European Institute
for Energy Research
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EIfER Bioenergy Conference

Book of Abstracts

On October 8th 2021, EIfER held a half-day conference convened of scientists on bioenergy presenting research findings from projects conducted in Germany and France.

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Summary

On October 8th 2021, ElfER held a half-day conference convened of German and French scientists on bioenergy.

Bioenergy is shaped by collectively binding political, economic, environmental and societal objectives and implemented measures. Thereby engaging a multitude of actors and intuitions. In the European Union, the policy level is primarily shaped at national and European level and thus largely determines the scope for action of the local actors. Bioenergy can be linked to different scholarly communities, including under others bio economy, socio-technical innovation, agroforestry and ecology. Thus, it allows for a multidisciplinary and transdisciplinary exchange.
One important element is the local availability of biogenic resources. It is a prerequisite for the development of a sustainable energy system characterised by decentralisation and the efficient use of locally available renewable (bio)energy sources. Challenges linked to this are local strategies for the foster agrosystem and the overall biogenic resource valorisation pathways. At the same time, these pathways are prone to fragmentation in regards to actor networks.

Overall eight presentations were held presenting research findings from projects conducted in Germany and France.
The objectives of this conference were to:

- Exchange on the topic of bioenergy from different perspectives ranging from political science, agroforestry, geography, psychology and environmental science.
- Create contacts within the research community in France and Germany.

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Presenters

Dr. Stefanie Baasch is a geographer and environmental psychologist. She works as a senior researcher and scientific project coordinator at the Sustainability Research Centre, University of Bremen. In the summer semester of 2020, she was a deputy professor of Integrative Geography at the European University Flensburg. Her research focuses on socio-ecological transformation, environmental governance, political ecology, environmental justice, and participation.

Katrin Beer is a geographer and cultural anthropologist. She worked as a research assistant at the Department of Social and Cultural Anthropology and the Institute of Environmental Social Sciences and Geography in Freiburg, and the European Institute for Energy Research (EIfER) in Karlsruhe. Since 2017, she is a researcher at the Chair for Political Science and Sustainable Development at OVGU Magdeburg. In her research, she focuses on sustainable (urban) development, global change, bioeconomy, bioenergy policy, and qualitative empirical research.

Monika Heyder is a geo-ecologist (KIT). Since 2010 she works as research fellow at EIfER. In recent years, she focused on community participation to support sustainable development in cities and communities. Her focus shifted from the urban to intercommunity perspective, researching in 2021 bioenergy villages in Germany and how the policy frameworks influence their implementation and operation.

Dr.-Ing. Marie-Laure Rabot-Querci is a wood science scientist. She has been working for more than 15 years in the field of bioenergy. She started her professional career in a private company producing woodlog and pellet residential heating appliances in France, as a research engineer and then as a research and development department manager. She joined EIfER in 2014 and since then she has been working in the field of bioenergy. Currently, as a project manager, she is in charge of biomass-oriented projects in which various biomass and waste valorisation paths are analysed, as well as the resources and their sustainable management.

Dr. Antoine Tabourdeau defended a PhD in Geography at the university of Grenoble in 2014 (*Between forest and energy: arranging the transition. The fuelwood case study in Auvergne and Rhône-Alpes French regions*). He has been working as research fellow at EIfER since 2016. His work focuses notably on the analysis of energy transitions and their impacts on local territories. He uses both qualitative and quantitative methods, including Geographical Information Systems.

Dr. Ulrike Zeigermann is a political scientist. She works at the department for Political Science and Sustainable Development at the University of Magdeburg. She is also an associated researcher at the Marc Bloch Centre in Berlin, where she co-directs the "Energy Transitions and Climate Governance" research group. Her research interests include the 2030 Agenda, environmental governance, climate and energy policy, and knowledge circulation processes in sustainability politics more broadly.

Agenda

Item	Presenter
Welcome and introduction to the dialogue session - Aim - Roundtable	Monika Heyder (EIfER), all
Introduction to EIfER and EDF R&D	Thierry Dhainaut (EIfER) and Fabrice Casciani (EDF R&D)
Which forest uses for tomorrow? Policy frameworks evolution & territorial effects (*work in progress*)	Antoine Tabourdeau Lea Dieckhoff, Marie-Laure Rabot-Querci (EIfER)
Practice of Germany's (bio)energy transition	Katrin Beer (OVGU)
Pathways to valorise biomass - Technical solutions overview (*work in progress*)	Marie-Laure Rabot-Querci, Stephan Seidelt, Karol Witkowski (EIfER)
Residue-based bioenergy in decentralized energy transitions	Dr. Stefanie Baasch (artec, University Bremen)
Discussion	Monika Heyder (EIfER)
Shifting scope: Moving from bioenergy villages to heat networks (work in progress)	Monika Heyder (EIfER), Katrin Beer
Theory on knowledge networks	Dr. Ulrike Zeigermann (OVGU)
Paper short presentation: "Local or national resource? The re-routed rise of fuelwood in the French Auvergne-Rhône-Alpes region: a case study for the geography of transitions"	Antoine Tabourdeau (EIfER)
Ongoing proposal about forest ecosystem services (Sylv'Valor)	Marie-Laure Rabot-Querci (EIfER)
Discussion	Markus Peter (EIfER)
Closing	Thierry Dhainaut (EIfER)

List of Abstracts

Practice of Germany‘s (bio)energy transition

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Abstract

This presentation summarizes findings about bioenergy policy in Germany, which mainly are based on qualitative expert interviews that have been conducted in the frame of the political science research project Bio-Ökopoli. In this project, five case studies in the broader policy area of bioeconomy policy have been conducted.

Energy policy in Germany is mainly shaped by regulations on the national and European level. Hence, political decisions of the German government and the European Union determine the scope of action of local actors in the field of bioenergy to a big extent. In the German federal system, the Bundesländer make up an additional governance layer, in which political decisions relevant for bioenergy production can be made, for instance in the policy fields of agricultural policy, forest policy or environmental policy. In 2010, the German federal government started a program supporting the development of so called Bioenergiedörfer (bioenergy villages) in Germany. These villages obtain the main part of the energy they use for power and heat from biogenic sources which have been produced locally. Currently, about 170 bioenergy villages in Germany are listed in a database, most of them are located in the South of Germany.

The presentation gives an overview over central findings of the case studies on the national level and contrasts developments in the power and heat sector. Findings for the local level from a case study about bioenergy villages in Germany are summarized and relevant factors that support or inhibit the introduction and operation of bioenergy villages are discussed.

Lehrstuhl für **Politikwissenschaft** Schwerpunkt **Nachhaltige Entwicklung**

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Bio-Ökopoli

Transnational knowledge networks in bioenergy transitions

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Abstract

With increasing pressure to implement ambitious bioenergy transition goals, municipalities are joining forces for climate action through transnational knowledge networks. Transnational knowledge networks are institutionalized platforms, like C40, ICLEI, Energy Cities or the Global Covenant of Mayors for Climate and Energy, aiming to foster the integration of (scientific) expertise for political decision-making and to inform transformations towards sustainability. They produce and diffuse knowledge, and internationally represent municipalities in energy and climate negotiations, and support cooperation for horizontal municipality-to-municipality learning.

Over the last years, the number of these networks has not only rapidly increased but they also seem to have taken an ever-growing role in structuring climate and energy governance. Yet, they have received surprisingly little academic attention. We know little about how and under what conditions they influence climate politics to increase bioenergy, including the use and non-use of knowledge.

My current research addresses this gap, studying their strategies and knowledge integration processes and arguing that these transnational knowledge networks can be understood as important new policy venues.

Publications

Zeigermann, U. (2021). Knowledge Integration for the Sustainable Development Goals. The role of science-based actor networks. in: Global Environmental Change. Vol. 69, 102314.

Zeigermann, U. (2021). Scientific Knowledge Integration and the Implementation of the SDGs: Comparing Strategies of Sustainability Networks. in: Politics and Governance, vol. 9(1), 3630.

Lehrstuhl für **Politikwissenschaft**
Schwerpunkt **Nachhaltige Entwicklung**

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Residue-based bioenergy in decentralized energy transitions

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Abstract

Bioenergy plays a significant role in the expansion of sustainable energy transitions based on renewable energies, and thus in achieving climate targets through decarbonization of global production and consumption patterns. The presentation deals with the question of whether and which bioenergy potentials exist and the barriers and preconditions relevant for utilization from a regional perspective based on stakeholder interviews in North Hesse, Germany. The project KlimaInnoGovernance is transdisciplinary and is characterized by an intensive cooperation of scientific (geography, political sciences, environmental psychology) and implementation partners (municipalities, counties, energy agency).

For an estimation of the local residual material potentials, no methodically uniform data basis is available, therefore own data calculations on biomass residual material potentials were necessary. For this purpose, a calculation tool from BOKU Vienna was used and regionally available data were integrated. The results were discussed in an iterative participation process with regional stakeholders (agriculture, forestry, waste management, municipalities, districts).

The central result of this analysis is that there are considerable differences between theoretically calculable and actually usable potentials. The analysis of barriers to use shows that there are significant fragmentation obstacles to the efficient use of biomass residues for energy at the material, process and structural levels.

The material fragmentations are characterized by a high degree of decentralization of residual material resources, different qualities (and thus different processing options) and, in some cases, seasonal availability. At the structural level, there are partly contradictory and regionally different legal and funding frameworks. With regard to the analysis of recovery paths, a strong fragmentation and diversity of actors becomes apparent, which are often based on grown structures of waste disposal paths.

In summary, it can be stated that biomass residue utilization for energy purposes has hardly been in the focus of regional actors so far. Instead, such materials are often still regarded as waste, for which suitable disposal routes are needed. This is also due to the legal framework conditions. Therefore, a more efficient use

of biomass for energy purposes requires both a change in the framework conditions and a re-evaluation of existing utilization and recycling paths.

Publication

Baasch, S. (2021). Energy transition with biomass residues and waste: regional-scale potential and conflicts. A case study from North Hesse, Germany, Journal of Environmental Policy & Planning, 23:2, 243-255, DOI: 10.1080/1523908X.2021.1888701 https://www.tandfonline.com/doi/full/10.1080/1523908X.2021.1888701

Pathways to valorize biomass - Technical solutions overview

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Abstract

With a global share of 75%, bioenergy is today by far the largest global renewable energy source. Its role in a low-carbon energy future has been emphasized in IEA's 2DS as well as in IRENAs REMap scenario on a global scale. Bioenergy contribution increases 4-fold by 2060 in the IEA scenario. In particular, its importance for aviation, shipping and other long-haul transport is highlighted. Biofuels for transport rise 10-fold by 2060, providing around 30% of the transport sector's total energy needs. In IRENAs REMap scenario, biofuels still provide 22% of total global energy needs for transport.

For Europe, the increase of bioenergy is less pronounced. Its future contribution is estimated to grow from todays 1.300 TWh up to 1.750 TWh in 2030, which still corresponds to around 50% of Renewable Energy Sources (RES). The required of amount of biomass can therefore be provided without imports and in good agreement with EUs sustainability criteria according the REDII. The overall biomass potential from forestry, agriculture and biowastes within the EU was assessed between 2.000 - 8.500 TWh, with agricultural biomass and residues mainly unused. So, a further growth seems to be at least within the realms of possibility. Today, biomass is mainly used to directly substitute fossil fuels; however, more and more fluctuating renewables like PV, wind or solar thermal heat will be produced with decreasing Levelized Costs of Energy (LOE). Biomass comes from solar energy storage and is then inherently dispatchable, but it stays as a limited and expensive RES, except from wastes. In the future its assumed role is that of a flexible energy source, complementing the less expensive volatile renewables if required, especially when other RES cannot fill the gap.

Manifold technologies exist to convert biomass into useful energy or secondary energy carrier, which are usually grouped into four conversion pathways dedicated to the main conversion process:

- Direct combustion for heat, power or cogeneration,
- Physical-chemical conversion: vegetable oils, biodiesel, pellets,
- Biochemical conversion: biogas/biomethane, bioethanol,
- Thermochemical conversion: Heat, Syngas, SNG/Biomethane, FT-fuels, biomethanol, pyrolysis oil, advanced solid fuels.

The study focuses on the possible conversion technologies and pathways of biomass into useful energy. The different technologies are discussed based on technical criteria regarding their future and prospective role in a decarbonized energy system.

Which forest uses for tomorrow? Policy frameworks evolution & territorial effects

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Abstract

The presentation focuses on the transition processes affecting the French forest and its exploitation. Since the 19th century and the replacement of wood by coal, oil, and nuclear as main energy sources, timber has arisen as the first and main economic valuation. However, energy valuation is now coming back for climate reasons but not always successfully. Indeed, the threats on biodiversity lead at the same time to concerns for ecosystem services and it appears that energy uses are the most affected by environmental policies (Lenglet and Caurla, 2020). These news concerns lead to the involvement of new stakeholders and the development of new policy frameworks. Thus, the goal of this study is to identify old and new forest uses, their possible combination, their effects on the stakeholders implied, and emerging sociotechnical trends.

The methodology combined literature reviews on the different forest potentials (for energy production, carbon storage, ecosystem services in general) with an analysis of the policy frameworks as well as of the stakeholders. Eventually, the goal is to identify the main sociotechnical drivers which may affect the forest transition trajectories.

Five main policy frameworks have been identified: forest policy, energy & climate, environment, territorial/rural development, and bioeconomy. The forest framework is the oldest and most stable. The energy & climate framework is very “dense” and its focus evolved over the last 15 years from the production of bioenergy to concern on carbon storage and sustainability. The territorial development framework does not especially put the emphasis on the forest but the new competences granted to French local authorities over the last 10 years means that both climate-environment concerns & economic issues are at the forefront of those local authorities' concerns. Finally, bioeconomy is a new EU strategy with a very strong R&D impulse but whose actual effects remain to be seen.

A review of the stakeholders publishing their prospective vision on the forest has also been conducted in 2020: it highlights that many NGOs or business institutions or organizations try to affect how future public policies are shaped. However, other influential stakeholders such as research institutes are “silent” or

communicate through other less visible media, such as direct exchanges with public authorities.

The last aspect of the presented work is the territorial value chain analysis, aimed at showing the different processes (economic and non-economic) by which the forest is valuated. It is based on an in-house method developed over the last years and applied to both private & public-funded projects. Its objective is to identify and quantify the various impacts and benefits from infrastructure, resources, projects, etc.

It highlights all the connections between the stakeholders and the resources and the multiple stakeholders' roles (consumer, owner, manager, planner, etc.). It also stresses the different types of valuations, such as timber, energy, leisure activities, landscape, biodiversity, protection again natural risks & climate change, etc. Thus, it allows determining the vatious types of interactions and units necessary to quantify (euros but also jobs, CO_2, biodiversity, MWh, cubic meters, etc.) and, if possible, spatialize them. This analytic tool aims to represent the multiple tension on the forest resources between the valuations (timber, energy, climate, risk, leisure activities, etc.) and how those processes imply several types of stakeholders.

Shifting scope: Moving from bioenergy villages to heat networks

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Abstract

Citizen initiatives as a bottom-up approach are a booster to the energy transition in different EU member states. They shape the EU energy transition since the 1960's. In the last years, their efforts are being more and more recognized by the EU and the national regulators. These citizen initiatives are widely known as community energy and mainly described by a concern for the community.

In this presentation, we will investigate energy communities using the example of bioenergy villages in Germany. Bioenergy villages are found in a rural context and can be described in broader terms as local bioenergy projects using multi-energy systems to democratize energy for the community. They have been developing since the early 2000er years. What is the future within a changing subsidy scheme in Germany?

Our research focused on the federal state of Baden-Württemberg. Around 1/3 of the 214 registered bioenergy villages in the database of the national "Fachagentur Nachwachsende Rohstoffe" (FNR) are located in Baden-Württemberg. The here presented results used findings from 5 qualitative interviews and one written responds with different stakeholders supporting and promoting bioenergy villages. The interviewed stakeholders comprised representatives from 1) a SME specialised in project development, 2) an association of cooperatives in Baden-Württemberg, 3) the "Klima und Energie Agentur" (KEA) Baden-Württemberg, 4) a research project coordinator, 5) the environmental department of the county of Lörrach (dt. Landkreis Lörrach). The written response was issued by the environmental ministry of Baden-Württemberg.

We found that in Baden-Württemberg, contrary to other federal states, SMEs play an important role to promote and operate bioenergy villages. Furthermore, we see a shift from bioenergy villages as a brand to efficient local heating networks as the core-element of a heat energy transition. The latter is being highlighted in the federal state's climate mitigation act. This indicates as well a shift on the national level. Further research will focus on quantitative data analysis from publicly available data bases.

Local or national resource? The rerouted rise of fuelwood in the French Auvergne-Rhône-Alpes region: a case study for the geography of transitions

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Abstract

Sustainability transition studies have been a dominant approach in academic literature in the last twenty years or so. However, several key shortcomings have been pointed out, among them a lack of spatial sensitivity. Therefore, this article uses the proximity approach, as developed by the French school, in the field of economic geography, to shed light on this spatial dimension. The article suggests a typology of the use of spatial processes in French-speaking literature over the last ten years.

Then, it combines two approaches: the 'geography of transitions' and proximity, to investigate the case of the tensions which arose in the French region Auvergne-Rhône-Alpes at the end of the 2000s regarding feed-in tariffs for biomass-based combined heat and power, and the subsequent creation of observatories producing spatial information at several levels (regional or below). Those observatories may be analyzed as a move to increase the proximity with the resource, i.e. to grasp its materiality and the weight of configurations, as well as multiscalar power struggles.

In conclusion, the paper proposes some inputs on the geography of transitions.

Publication

Tabourdeau, A. (2021). Ressource locale ou nationale ? L'essor détourné du bois-énergie en Auvergne-Rhône-Alpes, un cas pour la géographie des transitions. Nat. Sci. Soc., 29(1), 46-56.