Regional & Decentralized Bioeconomy Value-chains:

Insights on opportunities & trade-offs from a German perspective

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Short introduction to the IÖW

- **Since 1985 Research & Policy Consultancy for Sustainable Business based in Berlin**
- **Around 40 researchers** from economics, social sciences, engineering and natural sciences
- **Topics:**
  - Climate & Energy, Sustainable Corporate Governance, Environmental Policy & Governance, Products & Consumption, Water & Land Management, Innovation & Technologies, Evaluation
- **Many years of experience in the analysis, development and evaluation of**
  - innovations and markets (focus: renewable energies, especially photovoltaics and biomass; energy efficiency, especially buildings; bioeconomy)
  - policy instruments and climate mitigation/adaptation strategies
- **Independent, 100 % financed by third-party funds, mainly public authorities & NGOs, trade unions, foundations, companies**
- **More at: www.ioew.de/en**

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A decentralized & regional bioeconomy – an option for the future?

National Bioeconomy Strategy
(Federal Cabinet, 15th January 2020)

– The strategy's goal is "*the sustainable production and use of biological resources and […] the promotion of environment- and nature-friendly production processes in all economic sectors.*"

– **Guiding principles (i.a.)**
  – Bioeconomy as a contribution to sustainability
  – Bioeconomy as a development strategy for rural areas

Agenda:

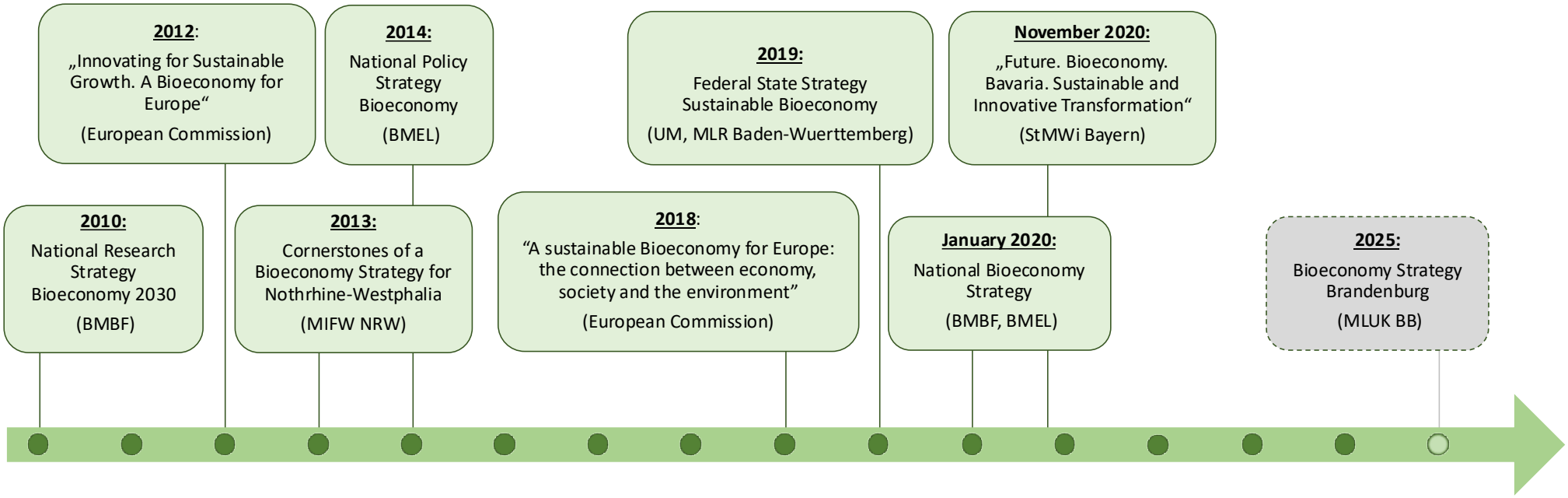
- **Background: Brief presentation of selected IÖW projects**
- **Policy focus on rural areas in the bioeconomy in Germany**
- **Definition of "Rural Bioeconomy" &**
  Understanding of decentralization / regionalization
- **Selection criteria & examples of relevant value chains**
- **Insights into dialogue formats with regional actors**
- **Conclusions**

IÖW projects related to a decentralized and regional bioeconomy – an overview

	Future potentials of a rural bioeconomy	Sustainable bioeconomy in Brandenburg	Change of perspective in bioeconomy	Focus areas of a bioeconomy strategy for the state of Brandenburg
Funder	Federal Ministry of Food & Agriculture (BMEL)	Federal State Ministry of Agriculture, Environment & Climate Protection Brandenburg (MLUK)	Federal Ministry of Education & Research (BMBF); Science Year 2020/21	Federal State Ministry of Agriculture, Environment & Climate Protection Brandenburg (MLUK)
Project duration	04/2016 – 03/2019	09/2018 – 11/2020	02/2020 – 10/2021	01/2023 – 12/2023
Objectives	**Definition of rural bioeconomy** Determination of value creation potential and ecological effects Recommendations for practitioners & policy-makers	Criteria for a sustainable bioeconomy **Presentation of 'Best-practice' examples for Brandenburg** Strengthening of discourse and networking of stakeholders	**Critical reflection of the bioeconomy from a regional perspective**	Illustration of status quo **Development of objectives, fields of action, measures**
Actors (Perspectives)	Federal, federal state, & regional level Economic actors (Processors)	State ministries Multipliers, economic actors (Producers & processors)	Organized civil society, citizens Economic actors, research (partly)	State ministries Multipliers, economic actors (producers & processors)
Formats for communication & participation	Interviews, workshops, future workshops, brochure, scientific publications	Interministerial project group, dialogue events, interviews, brochure	Regional online workshops, background materials	Interministerial working group, workshops, report

Source: Extended from Rupp et al. 2023

Intensified policy focus on rural areas in the bioeconomy in Germany over time



IÖW projects →

2016-2019:
Future Potentials of a Rural Bioeconomy

2020-2021:
Change of Perspective in Bioeconomy

2018-2020:
Sustainable Bioeconomy in Brandenburg

2023-2024:
Focus Areas of a Bioeconomy Strategy for the State of Brandenburg

Source: Extended from Rupp et al. 2023

Definition of a rural bioeconomy

Definition from the project “Future Potentials of a Rural Bioeconomy":

“Under the concept of a rural bioeconomy, the project partners understand the **further development of a bioeconomy** in which **rural areas are not merely viewed as suppliers of raw materials** for (industrial) bioeconomy concepts, but increasingly take the lead in **advancing decentralized bioeconomy approaches themselves**.
This means that, as far as possible, a **large portion of the value creation stages and steps should be realized within the region**. The goal is to ensure that rural areas also benefit from the **potential positive effects** of a growing bioeconomy regarding **value creation and employment**.”

Source: Rupp et al. 2020b

Understanding of decentralization & regionalization

Decentralization:

- **Relocation of economic structures, i.e. power** (decision-making powers, competencies, information, etc.) **& infrastructures** (relevant for processing & marketing) **at a lower level**
  → relevant for the development of value chains

Regionalization:

- In addition to economic, technical, and political aspects, it also **includes social & cultural aspects**
  → need for the involvement of various actors, implementation of dialogue formats

Source: Internal reflection at IÖW

Selection criteria for relevant value chains

Value chain structure, technology maturity & degree of innovation • Technology maturity • Innovation potential • Raw material efficiency	**Potentials & markets** • Raw material potential & land availability • Raw material supply • Competing Uses • Market potential
Decentralization & relevance for rural areas • Decentralization • Potential for regional value creation & employment	**Contribution to societal goals/environmental impacts** • Contribution to political/social goals • Environmental impacts

Source: Rupp et al. 2020b (in the project ”Future Potential of a Rural Bioeconomy")

Examples of relevant value chains, areas & sectors from Brandenburg

AGRICULTURE, FISHING & FOOD INDUSTRY	SUSTAINABLE CONSTRUCTION, FORESTRY & WOOD INDUSTRY	BIOTECHNOLOGY	RECYCLING OF RESIDUAL & WASTE MATERIALS	BIOENERGY
• Milk production based on regional nutrient cycles • Organic ranch with hemp & cattle production, country holiday • Regional Atlantic salmon • Enhancing marginal sites with agroforestry • Using organic 'waste' vegetables for cafeterias • Citizen shares for financing the agricultural transition	• Energy-efficient prefabricated wooden houses • Sustainable building with regional raw materials • Houses made from straw bales • Insulating & construction with hemp	• Orthoses made from bioplastics • Packaging from plant fibers • Microalgae as fish feed • Removing CO_2 from the atmosphere with microalgae • Sugar from harvest residues & by-products	• Protecting waterways with leaf compost • Fats & proteins from insects • Wood fiber boards from waste materials • Insulating with softwood bark	• Biomethane from straw • Forest residual wood for company energy supply • Community heating from forest residual wood • Energy self-sufficiency with biomass, wind & solar

Source: Rupp et al. 2020 (in the project "Sustainable Bioeconomy Brandenburg")

Examples of value chains – future potentials of a rural bioeconomy

Consideration of different biomass substrates

- Digestate processing into higher-quality fertilizers and fibers for wood-based materials
- Plant fibers (hemp) for insulation materials and natural fiber reinforced plastics (NFRP)
- Plant fibers (grass) for the production of paper and cardboard

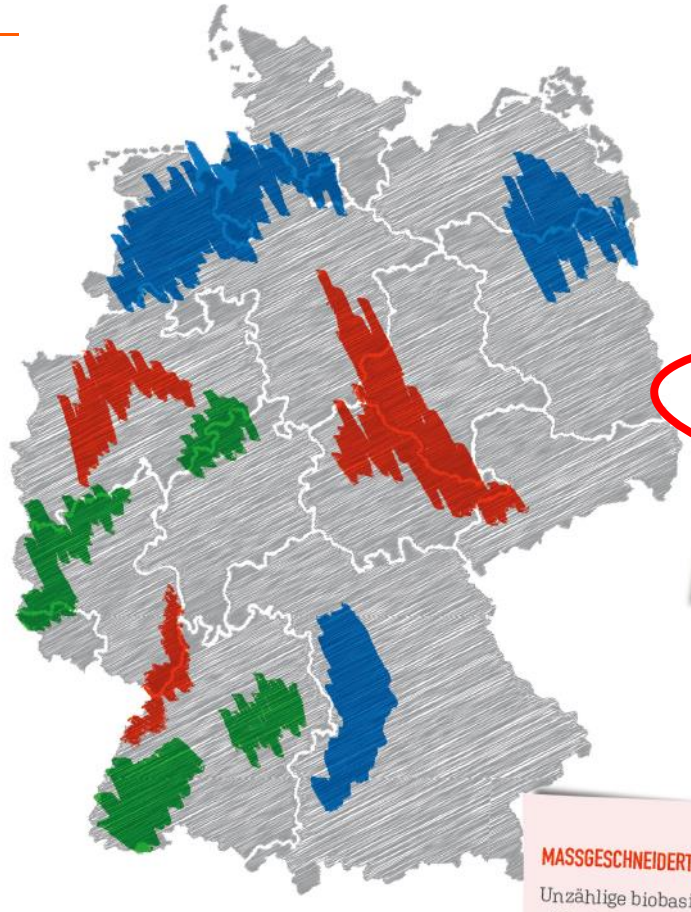
Important from a regional perspective: Reflection on supply & demand!

Source: Rupp et al. 2020b (in the project "Future Potentials of a Rural Bioeconomy")

Source: GNS mbH; Benas GmbH

Source: Pahren Agrar GmbH & Co. KG

Biomass potentials – need for more cooperation



GRÜNLAND ERHALTEN DURCH NEUE, STOFFLICHE NUTZUNGSOPTIONEN

Durch die rückläufige Haltung von Wiederkäuern in vielen Regionen stehen die Erträge aus Grünlandflächen künftig in zunehmendem Umfang für alternative Nutzungen zur Verfügung. Abgesehen von der energetischen Verwertung, etwa zur Erzeugung von Biogas für die Strom- und Wärmeversorgung, gibt es eine Vielzahl stofflicher Nutzungspfade, die sich in der Entwicklung und Erprobung befinden oder bereits im Markt angekommen sind.

Rund 270.000 Hektar Grünland mit einem durchschnittlichen Ertrag von ca. 6,8 Tonnen je Hektar (Trockenmasse) stehen bundesweit für eine stoffliche bzw. energetische Verwertung zur Verfügung.

Gerade in vielen Mittelgebirgsregionen und deren Übergangslagen, wo die Milchviehhaltung nur wenig konkurrenzfähig ist, bieten Grasraffinerien & Co. künftig neue Chancen für die ländliche Entwicklung.

NEUE PRODUKTE AUS GÄRRESTEN – RESTSTOFFE ZU WERTSTOFFEN VEREDELN

Regionen mit einem hohen Aufkommen an Wirtschaftsdüngern aus der Tierhaltung und Gärresten aus der Biogaserzeugung haben häufig mit Nährstoffüberschüssen zu kämpfen. Anlagenbetreiber können aus der Not eine Tugend machen, indem sie diese Stoffströme aufbereiten, die Transportwürdigkeit der enthaltenen Nährstoffe erhöhen und sogar noch weitere Produkte erzeugen.

In Deutschland fallen jährlich 5,4 Mio. Tonnen Gärreste an, das entspricht einem Stickstoffgehalt von rund 32.000 Tonnen. Der überwiegende Teil dieser Gärreste wird bislang noch keiner höherwertigen Aufbereitungsstufe zugeführt. Diese Potenziale können gehoben und gleichzeitig kann mancherorts die Umweltbelastung reduziert werden.

MASSGESCHNEIDERTE ROHSTOFFE AUS DEM ACKERBAU

Unzählige biobasierte Produkte werden heute schon in Deutschland hergestellt – viele davon mit importierter Biomasse. Dabei kann in puncto Nachhaltigkeit und Qualität der deutschen Landwirtschaft so schnell niemand das Wasser reichen. Zugleich ist Regionalität bei den Verbrauchern immer gefragter.

Die Landwirtschaft in den deutschen Ackerbauregionen kann unzählige Rohstoffe auf kurzem Wege bereitstellen. Warum sollte sie nicht auch an der Weiterverarbeitung und damit an der Wertschöpfung teilhaben?

Etwa 1,29 Mio. Hektar werden bundesweit als flexibel nutzbar angesehen, das sind 11 Prozent der Ackerfläche in Deutschland, die neben der Erzeugung von Nahrungs- und Futtermitteln für Bioenergie sowie die stoffliche Nutzung zur Verfügung stehen. Im besten Fall für beides gleichzeitig.

Source: Böhmer et al. 2019 (in the project “Future Potentials of a Rural Bioeconomy")

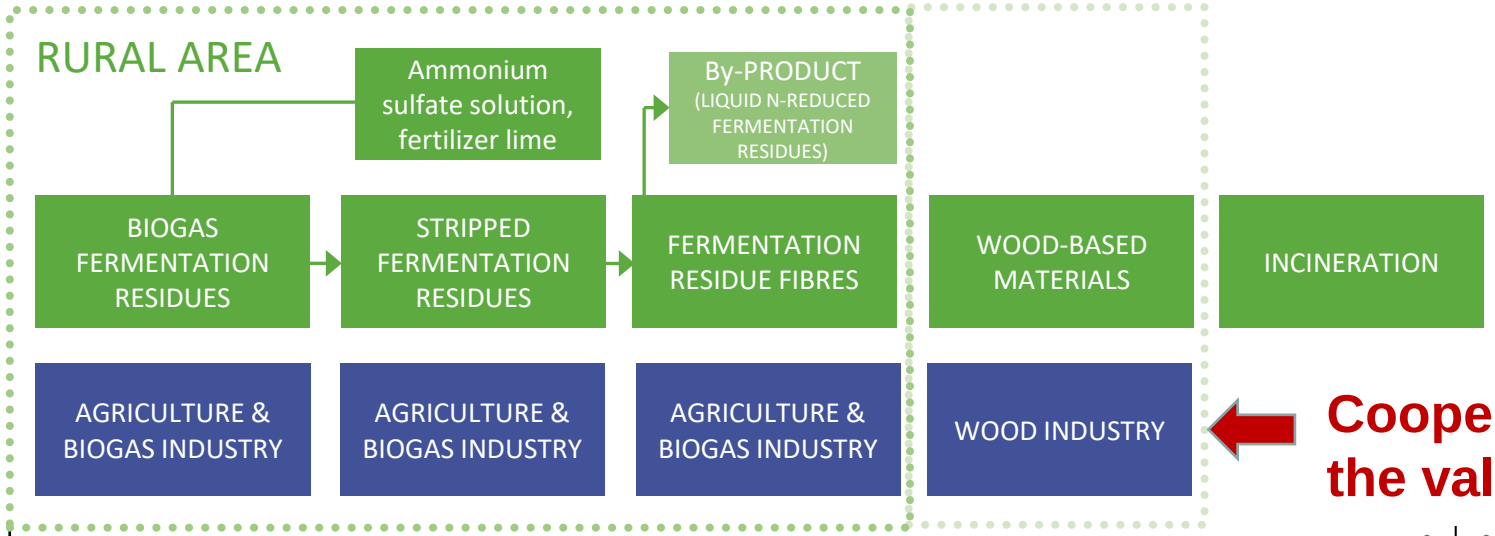
Example: Digestate processing into higher-quality fertilizers and fibers for wood-based materials

Products:

- Biogas fibers (e.g. for wood-based products)
- Ammonium sulfate solution & fertilizer lime

Results on value-added & employment effects
→ see Rupp et al. 2020b

Industries:



Source: IfaS (in the project „Future Potentials of a Rural Bioeconomy)

Cooperation along the value chain

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Insights into dialogue formats with regional actors (1/2)

Source: IÖW (in the project "Change of Perspective in Bioeconomy")

Wishes

- Havinge cultivation area **managed by local producers**
- Establishing a **circular economy**
- Strengthening **sufficiency**
- **Creating sustainable funding models** in dialogue with local actors
- **More appreciation** for agricultural products
- **More backbone** vis-à-vis international corporations

Doubts

- **Land pressure** due to increased biomass demand
- **Large corporations** benefit disproportionately
- **Ecological criteria** are neglected
- **People in rural areas** are not taken into account
- Lack of **processing industry**
- Bioeconomy is a concept that is **difficult to access**

Opportunities for action

- Establishing **regional raw material exchanges** for efficient and circular biomass distribution
- Strengthen **agroecology**
- **Enable dialogue on GMOs**
- **Promotion** of sustainable decentralised value chains
- **Forums** for knowledge transfer & networking
- **Role model function of the public sector** in sustainable procurement

Insights into dialogue formats with regional actors (2/2)

Source: Based on Rupp et al. 2023

- Environm. & nature conservation assoc.
- Agriculture
- Companies
- Administration and politics
- Civil society
- Research
- Cluster & project management
- Tourism

Feelings of concern	Curiosity	Enthusiasm
Intensification of land use at the expense of the environment		
Lack of direct marketing		Establishing **(new) sustainable farming practices**
Lack of political governance		
No regional added value	**Value creation potential** through higher-quality products, including usage of residual biomass	Rural development
Bioeconomy as a topic area vs. departmental focus		
Too much focus on economics – less on sustainability problems		Developing **new business areas** and bringing them from research to practice
	Visibility of bioeconomic activities	

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Conclusions

- **Potentials for a decentralized & regional bioeconomy are given**, the decisive factor is biomass use, structural conditions on site.
- **Need for further political attention & action by individual actors,** including interdisciplinary cooperation between political ministries & actors from business, science, and civil society
- **More focus on cooperative operation & business models,** through bundling production, processing and/or marketing, including focusing on ecosystem services
- **One major challenge, but also opportunity = societal dialogue & qualification of individual actors,** when it comes to the development of bioeconomy concepts & single value chains (focusing also on social & cultural aspects)

Thank you very much.

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31st October 2024

Literature & References

In German only, but with English abstracts!

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