

# **Update: Bioeconomy related issues in Germany**

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# Content

- Intertask collaboration
- Bioeconomy: How to measure
- New bioeconomy research strategy
- Running research projects at pilot/demo scale
  - 2G bioethanol
  - Advanced fuel
  - SWU gasification
- Bioeconomy clusters

# Intertask collaboration

## DEVELOPING THE GLOBAL BIOECONOMY

TECHNICAL, MARKET, AND ENVIRONMENTAL LESSONS FROM BIOENERGY

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ERIN SEARCY AND HEINZ STICHNOTHE

*Developing the Global Bioeconomy* brings together expertise from three IEA Bioenergy Tasks—Task 34 on Pyrolysis, Task 40 on International Trade and Markets, and Task 42 on Biorefineries—to review and draw technical, market, and environmental lessons from bioenergy to support the future deployment of a global bioeconomy. This is relevant as there is yet little understanding on how current markets will transition toward a global bioeconomy, despite the vast amount of politically driven strategies. The question is not only how the bioeconomy can be developed, but also how it can be developed sustainably in terms of economic, environmental, and social concerns. To answer this question, the authors seek to identify types of biorefineries that are expected to be implemented and the types of feedstock that may be used. They also provide a historical analysis of the developments of biopower and biofuel markets, the integration opportunities into existing supply chains, and the conditions that would need to be created and enhanced to achieve a global biomass trade system supporting a global bioeconomy. It is expected that a future bioeconomy will rely on a series of tradable biomass intermediates/commodities. Investigating the prerequisites for such a commoditization and lessons learned by other industries play a central role in this analysis.

The multidisciplinary approach of *Developing the Global Bioeconomy* is ideal for researchers, academics, and analysts across all bioeconomy sectors, as well as those interested in bioenergy systems, integrated biorefineries, and associated economics.

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DEVELOPING THE GLOBAL BIOECONOMY  
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TECHNICAL, MARKET, AND ENVIRONMENTAL LESSONS FROM BIOENERGY



# Content

## 1. Bioeconomy Strategies

J.R. Hess, P. Lamers, H. Stichnothe, M. Beermann and G. Jungmeier

- 1.1 Introduction
- 1.2 Status of Bioeconomy Strategies in IEA Bioenergy Member Countries
- 1.3 Scope, Objective, and Outline
- References

## 2. Development of Second-Generation Biorefineries

H. Stichnothe, H. Storz, D. Meier, I. de Bari and S. Thomas

- 2.1 Introduction
- 2.2 Technology and Feedstock Matrix
- 2.3 Summary
- References

## 3. Biorefineries: Industry Status and Economics

H. Stichnothe, D. Meier and I. de Bari

- 3.1 Introduction
- 3.2 Economics
- 3.3 Demonstration and Full-Scale Plants
- 3.4 Summary and Outlook
- References

## 4. Sustainability Considerations for the Future Bioeconomy

R. Diaz-Chavez, H. Stichnothe and K. Johnson

- 4.1 Introduction
- 4.2 Overview of Methodologies and Sustainability Assessment Framework
- 4.3 Lessons Learned From First-Generation Biofuels and Bioenergy Crops
- 4.4 Sustainability Assessment Challenges

- 4.5 Considerations for Future Assessments in the Bioeconomy Sector
- 4.6 Conclusions and Recommendations
- References

## 5. Biomass Supply and Trade Opportunities of Preprocessed Biomass for Power Generation

B. Batidzirai, M. Junginger, M. Klemm, F. Schipfer and D. Thrän

- 5.1 Introduction
- 5.2 International Trade and Supply Opportunities of Processed Stable Biomass Intermediates for Biopower Market
- 5.3 Local/Regional Trade and Supply Opportunities of Raw Biomass for Bioenergy Market
- 5.4 Conclusions
- References

## 6. Commodity-Scale Biomass Trade and Integration with Other Supply Chains

E. Searcy, P. Lamers, M. Deutmeyer, T. Ranta, B. Hektor, J. Heinimö, E. Tromborg and M. Wild

- 6.1 Introduction
- 6.2 Evolution of Commoditized Biomass
- 6.3 Current Commodity-Scale Biomass Trade
- 6.4 The Integration of Commoditized Biomass With Other Commodity Supply Chains
- 6.5 Future Trends, Recommendation, and Conclusion
- References

## 7. Commoditization of Biomass Markets

O. Olsson, P. Lamers, F. Schipfer and M. Wild

- 7.1 Introduction
- 7.2 Defining "Commodities"
- 7.3 Commoditization Example: The Case of the Crude Oil Market
- 7.4 Commoditization of Biomass Markets
- 7.5 Biomass Commoditization: The Way Forward
- Acknowledgment
- References

## 8. Transition Strategies: Resource Mobilization Through Merchandisable Feedstock Intermediates

P. Lamers, E. Searcy and J.R. Hess

- 8.1 Objective and Link to Previous Chapters
- 8.2 Challenges Within Large-Scale Biorefinery Feedstock Supply Chains
- 8.3 Feedstock Supply System Types: Conventional and Advanced
- 8.4 Depot Configurations and Evolvement
- 8.5 Depot Deployment
- 8.6 Market Transition
- 8.7 Conclusions

## 9. Conclusions

P. Lamers, J.R. Hess and H. Stichnothe

# Bioeconomy: How to monitor?

- Interministerial collaboration project
  - Federal Ministry of Food and Agriculture (BMEL)
  - Federal Ministry of Economy (BMWI)
  - Federal Ministry of Research and Education (BMBF)
- Three dimensions
  - Development of a monitoring concept and gathering comprehensive data at the national level for a bioeconomy (resource availability)
  - Provision of economic indicators and definition of bioeconomy specific economic indicators (beyond NACE classification)
  - Holistic assessment and modelling

# Bioeconomy reserach strategy

Responsibilities of various FM

BMBF → Research strategy

- Research strategy ends 2017
- International consultation

Flagship areas

- Bioeconomy council  
→ recommendation
- First public meeting March 2016
  - Changing role of bioeconomy  
(ressources and supply) →  
(innovation and decarbonisation)
  - Dialog with society
  - Food first !?

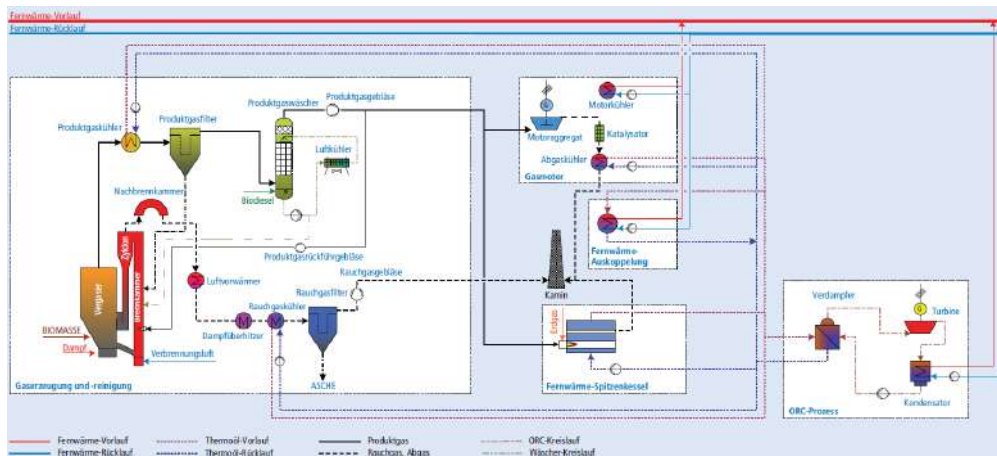


# Pilot projects

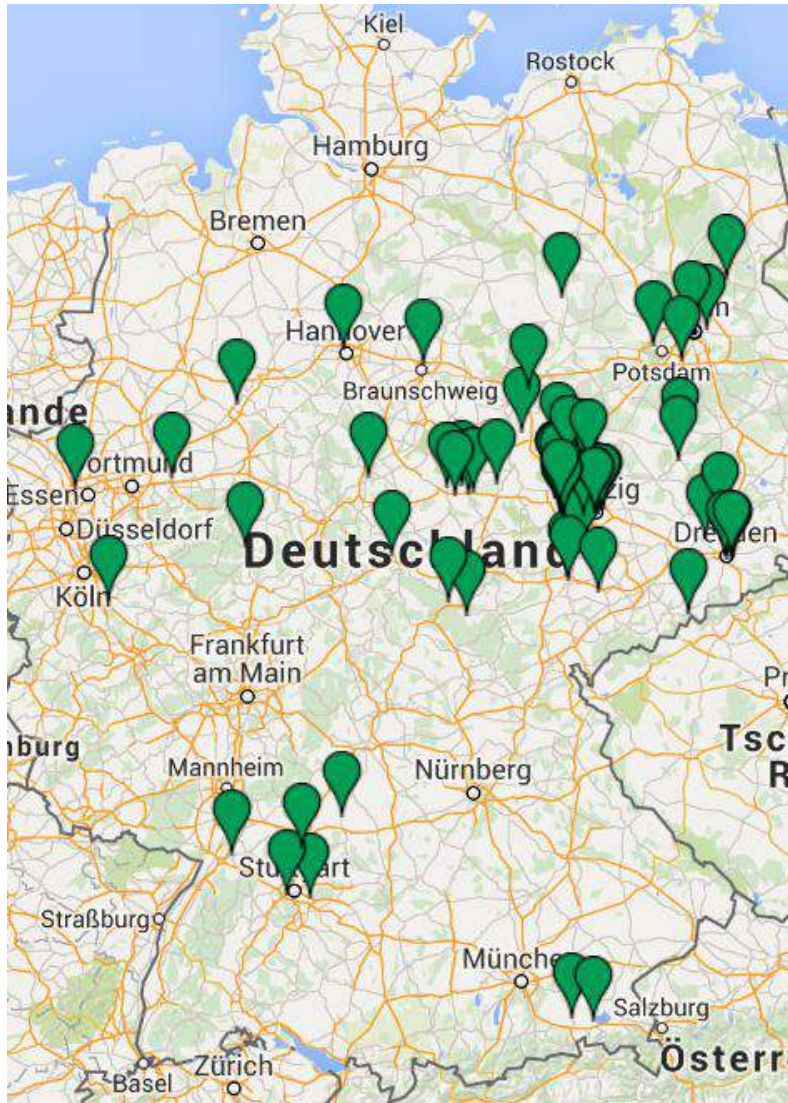
- 2G Ethanol in Straubing (Sinliquid®), duration 2014 – 2018, <http://sunliquid-project-fp7.eu/> in 2016 cooperation with Werner & Metz, Frosch® products (cleaning agents)
- Biorefinery 2021 (Phase III – until 2017), VERBIO straw to biogas and lignin, utilisation of lignin from different feedstocks, influence of early processing steps on lignine properties
- SWU in Selden-Ulm: wood gasification, throughput 40 – 45,k t/yr



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# Bioeconomy clusters



Cluster centre is former chemical production site Leuna (scale-up and process optimisation)

- French-German collaboration (Global BioEnergies and Audi) isobuten to isooktan, advanced fuel
- Various other projects mostly related to lignocellulosic feedstock

# Europe's Bioeconomy intercluster

France, Germany , the Netherlands and the United Kingdom joint forces



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