Fraunhofer UMSICHT takes an active part in the redesign of the modifying handling with energy and resources. One important step in a resource efficient direction of management thereof, is the efficient use of biogenic residues. The exploitation of remaining biomass regarding its compound and inherent energy reduces the emission of climate-hazardous gases, diversifies the provision of raw material and contributes to its long-term stabilization.

Existing concepts for the use of biomass currently presuppose either lignocellulose-poor biomass (biogas, bioethanol, biodiesel, white biotechnology etc.) or are focused on dry biomass containing lignocellulose (combustion, BtL-processes etc.). The concepts of use of applied conversion processes lead to costs, which are generally primarily determined by the transportation of biomass.

Hence, numerous research projects at Fraunhofer UMSICHT aim at the development of efficient product systems for biomass-based intermediate products with carrying value and storage stability. In the facilities in Oberhausen and Sulzbach-Rosenberg, scientists work out new processes for the chemo-thermal conversion of biomass.

Including:
- Thermo catalytic reforming TCR®
- Combustion and characterization of combustion material
- Pyrolysis
- Concepts for biogas and biomethane production
The Biobattery - Thermo Catalytic Reforming TCR®
The concept of the Biobattery incorporates multiple conversion technologies targeting the economical and environmentally friendly storage of surplus energy. The Biobattery was developed with the target to use surplus electricity from the grid to convert and thereby make available the energy locked within the vast amounts of existent and unused organic residues. The Biobattery includes multiple technologies, such as biogas plant elements, thermal storage systems, pyrolysis systems and motors for power generation purposes. A core element of the Biobattery is the Thermo Catalytic Reforming TCR® process, which uses residual biomass and converts these to oil, gas and char.

This approach offers unique aspects which offer competitive advantages over other conversion technologies which commonly face the following challenges:
- Partially high gate-fees for the disposal of biomass residues
- Market volatility requires flexible feedstocks
- Regular changes in market prices for products
- Changing funding conditions
- High capital commitment

Under these conditions, the following requirements exist for an innovative and reliable system:
- Suitability for a wide range of solid biomass
- A high energy efficiency
- High quality of fuels produced
- Robust and capital-efficient solution for decentralized applications
- High flexibility of the technology

The two integrated catalytic steps of the thermo catalytic reforming process generate products of unique quality, offering the following key advantages:
- High feedstock and product flexibility
- 75 percent of the energy content used is converted into fuels
- Up to 30 percent water content in the feedstock
- Preparation of pure oil
- Provision of high quality bio-char
- Product gas directly suitable for use on dual-fuel CHP
- Reliable, fully continuous process

The Biobattery is a concept developed by the Center for Energy Storage, which is funded by the Bavarian State Ministry for Economic Affairs, Media, Energy, and Technology (StMWI).