



Next Generation Bioenergy

A new approach of a combined multipurpose production facility for circular economy

Benefits:

- No food-or-fuel discussions
- Highly flexible in processing any kind of organic materials
- Broad bandwidth of valuable products
- Combination of different state-of-the-art technologies
- Use of economies of scale through upsizing to an industrial scale
- Process optimization through integration of different production facilities and use of interfaces.

Technologies:

- Wet digestion of liquid organic materials
- Dry digestion of more solid organic materials
- Digestion and distillation of sugar- and starch-containing materials
- Biogas-upgrading
- Production green gas
- LNG-liquification
- CO₂-separation
- Methanol production
- Digestate-Treatment
- Liquid fertilizer production
- Composting in tunnels
- Industrial airtreatment
- High Reduction of CO₂



Sustainability

Sustainable renewable energy production with advanced co-products and synthetic fuels requires an integrated approach at an industrial scale.

A future-oriented integrated power plant solution is able to connect energy and sustainable products in a carbon circular economy using all residues and CO₂ valuable resources (CCU).

Green Economy – A challenge and a chance!

It is a defined target of the member states of the European Union to reduce the output of carbon dioxide more than 30 % until 2030. Therefore a mix of different renewable energy capacities has to be installed of which an important is green gas and bio-Lng.

On the other hand there is a rising demand of new combined technology with a clean and highly sustainable energy output based on residue feedstocks (2nd generation).

The answer to this challenge is to connect industries – energy, transportation, agriculture and food processing – in a sensible way so that there is an economical and ecological benefit for all participants and significant CO₂-footprint reduction over the chain as a whole (Cradle-to-Grave LCA).

Green Fertilizers brings back use of fossil energy

Artificial fertilizers today are produced with a high amount of energy and fossil resources like phosphorus, natural gas or naphtha.

Fossil reserves are running out and becoming more expensive due to rising ETS prices and CO₂ taxes. So it is important to extract valuable substances from organic residue streams.

In a next step standardized marketable products are produced. This is solid digestion co-product, which contains for example the most of the phosphorus. This co-product is useful for bio-fertilising intensive used agricultural soil or eroded areas.



Liquid extracted bio-fertilizer concentrate reduces the transportation volume and can be applied easily to the farmland in an advanced fertilizer cropmanagement.

Another important fertilizer today for greenhouse farming is the carbon dioxide which is separated from green

Input Materials:

Bread crumbs, old bread and cookies
Potato peels und starch.
Residues of milk powder
Sugar products and molasses.
Fats and residues foodindustry
Green waste of communities
Vegetables, fruits and market waste
Grass from rural fields
Landscaping material
Olive Cake as residue
Fatstreams out of feedindustry
Manure out of agruculture
Dough products

Products:

Biogas /green gas industry
Bio-LNG for trucks/vessels
CO₂ and methanol
Compost for export
Green Fertilizer
Clean processing water
Sustainable use residues

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Bio-LNG for Transportation



Today purified biogas mostly is used for electricity production directly onsite on the production facility.

That challenges the electric grids to accept the energy not at the time and the place of use.

But purified biogas offers one of the best opportunities to store and transport energy with a very

interesting sustainable carbon footprint.

The first choice is to upgrade the biogas to natural gas quality to feed it into the natural gas grid. This enables industry to reduce footprint in existing processes like furnaces and hydrogen production.

More advanced is the mobility use as CNG (compressed natural gas) in passenger vehicles.

In metropolitan areas and harbours the emissions of diesel engines are an upcoming issue.

To substitute diesel a high dense energy source is needed. This will be Liquefied Natural Gas (LNG) into the future. It can be easily stored or transported and allows a high distance ride for cargo vessels, trucks, buses and trains.

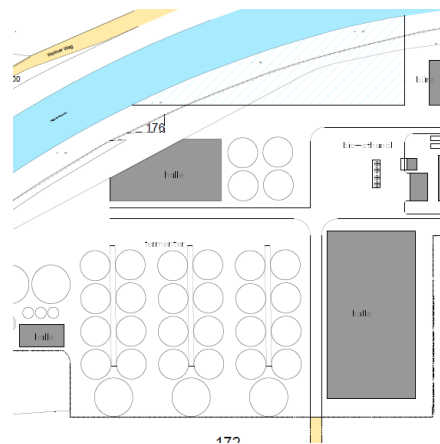
To meet the biofuel blending obligations for the transportation sector Bio-LNG is the best opportunity. A number of initiatives are on the way in local transportation or waterway transport.

Co-Production of bio-fuels

The combined approach of plant design of a biogas, green gas, lng and methanol and allows the integrated processing of energy and material flows. This is possible in Germany, Canada, Netherlands and EU.

For example the volume of biogas production can be further utilized for green methanol production.

All materials are processed with the maximum yield of energy and products



Industrial Size and Logistics

To exploit the economies of scale an industrial size of the plant makes sense. Waterway vessels are used to transport a huge volume of processing materials and products.

Industrial measurement and control techniques allows a safe und professional plant operation. Therefore the products out of biogas are continuesly monitored by DEKRA.

Therefore all locations are projected near harbours. Vessels can be used furthermore for storage or can be fueled with LNG.

