 25 (cross-industry innovation):

In order to advance cross-industry exchanges to promote technology transfers, Baden-Württemberg will set up so-called Innovation Challenges.

8 Cross-cutting action areas

8.1 ACTION AREA: NETWORKING AMONG AREAS, ACTORS AND CLUSTERS

Objective: Support the development and dissemination of a sustainable circular bioeconomy by networking material flows and stakeholders in rural, industrial and urban areas

8.1.1 SUPPORTING TOPIC-SPECIFIC INITIATIVES

Topic initiatives (such as clusters and consortia) comprise the networks that allow for knowledge and experience, facilities, materials, byproducts, residues and waste to be linked and exchanged along value chains both within and among different areas.

Measure 26 (professional initiatives):
Baden-Württemberg will implement regional professional initiatives focused on networking diverse stakeholders across areas and support networking among these areas as well.

These various actors, initiatives, competitions and networks/clusters will form a cross-cutting platform that will facilitate and even enable interdisciplinary, geographic and cross-sectoral networking and information exchanges.

8.1.2 FROM A RESEARCH AND INNOVATION HUB TO LEADING REGION

Through the implementation of the state's research strategy "Setting up a bioeconomy in the system", the relevant universities and research institutions, with the support of the State Ministry for Science, Research and Arts, have been able to develop structures, generate new knowledge and create a successful concept for knowledge and technology transfers in the scope of the research program Bioeconomy Baden-Württemberg (2014-2020). This has led to the creation of promising successor projects that are being funded by domestic as well as international resources.

It is in this context that Baden-Württemberg was named as one of six European regions that ranks high on the bioeconomy maturity index in a study issued by the European Commission. The plan now is to maintain and increase the visibility and pioneering role of Baden-Württemberg as a research, innovation, education and economic hub for a sustainable bioeconomy. Apart from interdisciplinary research and education focused on the bioeconomy, knowledge and technology transfers must also be carried out in practice, such as by providing efficient support for third-party funding requests at the regional national and EU levels along with strengthening international networking. In order to satisfy the broad-based approach being taken by the state government on the topic of the bioeconomy, as many experts from the state as possible must be incorporated and the overarching strategy will be guided by the Baden-Württemberg Bioeconomy Council.

Measure 27 (bioeconomy research, innovation and education cluster):

Building on the established network structures of the Bioeconomy Baden-Württemberg research program, the state will provide support for and further develop the creation of a bioeconomy research, innovation and education cluster.

8.1.3 PLATFORM FOR ADVISING AND NETWORKING CLUSTERS AND INITIATIVES

In today’s world, networking and communication are primary done via digital channels. Various actors, issue-specific initiatives, competitions and networks/clusters will form an overarching platform that facilitates and even enables networking across disciplines, initiatives, geographic areas and sectors along with exchanges and access to information. This can also be promoted by networking in the real world. Specifically, competent service and advice must be shared, such as support for large-scale national R&D tenders, professional advice for submitting requests for bioeconomy-related and interdisciplinary third-party funding tends (e.g., FNR, BLE, BMBF, BBI-JU, EU) as well as for general funding programs and questions about legal compliance.

Measure 28 (digital portal: “Sustainable Bioeconomy BW”):

Baden-Württemberg is creating a digital platform that will link actors with existing offers and services, provide consulting information and expand this across all three areas (rural, urban and industrial) as well as beyond the current level of development. Specifically, exclusive and public forums should promote exchanges, publish tenders and competitions, provide networked advice on available funding and identify opportunities for participation within professional groups and initiatives. Additionally, this platform will allow entrepreneurs to acquire partners (e.g., via a chatroom, internal areas for professional initiatives, funding recipients, etc.).

8.1.4 THE INTERNATIONAL BIOECONOMY CONGRESS BADEN-WÜRTTEMBERG

The development of a future-oriented and sustainable bioeconomy requires regional action paired with global thinking. The international “Bioeconomy Congress Baden-Württemberg”, established in the scope of the Bioeconomy Baden-Württemberg research program of the State Ministry for Science, Research and Arts, already serves as a space for promoting international exchange and networking. Now, it must also contribute to boosting the visibility of Baden-Württemberg as a leading hub for research, innovation, education and business.

Measure 29 (international bioeconomy congress):

Baden-Württemberg will continue to organize the international “Bioeconomy Congress Baden-Württemberg” and expand the topics addressed as well the target group through panels and presentations focused on real-life practices, including those related to primary generation, industry, sustainability, environmental and climate protection and implementation for waste-removal companies and within municipalities. The aim here is to promote networking among actors, strengthened cooperation and the exchange of knowledge about the sustainable bioeconomy among researchers, businesses, policy-makers and public administrations.

8.2 ACTION AREA: EDUCATING AND TRAINING PROFESSIONALS

Objective: Take advantage of the potential for value creation and employment offered by a sustainable and circular bioeconomy for Baden-Württemberg through professionals within interdisciplinary skills that are educated and trained in this area.

Strategic approaches and measures

Knowledge about the topic of a sustainable bioeconomy will be promoted within the pre-existing circle of experts and, at the same time, awareness will be raised among professionals from other disciplines, those working for the public administration and the general public. Additionally, the issue of the sustainable bioeconomy will be addressed at those who will shape the working world in the future, meaning school pupils, trainees and university students.

8.2.1 INSTRUCTION, EDUCATION AND PROFESSIONAL TRAINING FOR PROFESSIONALS

One key factor in the development and implementation of a sustainable bioeconomy in the state are the professionals who are skilled and capable, in particular, of coming up with disruptive innovations (“game changers”) and technological developments. Imparting the necessary background knowledge and creating a keen awareness of the topic plays an important role here as well. For that reason, Baden-Württemberg will link together the topics of “experts for a sustainable bioeconomy” with “education for sustainable development (ESD)” and integrate them at the appropriate sites for scholastic, professional and university education and training.

Possible approaches include:

- Assessing the expansion of curricula at schools,
- Promoting projects at technical schools as well as for school pupils, trainees and university students,
- Introducing numerous bioeconomy modules at colleges and universities across various areas of study,

Measure 30 (education and training):

Knowledge and awareness about the sustainable bioeconomy should be disseminated and anchored by using educational structures with the aim of promoting sustainable development in the state.

8.2.2 PROFESSIONAL TRAINING FOR STATE EMPLOYEES AND COMPANIES

In order to take advantage of the potential for added value and employment offered by a sustainable circular bioeconomy, professionals and experts in the state administration, municipalities and companies must be furnished with new knowledge about biological processes and approaches as well as about the legal and funding-related frameworks.

Measure 31 (professional education for state employees):

Together with the state's educational institutions, education authorities and associations, appropriate educational options will be developed and offered to employees of the state administration and municipalities.

Measure 32 (professional education for public waste disposal authorities):

Under the sponsorship of the Competence Center for Biowaste at the LUBW, Baden-Württemberg is developing consulting services for public waste disposal authorities.

Measure 33 (professional education at companies):

Together with the state's educational institutions, education authorities and associations, appropriate educational options will be developed and offered to employees working in industry as well as in agriculture and forestry.

8.3 ACTION AREA: INFORMATION AND DIALOG ABOUT THE SUSTAINABLE BIOECONOMY

Objective: Expand information about the bioeconomy and strengthen social dialog in order to generate new ideas and initiatives for sustainably implementing and further developing the sustainable circular bioeconomy.

Strategic approaches and measures

The processes and products associated with the bioeconomy touch on all areas of life. The interests and needs of consumers therefore have to be taken into consideration when identifying innovative potential. One of the unavoidable challenges in establishing a bioeconomy therefore includes achieving broader social consensus. Especially for an economic area associated with multiple policy fields and interests, engaging in broad, knowledge-based dialog about contested issues and objectives is particularly essential.

8.3.1 DIALOG FOR IMPLEMENTING AND FURTHER DEVELOPING A SUSTAINABLE BIOECONOMY IN BADEN-WÜRTTEMBERG

Through its methods, processes and products, a circular bioeconomy can make a significant contribution to sustainable development in Baden-Württemberg and to achieving the objectives of the state's sustainability strategy. This strategy must be open for different paths and technologies and it must be continuously developed in line with local and regional conditions. Exchanges of knowledge and ideas about the opportunities and consequences for the economy and society of rural areas, ecosystems, biodiversity, climate change mitigation, land use, etc. in Baden-Württemberg must therefore be perpetuated.

Measure 34 (participatory dialog):

In the scope of implementing and further developing its strategy, Baden-Württemberg will continue engaging in participatory dialog with science, the economy and society with the aim of establishing an innovation-friendly and citizen-oriented social and economic environment conducive to the sustainable development of a circular bioeconomy.

8.3.2 INFORMATION INITIATIVES

Targeted information and communication help to identify and transparently formulate social demands for sustainably developing a bioeconomy as well as to strengthen openness for innovations arising from the bioeconomy as well as interest in bio-based products.

Measure 35 (information initiatives):

Baden-Württemberg will support the creation of appropriate informational material and concepts aimed at promoting sustainable development in the state. The purpose of this is to make the utility of a sustainable circular bioeconomy accessible to everyone and the public in general, to more closely integrate consumers and to raise awareness for the future-oriented topic of the bioeconomy among agriculture and forestry enterprises, the manufacturing sector, industry and service providers. Information will be shared via suitable print media, digital platforms, trade fairs, expert conferences, lectures and educational institutions.

8.3.3 THE BIOECONOMY TRUCK

In order to convey the urgency, the objectives and the individual as well as social utility of a sustainable circular bioeconomy for the future to the general public, it will be necessary to publicly and transparently present the associated products and processes.

Measure 36 (bioeconomy experience scape):
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Baden-Württemberg will make the sustainable bioeconomy “accessible” to the general public in the scope of the overall concept and create the “Bioeconomy Experience Spare” with information and real-life examples for this purpose.
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8.3.4 COMPETENCE CENTER FOR BIOWASTE

In order to satisfy rising demand for consultation on establishing innovative bioeconomy-based exploitation practices among researchers, municipalities and the economy, and especially public waste-disposal authorities and private waste-disposal companies, this competence center will serve as a point of contact and support for efforts to develop a sustainable bioeconomy. This center will share information via project-related individual consultations, by providing support for pioneering projects and, in the future, via new media channels.

Measure 37 (further develop the Competence Center for Biowaste):

The “Competence Center for Biowaste” is to be developed in the scope of establishing a sustainable bioeconomy.
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