Fraunhofer
IWES

FRAUNHOFER INSTITUTE FOR WIND ENERGY AND ENERGY SYSTEM TECHNOLOGY IWES

HESSIAN BIOGAS RESEARCH CENTER – HBFZ

LLH Expertise in agriculture and horticulture

LHL Verbraucherschutz


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ENERGY FROM BIOGAS – VITAL FOR A FULL REGENERATIVE POWER SUPPLY

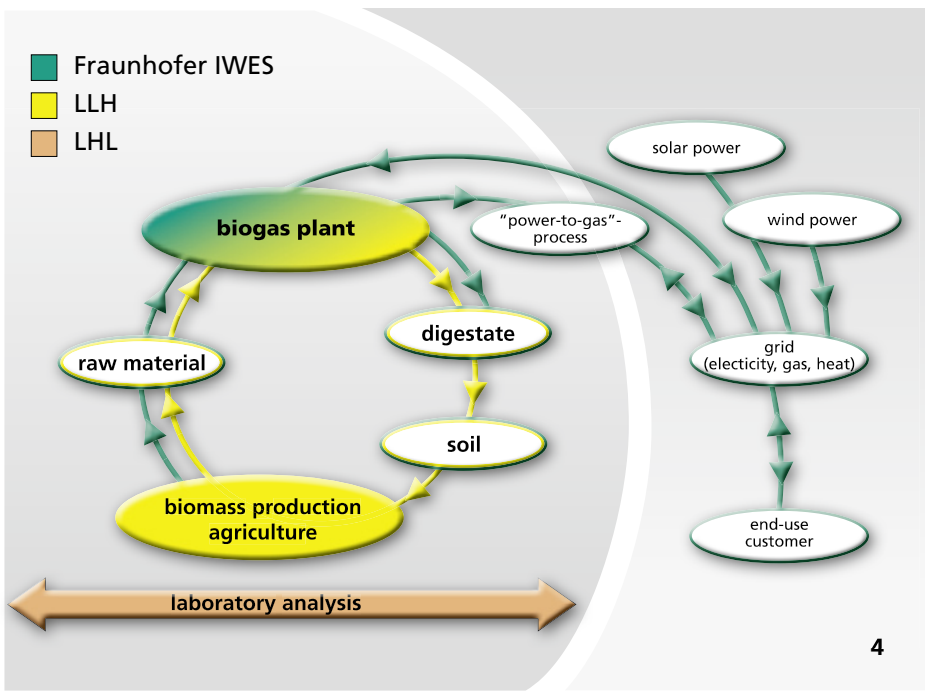
Bioenergy is gaining in importance due to the increasing share of renewable energy in the energy mix. Being a storable energy, bioenergy has to take an important part in future energy supply systems. On one hand biogas is able to provide energy, at times when other renewable energies such as wind or photovoltaic are not able to produce any. On the other hand the feed-in into the public grid can be stopped if the other sources can provide enough energy. Therefore, bioenergy does not compete with other renewable energy sources, but forms an important part of the total renewable energy power supply.

Research topics at HBFZ

As biomass is a limited resource it should not compete with food production: Therefore, sustainable concepts have to be developed, in which bioenergy is used to the highest degree of efficiency, using the specific properties bioenergy provides. All possible ways of using biogas must be considered and expediently integrated into the supply structure. This is possible at a supraregional, regional or local level.

The HBFZ investigates all aspects of energy production from biomass. Research activities begin with crop cultivation, continue with the adequate supply of the substrate, through to the production of biogas within the biogas installation as such, and also include the fermentation residues and the planting ground. The production and utilization of the biogas in combination with other renewable energy suppliers in various forms is also examined. These include the direct generation of electricity, the combined supply of electricity and heat, as well as the production of natural gas substitutes and fuel and the provision of CO_2 as a reactant for methanization (power-to-gas).

Furthermore, the HBFZ offers optimum conditions for testing energy management and control systems. Multiple PV-systems, a biogas plant with CHP, as well as a very flexible micro-gas-turbine and a wood chip-fired-plant are producing electrical or thermal energy. Moreover the facilities of the HBFZ include barns and stables, tool-room workshops, kitchens, boarding school and other facilities with a similar load profile to those found in a small village and which are all successively connected to a heating pipeline.



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All the research activities are application-oriented. The exchange between science and actual practice is guaranteed through the biogas counseling and numerous education and training possibilities for farmers at the HBFZ. Moreover each of the three HBFZ partners has their own network of research facilities and experts, not situated at the HBFZ, but who can be contacted for advice on specific questions or problems.

A high degree of interdisciplinary combined with in-depth expertise in individual topics

Prerequisites for the development of sustainable energy concepts are well structured networks and strategic alliances and not all institutions are able to provide the required infrastructure and man-power. The cooperation of the three partners at the Eichhof ensures that professional competence and infrastructure are available.

Fraunhofer IWES

The research activities of Fraunhofer IWES cover wind energy and the integration of renewable energies into energy supply structures. The focus of research and development activities for the energetic use of biomass is on the system technology of biogas plants and biogas treatment installations. These have a high potential for compensating supply-dependent and consumption-related fluctuation in future energy supply structures.

The "Landwirtschaftszentrum Eichhof"

The "Landwirtschaftszentrum Eichhof" of the LLH performs research on agronomy and plant breeding, grass land cultivation, fodder crops, animal production and biomass production. In addition it offers education and training programs for students, trainees, consultants and farmers so they can gain professional qualifications and receive the latest information during a range of workshops and training courses.

Since 2003, at the laboratory of Eichhof in Bad Hersfeld, a wide range of research activities focusing on the energetic use of biomass have been carried out. The research activities are performed using the modern analytical and measurement technology of the departments of the LHL: veterinary medicine, food, agronomy and environment.

Partner for industry and agriculture

The HBFZ as a research platform is not only available to scientists but also to industrial partners, all of whom are welcome to use the facilities. Due to the significance of the agricultural use of biomass, the HBFZ develops new concepts for agricultural holdings and is able to supply them with concrete recommendations. The Eichhof also offers accommodation and catering, thus providing favorable conditions for longer stays.

Container parking facilities are available for research projects. Test facilities can be supplied with biomass, digester content, biogas or treated biogas. The disposal of the material and energetic products of the research is also taken care of. The HBFZ offers a wide range of contract research, supporting evaluations, and accompanied industries in their research.

1 *Biogas plants and high-voltage electricity line*
2 *Wind energy plant*
3 *Grass harvesting*
4 *Holistic overview HBFZ*
5 *Feeding of biogas plant*
6 *Feeding of dairy cattle*
7 *Anaerobic digestion lab*

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Facilities of the HBFZ

The infrastructure of the partners (Fraunhofer IWES, LHL, LLH) is available for all research projects realized at HBFZ:

- Main (mother) digester, concrete, 500 m³
- Technical test stand, concrete, 400 m³
- Semi industrial test stand, stainless, 2 * 2,7 m³
- UASB-Reactor, stainless steel, 1 * 190 l
- Experimental reactor, synthetic material, 6 * 200 l
- Experimental reactor, synthetic material, 160 * 20 l
- Experimental reactor, stainless steel, 4 * 38 l
- Experimental reactor, glas, 4 * 20 l continuously and discontinuously operation, temperature baths, gas meters, IR-gas detectors
- 2 micro gas turbines à 30 kW
- CHP 130 kW
- Location to set up and operate test plants in containers (fermenters, gas treatment plants, fermentation residue drying plants, CHP´s etc.) as well as scientific monitoring by the HBFZ
- Laboratory analysis for example: lysimeter, eudiometer, near-infra-red measuring instrumentation, HPLC, ion chromatograph, gas chromatograph, soxhlett extraction equipment, equipment for total nitrogen and ammonium measurements, steam distillation used for volatile fatty acid measurements, conductivity measuring instruments, equipment for the physical parameter measurement of soil (e.g. elution behavior of digester residue components in soil)

Partners

Fraunhofer IWES

LLH

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