TUMCS

Technologie- und Förderzentrum

C.A.R.M.E.N.

KoNaRo

KoNaRo – Centre of Excellence for Renewable Resources

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KoNaRo

Why renewable resources?

The steadily growing world population faces what is probably its greatest challenge. It is up to us to limit global warming and thus to leave behind a livable earth for future generations. At the same time, we need sufficient food, energy and raw materials for all people, because these factors are the prerequisite for survival, progress and prosperity. There is great potential in renewable resources from agriculture and forestry. They can replace increasingly scarce fossil energy and raw material sources and serve as fuel for electricity and heat generation. Additionally, renewable resources can be used as a basic material for the chemical industry and as the basis for a wide range of products (from cell phones and plastic packaging to textiles and medicines). The use of renewable resources has been proven for thousands of years. For example, wood has a long tradition as a building material and for heating, as well as fibers for clothing or straw as an insulating material. Since industrialization, renewables have lost importance. Now it is up to us to find new uses for them and to expand the traditional uses. Whether as basic materials for products, i.e. for material use, or as a source of energy in solid, liquid or gaseous form - the possibilities offered by renewable resources are virtually unlimited. Biomass is one of the renewable energies in Germany today, with a share of more than 50 percent.

Our centre

Bavaria recognized this trend early on and research on renewable resources started in the 1970s. In the following decades these activities were expanded throughout Bavaria and finally bundled in 2001 by the Bavarian State Government in the KoNaRo – Centre of Excellence for Renewable Resources in Straubing. Three organizationally independent institutions have been working closely together since then: The Technical University of Munich – Campus Straubing for Biotechnology and Sustainability (TUMCS), the Technology and Support Centre (TFZ) and C.A.R.M.E.N. e.V. Each of these three pillars has different tasks and focal points of work. The proximity and the close cooperation between the three pillars result in new partnerships both nationally and internationally.

The extensive knowledge in the most diverse areas of renewable resources enables the KoNaRo to cover the entire path from the plant in the field to the marketing of the finished product on the market. The experts are involved in the research, development and testing of new technologies and products, as well as in market research and market development. In addition, KoNaRo advises consumers, assesses new projects and implements funding programs. All essential disciplines for research and implementation in the field of renewable resources are available here under one roof.

Foto: TUM

KoNaRo – Centre of Excellence for Renewable Resources

Research, consultancy and funding

KoNaRo – Centre of Excellence for Renewable Resources

TUMCS

Fundamental Research & Development

- Biogenic Materials
- Chemical Biotechnology
- Sustainable Chemicals & Processes
- Data Science & Optimization
- Renewable Resources
- Management & Sustainability
- Economics & Sustainable Policy

Academic Teaching

- Bachelor´s and Master's Degree Programs
- Graduation

Funded by the Bavarian State Ministry of Science and the Arts

Technologie- und Förderzentrum

Applied Research in the Fields of

- Renewable Resources Crops and Material Cycles
- Solid Biofuels
- Renewable Fuels and Materials
- System Evaluation of Renewable Resources

Project Funding

- Energy from Biomass
- Material Use
- Research, Development and Demonstration

Information

- Seminars
- Consultation
- NAWAREUM

Funded by the Bavarian State Ministry of Food, Agriculture and Forestry

C.A.R.M.E.N.

Coordination Centre for Renewable Resources, Renewable Energies and Sustainable Use of Resources

- Consultation, Information Transfer and Public Relations
- Assessment, Monitoring and Evaluation of Projects
- Networking with Science and Practice
- Analysis and Surveys for Producers, Users, Research and Politics
- Participation in all important Organizations and Boards

C.A.R.M.E.N. e. V. is a non-profit Association

The work of KoNaRo is accompanied by a Coordination Council, which includes representatives from science, industry and business as well as local politicians.

Facts and figures

- Employees: approx. 400
- State investments (construction measures): Over 142 million euros
- Area: approx. 48,900 m²
- Usable area: approx. 22,700 m²
- Energy supply: Biomass heating plant (1.3 MW), as well as solar thermal energy, heat pumps (air/air and geothermal probes) (status 2023)

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TUM Campus Straubing (TUMCS)


Foto: TUM

Research in the spirit of bioeconomy


Andreas Heddergott

The Campus for Biotechnology and Sustainability in Straubing is, along with Munich, Garching, Weihenstephan and Heilbronn, one of the five major sites of the Technical University of Munich (TUM) in Germany. By resolution of the Bavarian state parliament, the TUM Campus Straubing (TUMCS) has been an Integrative Research Centre since 1. October 2017 and is fully integrated into the TUM. In the process close cooperation exists with the Weihenstephan-Triesdorf University of Applied Sciences (HSWT; see box).

TUM is one of the most research-intensive technical universities in Europe. Its focus is on engineering sciences, natural sciences, life sciences and medicine, combined with economics and social sciences. TUM acts as an entrepreneurial university that fosters talent and creates added value for society. In international rankings, it regularly ranks among the best universities in Germany.

The unique selling point of the TUMCS is the focus on renewable resources, biotechnology and bioeconomy in research and teaching. Currently, 23 professors are working at the TUM Campus Straubing, which is systematically expanding its research and teaching capacities. The goals are to expand the campus to more than 30 chairs and professorships.

As an integrative research centre of the TUM, the Straubing campus stands for interdisciplinary research with the goal of a sustainable raw material and energy transformation in all areas of life. The use of renewable resources as a basis for chemical products, new materials and for energy recovery contributes comprehensively and in many ways to a sustainable supply of raw materials and energy. Central research areas are the bioeconomy, the circular economy, the establishment of new and novel high-performance technologies for the material and energetic use of biogenic and other regeneratively produced raw materials and their economic evaluation. We also support innovations in bioeconomy by developing business models and innovative products and technologies and bringing them to market maturity.

Cooperation with HSWT

The Weihenstephan-Triesdorf University of Applied Sciences (HSWT) has been cooperating successfully with TUM for several years – initially at the former Straubing Centre of Science, now at the TUMCS. Currently, eight professors from the HSWT and their scientific interdisciplinary team are researching on topics related to the use of renewable resources at the TUM Campus Straubing. The HSWT professorships at the Straubing campus usually have a secondary membership at the TUM.

HOCHSCHULE
WEIHENSTEPHAN-TRIESDORF
UNIVERSITY OF APPLIED SCIENCES

A study program unique in Germany


Andreas Heddergott

The study program (as of 2023)

THE BACHELOR'S DEGREE PROGRAMS (B.SC.)

- Bioeconomy
- Biogenic Materials
- Chemical Biotechnology
- Sustainable Management and Technology* (new as of WS 2021/22)
- Technology of Biogenic Resources

THE MASTER'S PROGRAMS (M.SC.)*

- Bioeconomy
- Biomass Technology (with BOKU Vienna)
- Chemical Biotechnology
- Sustainable Management and Technology (new as of WS 2021/22)
- Technology of Biogenic Resources

* can be studied in English

If you want to change the world in a sustainable way, TUMCS offers a variety of study options. In Straubing there are cross-faculty, Germany-wide unique interdisciplinary degree programs. Although all study programs pursue the goal of qualification in the field of sustainability and bioeconomy, the choice of study program can depend on personal interests.

The focus of research and study on the campus is on the areas of chemical and material utilization and energetic utilization, the development of sustainable materials, and research into the economic aspects of the production, marketing and use of renewable resources. Due to a particularly high supervision ratio, the described elective options and the close connection between basic and application-oriented as well as interdisciplinary research and teaching, the studies at TUMCS respond very well with the interests of the students and allow for flexibility, offer a view beyond one's own nose and thus prepare students for professional challenges optimally.

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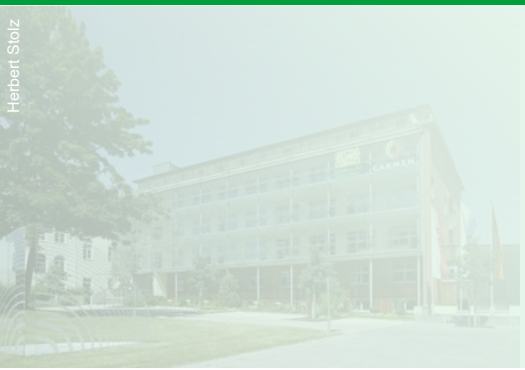
TUMCS

Technology and Support Centre (TFZ)


Herbert Stolz

Technologie- und Förderzentrum
im Kompetenzzentrum
für Nachwachsende Rohstoffe


Tobias Hase

Renewable resources crops and material cycles

Energy and raw material plants make a valuable contribution to energy supply and material use paths. The “Renewable Resources Crops and Material Cycles” department researches the suitability for cultivation and yield performance of new and rediscovered crop species in the research greenhouse or in plot trials in Bavaria. Promising crops are being integrated into sustainable cropping systems, in order to close the internal and external material cycles as far as possible. Through defined quality requirements of the biomass, advice to the grower and advice on production technology, practitioners benefit from the application-oriented research.

Solid biofuels

Applied research on processes for the provision and use of biogenic solid fuels has been an integral part of our expertise for over 30 years. In addition to supply and logistic chains for fuels, the focus is on research work on the definition of fuel quality, standardization and quality assurance. Another focus is on thermal energy conversion processes. On our combustion test rigs with an output of up to 100 kW the relations between fuel type/quality and the operating behavior of the furnaces, especially regarding pollutant emissions, are examined. Exhaust components as well as the level of plant efficiency are determined with the latest measuring technology under realistic circumstances.


Tobias Hase

Tobias Hase

Renewable fuels and materials

Renewable fuels are a central component of climate-friendly drive systems. Our research work includes the production, quality and evaluation of established and new fuel alternatives and their use in agricultural and forestry machinery. To this end, the performance, consumption and exhaust gas behavior of the machines are examined with stationary and mobile measuring equipment on both the test rig and in real-life operation. In addition, their suitability for practical use is evaluated in extensive field tests. A further focus of our work is the development and testing of degradable mulch and cover materials and suitable application methods. This can, for example, replace plastic films and protect natural habitats.

Applied research, knowledge transfer and promotion of renewable resources

Environmental assessment

What is the actual impact of greenhouse gas emissions and other environmental impacts caused by the cultivation and use of renewable resources? And how can they be further reduced? Answering those questions is an important cross-sectional task at the TFZ. For this purpose, specific data on cultivation (e.g. fertilization), production methods and use are collected and supplemented by data from the practical trials at the TFZ. This is followed by an evaluation of the energy and material flows regarding their environmental profile. The nationwide networking activities on greenhouse gas balancing and climate protection in agriculture are an important building block for the transfer of knowledge between research and practice.

Support centre for biomass

The use of renewable resources for energy and material use is in many cases not yet economically competitive compared to fossil raw materials. The Free State of Bavaria therefore supports projects for the energetic and material use of biomass as an energy source. The corresponding funding programs are managed at the TFZ by the “Support Centre for Biomass“. The processing and approval of the submitted applications for funding as well as the disbursement of the requested subsidies are the core tasks of the “Support Centre for Biomass“.

Knowledge transfer

The transfer of applied research into practice is of major importance at the TFZ. Additionally, LandSchafftEnergie+, which is coordinated at division Wissenstransfer, offers information and consultation that is neutral as well as free of charge, aiming at energy system transformation in Bavaria. The initiative of the Bavarian Ministry of Economic Affairs, Regional Development and Energy covers with advice, (online) events and publications various subjects like energy efficiency, the use of renewable energies and suitable storage, sustainable mobility, cultivation, energetic and material use of energy crops to biogenic solid fuels.

Tasks of the TFZ

The Technology and Support Centre (TFZ) is directly subordinated to the Bavarian State Ministry of Food, Agriculture and Forestry. It is an institution for applied research in the field of renewable resources and at the same time awarding authority for project funding in Bavaria. The tasks are in particular:

- Further development of cultivation systems for energy and raw material plants and their breeding processing
- Development, testing and optimization of technical processes for the provision, quality assurance and utilization of
  - biogenic solid fuels
  - renewable fuels and materials
- Assessment of the environmental impact of the cultivation and the use of renewable resources
- Approval of funding measures for biomass as energetic and material use
- Knowledge and technology transfer for agriculture, companies, municipalities, administration, society and politics
- Demonstration, exhibition and training
- Operation of the NAWAREUM

Herbert Stolz

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C.A.R.M.E.N. e.V.


Herbert Stolz

C.A.R.M.E.N.


C.A.R.M.E.N. e.V.

About us

C.A.R.M.E.N. e.V., the Central Agricultural Commodity Marketing and Energy Network, was founded in 1992 as a coordinating institution for renewable resources in Bavaria.

Within a few years C.A.R.M.E.N. e.V. became a sought-after contact point for information on industrial and energetic use of biomass. We advise governments (local, regional and national), science, industry, agriculture and consumers equally.

As a non-profit association with almost 90 members from the entire value chain of renewable resources and the energy sector, C.A.R.M.E.N. e.V. is active in the fields of wind energy, solar energy, geothermal energy, hydropower as well as energy and resource conservation.

C.A.R.M.E.N. e.V. mediates between science and practice by communicating the need for research and development as well as initiating and supporting demonstration projects that are ecologically and economically sensible. C.A.R.M.E.N. e.V. creates positive framework conditions for the development of renewable resources and renewable energies by preparing analyses for state and federal institutions, the cooperation in all important associations and committees, as well as through a quarterly economic survey.

Renewable resources - high-tech from nature


C.A.R.M.E.N. e.V.

Tasks of C.A.R.M.E.N. e.V.

C.A.R.M.E.N. e.V. collects information, evaluates it and makes the processed findings available to all user groups. Besides being an information service provider for everyone, C.A.R.M.E.N. e.V. is active as an expert for authorities, institutions and companies. It initiates and coordinates research, development and demonstration projects and supports producers, users, researchers and politics by up-to-date analyses.

In the field of information services C.A.R.M.E.N. e.V. offers a diverse spectrum:

- Extensive website with business directories, price indices for solid fuels and biofuels, event documentation and current information
- Exhibition material and trade fair participation (including traveling exhibition „In the Cycle of Nature – Natural Materials for a Modern Society“)
  Publication of press releases, conference proceedings, yearbooks and journals
- Informational and technical lectures
- Organization of more than 30 expert discussions per year
- Free, neutral consulting for all interest groups

C.A.R.M.E.N. e.V. evaluates and accompanies the projects funded by the Free State of Bavaria as part of the overall concept of renewable resources. The knowledge from the evaluation of these projects flows in turn into the consulting activities and is used for the adjustment of the subsidy programs. Further areas of the consultant activities are screenings on the application possibilities of renewable energies for municipalities, expert opinions on various issues of the Renewable Energy Sources Act (EEG), technical expert opinions and financing appraisals for credit institutions.

C.A.R.M.E.N. e.V. is the node in the network for renewable resources, renewable energies and sustainable use of resources, supported by the Bavarian Ministry of Food, Agriculture and Forestry, the Bavarian State Ministry of Economic Affairs, Energy and Technology and its other members.

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Manfred Bernhard


C.A.R.M.E.N. e.V.

Wide range of information


Herbert Stolz

TUMCS Technologie- und Förderzentrum C.A.R.M.E.N. KoNaRo

Permanent exhibitions

The KoNaRo offers the community many opportunities to inform themselves. The training and exhibition centre (SAZ) has cultivated the ideal conditions to provide information. In the large lecture hall advanced trainings, workshops and conferences can be held for up to 200 people. The three institutions of the KoNaRo also organize regular seminars and lecture series. In addition, there are two exhibitions in the SAZ.

The exhibition “Renewable Resources – from Plant to Utilization“ provides a comprehensive overview of the main areas of work at KoNaRo on about three hundred square meters of exhibition space. On display are plants, products and technologies from the biomass sector. Whether children‘s toys made from corn starch, fine dust filters for the stove or rapeseed oil fueled tractors – no question about renewable resources remains unanswered. The range of information extends from the production process of pellets, the cultivation of plants such as Miscanthus or Cup Plant to bio-based plastics.


TFZ


TFZ

In the exhibition **“Biomass Heating Systems“** the TFZ displays around 80 different fireplaces (mainly for wood logs, wood chips and wood pellets) from various manufacturers. Regular lectures provide additional information about efficent heating with wood, environmental aspects or public funding possibilities. All information about both exhibitions, guided tours and opening hours can be found at www.konaro.de.

NAWAREUM – Shaping a sustainable future

Franziska Schrödinger

Since spring 2023, the modern hands-on museum NAWAREUM in Straubing invites visitors to explore the topics of sustainability, climate change, regenerative resources, and renewable energy. The museum shows how a sustainable transformation of our economy and society is possible. On three floors and in the museum garden, the exhibition offers inspiration for all ages. More information can be found on our website www.nawareum.de/en.

Regional cooperations

Network with brand and profile

Through its research, development and marketing activities, KoNaRo is far beyond the country and federal borders an important initiator and driving force behind all aspects of the energy and raw materials revolution. At the same time, the facility strengthens the region by attracting new institutions and companies in the field of bioeconomy. Through intensive networking activities of a wide range of local partners, numerous initiatives and projects on the topic of renewable resources have already been generated.

Thus, Straubing became a university town and a region of competence in the field of renewable resources. Here city and district are jointly driving the topic forward and thus create the best conditions for the future viability of the region and its citizens. In the provision, characterization and processing of renewable resources, numerous partners have found each other – partners who have joined forces under the umbrella brand „Straubing – Region of Renewable Raw Materials“. Via the BioCampus GmbH at the port of Straubing-Sand, there is a close link to the bio-based economy in the region.

In order to further intensify this commitment to renewable resources, both the district council of the district of Straubing-Bogen and the city council of the city of Straubing unanimously passed forward-looking fundamental resolutions on this topic in 2016.

KoNaRo is thus locally integrated and an important part of a growing network in the Region of Renewable Raw Materials, which is increasingly gaining national and international importance. A network with solid cooperative relationships, open for further partners.

Imprint

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