



# ANNUAL REPORT 2020



## DIRECTIONS

**By train:** to Leipzig main station. Take tram line 3/3 E (towards Taucha/Sommerfeld) as far as the Bautzner Strasse stop. Cross the street, leave the car park on the right and use the main entrance of the DBFZ (House 1, Torgauer Str. 116). Please check in at the front office.

**By car:** on the A14 motorway. Exit at Leipzig Nord-Ost; follow signs for Taucha; then follow signs for Leipzig; then follow signs for Zentrum, Innenstadt. Turn off left after the "bft" filling station (see "By train" for further directions).

**By tram:** line 3/3 E towards Taucha/Sommerfeld; Bautzner Strasse stop (see "By train" for further directions).

# ANNUAL REPORT 2020

# TABLE OF CONTENTS

1 Preface by the management .....	4
2 The DBFZ in brief .....	6
3 Bioeconomy between energy and a circular economy .....	10
4 Policy advice: report from Berlin .....	18
5 Key scientific figures .....	22
6 The research focus areas .....	26
6.1 Systemic Contribution of Biomass .....	28
6.2 Anaerobic Processes .....	37
6.3 Biobased Products and Fuels .....	46
6.4 Smartbiomassheat .....	54
6.5 Catalytic Emission Control .....	64
7 Press and public relations .....	74

8 International activities .....	82
9 Young scientists .....	88
10 Knowledge and technology transfer .....	98
10.1 Cooperation and networks .....	101
10.2 Range of services .....	107
10.3 Research infrastructure .....	111
11 Organisation .....	114
11.1 Research departments .....	115
11.2 Supervisory Board and Research Advisory Council .....	116
11.3 Financial resources .....	120
11.4 Personnel/work & family .....	121
12 Boards, advisory councils and committees .....	124
13 Appendix: projects and publications .....	136



# 1

## PREFACE BY THE MANAGEMENT



### Dear Readers,

The year 2020 was challenging for the DBFZ too as a result of the Corona pandemic. In particular, we had to overcome a number of hurdles with regard to business trips, in-person events and applied research in our technical facilities and test beds. Despite the challenging conditions, however, we were once again able to secure major research projects in Germany and abroad. These included projects in Ghana and Ethiopia as well as the “LabTogo” project, funded by the German Federal Ministry of Education and Research (BMBF) (more on this starting on page 37). In Germany, we successfully continued our work on the Pilot-SBG project, our largest project to date which will receive more than ten million euros in funding.

In addition to specific project work, the focus in 2020 was also on the strategic development and scientific orientation of our research work. Together with the Research Advisory Council and the Supervisory Board, the DBFZ's R&D&I concept for the years 2021–2026 was launched in the fall of 2020. This can be downloaded free of charge from the DBFZ website. We now feel we are well-equipped for the next few years to continue to advance the important research topics of energy and integrated material utilisation of biomass, both in the context of the “energy transition” and the bioeconomy.

The Science Year 2020/21 – Bioeconomy has also kept us busy in many ways. In addition to working on various research projects and on an annual conference on the topic of “Bioenergy between the climate package and a bioeconomy strategy”, we are particularly pleased that, as a long-standing member of the Bioeconomy Council of the German Federal Government, Prof. Dr. Daniela Thrän has been elected to co-chair it for the next three years. See page 12 for more information. You will find these and other exciting topics in this Annual Report. We would like to sincerely thank all our partners (Supervisory Board, Research Advisory Council, project sponsors and project partners) for their tireless input, many valuable suggestions, and intensive project collaboration. We very much hope to continue this with you in 2021.

A handwritten signature in blue ink, appearing to read 'M. Nelles'.

**Prof. Dr. mont. Michael Nelles**  
Scientific Managing Director

A handwritten signature in blue ink, appearing to read 'Daniel Mayer'.

**Daniel Mayer**  
Administrative Managing Director

# 2

## THE DBFZ IN BRIEF

The DBFZ was founded on 28 February 2008 as a non-profit limited liability company in Berlin against the backdrop of the complex issues relating to the provision and use of bioenergy. The sole shareholder is the Federal Republic of Germany, represented by the Federal Ministry of Food and Agriculture (BMEL).



**Fig. 1** The new DBFZ building (office and seminar building with adjoining technical centre) opened in 2020

## OBJECT OF RESEARCH

In order to permanently establish biomass in the existing energy system, the DBFZ is developing a variety of concepts for using it in an economically viable, ecologically harmless and socially acceptable way to produce energy and as an integrated material. The aim of the research work is to analyse early on the potential areas of conflict between the various objectives that are being pursued through the expansion of bioenergy and to develop forward-looking approaches. Questions to be dealt with in this context include the integration of bioenergy in a changing energy system, the improvement of energy efficiency, the avoidance of competing uses, and the prevention of emissions into the soil, water and especially the air. The work of the DBFZ is intended to expand our understanding of the possibilities and limits of using biomass for energy and to secure Germany's leading position in this sector as an industrial location.

## THE SMART BIOENERGY APPROACH

Future biomass utilisation must unite numerous objectives. These include food security, supply security in the energy mix, as well as innovative products and markets within the bioeconomy, climate and environmental protection, and the development of rural areas. Commodity strategies should accordingly follow the "food first" prioritisation and focus on sustainable innovative utilisation pathways in key technologies. In addition, innovation is needed at the societal level that enables technical progress but also cleverly intertwines the relevant sectors in the system. The "Smart Bioenergy approach", developed by the DBFZ, incorporates these ideas. Smart bioenergy thus encompasses the development of modern biomass utilisation systems into integrated systems that optimally function with various renewable energy sources on the one hand, and with combined material-energetic use within the bioeconomy on the other.

[www.smart-bioenergy.com](http://www.smart-bioenergy.com)

## FACTS AND FIGURES

**DBFZ founded:** 28 February 2008

**Start of research operations:** June 2008

**Predecessor institution:** Institute for Energy and Environment (IE)

**Company headquarters:** Leipzig

**Legal form:** Non-profit limited liability company

**General management:** Prof. Dr. mont. Michael Nelles (scientific), Daniel Mayer (admin.)

**Number of staff:** 256 employees (31/12/2020)

**Projects worked on in 2020:** 119 (31/12/2020)

**Owner:** Federal Republic of Germany

**Sole shareholder:** Federal Ministry of Food and Agriculture



Fig. 2 R&D&I concept of the DBFZ

The research and development goals of the DBFZ are transparent and comprehensible summarized and are available as a download.



# 3

## BIOECONOMY BETWEEN ENERGY AND A CIRCULAR ECONOMY

In the interest of sustainable development, Germany's energy supply must be completely converted to renewable energies (RE) in the coming decades and the supply of organic raw materials to industry must be changed from petro-based to biobased materials. The ambitious goal of long-term integration of biomass into a sustainable energy and bioeconomy system can, however, only be achieved if it is used efficiently, in an environmentally sound way, and with the highest possible economic benefit. In order to achieve climate neutrality by 2050, systematic energy savings are required in addition to negative emissions.

The material and energetic coupling and cascade use of biogenic resources is the central pillar of a climate-neutral and sustainable bioeconomy. For this, carbon and nutrient cycles must be closed and bioenergy must be provided from sustainable raw materials and residual material streams. In 2020, this was also increasingly recognised by the key national and international stakeholders in the field of the "circular economy" and taken up as an important field of action. Current examples of this are the position paper "Biogenic Residues" of the German Society for Waste Management (DGAW), the 2021 annual meeting of the German RETech Partnership (RETech), and the activities of the International Solid Waste Association (ISWA). In Germany, the transformation process toward a sustainable, circular biobased economy and society is being accompanied on a scientific basis by the Bioeconomy Council of the Federal Government, among other institutions. The current co-chair of the Bioeconomy Council is the deputy scientific managing director of the DBFZ, Prof. Dr. Daniela Thrän.

### For further information visit:

[www.dgaw.de](http://www.dgaw.de)

[www.retech-germany.net](http://www.retech-germany.net)

[www.iswa.org](http://www.iswa.org)



Deutsche Gesellschaft für Abfallwirtschaft e.V.



German RETech Partnership  
Recycling & Waste Management  
Made in Germany



International Solid Waste Association

## “THE BIOECONOMY MUST BECOME A HOLISTIC GUIDING PRINCIPLE.”

**Prof. Dr. Thrän:** The Science Year 2020/21 is dedicated to the bioeconomy. In your view, what major impulses could the Science Year provide?

**Daniela Thrän:** First of all, I would like to highlight why we are talking about the bioeconomy at all. The world’s population is growing rapidly and at the same time fossil resources are dwindling. Against this backdrop, it is essential that we transform our way of life and our entire economic system to one that is sustainable. This requires technical and social innovations and a rapid transformation of the raw material base. This is happening at different levels: in cities, such as the BIO CITY Leipzig, in former coal-mining regions, as well as in the regions and states that are turning towards specific bioeconomy fields. At the same time, however, it is also clear that a sustainable bioeconomy must keep the United Nations’ Sustainable Development Goals (SDGs) in mind and, in particular, must pay greater attention to a healthy balance of nature. The Science Year has both in sight: What has already been achieved and the challenges that we will face in the future. Numerous lectures have gone a long way towards making an important contribution so far. Since unfortunately many bioeconomy events could not take place due to Corona, the year 2021 will also be dedicated to this topic, something which I very much welcome, of course.

**What stage are these aspects currently at?**

**Daniela Thrän:** The topic is very complex. We can see from a large number of movements, such as Fridays for Future, that society has shifted in recent years. Young people in particular are a major driver behind protecting the environment. In terms of the bioeconomy, we see that the market for biobased products has recently undergone rapid development. Here many new products, services and

Eine Initiative des Bundesministeriums  
für Bildung und Forschung

Wissenschaftsjahr 2020|21

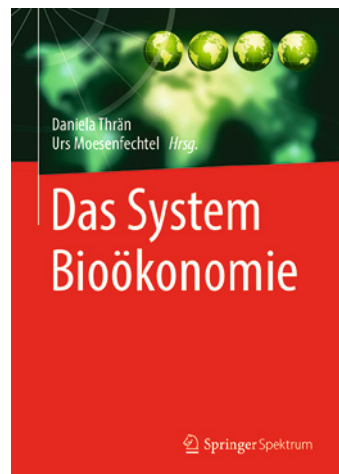
BIOÖKONOMIE

jobs have been created. Well-established industrial companies are increasingly incorporating biobased production steps into their existing structures. As already indicated, however, the bioeconomy should not be regarded as being a purely economic sector, but rather as a holistic model that links economic sectors and embeds them in a sustainable economic approach. “The German bioeconomy system” is what we called it in our handbook published just in time for the Science Year. Against this backdrop, we at the DBFZ are examining and researching various facets of the bioeconomy system that will allow us to make an important contribution to the necessary transformation of the raw material base.

**How can the bioeconomy and circular economy contribute to climate neutrality?**

**Daniela Thrän:** Climate protection is, of course, an essential aspect of the so-called “green economy”, i.e. a biobased economy. Topics such as sustainability and ecological awareness and action must become the cornerstones of our way of thinking about the economy. If we are really serious about achieving climate neutrality by 2050, we need a sustainable bioeconomy. This requires constant energy conservation, a complete conversion to renewable energy, and CO<sub>2</sub> removal. The coupled and cascade use of biogenic resources is key to a climate-neutral bioeconomy. This means carbon and nutrient cycles must be closed. Bioenergy must also be supplied from sustainable raw materials and residue streams. It must be used in conjunction with other renewable energy sources where the greatest system benefit is achieved in an increasingly digitalised society.





**Fig. 3** The German bioeconomy system (Springer, 2021)

plant for the chemical industry. Hydrothermal processes produce, among other things, process water that can also be used in industry. There are a large number of other very specific examples of residual and waste materials in the bioeconomy; the spectrum is broad and is constantly being expanded. Finally, we at the DBFZ also provide a comprehensive database of residual materials for Germany, which supports companies and politicians in activities that use residual and waste materials.

#### How will smart bioenergy contribute to the energy system of the future?

**Daniela Thrän:** Our overarching research goal is to achieve “sustainable integration of the material and energetic use of renewable raw materials as well as biogenic residual and waste materials within the bioeconomy as a way of contributing towards the implementation of the UN’s Sustainable Development Goals”. An important question here is how a climate-neutral energy supply can best be supported by flexible bioenergy – in providing electricity, heat and fuel, in sector

#### How do residual and waste materials specifically contribute to the bioeconomy?

**Daniela Thrän:** Residual and waste materials already play a very important role in the bioeconomy. The DBFZ is pursuing a variety of different research approaches to the bioeconomy as part of its research work. To give a few concrete examples: In the research focus area “Catalytic Emission Control”, so-called “biogenic silica” is obtained from ash through special combustion processes. This can be used as a functional additive, for example in car tyres, paints and coatings, or – depending on its degree of purity – also as a catalyst carrier or desiccant. In a modified and augmented biogas process, lubricants and surfactants can be extracted from the biogas

coupling, and in removing CO<sub>2</sub> from the atmosphere. This can vary greatly depending on the raw material base, energy system and infrastructure. What seems clear today is that bioenergy will be in demand wherever residual and waste materials are produced, where solar and wind are not available, where carbon-based energy sources are needed, and where carbon cycles require support.

**At the end of 2020, you were reappointed to the Bioeconomy Council and, alongside Prof. Lewandowski from the University of Hohenheim, you have also been appointed to the Executive Board. What will the Bioeconomy Council focus on in the future?**

**Daniela Thrän:** In January 2020, the German government created a good framework through its new bioeconomy strategy and defined a clear pathway forward through a comprehensive anchoring of the SDGs. “The shift towards a bioeconomy opens up tremendous opportunities!” the paper states, while at the same time the second guideline targets the economy’s raw material base, which is to be made sustainable and circular through biogenic resources. I would like to express-



© BMBF/Hans-Joachim Rickel

**Fig. 4** Federal Minister Anja Karliczek (BMBF) welcomes the members of the federal government’s newly elected Bioeconomy Council

ly emphasise both of these points. The Bioeconomy Council is an advisory body consisting of a number of experts from various fields. Here, of course, everyone contributes their experience and knowledge from their respective field. The overarching goal is to advise the German government on the implementation of the bioeconomy strategy, to create optimal economic and political framework conditions for a biobased economy, and to make the bioeconomy more widely known, as stated in the statutes. This is what we want to work on together.

Thank you for the interview.

#### In profile:



**Prof. Dr. Daniela Thrän** is the deputy scientific managing director of the DBFZ and head of the research focus area “Systemic contribution of biomass”. She also heads the Bioenergy Department (BEN) at the Helmholtz Centre for Environmental Research (UFZ) and holds the Chair of Bioenergy Systems at the University of Leipzig. Her book “The German bioeconomy system” was published by Springerverlag as part of the Science Year 2020/21 – Bioeconomy. It offers a concise overall view of the status quo of the bioeconomy and its future developments. Further information can be found at: [www.springer.com/de/book/9783662607299](http://www.springer.com/de/book/9783662607299).

#### Further information:

[www.wissenschaftsjahr.de](http://www.wissenschaftsjahr.de)



# 4

## POLICY ADVICE: REPORT FROM BERLIN



Research into the sustainable use of biomass as a raw material and in energy production comprises a multitude of different topics and levels of investigation. These must be regularly brought together and developed to support decision-makers in politics and industry in a targeted way. In this context, the DBFZ offers a variety of consulting services for political decision-makers in ministries, political parties, and associations in the areas of bioenergy and the bioeconomy. These services take the form of opinion statements and recommendations for current legislative projects, amendments and adjustments to laws, as well as strategy processes, responses to ministerial inquiries or parliamentary requests, or within the context of lectures and expert discussions. In addition to expanding the focus beyond the national level to the European level, the entire legislative process can be supported early on. Therefore, proactive participation in public hearings plays an increasingly important role, which is supplemented by responding to specific inquiries. In addition, expertise is made available to a specialist audience in the form of position and background papers. Research findings form the bases of this alongside a continuous observation of the development of bioenergy markets and their policy framework, the monitoring of projects on electricity generated from biomass and biofuel use, and energy system scenarios for the medium and long-term use of biomass in the energy sectors.

### HIGHLIGHTS OF THE POLICY ADVICE IN 2020

Focal points in 2020 were the national implementation of RED II, the amendment of the Renewable Energy Sources Act (EEG), the National Hydrogen Strategy, and Federal Funding for Efficient Buildings (BEG). In this context, the DBFZ accompanied the departmental negotiations of the federal ministries and provided, among other things, impact assessments on planned and implemented amendments to laws and ordinances (including EEG 2021, Biokraft-NachV, BImSchG/38<sup>th</sup> BImSchV, BioSt-NachV, BEG, National Hydrogen Strategy, BEHG). In addition, position statements and background information were published on the fundamental role of bioenergy for climate and energy policy, how the GHG quota works for the biofuels market, and the design of the EU taxonomy for sustainable investments. The BE20plus project, in which the prospects of continuing to oper-

ate biomass plants after the expiry of the EEG feed-in tariff were analysed, also provided important impetus for policymakers, plant operators and the public. The approaches developed from this as well as other research projects were incorporated into the development of instruments for reducing GHG emissions in agriculture, which are embedded in the German government’s package of measures for the Climate Protection Plan 2030. Ongoing since January 2017, part of this knowledge transfer to politics takes place in the form of a direct secondment of DBFZ employees to the German Federal Ministry of Food and Agriculture (BMEL). The aim is to support Department 524 “Bioenergy and Energy Affairs”.



Fig. 5 Federal Ministry of Food and Agriculture

Tab. 1 A selection of position papers in 2020

Topic	Addressee
Recommendations on the amendment of the EEG	BMEL, BMWi
Statement on the amendment of the GHG quota	BMWi
Statement on the National Hydrogen Strategy	Project Management Jülich
Position paper on bioenergy for a consistent climate and energy policy (FVEE paper)	Specialist audience

### OUR SERVICES AT A GLANCE

- Scientific monitoring of legislative and administrative procedures
- Support in the development of political strategies in the field of bioenergy/bioeconomy
- Monitoring and regulatory impact assessment
- Analysis of the policy framework of the bioeconomy with respect to climate, energy, the environment and research

**For further information visit:**

[www.dbfz.de/en/services/policy-recommendations-and-advice](http://www.dbfz.de/en/services/policy-recommendations-and-advice)  
[www.dbfz.de/en/press-media-library/more-publishments/statements-studies](http://www.dbfz.de/en/press-media-library/more-publishments/statements-studies)

**Contact**

<b>Uta Schmieder</b> Phone: +49 (0)341 2434-556 E-Mail: <a href="mailto:uta.schmieder@dbfz.de">uta.schmieder@dbfz.de</a>	<b>Dr. Harry Schindler</b> Phone: +49 (0)341 2434-557 E-Mail: <a href="mailto:harry.schindler@dbfz.de">harry.schindler@dbfz.de</a>
--	--

© Ursula Böhmer/BMEL

# 5 KEY SCIENTIFIC FIGURES



25

**NEWLY LAUNCHED PROJECTS**

Market and third-party funded projects

256

**EMPLOYEES**

(as of 31/12/2020)

€ 200,279.84

**AVERAGE PROJECT VOLUME**

of the projects launched in 2020

40

**COMPLETED PROJECTS**

30

**EVENTS**

(Online/Hybrid)

70

**PEER REVIEWED PUBLICATIONS**

(including 56 open access articles)

119

**PROJECTS**

7

**GROUPS OF VISITORS AT THE DBFZ**

(Visitor ban since March 2020 due to the pandemic)

## COLLABORATIVE PROJECTS

A close research cooperation with numerous partners from science, industry and society enabled the DBFZ to further consolidate its position as the leading national research institution in the field of the energetic and integrated material use of biomass in 2020. The DBFZ has also been continuously strengthening its position at the international level for more than ten years. For example, the research centre is collaborating on 22 EU projects with around 200 partners and is an active member and national team leader in major international research networks such as the IEA Energy Technology Collaboration Programme, the European Energy Research Alliance (EERA) and the European Technology and Innovation Platform Bioenergy (ETIP Bioenergy). An overview of its extensive committee and network activities can be found in this annual report starting on page 101.

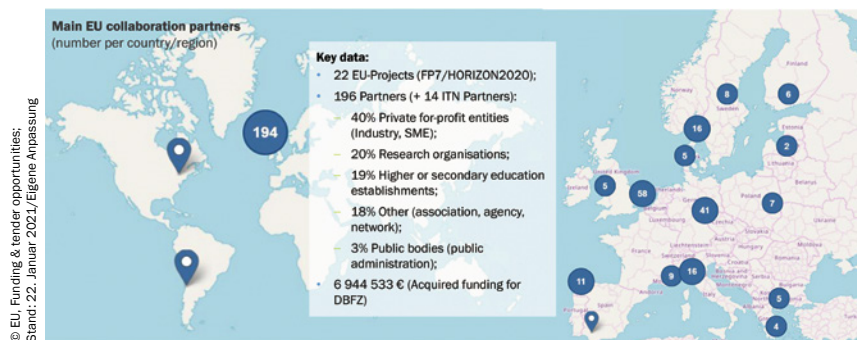


Fig. 6 International cooperation at EU level



## PUBLICATIONS

Every year, project results and findings from collaborative research projects are published together with co-authors from approximately 60 institutions from science, industry and society<sup>1</sup> in more than 60 peer-reviewed publications. Approximately 150 publications are release every year with DBFZ involvement, including journal articles as well as opinion statements and position papers to inform all who are interested. DBFZ scientists present the latest results and findings of bio-energy research at more than 150 events worldwide, networking with the scientific community, practitioners and the public. An overview of the DBFZ's publications can be found in the Appendix starting on page 143.

Tab. 2 Key figures on DBFZ publications from 2016 to 2020

Publications	2016	2017	2018	2019	2020
Book publications/editorships	16	19	12	9	12 <sup>2</sup>
Book contributions	14	15	4	14	37
Journal articles (reviewed)	65	52	56	53	70 <sup>3</sup>
Journal articles	9	15	13	10	11
Contributions to conference proceedings	55	49	33	43	26
Research data	0	1	2	1	3
<b>Total</b>	<b>159</b>	<b>151</b>	<b>120</b>	<b>130</b>	<b>161</b>

<sup>1</sup> including 51 European institutions

<sup>2</sup> including nine monographs and three editorships of collective works

<sup>3</sup> including 56 open access articles

# 6

## THE RESEARCH FOCUS AREAS

Since 2014, the DBFZ has been working on important research topics relating to the use of biomass for energy and integrated material use within five research focus areas. They ensure that key questions and aspects of bioenergy can be covered at the depth necessary to produce excellent research. The focus areas are oriented towards future developments and the research policy challenges and framework conditions of the federal government. Examples are the national research strategy BioEconomy 2030, the national bioeconomy policy strategy, the mobility and fuel strategy of the federal government or the Biorefineries Roadmap. Other important cornerstones guiding the direction of the research priorities include the funding policy framework, the unique selling points in the research landscape, and the good research infrastructure at the DBFZ.

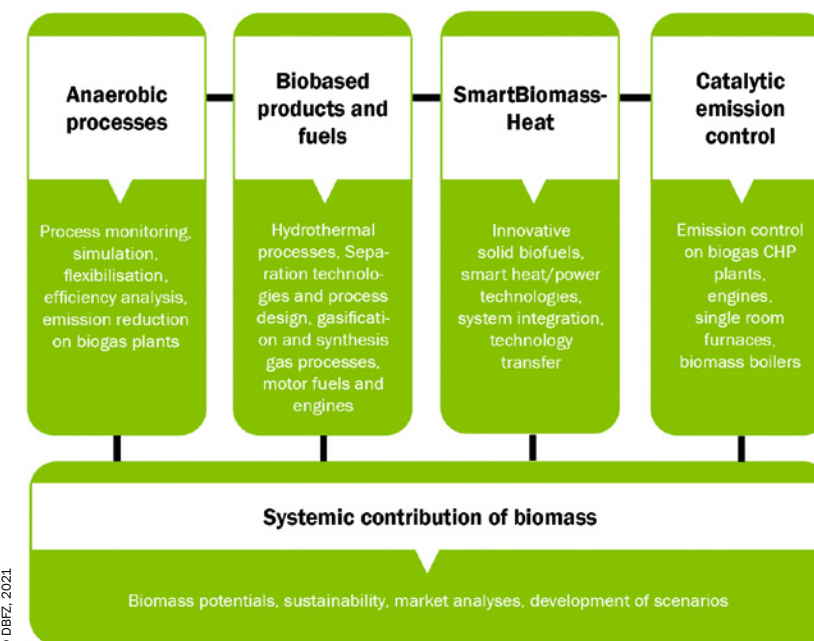


Fig. 7 The five research focus areas of the DBFZ

## 6.1 SYSTEMIC CONTRIBUTION OF BIOMASS



*“The transformation of energy systems in Germany towards renewable energies is leading to a profound change in the lignite mining regions, especially in Lusatia and Central Germany. The ‘MoreBio’ project is accompanying this transformation by collecting in-depth information on all the important factors of a biobased economy in these regions. This will serve the Federal Ministry of Agriculture and Food as a basis for decisions on further incentives, investments and funding programmes in alignment with the National Bioeconomy Strategy.”*

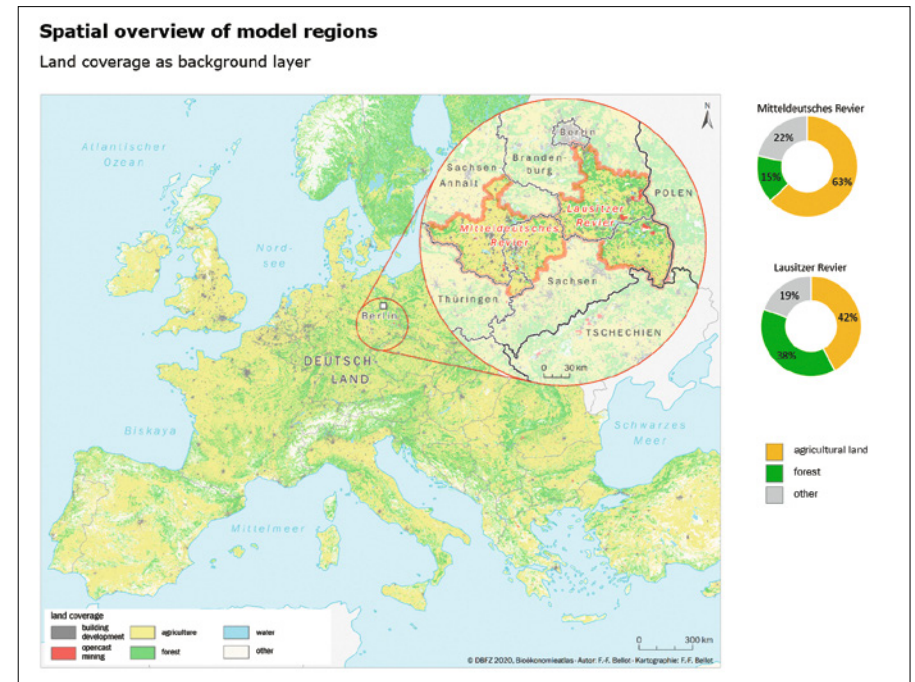
Romann Glowacki, Project Manager

**Keywords:** bioeconomy, structural change, regional monitoring, bioeconomy atlas, OpenData

### MODEL REGIONS OF THE BIOECONOMY IN THE CENTRAL GERMAN AND LAUSITZ MINING AREAS (MOREBIO)

With the phase-out of coal-fired power generation, the mining regions of Lusatia, Central Germany and the Rhineland are facing profound structural change. The “MoreBio” project focuses on the two regions in eastern Germany. The Central German mining area extends across the federal states of Saxony-Anhalt, Thuringia and Saxony; the Lusatian mining area across Brandenburg and Saxony. The latter borders Poland to the east and the Czech Republic to the south. Both regions lie in the heart of Europe, geographically and logistically connecting Eastern and Western Europe. Important trade and transport routes run through both areas and they also represent an important cultural junction.

Different spatial structures characterise the districts: Central Germany is more urbanised with Leipzig and Halle at its centre, while Lusatia is more decentralised.



**Fig. 8** The two former lignite mining areas of Central Germany and Lusatia, are located in the heart of Europe and border Poland and the Czech Republic. They offer a variety of land with a strong agriculture and forestry industry that can be used for the bioeconomy.

The urbanisation trend has continued in recent years. The large cities of Leipzig and Halle continue to gain inhabitants, while the smaller towns and rural areas are losing inhabitants, for example, through outmigration. Demographic change is therefore accelerating in the Central German and Lusatian regions and presents both regions with a variety of challenges. In addition, lignite mining is a major employer in some districts. Other industries in the otherwise structurally weak regions cannot compensate for the decline in jobs on their own.



## How can the two regions develop sustainable economic structures?

The bioeconomy is a great opportunity to develop sustainable, biobased economic structures. Raw materials from agriculture and forestry are the precursors for a variety of biobased products for the food, plastics, chemical, textile and timber industries. Cross-industry and cross-sectoral value-creation networks, products and services are created, which are collectively referred to as the bioeconomy.

Both Central Germany and Lusatia have an above-average potential for the development a biobased economy. In the Lusatian mining area, 42% of the land is currently used for agriculture, and a further 38% for forestry. In the Central German mining area, the figures are as high as 63% and 15% respectively. In total, 1.76 million hectares are available for a biobased and sustainable economy. The coal phase-out will add another 43,000 hectares of usable land. In addition to the crucial labour force factor, the regions also have considerable potential for trade and industry as well as for research and development. The German Federal Ministry of Food and Agriculture (BMEL) has commissioned the DBFZ to closely examine the bioeconomy potential of the two eastern German coal-mining areas. The findings are to form the basis for the development of “Model Regions of the Bioeconomy in the Central German and Lusatian Mining Areas (MoreBio)”. The first phase of the project is being funded through the emergency programme of the Structural Strengthening Act for Coal Regions until the end of 2021. In further phases, guiding principles and concrete implementation plans for the development of the bioeconomy and value creation potentials will be developed together with local stakeholders. The project will fall under the federal government’s “National Bioeconomy Strategy for a Sustainable, Circular and Strong Economy”. The core objective is to create a sustainable, circular and innovative economy in Germany in all utilisation stages.

## METHODS/MEASURES

The first phase of the project includes a detailed analysis of the initial bioeconomic situation in the regions as well as a detailed survey of the existing biobased economic structures. The following will be investigated:

- the economic and mining area structure
- the biomass base
- case studies on relevant industries and processing pathways
- the research and innovation landscape

The project focuses on the close cooperation and inclusion of relevant stakeholders from business, industry, clusters and bioeconomic networks, as well as the regional institutions that drive structural change from an administrative and political perspective. Key partners in the project are regionally anchored networks with which the DBFZ already maintains a close relationship. A wide range of local stakeholders are actively involved in the project. Close contacts are being established and maintained, new ideas are being developed, and any resistance that may arise will be systematically and actively dealt with. Supraregional and international partners such as start-up networks and technology start-up centres are also being approached and actively integrated in the project.

Transformation scenarios are being developed together with all regional, supraregional and international stakeholders which depict different future visions for the bioeconomy in the mining areas. The focus here is on estimating the future biomass base (taking into account adaptation to climate change), the analysis and selection of possible technologies and raw material pathways and their regional suitability, and an impact assessment of the economic and sustainability effects. Guiding ideas and implementation plans, so-called roadmaps, are developed based on previous work steps. These contain potential measures for transforming the two former coal-mining areas into model bioeconomy regions. Supporting measures are taken into account, such as ways to attract companies, technology transfer concepts, and instruments to increase investment activities.

## MILESTONES/CHALLENGES

Concrete milestones were formulated for the project. The most important milestone relates to the analysis of current conditions. Since August 2019, extensive data on the area’s structure, biomass base, case studies, as well as research and innovation have been compiled and evaluated for this purpose. This data was

made available digitally in February 2021 in a comprehensive regional bioeconomy atlas. Bioeconomy data, such as the availability of biogenic raw materials, harvesting and felling volumes, and important economic indicators are available interactively and free of charge to all interested parties and, above all, to a specialist audience. The atlas is divided into the topics of “mining area structure”, “biomass base”, “bioeconomy” and “knowledge & innovation”. The extensive collection of data forms the basis for decision-making and strategy processes for stakeholders from industry, administration, politics and society or for research purposes.

A further milestone in the project is the establishment of the first contact office in the Lusatian mining region. Rooms were rented in Cottbus in October 2020. The contact office is linked to the start-up centre of the “Zukunft Lausitz” initiative. This provides an opportunity to benefit from the initiative's network. The contact office is to be expanded into a networking office with several employees.

Important results have also already been achieved in the area of stakeholder management. The project team established contacts with local stakeholders from politics and associations, such as the structural development agencies or the economic development agencies of the two regions and the participating states. Intermediaries, industry and the scientific community were also informed and partly involved. Cooperation agreements were concluded with some stakeholders, such as “BioEconomy e.V.”, the Central German Metropolitan Region and “Innovationsregion Lausitz”.

Due to the contact restrictions resulting from the Corona pandemic, it has not yet been possible to hold workshops and conferences with the stakeholders. Contacts have to be established mainly by telephone and bilaterally, which is extremely time-consuming. This significantly hinders the development of scenarios and guiding principles and thus the progress of the project.

## PERSPECTIVES

In the coming months, the project will focus primarily on engaging stakeholders. This is vital for developing the envisaged scenarios and for deriving and discussing the guiding principles for the two regions. At the heart of this work is a digital conference which is planned for autumn 2021.

Fig. 9 The Bioeconomy Atlas brings together a wide range of data on the Central German and Lusatian mining areas

The second part of the activities will involve the development of the Bioeconomy Atlas. Interested stakeholders are invited here to actively participate in its further development and to relay important topics and information needs. These will be determined, among other things, in further dialogue with the stakeholders in the region. The project team will continue to search for extensive data and prepare it for the Bioeconomy Atlas.

In the future, the first phase of the project “Model Regions of the Bioeconomy in the Central German and Lusatian Mining Regions (MoreBio)” will be followed by two further funding phases. The aim of all funding phases is to create model bioeconomy regions in Central Germany and the Lusatian mining areas. Promising bioeconomy demonstration plants and investments in the mining areas will be jointly funded by the federal and state governments. In future, this will give rise to new employment opportunities and new value-creation networks. Overall, the project results form the basis for future incentives, investments and funding programmes of the federal government and the federal states in alignment with the National Bioeconomy Strategy.

**For further information visit:**

[webapp.dbfz.de/?lang=en](http://webapp.dbfz.de/?lang=en) (OpenData Platform)

[www.dbfz.de/biooekonomieatlas](http://www.dbfz.de/biooekonomieatlas) (German language)

[www.biooekonomie.de/themen/politikstrategie-deutschland](http://www.biooekonomie.de/themen/politikstrategie-deutschland)

## Project summary

<b>Duration:</b>	23/8/2019–31/12/2021
<b>Scientific contact:</b>	Romann Glowacki
<b>Project number:</b>	Inhouse (proposal number a STAB 19-185)
<b>Funding body:</b>	Federal Ministry of Food and Agriculture, Agency for Renewable Resources e. V.

With support from



by decision of the  
German Bundestag



## THE RESEARCH FOCUS AREA “SYSTEMIC CONTRIBUTION OF BIOMASS”

The research focus area is aimed at contributing to the development of sustainable bioenergy strategies at a national and international level. Regionally and globally available biomass potentials are determined and various biomass utilisation concepts are considered and evaluated. The overarching goal is to answer methodological and systems engineering questions on the efficiency and sustainability of biomass use from an economic, ecological and technical perspective, taking into account both the land resources used and the energy carrier-specific processing and conversion technologies. The combination of these topics provides the basis for deriving strategies and recommended actions for policymakers and corporate decision-makers.

## Important reference projects and publications

**Project:** BE20PLUS – BIO E Bioenergy: Potentials, long-term perspectives and strategies for power generation after 2020, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/11/2017–31/8/2020 (funding code: 22404016)

**Project:** BECOOL – Brazil-EU Cooperation for the Development of Advanced Lignocellulosic Biofuels, EU/Horizon2020, 1/6/2017–31/5/2021 (GA 744821)

**Project:** FLEXSIGNAL – Concepts for demand-oriented, cost-efficient and climate-friendly electricity generation from bioenergy plants, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/1/2019–31/12/2020 (funding code: 03KB150B)

**Project:** MUSIC – Market Uptake Support for Intermediate Bioenergy Carriers, EU/Horizon2020, 1/9/2019–31/8/2022 (GA 857806)

**Project:** SmarKt – Assessment of the market potential and system contribution of integrated bioenergy concepts, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/9/2017–30/6/2020 (funding code: 03KB130)

**Publication:** Brosowski, A.; Bill, R.; Thrän, D. (2020). “Temporal and spatial availability of cereal straw in Germany – Case study: Biometane for the transport sector”. *Energy, Sustainability and Society*, Vol. 10, H. 1. S. 1712. DOI: 10.1186/s13705-020-00274-1.

**Publication:** Lauer, M.; Leprich, U.; Thrän, D.

(2020). “Economic assessment of flexible power generation from biogas plants in Germany’s future electricity system”. *Renewable Energy* (ISSN: 0960-1481), H. 146. S. 1471–1485. DOI: 10.1016/j.renene.2019.06.163.

**Publication:** Meisel, K.; Millinger, M.; Naumann, K.; Müller-Langer, F.; Majer, S.; Thrän, D. (2020). “Future Renewable Fuel Mixes in Transport in Germany under RED II and Climate Protection Targets”. *Energies* (ISSN: 1996-1073), Vol. 13, H. 7. DOI: 10.3390/en13071712.

**Publication:** Moosmann, D.; Majer, S.; Ugarte, S.; Ladu, L.; Wurster, S.; Thrän, D. (2020). “Strengths and gaps of the EU frameworks for the sustainability assessment of bio-based products and bioenergy”. *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-020-00251-8.

**Publication:** Thrän, D.; Bauschmann, M.; Dahmen, N.; Erlach, B.; Heinbach, K.; Hirschl, B.; Hildebrand, J.; Rau, I.; Majer, S.; Oehmichen, K.; Schweizer-Ries, P.; Hennig, C. (2020). “Bioenergy beyond the German ‘Energiewende’: Assessment framework for integrated bioenergy strategies”. *Biomass and Bioenergy* (ISSN: 0961-9534), Vol. 142. DOI: 10.1016/j.biombioe.2020.105769.

**Publication:** Thrän, D.; Moesenfechtel, U. (2020). “Das System Bioökonomie”. Berlin: Springer. XX, 391 S. ISBN: 978-3-662-60729-9. DOI: 10.1007/978-3-662-60730-5.



### Head of the research focus area

**Prof. Dr.-Ing. Daniela Thrän**

Phone: +49 (0)341 2434-435

E-Mail: daniela.thraen@dbfz.de

## 6.2 ANAEROBIC PROCESSES



*“The core objective of the project is to build up research and laboratory capacities in the partner country of Togo and to transfer knowledge on the use of biogenic organic residues in energy production. This is to promote efficient and sustainable biomass use in Togo. Reducing the deforestation currently taking place and developing alternative energy sources for rural areas can contribute to local climate protection. A well-developed research infrastructure is the basis for successful development and use of the energy sources identified in the project. The results of the project should provide a model for the entire region of West Africa.”*

**Dr. Nils Engler, Project Manager**

**Keywords:** international, knowledge transfer, biomass potentials, micro firing systems, biogas, laboratory methods

### LABTOGO – SETTING UP RESEARCH ACTIVITIES AND DEMONSTRATING TECHNOLOGIES FOR THE UTILISATION OF BIOMASS POTENTIALS IN TOGO

In 2012, the Federal Ministry of Education and Research (BMBF) initiated the joint research centre West African Science Service Center on Climate Change and Adapted Land Use (WASCAL). Ten countries from the West Africa region are partners in this project. The aim is to build long-term know-how and scientific capacities on the topics of climate change and deal locally with the impacts on land use. As a member of the WASCAL network, Togo plays a leading role in using biomass in energy production (bioenergy) and is therefore a target country and partner country in the “LabTogo” project.

The development of research infrastructure and knowledge transfer for the comprehensive use of organic residues from agricultural and forestry (including e.g.

the organic fraction of household waste) in energy production are important pre-conditions in the fight against climate change.

## **METHODS/MEASURES**

In line with the initial situation and objectives described above, the project is divided into three sub-projects.

### **Sub-project I: Analysis of the potential system contribution of biogenic resources**

In this sub-project, an analysis of the existing resource base is carried out together with Togolese partners. The available biomass potentials are identified, including waste biomass from commercial, agricultural and industrial processes. In addition, availability and mobilisability are considered within the framework of an overall potential analysis. A comprehensive systemic assessment will present the potential impacts that would occur if the technologies considered in the project were to be comprehensively established in Togo. This sub-project thus forms the basis for strategic planning of resource use and the appropriate technologies.

### **Sub-project II: Establishment and commissioning of a biogas laboratory as well as corresponding training courses**

Lomé is the logistical hub of West Africa and offers the best conditions for creating a research infrastructure in the area of biomass conversion. In addition to good transport routes for the provision of potential biogenic substrates from agriculture and the food industry, the location benefits from a local university and existing scientific competences. The university in Lomé can thus serve as a foundation for the development of research activities through the training of future experts. The aim of this sub-project is to set up and commission a biogas laboratory at the Université de Lomé. The laboratory will be equipped with state-of-the-art exper-

imental technology and analytical equipment. In order to support a sustainable transfer of both technical methods and theoretical topics, several in-depth workshops are planned at the Université de Lomé once the laboratory has been successfully commissioned. This will lay the foundations for independent applied research in the field of biogas production and use in Togo. In addition, the laboratory is to provide higher education and train personnel in operating the biogas plants.

### **Sub-project III: Development and introduction of high-efficiency and low-emission stoves**

A large part of Togo's population lives in rural areas. The use of solid biomass for cooking is widespread and largely takes place in traditional fireplaces. In addition to the problem of low energy utilisation, these traditional cooking sites can cause considerable emissions, which often leads to health hazards. The aim of sub-project III is therefore to develop efficient, low-emission, low-cost and easy-to-use stoves that can be operated with agricultural residues wherever possible. The basis for the development is a model of a mini pyrolysis stove developed at the DBFZ. The pyrolysis stoves will first be developed as prototypes at the DBFZ and then developed into pilot and demonstration models at the Université de Lomé. In the next step, the stoves will be tested in a field study to determine their technical suitability and socio-economic impact. Employees of the DBFZ and a local NGO will conduct interviews with the users of the field-test stoves and fill out evaluation forms. The questions to be answered include acceptance among women, whether and how the pyrolysis stoves make their everyday lives easier, and how users rate the lower health impact of the emissions. Questions of fuel procurement, difficulties in daily use and cost effects are also investigated. The project was officially launched in July 2020 with a virtual kick-off meeting.

## **MILESTONES/CHALLENGES**

Work on resource mapping could be carried out despite extremely limited travel opportunities in 2020. Land cover changes could be analysed and quantified

through a remote-sensing-based evaluation of freely accessible MODIS satellite image data from the last 19 years (see Figure 11). The findings on the expansion of agricultural land as well as the reduction of savannahs support the establishment of preferential regions for biogas production and pyrolysis. Further geo-data intersections with the production quantities of agricultural products and primary data from Togolese partners support the location decision. The biogas laboratory will consist of a total of seven individual container modules, which will be assembled at the installation site to create a structurally closed unit. Each of the container modules form a functional unit that represents specific work areas in the biogas lab. After completion of the construction work, each container module will be fitted out with equipment specific to the activity to be conducted there.



**Fig. 10** Official kick-off of the “LabTogo” project at the DBFZ in Leipzig (17 July 2020)

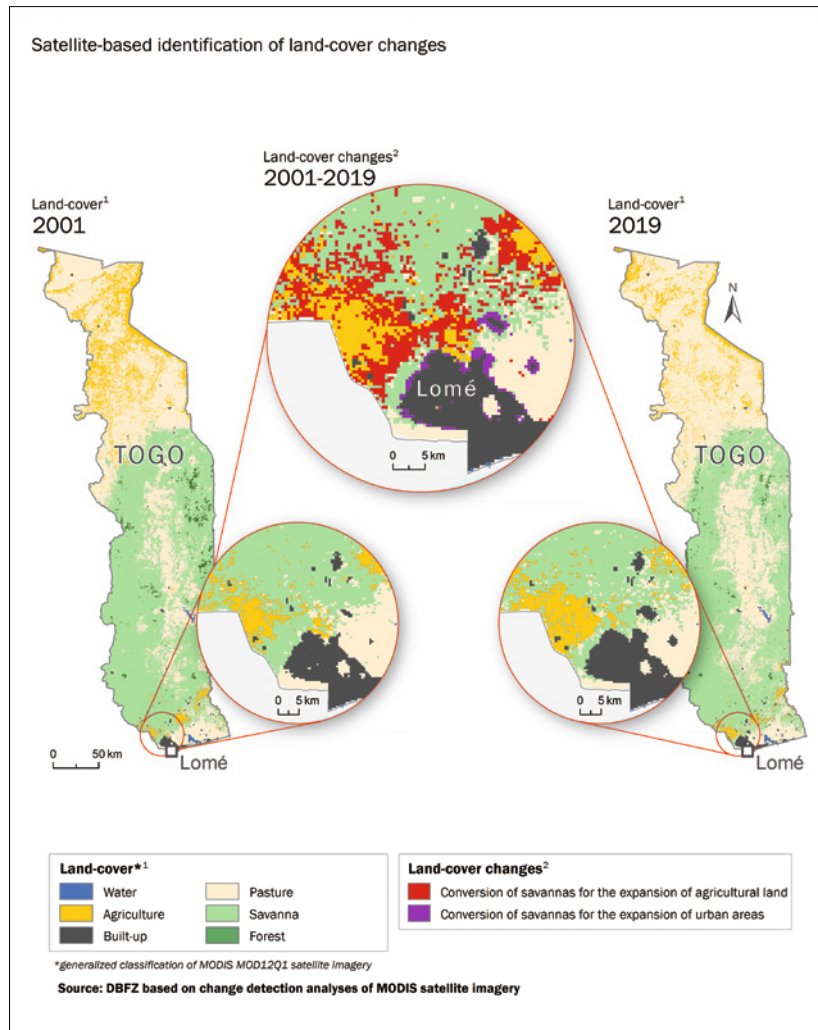
Providing construction services abroad is cost-intensive, both in terms of sending skilled personnel and in terms of the necessary coordination work. The idea of constructing the biogas laboratory as a container building aimed to keep the assembly work required on site in Lomé to a minimum. The final detailed planning for the modular building is currently underway, and production is expected to begin in the second half of 2021. A major challenge for the implementation of the objectives of sub-project III are the regionally different socio-economic and cultural conditions in the rural regions of Togo. Different regional languages and cultural customs have to be taken into account when rolling out the stoves and conducting the practical field tests. This is where the NGO Jeunes Volontaires pour l'Environnement (JVE) comes in as a project partner. JVE has the necessary knowledge about the country and will provide the DBFZ with comprehensive support when rolling out the stoves and conducting the interviews and evaluations.

## OUTLOOK

As things stand, the biogas laboratory at the Université de Lomé will be ready for operation in the first half of 2022. By then, scientists and laboratory staff from Togo will have already completed a comprehensive training program at the DBFZ's biogas laboratory. The data available on biomass potential at this time can then be used to develop the first implementation projects – such as municipal bio-waste fermentation plants – using laboratory tests and applied research. Student training in the laboratory will support the development of local experts in Togo. The pyrolysis stoves developed as part of the project are to be designed in such a way that they can be manufactured in Togo at low cost. After successful field tests, these stoves will be able to be produced and marketed by small businesses around the country. The LabTogo project is a sample project within the framework of the WASCAL network. The results will be used to initiate similar innovations and establish facilities in other West African countries.

**For further information visit:**

[www.dbfz.de/en/labtogo](http://www.dbfz.de/en/labtogo)



**Fig. 11** In sub-project I, satellite-supported evaluations are used to analyse changes in land use

### Project summary

**Duration:** 2/1/2020–31/12/2023  
**Project partner:** WASCAL, Université de Lomé, JVE  
**Scientific contact:** Dr. Nils Engler, Prof. Komi Agboka  
**Funding code:** Inhouse  
**Funding body:** Federal Ministry of Education and Research, Project Management Jülich



### THE RESEARCH FOCUS AREA “ANAEROBIC PROCESSES”

Processes for the conversion of biomass by microorganisms under anaerobic conditions are the basis of a large number of biotechnological processes for the provision of energy sources and materials. In the research focus area “Anaerobic processes”, efficient and flexible processes for the requirements of the future energy system are being developed primarily for biogas production. Higher added value is achieved by coupling these with processes for material utilisation. To this end, tools for process monitoring and control, concepts for flexible, low-emission plants and operating regimes, methods for evaluating and optimizing efficiency, and processes for maximizing material conversion, especially for difficult substrates, are being developed.

## Important reference projects and publications

**Project:** BMPIII – Biogas Measurement Programme III: Factors in the efficient operation of biogas plants – Sub-project 1: Energy Balancing, Flexibilisation, Economy, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/12/2015–30/11/2019 (funding code: 22403515)

**Project:** CarBioPhos – Development of an integrated process for the carbonisation of sewage sludge, generation of biogas and recovery of phosphorus, Sub-project 2, Federal Ministry of Education and Research/Karlsruhe Institute of Technology, 1/7/2018–31/12/2020 (funding code: 031B0483E)

**Project:** KlimaBioHum – Climate protection-oriented treatment of bio-waste for agriculture, Federal Ministry of Food and Agriculture/Federal Agency for Agriculture and Food, 1/10/2018–30/11/2021 (funding code: 281B303316)

**Project:** RESTFLEX – Investigation of the suitability of agricultural residues for flexibilisation of the biogas process using model-based methods and merging the results with existing volume potentials, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/7/2019–30/6/2022 (funding code: 22041818)

**Project:** WaSSGhan – Hybrid energy from waste as a sustainable solution for Ghana, Federal Ministry of Education and Research/Project Management Jülich, 1/1/2020–31/12/2023 (funding code: 03SF0591D)

**Publication:** Gökgöz, F.; Liebetrau, J.; Nelles, M. (2020). "Kombinierte Bereitstellung von Strom

und Kraftstoff an Biogasanlagen: Wirtschaftlichkeit von Anschlusszenarien". Landtechnik (ISSN: 0023-8082), Vol. 75, Nr. 3. S. 141–160. DOI: 10.15150/lt.2020.3242.

**Publication:** Janke, L.; McDonagh, S.; Weinrich, S.; Nilsson, D.; Hansson, P.-A.; Nordberg, A. (2020). "Techno-Economic Assessment of Demand-Driven Small-Scale Green Hydrogen Production for Low Carbon Agriculture in Sweden". Frontiers in Energy Research (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/fenrg.2020.595224.

**Publication:** Liebetrau, J.; Pfeiffer, D. (2020). "Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector". 2<sup>nd</sup> edition (Series "Biomass energy use", 7). Leipzig: DBFZ. 451 S. ISBN: 978-3-946629-47-4.

**Publication:** Schumacher, B.; Zerback, T.; Wedwitschka, H.; Weinrich, S.; Hofmann, J.; Nelles, M. (2020). "The Influence of Pressure-Swing Conditioning Pre-Treatment of Cattle Manure on Methane Production". Bioengineering (ISSN: 2306-5354), Vol. 7, Nr. 1. DOI: 10.3390/bioengineering7010006.

**Publication:** Weinrich, S.; Paterson, M.; Roth, U. (2020). "Leitfaden zur Substrat- und Effizienzbewertung an Biogasanlagen". (DBFZ-Report, 35). Leipzig: DBFZ. VII, 9-63 S. ISBN: 978-3-946629-57-3



### Head of the research focus area

**Dr. agr. Peter Kornatz**

Phone: +49 (0)341 2434-716

E-Mail: peter.kornatz@dbfz.de





## 6.3 BIOBASED PRODUCTS AND FUELS



*“With the help of the 100-L HTC reactor, wet biogenic residues can be converted on a scale that allows uniform product batches to be produced for the development of downstream processes.”*

**Hendrik Etzold, Project Manager**

**Keywords:** bioeconomy, residue recycling, disposal, recovery of recyclable materials, sewage sludge

### HTC-LIQ – DEVELOPMENT OF A HIGHLY EFFICIENT CASCADE PROCESS FOR THE TREATMENT OF PROCESS WATER FROM HYDROTHERMAL PROCESSES

In the context of the energy transition and the transformation to a bioeconomy, new ways are needed to put the limited biomass resources to optimal use with the greatest possible added value. In this context, hydrothermal processes (HTP) and especially hydrothermal carbonisation (HTC) can play a particularly important role, as they enable low-grade and, above all, wet organic material flows to be used in a highly efficient manner. Compared to other thermochemical processes, a decisive advantage of HTP is that the input material does not have to undergo the energy-intensive drying process. At the same time, material utilisation, for example the production of basic chemicals, not only provides economic advantages over using it purely for energy. Material use is also preferable from an ecological and resource standpoint, since, of the many renewable energy sources, biomass is the only renewable source of carbon (apart from carbon dioxide).

The aim of the HTC-liq project was to develop an efficient solution for the use of biogenic residues that have few alternative uses, i. e. biogenic residues that are neither ideally suited for combustion or gasification nor for biochemical conver-



**Fig. 12** HTC experiments on a 0.5 L scale

sion. Therefore, in the context of a hydrothermal biorefinery, an optimised process should be found for the coupled production of valuable materials and a refined solid fuel, which at the same time contributes to the conservation of resources (energy, nutrients, water).

Building on the DBFZ's many years of expertise in the field of HTC and the competencies of the Fraunhofer Institute for Ceramic Technologies and Systems (IKTS) in Dresden in the field of material treatment of organic substrates and process waters, targeted technical solutions were to be developed that enable efficient recovery of chemicals and energy sources and at the same time solve the issue of HTC process water. The planned investigations focused on exploiting the material and energy potential of this HTC process water before it is turned into water that can be discharged. The overall project pursues three objectives with the following tasks shown in Figure 13.

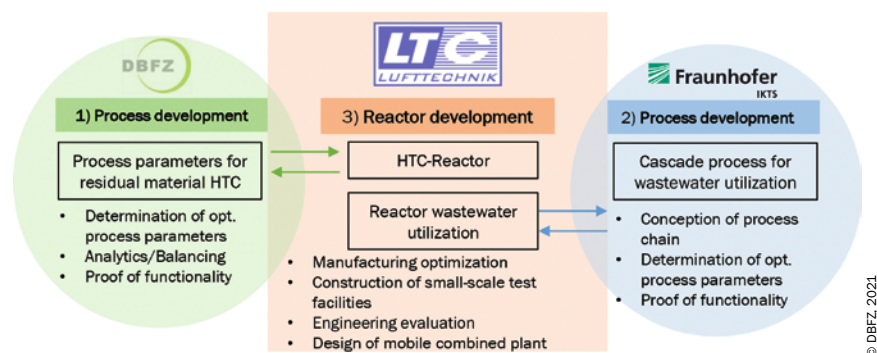


Fig. 13 Distribution of tasks in the HTC-liq project

- Increasing the efficiency of the hydrothermal carbonisation of residues in terms of the quantity and quality of the valuable materials produced (especially carboxylic acids and HTC carbon)
  - Treatment of HTC process water with the recovery of carboxylic acids, nutrients and energy
- Development and technical evaluation of reactors for the hydrothermal carbonisation of residues and for carboxylic acid recovery

## METHODS/MEASURES

After an extensive regional examination of residues in the Leipzig area, including their physicochemical characterisation, three groups of residues with high potential were investigated: sewage sludge, fermentation residues and residues from the food industry. Six different residues from each of these groups were analysed and evaluated with regard to their potential. One residue from each group (dewatered digested sludge, digestate maize/cattle slurry, grease trap residues) was selected for subsequent HTC trials. The HTC trials were carried out by varying the temperature, dwell time and pH value using statistical trial planning to optimise the valuable material yields.

In the next step, various methods were used to separate the carboxylic acids (membrane, extraction, thermal separation) as part of the process water treat-

ment. The downstream biogas production was initially started in batch mode and then, in the course of the project, was moved to a continuous biogas reactor at the project partner in Dresden. A nutrient recovery of phosphorus was connected to the biogas process. This was obtained from the digestate through precipitation. During the water treatment process, tests were carried out using membrane filtration, electrolysis and evaporation.

Parallel to the small-scale preliminary tests, reactors for hydrothermal carbonisation and wastewater treatment were developed, built and put into operation. Experiments on these new scales have provided knowledge about up-scaling the experiments and have served as a basis for an overall evaluation of the process from an economic and ecological standpoint.

## MILESTONES/CHALLENGES

The challenge for hydrothermal carbonisation was to maximise the yield of marketable recyclables while maintaining the quality of the carbon and optimising carbon yield. The central goal was to minimise the wastewater constituents that cannot be separated into marketable chemicals or that interfere with the material separation or the biogas process. Transferring the process from a 0.5-L to a 100-L scale was a key challenge for the DBFZ in the project. In cooperation with LTC – Lufttechnik Crimmitschau GmbH, it was possible to accompany the entire reactor development process over the course of the project. By drawing up comprehensive specifications, it was possible to determine the necessary operating parameters, develop the mode of operation and geometry, and define the requirements for the measurement and control technology. After monitoring the manufacturing process and installation, the 100 L HTC reactor was commissioned at the DBFZ in June 2020, thus reaching the key milestone in the project. With an operating temperature of up to 230 °C and a maximum operating pressure of approx. 40 bar, the stirred reactor enables a new scaling of the hydrothermal processes at the DBFZ by a factor of 10 through active, thermo oil-based temperature control. The batch reactor is unique in Germany due to its controllability and size. Larger batches of HTC products can be produced making it easier to investigate downstream process steps. Carboxylic acids were to be extracted by developing and using



**Fig. 14** 100-L HTC reactor in the fuel technical centre of the DBFZ

ceramic membranes for direct selective separation. Focus was on the development of a membrane extraction process. In the course of the project, however, it was not possible to generate a concentration of the relevant substances in the process water through hydrothermal carbonisation of the selected residues to such an extent to make separation via a membrane economical. The biogas production was to achieve a stable and high gas yield in compact reactors and the microorganisms were to be adapted to problematic substances present in the HTC process water. This could be implemented with a continuous biogas trial over a period of more than one year. The purification of the process water was finally achieved within the framework of the project through the development and construction of an evaporator plant at the project partner's premises in Dresden.

## OUTLOOK

The current hurdles of the technology, which lie primarily in the utilisation of the process water, can be further addressed by integrating hydrothermal carbonisation into the complete process chain. An advancement in the utilisation of moist, unused residual material flows could thus be made and possible utilisation paths worked out. The upscaling of hydrothermal carbonisation at the DBFZ makes it possible to produce larger product batches and thus to better investigate the use of the products in the future.

### For further information visit:

[www.dbfz.de/en/hydrothermal-processes](http://www.dbfz.de/en/hydrothermal-processes)

### Project summary

<b>Duration:</b>	1/4/2017–31/12/2020
<b>Project partner:</b>	LTC – Lufttechnik Crimmitschau GmbH; Fraunhofer Institut for Ceramic Technologies and Systems (IKTS)
<b>Scientific contact:</b>	Hendrik Etzold
<b>Project number:</b>	100283030
<b>Funding body:</b>	Development Bank of Saxony – SAB, EFRE Technology Funding



## RESEARCH FOCUS AREA “BIOBASED PRODUCTS AND FUELS”

The research focus area is an important part of the overall process chain, ranging from biomass as a raw material to biofuels and chemical bioenergy carriers as products of biorefineries. In addition to process and concept development, it also includes implementation on a laboratory and pilot plant scale as well as technology assessment. The overarching goal is to contribute to flexible, highly efficient and sustainable biorefinery concepts with innovative technological approaches and thus also takes into account the requirements within the context of the bioeconomy. To this end, chemical upgrading processes are being further developed with a focus on hydrothermal processes (HTP). The development of fractionation processes for solid-liquid and liquid-liquid separation plays an important role as a link between the individual research priorities (especially in connection with anaerobic processes and HTP intermediates). Another building block is the development of synthesis gas processes for the generation of high-value products with a focus on biomethane in the form of bio-synthetic natural gas (Bio-SNG). In the short term, a sample HTP-based biorefinery concept is to be developed. Within this context, the work in the research focus area concentrates on (i) the analysis of relevant individual processes and required system components, (ii) preliminary tests for selected individual processes (e. g. HTP, gasification, methanation to SNG) and (iii) the preparation of an accompanying technology assessment (focus: material and energy balancing, costs and economic efficiency, environmental effects).

## Important reference projects and publications

**Project:** abonoCARE – Growth Core – abonoCARE – VP2: Pollutant reduction and phosphorus enrichment in fertiliser intermediates; SP 2.5: HTC phosphorus capture/drying HTC carbon, Federal Ministry of Education and Research/Project Management Jülich, 1/4/2019–31/3/2022 (funding code: 031B0139A)

**Project:** NORMAKR – Collaborative project: BEniVer; sub-project: NormAKraft – Fuel assessment in the context of national and international fuel regulations, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/1/2020–31/12/2022 (funding code: 03EIV241C)

**Project:** OpToKNuS – Collaborative project: OpToKNuS – Development of a “toolbox” based on numerical models and practical measurements for the design and optimisation of thermochemical plants for the provision of energy from alternative fuels; sub-project: Investigations using the DBFZ fixed-bed laboratory gasifier, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/1/2020–31/12/2022 (funding code: 03KB163B)

**Project:** Pilot-SBG – Research and demonstration project, bioresources and hydrogen to methane as fuel – conceptual design and construction of a pilot-scale plant, Federal Ministry of Transport and Digital Infrastructure (inhouse), 1/9/2018–31/12/2021

**Publication:** Klemm, M.; Kröger, M.; Görsch, K.; Lange, R.; Hilpmann, G.; Lali, F.; Haase, S.; Krusche, M.; Ullrich, F.; Chen, Z.; Wilde, N.;

Al-Naji, M.; Gläser, R. (2020). “Experimental Evaluation of a New Approach for a Two-Stage Hydrothermal Biomass Liquefaction Process”. *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 14. DOI: 10.3390/en13143692.

**Publication:** Lühmann, T.; Wirth, B. (2020). “Sewage Sludge Valorization via Hydrothermal Carbonization: Optimizing Dewaterability and Phosphorus Release”. *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 17. DOI: 10.3390/en13174417

**Publication:** Nitzsche, R.; Gröngröft, A.; Köchermann, J.; Meisel, K.; Etzold, H.; Verges, M.; Leschinsky, M.; u.a. “Platform and Fine Chemicals from Woody Biomass: Demonstration and Assessment of a Novel Biorefinery”. *Biomass Conversion and Biorefinery*, 9 June 2020. DOI: 10.1007/s13399-020-00769-z

**Publication:** Schripp, T.; Grein, T.; Zinsmeister, J.; Oßwald, P.; Köhler, M.; Müller-Langer, F.; Hauschild, S.; Marquardt, C.; Scheuermann, S.; Schocke, A.; Posselt, D.: Technical application of a ternary alternative jet fuel blend – Chemical characterization and impact on jet engine particle emission; *Fuel Volume 288*, 15 March 2021, 119606 <https://doi.org/10.1016/j.fuel.2020.119606>

**Publication:** Schröder, J.; Görsch, K. (2020). “Storage Stability and Material Compatibility of Poly(oxyethylene) Dimethyl Ether Diesel Fuel”. *Energy & Fuels* (ISSN: 0887-0624), Vol. 34, Nr. 1. S. 450–459. DOI: 10.1021/acs.energyfuels.9b03101.



Head of the research focus area

**Dr.-Ing. Franziska Müller-Langer**

Phone: +49 (0)341 2434-423

E-Mail: [franziska.mueller-langer@dbfz.de](mailto:franziska.mueller-langer@dbfz.de)

## 6.4 SMARTBIOMASSHEAT



*“Within the ‘VergOpt’ project, pre-treatment of low-quality wood assortments was studied to indicate the effects of sieving and drying on the properties and composition of such assortments. It was demonstrated that wood gasification plants can also be operated with low-quality wood chips provided that an appropriate pre-treatment of the fuels is applied. Furthermore, a simple but reliable rapid test procedure RAPPD was developed within the project that enables on-site determination of the potassium content, which has a significant influence on ash related operational problems of biomass fuels.”*

**Dr. Annett Pollex, Project Manager**

**Keywords:** woodchips, biomass gasification, preparation, rapid test, residues

### **VERGAOPT – VALORIZATION OF LOW QUALITY WOOD CHIP ASSORTMENTS FOR BIOMASS GASIFICATION FACILITATING THE ECONOMIC OPERATION OF EXISTING CHP PLANTS AND SUPPORTING PLANNED FURTHER INSTALLATIONS; SUB-PROJECT: FUEL PROPERTIES: ANALYSIS AND EVALUATION**

If the share of renewable energies in electricity generation increases to at least 80% by 2050 as planned [1], energy supply will be characterised significantly more by fluctuating electricity sources such as solar and wind energy. This makes the contributions from small, biomass-fired CHPs, which are increasingly needed to compensate for these volatilities and for system services, all the more important (cf. [2]). Since higher fees can usually be achieved for demand-oriented direct marketing, new economic perspectives are opening up for this energy sector. However, today’s woodchip (small-scale) gasifiers generally require

a fuel that has a very precisely defined fuel quality. In the context of a future bioeconomy strategy [3], it will be increasingly difficult to provide this fuel exclusively for the production of energy. At the same time, considerable amounts of wood from landscape maintenance (e. g. in the maintenance of traffic routes) and low-quality forest residues accumulate at the regional level, which have few other promising utilisation options except in the energy sector [4]. With the expiry of the EEG subsidy for waste wood-fired power plants, it can also be assumed that, in the medium term, cost-effective forms of waste wood will also be available in considerable quantities.

In the past, only physical and mechanical properties were considered when processing low-quality assortments of wood using chipping and screening technologies and the composition was not taken into account. As a result, the use of such fuels in small wood gasification plants (< 100 kW<sub>el</sub>) often resulted in ash-related operational problems. The increased maintenance and the considerable downtimes of the plants resulting from this lead to a loss of revenue and to additional costs, which increasingly jeopardise the economic viability of these plants [5] and thus the further expansion of this important technology for the future energy system. This is particularly problematic in view of the fact that (small-scale) gasifiers in particular are often operated as a sideline. Thus, there are time restrictions with regard to maintenance and the repair of faults caused by an inadequate fuel quality. It is precisely here that tailored fuel preparation, combined with simplified quality assurance measures, can greatly minimise disruptions in the operation of gasifiers and help to further establish this technology and promote its expansion. It was therefore important to carry out the planned investigations with the gasifier plant manufacturer Spanner Re<sup>2</sup> and to involve fuel conditioners and gasifier plant operators. The aim of the project was to develop flexible, efficient and cost-effective processing routes and simple but at the same time reliable rapid test procedures to control the fuel quality of low-grade wood assortments (including wood from landscape maintenance (especially roadside wood), forest residues, waste wood AI) (Figure 15). This is intended to secure the contribution of small, biomass-fired CHPs in the future energy system, which is characterised by fluctuating energy sources.



Fig. 15 Production of woodchips in a quality suitable for use in wood gasifiers

## METHODS

In the project, the DBFZ worked together with the Straubing Technology and Support Centre (TFZ) and the gasification system manufacturer Spanner Re<sup>2</sup>. The three project partners investigated the following three aspects: i) preparation of low-quality wood fuels and extensive analytical monitoring of the preparation process, ii) use of the prepared fuels in biomass gasification, and iii) development of rapid tests for identifying the content of the fuels. The following wood types were selected as fuels in the project's investigations:

- log/round timber as reference
- Calamity wood
- Roadside timber
- AI waste wood

The materials were each homogenised and divided into three sub-batches. This ensured that comparable types of raw materials were used at each of the three processing plants. Different screening and drying technologies were used at the three processing sites to produce fuels suitable for woodchip gasifiers. The processing was accompanied scientifically by extensive sampling and analysis. The physical and mechanical properties (bulk density, fine particle content, particle size distribution), the fuel properties (ash content, water content, calorific value) and the determination of the content-related properties relevant for gasification

(in particular C, H, N, S, Cl, Si, K, Ca, Na, P) were determined. The ash melting behaviour was determined for selected samples. Subsequently, the usability of the processed lower-quality wood assortments was tested at three different gasification plants of the company Spanner Re<sup>2</sup> (Figure 16). The plants were equipped with measurement technology in order to assess the effects of fuel preparation on plant operation and the electrical and thermal performance of the gasification process.

The DBFZ used commercially available soil analysis methods and adapted them for use with wood fuels to develop rapid methods for testing the content of wood. Furthermore, preliminary investigations were carried out with a portable NIR device.

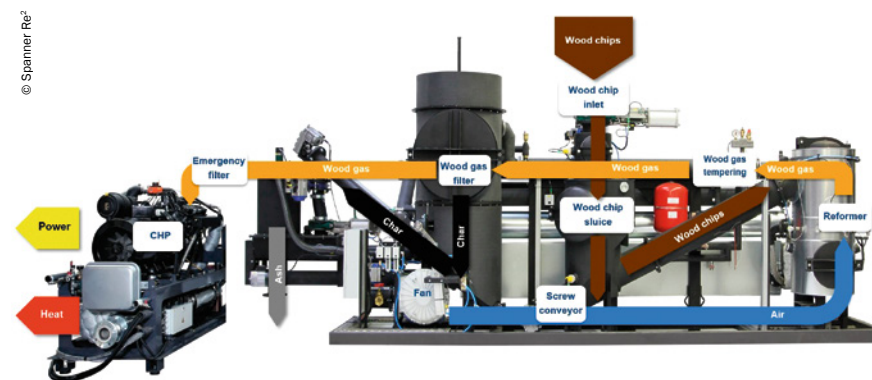
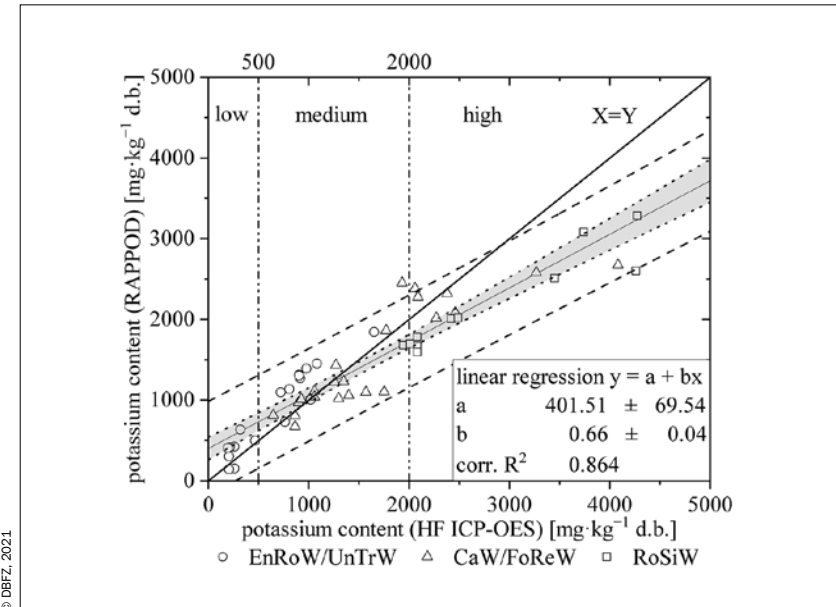


Fig. 16 A Spanner Re<sup>2</sup> wood gasification plant

## MILESTONES

The analytical monitoring of the processing provided important insights into the influence of the processing technologies on the quality of the fuels. Since for each of the raw materials used, partial batches with comparable properties were processed at the different locations, the respective effects of the technologies used for drying (container drying vs. sliding floor drying) and screening (drum screens with different mesh geometries vs. vertical screw screening) could be directly compared. In all cases the water content of the processed fuels were below the value of 12 mass% required by the manufacturer. The higher standard deviation in the water content samples from container drying illustrates a poorer homogeneity with regard to water content when this drying method is used. Screening enriches critical elements such as N, K, Ca, Al and Si, especially in the fine particle fraction. This is particularly visible in roadside wood. Fuel indices identifying contamination from adhering soil (Al<sub>2</sub>O<sub>3</sub> and Fe/Mn) indicate enrichment of these components in the fine particle fraction. Analysis of ash melting behaviour shows that an increased tendency towards slagging is to be expected in the fine particle fraction. Drying prior to screening resulted in a more efficient separation of the fine particle fraction (< 3.15 mm). The separation of the fine particle fraction via a perforated plate in the stoker screw of the wood gas CHP unit itself leads to lower material losses. As a result, only the fine particle fraction of the raw material and hardly any larger particles are separated. The mesh geometry of the drum screens (round vs. angular) and the mesh width greatly influence the amount and particle size distribution of the separated fine particle fraction. In the course of the project, the rapid test method RAPPD (Figure 17) was developed on the basis of commercially available soil analysis, which cost less than € 1,000 [6]. This allows the potassium content to be determined in wood samples within about 10 to 15 minutes at a cost of roughly 5 euros per sample. This can make it much easier to establish the necessary fuel quality through self-monitoring and quality assurance on site. The results of the project were presented at four different conferences (27<sup>th</sup> EUBCE 2019, FORMEC 2019, 8<sup>th</sup> Status Conference “Biomass Energy Use” 2019 and 28<sup>th</sup> EUBCE 2020) and have been included in two peer-reviewed publications:



**Fig. 17** Comparison of the determination of the potassium content by means of standardized fuel analysis using ICP-OES after hydrofluoric acid digestion and by means of RAPPD (regression [solid line], 95% confidence interval [gray shaded area], 95% prediction range [dashed line], vertical line to delineate the three ranges with different potassium contents.

- Publication of the results on the processing of woodchips using various processing technologies in the journal *CET Chemical Engineering Technology* (peer-reviewed)
- Publication of the results for the rapid potassium test using a soil kit in the journal *Biomass and Bioenergy* (peer-reviewed)

## OUTLOOK

A more precise understanding of the influence of fuel preparation on the quality of low-quality woodchips is of great interest both for pilot plant operators and with regard to regional fuel supply and the use of biogenic residues for energy production. The project thus contributes to ensuring the broadest possible fuel base for biomass gasification in order to avoid competing uses and to guarantee the greatest possible flexibility in terms of the fuels that can be used. It could be shown that with appropriate pre-treatment even difficult woody biomass can be used for biomass gasification. The extensive analysis that accompanied the processing made it possible to show the improvement in homogeneity within the fuel and the effect of the processing steps, as well as to identify optimisation potential in the sequence of the processing steps and specific process parameters. An extended raw material quality control in the form of rapid tests for determining content can help operators to identify difficult assortments of wood early on that could potentially cause operational problems, and to initiate appropriate countermeasures.

### For further information visit:

<https://www.energetische-biomassenutzung.de/en/projects-partners/details/project/show/Project/VergaOpt-561>



## Sources:

- [1] Energy Concept 2050: [www.fvee.de/fileadmin/politik/10.06.vision\\_fuer\\_nachhaltiges\\_energiekonzept.pdf](http://www.fvee.de/fileadmin/politik/10.06.vision_fuer_nachhaltiges_energiekonzept.pdf). retrieved on 27/9/2016.
- [2] Bioenergy policy in Germany and social challenges. [www.biooekonomierat.de/fileadmin/Publikationen/berichte/BOERMEMO\\_Bioenergie\\_final.pdf](http://www.biooekonomierat.de/fileadmin/Publikationen/berichte/BOERMEMO_Bioenergie_final.pdf). retrieved on 27/9/2016
- [3] National Bioeconomy Policy Strategy. [www.bmbf.de/files/BioOekonomiestrategie.pdf](http://www.bmbf.de/files/BioOekonomiestrategie.pdf). retrieved on 27/9/2016
- [4] Brosowski, A. et al.: Biomassepotenziale von Rest- und Abfallstoffen – Status quo in Deutschland. In: Schriftenreihe Nachwachsende Rohstoffe: Band 36, Gülzow-Prüzen, Germany, 2015
- [5] Zeymer, M: Technik, Betrieb und Wirtschaftlichkeit – Holzvergasungsanlagen in der Praxis. In: 13. Holzenergie-Symposium: Entwicklungen für Wärme, Kraft und Fernwärme aus Holz. ETH Zürich, 12 September 2014.
- [6] Mühlenberg J., Pollex A., Zeng T. Development of a simple and rapid test method for potassium to ensure fuel quality of woody biomass fuel. Conference proceedings. In: 28<sup>th</sup> EUBC, 6–9 July 2020, virtual.

## Project summary

<b>Duration:</b>	1/1/2018–30/7/2020
<b>Project partner:</b>	Technology and Support Centre (TFZ) at the Competence Centre for Renewable Resources Straubing, Spanner Re <sup>2</sup>
<b>Scientific contact:</b>	Dr. Annett Pollex
<b>Project number:</b>	O3KB135
<b>Funding body:</b>	Federal Ministry for Economic Affairs and Energy, Project Management Jülich

Supported by:



on the basis of a decision  
by the German Bundestag



## Important reference projects and publications

**Project:** AbfallE – Waste-end property of untreated, woody residues through treatment processes and quality assurance; Sub-project: Evaluation of waste and licensing practices as well as environmental impact and economic efficiency, Federal Ministry for Economic Affairs and Energy/ Project Management Jülich, 1/11/2019–30/4/2022 (funding code: 03KB160A)

**Project:** OBEN – Oil Substitute Biomass Heating, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/9/2019–28/2/2023 (funding code: 03KB156)

**Project:** oNIReduce – Emissions reduction through adapted boiler control based on data from a continuous online NIR fuel analysis, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/7/2019–31/12/2021 (funding code: 22033218)

**Project:** OptDienE – Options for the grid-supporting operation of single-room fireplaces; sub-project: System effect of single-room fireplaces, Federal Ministry for Economic Affairs and Energy/ Project Management Jülich, Energy/Project Management, 1/8/2018–31/3/2021 (funding code: 03KB138A)

**Project:** VaBiFlex – ERA-Net collaborative project: Value-optimised use of biomass in a flexible energy infrastructure; Sub-project 1: Theoretical and experimental investigations, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/9/2018–31/3/2021 (funding code: 22408317)

**Publication:** Adam, R.; Zeng, T.; Ulbricht, T.; Kirsten, C.; Schneider, P.; Dobler, U.; Lenz, V. (2020). "Erfolgreiche Demonstration des Prüfbrennstoffkonzeptes zum Einsatz nicht-holzartiger Festbrennstoffe im Geltungsbereich der 1. BImSchV". Müll und Abfall (ISSN:

0027-2957), Vol. 52, H. 7. S. 356–361. DOI: 10.37307/j.1863-9763.2020.07.06.

**Publication:** Krüger, D.; Lenz, V.; Ulbricht, T. (2020). "Simulation of the natural draft for test bench measurements". Biomass Conversion and Biorefinery (ISSN: 2190-6815), Vol. 10, H. 1. S. 73–83. DOI: 10.1007/s13399-019-00531-0.

**Publication:** Lenz, V.; Szarka, N.; Jordan, M.; Thran, D. (2020). "Status and perspectives of biomass use for industrial process heat for industrialized countries, with emphasis on Germany". Chemical Engineering & Technology, Vol. 43, H. 8. S. 1469–1484. DOI: 10.1002/ceat.202000077.

**Publication:** Mutlu, Ö. Ç.; Zeng, T. (2020). "Challenges and Opportunities of Modeling Biomass Gasification in Aspen Plus: A Review". Chemical Engineering & Technology (ISSN: 0930-7516), Vol. 43, H. 9. S. 1674–1689. DOI: 10.1002/ceat.202000068.

**Publication:** Pollex, A.; Lesche, S.; Kuptz, D.; Zeng, T.; Kuffer, G.; Mühlenberg, J.; Hartmann, H.; Lenz, V. (2020). "Influence of screening and drying on low quality wood chips for the application in small-scale gasification plants". Chemical Engineering & Technology (ISSN: 0930-7516), Vol. 43, H. 8. S. 1493–1505. DOI: 10.1002/ceat.202000034.

**Publication:** Zareihassangheshlaghi, A.; Beidaghy Dizaji, H.; Zeng, T.; Huth, P.; Ruf, T.; Denecke, R.; Enke, D. (2020). "The behavior of metal impurities on surface and bulk of biogenic silica from rice husk combustion and their impact on ash melting tendency". ACS Sustainable Chemistry & Engineering (ISSN: 2168-0485), Vol. 8, H. 28. S. 10369–10379. DOI: 10.1021/acssuschemeng.0c01484.

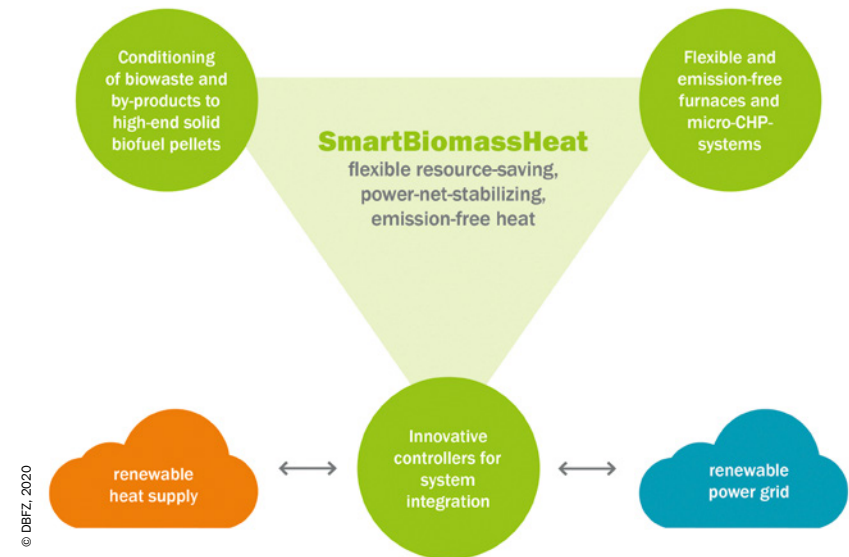


### Head of the research focus area

**Dr.-Ing. Volker Lenz**

Phone: +49 (0)341 2434-450

E-Mail: volker.lenz@dbfz.de



## THE RESEARCH FOCUS AREA "SMARTBIOMASSHEAT"

The research focus area focuses on the small-scale, renewable supply of heat to buildings and building complexes on up to villages and neighbourhoods using other renewable energy sources and smart heating technology networks based on biomass, primarily from residues, by-products and waste. The overarching goal is to make the best technological and economic use of all renewable heat sources through the flexible demand-oriented use of biomass-based heating technologies. The entire chain must be mapped, investigated, simulated and optimised on an individual basis and in combination, from the refinement of biomass fuels via new conversion plants, to the integration of biomass heating systems in the heat and power grid. These biomass heating system will also be designed as future heat-power-cooling systems. By developing the necessary technical components and connecting this with the research and development of control systems, these systems are to be optimised for flexible operation (including for micro and small CHPs) as well as for efficient, environmentally friendly, economic, safe, demand-oriented, flexible and sustainable (smart) operation.

**For further information visit:**  
[www.smartbiomassheat.com](http://www.smartbiomassheat.com)

## 6.5 CATALYTIC EMISSION CONTROL



*“In the ‘Sitrophen’ project, a completely new, low-emission, flexible and efficient woodchip stove is being developed that is currently not available on the market. The project does not intend to copy the pellet stove that uses woodchips as a substitute fuel, but rather to develop and test a small-scale woodchip stove with a heat output smaller 4 kW that uses homogeneous dry and sifted woodchips”.*

Prof. Dr. Ingo Hartmann, Project Manager

**Keywords:** precision wood chips, pellets, continuous feed, stove, emission control

### SITROFEN – DEVELOPMENT OF A LOW-EMISSION COMBUSTION SYSTEM FOR HIGH-QUALITY WOODCHIPS PRODUCED ACCORDING TO DEMAND; SUB-PROJECT 1: THEORETICAL AND EXPERIMENTAL INVESTIGATIONS, EVALUATION OF EMISSION LIMITS

The aim of the project is to develop an economically promising technology demonstrator for a woodchip stove and to demonstrate its practicality, including the necessary fuel chain, in a real operational environment. This innovative approach is characterised by two basic considerations. On the one hand, the fundamental research and development of the stove, including the necessary fuel supply and logistics chain, is to be developed independently of special manufacturer interests in order to enable a broad market launch later on. At the same time, this development should lead to a marketable product. Therefore, the project consists of two stages. First, an efficient and economical alternative to log stoves is to be developed. The main focus here is on stable and low-emission operation with a high degree of efficiency. Even though the nominal output of the stove is

below 4 kW and is therefore not subject to measurement obligations under the 1<sup>st</sup> Federal Emissions Protection Act (1<sup>st</sup> BImSchV), the abatement of emissions is a primary goal of the project. The aim is to remain well below the limits of the 1<sup>st</sup> BImSchV for particulate matter and CO for single-room stoves, even in normal real-world operation, and at the same time to achieve high efficiencies. Based on tests on a laboratory and pilot plant scale, the system is currently being developed and optimised at the DBFZ and at the South Westphalia University of Applied Sciences as part of the first phase of the project. Industry feedback is to be incorporated into this development and a close exchange of ideas should help industry to participate in the second phase. In the second phase, at least one company will participate and build a prototype based on the developed demonstrator and test it in a real-life environment.

### METHODS/MEASURES

The South Westphalia University of Applied Sciences, Energie Holz Hess GmbH & Co. KG, IBT-Krämer and the DBFZ are working on a project funded by the Agency for Renewable Resources (Fachagentur Nachwachsende Rohstoffe e.V. FNR) to develop a low-emission, automatically fed single-room firing system with a nominal output of 4 kW, which can be operated with precision woodchips. This results in lower fuel costs than for pellets and a flame pattern comparable to that of log combustion. Different types of natural logs are used for the precision woodchips, which can be produced on a decentralised basis and enable regional marketing, though recognised quality standards must be adhered to. In terms of the development of the combustion chamber, basic technically successful principles, e.g. from boiler construction, were transferred to the new application. The continuous fuel feed is either from the side, as in grate firing, or as traditionally done from below, as in underfeed firing. The primary air is fed in from the side. This ensures a constant and controllable output and a stable fire bed without the swirling up of ash particles. Mixing with secondary air, temperature and residence time are optimised in the burnout zone. Varying the fuel in the test combustion chamber has shown that:

- air-dry fuels are best suited
- fuel particle size has no impact for the 8–16 mm range under investigation
- the conveyance technology as a whole must be adapted to the fuel
- the different bulk densities of the various types of wood require an adjustment of the feed rate of the metering system.

Emissions are currently already in the range of good pellet stoves, even without being optimised to one combustion chamber. However, this purely technical optimisation means little as this requirement is taken for granted by the market. From the market's point of view, other criteria must be fulfilled. In addition to the product design, which is not being looked at in the current project phase, important ancillary conditions include ease of operation, noise level and, last but not least, the flame design, which essentially determines the fire experience. These are explicitly addressed and methodically elaborated within the framework of the project.

## MILESTONES/CHALLENGES

### Precision woodchip fuel

Precision woodchips are a sustainable and homogeneous wood fuel made from debarked coniferous or deciduous wood which is chopped to a fibre length of 8 to 16 mm using commercially available chippers. Optimised parameters lead to high yield. It is dried to a water content of M 14 and fine and coarse particles are separated out. It can be delivered by pumping truck or in bags. Precision chopped material has few fine particles, can be stably stored, and does not generate CO. The particle size is based on average wood pellets in order to be able to directly compare screw conveyance, fuel metering and the combustion process. A 4-kW stove with a 30-litre hopper can heat for an evening (up to 6 h) with precision woodchip. Next, the question is tackled about whether the quantity and quality of the fuel prepared for single-fuel woodchip stoves can be provided throughout the country. In principle, three production pathways (forestry, timber, waste) are conceivable,

which, even with centralised production and distribution activities throughout Germany, would enable nationwide production and regional supply of precision woodchips. As soon as this market establishes itself and begins to grow, regional competitors will emerge.

### Combustion principle

In terms of the type of combustion, the principle of lateral fuel insertion was selected, which has so far been used predominantly for boiler units, in particular woodchip boilers. This principle has not yet been investigated in detail for single-room stoves (cf. Figure 18, Figure 19).

In the principle investigated in this project, the fuel is fed laterally into the combustion chamber via a metering screw onto an inclined combustion trough. This is similar to the stair grate firing system which has been widely used in boilers for many years. Here the combustion air is injected as primary air through air nozzles through the side of the combustion trough. The secondary air is supplied above the grate before entering the afterburner chamber. No grate air is used in order to avoid fire bed disturbance and at the same time to enable the control of the fire bed temperature. Furthermore, a continuous fuel supply is provided via the metering screw by means of a speed-controlled screw feeder. This means that batchwise fuel supply and the associated batch combustion is avoidable. The secondary air is fed after the primary zone just before the tubular combustion reactor, thus enabling separation of the primary and secondary zones. For an almost complete gas burnout, a tertiary air supply has also been integrated below the cylindrical flame glass reactor, which also acts as purge air to prevent combustion products from being deposited on the glass reactor currently in use. The comparatively "small" glass reactor (small diameter) for a 360° view of the flame has been deliberately chosen in order to be able to visually observe the flame from all sides. Because of the comparatively cold glass wall (here made of quartz glass), soot forms upon contact with the flame. This is deposited on the inner glass reactor wall if no tertiary air/reactor purge air is used. Purge air effectively prevents soot from being deposited on the glass wall. Corresponding design and optimisation studies must be carried out in a possible second phase of the project

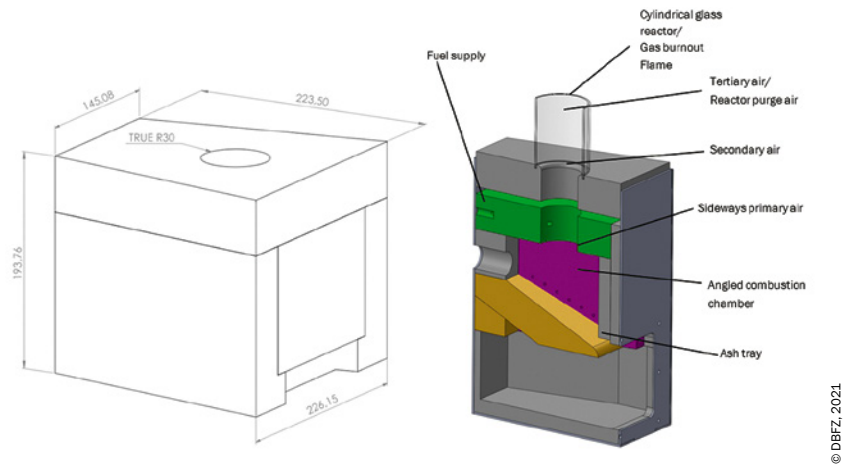


Fig. 18 Schematic diagram of the prototype of the OHS furnace

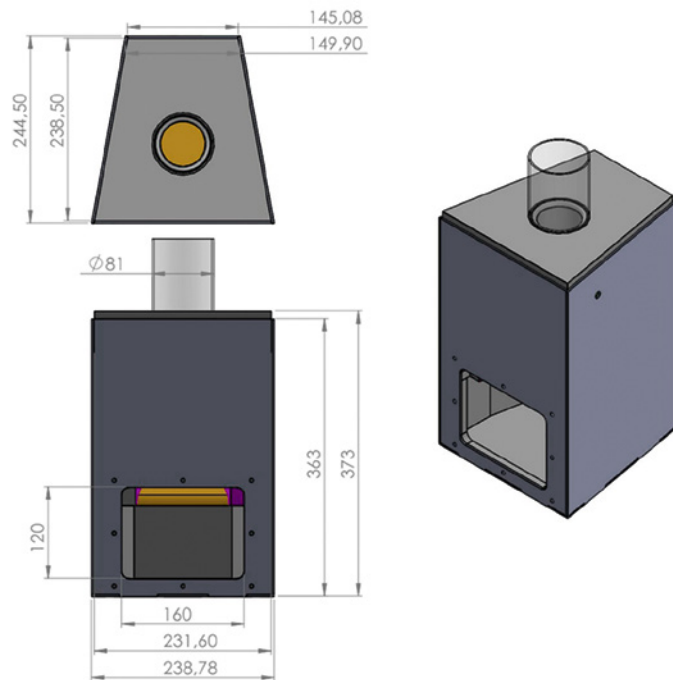


Fig. 19 Drawing of the combustion chamber of the PHS furnace

before it can be transferred to market-relative geometries in cooperation with a stove manufacturer.

## OUTLOOK

### Development results

The research work shows that the use of precision woodchips in the newly developed single-room firing system is possible. Despite the predominantly low heat output (< 4 kW), CO as well as particulate matter emissions were below the limit values under the 1<sup>st</sup> BImSchV (for pellet stoves) for all tested fuel assortments under steady conditions. The stove produces low emissions with both beech and spruce precision woodchips, whereby slightly more particulate matter was measured in the spruce wood exhaust gas. The influence of the water content is clear, i.e. all varieties with  $w = 18 \text{ mass\%}$  showed significantly higher CO emissions than when chips with lower water content were combusted. In contrast, no difference was found between  $w = 14 \text{ mass\%}$  and  $w = 7 \text{ mass\%}$  in this regard. Moreover, better results were obtained with the drier woodchips than with wood pellets, although the used test combustion unit and fuel dosing is not designed for this application. The irregular feed-in rate is due to a decreasing conveyance rate in the hopper and bridging. In particular, the particle size P12-16 behaves problematically with the metering screw used. An in-depth analysis can only be carried out in further trials with a modified design, which is currently being done at the DBFZ.

Corresponding data and videos have been recorded for the evaluation of the flame pattern (as a crucial criterion for later marketing); the evaluation will be carried out in the course of the project.

## Opportunities for cooperation with stove manufacturers and fuel suppliers

Precision woodchips can be produced cost-effectively, sustainably, and in a quality comparable to that of pellets. It is only a question of time until both fuel types – wood pellets and precision woodchips – will be able to be used in the same stove. It is very likely that this development will initially take place via contracting plants. The development of a low-emission, automatically fed stove with precision woodchips, modern flame pattern, and space heating contribution (including substitution of gas and electricity for central heating) provides an additional opportunity for replacing other domestic heat sources. As a recognised partner for research and development, we are offering a stove manufacturer the opportunity to co-develop a PHS stove based on the project results. This has the advantage of low development costs. Emission measurements are possible as preliminary work for type testing. This opens up the production and marketing of a new type of stove with a unique selling proposition for stove manufacturers, as there are currently no comparable woodchip stoves. At the same time, work is already underway on the production and marketing of a PHS fuel type (M14 ± 2.5, 8 mm < P ≤ 16 mm, spruce or beech, bagged) with the help of the experience and quality assurance provided by project partners, and a follow-up project for a production-scale pilot plant is underway. As soon as the first combustion system can be reliably operated as a demonstrator and supplied with precision woodchips, the stove manufacturer can advertise the option of firing it with precision woodchips as an alternative to wood pellets.

### For more information visit:

[www.fnr.de/index.php?id=11150&fkz=22016817](http://www.fnr.de/index.php?id=11150&fkz=22016817)

(in German)



## Project summary

<b>Duration:</b>	1/4/2019–31/8/2021
<b>Project partner:</b>	South Westphalia University of Applied Sciences (Faculty of Engineering and Economics)
<b>Scientific contact:</b>	Prof. Dr. rer. nat. Ingo Hartmann
<b>Project number:</b>	22016817
<b>Funding body:</b>	Federal Ministry of Food and Agriculture, Agency for Renewable Resources e. V.

With support from



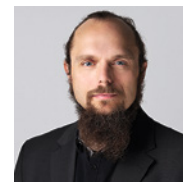
by decision of the  
German Bundestag

## RESEARCH FOCUS AREA “CATALYTIC EMISSION CONTROL”

The vision of a climate-neutral and sustainable bioeconomy and the premises associated with this place very high demands on the research focus area “Catalytic Emission Control” when it comes to pollutant-free bioenergy use. In particular, increased use in the future of biogenic residual and waste materials in increasingly varying qualities represents a challenge for emission-free use. The focus here is on emission reductions in combustion processes for bioenergy sources through the use of and in combination with solid-state catalysts. The greenhouse gas methane (CH<sub>4</sub>), toxic volatile organic compounds (VOC), semi-volatile and low-volatile hydrocarbons, such as polycyclic aromatic hydrocarbons (PAH) and polychlorinated dioxins and furans (PCDD/PCDF), soot particles (carbon black) and nitrogen oxides (NO<sub>x</sub>) must be extensively reduced. The overriding research objective of the research focus area is the investigation of recyclable and cost-effective catalysts that are stable over the long-term and at high temperatures with no, or significantly lower, proportions of precious metals. In particular, combining catalysts with additional emission abatement processes has to be investigated in detail.

## Important reference projects and publications

- Project:** GASASH – Thermochemical conversion of residual materials in a gasifier CHP with coupled ash recovery; sub-project: Investigations into product gas quality, CHP emissions, emission reduction measures and ash utilisation, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/9/2018–30/6/2021 (funding code: 03KB139A)
- Project:** HypoBio – Energetic use of logs through the development of an efficient and low-emission, small-scale log firing system using continuous fuel feeding, Federal Ministry of Food and Agriculture/Agency for Renewable Resources, 1/8/2020–31/7/2022 (funding code: 22033218)
- Project:** KaRo – Catalytic tubular reactor for the total oxidation of fuel gases from the thermal conversion of solid biofuels for low-emission regenerative heat generation, Development Bank of Saxony, 1/10/2019–30/6/2022 (funding code: 100332481)
- Project:** SCRCOAT – Optimisation and validation of processes for the combined reduction of fine dust and acidic pollutant gases in biomass furnaces; sub-project: Experimental investigations on the combination of SCR and precoat processes on a fabric filter, Federal Ministry for Economic Affairs and Energy/Project Management Jülich, 1/9/2017–28/2/2021 (funding code: 03KB128A)
- Project:** UVV – collaborative project: Emission reduction strategies for environmentally friendly combustion based on current research findings, sub-project 1: Theoretical and experimental investigations, coordination; Federal Ministry of Food and Agriculture/Agency for Renewable Resources 1/4/2019–31/3/2022 (funding code: 22038418)
- Publication:** Formann, S. (2020). “Combined substantial-energetic utilization of biogenic residues for the production of biogenic silica, REE and Noble Metals as Catalytic Compounds for Emission Reduction”. Talk held at DBFZ annual conference, [online], 16–17/9/2020
- Publication:** Formann, S.; Hahn, A.; Janke, L.; Stinner, W.; Sträuber, H.; Logrono, W.; Nikolausz, M. (2020). “Beyond sugar and ethanol production: Value generation opportunities through sugarcane residues”. *Frontiers in Energy Research* (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/ferg.2020.579577.
- Publication:** Hartmann, I.; Tebert, C. (2020). “The new Blue Angel ecolabel certification method for firewood stoves”. Talk held at the 6<sup>th</sup> Central European Biomass Conference, Graz (Austria), 22–24/1/2020
- Publication:** He, F.; Li, X.; Behrendt, F.; Schliermann, T.; Shi, J.; Liu, Y. (2020). “Critical changes of inorganics during combustion of herbaceous biomass displayed in its water-soluble fractions”. *Fuel Processing Technology* (ISSN: 0378-3820), Vol. 198. DOI: 10.1016/j.fuproc.2019.106231.
- Publication:** Stolze, B.; Hartmann, I. (2020). “Zeitliche Darstellung des Alterungsverhaltens eines Oxidationskatalysators in einem Biogas-BHKW”. *Chemie Ingenieur Technik* (ISSN: 1522-2640), Vol. 92, Nr. 6. S. 782–787. DOI: 10.1002/cite.201900152



Head of the research focus area

**Prof. Dr. rer. nat. Ingo Hartmann**

Phone: +49 (0)341 2434-541

E-Mail: ingo.hartmann@dbfz.de

# 7

## PRESS AND PUBLIC RELATIONS

In 2020, press and public relations work was dominated by the pandemic. Within a short period of time, face-to-face events had to be converted to virtual or hybrid events, hygiene concepts had to be developed, and technical requirements for transmission had to be created. Even groups of visitors could not be received, or only to a very limited extent and in compliance with all recommended hygiene regulations. Despite the adverse conditions, the DBFZ can nevertheless look back on a successful year of events in 2020.



Autumn is a traditional time for events to be held at the DBFZ and was marked by the Annual Conference and the 3<sup>rd</sup> Doctoral Colloquium BIOENERGY that immediately followed. The biennial conference took place on 16–17 September 2020 under the slogan “Bioenergy between climate package and bioeconomy strategy” and was able to bring together on a virtual basis a total of more than 350 participants from science, industry and politics. A total of 29 presentations were given in which the political and scientific perspectives on bioenergy were discussed as well as the challenges and prospects towards a sustainable bioeconomy. The conclusion by event participants: the bioeconomy market is booming, employing around two million people in Germany. It offers enormous economic opportunities through regional value creation and new jobs. Political framework conditions are crucial when it comes to meeting the climate neutrality goal, according to the scientific managing director of the DBFZ, Prof. Dr. Michael Nelles: “If Europe really wants to become the first climate-neutral continent by 2050, rapid and consistent measures are needed on a large scale. Climate neutrality can only be achieved through consistent energy conservation, a complete conversion to renewable energies, and CO<sub>2</sub> removal. Bioenergy must be used in conjunction with other renewable energy sources where the greatest system benefit can be achieved.”



Fig. 20 Annual Conference of the DBFZ in a hybrid format (16–17 September 2020)

## 6<sup>th</sup> EXPERT FORUM “HYDROTHERMAL PROCESSES”



Fig. 21 Conference reader for the 6<sup>th</sup> HTP Expert Forum

The expert forum “Hydrothermal Processes” was held as a virtual event for the sixth time on 25–26 November 2020. A wide variety of topics and research approaches relating to hydrothermal processes were presented at a total of six sessions. A special focus was on international activities around the hydrothermal liquefaction of biomass. A total of 70 participants from ten different countries were represented, mainly from scientific and economic fields. In addition to a large number of other speakers on a range of aspects surrounding hydrothermal processes, Prof. Dr. Andrea Kruse from the University of Hohenheim gave a talk on water as an extraordinary reaction medium and reaction partner.

The various presentations and posters from the event are available in the conference reader, which can be downloaded free of charge from the DBFZ website.

The next event will take place in autumn 2021 at the DBFZ.

In spring (4–5 February 2020), the 11<sup>th</sup> expert talk “Particle Separators for Domestic Combustion Systems” and the expert talk “Dust Measurement Methods for Small Combustion Systems” were held at the DBFZ in Leipzig as part of a long-standing cooperation with the Technology and Support Centre (TFZ) in Straubing. During the expert talks, it was established that suitable electrostatic precipitators are available for all sizes of furnaces and that their long-term usability has also been proven. Filtering separators for small furnaces are still under development. In the future, however, the aspect of proof of operation will become increasingly important. Also, the Blue Angel certification for wood-burning stoves, which was launched in 2019, could also lead to a revival in demand for separators





**Fig. 22** Expert talk on particle separators at the DBFZ (in cooperation with TFZ Straubing)

in the future. A large number of events also await you in 2021, an overview of which can be found in the following table. We look forward to welcoming you in person at one of our upcoming events in the near future.

**HERE IS WHERE YOU CAN MEET US**

Title	Date	Form
Week of the Environment	10–11 June 2021	Online
15 <sup>th</sup> Rostock Bioenergy Forum	16–17 June 2021	Online
14 <sup>th</sup> Biogas Innovation Congress digital	23–24 June 2021	Online
Long Night of Science	16 July 2021	Online
4 <sup>th</sup> Doctoral Colloquium BIOENERGY	13–14 September 2021	In-person event
FVEE Annual Conference	10–11 November 2021	tba
Biogas expert meeting	24 November 2021	tba
10 <sup>th</sup> Status Conference Bioenergy	29 Nov.–1 Dec. 2021	tba
DBFZ Annual Conference	Spring 2022	Hybrid event

**For more information visit:**  
[www.dbfz.de/en/events](http://www.dbfz.de/en/events)



**Fig. 23** The DBFZ event team



Fig. 24 New issues of the “DBFZ Report” publication series are available free of charge

## NEW PUBLICATIONS/DBFZ PUBLICATION SERIES

Numerous new publications have expanded the portfolio of scientific publications in 2020 which are available free of charge. In addition to four conference readers for our events, we were also able to further expand the “DBFZ Report” series. The new publications include two English language dissertation papers on the “Economic assessment of biogas plants as a flexibility option in future electricity systems” and “Hydrothermal processing of biogenic residues in Germany – A technology assessment considering development paths by 2030”. Other issues deal with “Substrate and efficiency assessments of biogas plants” and “System solutions of bioenergy in the heat sector in the context of future developments”. The support of the BMWi funding programme “Biomass Energy Use” was also able to release new publications in 2020 as part of a publication series. The publications, which are also available free of charge, include a booklet on the topic of “System solutions in the heating sector”, a conference reader for the conference “Digitalization, Sector coupling, Flexibilization” (Systemic integration of bioenergy & other renewable energies in buildings and neighbourhoods), and the English edition of the “Collection of Measurement Methodologies for Biogas”.

For further information and free downloads visit:

[www.dbfz.de/en/reports](http://www.dbfz.de/en/reports)

[www.dbfz.de/en/conference-reader](http://www.dbfz.de/en/conference-reader)

[www.energetische-biomassenutzung.de/en/publications](http://www.energetische-biomassenutzung.de/en/publications)



Fig. 25 In 2020, DBFZ scientists were once again in demand as experts on the topics of the bioeconomy and bioenergy

## PRESS AND MEDIA RELATIONS

DBFZ scientists were increasingly invited to appear in the media as guest experts in 2020. Thus, participation in scientific webinars, podcasts and videos increased. The focus here was on topics such as current developments in the bioeconomy, renewable fuels, the importance of biogenic residual and waste materials, and the role of bioenergy in the energy transition.

### Podcasts and media contributions in 2020 (selection):

[www.soundcloud.com/user-564290903/s1-e1-franziska-muller-langer](https://www.soundcloud.com/user-564290903/s1-e1-franziska-muller-langer)

[www.koerber-stiftung.de/mediathek/koennen-flugzeuge-mitbioenergie-fliegen-daniela-thraen-2037](http://www.koerber-stiftung.de/mediathek/koennen-flugzeuge-mitbioenergie-fliegen-daniela-thraen-2037)

[www.br.de/mediathek/podcast/campus-talks/prof-dr-ing-daniela-thraen-kann-das-weg-oder-ist-das-bioeconomie/1814114](http://www.br.de/mediathek/podcast/campus-talks/prof-dr-ing-daniela-thraen-kann-das-weg-oder-ist-das-bioeconomie/1814114)

[www.daserste.de/information/wirtschaft-boerse/plusminus/broadcast/gas-oline-carbon-dioxide-climate-target-100.html](http://www.daserste.de/information/wirtschaft-boerse/plusminus/broadcast/gas-oline-carbon-dioxide-climate-target-100.html)

## CONTACT

**Paul Trainer**

Phone: +49 (0)341 2434-437

E-Mail: [paul.trainer@dbfz.de](mailto:paul.trainer@dbfz.de)

**Katja Lucke**

Phone: +49 (0)341 2434-119

E-Mail: [katja.lucke@dbfz.de](mailto:katja.lucke@dbfz.de)

**Joana Klein**

Phone: +49 (0)341 2434-752

E-Mail: [joana.klein@dbfz.de](mailto:joana.klein@dbfz.de)

# 8

## INTERNATIONAL ACTIVITIES

In the international context, the DBFZ pursues its primary goal of making the DBFZ's scientific expertise available to foreign partners. Tools for this include joint research projects, doctoral student exchanges and the implementation of reciprocal research stays. Another goal is to establish cooperation with international universities and non-university research institutes. In addition, non-European networks are to be consolidated and selectively expanded. This also includes initiating and arranging reciprocal visits and organising workshops and conferences.



© FVC Limited, Municipality Awabiyaga, WASOCL, Dr. Narra

**Fig. 26** Preparations for the construction of a pilot waste-to-energy plant in Ghana



Despite the global pandemic, international activities were further expanded in 2020. Content focused on waste utilisation on the African continent (Ghana and Togo) and in Ethiopia. Information on the LabTogo project can be found on page 37.

### CONCEPTS AND PILOT PLANT FOR WASTE UTILISATION IN GHANA

The African country of Ghana faces a multitude of challenges, of which waste management is one of the most urgent. Every day, more than 12,000 tonnes of municipal waste are generated, of which only 10% is collected and disposed of. The remaining 90% ends up in open fields, drains and roadside ditches, causing serious health problems. The project “Hybrid waste to energy as a sustainable solution for Ghana (W2E)” (P3230084), funded by the German Federal Ministry of Education and Research (BMBF), aims to treat solid waste in Ghana and convert it to energy. By the end of 2023, the project will have developed concepts for the treatment of municipal solid waste in Ghana and build an innovative 400 kW hybrid PV, biogas and pyrolysis plant to generate energy from waste in Gyankobaa (Ashanti Region). Among other things, the DBFZ will build a bioenergy laboratory and train technical staff in laboratory procedures. The overall goal of the project, which started in 2020, is to demonstrate the transition from a waste collection and landfill system to a circular economy in Ghana. The project is expected to have a positive impact so that Ghanaian businesses experience first-hand the design, construction and maintenance of the facility. In order to improve the sustainability of the project beyond the duration of the funding phase, key state institutions, municipalities and non-governmental organisations have pledged their cooperation, so that the project can continue its activities beyond the duration of the funding period. The total contract value of the project amounts to 5.8 million euros, including 870,000 euros for the DBFZ.

## PREVENT ETHIOPIA

At the end of 2020, the DBFZ was awarded the contract to develop a guideline for handling organic waste in urban and rural areas in Africa, and more specifically, in Ethiopia. This involves analysing the status quo in the recycling of organic waste and determining its potential. At the same time, technical solutions are proposed to local partners and stakeholders. The project is of particular interest to the DBFZ because some aspects are being investigated in Leipzig's partner city of Addis Ababa. The project is scheduled to run from February 2021 to June 2022.

## BOGOTA – WASTE CONCEPT FOR ORGANIC WASTE FRACTIONS

For the city of Bogotá, the DBFZ will develop a waste concept for organic waste fractions together with GIZ and the District Government Office for Public Services (UAESP). In the first phase, the material flows and hotspots will be identified. In addition, under the guidance of the DBFZ, the organic fractions from different sources (e.g. household waste, food industry, parks, restaurants, hotels and food markets) will be investigated in terms of their composition and properties. Based on this preliminary work, clear recommendations will then be developed in a second phase starting in 2022 which will determine which recycling route would be best for which organic residual fraction in which urban area.

## BIOECONOMY WORKSHOP IN CANADA

The DBFZ hosted the “Canada-Germany Bioeconomy Cooperative R&D Partnering Event” together with the Canadian Embassy and Project Management Jülich which took place from 2–4 March 2020. The event focused on initiating cooperation between German and Canadian companies and research institutes on various bioeconomy topics. About 80 participants from business, science, administration and politics found their way to Leipzig.

The DBFZ has established contacts with Agriculture and AgriFood Canada (AAFC) and Natural Resources Canada (NRCan) as well as two central departmental



Fig. 27 Canada workshop at the DBFZ (2–4 March 2020)

research institutions for bioenergy research in Canada. Initial concepts for joint research projects have also emerged with the University of British Columbia, especially with the Biomass Research Group.

**For further information visit:**

[www.dbfz.de/en/research/international-activities](http://www.dbfz.de/en/research/international-activities)



### Contact

**Dr. rer. pol. Sven Schaller**

Phone: +49 (0)341 2434-551

E-Mail: [sven.schaller@dbfz.de](mailto:sven.schaller@dbfz.de)

# 9

## YOUNG SCIENTISTS



The DBFZ attaches great importance to young scientists in the field of bioenergy. In order to fulfil its scientific mission, the DBFZ is continuously developing its staff, interdisciplinary expertise and research infrastructure. Young scientists are supported through supervision of their bachelor's, master's and doctoral theses. In addition, employees benefit from a broad continuing education programme. The DBFZ also attaches great importance to a work-life balance (more on this starting on page 123).

### THE DBFZ'S DOCTORAL PROGRAMME

The DBFZ's doctoral programme has been in place since 2013 and offers doctoral staff a variety of opportunities to explore in depth a bioenergy or bioeconomy topic and, at the same time, to put their findings and acquired knowledge to practice. To explore their research topics, doctoral students have state-of-the-art technology available in the DBFZ's laboratories, technical centres and offices. Modern equipment and an excellent infrastructure enable a high level of scientific work.

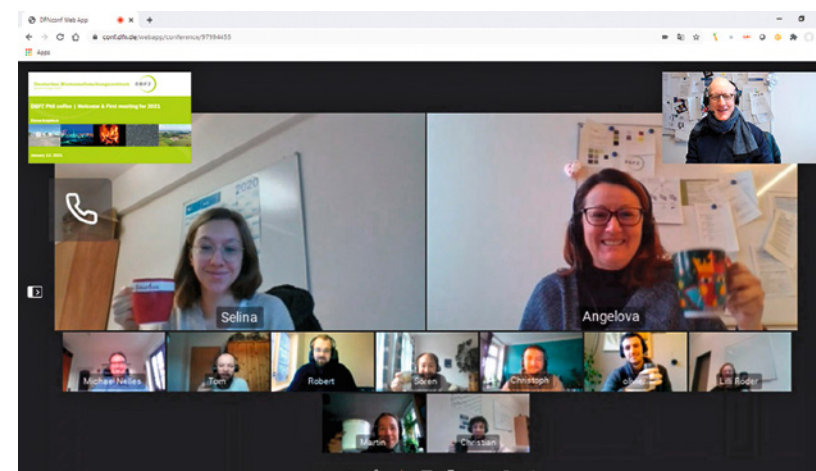


Fig. 28 Virtual meeting of doctoral students in February 2021

The professional supervision of the doctoral candidates by one or two experienced DBFZ scientists is an additional guarantee for high-quality research.

As a rule, academic supervision is provided by renowned universities in Germany with which the DBFZ closely cooperates. The doctoral students participate in the research life of the DBFZ from the very beginning and are integrated into ongoing projects. Through regular participation in high-level scientific events (e.g. Doctoral Colloquium BIOENERGY), they are also introduced to the scientific community early on. In addition, they are given the opportunity to consolidate their experience through committee work.

A total of about 70 doctoral projects are carried out annually at and in cooperation with the DBFZ. For this purpose, the DBFZ cooperates with nine German universities<sup>4</sup> and one university of applied sciences as well as two foreign universities. Of a total of 68 PhD projects in 2020, 42 were supervised directly at the DBFZ. Most (29) doctoral projects were supervised in cooperation with the University of Leipzig and in cooperation with the Chair of Waste and Material Flow Management at the University of Rostock (15). Of these, six doctoral projects in cooperation with the University of Leipzig and three in cooperation with the University of Rostock were successfully completed in 2020.

## DOCTORAL COLLOQUIUM BIOENERGY

A successful example of the efforts to integrate young researchers into the scientific community is the Doctoral Colloquium BIOENERGY which was initiated by the DBFZ. It is held annually in cooperation with over 30 leading research institutions and universities in the field of bioenergy.

The 3<sup>rd</sup> Doctoral Colloquium BIOENERGY took place on 17–18 September 2020 following the DBFZ's Annual Conference, as a virtual web conference under the patronage of Prof. Dr. Daniela Thrän (UFZ/DBFZ/University of Leipzig). The event, which had 185 participants from 18 countries, 24 oral presentations and

<sup>4</sup> 15 were in cooperation with the UFZ Department of Bioenergy (BEN), the UFZ Department of Economics and the UFZ Department of Environmental Microbiology (UMB).

36 poster presentations, aimed to improve the quality of the entire bioenergy research field in Germany and to increase its visibility within the broader scientific community. The programme committee, consisting of 13 high-ranking scientists, was responsible for selecting the contributors and received support from the Scientific Advisory Council, which includes more than 40 renowned bioenergy scientists from Germany, Austria, Switzerland and Norway. The 4<sup>th</sup> Doctoral Colloquium BIOENERGY will take place in autumn 2021 at KIT in Karlsruhe.



**Fig. 29** The 3<sup>rd</sup> Doctoral Colloquium BIOENERGY brought together young scientists from 18 countries

## INTERVIEW WITH DOCTORAL STUDENT ANDREA DERNBECHER



**Fig. 30** Doctoral student Andrea Dernbecher

**Ms. Dernbecher, what is your dissertation about?**

**Andrea Dernbecher:** My dissertation deals with the flow simulation of small combustion plants. This involves investigating combustion, flow and temperature distribution in the combustion chamber in order to better understand the processes involved in biomass combustion and to be able to optimise the combustion chamber with regard to the lowest possible emissions.

**What have been the biggest challenges so far?**

**Andrea Dernbecher:** Most simulation programmes don't have models that are specifically designed for biomass combustion. Therefore, I had to fall back on existing models and adapt them in places. This is a major challenge,

especially for a natural material like biomass, which can have very different properties depending on its type and origin, and which also changes significantly during the combustion process.

#### To what extent were you able to benefit from the DBFZ's doctoral programme?

**Andrea Dernbecher:** The doctoral programme has enabled me to carry out a large part of my work without the need for research project funding. As a result, neither the direction of the content nor the timeframe was dictated by a successful project application. This is a great advantage for topics that require very basic research and are important for the focus of the DBFZ.

#### What importance would you attach to the Doctoral Colloquium BIOENERGY?

**Andrea Dernbecher:** The Doctoral Colloquium BIOENERGY has become an established place for networking with other doctoral students from the field of bioenergy. This makes it possible to establish contacts that continue after the completion of our doctorates and provides the basis for long-term cooperation. Due to the fact that the conference is held in English, networking can also be done at an international scale.

Many thanks for the interview.

---

**BIOENERGY**  
**DOC2020**  
3<sup>RD</sup> DOCTORAL  
COLLOQUIUM BIOENERGY

---

**Tab. 3** List of current dissertations at the DBFZ (as of 31 March 31, 2021)/  
\* Successful completion in 2020/2021

Name	Dissertation subject	Institution/ University
Adam, Roman	Further Development of the Biomass Compaction Process using DEM Simulations	Pending approval
Beidaghy, Hossein	Ash-related aspects during the thermochemical conversion of leached silicon rich biomass assortments for the production of heat and power and the combined transformation into valuable inorganic multipurpose chemical compounds	University of Leipzig/ Iran University of Science and Technology (IUST)
Bindig, René	Procedure for Developing Catalysts for Emission Reduction at Incineration Plants	University of Leipzig/ University of Halle
Brosowski*, André	National Resource Monitoring for Biogenic Residues, By-products and Wastes – Development of Systematic Data Collection, Management and Assessment for Germany	University of Leipzig
Büchner*, Daniel	Optimised Control Strategies for Combination Pellet/ Solar Plants to Improve System Efficiency while Minimising Environmental Impact	Technical University Dresden
Chang, Yingmu	Improvement of Biogas Use of Agricultural Residues in China Combined with Germany's Experience	University of Leipzig
Dernbecher*, Andrea	Numerical Study of Emissions from Small-scale Biomass Combustion Plants	Technical University Berlin
Dietrich, Sebastian	Biogas Upgrading to H-gas by Direct Synthesis of Short-chain Hydrocarbons	Technical University Berlin
Dietrich, Steffi	Evaluation of Policy Instruments to Promote Bioeconomic Solutions for Agricultural Residue Utilisation	Martin Luther University Halle- Wittenberg
Dotzauer, Martin	Economic Evaluation of Policy Instruments to Achieve the Expansion Targets of Bioenergy Plants in the Electricity Sector using Object-oriented Programming	University of Leipzig
Gallegos, Daniela	Potential of Water Plants for Water Cleaning and Sustainable Energy Production for Mexico	University of Rostock
Gebhardt, Heike	Heating Network 4.0 – Options for Using Solid Biomass in Decarbonised Heating Networks	Technical University Dresden
Gökgöz, Fatih	Development and Optimisation of Self-Sufficient Biogas Treatment Plants with Integrated Filling Station Technology for a Local Biomethane Fuel Supply	University of Rostock



Name	Dissertation subject	Institution/ University
Hahn, Alena	The Role of Smart Bioenergy in Combination with CO <sub>2</sub> Removal in Decarbonisation Scenarios	University of Leipzig
Haufe, Henryk	Development of a Pattern Recognition Methodology Based on Machine Learning for the Sectoral Coupling of Power and Heating Networks in Rural Regions	Pending approval
Hirschler, Olivier	Potential of Renewable Raw Materials to Replace Peat as a Substrate Feedstock in German Horticulture	Pending approval
Horschig*, Thomas	Using System Dynamics to Model the Scenario-Based Development of the German Biomethane Market	University of Leipzig
Karras, Tom	Biomass Supply Costs for Biogenic Residues	University of Leipzig
Kirsten*, Claudia	Contribution to Optimising the Pelleting Behaviour of Fermentation Residues and Landscape Conservation Hay and Mixtures Thereof	Technical University Berlin
Kirstein, Niels	Future Use of Biogenic Solid Fuels against the Background of the Two-Degree Target	University of Leipzig
Klüpfel, Christan Paul	Hydrothermal Liquefaction of Residual Biomass	Pending approval
Köchermann, Jakob	Hydrothermal Treatment of Wood Hydrolysates for the Production of Furan Derivatives	Technical University Berlin
König, Mario	Investigation of the Development and Utilisation of Novel SCR-Catalysts to Reduce Nitrogen Oxides from the Waste Gas of the Thermochemical Conversion of Biogenic Solid Fuels	Martin Luther University Halle-Wittenberg
Krüger*, Dennis	Development and System Integration of a Micro-Scale Combined Heat and Power Plant for Solid Biomass	Technical University Chemnitz
Kurth, Matthis	Development, Characterisation and Modelling of a Water-Separating Membrane to Increase the Turnover of the Methanation Process	Technical University Berlin
Lauer*, Markus	Macro-Economic Assessment of Biogas Plants as an Option to Enhance Flexibility in the Electricity System of the Future	University of Leipzig
Müller*, Mirjam	Emissions Reduction in Small-Scale Biomass Furnaces Based on Integrated Catalysis	Leipzig University of Applied Sciences/ University of Leipzig
Ngoumelah, Daniel Dzofou	Development of Microbial Electrochemical Technologies for Material and Energetic Use of Humans' and Animals' Raw Liquid Manure	University of Leipzig

Name	Dissertation subject	Institution/ University
Nieß, Selina	Investigation of Methanation Catalysts for the Upgrading of Purified Biogas in Continuous Operation	Pending approval
Nitzsche, Roy	Adsorption and Membrane Filtration for the Treatment of Aqueous Product Solutions in Lignocellulose Biorefineries	Technical University Berlin
Prempeh, Clement Owusu	Generation of Silicon Dioxide from Biogenic Residues for Advanced Applications	University of Rostock/University of Stellenbosch, South Africa
Pujan, Robert	Systematic Modelling of Biorefinery Processes	NTNU Trondheim, Norway
Reinelt, Torsten	Monitoring of Locally Unknown and Time-Varying Methane Emissions from Biogas Plants	Technical University Dresden
Richter, Sören	Development of Bioeconomy Scenarios	University of Leipzig
Röder, Lilli Sophia	Implementation of Demand Side Management in Biorefineries	Ruhr-University Bochum
Rönsch*, Cornelia	Development of a Method to Use the Data of the Chimney Sweep Trade for Energy Industry Reporting	University of Leipzig
Schliermann, Thomas	Synthesis and Property Optimisation of Biogenic Silica through Thermochemical Conversion on the Basis of Rice Husks in Conversion Plants from Laboratory to kg Scale	Pending approval
Siol, Christoph	Assessing New Technologies for the Circular Bioeconomy with Combined Environmental and Economic LCSA	Pending approval
Sumfleth, Beike	Assessment of Low Indirect Land Use Change Risk Indicators in the Sustainability Certification of Biobased Products	University of Leipzig
Thiel, Christian	Reduction of Volatile Organic Compounds (VOCs), Soot, Polycyclic Aromatic Hydrocarbons (PAHs) and Particulates in a Single-Room Stove	Pending approval
Undiandeye, Jerome Anguel	Fermentation of Agricultural Residues for Energetic and Material Utilisation	University of Rostock
Wedwitschka, Harald	Development of Method for Feedstock Characterisation for Box Fermentation Processes	University of Rostock
Zeng*, Thomas	Optimising Combustion of Biogenic Residues in Small-scale Furnaces through Mechanical Treatment	University of Rostock
Zerback, Timo Rolf	Effects of Hydrothermal Substrate Disintegration in the Biogas Process	Pending approval

**Tab. 4** List of current dissertations in cooperation with the Helmholtz Centre for Environmental Research – UFZ (as of 28 February 2021)/

\* Successful completion in 2020/2021.

Name	Dissertation subject	Institution/ University
Baleeiro, Flávio César Freire	A Biorefinery on Sugarcane By-Products Based on the Carboxylate and Syngas Platforms	Karlsruhe Institute of Technology
Boldt, Christin	Transformative Change Towards a Sustainable Bioeconomy: Participatory Pathways to Sustainable Living Environments in Bio-principled Cities	University of Leipzig
Budzinski*, Maik	Towards Ex-Post Monitoring and Ex-Ante Evaluation of the Bioeconomy in Germany – the Example of Wood Use	University of Leipzig
Chan, Katrina	Modelling of Energetic and Material Biomass Use in Sustainable Agriculture and Food Scenarios	University of Leipzig
Fleischer*, Benjamin	System Effects of Bioenergy in the Electricity and District Heating Sector – A Model-based Analysis of Long-term Energy Transition Scenarios in Germany	University of Stuttgart
Grosch Schröder, Bruna	Development of a Biogas Production Process Inspired by the <i>Pachnoda marginata</i> Larvae Gut System	University of Leipzig
Jordan, Matthias	The Future Role of Bioenergy in the German Heat Sector: Insights from an Energy System Analysis	University of Leipzig
Jusakulvijit, Piradee	Sustainable Bioethanol Development for an Approach to the Circular Economy in Thailand – an Evaluation by Multi-criteria Decision Making	University of Leipzig
Kirchner, Dirk	Integration of Modern European Biogas in Off-grid Systems	University of Leipzig
Liu, Bin	Applied Microbial Ecology of Anaerobic Reactor Microbiomes	University of Leipzig
Logroño, Washington	Flexible Alkalitolerant Biomethanation of Renewable Hydrogen Derived from Excess Electricity	University of Leipzig
Musonda, Frazer	Modelling of Bioenergy and Bioeconomy Futures: The Optimal Allocation of Biomass to Competing Sectors	University of Leipzig

Name	Dissertation subject	Institution/ University
Pannicke-Prochnow, Nadine	Sustainable Allocation of Wood-based Secondary Raw Materials – Agent-based Modelling	University of Leipzig
Reißmann*, Daniel	Hydrothermal Processing of Biogenic Residues in Germany – A Technology Assessment Considering Development Paths by 2030	University of Leipzig
Siebert*, Anke	Socioeconomic Evaluation of Wood-Based Products from Germany: Development of a Regional, Social LCA Method and Application in a Bioeconomic Region	University of Leipzig
Tafarte, Philip	Assessing the Potential of Immediate Technical Options for an Optimized Renewable Energy Supply – a Case Study for Germany	University of Leipzig
Zeug, Walter	A Holistic Life Cycle Sustainability Assessment for Bioeconomy Regions – Linking Regional Assessments, Stakeholders and Global Goals	University of Leipzig



### Contact

**Dr. rer. nat. Elena H. Angelova**

Phone: +49 (0)341 2434-553

E-Mail: elena.angelova@dbfz.de

# 10 KNOWLEDGE AND TECHNOLOGY TRANSFER

Through applied research, the DBFZ develops solutions to current practical issues, be it the development of new or the improvement of existing technologies, services and business models. The infrastructure, laboratories, technical centres and experimental facilities are geared towards this practical application. The DBFZ is thus an ideal cooperation partner for small, medium-sized and large companies from a wide range of industries – from agriculture and forestry, to plant and equipment manufacturing, and the food, paper, pulp and chemical industry. A variety of solutions and information have already been developed or made utilisable and can become part of industrial process chains or business decisions through knowledge and technology transfer. As a catalyst for research, develop-



Fig. 31 Knowledge transfer at the DBFZ's Combustion Technical Centre

ment and innovation projects, the DBFZ is open to all forms of cooperation, for example publicly funded collaborative research with participants from industry, science and society, direct research contracts with industry, and a range of consulting services for various stakeholders.

Companies can work with the DBFZ as a partner to jointly (further) develop technologies, processes and services that meet their specific needs. The DBFZ draws on holistic knowledge, long-standing scientific expertise and new ideas in the research fields of biobased products/biorefineries, biogas/methane, biomass gasification and combustion, biofuels, biogenic solid fuels (especially pellets), system integration of bioenergy or biogenic raw material potentials. In addition to providing expertise, competent consulting services on bioeconomy issues, and a large research network, DBFZ also offers the joint use of its extensive research infrastructure within the framework of cooperation projects. Under certain conditions, such cooperation projects can also be publicly funded – simply contact us if you are interested!

- General questions about research collaborations and contracts with the DBFZ
- Initiation of joint projects
- Contact brokerage, partner search, integration into existing networks
- Knowledge and technology transfer in the field of the bioeconomy

**For more information visit:**

[www.dbfz.de/en/services/research-with-companies](http://www.dbfz.de/en/services/research-with-companies)



**Contact**

**Karen Deprie**

Phone: +49 (0)341 2434-118

E-Mail: karen.deprie@dbfz.de

## 10.1 COOPERATION AND NETWORKS

The DBFZ is a member of numerous networks and research associations related to the bioeconomy and bioenergy. Strong networking within the national and international research landscape and with industry is essential in order to be able to comprehensively and sustainably solve the complex challenges of the energy and raw material transition.

### IEA BIOENERGY

In the IEA Bioenergy Technology Collaboration Programme (TCP), DBFZ scientists are successfully involved in a total of five of the 11 existing working groups (tasks). In January 2020, Task 44 organised a workshop on “Flexible Bioenergy” during the Central European Biomass Conference. In June 2020, the Task 40 team additionally organised an online event around the first publication from the BECCS/U project.

In August, Task 37 published a report entitled “Integration of biogas systems into the energy system” and a paper was also presented at the BIOSEET Annual Conference. Further highlights of 2020 included moderating at the IEA Bioenergy eWorkshop “Contribution of sustainable biomass and bioenergy in industry transitions towards a circular economy” in October, as well as the launch of the project “Lessons learned biofuels”, in which T39, T40 and T45 cooperated under the co-coordination of the DBFZ.

The joint meeting of Tasks 39 and 44, planned for November at the DBFZ in Leipzig, could not take place due to Covid 19, but a virtual workshop was organised instead. Task 45 “Sustainability” started two projects in 2020 on the topic of “Compliance and Verification” in certification systems and the development of an overview of GHG calculators for bioenergy, organised by the DBFZ. In addition





© Ilkka Hannula/IEA Task 44

**Fig. 32** Meeting of IEA's Task 44 team in Graz during the Central European Biomass Conference (January 2020)

to the Technology Collaboration Programme (TCP), the DBFZ contributed to IEA Advanced Motor Fuels (AMF) with the report “The Role of Renewable Transport Fuels in Decarbonizing Road Transport”, which was also presented online in November.

**For further information visit:**

[www.dbfz.de/en/feature/iea-bioenergy](http://www.dbfz.de/en/feature/iea-bioenergy)

## EERA BIOENERGY

Since the end of 2019, the DBFZ, as a full member of the European Energy Research Alliance (EERA), has represented various aspects of bioenergy in five sub-groups of the EERA Bioenergy programme. The overall goal of EERA Bioenergy is to evolve into a robust research and development tool to assess the research challenges and priorities identified for bioenergy in the European Union's Strategic Energy Technology Plan (SET-Plan) roadmap. By joining the European Energy Research Alliance, the DBFZ has become even more closely involved in European bioenergy research. The membership augments the portfolio of the EERA with the know-how of the “Smart Bioenergy” approach developed by the DBFZ.



Further activities take place within the following networks, among others, predominantly with a focus on the exchange between science, industry and administration:

- Renewable Energies Research Association – FVEE
- BioEconomy Cluster
- BMWi Bioenergy Research Network/Companion Project of the BMWi funding area “Biomass Energy Use”.
- The Energy Saxony energy cluster
- Network for Energy and Environmental Technology Leipzig – NEU e. V.
- TREC Danube Network (EU level)



## SCIENTIFIC COOPERATION WITH UNIVERSITIES AND RESEARCH INSTITUTES

Scientific cooperation with universities and other research institutes is another essential component of the DBFZ's networking activities. Activities are focused on the implementation of the defined research objectives within the framework of applied research and development (R&D). As part of a long-standing cooperation with the Helmholtz Centre for Environmental Research – UFZ issues surrounding the system assessment of bioenergy and the microbiological basis of biochemical processes are studied. Here, the DBFZ's "Bioenergy Systems" department works closely with the UFZ "Bioenergy" department (headed in both cases by: Prof. Dr. Daniela Thrän). At the same time, the "Biochemical Conversion" department cooperates with the UFZ Department of Microbiology "MicAS". In the field of energy recovery from organic waste and residues, there is strategically oriented cooperation between the DBFZ's research focus areas with the Rostock Chair of Waste and Material Flow Management (ASW), represented by the scientific managing director of the DBFZ, Prof. Dr. Michael Nelles. In this context, the University of Rostock organises joint events in partnership with the DBFZ, such as the annual Rostock Bioenergy Forum. Due to the Corona pandemic, the 14<sup>th</sup> Rostock Bioenergy Forum unfortunately could not take place.

Since the end of 2011, the DBFZ's Deputy Scientific Managing Director, Prof. Dr. Daniela Thrän, has worked closely with the University of Leipzig via the Bioenergy Systems Chair at the Faculty of Economics (IIRM – Institute for Infrastructure and Resource Management). In addition to the University of Leipzig, national universities such as Chemnitz University of Technology, Dresden University of Technology,



Anhalt University of Applied Sciences, Merseburg University of Applied Sciences and HTWK Leipzig are also linked to the DBFZ through the lecturing activities of DBFZ scientists. Since winter semester 2020/2021, Prof. Dr. Ingo Hartmann (head of the research focus area "Catalytic Emission Control" at the DBFZ) has also been representing the "Special Areas of Environmental Engineering III" module at the Leipzig University of Applied Sciences (HTWK) as an honorary professor for air pollution control technology. In addition, scientific cooperation with non-European countries, in particular China, has been greatly expanded in recent years. DBFZ scientists are active as visiting professors at the University of Hefei and other renowned universities in China.



© HTWK Leipzig

Fig. 33 Dr. Ingo Hartmann (centre) is a newly appointed professor at the HTWK Leipzig



**Fig. 34** The DBFZ maintains a large number of R&D collaborations with local industry

## R&D COOPERATION WITH LOCAL BUSINESSES

Close cooperation with partners from the business community ensures the necessary practical application, access to important market information, and a focus on innovative and feasible solutions. In cooperation projects with industry, the DBFZ provides a neutral perspective and holistic approach, enabling it to contribute its expertise extensively to market-oriented R&D projects. Strong corporate participation is essential, especially in externally funded projects. For this purpose, the four research departments of the DBFZ have national and international ties with companies driving forward R&D, as well as with many relevant partners from various sectors of the bioeconomy.

## 10.2 RANGE OF SERVICES

As a research institute that primarily conducts applied research, the DBFZ strives for close cooperation with project partners from industry and offers extensive contract research as well as a wide range of science-based services. These services go beyond the main research areas and are aimed at industry, associations, politics, experts and committees alike. The content of the projects is investigated in a cross-departmental and interdisciplinary manner, so that all of the DBFZ's expertise can be used efficiently and to the fullest extent for the following consulting and technical services.

### SCIENCE-BASED SERVICES

- Market analyses and data provision
- Technical, economic, and ecological evaluation
- Concept and process development and optimisation
- Scientific support of R&D projects
- Knowledge and technology transfer

In addition, the DBFZ offers a special R&D infrastructure within the three technical research departments "Biochemical Conversion", "Thermochemical Conversion" and "Biorefineries" as well as an analytical laboratory. The scientific services are aimed at plant and mechanical engineering companies, process-developing companies, plant operators as well as other companies and institutions driving forward R&D.

**For further information visit:**

[www.dbfz.de/en/services/science-based-services](http://www.dbfz.de/en/services/science-based-services)

## TECHNICAL AND SCIENTIFIC SERVICES

### Biochemical Conversion Department:

- Market analysis (based, for example, on the annual operator survey), forecasting and strategy consulting
- Scientific monitoring of the development of plant components
- Balancing and evaluation of processes with regard to efficiency, technical feasibility and economy
- Testing (batch and continuous testing, microbial electrochemical trials)
- Concept development for specific site conditions
- Analysis of biogas processes
- Determination of energy quantities (electricity, heat) and identification of optimisation potentials

### Thermochemical Conversion Department:

- Development, characterisation, pretreatment and additivation of fuels
- Combustion tests and comparative classification of the combustion properties
- Separator measurements, dust and CO measurements
- CFD simulation of thermodynamic processes
- Investigation of catalyst technology for combustion integration
- Catalyst investigations on the test bed and in practice with regard to efficiency and emissions
- Catalyst screening in model and real gas
- Catalyst characterisation by physisorption and chemisorption measurement
- Catalyst synthesis



Fig. 35 Work in the DBFZ's biogas laboratory

### Biorefineries Department:

- Pilot plant experiments on:
  - Hydrothermal carbonisation and liquefaction
  - Fixed-bed and dust gasification
  - Synthesis gas process
  - Gas purification
  - Solid-liquid/liquid-liquid separation processes for biogenic recyclables from aqueous media
- Investigation of the behaviour of fuels and their emissions in an engine test bed



## ANALYTICAL LABORATORY

In order to assess the potential applications of various biomasses, the DBFZ's analytical laboratory investigates the chemical composition and fuel properties of liquid fuels, solid biofuels, biogas substrates, by-products and residues, as well as their conversion products, such as ash, filter dust and process water. The analysis is carried out in accordance with common standards as well as problem-oriented methods development and/or adaptation.

The following parameters can be determined using the equipment available: pellet density, bulk density, particle size distribution, fine particle content, abrasion resistance, calorific value, water content, volatile content, fixed, elemental and organic carbon, CHNS composition, ash content, elemental composition with respect to main and trace elements, total content of sulphur and chlorine as well as concentrations of eluants, density, viscosity, refractive index, flash point, copper corrosion degree, acid and saponification number for glycerol as well as the pH value. Polycyclic aromatic hydrocarbons (PAHs), fatty acid methyl esters (FAMES) and phenols can be identified and quantified by means of GC analyses, and the concentrations of sugars and furan derivatives can be determined by HPLC. In future, a method for determining volatile organic hydrocarbons (BTEX) by GC will be established.

### For further information visit:

[www.dbfz.de/en/services/technical-and-scientific-services](http://www.dbfz.de/en/services/technical-and-scientific-services)



### Contact

**Karen Deprie**

Phone: +49 (0)341 2434-118

E-Mail: [karen.deprie@dbfz.de](mailto:karen.deprie@dbfz.de)

## 10.3 RESEARCH INFRASTRUCTURE

Due to its strong application focus, the DBFZ operates a large number of technical facilities and test beds. Below you will find an overview of its facilities as well as the respective scientific contact persons.

### Detailed information on the technical infrastructure of the DBFZ:

[www.dbfz.de/en/research-infrastructure](http://www.dbfz.de/en/research-infrastructure)



Fig. 36 New DBFZ technical centre

**Tab. 5** Overview of the contact persons in the laboratories, test beds and technical facilities at the DBFZ

Department	Description	Contact
<b>Biochemical Conversion</b>	Research biogas plant	Ulf Müller E-Mail: ulf.mueller@dbfz.de Christian Krebs E-Mail: christian.krebs@dbfz.de
	Biogas lab	Dr. Liane Müller E-Mail: liane.mueller@dbfz.de Dr. Nils Engler E-Mail: nils.engler@dbfz.de Katrin Strach E-Mail: katrin.strach@dbfz.de
	Emission measurement	Lukas Knoll E-Mail: lukas.knoll@dbfz.de
<b>Thermochemical Conversion</b>	Combustion lab	Michael Junold E-Mail: michael.junold@dbfz.de
	Fuel conditioning lab	Claudia Kirsten E-Mail: claudia.kirsten@dbfz.de
<b>Biorefineries</b>	Biorefineries technical centre	André Herrmann E-Mail: andre.herrmann@dbfz.de
	Engine test bed	Jörg Schröder E-Mail: joerg.schroeder@dbfz.de Thomas Hirsch E-Mail: thomas.hirsch@dbfz.de
<b>Bioenergy systems</b>	Databases/research data	Dr. Kai Radtke E-Mail: kai.radtke@dbfz.de
	Assessment methods	Stefan Majer E-Mail: stefan.majer@dbfz.de
	Potential analyses	André Brosowski E-Mail: andre.brosowski@dbfz.de
<b>All departments</b>	Analytical lab	Dr. Jana Mühlenberg E-Mail: jana.muehlenberg@dbfz.de Igor Adolf E-Mail: igor.adolf@dbfz.de



**Fig. 37** Multifuel boiler in the combustion lab of the DBFZ

# 11 ORGANISATION

## 11.1 RESEARCH DEPARTMENTS

The DBFZ has four research departments which cooperate closely with each other, providing an organisational framework for conducting numerous scientific research tasks. While the Biochemical Conversion, Thermochemical Conversion and Biorefineries departments mainly work on applied research tasks, the Bioenergy Systems department develops policy recommendations and advice as well as potential analyses, acceptance studies and a wide range of scenarios for biomass use.

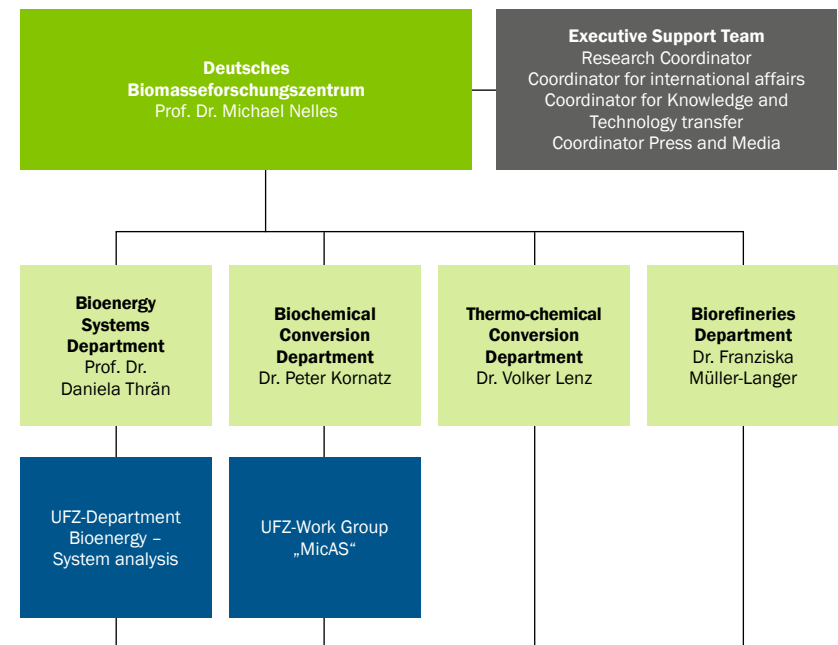


Fig. 38 The research departments of the DBFZ incl. joint departments with the UFZ



## 11.2 SUPERVISORY BOARD AND RESEARCH ADVISORY COUNCIL

### THE SUPERVISORY BOARD OF THE DBFZ

The Supervisory Board, which is chaired by the Federal Ministry of Food and Agriculture (BMEL), makes the substantive and organisational decisions surrounding the development of the DBFZ. The other members are the Federal Ministry of Education and Research (BMBF), the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the Federal Ministry of Transport and Digital Infrastructure (BMVI), the Federal Ministry for Economic Affairs and Energy (BMWi) as well as the Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture (SMEKUL). The Supervisory Board meets twice a year at the DBFZ.

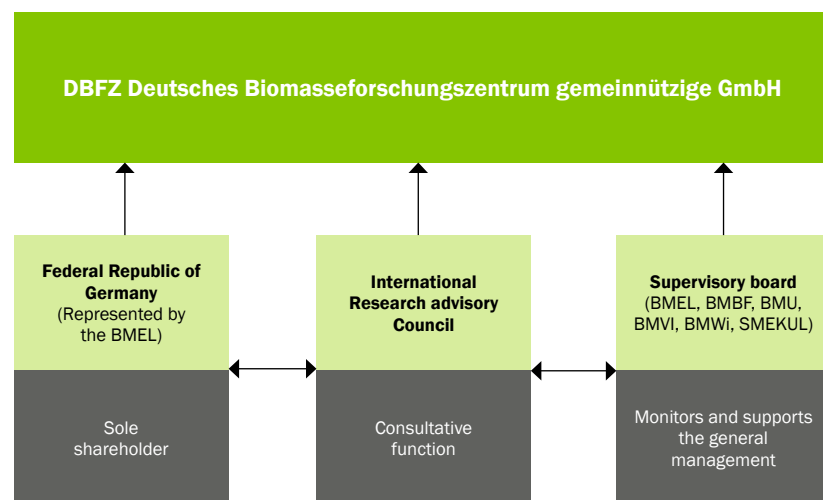


Fig. 39 The control bodies of the DBFZ

The representatives of the Supervisory Board are as follows:  
(as of 1 April 2021)

#### Olaf Schäfer (Chair)

Head of Subdepartment 52 “Sustainability, Renewable Resources”,  
Federal Ministry of Food and Agriculture (BMEL)

#### Ministerial Director Berthold Goeke (Deputy Chair)

Head of Subdepartment “KI | Climate Protection Policy”,  
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety  
(BMU)

#### Daniel Gellner

Head of Department “Agriculture and Forestry”,  
Saxon State Ministry for Energy, Climate Protection, Environment and  
Agriculture (SMEKUL)

#### Dr. Christine Falken-Großer

Head of Division IIA2 – Bilateral Energy Policy Cooperation,  
Federal Ministry for Economic Affairs and Energy (BMWi)

#### Dr. Kerstin Zimmermann

Senior Government Councillor, Department 7 (Provision for the Future),  
Unit 722 “Energy, Hydrogen Technologies”  
Federal Ministry of Education and Research (BMBF)

#### Birgit Breiffuss-Renner

Ministerial Director of Subdepartment G2, Environment and Noise Protection  
Federal Ministry of Transport and Digital Infrastructure (BMVI)

## THE RESEARCH ADVISORY COUNCIL OF THE DBFZ

Since its foundation in 2008, the Research Advisory Council, which is made up of nationally and internationally renowned bioenergy experts, has advised the DBFZ on the direction of its scientific activities. The Advisory Council ensures that the research carried out with institutional funding is scientifically sound and highly relevant to the current and future use of bioenergy in the energy system. At the onset of 2020, five new members (\*) joined the Advisory Council. The term of the newly appointed board is 2020–2023.



Fig. 40 The Research Advisory Council of the DBFZ

Tab. 6 Representatives of the Research Advisory Council are as follows.  
(as of April 1, 2021)

Council member	Organisation	City and Country
<b>Chiaramonti,</b> Prof. Dr. David	Polytechnic University of Turin – DENERG – Department of Energy “Galileo Ferraris”; RE-CORD – Renewable Energy Consortium for Research and Demonstration	Turin (Italy)
<b>Dong,</b> Prof. Dr. Renjie (stellvertreder Vorsitzender)	China Agricultural University (CAU) – National Center for International Research of BioEnergy Science and Technology	Beijing (China)
<b>Dornack,</b> Prof. Dr. Christina (Vorsitzende)	Technical University Dresden – Institute of Waste Management and Circular Economy	Dresden (Germany)
<b>Grzybek*,</b> Prof. Dr. habil. Teresa	AGH University of Science and Technology Kraków – Department of Fuel Technology	Krakow (Poland)
<b>Hartmann,</b> Dr. Hans	Technology and Support Centre (TFZ) at the Competence Centre for Renewable Resources	Straubing (Germany)
<b>Kemfert,</b> Prof. Dr. Claudia	German Institute for Economic Research (DIW Berlin)	Berlin (Germany)
<b>Murphy*,</b> Prof. Dr. Jerry	University College Cork – Professorship of Civil Engineering	Cork (Ireland)
<b>Schenk*,</b> Prof. Dr. Joachim	Leipzig University of Applied Sciences – Chair of Environmental Engineering	Leipzig (Germany)
<b>Teutsch,</b> Prof. Dr. Georg	Helmholtz Centre for Environmental Research – UFZ	Leipzig (Germany)
<b>Thiffault,</b> PhD Evelyne	Laval University – Department of Wood and Forest Sciences	Québec (Canada)
<b>Wagemann*,</b> Prof. Dr. Kurt	DECHEMA – Society for Chemical Engineering and Biotechnology	Frankfurt am Main (Germany)
<b>Walter*,</b> Prof. Dr. Arnaldo	University of Campinas – Department of Energy	Campinas (Brazil)

### 11.3 FINANCIAL RESOURCES

The DBFZ was founded as a limited liability company (GmbH) and is recognized as a non-profit organisation according to Section 52 para. 2 no. 1 of the Fiscal Code. The aim was and is to be able to make use of public research funding in a flexible and transparent manner and to work on behalf of third parties in a research and advisory capacity. The DBFZ is financed by institutional shortfall funding from the Federal Ministry of Food and Agriculture as well as competitively acquired project grants, contract research and services.

In 2020, the DBFZ received funding from the BMEL of 19.6 million euros. In addition, around 10.9 million euros in third-party funding was raised (see Figure 41). On the expenditure side, personnel expenses totalled 13.1 million euros and formed a major portion of the expenses. Further expenditures included approx. 7.4 million euros for investments and 5.1 million euros for material expenses.

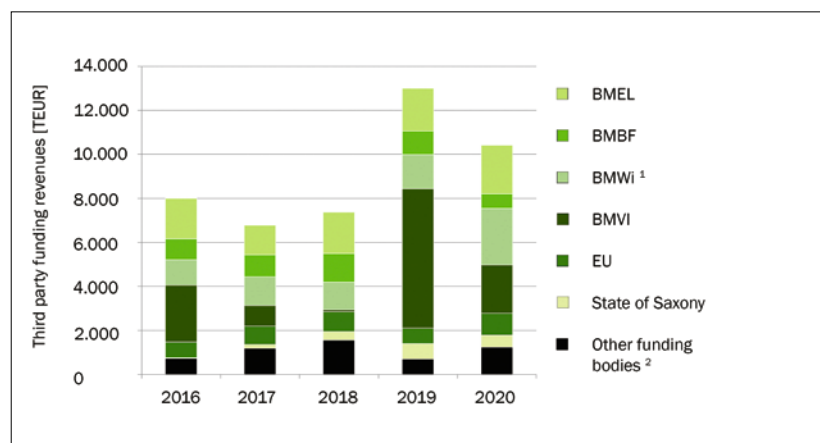


Fig. 41 Overview of third-party funding revenues from 2016–2020 (preliminary figures).

<sup>1</sup> Until 2018 incl. BMU,

<sup>2</sup> Contract research and services from private and public clients.

### 11.4 PERSONNEL/WORK & FAMILY

As of 31 December 2020, 256 people were employed at the DBFZ. Of these, 194 were employed in a scientific/technical capacity and 62 in administration (including the department for infrastructure and real estate management as well as IT). These figures include the scientific staff as well as press and public relations employees.

In 2020, a large number of dissertations were again supervised at the DBFZ. A total of 18 internship reports and student research papers, as well as 54 bachelor’s, master’s and dissertations were supervised. In addition, a total of 29 guest scientists, foreign interns and scholarship holders worked at the DBFZ last year.

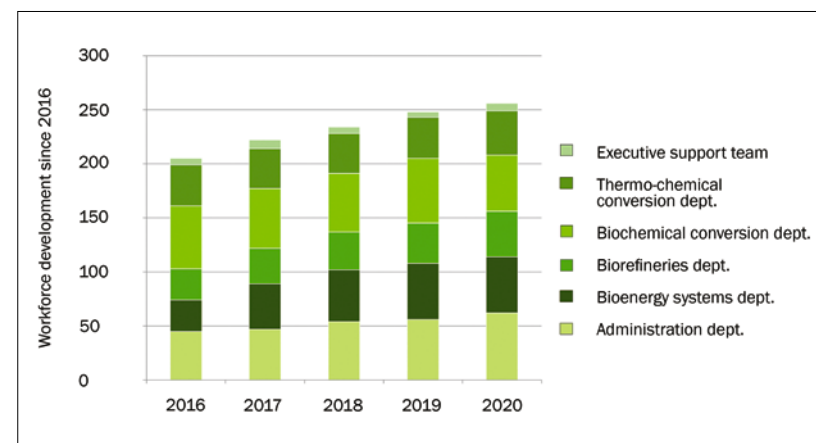


Fig. 42 Personnel development at the DBFZ (2016–2020)

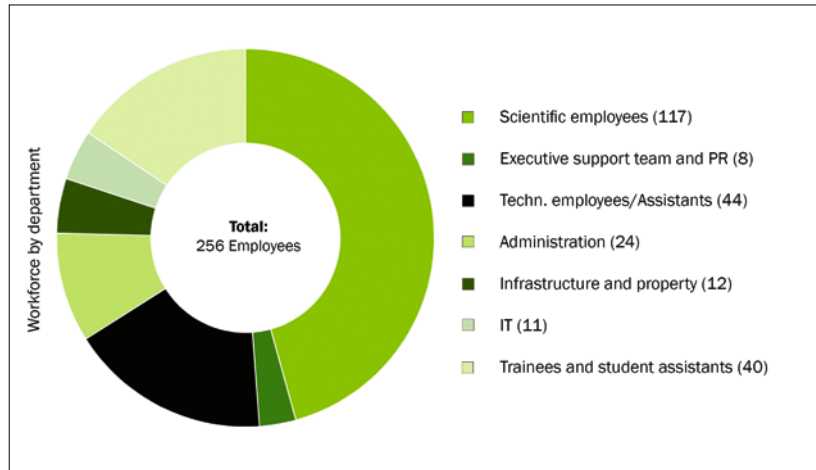


Fig. 43 Number of employees working under collective agreements by area (as of 31 December 2020)

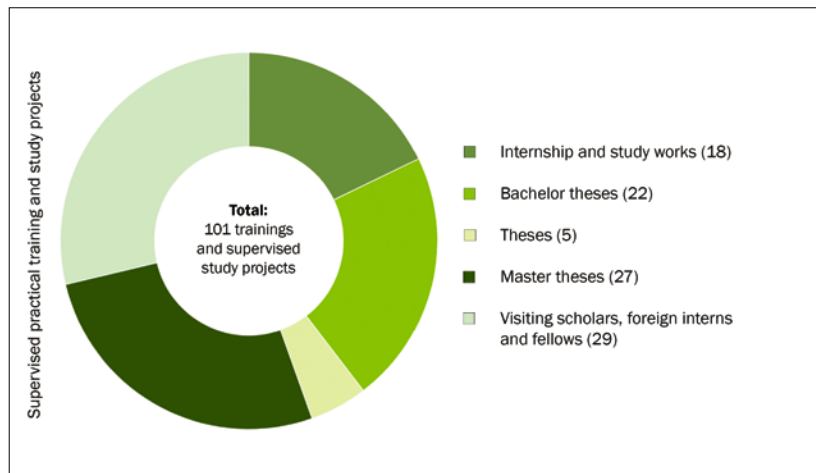


Fig. 44 Overview of work supervised at the DBFZ in 2020 (as of 31 December 2020)

### TRAINEES AT THE DBFZ

The DBFZ has been a training centre since it was founded in 2008. By the end of 2020, a total of 30 trainees and re-trainees had successfully completed their training. In 2020, eleven trainees/re-trainees were trained in the areas of “event management assistant”, “office management assistant”, “electronics technician for plant technology”, “human resources clerk”, “chemical laboratory assistant” and, for the first time, “mechatronics technician”, as well as five BA students in the fields of information technology, controlling, environmental technology and biotechnology.

For further information visit:

[www.dbfz.de/en/career/professional-qualification](http://www.dbfz.de/en/career/professional-qualification)

### WORK AND FAMILY

The DBFZ has successfully held the “workandfamily” (“berufundfamilie”) certificate since 31 October 2014. As part of the auditing and re-auditing process, the DBFZ’s work-life balance programme is continuously assessed and further family-friendly objectives are defined in its HR policy. The resulting measures are constantly updated and implemented in the short or long term.



Fig. 45 Parent-child office at the DBFZ

For example, in addition to consulting services on the topics of children and care for dependents, the DBFZ also offers its employees a wide range of family-friendly working time arrangements (e.g. flexitime, short-term or alternating teleworking, part-time), as well as childcare for small children through child minders and a parent-child office (see Figure 45). Childcare in the company’s own day care centre is run by an external provider. On 10 December 2020, the DBFZ was again awarded the certificate following an external assessment which lasted several days.

# 12 BOARDS, ADVISORY COUNCILS AND COMMITTEES



From the very beginning, the DBFZ has endeavoured to have an intensive knowledge transfer with the scientific community. This is part of the objective of applied research and the utilisation of research results. The scientists at the DBFZ are involved in a wide range of scientific bodies, advisory boards, research groups, networks and committees, and are (visiting) professors in Germany and abroad.

**Tab. 7 Selected committee activities of DBFZ staff (as of February 2021)**

## SCIENTIFIC COMMITTEES/EXECUTIVE BOARDS/DIRECTORATES (SELECTION)

Committee	Function	Country	Since
Advisory Board of the Aviation Initiative for Renewable Energy in Germany e. V. (aireg)	Member of the Executive Board	Germany	2011
BioEconomy Cluster of BioEconomy e. V.	Member of the Executive Board	Germany	2012
Bioeconomy Council – independent advisory body for the federal government	Co-Chair	Germany	2021
Biogas from straw – Conferences	Member of the Research Advisory Council	Germany	2017
Biomass to Power and Heat	Member of the Programme Committee	Germany	2014
Circular Economy 4 Africa	Member of the Executive Board	Germany	2020
Doctoral Colloquium BIOENERGY	Member of the Programme Board	Germany	2018
Doctoral Colloquium BIOENERGY	Member of the Research Advisory Council	Germany	2018
Energy Advisory Council Saxony, state level	Member of the Expert Committee	Germany	2016
Energie und Umweltstiftung Leipzig	Member of the Board of Trustees	Germany	2013
European Biogas Association (EBA)	Member of the Research Advisory Council	Belgium	2019



Committee	Function	Country	Since
Export Initiative RETech "Recycling & Waste Management in Germany" of the German Federal Government (BMU, BMWi, BMZ)	Member of the Executive Board and Head of the Working Group on China	Germany	2014
German Association for Waste Management (DGAW)	Member of the Executive Board	Germany	2014
German BioEnergy Association (BBE)	Member of the Advisory Board	Germany	2012
German-Chinese Centre in Anhui Province	Member of the Executive Board	China	2009
German Energy Research Association (FVEE)	Member of the Directorate	Germany	2015
German Energy Research Association (FVEE)	Experts on bioenergy (electricity, heating, fuels) and FVEE-Spokesperson 2021	Germany	2016
German Energy Research Association (FVEE) Annual Conference	Member of the Programme Committee	Germany	2016
Helmholtz Centre for Environmental Research – UFZ	Member of the Research Advisory Council	Germany	2013
IEA Bioenergy, Task 37 "Energy from Biogas"	Member	International	2019
IEA Bioenergy, Task 39 "Commercialising Conventional and Advanced Transport Biofuels from Biomass and Other Renewable Feedstocks"	German Representative	International	2014
IEA Bioenergy, Task 40 "Deployment of Biobased Value Chains"	German Representative	International	2019
IEA Bioenergy, Task 44 "Flexible Bioenergy and System Integration"	German Representative, Co-task Leader	International	2019
IEA Bioenergy, Task 45 "Climate and Sustainability Effects of Bioenergy within the Broader Bioeconomy"	German Representative	International	2019
Institute of Non-classical Chemistry at the University of Leipzig (INC)	Member of the Advisory Board	Germany	2013
IUTA e. V. – Project Monitoring Committee: Multiphase anode materials for SOFCs – Development of effective catalyst systems based on cerioxide for the upgrading of biogas and biomethane (KatCe).	Member of the Advisory Board	Germany	2014

Committee	Function	Country	Since
LaNDER3 – University of Zittau/Görlitz	Member of the Advisory Board	Germany	2017
Ministry of Agriculture, Environment and Consumer Protection Mecklenburg-Western Pomerania	Member of the Research Advisory Council	Germany	2017
Open Access Journal "Land", Special Issue "Bioenergy and Land"	Guest Editor	Schweiz	2020
Research Association for Exhaust Aftertreatment Technologies for Internal Combustion Engines (FAD)	Member of the Advisory Board	Germany	2013
Scientific Journal "Müll & Abfall"	Member of the Advisory Board	Germany	2007
Scientific Journal "Waste Management"	Co-publisher	International	2018
Sino-German Centre for Environmental technology & Knowledge Transfer (CETK) of Anhui Province	Directorate	China	2005
State Energy Council of Mecklenburg-Western Pomerania	Member and Head of the Working Group on F&L	Germany	2012
Steering Committee Federal Ministry of Food and Agriculture	Member	Germany	2012
Steering Committee for the 2 <sup>nd</sup> stage of the 1 <sup>st</sup> Federal Immission Control Act	Member and Head of the Working Group on Technology	Germany	2014
Strategy Council for the Economy and Science Mecklenburg-Western Pomerania	Speaker for the future field of energy	Germany	2014
The Association of German Engineers (VDI), District Association Mecklenburg-Western Pomerania	Member of the Guideline Committee	Germany	2008
Thuringian Ministry of the Environment, Energy and Water Conservation	Member of the Research Advisory Council for Climate Protection and Climate Change Adaptation	Germany	2019

## PROFESSORSHIPS

Committee	Function	Country	Since
Faculty of Agricultural and Environmental Sciences, University of Rostock	Professorship	Germany	2006
Faculty of Environmental and Biotechnology, University of Hefei	Professorship	China	2002
Faculty of Environmental and Biotechnology, University of Hefei	Professorship	China	2018
Institute for Infrastructure and Resource Management, Chair of Bioenergy Systems, University of Leipzig	Professorship	Germany	2011
Institute for Renewable Energies, China University of Petroleum Beijing	Professorship	China	2014
Leipzig University of Applied Sciences (HTWK)	Professorship	Germany	2020
Shenyang Aerospace University, School of Energy and Environment	Professorship	China	2011

## WORKING GROUPS

Committee	Function	Country	Since
Agru Interlaboratory Test, Kuratorium für Technik und Bauwesen in der Landwirtschaft e. V. (KTBL)	Member	Germany	2018
Biogas Working Group of VGB PowerTech e. V.	Member	Germany	2019
Bioeconomy Working Group of the Structural Commission for Technology Assessment and Design (Saxon Academy of Sciences in Leipzig)	Member	Germany	2014
Board of Trustees for Technology and Construction in Agriculture, Working Group "Energy"	Member	Germany	2019
European Biofuels Technology Platform (ETIP Bioenergy)		EU/Belgium	
WG1 Biomass availability	Member		2007
WG4 Policy and sustainability	Member		2008
European Research Alliance (EERA) Bioenergy; Subprogrammes		EU/Belgium	
1: Sustainable production of biomass	Member		2019
2: Thermochemical platform	Member		2019
3: Biochemical platform	Member		2019
4: Stationary bioenergy	Member		2019
5: Sustainability/techno-economic analysis/public acceptance	Member		2019
Federal Ministry for Economic Affairs and Energy, Bioenergy Research Network, method harmonisation	Leader	Germany	2010
Federal Ministry for Economic Affairs and Energy, Bioenergy Research Network, method harmonisation	Member	Germany	2010
Federal Ministry for Economic Affairs and Energy, Research Network Bioenergy, working group on the electricity market/working group on the heating market	Member/Expert	Germany	2017
German RETech Partnership "Recycling & Waste Management in Germany"	Member of the International Working Group (Emerging and Developing Countries)	Germany	2017
ProcessNet – Sustainable Production, Energy and Resources (SuPER), "Energy Process Technology"	Member	Germany	2014

Committee	Function	Country	Since
ProcessNet – Sustainable Production, Energy and Resources (SuPER), “Alternative Fuels”	Member	Germany	2015
Project Group Russia of the City of Leipzig	Member	Germany	2020
RHC–European Technology and Innovation Platform on Renewable Heating and Cooling;		Belgium	
Horizontal Working Group: 100 % RE, Individually Heated & Cooled Buildings;	Member		2019
Horizontal Working Group: 100 % RE Cities	Member		2019
Working Committee “Material Specific Waste Treatment”, ASA e.V.	Member of the Advisory Board	Germany	2009
Working Group “Blauer Engel”, Environmental Action Germany (DUH)	Consultant	Germany	2014
Working Group “Heating Market 2.0”, BMWi/ PTJ support programme “Biomass energy use”/ BMWi Bioenergy Research Network	WG Leader	Germany	2017
Working Group “Library Concepts” of the BMEL Departmental Research Institutes	Member	Germany	2016
Working Group “OpenAgrar” of the BMEL Departmental Research Institutes	Member	Germany	2016
Working Group 2 Alternative Propulsion Systems and Fuels for Sustainability Mobility (Focus Group 3 “Alternative Fuels for Combustion Engines”)	Member	Germany	2019

## NETWORKS/ASSOCIATIONS/PLATFORMS (SELECTION)

Committee	Function	Country	Since
BioEconomy e.V.	Member	Germany	2012
BioWEconomy	Member Core Group/ Initiators	EU/Belgium	2020
Committee on the Sustainability of Biofuels and Bioliquids of the RU Commission	Member	EU/Belgium	2017
Energy Committee of Leipzig Chamber of Industry and Commerce (IHK)	Member	Germany	2016
Energy Saxony e.V. – the Energy Cluster for Saxony (group initiative)	Member	Germany	2010
European Bioeconomy	Member	Belgien	2016
German Energy Agency (DENA), DENA Biogas partner – the Biogas Feed-in Platform	Member	Germany	2017
German Energy Research Association (FVEE), Expert Committee on Hydrogen	Member	Germany	2020
Humus e.V. Association (FVH)	Member of the Research Advisory Council	Germany	2019
Network for a Circular Carbon Economy (NK2)	Member	Germany	2019
Network for Energy & Environmental Technology (NEU e.V.) – Bioenergy Cluster	Member of the Advisory Board	Germany	2014
Network for Energy & Environmental Technology Leipzig e.V. (NEU)	Member of the Advisory Board	Germany	2014
PREVENT Waste Alliance	Member	Germany	2020
Project group “Wood-based Bioeconomy”	Member	Germany	2020
Stakeholders’ Panel	Member	Belgium	2016
Sustainable Development Solutions Network (SDSN)	Member of the Extended Steering Committee	Germany	2016

## DIN/ISO-STANDARD COMMITTEES (SELECTION)

Committee	Function	Country	Since
Association of German Engineers (VDI) VDI 3670 "Exhaust Gas Cleaning - Downstream Dust Reduction Device for Small and Medium Sized Solid Fuel Combustion Plants"	Chair	Germany	2014
VDI 4630 "Fermentation of Organic Substances, Substrate Characterisation, Sampling, Substance Data Collection, Fermentation Experiments"	Member of the Directives Committee		2019
VDI 4635 Power-to-Gas, WG "CO <sub>2</sub> -Provision"	Member of the working group		2020
CEN - European Committee for Standardization TC 454 Algae and algae products	Chair WG 3 "Productivity"	Belgium	2015
DECHEMA, Expert group "Industrial use of renewable raw materials"	Member	Germany	2020
Expert group "Measurement and regulation in biotechnology"	Member		2018
German Institute for Standardization (DIN) Working committee "Requirements of liquid fuels" NA 062-06-32 AA	Member	Germany	2020
Working committee "Biogenic solid fuels" NA 062-05-82 AA	Expert "Terminology"/ Working Group Convener		2002
Working committee "Biogenic solid fuels" NA 062-05-82 AA	Member		2019
Working group "Dust separator test" 33999	Member		2012
Standards committee "Biogas" NA 032-03-08 AA	Member		2015
International Organization for Standardization (ISO)		Switzerland	
ISO TC 238 Solid Biofuels WG 1 Terminology	Working Group Convenors		2009
ISO TC 238 Solid Biofuels WG 2 Fuel specifications and classes	Task leader		2020
ISO TC 238 Solid Biofuels WG 7 Safety of solid biofuels	Member		2019
ISO TC 255 Biogas WG 1 Terms, definitions and classification scheme for the production, conditioning and utilisation of biogas	Member		2015

Committee	Function	Country	Since
The Bavarian Environment Agency (LFU Bayern), Standards Committee for Continuous Separator Function	Member	Germany	2020
VDI/DIN Air Pollution Control Commission, WG 3933 "Production of biochar"	Member	Germany	2013



For further information about the DBFZ's committee activities, please contact the Research Coordinator, Dr. Elena H. Angelova.



### Contact

**Dr. rer. nat. Elena H. Angelova**

Phone: +49 (0)341 2434-553

E-Mail: elena.angelova@dbfz.de

## GENERAL MANAGEMENT

**Scientific Managing Director****Prof. Dr. mont. Michael Nelles**

Phone: +49 (0)341 2434-112  
E-Mail: michael.nelles@dbfz.de

**Administrative Managing Director****Dipl.-Kfm. (FH), LL. M. Daniel Mayer**

Phone: +49 (0)341 2434-112  
E-Mail: daniel.mayer@dbfz.de

## HEADS OF THE RESEARCH FOCUS AREAS

**Systemic Contribution of Biomass****Prof. Dr.-Ing. Daniela Thraen**

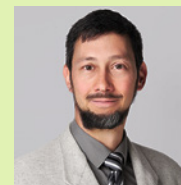
Phone: +49 (0)341 2434-435  
E-Mail: daniela.thraen@dbfz.de

**Anaerobic Processes****Dr. agr. Peter Kornatz**

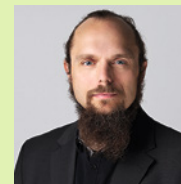
Phone: +49 (0)341 2434-716  
E-Mail: peter.kornatz@dbfz.de

**Biobased Products and Fuels****Dr.-Ing. Franziska Müller-Langer**

Phone: +49 (0)341 2434-423  
E-Mail: franziska.mueller-langer@dbfz.de

**SmartBiomassHeat****Dr.-Ing. Volker Lenz**

Phone: +49 (0)341 2434-450  
E-Mail: volker.lenz@dbfz.de

**Catalytic Emission Control****Prof. Dr. rer. nat. Ingo Hartmann**

Phone: +49 (0)341 2434-541  
E-Mail: ingo.hartmann@dbfz.de

## EXECUTIVE SUPPORT TEAM

**Research Coordinator****Dr. rer. nat. Elena H. Angelova**

Phone: +49 (0)341 2434-553  
E-Mail: elena.angelova@dbfz.de

**Coordinator for International Knowledge and Technology Transfer****Dr. rer. pol. Sven Schaller**

Phone: +49 (0)341 2434-551  
E-Mail: sven.schaller@dbfz.de

**Coordinator for Knowledge and Technology Transfer****Karen Deprie**

Phone: +49 (0)341 2434-118  
E-Mail: karen.deprie@dbfz.de

**Coordinator Press and Media****Paul Trainer**

Phone: +49 (0)341 2434-437  
E-Mail: paul.trainer@dbfz.de

# 13

## APPENDIX: PROJECTS AND PUBLICATIONS



Major projects and publications from 2020 are listed below to show the current working areas of the DBFZ. The language of the title reflects the language of the project/publication.

### PROJECTS (SELECTION)

#### Federal Ministry of Food and Agriculture (BMEL)

- ABiOx – Thermochemische Umwandlung von siliziumoxidreichen Biomasse-Rückständen zur Erzeugung von Wärme und Strom sowie der gekoppelten Erzeugung von mesoporösem biogenem Silica für die Materialanwendungen, Bundesministerium für Ernährung und Landwirtschaft/Bundesanstalt für Landwirtschaft und Ernährung, 01.10.2019–31.12.2022 (FKZ: 2819DOKA05)
- BA\_EEG20 – Beratungsleistungen zur EEG-Novelle 2020, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V. (Inhouse), 20.04.2020–26.06.2020
- BE20PLUS – BIO E Bioenergie: Potenziale, Langfristperspektiven und Strategien für Anlagen zur Stromerzeugung nach 2020, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.11.2017–31.08.2020 (FKZ: 22404016)
- BioNetz – IE BioNetz, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.02.2019–31.01.2021 (FKZ: 22405317)
- BioSim – Modellbasierte Zustandsüberwachung und Prozessführung an Biogasanlagen, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.11.2020–31.10.2023 (FKZ: 2219NR333)
- ChinaRes – Energetische Nutzung landwirtschaftlicher Reststoffe in Deutschland und China; Teilvorhaben 1: Erarbeitung von Konzepten für zukünftige Biogasanlagenbetreiber, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 15.08.2017–31.07.2021 (FKZ: 22025816)
- EFFEKTOR – Prozessinformationssysteme zur kontinuierlichen Überwachung der Energieeffizienz von Biogasanlagen; Teilvorhaben 1: Modellentwicklung und Auswertung, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.10.2019–30.09.2022 (FKZ: 22401318)
- EvEmBi – Bewertung und Minderung von Metha-

nemissionen aus verschiedenen europäischen Biogasanlagen; Teilvorhaben 1: Quantifizierung und Minderung von Methanemissionen aus landwirtschaftlichen Biogasanlagen und Wissenstransfer in die Praxis, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.04.2018–31.03.2021 (FKZ: 22407917)

FlexiMod – Weiterentwicklung eines modellbasierten Prognosetools für die flexible Biogaserzeugung in großtechnischen Biogasanlagen; Teilvorhaben 2: Datenaufbereitung und Weiterentwicklung bestehender Simulationsmodelle unter Berücksichtigung praxisnaher Prozessüberwachungstechnik, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.08.2020–31.07.2022 (2219NR387)

HypoBio – Energetische Nutzung von Scheitholz durch die Entwicklung einer effizienten und emissionsarmen, kleinen Scheitholzfeuerung mittels kontinuierlicher Brennstoffzuführung, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 01.08.2020–31.07.2022 (FKZ: 22033218)

IraSIL – Untersuchung des Ascheverhaltens während der thermo-chemischen Konversion vorbehandelter, siliziumreicher Biomassesortimente zur Strom- und Wärmeezeugung und Nutzung der dabei anfallenden Aschen zur Gewinnung anorganischer Gerüstverbindungen mit vielfältigen Anwendungsmöglichkeiten, Bundesministerium für Ernährung und Landwirtschaft/Bundesanstalt für Landwirtschaft und Ernährung, 01.01.2018–30.06.2021 (FKZ: 2816DOKI03)

KlimaBioHum – Klimaschutzorientierte Bioabfallverwertung für die Landwirtschaft, Bundesministerium für Ernährung und Landwirtschaft/Bundesanstalt für Landwirtschaft und Ernährung, 01.10.2018–30.11.2021 (FKZ: 281B303316)

MeOH-AMF – IEA AMF Annex Methanol aus Kraftstoff, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsende Rohstoffe e.V., 09.01.2019–30.06.2020

Mini-WS – Verbundvorhaben: Emissionsarme kleinskalige Wirbelschichtfeuerungen zur Verbrennung von biogenen Reststoffen; Teilvorhaben 2: Charakterisierung des lastabhän-

gigen Emissionsverhaltens für verschiedene Brennstoffe und Anforderungen an die Abgasnachbehandlung, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.06.2019–31.05.2022 (FKZ: 2219NR010)

MoReBio – Modellregionen Bioökonomie im Mitteldeutschen Revier und im Lausitzer Revier, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V. (Inhouse), 22.08.2019–31.12.2021

Nred – Verstärkte energetische Nutzung stickstoffreicher landwirtschaftlicher Abfallstoffe durch biologische Stickstoffreduzierung; Teilvorhaben 1: Verfahrensentwicklung im Labormaßstab, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.11.2019–31.10.2022 (FKZ: 22042118)

oNIReduce – Emissionsminderung durch angepasste Kesselsteuerung auf der Basis von Daten aus der kontinuierlichen online-NIR-Brennstoffanalyse, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.07.2019–31.12.2021 (FKZ: 22033218)

PapGas – Biomethan und Torfersatzstoff aus Pappelholz, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.04.2019 – 30.06.2021 (FKZ: 22038318)

OptiFlex – Optimierung des Betriebs und Design von Biogasanlagen für eine bedarfsgerechte, flexibilisierte und effiziente Biogasproduktion unter Berücksichtigung der Prozessstabilität als Post-EEG Strategie, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.10.2017–30.06.2021 (FKZ: 22401717)

RESTFLEX – Untersuchung der Eignung landwirtschaftlicher Reststoffe zur Flexibilisierung des Biogasprozesses mittels modellgestützter Methoden und Verschneidung der Ergebnisse mit vorhandenen Mengenpotenzialen, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.07.2019–30.06.2022 (FKZ: 22041818)

Sens-O-Mix – Automatisierte Rührsysteme in Biogasanlagen – Entwicklung und Erprobung sensorbasierter Rührsysteme in Biogasanla-

gen zur Steigerung der Effizienz und Prozessstabilität bei einer lastflexiblen und bedarfsgerechten Biogasproduktion; Teilvorhaben 5: Fütterungsoptimierung, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.05.2020–30.04.2023 (FKZ: 2219NR387)

SiTroFen – Entwicklung einer emissionsarmen Einzelraumfeuerung für bedarfsgerecht erzeugte und qualitätsgesicherte Holzhackschnitzel; Teilvorhaben 1: Theoretische und experimentelle Untersuchungen, emissionsrechtliche Evaluierung, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.04.2019 – 31.08.2021 (FKZ: 22016817)

STM-DE – Auktionsmodell für eine nachhaltige Nutzung von Stroh in Deutschland, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.10.2017–30.04.2019 (FKZ: 22027216)

UVV – Verbundvorhaben: Emissionsminderungsstrategien zur umweltverträglichen Verbrennung (UVV) auf Basis von aktuellen Forschungsergebnissen, Teilvorhaben 1: Theoretische und Experimentelle Untersuchungen, Koordination; Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.04.2019 – 31.03.2022 (FKZ: 22038418)

VaBiFlex – ERA-Net-Verbundvorhaben: Wertoptimierte Nutzung von Biomasse in einer flexiblen Energieinfrastruktur; Teilvorhaben 1: Theoretische und experimentelle Untersuchungen, Bundesministerium für Ernährung und Landwirtschaft/Fachagentur Wachwachsene Rohstoffe e.V., 01.09.2018–31.03.2021 (FKZ: 22408317)

#### Federal Ministry of Education and Research (BMBF)

abonoCARE – Wachstumskern – abonoCARE – VP2: Schadstoffreduzierung und Phosphoranreicherung in Düngervorprodukten; TP 2.5: HTC-Phosphorabscheidung/Trocknung HTC-Kohle, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.04.2019–31.03.2022 (FKZ: 031B0139A)

BEPASO – Bioökonomie 2050: Potenziale, Zielkon-

flikte, Lösungsstrategien, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.12.2016–29.02.2020 (FKZ: 031B0232B)

BioFAVOR 2 – Entwicklung und Evaluierung einer mobilen Demonstrationsanlage für die dezentrale Verwertung menschlicher Fäkalien, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.04.2018–31.03.2020 (FKZ: 031B0483E)

BIOKOFF – Bio-basierte Kohlenstoffe als funktionale Füllstoffe in Polymermischungen (kmu-innovativ), Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.09.2018–31.08.2020 (FKZ: 03XP0160D)

CarBioPhos – Entwicklung eines integrierten Verfahrens zur Carbonisierung von Klärschlamm, Erzeugung von Biogas und Rückgewinnung von Phosphor, Teilprojekt 2, Bundesministerium für Bildung und Forschung/Karlsruhe Institut für Technologie, 01.07.2018–31.12.2020 (FKZ: 031B0483E)

E-Boot – IBÖ-06: Entwicklung einer Ernteprozesskette mit Erntetechnologie sowie Transportboot und Anlandeperipherie zur umweltschonenden Ernte von Wasserpflanzen, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.10.2019–30.09.2020 (FKZ: 031B0893)

HTKChem – Umwandlung von wasser- und kohlenhydratreichen Reststoffen der Biomasseverarbeitung in Chemikalien und Kraftstoffkomponenten durch hydrothermale Prozesse, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.11.2018–30.04.2021 (FKZ: 031B0674A)

LABTOGO – Aufbau eines Biogasforschungslabors an der Uni Lomé/Togo, Bundesministerium für Bildung und Forschung/Projektträger Jülich (Inhouse), 15.11.2019–14.11.2023

MaiD II – IBÖM03: MaiD II – Entwicklung eines auf Maisspindeln basierenden Dämmstoffe, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 15.12.2017–14.06.2020 (FKZ: 031B0480A)

MKM2 – Entwicklung eines Mehrkammerbiomeilers zur effizienten Wärme- und Komposterzeugung, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.04.2018–31.03.2020 (FKZ: 031B0492A)

RenewVal – ERA-NET-Verbundprojekt: Lokale nachhaltige Versorgung mit erneuerbarer Energie für gefährdete Gemeinden in ariden und

semi-ariden Mittelmeerzonen; Teilvorhaben: DBFZ, Bundesministerium für Bildung und Forschung/Deutsches Zentrum für Luft- und Raumfahrt, 01.05.2018–31.08.2020 (FKZ: 01DH17063B)

SchlauFe II – IBÖM04: SchlauFe II – Entwicklung eines geotextilen, mehrjährig verwendbaren Schlauchfermentationsverfahrens für TS-arme Biomassen, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.09.2018–30.06.2021 (FKZ: 031B0578A)

SYMOBIO+ – Systemisches Monitoring der Bioökonomie – TP DBFZ, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.09.2020–31.08.2021 (FKZ: 031B0281J)

WaSSGhan – Hybrid Energie aus Abfall als nachhaltige Lösung für Ghana, Bundesministerium für Bildung und Forschung/Projektträger Jülich, 01.01.2020–31.12.2023 (FKZ: 03SF0591D)

#### Federal Ministry of Transport and Digital Infrastructure (BMVI)

DEMO-SPK – Forschungs- und Demonstrationsvorhaben: Einsatz von erneuerbarem Kerosin am Flughafen Leipzig/Halle, Bundesministerium für Verkehr und digitale Infrastruktur (Inhouse), 04.11.2016–30.06.2020

Pilot-SBG – Forschungs- und Demonstrationsvorhaben Bioressourcen und Wasserstoff zu Methan als Kraftstoff – Konzeptionierung und Realisierung einer Anlage im Pilotmaßstab, Bundesministerium für Verkehr und digitale Infrastruktur (Inhouse), 01.09.2018–31.12.2021

OpenGeoEdu – Offene Daten für Lehre und Forschung in raumbezogenen Studiengängen (OpenGeoEdu) – Teilvorhaben e-Learning: "Räumliche Verteilung von biogenen Ressourcen", Modernitätsfonds mFUND, Bundesministerium für Verkehr und digitale Infrastruktur/Verein Deutscher Ingenieure e.V., 01.05.2017–31.07.2020 (FKZ: 19S2007D)

BIOKRAFT – Rohstoffverfügbarkeit von holzartiger Biomasse zur Produktion von Biokraftstoffen in Deutschland und EU, Bundesministerium für Verkehr und digitale Infrastruktur, 20.01.2020–31.08.2022 (FKZ: G22/3552.1/2)

### Federal Ministry for Economic Affairs and Energy (BMWi)

AbfallE – Abfall-Ende-Eigenschaft naturbelassener, holzartiger Reststoffe durch Aufbereitungsverfahren und Qualitätssicherung; Teilvorhaben: Bewertung der Abfall- und genehmigungsrechtlichen Praxis sowie Umweltwirkung und Wirtschaftlichkeit, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.11.2019 – 30.04.2022 (FKZ: 03KB160A)

Bio2Geo – Entwicklung und Demonstration eines innovativen ökologischen Hybridkraftwerks für die Kopplung von Bioenergie mit Geothermie zur Versorgung unterschiedlicher Abnehmerstrukturen. Teilvorhaben: Gesamtheitliche Systemanalyse mit Fokus auf ökonomische Aspekte des Anlagenbetriebs, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.10.2018 – 31.03.2021 (FKZ: 03ET1593B)

SmartBioGrid – Optionen zum Einsatz fester Biomasse in dekarbonisierten Wärmenetzen, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2019 – 31.08.2022 (FKZ: 03KB159A)

BiWiBi – Nachhaltige Kombination von bifacialen Solarmodulen, Windenergie und Biomasse bei gleichzeitiger landwirtschaftlicher Flächennutzung und Steigerung der Artenvielfalt, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.05.2020 – 30.04.2021 (FKZ: 03EI5209C)

Calgonit – Entwicklung biogastoleranter Reinigungs- und Desinfektionsmittel zum Einsatz auf Agrarbetrieben mit Nutztierhaltung; Entwicklung eines stabilen Biogasprozesses auf Güllebasis unter Einwirkung von Stall- und Melkanlagen-Reinigungs- und Desinfektionsmitteln und zugehörigem internen Prüfstandard/Testverfahrens, Bundesministerium für Wirtschaft und Energie/Arbeitsgemeinschaft industrieller Forschungsvereinigungen, 01.07.2018 – 30.04.2021 (FKZ: ZF4077205RH8)

FLEXISIGNAL – Konzepte für eine bedarfsorientierte, kosteneffiziente und klimaschonende Stromerzeugung aus Bioenergieanlagen, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.01.2019 – 31.12.2020 (FKZ: 03KB150B)

GASASH – Thermo-chemische Konversion von Reststoffen in einem Vergaser-BHKW mit ge-

koppelter Aschegewinnung; Teilvorhaben: Untersuchungen zur Produktgasqualität, den BHKW-Emissionen, Emissionsminderungsmaßnahmen und der Ascheverwertung, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2018 – 30.06.2021 (FKZ: 03KB139A)

EIV – Begleitforschung Energiewende im Verkehr – Teilvorhaben: Ermittlung von Rohstoffpotenzialen strombasierter Biokraftstoffoptionen und ökologische Bewertung von biokraftstoffbasierten Referenzszenarien, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.06.2018 – 31.05.2022 (FKZ: 03EIV116E)

KonditorGas – Verbundvorhaben: Industrielle Prozesswärmeerzeugung durch katalytische Konditionierung von biomassebasierten Synthesegasen; Teilvorhaben II: Katalytische Konditionierung von Synthesegasen aus der autothermen Vergasung, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2020 – 31.08.2023 (FKZ: 03EI5417B)

KoSaTZ – Behandlung und kombinierter Einsatz von Stroh- und Getreideausputzmischungen für eine Biogas-Technologieketten mit Zukunft; Teilvorhaben: Untersuchungen zur alternativen Aufbereitung und Kompaktierung von Stroh-Mischsubstraten, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.01.2020 – 31.12.2021 (FKZ: 03EI5403D)

MiniGas – Optimierung u. Validierung v. Verfahren zur kombinierten Reduktion von Feinstaub u. sauren Schadgasen an Biomassefeuerungen; Teilvorhaben: Experimentelle Untersuchungen zur Kombination von SCR- u. Precoatverfahren an einem Gewebefilter, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2017 – 31.08.2020 (FKZ: 03KB131B)

MoBiFuels – Analyse und Beseitigung von Markthemmnissen von technisch modifizierten Bioenergeträgern, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.11.2018 – 31.10.2022 (FKZ: 03KB136A)

NORMAKR – Verbundvorhaben: BEiNVer; Teilvorhaben: NormAKraft – Kraftstoffbewertung im Kontext nationaler und internationaler Kraftstoffregulierungen, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.01.2020 – 31.12.2022 (FKZ: 03EIV241C)

NovoHTK – Neuartiges Verfahren zur Mono-Vergärung von Hühner trockenkot, Bundesminis-

terium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2018 – 31.08.2021 (FKZ: 03KB137A)

OBEN – Ölersatz Biomasse Heizung, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2019 – 28.02.2023 (FKZ: 03KB156)

OptDienE – Optionen zum netzdienlichen Betrieb von Einzelraumfeuerstätten; Teilvorhaben: Systemwirkung von Einzelraumfeuerstätten, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.08.2018 – 31.03.2021 (FKZ: 03KB138A)

OpToKNuS – Verbundvorhaben: OpToKNuS – Entwicklung einer „Toolbox“ basierend auf numerischen Modellen und Praxismessungen zur Auslegung bzw. Optimierung von thermochemischen Anlagen zur Energiebereitstellung aus alternativen Brennstoffen; Teilvorhaben: Untersuchungen am DBFZ-Festbettlaborvergaser, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.01.2020 – 31.12.2022 (FKZ: 03KB163B)

PlasmaCrack – Kläranlage – PlasmaCrack: Nachweis der Faulgassteigerung und Reduktion endokriner Substanzen, Bundesministerium für Wirtschaft und Energie/VDI/VE-IT, 01.01.2019 – 31.12.2022 (FKZ: 16KN041344)

PROBEGII – Programmbegleitung des BMWi-Förderprogramms „Energetische Biomassenutzung“ (ProgBegII) – Ausbau des Wissenstransfers, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.07.2016 – 31.03.2021 (FKZ: 03KB001B)

SCRCOAT – Optimierung u. Validierung von Verfahren zur kombinierten Reduktion von Feinstaub und sauren Schadgasen an Biomassefeuerungen; Teilvorhaben: Experimentelle Untersuchungen zur Kombination von SCR- und Precoatverfahren an einem Gewebefilter, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2017 – 28.02.2021 (FKZ: 03KB128A)

SmarKt – Bewertung des Marktpotenzials und Systembeitrags von integrierten Bioenergiekonzepten, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2017 – 30.06.2020 (FKZ: 03KB130)

SNuKR – Steigerung des Nutzens von kleinen, biomassebefeuernden BHKWs durch bedarfsgerechte Regelung, Teilvorhaben: Entwicklung

des Regelungsalgorithmus, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.07.2017 – 31.05.2021 (FKZ: 03KB121A)

Vergaflex – Flexibilisierung der Biomassevergasung durch Nutzung des Vergaserkokes als Brennstoff für Kleinstvergaser <5 kW<sub>el</sub> bzw. für die stoffliche Verwertung, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.10.2019 – 31.03.2022 (FKZ: 03KB157A)

VergaOpt – Mittel- u. langfristige Sicherung des Holzvergaseranlagenbestandes u. Beitrag zu dessen weiterem Ausbau durch Erschließung preiswerter Brennstoffsortimente; Teilvorhaben: Brennstoffeigenschaften: Analyse u. Bewertung, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.01.2018 – 30.06.2020 (FKZ: 03KB135A)

ZertGas – Implementierung der RED II und Entwicklung von praktikablen Zertifizierungslösungen und Handlungsoptionen für Betreiber von Biogas- und Biomethananlagen; Teilvorhaben: Methodenentwicklung, Werkzeuge und Handlungsempfehlungen, Bundesministerium für Wirtschaft und Energie/Projektträger Jülich, 01.09.2019 – 31.08.2021 (FKZ: 03KB164A)

### EU projects

BECOO – Brazil-EU Cooperation for Development of Advanced Lignocellulosic Biofuels, EU/Horizon2020, 01.06.2017 – 31.05.2021 (GA 744821)

BIOFIT – Bioenergy retrofits for Europe's industry, EU/Horizon2020, 01.10.2018 – 31.03.22 (GA 817999)

CAFIPLA – Pretreatment of organic waste for application of the carboxylic acid and fiber platform, EU/Horizon2020, 01.06.2020 – 31.05.2023 (GA: 887115)

DRALOD – Renewables-based drying technology for cost-effective valorisation of waste from the food processing industry, EU/Horizon2020, 01.08.2018 – 30.06.2021 (GA 820554)

HyFlexFuel – Hydrothermal liquefaction: Enhanced performance and feedstock flexibility for efficient biofuel production, EU/Horizon2020, 01.10.2017 – 30.09.2021 (GA 764734)

MUSIC – Market Uptake Support for Intermediate Bioenergy Carriers, EU/Horizon2020, 01.09.2019 – 31.08.2022 (GA 857806)



POWER4BIO – emPOWERing regional stakeholders for realising the full potential of European BIOeconomy, EU/Horizon2020, 01.10.2018–31.03.2021 (GA 818351)  
 REGATRACE – Erarbeitung eines Biomethanregisters, EU/Horizon2020, 01.06.2019–31.05.2022 (GA 857796)  
 STAR-ProBio – Sustainability Transition Assessment and Research of Bio-based Products, EU/Horizon2020, 01.05.2017–30.04.2020 (GA 727740)

### Service/Contract research

AGEEstat – wiss. Analyse zu ausgewählten Aspekten der EE-Statistik für AGEE-Stat, Marktprojekt, 01.04.2019–30.06.2022  
 BASF load – Kontinuierliche Gärversuche zur Verfahrensentwicklung für Abwässer, Marktprojekt, 20.04.2020–31.10.2020  
 BYPRO 0 – Analyse der Verwertungsoptionen eines Bioraffinerienebenprodukts im Biogassektor, Marktprojekt, 24.01.2020–24.04.2020  
 C-DBFZ\_A – Aufbau eines C-DBFZ in Hefei, University of Hefei, Marktprojekt, 01.07.2018–31.12.2021  
 CoFire3 – Begutachtung der Biowärmebereitstellung der Wärme Hamburg GmbH bis einschließlich 2023, Marktprojekt, 01.05.2019–31.12.2023  
 EXPLORE – Strategische Erschließung wirtschaftlicher Minderungspotenziale, GIZ (Inhouse), 13.09.2019–30.07.2020  
 HTC-GMH – Erarbeitung einer Klimafreundliche Alternative für Schaumkohle auf Basis der HTC von Biomasse, Marktprojekt, 07.04.2020–06.11.2020  
 IEA Bioenergy Task 40: Deployment of biobased value chains (c/o IINAS GmbH), 01.01.2019–31.12.2021  
 IEA Bioenergy Task 44: Flexible bioenergy and system integration (c/o VTT TRCoF), 01.01.2019–31.12.2021  
 IRMD – Energiekonzept für die Innovationsregion Mitteldeutschland, Marktprojekt, 05.06.2020–30.06.2021  
 MOKATTA04 – Testung von Abgaskatalysatoren für Blockheizkraftwerke, Marktprojekt, 13.09.2019–31.03.2020  
 PAKUBA – Bereitstellung eines Prüfstandes für

PAK Messungen an Kaminöfen, Marktprojekt, 05.04.2019–30.11.2020  
 SimGuide – Modellierung des Biogasprozesses, Marktprojekt, 01.08.2018–30.07.2020  
 SUVALIG – Entwicklung eines Bioraffineriekonzeptes im Rahmen des Projekts SUVALIG, Universität Rostock, 01.11.2019–28.02.2021  
 TC454WG3 – CEN/TC 454 Working Group 3 Algae processing, Marktprojekt, 20.10.2017–25.02.2021

### Other funding bodies (donations, foundations, country)

AUTOBUS Plug-and-Run-Prinzip – Automatische Integration von Wärme- und Stromerzeugern sowie Verbrauchern in eine Objektergänzung nach dem Plug-and-Run-Prinzip, Sächsische Aufbaubank, 01.08.2016–30.04.2020 (FKZ: 100250636)  
 GAZELLE – Ganzheitliche Regelung von Biogasanlagen zur Flexibilisierung und energetischen Optimierung, Sächsische Aufbaubank, 01.02.2017–30.11.2020 (FKZ: 100267056)  
 HTC-liq – Entwicklung eines hocheffizienten Kaskadenprozesses zur Aufbereitung von Prozesswässern aus hydrothermalen Prozessen, insbesondere der hydrothermalen Carbonisierung mit Gewinnung von organischen Säuren, anschließender energetischer Nutzung und Prozesswasserreinigung, Sächsische Aufbaubank, 01.04.2017–31.12.2020 (FKZ: 100283029)  
 KaRo – Katalytischer Rohrbündelreaktor für die Totaloxidation von Brenngasen aus der thermischen Umsetzung von festen Biobrennstoffen zur emissionsarmen regenerativen Wärmezeugung, Sächsische Aufbaubank, 01.10.2019–30.06.2022 (FKZ: 100332481)  
 MethBos2 – Bioenergy Component – Advisory for biomass potential map development in Bosnia and Herzegovina, Gesellschaft für Internationale Zusammenarbeit GmbH (Inhouse), 05.09.2017–30.04.2019  
 WKK – Demonstrator – Erforschung und Errichtung eines Technologie-Demonstrators zur stromnetzstabilisierenden Heizung auf Basis biogener Festbrennstoffe (Mikro-Wärme-Kraft-Kopplung), 01.08.2016–31.07.2020

## PUBLICATIONS

### Monographs

Banse, M.; Zander, K.; Babayan, T.; Bringezu, S.; Dammer, L.; Egenolf, V.; Göpel, J.; Haufe, H.; Hempel, C.; Hüfner, R.; Millinger, M.; Morland, C.; Munsoda, F.; Partanen, A.; Piotrowski, S.; Schaldach, R.; Schier, F.; Schüngel, J.; Sturm, V.; Szarka, N.; Thrän, D.; Weimar, H.; Wilde, A.; Will, S. (2020). *Eine biobasierte Zukunft in Deutschland: Szenarien und gesellschaftliche Herausforderungen*. Braunschweig: BEPASO-Konsortium. 48 S.  
 Langhans, G.; Scholwin, F.; Nelles, M. (2020). *Handbuch zur Bilanzierung von Biogasanlagen für Ingenieure – Band I: Grundlagen und Methoden für die Bewertung und Bilanzierung in der Praxis*. Wiesbaden: Springer. XIV, 458 S. ISBN: 978-3-658-27338-5.  
 Lauer, M. (2020). *Economic assessment of biogas plants as a flexibility option in future electricity systems: Dissertationsschrift*. (DBFZ-Report, 37). Leipzig: DBFZ. XI, 96 S. ISBN: 978-3-946629-63-4.  
 Reißmann, D. (2020). *Hydrothermal processing of biogenic residues in Germany: A technology assessment considering development paths by 2030. Dissertationsschrift*. (DBFZ-Report, 38). Leipzig: DBFZ. [174] S. ISBN: 978-3-946629-64-1.  
 Thabit, Q.; Nassour, A.; Nelles, M. (2020). *Waste-to-Energy coupling sector in MENA Region: Potential Economic*. [online]. Saarbrücken: GlobeEdit. 52 S. ISBN: 978-620-0-60999-1.  
 Thrän, D.; Szarka, N.; Haufe, H.; Lenz, V.; Majer, S.; Oehmichen, K.; Jordan, M.; Millinger, M.; Schaldach, R.; Schüngel, J. (2020). *BioplanW: Systemlösungen Bioenergie im Wärmesektor im Kontext zukünftiger Entwicklungen. Schlussbericht*. (DBFZ-Report, 36). Leipzig: DBFZ. IV, 5-81 S. ISBN: 978-3-946629-56-6.  
 Weinrich, S.; Paterson, M.; Roth, U. (2020). *Leitfaden zur Substrat- und Effizienzbewertung an Biogasanlagen*. (DBFZ-Report, 35). Leipzig: DBFZ. VII, 9-63 S. ISBN: 978-3-946629-57-3.  
 Zeng, T. (2020). *Prediction and reduction of bottom ash slagging during small-scale combustion of biogenic residues: Dissertations*. (Schriftenreihe Umweltingenieurwesen, 101). Rostock. XIV, 176 S. ISBN: 978-3-86009-519-5.

### Collections

Lenz, V.; Thrän, D.; Pfeiffer, D. (Hrsg.). Lenz, V.; Haufe, H.; Oehmichen, K.; Szarka, N.; Thrän, D.; Jordan, M. (2020). *Focus on Systemlösungen im Wärmesektor: 52 Modellkonzepte für eine klimaneutrale Wärme*. (Fokusheft Energetische Biomassenutzung). Leipzig: DBFZ. 118 S. ISBN: 978-3-946629-59-7.  
 Liebetrau, J.; Pfeiffer, D. (Hrsg.) (2020). *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. (Series "Biomass energy use", 7). Leipzig: DBFZ. 451 S. ISBN: 978-3-946629-47-4.  
 Thrän, D.; Moesenfichtel, U. (Hrsg.) (2020). *Das System Bioökonomie*. Berlin: Springer. XX, 391 S. ISBN: 978-3-662-60729-9. DOI: 10.1007/978-3-662-60730-5.

### Conference Proceedings/Conference Readers

11. *Fachgespräch Partikelabscheider in häuslichen Feuerungen*. [online]. 5. Februar 2020 in Leipzig, DBFZ (2020). [online]. (Tagungsreader, 18). Leipzig: DBFZ. 13 S. ISBN: 978-3-946629-53-5. [11. Fachgespräch Partikelabscheider in häuslichen Feuerungen, Leipzig, 05.02.2020]  
 3. *Fachgespräch Staubmessverfahren an Kleinfeuerungsanlagen*. 4. Februar 2020, Leipzig, DBFZ (2020). [online]. (Tagungsreader, 17). Leipzig: DBFZ. 95 S. ISBN: 978-3-946629-54-2. [3. Fachgespräch Staubmessverfahren an Kleinfeuerungsanlagen, Leipzig, 04.02.2020]  
 DBFZ Jahrestagung 2020: *Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020 (2020). (Tagungsreader, 19). Leipzig: DBFZ. 305 S. ISBN: 978-3-946629-61-0. [DBFZ-Jahrestagung, [online], 16.–17.09.2020]  
 HTP-Fachforum 2020: *Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ (2020). [online]. (Tagungsreader, 20). Leipzig: DBFZ. 239 S. ISBN: 978-3-946629-66-5. [6. HTP-Fachforum, [online], 25.–26.11.2020].  
 Nelles, M. (Hrsg.) (2020). 14. *Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17. + 18. Juni 2020 an der Uni-*

- versität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie). (Schriftenreihe Umweltingenieurwesen, 95). Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. 564 S. ISBN: 978-3-86009-507-2. [14. Rostocker Bioenergieforum, Rostock, 16.–18.06.2020]. DOI: 10.18453/rosdok\_id00002650.
- Thrän, D.; Pfeiffer, D. (Hrsg.) (2020). *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen.* (Reader Energetische Biomassennutzung). Leipzig: DBFZ. 217 S. ISBN: 978-3-946629-62-7. [Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020]
- Book contributions**
- Apelt, M. (2020). Determination of aliphatic, organic acids and benzaldehyde with headspace GC. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 64–68.
- Apelt, M. (2020). Examination of samples of solids (substrates) and digestates with HPLC for aliphatic and aromatic acids, alcohols and aldehydes. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 75–80.
- Cuhls, C.; Reinelt, T.; Liebetrau, J. (2020). Emission measurements on plants for biological waste treatment. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 139–146.
- Ekanthalu, V. S.; Hemidat, S.; Hartard, S.; Morscheck, G.; Narra, M.-M.; Narra, S.; Sprafke, J.; Nelles, M. (2020). Waste value potential analysis of municipal solid waste produced in the peri-urban area of Zhaoquanying, China. In: Casares, J.; Itoh, H.; Lega, Massimiliano (Hrsg.) *Waste Management and the Environment X.* Southampton: WIT Press. (WIT Transactions on Ecology and the Environment, 247). ISBN: 978-1-78466-405-3. S. 25–34. DOI: 10.2495/WIT200031.
- Engler, N. (2020). Description of the experiment for the Oberhausen/Rostock/Göttingen Activity Test (ORGA-Test). In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 228–231.
- Engler, N. (2020). GRW-Biogas- and Biomethane Potential Test. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 315–318.
- Fischer, A.; Kuntze, K.; Müller, L.; Richnow, H.-H.; Nikolausz, M. (2020). Differentiation of methanogenic pathways in biogas plants using compound-specific stable isotope analysis. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 268–278.
- Lorenz, H.; Yong-Sun, K.; Bendorff, R.; Fischer, P. (2020). Determination of the retention time by means of tracers. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 212–218.
- Moeller, L.; Görsch, K. (2020). Determination of the foaming potential by means of the "bubble test". In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 172–173.
- Moeller, L.; Görsch, K. (2020). Determination of the protein content. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 93–94.
- Moeller, L.; Görsch, K. (2020). Determination of the surface tension. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 52–56.
- Mühlenberg, J. (2020). Determination of sugars and glucose degradation products. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 81–85.
- Nelles, M.; Nassour, A.; Morscheck, G. (2020). Status and Development of the Circular Economy in Germany. In: Ghosh, S. Kumar (Hrsg.) *Circular Economy: Global Perspective.* Singapur (Singapur): Springer. ISBN: 978-981-15-1051-9. S. 131–147.
- Reinelt, T.; Liebetrau, J. (2020). Monitoring of operational methane emissions from pressure relief valves of biogas plants. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 153–159.
- Schaldach, R.; Thrän, D. (2020). Szenarien und Modelle zur Gestaltung einer nachhaltigen Bioökonomie. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie.* Berlin: Springer. ISBN: 978-3-662-60729-9. S. 297–310. DOI: 10.1007/978-3-662-60730-5\_19.
- Schüch, A.; Hennig, C. (2020). Abfall- und reststoffbasierte Bioökonomie. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie.* Berlin: Springer. ISBN: 978-3-662-60729-9. S. 125–146. DOI: 10.1007/978-3-662-60730-5\_8.
- Schumacher, B. (2020). Total solids content correction according to Weissbach & Strubelt. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 5–8.
- Schumacher, B.; Stinner, W.; Strach, K.; Amon, T. (2020). Determination of methane emission potential of liquid manure during storage at ambient temperature. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 130–138.
- Stinner, W.; Denysenko, V. (2020). Sampling of manure (Suitability for biogas production). In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 38–49.
- Strach, K. (2020). Continuous fermentation tests. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector.* 2. Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 250–258.
- Strach, K. (2020). Determination of the ammonia nitrogen content. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters*

- for analysis purposes and parameters that describe processes in the biogas sector. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 60.
- Strach, K. (2020). Determination of total solids (dry matter) and volatile solids (organic dry matter). In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 50–51.
- Strach, K. (2020). Process specification for the determination of sand. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 222–226.
- Strach, K.; Zechendorf, M. (2020). Determination of the VOA value (according to Kapp) and of the VOA/buffer capacity value (in accordance with FAL). In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 57–59.
- Szarka, N.; Kittler, R. (2020). Bioökonomienetzwerke in Europa. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie*. Berlin: Springer. ISBN: 978-3-662-60729-9. S. 251–264. DOI: 10.1007/978-3-662-60730-5\_16.
- Thrän, D. (2020). Einführung in das System Bioökonomie. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie*. Berlin: Springer. ISBN: 978-3-662-60729-9. S. 1–19. DOI: 10.1007/978-3-662-60730-5\_1.
- Thrän, D. (2020). Monitoring der Bioökonomie. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie*. Berlin: Springer. ISBN: 978-3-662-60729-9. S. 311–319. DOI: 10.1007/978-3-662-60730-5\_20.
- Thrän, D.; Moesenfechtel, U. (2020). Standortbestimmung des Systems Bioökonomie in Deutschland. In: Thrän, D.; Moesenfechtel, Urs (Hrsg.) *Das System Bioökonomie*. Berlin: Springer. ISBN: 978-3-662-60729-9. S. 373–386. DOI: 10.1007/978-3-662-60730-5\_25.
- Wedwitschka, H.; Gallegos, D.; Liebetrau, J.; Jensen, E. (2020). Substrate suitability assessment for anaerobic dry digestion processes: Method to determine substrate material permeability under compaction. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 424–427.
- Weinrich, S.; Astals, S.; Hafner, S. D.; Koch, K. (2020). Kinetic modelling of anaerobic batch tests. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 349–369.
- Weinrich, S.; Pröter, J.; Hofmann, J.; Kube, J. (2020). Mass balancing of biogas plants. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 381–392.
- Zechendorf, M. (2020). Determination of crude fat. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 95–97.
- Zechendorf, M. (2020). Determination of crude fibre. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 98–100.
- Zechendorf, M. (2020). Determination of Neutral Detergent Fibre (NDF). In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement*

- Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 104–106.
- Zechendorf, M. (2020). Determination of total Kjeldahl nitrogen and crude protein. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 90–92.
- Zechendorf, M. (2020). Process specification for the determination of ADF and ADL. In: Liebetrau, J.; Pfeiffer, Diana (Hrsg.) *Collection of Measurement Methods for Biogas: Methods to determine parameters for analysis purposes and parameters that describe processes in the biogas sector*. 2 Aufl. Leipzig: DBFZ. (Series "Biomass energy use", 7). ISBN: 978-3-946629-47-4. S. 101–103.
- Zeug, W.; Uglük, M.; Bezama, A.; Meisel, K.; Majer, S.; Thrän, D. (2020). Energetische und stoffliche Verwendung von Biomasse. In: Bringezu, S.; Banse, Martin (Hrsg.) *Pilotbericht zum Monitoring der deutschen Bioökonomie: Bioökonomie Juni 2020*. Kassel: Universität Kassel, Center for Environmental Systems Research (CESR). S. 56–63.
- In: *Energy Research for Future: Forschung für die Herausforderungen der Energiewende. Beiträge zur FVEE-Jahrestagung 2019*. Berlin: FVEE. (FVEE-Themen). S. 87–93.
- Chaher, N. E. H.; Nassour, A.; Nelles, M.; Hamdi, M. (2020). Optimization of food and green wastes mixture ratios during open windrow co-composting process. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie)*. Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 535–545.
- Ekanthalu, V. S.; Morscheck, G.; Narra, S.; Nelles, M. (2020). Hydrothermal Carbonization: A Sustainable Approach to Deal with the Challenges in Sewage Sludge Management. In: Ghosh, S. Kumar (Hrsg.) *Urban Mining and Sustainable Waste Management*. Singapur (Singapur): Springer. ISBN: 978-981-15-0531-7. S. 293–302. DOI: 10.1007/978-981-15-0532-4\_29.
- Gallegos, D.; Wedwitschka, H.; Moeller, L.; Stabenau, N.; Bauer, A.; Zehndorf, A.; Stinner, W. (2020). Feedstock suitability assessment of Elodea, wheat straw and mixed Elodea-wheat straw silages for biogas production. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie)*. Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 267–276.
- Grope, J.; Scholwin, F.; Nelles, M. (2020). Modellbasierte Prozessüberwachung in großtechnischen Biogasanlagen. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie)*. Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 175–183.
- Jalalipour, H.; Narra, S. (2020). Odor Control in Composting Facilities. In: Nelles, M. (Hrsg.) *14. Contributions to conference proceedings*
- Brosowski, A.; Sumfleth, B.; Kussin, T.; Schaubach, K.; Thrän, D.; Nelles, M.; Oehmichen, K. (2020). A Multi-step Quick Scan for Options and Limitations of Biogenic Resources: From Agricultural Statistics to CNG tuk tuks in India. In: Ghosh, S. Kumar (Hrsg.) *Sustainable Waste Management: Policies and Case Studies. 7<sup>th</sup> IconSWM-ISWMAW 2017, Volume 1*. Singapur (Singapur): Springer. ISBN: 978-981-13-7070-0. S. 383–395. DOI: 10.1007/978-981-13-7071-7\_34.
- Büttner, B.; Lenz, V.; Krause, M.; Bueno, B.; Kuhn, T.; Giovannetti, F.; Knoop, M.; Kotzur, L.; Robinius, M.; Rongstock, R. (2020). Potenziale im Gebäudesektor für effiziente Energieverwendung.

- Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie). Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 513–521.
- Köchermann, J.; Klüpfel, C.; Klemm, M. (2020). Brønsted/Lewis-Acid Combinations for Hydrothermal Production of Levulinic Acid from Starch Residues. In: Mauguin, P.; Scarlat, N.; Grassi, A.; Helm, P. (Hrsg.) *Papers of the 28<sup>th</sup> European Biomass Conference: Bioeconomy's role in the post-pandemic economic recovery. Extracted from the Proceedings of the International Conference held virtually. 6–9 July 2020.* Florenz (Italien): ETA-Florence Renewable Energies. ISBN: 978-88-89407-20-2. S. 515–519. DOI: 10.5071/28thEUBCE2020-3A0.9.4.
- Mauky, E.; Stur, M.; Krebs, C.; Winkler, M.; Kretschmar, J. (2020). Gasspeichermanagement für einen optimierten bedarfsgesteuerten Betrieb von anaeroben Vergärungsanlagen. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 195–203.
- Mercker, O.; Büchner, D.; Pärtsch, P. (2020). Wärmetransport via Innentüren & Fensterlüftung am Beispiel eines Einfamilienhauses mit Einzelraumfeuerung in Trnys. In: Monsberger, M.; Hopfe, C.; Johanna; Krüger, Markus (Hrsg.) *BauSIM 2020: 8<sup>th</sup> Conference of IBPSA Germany and Austria, 23-25 September 2020, Graz University of Technology, Austria. Proceedings.* Graz (Österreich): Verlag der Technischen Universität Graz. ISBN: 978-3-85125-786-1. S. 95–102.
- Mühlenberg, J.; Pollex, A.; Zeng, T. (2020). Development of a Simple and Rapid Test Method for Potassium to Ensure Fuel Quality of Woody Biomass Fuels. In: Mauguin, P.; Scarlat, N.; Grassi, A.; Helm, P. (Hrsg.) *Papers of the 28<sup>th</sup> European Biomass Conference: Bioeconomy's role in the post-pandemic economic recovery. Extracted from the Proceedings of the International Conference held virtually. 6–9 July 2020.* Florenz (Italien): ETA-Florence Renewable Energies. ISBN: 978-88-89407-20-2. S. 257–262. DOI: 10.5071/28thEUBCE2020-2A0.2.2.
- Müller-Langer, F.; Dögnitz, N.; Marquardt, C.; Posselt, D.; Schripp, T.; Majer, S.; Bullerdiel, N.; Zschocke, A.; Halling, A.-M.; Buse, J. (2020). Einsatz von Multiblend JET A-1 in der Praxis: Einblicke und Ergebnisse aus dem Projekt DEMO-SPK. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 97–106.
- Narra, M.-M.; Shettigondahalli Ekanthalu, V.; Hartard, S.; Morscheck, G.; Narra, S.; Nelles, M. (2020). Municipal solid waste behaviour in the Chinese peri-urban area: Zhaoquanying. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 523–534.
- Nelles, M.; Deprie, K. (2020). Biomassennutzung 2050: Beitrag zum Klima- und Ressourcenschutz sowie zur nachhaltigen Energieversorgung. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 15–26.
- Pomsel, D.; Wurdinger, K.; García, L.; Szarka, N.; Lenz, V. (2020). Ölersatz Biomasse Feuerung. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 311–321.
- Pujan, R.; Nitzsche, R.; Köchermann, J.; Preisig, H. A. (2020). Modelling Ontologies for Biorefinery Processes: A Case Study. In: Pierucci, S.; Manenti, F.; Bozzano, G. Luisa; Manca, Davide (Hrsg.) *30<sup>th</sup> European symposium on computer aided chemical engineering: Part A. Amsterdam (Niederlande) et al.: Elsevier. (Computer-aided chemical engineering, 48).* ISBN: 978-0-12-823511-9. S. 1693–1698.
- Pujan, R.; Preisig, H. A. (2020). Systematic Modelling of Flow and Pressure Distribution in a Complex Tank. In: Pierucci, S.; Manenti, F.; Bozzano, G. Luisa; Manca, Davide (Hrsg.) *30<sup>th</sup> European symposium on computer aided chemical engineering: Part A. Amsterdam (Niederlande) et al.: Elsevier. (Computer-aided chemical engineering, 48).* ISBN: 978-0-12-823511-9. S. 1945–1950.
- Schäfer, F.; Janke, L.; Niebling, F.; Himmelstoss, A.; Pröter, J. (2020). NovoHTK: Ein neuartiges Verfahren zur Monovergärung von Hühnertröckenkot. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 253–266.
- Schmidt-Baum, T.; Jaschke, N. (2020). Mehrkammer-Biomeiler: Neue Möglichkeiten zur Schließung regionaler Energie- und Stoffkreisläufe durch flammenlose energetische Nutzung von Reststoffen. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 329–343.
- Schumacher, B.; Wedwitschka, H.; Nordzicke, B.; Fischer, P.; Grundmann, J. (2020). Holzvergärung zur Biogas- und Torfersatzstoffgewinnung. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 277–285.
- Sprafke, J.; Lajewski, N.; Schüch, A.; Nelles, M. (2020). Kontinuierliche Gärversuche mit Bioabfall und Co-Substraten. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 223–235.
- Szarka, N.; Dotzauer, M.; Liebetrau, J.; Hahn, A.; Mauky, E.; Schmid, C.; Krautkremer, B.; Mercker, O.; Matschoss, P.; Dahmen, N.; Steubing, M.; Thrän, D.; Arnold, K. (2020). Bioenergie: Intelligenter Baustein für ein nachhaltiges Energiesystem. In: *Energy Research for Future: Forschung für die Herausforderungen der Energiewende. Beiträge zur FVEE-Jahrestagung 2019.* Berlin: FVEE. (FVEE-Themen). S. 56–60.
- Thabit, Q.; Nassour, A.; Nelles, M. (2020). Energy Efficiency increment of Waste incineration plant in combination with CSP technology in MENA region. In: Nelles, M. (Hrsg.) *14. Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17./18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie).* Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 547–552.
- Wern, B.; Lenz, V.; Sperber, E.; Saadat, A.; Schmidt, D.; Engelmann, P.; Hering, D.; Xhonneux, A.; Giovannetti, F.; Schmidt, F.; Jordan, M.; Strunz, S.; Ebert, H.-P. (2020). Wärmebereitstellung in Privathaushalten: Lösungen für eine CO<sub>2</sub>-freie Energiebereitstellung. In: *Energy Research for Future: Forschung für die Herausforderungen der Energiewende. Beiträge zur FVEE-Jahrestagung 2019.* Berlin: FVEE. (FVEE-Themen). S. 28–32.
- Winkler, M.; Mauky, E.; Weinrich, S. (2020). Strom-

marktgeführte Optimierung des Biogasprozesses: Theoretische Grundlagen und Anwendung im Praxismaßstab. In: *BIOGAS 2020: 13. Innovationskongress*. [s.l.]: [s.n.]. S. 37–47.

### Abstracts in conference readers/ conference proceedings

- Bartsch, A.; Gebhardt, H.; Büchner, D.; Panitz, F.; Stange, P. (2020). Optionen zum Einsatz von fester Biomasse in dekarbonisierten Wärmenetzen. In: Thran, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 46–48.
- Braune, M. (2020). Kombination von stofflicher und energetischer Biomassenutzung in Biogasanlagen. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 154–161.
- Büchner, D.; Mercker, O.; Wurdinger, K. (2020). OptDienE: Optionen zum netzdienlichen Betrieb von Einzelraumfeuerstätten. In: Thran, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 30–31.
- Büchner, D.; Schraube, C. (2020). Development of a demand-based controller for small biomass fired CHP systems. In: 6. *Mitteleuropäische Biomassekonferenz: Tagungsband. 22. bis 24. Jänner 2020, Graz, Österreich*. Wien (Österreich): Österreichischer Biomasse-Verband. ISBN: 978-3-9504380-4-8. S. 129.
- Büchner, D.; Wurdinger, K.; Theurich, S. (2020). Systemdienlicher Betrieb von dezentralen Bioenergieanlagen als Baustein eines nachhaltigen Klimaschutzes. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 212–219.
- Etzold, H.; Wirth, B. (2020). HTC von Klärschlamm: Eine Auswertung ökonomischer Daten. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 228–236.
- Formann, S.; Stolze, B.; Hartmann, I. (2020). Kombinierte stofflich-energetische Nutzung von biogenen Reststoffen zur Gewinnung von biogenem Silica, Seltenen Erden und Edelmetallen als Katalysatorkomponenten zur Emissionsminderung. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 128–135.
- Görsch, K.; Naumann, K.; Müller-Langer, F. (2020). Bioressourcen und Wasserstoff zu Methan als Brennstoff. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 178–189.
- Graffenberger, M.; Brödner, R.; Glowacki, R. (2020). Functional and spatial relationships in regional bioeconomies. In: *Sustainable & Resilient Urban-Rural Partnerships: 25-27 November 2020, Leipzig, Germany. Book of Accepted Abstracts*. [s.l.]: [s.n.].
- Hartmann, I. (2020). Blauer Engel für Kaminöfen: Ein Markt für Staubabscheider. In: 11. *Fachgespräch Partikelabscheider in häuslichen Feuerungen: 5. Februar 2020 in Leipzig, DBFZ*. [online]. Leipzig: DBFZ. (Tagungsreader, 18). ISBN: 978-3-946629-53-5. S. 18–26.
- Klüpfel, C.; Köchermann, J. (2020). Kinetic investigation of various Brønsted and Lewis acids for the production of levulinic acid from starch. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 142–152.
- Knötig, P. (2020). Entwicklung eines hydrothermalen Mehrzweckreaktors innerhalb eines Pilotanlagenkonzepts zur Gewinnung von Kraftstoffen aus biogenen Reststoffen. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 212–216.
- Köchermann, J. (2020). Hydrothermal reactive distillation of biomass and biomass hydrolysates for the production of furfural. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 132–141.
- Kornatz, P. (2020). Zu wertvoll zum Wegwerfen: Reststoffe als Wertstoffe. Potentiale, Erschließung, Nutzung. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 120–127.
- Körner, P.; Wirth, B. (2020). Hydrothermal Carbonisation of Nitrogen Rich Substrates. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 176–184.
- Lehneis, R.; Manske, D.; Schinkel, B.; Thran, D. (2020). Modeling of the power generation from wind turbines with high spatial and temporal resolution. In: *EGU2020: Sharing Geoscience Online*. [online]. DOI: 10.5194/egusphere-egu2020-19913.
- Lenz, V. (2020). Aktuelle Entwicklungen: Deutschland und EU. In: 11. *Fachgespräch Partikelabscheider in häuslichen Feuerungen: 5. Februar 2020 in Leipzig, DBFZ*. [online]. Leipzig: DBFZ. (Tagungsreader, 18). ISBN: 978-3-946629-53-5. S. 8–17.
- Lenz, V. (2020). Begleitvorhaben Forschungsnetzwerke Bioenergie. In: Thran, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 18.
- Lenz, V. (2020). Einführung: SmartBiomassHeat. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 204–208.
- Müller-Langer, F. (2020). Einführung: Bioraffinerien als wichtiger Bestandteil von Wertschöpfungsketten der Bioökonomie. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 150.
- Nelles, M.; Angelova, E. (2020). Closing DBFZ Jahrestagung 2020, Bioenergie zwischen Klimapaket und Bioökonomiestrategie. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 236–241.
- Reißmann, D.; Bezama, A.; Thran, D. (2020). Hydrothermale Carbonisierung von Klärschlamm: Ergebnisse einer szenariobasierten multi-kriteriellen Technologiebewertung. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 112–118.
- Röder, L. S.; Gröngroft, A. (2020). Simulation und zeitliche Erfassung des Energiebedarfs einer Bioraffinerie. In: *Jahrestreffen der Process-Net-Fachgemeinschaft Process-, Apparate- und Anlagentechnik (PAAT): Book of Abstracts. 9.–10. November 2020. Virtuelle Tagung*. [s.l.]: DECHEMA, VDI. S. 37.
- Röver, L.; Körner, P.; Etzold, H.; Wirth, B. (2020). Heißentwässerung von hydrothermal behandelten Klärschlämmen. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 220–226.
- Thran, D. (2020). Auf dem Weg zu einer nachhaltigen Bioökonomie: Herausforderungen und Perspektiven. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 242–254.

- Thrän, D.; Szarka, N. (2020). Einführung: Klimagasreduktion mit intelligenter Bioenergie. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 78–87.
- Wedwitschka, H. (2020). Kleine Tiere, großes Potenzial: Insektenbiomasse als zukünftige Quelle für hochwertige Proteine und Fette für Futtermittel und Industrieanwendungen. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 136–143.
- Zechendorf, M. (2020). Wohin damit?: Gesamtheitliche Ansätze zur kombinierten Abfall- und Klärschlammverwertung am Beispiel von Paris. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 144.
- Posters in conference proceedings**
- Bao, K.; Padsala, R.; Coors, V.; Thrän, D. (2020). GIS-based assessment of regional biomass potentials at the example of two counties in Germany. In: Mauguin, P.; Scarlat, N.; Grassi, A.; Helm, P. (Hrsg.) *Papers of the 28<sup>th</sup> European Biomass Conference: Bioeconomy's role in the post-pandemic economic recovery*. Extracted from the Proceedings of the International Conference held virtually, 6–9 July 2020. Florenz (Italien): ETA-Florence Renewable Energies. ISBN: 978-88-89407-20-2. S. 77–85. DOI: 10.5071/28thEUBCE2020-1CV.4.15.
- Çepeliogullar Mutlu, Ö.; Büchner, D.; Zeng, T. (2020). Renewables-based drying technology for costeffective valorisation of waste from the food processing industry: DRALOD. In: 6. *Mitteuropäische Biomassekonferenz: Tagungsband. 22. bis 24. Jänner 2020, Graz, Österreich*. Wien (Österreich): Österreichischer Biomasse-Verband. ISBN: 978-3-9504380-4-8. S. 202.
- Çepeliogullar Mutlu, Ö.; Theurich, S.; Büchner, D.; Zeng, T. (2020). Renewables-based Drying Technology for Cost-effective Valorization of Waste from the Food Processing Industry. In: Mauguin, P.; Scarlat, N.; Grassi, A.; Helm, P. (Hrsg.) *Papers of the 28<sup>th</sup> European Biomass Conference: Bioeconomy's role in the post-pandemic economic recovery*. Extracted from the Proceedings of the International Conference held virtually, 6–9 July 2020. Florenz (Italien): ETA-Florence Renewable Energies. ISBN: 978-88-89407-20-2. S. 341–344. DOI: 10.5071/28thEUBCE2020-2BV.2.6.
- Foth, S.; Schüch, A.; Nelles, M. (2020). COASTAL Biogas: Energetische Verwertung von Seegrass als Co-Substrat in der Vergärung. In: Nelles, M. (Hrsg.) *Rostocker Bioenergieforum – 19. Dialog Abfallwirtschaft MV: geplant am 16./17. + 18. Juni 2020 an der Universität Rostock (nicht durchgeführt aufgrund der Beschränkungen im Zuge der Corona-Pandemie)*. Rostock: Univ., Professur Abfall- und Stoffstromwirtschaft. (Schriftenreihe Umweltingenieurwesen, 95). ISBN: 978-3-86009-507-2. S. 415–423.
- Gebhardt, H. (2020). Options for an efficient usage of solid biofuels in decarbonized heating grids. In: 6. *Mitteuropäische Biomassekonferenz: Tagungsband. 22. bis 24. Jänner 2020, Graz, Österreich*. Wien (Österreich): Österreichischer Biomasse-Verband. ISBN: 978-3-9504380-4-8. S. 181.
- Glowacki, R.; Brödner, R.; Graffenberger, M. (2020). Modellregionen Bioökonomie im Lausitzer und im Mitteldeutschen Revier. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 264–265.
- Grundmann, J.; Schumacher, B. (2020). Holzbaisiertes Biomethan aus der Vergärung für die Wärmewende. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 172–173.
- Haufe, H.; Schneider, J.; Pannicke, N.; Birger, J.; Volz, B.; Schmeichel, A. (2020). Innovative nachhaltige Konzepte für eine in die landwirt-

- schafliche Flächennutzung integrierte Energieerzeugung. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 268–269.
- Janke, L.; Schäfer, F.; Niebling, F.; Himmelstoss, A.; Pröter, J. (2020). NovoHTK: Ein neuartiges Verfahren zur Monovergärung von Hühnertröckenkot. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 274–275.
- Klüpfel, C.; Köchermann, J.; Wirth, B. (2020). Hydrothermal Liquefaction of waste biomass. In: *HTP-Fachforum 2020: Hydrothermale Prozesse zur stofflichen und energetischen Wertschöpfung*. 25./26. November 2020, Leipzig, DBFZ. [online]. Leipzig: DBFZ. (Tagungsreader, 20). ISBN: 978-3-946629-66-5. S. 32–33.
- Köchermann, J.; Klüpfel, C.; Görsch, K.; Klemm, M. (2020). Platform chemicals from biogenic residues by hydrothermal processes. In: 6. *Mitteuropäische Biomassekonferenz: Tagungsband. 22. bis 24. Jänner 2020, Graz, Österreich*. Wien (Österreich): Österreichischer Biomasse-Verband. ISBN: 978-3-9504380-4-8. S. 192.
- König, M.; Hartmann, I. (2020). Flexibilisierung des Brennstoffeinsatzes für die Nahwärmeversorgung durch adaptive Emissionsminderungsmaßnahmen. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 134–135.
- König, M.; Müller, M.; Hartmann, I.; Lenz, R.; Schenk, J. (2020). Entwicklung einer marktnahen emissionsarmen Biomassekleinstfeuerung für Niedrigenergie- und Passivhäuser. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 286–287.
- Kurth, M.; Rösch, S. (2020). Herstellung, Charakterisierung und Modellierung von wasserelektiven Membranen für die Methanisierung von CO<sub>2</sub>. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 288–289.
- Lange, J.; Formann, S. (2020). Einlagerung von biogenem Silica in Getreide-Biomasse. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 292–293.
- Lange, N.; Majer, S.; Meisel, K.; Oehmichen, K. (2020). Assessed, assessing and to be assessed: past, present and future of LCA at the DBFZ. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 290–291.
- Lenz, V.; Pomsel, D.; Wurdinger, K.; García, L.; Schmidt-Baum, T.; Szarka, N. (2020). Projekt OBEN: Ölersatz Biomasseheizung als Beitrag zur nationalen Bioökonomiestrategie. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 272–273.
- Mathew, J.; Büchner, D. (2020). Control strategies for multivariant biomass systems. In: 6. *Mitteuropäische Biomassekonferenz: Tagungsband. 22. bis 24. Jänner 2020, Graz, Österreich*. Wien (Österreich): Österreichischer Biomasse-Verband. ISBN: 978-3-9504380-4-8. S. 197.
- Reumerman, P. J.; Rutz, D.; Janssen, R.; Bacovsky, D.; Gröngroft, A.; Saastamoinen, H.; Mäki, E.; Karampinis, E. (2020). Mapping Bioenergy Retrofitting in Europe's Industry: BIOFIT First Results. In: Mauguin, P.; Scarlat, N.; Grassi, A.; Helm, P. (Hrsg.) *Papers of the 28<sup>th</sup> European Biomass Conference: Bioeconomy's role in the post-pandemic economic recovery*. Extracted from the Proceedings of the International Conference held virtually, 6–9 July 2020. Florenz (Italien): ETA-Florence Renewable Energies. ISBN: 978-88-89407-20-2. S. 1003–1010. DOI: 10.5071/28thEUBCE2020-1BV.1.34.

- Schliermann, T.; Hermann, A.; Hartmann, I.; Wiest, W.; Ho, J.; Köster, F.; Zimmermann, G. (2020). Einsatz von aschereichen Reststoffen in einem Vergaser-BHKW. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 212.
- Schmid, C.; Hahn, A. (2020). Biogenes CO<sub>2</sub>: Wertvolle Ressource für CO<sub>2</sub>-Nutzungspfade in Deutschland. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 296–297.
- Schneider, J.; Gerhards, C.; Pannicke, N.; Haufe, H.; Birger, J.; Zwosta, N.; Mattiza, M. (2020). BiWiBi-Projekt: Nachhaltige Kombination von bifacialen Solarmodulen, Windenergie und Biomasse bei gleichzeitiger landwirtschaftlicher Flächennutzung und Steigerung der Artenvielfalt. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 62–63.
- Schumacher, B.; Wedwitschka, H.; Nordzieke, B.; Fischer, P.; Grundmann, J. (2020). Innovative value chains via anaerobic digestion of wood fibres. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 298–299.
- Theurich, S.; Büchner, D.; Schraube, C. (2020). Steigerung des Nutzens von kleinen, biomassenbefeuerten BHKWs durch bedarfsgerechte Regelung: SNUKR. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 300–301.
- Theurich, S.; Schraube, C.; Büchner, D. (2020). Be-

- darfsgerechte Regelung von kleinen, biomassenbefeuerten BHKWs. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 78–79.
- Wurdinger, K.; Pomsel, D.; Lenz, V.; Szarka, N. (2020). Unterstützung des Entscheidungsprozesses von Stakeholdern für ein erneuerbares Heizungssystem durch digitale Technologien. In: Thrän, D.; Pfeiffer, Diana (Hrsg.) *Digitalisieren, Sektoren koppeln, flexibilisieren: Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden und Quartieren. Gemeinsame Fachkonferenz der BMWi-Forschungsnetzwerke Bioenergie und Energiewendebauen*. Leipzig: DBFZ. (Reader Energetische Biomassenutzung). ISBN: 978-3-946629-62-7. S. 66–68.
- Yoshida, T.; Hashida, K.; Zeng, T.; Lenz, V. (2020). Effect of softwood species on reactivity during gasification. In: *DBFZ Jahrestagung 2020: Bioenergie zwischen Klimapaket und Bioökonomiestrategie*. Leipzig, 16./17. September 2020. Leipzig: DBFZ. (Tagungsreader, 19). ISBN: 978-3-946629-61-0. S. 266–267.

### Contributions to reports

- Berndes, G.; Cowie, A. L.; Thrän, D. (2020). Recommendation and next steps. In: Thrän, D.; Cowie, A. L.; Berndes, Göran (Hrsg.) *Roles of bioenergy in energy system pathways towards a "well-below-2-degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. S. 34–35.
- Billig, E.; Budzinski, M.; Borchers, M.; Moesenfechtel, U.; Thrän, D.; Bringezu, S. (2020). Potenziell Transformativ Technologien. In: Bringezu, S.; Banse, Martin (Hrsg.) *Pilotbericht zum Monitoring der deutschen Bioökonomie: Blioökonomie Juni 2020*. Kassel: Universität Kassel, Center for Environmental Systems Research (CESR). S. 72–74.

- Borchers, M.; Cherubini, F.; Cowie, A. L.; Egnell, G.; Hamelin, L.; Harris, M. Z.; Kollai, H.; Lodato, C.; Röder, M.; Thrän, D. (2020). Summary of the workshop. In: Thrän, D.; Cowie, A. L.; Berndes, Göran (Hrsg.) *Roles of bioenergy in energy system pathways towards a "well-below-2-degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. S. 14–19.
- Brosowski, A.; Krause, T.; Mantau, U.; Mahro, B.; Noke, A.; Richter, F.; Raussen, T.; Bischof, R.; Hering, T.; Blanke, C.; Thrän, D. (2020). Rest- und Abfallströme. In: Bringezu, S.; Banse, Martin (Hrsg.) *Pilotbericht zum Monitoring der deutschen Bioökonomie: Blioökonomie Juni 2020*. Kassel: Universität Kassel, Center for Environmental Systems Research (CESR). S. 35–36.
- Cowie, A. L.; Berndes, G.; Thrän, D. (2020). Translating research into practice. In: Thrän, D.; Cowie, A. L.; Berndes, Göran (Hrsg.) *Roles of bioenergy in energy system pathways towards a "well-below-2-degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. S. 31–34.
- Cyffka, C.; Brosowski, A. (2020). Nahrungsmittelabfälle. In: Bringezu, S.; Banse, Martin (Hrsg.) *Pilotbericht zum Monitoring der deutschen Bioökonomie: Blioökonomie Juni 2020*. Kassel: Universität Kassel, Center for Environmental Systems Research (CESR). S. 54–56.
- Kollai, H.; Fritsche, U.; Thrän, D. (2020). Background. In: Thrän, D.; Cowie, A. L.; Berndes, Göran (Hrsg.) *Roles of bioenergy in energy system pathways towards a "well-below-2-degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. S. 12–14.
- Thrän, D.; Cowie, A. L.; Berndes, G. (Hrsg.) (2020). Thrän, D.; L. Cowie Annette; Berndes, G. *Roles of bioenergy in energy system pathways towards a "well-below-2-degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. 124 S.

- Zeug, W.; Ugljik, M.; Bezama, A.; Meisel, K.; Majer, S.; Thrän, D. (2020). Energetische und Stoffliche Verwendung von Biomasse. In: Bringezu, S.; Banse, Martin (Hrsg.) *Pilotbericht zum Monitoring der deutschen Bioökonomie: Blioökonomie Juni 2020*. Kassel: Universität Kassel, Center for Environmental Systems Research (CESR). S. 56–63.

### Journal articles (peer reviewed)

- Chaher, N. E. H.; Chakchouk, M.; Engler, N.; Nassour, A.; Nelles, M.; Hamdi, M. (2020). "Optimization of Food Waste and Biochar In-Vessel Co-Composting". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 4. DOI: 10.3390/su12041356.
- He, F.; Li, X.; Behrendt, F.; Schliermann, T.; Shi, J.; Liu, Y. (2020). "Critical changes of inorganics during combustion of herbaceous biomass displayed in its water soluble fractions". *Fuel Processing Technology* (ISSN: 0378-3820), Vol. 198. DOI: 10.1016/j.fuproc.2019.106231.
- Jordan, M.; Millinger, M.; Thrän, D. (2020). "Robust bioenergy technologies for the German heat transition: A novel approach combining optimization modeling with Sobol' sensitivity analysis". *Applied Energy* (ISSN: 0306-2619), Nr. 262. DOI: 10.1016/j.apenergy.2020.114534.
- Kusuma, M. A.; Nassour, A.; Nelles, M.; Ragosnig, A. (2020). "Potential utilization of commercial waste in Jakarta as alternative fuel by cement industry". *Waste Management & Research* (ISSN: 0734-242X), Vol. 38, Nr. 12. S. 1367–1378. DOI: 10.1177/0734242X20943279.
- Lauer, M.; Leprich, U.; Thrän, D. (2020). "Economic assessment of flexible power generation from biogas plants in Germany's future electricity system". *Renewable Energy* (ISSN: 0960-1481), Nr. 146. S. 1471–1485. DOI: 10.1016/j.renene.2019.06.163.
- Lüdecke, B.; Nelles, M.; Dibbert, R. (2020). "Anaerobic treated organic waste: Effects of sanitation regarding to pathogenic clostridia". *Biomass and Bioenergy* (ISSN: 0961-9534), Vol. 141. DOI: 10.1016/j.biombioe.2020.105709.
- Reißmann, D.; Thrän, D.; Bezama, A. (2020). "What could be the future of hydrothermal processing wet biomass in Germany by 2030?: A semi-quantitative system analysis". *Biomass and Bioenergy* (ISSN: 0961-9534), Nr. 138. DOI: 10.1016/j.biombioe.2020.105588.

- Schröder, J.; Görsch, K. (2020). "Storage Stability and Material Compatibility of Poly(oxy)methylene Dimethyl Ether Diesel Fuel". *Energy & Fuels* (ISSN: 0887-0624), Vol. 34, Nr. 1. S. 450–459. DOI: 10.1021/acs.energyfuels.9b03101.
- Sobhi, M.; Han, T.; Stinner, W.; Cui, X.; Sun, H.; Li, B.; Guo, J.; Dong, R. (2020). "Hybrid technology for nutrients recovery as microbial biomass and ammonium sulfate from un-diluted biogas liquid digestate using a modified airlift reactor". *Journal of Cleaner Production* (ISSN: 0959-6526), Nr. 267. DOI: 10.1016/j.jclepro.2020.121976.
- Sun, H.; Cui, X.; Stinner, W.; Zhang, Leping, Ju, Xinxin; Guo, J.; Dong, R. (2020). "Ensiling excessively wilted maize stover with biogas slurry: Effects on storage performance and subsequent biogas potential". *Bioresource Technology* (ISSN: 0960-8524), Nr. 305. DOI: 10.1016/j.biortech.2020.123042.
- Thrän, D.; Bauschmann, M.; Dahmen, N.; Erlach, B.; Heinbach, K.; Hirschl, B.; Hildebrand, J.; Rau, I.; Majer, S.; Oehmichen, K.; Schweizer-Ries, P.; Hennig, C. (2020). "Bioenergy beyond the German „Energiewende“: Assessment framework for integrated bioenergy strategies". *Biomass and Bioenergy* (ISSN: 0961-9534), Vol. 142. DOI: 10.1016/j.biombioe.2020.105769.
- Zareihassangheshlaghi, A.; Beidaghy Dizaji, H.; Zeng, T.; Huth, P.; Ruf, T.; Denecke, R.; Enke, D. (2020). "The behavior of metal impurities on surface and bulk of biogenic silica from rice husk combustion and their impact on ash melting tendency". *ACS Sustainable Chemistry & Engineering* (ISSN: 2168-0485), Vol. 8, Nr. 28. S. 10369–10379. DOI: 10.1021/acssuschemeng.0c01484.
- Zhou, Y.; Engler, N.; Li, Y.; Nelles, M. (2020). "The influence of hydrothermal operation on the surface properties of kitchen waste-derived hydrochar: Biogas upgrading". *Journal of Cleaner Production* (ISSN: 0959-6526), Nr. 259. DOI: 10.1016/j.jclepro.2020.121020.
- Compounds on the Hydrochar Formation". *ChemistryOpen* (ISSN: 2191-1363), Vol. 9, Nr. 8. S. 864–873. DOI: 10.1002/open.202000148.
- Astals, S.; Koch, K.; Weinrich, S.; Hafner, S. D.; Tait, S.; Peces, M. (2020). "Impact of Storage Conditions on the Methanogenic Activity of Anaerobic Digestion Inocula". *Water* (ISSN: 2073-4441), Vol. 12, Nr. 5. DOI: 10.3390/w12051321.
- Bao, K.; Padsala, R.; Coors, V.; Thrän, D.; Schröter, B. (2020). "A Method for Assessing Regional Bioenergy Potentials Based on GIS Data and a Dynamic Yield Simulation Model". *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 24. DOI: 10.3390/en13246488.
- Bao, K.; Padsala, R.; Thrän, D.; Schröter, B. (2020). "Urban Water Demand Simulation in Residential and Non-Residential Buildings Based on a CityGML Data Model". *ISPRS International Journal of Geo-Information* (ISSN: 2220-9964), Vol. 9, Nr. 11. DOI: 10.3390/ijgi9110642.
- Bill, R.; Lorenzen-Zabel, A.; Hinz, M.; Kalcher, J.; Pfeiffer, A.; Brosowski, A.; Aberle, H.; Hovenbitzer, M.; Meinel, G.; Sikder, S.; Herold, H. (2020). "OPENGE0EDU: a massive open online course on using open geodata". *ISPRS – Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences* (ISSN: 2194-9042), Nr. V-5-2020. S. 31–38. DOI: 10.5194/isprs-annals-V-5-2020-31-2020.
- Brosowski, A.; Bill, R.; Thrän, D. (2020). "Temporal and spatial availability of cereal straw in Germany: Case study: Biomethane for the transport sector". *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-020-00274-1.
- Budzinski, M.; Bezama, A.; Thrän, D. (2020). "Estimating the potentials for reducing the impacts on climate change by increasing the cascade use and extending the lifetime of wood products in Germany". *Resources, Conservation & Recycling: X* (ISSN: 2590-289X), Nr. 6. DOI: 10.1016/j.rcrx.2020.100034.
- Chaher, N. E. H.; Hemidat, S.; Chakchouk, M.; Nassour, A.; Hamdi, M.; Nelles, M. (2020). "From anaerobic to aerobic treatment: Upcycling of digestate as a moisturizing agent for in-vessel composting process". *Bioresources and Bioprocessing* (ISSN: 2197-4365), Vol. 7. DOI: 10.1186/s40643-020-00348-0.
- Chaher, N. E. H.; Hemidat, S.; Thabit, Q.; Chakchouk, M.; Nassour, A.; Hamdi, M.; Nelles, M.

#### Open Access journal articles (peer reviewed)

- Alhndi, M.-J.; Körner, P.; Wüst, D.; Pfersich, J.; Kruse, A. (2020). "Nitrogen-Containing Hydrochar: The Influence of Nitrogen-Containing

- (2020). "Potential of Sustainable Concept for Handling Organic Waste in Tunisia". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 19. DOI: 10.3390/su12198167.
- Dietrich, S.; Nieß, S.; Rönsch, S.; Kraume, M. (2020). "Synthesis of light hydrocarbons from biogas and hydrogen: Investigation of Fe-Mn-K/MgO catalyst". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 8. S. 1547–1553. DOI: 10.1002/ceat.202000035.
- Formann, S.; Hahn, A.; Janke, L.; Stinner, W.; Sträuber, H.; Logrono, W.; Nikolausz, M. (2020). "Beyond sugar and ethanol production: Value generation opportunities through sugar cane residues". *Frontiers in Energy Research* (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/fenrg.2020.579577.
- Gökgöz, F.; Liebetrau, J.; Nelles, M. (2020). "Kombinierte Bereitstellung von Strom und Kraftstoff an Biogasanlagen: Wirtschaftlichkeit von Anschlusszenarien". *Landtechnik* (ISSN: 0023-8082), Vol. 75, Nr. 3. S. 141–160. DOI: 10.1515/lt.2020.3242.
- Haensel, K.; Barchmann, T.; Dotzauer, M.; Fischer, E.; Liebetrau, J. (2020). "Weiterbetrieb flexibilisierter Biogasanlagen: realisierbare Gebotspreise im EEG 2017". *Landtechnik* (ISSN: 0023-8082), Vol. 75, Nr. 2. S. 81–103. DOI: 10.1515/lt.2020.3235.
- Hahn, A.; Szarka, N.; Thrän, D. (2020). "German Energy and Decarbonization Scenarios: 'Blind Spots' With Respect to Biomass-Based Carbon Removal Options". *Frontiers in Energy Research* (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/fenrg.2020.00130.
- Helka, J.; Ostrowski, J.; Abdel-Razek, M.; Hawighorst, P.; Henke, J.; Majer, S.; Thrän, D. (2020). "Combining Environmental Footprint Models, Remote Sensing Data, and Certification Data towards an Integrated Sustainability Risk Analysis for Certification in the Case of Palm Oil". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 19. DOI: 10.3390/su12198273.
- Hildebrandt, J.; Bezama, A.; Thrän, D. (2020). "Insights from the Sustainability Monitoring Tool SUMINISTRO Applied to a Case Study System of Prospective Wood-Based Industry Networks in Central Germany". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 9. DOI: 10.3390/su12093896.
- Hofmann, J.; Müller, L.; Weinrich, S.; Debeer, L.; Schumacher, B.; Velghe, F.; Liebetrau, J. (2020). "Assessing the Effects of Substrate Disintegration on Methane Yield". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 1. S. 47–58. DOI: 10.1002/ceat.201900393.
- Horschig, T.; Schaubach, K.; Sutor, C.; Thrän, D. (2020). "Stakeholder perceptions about sustainability governance in the German biogas sector". *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-020-00270-5.
- Jalalipour, H.; Jaafarzadeh, N.; Morscheck, G.; Narra, S.; Nelles, M. (2020). "Potential of Producing Compost from Source-Separated Municipal Organic Waste (A Case Study in Shiraz, Iran)". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 22. DOI: 10.3390/su12229704.
- Janke, L.; McDonagh, S.; Weinrich, S.; Murphy, J. D.; Nilsson, D.; Hansson, P.-A.; Nordberg, A. (2020). "Optimizing power-to-H2 participation in the Nord Pool electricity market: Effects of different bidding strategies on plant operation". *Renewable Energy* (ISSN: 0960-1481), Nr. 156. S. 820–836. DOI: 10.1016/j.renene.2020.04.080.
- Janke, L.; McDonagh, S.; Weinrich, S.; Nilsson, D.; Hansson, P.-A.; Nordberg, A. (2020). "Techno-Economic Assessment of Demand-Driven Small-Scale Green Hydrogen Production for Low Carbon Agriculture in Sweden". *Frontiers in Energy Research* (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/fenrg.2020.595224.
- Jarosch, L.; Zeug, W.; Bezama, A.; Finkbeiner, M.; Thrän, D. (2020). "A Regional Socio-Economic Life Cycle Assessment of a Bioeconomy Value Chain". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 3. DOI: 10.3390/su12031259.
- Klemm, M.; Kröger, M.; Görsch, K.; Lange, R.; Hilpmann, G.; Lali, F.; Haase, S.; Krusche, M.; Ullrich, F.; Chen, Z.; Wilde, N.; Al-Najji, M.; Gläser, R. (2020). "Experimental Evaluation of a New Approach for a Two-Stage Hydrothermal Biomass Liquefaction Process". *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 14. DOI: 10.3390/en13143692.
- Klemm, M.; Kröger, M.; Görsch, K.; Müller-Langer, F.; Majer, S. (2020). "Fuel-Driven Biorefineries Using Hydrothermal Processes". *Chemie Ingenieur Technik* (ISSN: 1522-2640), Vol. 92, Nr. 11. S. 1653–1664. DOI: 10.1002/cite.202000093.
- Knight, L.; Meehan, J.; Tapinos, E.; Menzies, L.; Pfeiffer, A. (2020). "Researching the Future



- of Purchasing and Supply Management: The purpose and potential of scenarios". *Journal of Purchasing and Supply Management* (ISSN: 1478-4092), Vol. 26, Nr. 3. DOI: 10.1016/j.pur-sup.2020.100624.
- Koch, K.; Hafner, S. D.; Astals, S.; Weinrich, S. (2020). "Evaluation of Common Supermarket Products as Positive Controls in Biochemical Methane Potential (BMP) Tests". *Water* (ISSN: 2073-4441), Vol. 12, Nr. 5. DOI: 10.3390/w12051223.
- Koch, K.; Hafner, S. D.; Weinrich, S.; Astals, S.; Holiger, C. (2020). "Power and Limitations of Biochemical Methane Potential (BMP) Tests". *Frontiers in Energy Research* (ISSN: 2296-598X), Vol. 8. DOI: 10.3389/fenrg.2020.00063.
- Korth, B.; Kretzschmar, J.; Bartz, M.; Kuchenbuch, A.; Harnisch, F. (2020). "Determining incremental coulombic efficiency and physiological parameters of early stage Geobacter spp. enrichment biofilms". *Plos one* (ISSN: 1932-6203), Vol. 15, Nr. 6. DOI: 10.1371/journal.pone.0234077.
- Krüger, D.; Lenz, V.; Ulbricht, T. (2020). "Simulation of the natural draft for test bench measurements". *Biomass Conversion and Biorefinery* (ISSN: 2190-6815), Vol. 10, Nr. 1. S. 73–83. DOI: 10.1007/s13399-019-00531-0.
- Lehneis, R.; Manske, D.; Thrän, D. (2020). "Generation of Spatiotemporally Resolved Power Production Data of PV Systems in Germany". *ISPRS International Journal of Geo-Information* (ISSN: 2220-9964), Vol. 9, Nr. 11. DOI: 10.3390/ijgi9110621.
- Lenz, V.; Szarka, N.; Jordan, M.; Thrän, D. (2020). "Status and perspectives of biomass use for industrial process heat for industrialized countries, with emphasis on Germany". *Chemical Engineering & Technology*, Vol. 43, Nr. 8. S. 1469–1484. DOI: 10.1002/ceat.202000077.
- Lühmann, T.; Wirth, B. (2020). "Sewage Sludge Valorization via Hydrothermal Carbonization: Optimizing Dewaterability and Phosphorus Release". *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 17. DOI: 10.3390/en13174417.
- Matschoss, P.; Steubing, M.; Pertagnol, J.; Zheng, Y.; Wern, B.; Dotzauer, M.; Thrän, D. (2020). "A consolidated potential analysis of bio-methane and e-methane using two different methods for a medium-term renewable gas supply in Germany". *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-020-00024-5.
- Meisel, K.; Millinger, M.; Naumann, K.; Müller-Langer, F.; Majer, S.; Thrän, D. (2020). "Future Renewable Fuel Mixes in Transport in Germany under RED II and Climate Protection Targets". *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 7. DOI: 10.3390/en13071712.
- Moosmann, D.; Majer, S.; Ugarte, S.; Ladu, L.; Wurster, S.; Thrän, D. (2020). "Strengths and gaps of the EU frameworks for the sustainability assessment of bio-based products and bioenergy". *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-020-00251-8.
- Müller, L.; Engler, N.; Rostalsky, K.; Müller, U.; Krebs, C.; Hinz, S. (2020). "Influence of Enzyme Additives on the Rheological Properties of Digester Slurry and on Biomethane Yield". *Bioengineering* (ISSN: 2306-5354), Vol. 7, Nr. 51. DOI: 10.3390/bioengineering7020051.
- Müller-Langer, F.; Dögnitz, N.; Marquardt, C.; Zschocke, A.; Schripp, T.; Oehmichen, K.; Majer, S.; Bullerdiel, N.; Halling, A.-M.; Posselt, D.; Kuchling, T.; Buse, J. (2020). "Multiblend JET A-1 in Practice: Results of an R&D Project on Synthetic Paraffinic Kerosenes". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 8. S. 1514–1521. DOI: 10.1002/ceat.202000024.
- Musonda, F.; Millinger, M.; Thrän, D. (2020). "Greenhouse Gas Abatement Potentials and Economics of Selected Biochemicals in Germany". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 6. DOI: 10.3390/su12062230.
- Mutlu, Ö. Ç.; Zeng, T. (2020). "Challenges and Opportunities of Modeling Biomass Gasification in Aspen Plus: A Review". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 9. S. 1674–1689. DOI: 10.1002/ceat.202000068.
- O'Keefe, S.; Thrän, D. (2020). "Energy Crops in Regional Biogas Systems: An Integrative Spatial LCA to Assess the Influence of Crop Mix and Location on Cultivation GHG Emissions". *Sustainability* (ISSN: 2071-1050), Vol. 12, Nr. 1. DOI: 10.3390/su12010237.
- Pollex, A.; Lesche, S.; Kuptz, D.; Zeng, T.; Kuffer, G.; Mühlenberg, J.; Hartmann, H.; Lenz, V. (2020). "Influence of screening and drying on low quality wood chips for the application in small-scale gasification plants". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 8. S. 1554–1563. DOI: 10.1002/ceat.202000033.
- Tafarte, P.; Kanngießler, A.; Dotzauer, M.; Meyer, B.; Grevé, A.; Millinger, M. (2020). "Interaction of Electrical Energy Storage, Flexible Bioenergy Plants and System-friendly Renewables in Wind- or Solar PV-dominated Regions". *Energies*, Vol. 13, Nr. 5. DOI: 10.3390/en13051133.
- Thabit, Q.; Nassour, A.; Nelles, M. (2020). "Potentiality of Waste-to-Energy Sector Coupling in the MENA Region: Jordan as a Case Study". *Energies* (ISSN: 1996-1073), Vol. 13, Nr. 11. DOI: 10.3390/en13112786.
- Theurich, S.; Rönsch, S.; Güttel, R. (2020). "Transient Flow Rate Ramps for Methanation of Carbon Dioxide in an Adiabatic Fixed-Bed Recycle Reactor". *Energy Technology* (ISSN: 2194-4288), Vol. 8, Nr. 3. DOI: 10.1002/ente.201901116.
- Thoni, T.; Beck, S.; Borchers, M.; Förster, J.; Görl, K.; Hahn, A.; Mengis, N.; Stevenson, A.; Thrän, D. (2020). "Deployment of Negative Emissions Technologies at the National Level: A Need for Holistic Feasibility Assessments". *Frontiers in Climate* (ISSN: 2624-9553), Vol. 2. DOI: 10.3389/fclim.2020.590305.
- Thrän, D.; Schaubach, K.; Majer, S.; Horschig, T. (2020). "Governance of sustainability in the German biogas sector: adaptive management of the Renewable Energy Act between agriculture and the energy sector". *Energy, Sustainability and Society* (ISSN: 2192-0567), Vol. 10. DOI: 10.1186/s13705-019-0227-y.
- Wedwitschka, H.; Gallegos, D.; Schäfer, F.; Jenson, E.; Nelles, M. (2020). "Material Characterization and Substrate Suitability Assessment of Chicken Manure for Dry Batch Anaerobic Digestion Processes". *Bioengineering* (ISSN: 2306-5354), Vol. 7, Nr. 3. DOI: 10.3390/bioengineering7030106.
- Wedwitschka, H.; Gallegos, D.; Tietze, M.; Reinhold, J.; Jenson, E.; Liebetrau, J.; Nelles, M. (2020). "Effect of Substrate Characteristics and Process Fluid Percolation on Dry Anaerobic Digestion Processes". *Chemical Engineering & Technology*, Vol. 43, Nr. 1. S. 59–67. DOI: 10.1002/ceat.201900404.

#### Journal articles (not peer reviewed)

- Adam, R.; Zeng, T.; Ulbricht, T.; Kirsten, C.; Schneider, P.; Dobler, U.; Lenz, V. (2020). "Erfolgreiche Demonstration des Prüfbrennstoffkonzeptes zum Einsatz nicht-holzartiger Festbrennstoffe im Geltungsbereich der 1. BImSchV". *Müll und*

- Abfall (ISSN: 0027-2957), Vol. 52, Nr. 7. S. 356–361. DOI: 10.37307/j.1863-9763.2020.07.06.
- Chaabane, W.; Nassour, A.; Eickhoff, I.; Nelles, M. (2020). "Editorial: Klima- und Ressourcenschutz durch Abfallwirtschaft: Internationales Engagement aus Deutschland stark nachgefragt!". *Müll und Abfall* (ISSN: 0027-2957), Vol. 52, Nr. 4. S. 169.
- Chaabane, W.; Nassour, A.; Eickhoff, I.; Nelles, M. (2020). "Integriertes Abfallmanagement für nachhaltigen Tourismus in Tunesien". *Müll und Abfall* (ISSN: 0027-2957), Vol. 52, Nr. 4. S. 172–180.
- Lenz, V.; Naumann, K.; Denysenko, V.; Daniel-Gromke, J.; Rendsberg, N.; Schröder, J.; Janczik, S.; Maslaton, M.; Hilgedieck, J.; Christ, D.; Kaltschmitt, M. (2020). "Erneuerbare Energien". *BWK: Das Energie-Fachmagazin* (ISSN: 1618-193X), Vol. 72, Nr. 8/9. S. 62–93.
- Liebetrau, J.; Kleinstaub, S.; Jacobi, H.-F.; Pfeiffer, D. (2020). "Editorial: Monitoring and Process Control of Anaerobic Digestion Plants". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 1. S. 6. DOI: 10.1002/ceat.202070015.
- Müller-Langer, F.; Dahmen, N.; Paiva, G. C. de (2020). "Biofuels production and consumption in Germany: Status, advances and challenges". *Task 39 Newsletter*, Nr. 51. S. 6–15.
- Nikolaus, M.; Kretschmar, J. (2020). "Editorial: Anaerobic Digestion in the 21<sup>st</sup> Century". *Bioengineering* (ISSN: 2306-5354), Vol. 7, Nr. 4. DOI: 10.3390/bioengineering7040157.
- Röder, L. S.; Gröngöft, A. (2020). "Implementierung eines Demand Side Managements in Bio-refinerien". *Chemie Ingenieur Technik* (ISSN: 1522-2640), Vol. 92, Nr. 9. S. 1258–1259. DOI: 10.1002/cite.202055302.
- Thrän, D.; Gawel, E.; Fiedler, D. (2020). "Editorial: Energy landscapes of today and tomorrow". *Energy, Sustainability and Society*, Vol. 10. DOI: 10.1186/s13705-020-00273-2.
- Thrän, D.; Pfeiffer, D. (2020). "Editorial: Bioenergy: The X-Factor". *Chemical Engineering & Technology* (ISSN: 0930-7516), Vol. 43, Nr. 8. S. 1468. DOI: 10.1002/ceat.202070085.

### Reports, background papers, statements, etc.

- Bacovsky, D.; Sonnleitner, A.; Müller-Langer, F.; Schröder, J.; Meisel, K.; Brown, A.; Maniatis, K.; Fee, E.; Oliveira da Costa, A.; Ferreira Coelho, J. M.; Rangel do Nascimento, J.; da Costa Barbosa, P. I.; Martins Henriques, R.; Fagerström, A.; Kobayashi, M.; Takada, Y.; Lindblom, H.; Zhang, S.; Wu, Y.; Millinger, M.; Ebadian, M.; Saddler, J.; Lindauer, A.; Stork, K.; Haq, Z.; Laurikko, J.; Hannula, I.; Nylund, N.-O.; Aakko-Saksa, P.; Waldheim, L. *The Role of Renewable Transport Fuels in Decarbonizing Road Transport: Summary Report. A Report from the Advanced Motor Fuels TCP and IEA Bioenergy TCP* (2020). [online]. [s.l.]: IEA Bioenergy. VIII, 33 S.
- Daniel-Gromke, J.; Rendsberg, N.; Denysenko, V.; Barchmann, T.; Oehmichen, K.; Beil, M.; Beyrich, W.; Krautkremer, B.; Trommler, M.; Reinholz, T.; Vollprecht, J.; Rühr, C. *Optionen für Biogas-Bestandsanlagen bis 2030 aus ökonomischer und energiewirtschaftlicher Sicht: Abschlussbericht* (2020). Dessau-Roßlau: Umweltbundesamt. 246 S.
- Jahresbericht 2019* (2020). Leipzig: DBFZ. 187 S. ISBN: 978-3-946629-50-4.
- Lehmann, P.; Ammermann, K.; Gawel, E.; Geiger, C.; Hauck, J.; Heilmann, J.; Meier, J.-N.; Ponitka, J.; Schickelanz, S.; Stemmer, B.; Tafarte, P.; Thrän, D.; Wolfram, E. *Managing spatial sustainability trade-offs: The case of wind power* (2020). Leipzig: UFZ.
- Murphy, J. D. (Hrsg.) (2020). Liebetrau, J.; Kornatz, P.; Baier, U.; Wall, D.; Murphy, J. D. *Integration of biogas systems into the energy system: Technical aspects of flexible plant operation*. [s.l.]: IEA Bioenergy. 35 S. ISBN: 978-1-910154-76-2.
- Tebert, C.; Rödiger, L.; Hartmann, I.; Ulbricht, T.; Lenz, V. *Umweltzeichen Blauer Engel: Entwicklung von Vergabekriterien für Kaminöfen für Holz. Hintergrundbericht zur Erarbeitung der Vergabekriterien DE-UZ 212, Ausgabe Januar 2020* (2020). Dessau: Umweltbundesamt. 75 S.
- Thrän, D.; Bunzel, K.; Bovet, J.; Eichhorn, M.; Hennig, C.; Keuneke, R.; Kinast, P.; Klenke, R.; Koblenz, B.; Lorenz, C.; Majer, S.; Manske, D.; Massmann, E.; Oehmichen, G.; Peters, W.; Reichmuth, M.; Sachs, M.; Scheffelowitz, M.; Schinkel, B.; Schiffer, A.; Tylmann, M. *Naturschutzfachliches Monitoring des Ausbaus der*

- erneuerbaren Energien im Strombereich und Entwicklung von Instrumenten zur Verminderung der Beeinträchtigung von Natur und Landschaft ("EE-Monitor")* (2020). Bonn: BfN. ISBN: 978-3-89624-304-1. DOI: 10.19217/skr562.
- Thrän, D.; Cowie, A. L.; Berndes, G. (Hrsg.) (2020). Thrän, D.; L. Cowie Annette; Berndes, G. *Roles of bioenergy in energy system pathways towards a "well-below-2 -degrees-Celsius (WB2)" world: Workshop report and synthesis of presented studies. A Strategic Inter-Task Study carried out with cooperation between IEA Bioenergy Tasks 40, 43, 44 and 45*. [s.l.]: IEA Bioenergy. 124 S.
- Zeug, W.; Bezama, A.; Thrän, D. *Towards a Holistic and Integrated Life Cycle Sustainability Assessment of the Bioeconomy: Background on Concepts, Visions and Measurements* (2020). Leipzig: UFZ. 35 S.

### Online documents

- Hilgedieck, J.; Christ, D.; Kaltschmitt, M.; Magdowski, A.; Kirstein, N.; Paiva, G. C. de; Schmid, C.; Lenz, V. (2020). *Biomasse ist global meist genutzter regenerativer Energieträger* [online]. Verfügbar unter: <https://www.ingenieur.de/fachmedien/bwk/erneuerbare-energien/biomasse-ist-global-meist-genutzter-regenerativer-energietraeger/>.

### Presentations

- Adam, R. (2020). *Abfall-Ende-Eigenschaft naturbelassener, Holziger Reststoffe durch Aufbereitungsverfahren und Qualitätssicherung (Abfall-Ende)*. Vortrag gehalten: BAV-Altholztag, Bad Neuenahr, 16.09.2020.
- Adam, R. (2020). *Determination of a ideal fuel geometry for combustion in residential pellet stoves (< 6 kW) with the aim of emission reduction*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Adam, R.; Ho, J.; Wiest, W.; Krämer, G. (2020). *[Aufbereitung und Nutzung holzartiger Rest- und Abfallstoffe]*. Vortrag gehalten: DBFZ-Onlineveranstaltung, [online], 29.09.2020.
- Barchmann, T.; Dotzauer, M. (2020). *Geschäftsfelder für Bioenergieanlagen: Fokus Aus-*

- schreibungsdesign*. Vortrag gehalten: Doppelabschlussveranstaltung Bioenergie Post-EEG, Berlin, 19.02.2020.
- Beidaghy Dizaji, H. (2020). *Ash-melting tendency of rice husk during combustion*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Beidaghy Dizaji, H.; Zeng, T.; Enke, D. (2020). *Evaluation of ash melting behavior of rice husk and rice straw during thermochemical conversion*. Vortrag gehalten: 6<sup>th</sup> Central European Biomass Conference, Graz (Österreich), 22.–24.01.2020.
- Bett, A.; Krugel, G.; Brödner, R.; O'Sullivan, M.; Gils, H. C.; Wenske, J.; Hauch, J.; Robinus, M.; Schlatmann, R.; Lim, B.; Püttner, A. (2020). *Erneuerbare Energie: Chancen einer industriellen Wertschöpfung in Europa*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.–04.11.2020.
- Bindig, R. (2020). *Procedure for the development of catalysts for the reduction of emissions from small-scale combustion plants*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Braun, M.; Würdinger, K.; Maydell, K. v.; Vogt, T.; Linssen, J.; Robinus, M.; Degner, T.; Stock, S.; Kneiske, T.; Wittwer, C.; Hagenmeyer, V.; Merten, F. (2020). *Resiliente und kosteneffiziente Stromnetze für die europäische Energieversorgung*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.–04.11.2020.
- Brödner, R.; Graffenberger, M. (2020). *MoreBio: Model regions of the bioeconomy. Analysing and preparing structural change in coal regions: Tapping potentials for the development of strong bioeconomy regions*. Vortrag gehalten: POWER4BIO Central Germany cross-visit, [online], 23.–24.06.2020.
- Brödner, R.; Graffenberger, M. (2020). *Functional and spatial relationships in regional bioeconomies*. Vortrag gehalten: URP Conference, [online], 26.11.2020.
- Brosowski, A.; Krause, T.; Müller, P. (2020). *Online-Datenbank zur Biomasseverfügbarkeit*. Vortrag gehalten: BEniVerFachforum "Energieszenarien", [online], 04.11.2020.
- Büchner, D.; Schraube, C.; Theurich, S. (2020). *Development of a demand-driven controller for small biomass-fired cogeneration units*. Vortrag gehalten: 6. Central European Biomass Conference, Graz (Österreich), 22.–24.01.2020.

- Clauß, T. (2020). *Introduction of EvEmBi research project*. Vortrag gehalten: "Research Agenda on Biogas in Europe", [online], 03.06.2020.
- Clauß, T.; Reinelt, T.; Daniel-Gromke, J. (2020). *Treibhausgas-Emissionen von Biogasanlagen mit landwirtschaftlichen Einsatzstoffen*. Vortrag gehalten: Workshop "Klimaschutz bei der Herstellung und Anwendung organischer Dünger", Dessau-Roßlau, 05.03.2020.
- Clauß, T.; Reinelt, T.; Rensberg, N. (2020). *Fugitive emissions at biogas plants and possible mitigation measures*. Vortrag gehalten: EvEmBi Workshop "Quantification of GHG emissions from biogas plants", Brüssel, 29.01.2020.
- Daniel-Gromke, J.; Denysenko, V.; Rensberg, N.; Oehmichen, K.; Meisel, K.; Beil, M.; Beyrich, W.; Hüttenrauch, J. (2020). *Mikro-Biogas upgrading plants in Germany: Potentials and cost analysis*. Vortrag gehalten: 17<sup>th</sup> International Conference on Renewable Mobility "Fuels of the Future", Berlin, 20.-21.01.2020.
- Daniel-Gromke, J.; Oehmichen, K.; Rensberg, N.; Denysenko, V.; Barchmann, T.; Beil, M.; Beyrich, W.; Reinholz, T.; Rühr, C.; Vollprecht, J. (2020). *Optionen für Biogas Bestandsanlagen aus ökologischer und ökonomischer Sicht*. Vortrag gehalten: Biogas-Infotage 2020, Ulm, 29.-30.01.2020.
- Daniel-Gromke, J.; Rensberg, N.; Denysenko, V. (2020). *Biomethanpotenzial: Exkurs: NRW*. Vortrag gehalten: "Branchenfachgespräch Biometan NRW", [online], 10.06.2020.
- Dietrich, S.; Nieß, S.; Rönsch, S. (2020). *Einfluss von Prozessparametern auf die Synthese leichter Kohlenwasserstoffe aus Biogas und Elektrolysewasserstoff*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgruppe Energieverfahrenstechnik, Frankfurt am Main, 04.03.2020.
- Dotzauer, M. (2020). *Flexibilisierung von Biogasanlagen: Chancen und Herausforderungen im Hinblick auf das EEG 2021*. Vortrag gehalten: Arbeitstagung Schaumann, [online], 19.11.2020.
- Dotzauer, M.; Barchmann, T. (2020). *Ökonomische Analysen der flexiblen Fütterung: Evaluation von Praxisanlagen*. Vortrag gehalten: Leipziger Biogas-Fachgespräch, [online], 03.12.2020.
- Dotzauer, M.; Daniel-Gromke, J. (2020). *Anlagenbestand & Entwicklungsperspektiven für Biogas*. Vortrag gehalten: Webinar zur EEG-No-
- velle – Flexibilisierung der Stromerzeugung aus Biogas für die Versorgungssicherheit in der Energiewende, [online], 27.04.2020.
- Dotzauer, M.; Thrän, D. (2020). *Flexibilitätsoptionen in der Bioenergie aus Systemsicht*. Vortrag gehalten: Workshop "Flexible Bioenergie", [online], 01.12.2020.
- Etzold, H. (2020). *HTC von Klärschlamm: eine Auswertung ökonomischer Daten*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.
- Formann, S. (2020). *Combined substantial-energetic Utilization of Biogenous Residues for the Production of Biogenous Silica, REE and Noble Metals as Catalytic Compounds for Emission Reduction*. Vortrag gehalten: DBFZ-Jahrestagung, [online], 16.-17.09.2020.
- Graffenberger, M. (2020). *Transformationspfad Bioökonomie: (Neue) Perspektiven für ländliche Räume?* Vortrag gehalten: Ringvorlesung "Facetten der Nachhaltigkeit" der Hochschule Bremen, [online], 18.11.2020.
- Hahn, A. (2020). *Negative Emissionstechnologien (NETs) mit Fokus auf Bioenergie mit CO<sub>2</sub>-Abscheidung und -Speicherung (BECCS)*. Vortrag gehalten: "Fridays for Future Leipzig", [online], 18.05.2020.
- Hahn, A. (2020). *Carbon capture readiness of German bioenergy plants: Retrofit criteria astool for assessing near-term potential for CO<sub>2</sub> utilization and storage*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.-18.09.2020.
- Hartmann, I. (2020). *Emissionsmessung an häuslichen Biomassefeuerungen*. Vortrag gehalten: Online-Workshop "Einfluss von Kondensaten auf die Partikelkonzentration – FKZ 3718 51 2410", [online], 07.12.2020.
- Hartmann, I. (2020). *Messung und Minderung von Partikelemissionen*. Vortrag gehalten: HKI Technikveranstaltung, [online], 10.12.2020.
- Hartmann, I.; Müller, M.; Lenz, V. (2020). *Keynote Holzfeuerungsagenda 2030-2050*. Vortrag gehalten: Zweiter Zukunftsworkshop EFA, Leipzig, 15.01.2020.
- Hartmann, I.; Tebert, C. (2020). *The new Blue Angel ecolabel certification method for firewood stoves*. Vortrag gehalten: 6. Central European Biomass Conference, Graz (Österreich), 22.-24.01.2020.
- Haufe, H. (2020). *Bioenergiedörfer: Eine technologische Analyse und Evaluation unter dem Aspekt der Sektorkopplung. Welche zukünftige*
- Rolle kann Bioenergie in Bioenergiedörfern einnehmen?* Vortrag gehalten: 20. Fachkongress für Holzenergie, [online], 22.09.-30.09.2020.
- Kirstein, N. (2020). *Entwicklung und Status quo der Märkte biogener Festbrennstoffe in der Europäischen Union*. Vortrag gehalten: Young Academics Conference, [online], 17.06.2020.
- Kirstein, N. (2020). *Current Status of Solid Biogenic Fuels in the European Union*. Vortrag gehalten: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.-09.07.2020.
- Kirstein, N. (2020). *Development and Current Status of Solid Biofuel Markets in the European Union*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.-18.09.2020.
- Kirstein, N. (2020). *Entwicklung und Status quo der Biofestbrennstoffnutzung in der Europäischen Union*. Vortrag gehalten: 20. Fachkongress für Holzenergie, [online], 22.09.-30.09.2020.
- Klüpfel, C. (2020). *Hydrothermal Liquefaction of Waste Biomass*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.-18.09.2020.
- Klüpfel, C. (2020). *Hydrothermal liquefaction of waste biomass*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.
- Klüpfel, C. (2020). *Kinetic investigation of various Brønsted and Lewis acids for the production of levulinic acid from starch*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.
- Knötig, P. (2020). *Development of a hydrothermal multi-purpose reactor within a pilot-scale biorefinery concept for fuel production from biogenic residues*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.
- Köchermann, J. (2020). *Brønsted/Lewis-Acid Combinations for Hydrothermal Production of Levulinic Acid from Starch Residues*. Vortrag gehalten: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.-09.07.2020.
- Köchermann, J. (2020). *Hydrothermal reactive distillation of biomass and biomass hydrolysates for the production of furfural*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.
- Köchermann, J.; Klüpfel, C.; Körner, P.; Klemm, M. (2020). *Platform chemicals from biogenic residues by hydrothermal processes*. Vortrag gehalten: 6<sup>th</sup> Central European Biomass Conference, Graz (Österreich), 22.-24.01.2020.
- Köchermann, J.; Körner, P. (2020). *Production of*
- Furfural and Levulinic Acid in a Two-Stage Hydrothermal Conversion Process as Precursor for GVL*. Vortrag gehalten: 13<sup>th</sup> International Conference on Bio-based Materials, [online], 14.05.2020.
- König, M. (2020). *New developments in small-scale biomass combustion*. Vortrag gehalten: Webinar UTALCA "Ciclo de Innovación en Energía – Combustión de Biomasa", [online], 02.07.2020.
- Kornatz, P. (2020). *Zu wertvoll zum Wegwerfen: Reststoffe als Wertstoffe. Potenziale, Erschließung, Nutzung*. Vortrag gehalten: DBFZ-Jahrestagung, [online], 16.-17.09.2020.
- Kornatz, P. (2020). *Perspektiven für Bestandsanlagen und Wege für die Zukunft der Branche*. Vortrag gehalten: Arbeitstagung Schaumann, [online], 19.11.2020.
- Kornatz, P.; Daniel-Gromke, J.; Denysenko, V.; Rensberg, N.; Schindler, H.; Schmieder, U.; Nelles, M. (2020). *Biogasanlagen in Deutschland: Stand und Perspektiven*. Vortrag gehalten: 13. Biogas-Innovationskongress, [online], 24.-25.11.2020.
- Kornatz, P.; Liebetrau, J.; Rensberg, N.; Daniel-Gromke, J.; Majer, S.; Brosowski, A. (2020). *Perspectives of valorization of manure in Germany*. Vortrag gehalten: BIOSWEET Annual Conference, [online], 09.10.2020.
- Kornatz, P.; Szarka, N.; Dotzauer, M.; Schmieder, U.; Schindler, H.; Thrän, D.; Mercker, O.; Matschoss, P.; Laub, K.; Wern, B.; Fleck, S. (2020). *Bioenergie in der europäischen Zeitenwende: Ein intelligenter Baustein für ein nachhaltiges Energie und Kreislaufwirtschaftssystem als Beitrag zum European Green Deal*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.-04.11.2020.
- Kornatz, P.; Thrän, D.; Müller-Langer, F.; Lenz, V.; Majer, S.; Rensberg, N. (2020). *Das Smart Bioenergy-Konzept: Wie muss die künftige Biomassennutzung im Kontext des Klimawandels aussehen?* Vortrag gehalten: E2M Wintertagung, Walsrode, 21.01.2020.
- Körner, P. (2020). *Production of levulinates from starch-containing residues*. Vortrag gehalten: 3. Internationaler Bioökonomiekongress Baden-Württemberg, [online], 21.-22.09.2020.
- Körner, P. (2020). *Hydrothermal Carbonisation of Nitrogen Rich Substrates*. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.-26.11.2020.

- Körner, P. (2020). *Hydrothermale Prozesse: Perspektiven für flexible Bioenergie-Lösungen*. Vortrag gehalten: FLEXible Bioenergie, [online], 01.-02.12.2020.
- Körner, P.; Röver, L.; Römerscheid, S.; Wirth, B. (2020). *Hydrothermale Phosphatextraktion aus Klärschlamm*. Vortrag gehalten: abonoCA-RE-Konferenz, Leipzig, 05.-06.03.2020.
- Kretzschmar, J. (2020). *Das Forschungsvorhaben Gazelle: Kurzvorstellung*. Vortrag gehalten: Leipziger Biogas-Fachgespräch, [online], 03.12.2020.
- Kurth, M. (2020). *Fabrication, characterization and modeling of water selective membranes for the methanation of CO<sub>2</sub>*. Vortrag gehalten: 06.07.2020.
- Kurth, M.; Repke, J.-U.; Rönsch, S. (2020). *Herstellung, Charakterisierung und Modellierung von wasserselektiven Membranen zur Umsatzsteigerung der Methanisierung*. Vortrag gehalten: 16.01.2020.
- Kurth, M.; Repke, J.-U.; Rönsch, S. (2020). *Herstellung, Charakterisierung und Modellierung von wasserselektiven Membranen zur Umsatzsteigerung der Methanisierung*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgruppe Energieverfahrenstechnik, Frankfurt, 04.03.2020.
- Leipprand, A.; Samadi, S.; Holtz, G.; Schneider, C.; Lenz, V.; Jordan, M.; Lorenz, T.; Pitz-Paal, R.; Dahmen, M.; Robinus, M.; Pesch, T.; Röben, F.; Markewitz, P.; Nitz, P.; Niepelt, R.; Dittmeyer, R.; Stapf, D. (2020). *Auf dem Weg zur klimaneutralen Industrie Herausforderungen und Strategien*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.-04.11.2020.
- Lenz, V. (2020). *Wirtschaftsstruktur für die Zukunft: Einführung, SmartBiomassHeat*. Vortrag gehalten: DBFZ-Jahrestagung, [online], 16.-17.09.2020.
- Lenz, V. (2020). *Wärmeversorgung mit Einzelraumfeuerungen in Kombination mit Wärmepumpen*. Vortrag gehalten: HKI Technikveranstaltung, [online], 10.12.2020.
- Lenz, V.; Hartmann, I. (2020). *Zukunft der Einzelraumfeuerstätten für biogene Festbrennstoffe*. Vortrag gehalten: Arbeitsseminar der Ofen- und Luftheizungsbauer, Bad Tölz, 07.02.2020.
- Lenz, V.; Pfeiffer, D. (2020). *11 Jahre Begleitvorhaben Bioenergie: Netzwerke fördern und gemeinsam gestalten*. Vortrag gehalten: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Liebetrau, J.; Kornatz, P. (2020). *Integration of biogas systems into the energy system: Technical aspects of flexible plant operation*. Vortrag gehalten: IEA Bioenergy Technology Collaboration Programme, [online], 06.11.2020.
- Matschoss, P.; Hauser, E.; Müller-Langer, F.; Schröder, J.; Brand, U.; Dietrich, R.-U.; Eggemann, L.; Peters, R.; Theiss, L.; Dittmeyer, R.; Rösch, C.; Haase Martina; Millinger, M.; Terrapon-Pfaff, J.; Fuchs, A.-L.; Schmidt, M. (2020). *Synthetische Kraftstoffe: Ökonomie, Gesellschaft und Nachhaltigkeit*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.-04.11.2020.
- Mauky, E.; Krebs, C.; Müller, U.; Kretzschmar, J. (2020). *Praxiserfahrungen beim flexiblen Betrieb an der Forschungsbiogasanlage des DBFZ und dem Lehr- und Versuchsgut Köllitsch*. Vortrag gehalten: Leipziger Biogas-Fachgespräch, [online], 03.12.2020.
- Mühlenberg, J.; Pollex, A.; Zeng, T. (2020). *Development of A Simple and Rapid Test Method for Potassium to Ensure Fuel Quality of Woody Biomass Fuels*. Vortrag gehalten: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.-09.07.2020.
- Müller-Langer, F.; Marquardt, C.; Posselt, D.; Zschocke, A.; Schripp, T.; Majer, S.; Oehmichen, K.; Halling, A.-M.; Dögnitz, N.; Bullerdiel, N.; Buse, J.; Hauschild, S. (2020). *Multiblends in Practice: Insights and Results of the Project DEMO-SPK. Research and Demonstration Project on the Use of Renewable Kerosene at Airport Leipzig/Halle*. Vortrag gehalten: Fuels of the Future, Berlin, 20.-21.01.2020.
- Müller-Langer, F.; Meisel, K.; Schröder, J.; Millinger, M. (2020). *Beitrag der Biokraftstoffe zur Minderung der CO<sub>2</sub>-Emissionen*. Vortrag gehalten: TechDay, Dresden, 17.01.2020.
- Müller-Langer, F.; Meisel, K.; Schröder, J.; Naumann, K.; Millinger, M. (2020). *Erneuerbare (Bio-) kraftstoffe: Status und Perspektiven*. Vortrag gehalten: KTBL-Tagung "Mit Energie in die Zukunft - Strom, Wärme und Kraftstoffe in der Landwirtschaft", Mannheim, 02.-03.03.2020.
- Müller-Langer, F.; Naumann, K.; Meisel, K.; Schröder, J. (2020). *RED II-Umsetzung im Verkehr: Wie gelingt der Durchbruch im Klimaschutz?* Vortrag gehalten: RED II-Umsetzung im Verkehr: Wie gelingt der Durchbruch im Klimaschutz?, [online], 13.11.2020.
- Müller-Langer, F.; Naumann, K.; Meisel, K.; Schröder, J. (2020). *Beitrag erneuerbarer Kraftstoffe zur Minderung der CO<sub>2</sub>-Emissionen im Verkehr*. Vortrag gehalten: 3. TechDay, [online], 11.12.2020.
- Nelles, M. (2020). *Erfolgreiche Zusammenarbeit zwischen China und Deutschland im Bereich Kreislaufwirtschaft und Biomasseverwertung*. Vortrag gehalten: Jubiläumsfeier zum 40-jährigen Bestehen der Universität Hefei, [online], 02.12.2020.
- Nelles, M. (2020). *Klimaschutz durch stoffliche und energetische Nutzung biogener Rest- und Abfallstoffe*. Vortrag gehalten: Zukunftsforum Energie & Klima, [online], 15.-20.11.2020.
- Nelles, M.; Brosowski, A.; Morscheck, G.; Narra, S. (2020). *Biogene Reststoffe und Sekundärdünger in Deutschland: Mengen, aktuelle Nutzung und künftige Entwicklung*. Vortrag gehalten: DGAW-Regionalveranstaltung "Klimaschutz bei der Düngung. Ressourcenschutz im Ackerbau", Lübeck, 09.03.2020.
- Nelles, M.; Daniel-Gromke, J.; Rensberg, N.; Denysenko, V.; Stinner, W.; Kornatz, P. (2020). *Biogas in Germany: Status and prospects*. Vortrag gehalten: Great Cycle - International Symposium on Rural Biowaste-to-Resource, [online], 24.-27.09.2020.
- Nelles, M.; Daniel-Gromke, J.; Rensberg, N.; Denysenko, V.; Kornatz, P. (2020). *Status and outlook of biogas in Germany*. Vortrag gehalten: VII Baltic Biogas and Circular Economy Forum, [online], 22.23.09.2020.
- Nelles, M.; Morscheck, G.; Narra, S. (2020). *Energy Recovery from biomass in Germany*. Vortrag gehalten: 10<sup>th</sup> International Conference on Sustainable Waste Management towards Circular Economy, [online], 02.-07.12.2020.
- Nelles, M.; Morscheck, G.; Nassour, A. (2020). *Separate collection and utilisation of biowaste in Germany: A key component of sustainable waste management systems*. Vortrag gehalten: Recycling- & Waste Management Technologien des BMWi, [online], 08.09.2020.
- Nelles, M.; Qian, M. Y. (2020). *Entwicklung und Stand der Abfallwirtschaft und -technik in China*. Vortrag gehalten: Abfallwirtschaft und Recycling in China, [online], 07.09.2020.
- Nelles, M.; Schindler, H.; Schmieder, U.; Thrän, D. (2020). *Bioenergie: EEG-Novelle und Zukunftsperspektiven*. Vortrag gehalten: Bundesfachausschuss Umwelt und Landwirtschaft der CDU, [online], 30.09.2020.
- Nitzsche, R.; Köchermann, J.; Gröngroft, A.; Klemm, M. (2020). *Einfluss der hydrothermalen Vorbehandlung von Organosolv-Hemicelluloselösung auf die Abtrennung von C5-Zuckern mittels Nanofiltration*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgruppe "Membrantechnik", Freising, 19.02.2020.
- Olsson, O.; Tynjälä, T.; Bang, C.; Thrän, D. (2020). *Deployment of BECCS/U: Technologies, supply chain setup & policy options*. Vortrag gehalten: IEA Bioenergy Task 40, [online], 16.06.2020.
- Pfeiffer, A. (2020). *Biomass Supply Chains*. Vortrag gehalten: Lecture Series on Systems and Logistics Foundations, [online], 04.11.2020.
- Pohl, M.; Barchmann, T.; Hülsemann, B.; Mächtig, T.; Effenberger, M.; Liebetrau, J. (2020). *Biogas monitoring programme III: Energy efficiency assessment of 61 biogas plants in Germany*. Vortrag gehalten: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.-09.07.2020.
- Pollex, A. (2020). *Überwindung von Hemmnissen bei der stofflichen und energetischen Nutzung von Vergaserkoks aus Holzgas-Anlagen*. Vortrag gehalten: Fachkongress für Holzenergie, [online], 22.-30.09.2020.
- Pujan, R.; Preisig, H. A. (2020). *Systematic Modelling of a Butanol Fermentation equipped with in-situ Gas Stripping*. Vortrag gehalten: 8<sup>th</sup> International Symposium on Energy from Biomass and Waste, [online], 16.-19.11.2020.
- Pujan, R.; Preisig, H. A. (2020). *ProMo: A Tool for the Systematic Modelling of Process Technology*. Vortrag gehalten: Bio4Fuels Days, [online], 18.-19.11.2020.
- Röder, L. S. (2020). *Flexibility options for demand side management in biorefineries*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.-18.09.2020.
- Röder, L. S. (2020). *Simulation und zeitliche Erfassung des Energiebedarfs einer Bioraffinerie: In Vorbereitung auf die Implementierung eines Demand Side Managements*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgemeinschaft Prozess-, Apparate- und Anlagentechnik, [online], 09.-10.11.2020.
- Röver, L. (2020). *High temperature dewatering of*

- hydrothermally treated sewage sludge. Vortrag gehalten: 6. HTP-Fachforum, [online], 25.–26.11.2020.
- Schaller, S. (2020). *Smarte Bioenergie-Lösungen für China*. Vortrag gehalten: Virtuelle Weiterbildung für chinesische Umweltexperten, [online], 12.11.2020.
- Schaller, S.; Clauß, T.; Wedwitschka, H. (2020). *Bioenergy Research in the German Canadian Context*. Vortrag gehalten: Canada-Germany Bioeconomy Cooperative R&D Partnering Mission and Event, Leipzig, 03.–04.05.2020.
- Schering, K.; Dotzauer, M. (2020). *Erlös-optimierte Anlagenfahrweisen unter Anwendung der Anreizkonzepte und Berücksichtigung technischer Restriktionen*. Vortrag gehalten: Flexsignal Abschlussworkshop, [online], 02.12.2020.
- Schliermann, T. (2020). *Recycling of ashes from thermo-chemical conversion of agricultural residues*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Schmidt, M.; Müller-Langer, F.; Kretzschmar, J.; Agert, C.; Bard, J.; Hebling, C.; Heinrichs, H.; Robinus, M.; Niepelt, R.; Dittmeyer, R. (2020). *Grüner Wasserstoff als Schlüsseltechnologie für die europäische Energiewende*. Vortrag gehalten: FVEE-Jahrestagung, [online], 02.–04.11.2020.
- Schmieder, U.; Dotzauer, M. (2020). *Aspekte der Holzenergie im aktuellen Prozess der EEG-Novellierung und Geschäftsfelder für den Abschlussbetrieb nach der ersten Förderperiode*. Vortrag gehalten: 20. Fachkongress für Holzenergie, [online], 22.09.–30.09.2020.
- Sprafke, J.; Lajewski, N.; Nelles, M. (2020). *Influence of co-substrates from industrial and agricultural origin on the continuous fermentation of biowaste*. Vortrag gehalten: 8<sup>th</sup> International Symposium on Energy from Biomass and Waste, [online], 16.–19.10.2020.
- Stinner, W. (2020). *Biogas, quo vadis?* Vortrag gehalten: Biogas aus Stroh, Gülle & Co., [online], 26.08.–23.10.2020.
- Stinner, W. (2020). *Herausforderungen der Pflanzenernährung vor dem Hintergrund von Klimawandel, Ressourcenknappheit und Umweltanforderungen: MAP als Chance?* Vortrag gehalten: Biogas aus Stroh, Gülle & Co., [online], 26.08.–23.10.2020.
- Stinner, W. (2020). *Nährstoffmanagement: Einführung in die Thematik*. Vortrag gehalten: Biogas aus Stroh, Gülle & Co., [online], 26.–27.08.2020.
- Stinner, W. (2020). *Potentiale und Kosten der Strohvergärung*. Vortrag gehalten: Biogas aus Stroh, Gülle & Co., [online], 26.08.–23.10.2020.
- Stinner, W. (2020). *Zukunftsoption Wirtschaftsdünger?: Klimaschutzeffekte, Rahmenbedingungen und Herausforderungen*. Vortrag gehalten: Biogas aus Stroh, Gülle & Co., [online], 26.–27.08.2020.
- Stinner, W. (2020). *Nutrient management: a challenge for animal husbandry and biogas plants*. Vortrag gehalten: Great Cycle – International Symposium on Rural Biowaste-to-Resource, [online], 24.–27.09.2020.
- Stinner, W. (2020). *Wirtschaftsdüngernutzung und Gärrestverwertung: Zukunftsbausteine für Biogas? Klimaschutzeffekte, Rahmenbedingungen und Herausforderungen*. Vortrag gehalten: IBBK Konferenz "Fortschritt Gülle und Gärrest", Schwäbisch Hall, 06.10.2020.
- Stinner, W. (2020). *Maßnahmen zur Emissionsminderung bei der Gärproduktbehandlung und -nutzung*. Vortrag gehalten: Aufbereitung und Verwertung von Gärprodukten, [online], 27.–28.10.2020.
- Stinner, W.; Daniel-Gromke, J. (2020). *Biogas: Tank, Teller oder Naturschutz? Oder geht auch winwin?* Vortrag gehalten: Parlamentarisches Experten-Webinar für Entscheidungsträger, [online], 27.04.2020.
- Stinner, W.; Denysenko, V.; Stur, M. (2020). *Vergärung von Agrarreststoffen in der Praxis: Herausforderungen, Perspektiven und Chancen*. Vortrag gehalten: Stroh, Gras Biogas – Innovative Verfahren zur Nutzung von Ernteresten in Biogasanlagen, Dingolfing, 12.02.2020.
- Stinner, W.; Schliermann, T.; Schumacher, B. (2020). *Current DBFZ-Activities with China*. Vortrag gehalten: RETech/AG China, [online], 04.09.2020.
- Sträuber, H.; Braune, M.; Denysenko, V.; Kleinstaub, S. (2020). *The carboxylate platform: chances and challenges for retrofitting biogas plants*. Vortrag gehalten: International Seminar on Sustainable 2-G Biorefinery Platforms, Kalkutta (Indien), 16.01.2020.
- Stur, M. (2020). *Forschungsvorhaben E-Boot: Sondierungsphase*. Vortrag gehalten: Jahrestreffen "Ideenwettbewerb Neue Produkte für die Bioökonomie", Berlin, 29.01.2020.

- Sumfleth, B.; Majer, S.; Thrän, D. (2020). *EU Low iLUC Policy and Certification*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Szarka, N.; García, L. (2020). *Challenges and opportunities of the bioeconomy at regional level*. Vortrag gehalten: [online], 23.–24.06.2020.
- Thrän, D. (2020). *Potentiale und Grenzen der Bioökonomie im Spiegel der Öffentlichkeit*. Vortrag gehalten: Auftaktveranstaltung "Wissenschaftsjahr zur Bioökonomie", Berlin, 16.01.2020.
- Thrän, D. (2020). *Towards a Sustainable Bioeconomy: Challenges & Perspectives*. Vortrag gehalten: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Thrän, D. (2020). *How Bioeconomy can contribute to mitigation of climate change?* Vortrag gehalten: 3<sup>rd</sup> International Bioeconomy Congress Baden-Württemberg, [online], 21.–22.09.2020.
- Thrän, D. (2020). *Bioeconomy's Contribution to Economic Growth*. Vortrag gehalten: Workshop "It's the (bio)economy, stupid!", [online], 07.–08.10.2020.
- Thrän, D. (2020). *Nachhaltige Bioökonomie und Bioenergie*. Vortrag gehalten: Bioökonomie – Eine nachhaltige Wirtschaftsform mit Zukunft?, [online], 10.12.2020.
- Thrän, D. (2020). *Bioökonomie: Chancen und Herausforderungen in der Landwirtschaft*. Vortrag gehalten: [online], 12.11.2020.
- Thrän, D. (2020). *Bioenergie in der Bioökonomie*. Vortrag gehalten: Wissenschaft im Dialog: Nachhaltigkeitsbarrieren in der Energiewirtschaft, [online], 25.11.2020.
- Thrän, D. (2020). *Bioenergy in Leipzig*. Vortrag gehalten: IEA Task 44 Meeting, [online], 26.11.2020.
- Thrän, D.; Majer, S.; Szarka, N.; Brosowski, A. (2020). *Climate gas reduction with smart bioenergy*. Vortrag gehalten: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Weinrich, S.; Mauky, E. (2020). *Möglichkeiten der Prozessflexibilisierung und Anlagensimulation*. Vortrag gehalten: Leipziger Biogas-Fachgespräch, [online], 03.12.2020.
- Winkler, M.; Mauky, E.; Weinrich, S.; Kretzschmar, J. (2020). *Strommarktgeführte Optimierung des Biogasprozesses: Theoretische Grundlagen und Anwendung im Praxismaßstab*. Vortrag gehalten: 13. Biogas-Innovationskongress, [online], 24.–25.11.2020.
- Winkler, M.; Mauky, E.; Weinrich, S.; Kretzschmar, J. (2020). *Chancen und Ergebnisse der modellbasierten Prozessführung*. Vortrag gehalten: Leipziger Biogas-Fachgespräch, [online], 03.12.2020.
- Wurdinger, K. (2020). *Unterstützung des Entscheidungsprozesses von Stakeholdern für ein erneuerbares Heizungssystem durch digitale Technologien (OBEN)*. Vortrag gehalten: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Yuan, B.; Braune, M. (2020). *Bioraffinerien Gewinnung von Capron- und Caprylsäure aus einer Fermentationsbrühe*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgruppe "Fluidverfahrenstechnik, Adsorption und Extraktion 2020", Berchtesgaden, 28.02.2020.
- Yuan, B.; Braune, M. (2020). *Gewinnung von Capron- und Caprylsäure aus einer Fermentationsbrühe*. Vortrag gehalten: Jahrestreffen der ProcessNet-Fachgruppen Fluidverfahrenstechnik, Adsorption und Extraktion 2020, 28.02.2020.

## Posters

- Beidaghy Dizaji, H.; Zareihassangheshlaghi, A.; Zeng, T.; Huth, P.; Ruf, T.; Denecke, R.; Enke, D. (2020). *Ash-Melting Tendency of Rice Husk During Combustion*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Brosowski, A.; Bill, R.; Thrän, D. (2020). *National Resource Monitoring for Biogenic Residues, By-products and Wastes: Development of a Systematic Data Collection, Management and Assessment for Germany*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Çepelioğullar Mutlu, Ö.; Büchner, D.; Zeng, T. (2020). *Renewables-based drying technology for cost-effective valorization of waste from food processing industry: DRALOD*. Poster präsentiert: 6<sup>th</sup> Central European Biomass Conference, Graz (Österreich), 22.–24.01.2020.

- Cepeliogullar Mutlu, Ö.; Theurich, S.; Büchner, D.; Zeng, T. (2020). *Renewables-based drying technology for cost-effective valorization of waste from food processing industry*. Poster präsentiert: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.–09.07.2020.
- Dernbecher, A. (2020). *Experimental and numerical investigation of a log wood stove*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Dzofou N., D.; Harnisch, F.; Kretzschmar, J. (2020). *Interaction between electroactive biofilms and anaerobic digestion effluents*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Gebhardt, H.; Büchner, D.; Stange, P.; Bartsch, A. (2020). *Options for an efficient usage of solid biofuels in decarbonized heating grids*. Poster präsentiert: 6. Central European Biomass Conference, Graz (Österreich), 22.–24.01.2020.
- Grundmann, J.; Schumacher, B.; Nordzieke, B. (2020). *Holzbasierendes Biomethan aus der Vergärung für die Wärmewende*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Hahn, A.; Szarka, N.; Thrän, D. (2020). *Carbon capture readiness of German bioenergy plants: Retrofit criteria as tool for assessing near-term potential for CO<sub>2</sub> utilization and storage*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Karras, T.; Brosowski, A.; Thrän, D. (2020). *A review on supply costs of biogenic resources in Europe*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Kirstein, N. (2020). *Status Quo of Solid Biogenic Fuels in the European Union: Overview on Qualities, Standards and Applications*. Poster präsentiert: International Winter School "Impact Assessment of European Climate Policy", Freiberg, 03.02.–07.02.2020.
- Klüpfel, C.; Köchermann, J.; Wirth, B. (2020). *Hydrothermal liquefaction of waste biomass*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- Klüpfel, C.; Köchermann, J.; Wirth, B. (2020). *Hydrothermal liquefaction of waste biomass*. Poster präsentiert: 6. HTP-Fachforum, [online], 25.–26.11.2020.
- König, M. (2020). *Development and application of novel SCR catalysts for the low-temperature denitrification of exhaust gases from the thermo-chemical conversion of biogenic solid fuels*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, [online], 17.–18.09.2020.
- König, M. (2020). *Minderung von Staub, NO<sub>x</sub>, SO<sub>2</sub> und HCl an Reststofffeuerungen: Flexibilisierung des Brennstoffeinsatzes für die Nahwärmeversorgung durch adaptive Emissionsminderungsmaßnahmen*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Kurth, M.; Rönsch, S.; Repke, J.-U. (2020). *Charakterisierung und Modellierung von wasserselektiven Membranen zur Umsatzsteigerung der Methanisierung*. Poster präsentiert: ProcessNet-Jahrestreffen Hochdruckverfahrenstechnik und Membrantechnik, Freising, 17.–19.02.2020.
- Kurth, M.; Rönsch, S.; Repke, J.-U. (2020). *Charakterisierung und Modellierung von wasserselektiven Membranen zur Umsatzsteigerung der Methanisierung*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Lange, J.; Formann, S.; Klöss, G. (2020). *Einlagerungen biogenen Silicas in Getreide-Biomassen*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Lange, N.; Meisel, K.; Oehmichen, K.; Majer, S. (2020). *Assessed, assessing & to be assessed: Past, present & future of LCA at the DBFZ*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Lehneis, R.; Manske, D.; Schinkel, B.; Thrän, D. (2020). *Modeling of the power generation from wind turbines*. Poster präsentiert: EGU General Assembly, [online], 04.–08.05.2020.
- Lenz, V.; Wurdinger, K.; Garcia, L.; Schmidt-Baum, T.; Szarka, N.; Pomsel, D. (2020). *Projekt OBEN: Ölersatz Biomasse Heizung. Es geht auch ohne Öl in Heizungen!* Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Mathew, J.; Wurdinger, K.; Büchner, D. (2020). *Communication Architecture for Multivariant Combined Heat & Power Systems*. Poster präsentiert: 6. Central European Biomass Conference, Graz (Österreich), 22.–24.01.2020.
- Müller, M.; König, M.; Hartmann, I.; Lenz, R.; Schenk, J. (2020). *Entwicklung einer marktnahen emissionsarmen Biomasse-Kleinstfeuerung für Niedrigenergie- und Passivhäuser*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Pfeiffer, A.; König, L.; Kupfer, R.; Thrän, D. (2020). *Supply Chain Management for Intermediate Bioenergy Carriers: Analysis of Four European Case Studies*. Poster präsentiert: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.07.–06.09.2020.
- Prempeh, C. O.; Formann, S.; Hartmann, I.; Nelles, M. (2020). *Generation of Silicon Dioxide from Biomass for Industrial Applications*. Poster präsentiert: 3<sup>rd</sup> Doctoral Colloquium Bioenergy, Leipzig, 17.–18.09.2020.
- Röder, L. S.; Gröngroft, A.; Riese, J.; Grünwald, M. (2020). *Die Implementierung eines Demand Side Managements in Bioraffinerien*. Poster präsentiert: 10. ProcessNet-Jahrestagung und 34. DECHEMA-Jahrestagung der Biotechnologen, [online], 21.–24.09.2020.
- Röver, L.; Körner, P.; Etzold, H.; Wirth, B.; Kehler, E.; Schindler, S. (2020). *Heißentwässerung von hydrothermal behandelten Klärschlämmen*. Poster präsentiert: 1. abonocare Konferenz, Leipzig, 05.–06.03.2020.
- Schliermann, T. (2020). *Recycling of ashes from thermo-chemical conversion of agricultural residues*. Poster präsentiert: 3<sup>rd</sup> Conference Monitoring & process control of anaerobic digestion plants, [online], 17.–18.09.2020.
- Schliermann, T.; Herrmann, A.; Wiest, W.; Ho, J.; Köster, F.; Zimmermann, G. (2020). *GASASH: Einsatz von aschereichen Reststoffen in einem Vergaser-BHKW*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Schmid, C.; Hahn, A. (2020). *Biogenes CO<sub>2</sub>: Wertvolle Ressource für CO<sub>2</sub>-Nutzungspfade in Deutschland*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Schneider, J.; Gerhards, C.; Pannicke, N.; Haufe, H.; Birger, J.; Zwosta, N.; Mattiza, M. (2020). *BiWiB: Nachhaltige Kombination von bifacialen Solarmodulen, Windenergie und Biomasse bei gleichzeitiger landwirtschaftlicher Flächennutzung und Steigerung der Artenvielfalt*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Schumacher, B.; Wedwitschka, H.; Fischer, P. (2020). *Biomethan & Torfersatzstoff aus Pappelholz*. Poster präsentiert: Fachtagung Torfminderung, Berlin, 18.–19.02.2020.
- Schumacher, B.; Wedwitschka, H.; Nordzieke, B. H.; Fischer, P.; Grundmann, J. (2020). *Innovative value chains via anaerobic digestion of wood fibres*. Poster präsentiert: DBFZ-Jahrestagung, 16.–17.09.2020.
- Sumfleth, B.; Majer, S.; Thrän, D. (2020). *Low iLUC Risk Indicators for Sustainability Certification in the EU Bioeconomy*. Poster präsentiert: 28<sup>th</sup> European Biomass Conference and Exhibition, [online], 06.07.–06.09.2020.
- Szarka, N.; Hahn, A. (2020). *DBFZ Szenario-Tool: Datenbank mit Energie- und Klimaszenarien*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Theurich, S.; Büchner, D.; Schraube, C. (2020). *Steigerung des Nutzens von kleinen, biomassebefeueren BHKWs durch bedarfsgerechte Regelung: SNUKR*. Poster präsentiert: DBFZ-Jahrestagung, [online], 16.–17.09.2020.
- Theurich, S.; Büchner, D.; Schraube, C. (2020). *SNUKR: Steigerung des Nutzens von kleinen, biomassebefeueren BHKWs durch bedarfsgerechte Regelung*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.
- Wurdinger, K.; Pomsel, D.; Lenz, V.; Szarka, N. (2020). *Individuelle Antworten auf komplexe Fragestellungen: Unterstützung des Entscheidungsprozesses von Stakeholdern für ein erneuerbares Heizungssystem durch digitale Technologien*. Poster präsentiert: Fachkonferenz "Digitalisieren, Sektoren koppeln, Flexibilisieren. Systemische Integration der Bioenergie und weiterer erneuerbarer Energien in Gebäuden & Quartieren", [online], 24.11.2020.

## Research data

Krause, T.; Mantau, U.; Mahro, B.; Noke, A.; Richter, F.; Raussen, T.; Bischof, R.; Hering, T.; Thrän, D.; Brosowski, A. (2020). *Nationales Monitoring biogener Reststoffe, Nebenprodukte und Abfälle in Deutschland Teil 1: Basisdaten zu Biomassepotenzialen*. Verfügbar unter: [https://www.openagrar.de/receive/openagrar\\_mods\\_00065538](https://www.openagrar.de/receive/openagrar_mods_00065538).  
Krause, T.; Pohl, M.; Klemm, M.; Wirth, B.; Gröngröft, A.; Müller-Langer, F.; Hartmann, I.; Radtke, K. S.; Thrän, D.; Brosowski, A. (2020). *Nationales Monitoring biogener Reststoffe, Nebenprodukte und Abfälle in Deutschland Teil 2: Rohstoffeigenschaften und Konversionsfaktoren*. Verfügbar unter: [https://www.openagrar.de/receive/openagrar\\_mods\\_00065551](https://www.openagrar.de/receive/openagrar_mods_00065551).  
Stolze, B.; Müller, U. (2020) *Long-term monitoring of a research biogas plant*. Mendeley Data, V1, doi: 10.17632/3ydxwchm2c.1

## IMPRINT

### Published by:

DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Leipzig, an enterprise of the German Government with funding from the Federal Ministry of Food and Agriculture pursuant to a resolution by the German Bundestag

### Contact:

DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH  
Torgauer Straße 116  
04347 Leipzig  
Phone: +49 (0)341 2434-112  
Fax: +49 (0)341 2434-133  
E-Mail: [info@dbfz.de](mailto:info@dbfz.de)

### General Management:

Prof. Dr. mont. Michael Nelles (Scient. Managing Director)  
Daniel Mayer (Admin. Managing Director)

### Editing/V.i.S.d.P.: Paul Trainer

Responsibility for the content of this brochure lies with the publishers.

**ISBN:** 978-3-946629-55-9

**Printed by:** OsirisDruck, printed on recycling paper.

**Pictures:** : if not indicated on the image:

DBFZ, private, Jan Gutzeit, Kai und Kristin Fotografie, f. j. schenk (P. 118, 2<sup>nd</sup> row, 2<sup>nd</sup> from left), Adobe Stock.  
Front page: © BMBF/Science Year

**Design/Desktop Publishing:** Stefanie Bader

© **Copyright:** DBFZ 2021

All rights reserved. No part of this brochure may be reproduced or published without the written consent of the publishers. This prohibition also and in particular covers commercial reproduction by means of physical copying, import into electronic databases and copying to CD-ROM.

With support from



by decision of the German Bundestag





**Make a note of it now!**

**DBFZ ANNUAL CONFERENCE**

in spring 2022 at the DBFZ in Leipzig

Further information at:

[www.bioenergiekonferenz.de](http://www.bioenergiekonferenz.de)

[#DBFZ2022](https://www.twitter.com/dbfz_de)

**DBFZ Deutsches Biomasseforschungszentrum  
gemeinnützige GmbH**

Torgauer Straße 116

04347 Leipzig

Phone: +49 (0)341 2434-112

Fax: +49 (0)341 2434-133

E-Mail: [info@dbfz.de](mailto:info@dbfz.de)

[www.dbfz.de/en](http://www.dbfz.de/en)

