



BDI is a full-range supplier

of innovative upcycling solutions.

Since the company's founding in 1996, BDI-BioEnergy International has been developing resource-saving technologies for upgrading industrial residual and waste streams. BDI designs projects of all sizes and builds plants to produce the purest biofuels and valuable by-products.

INNOVATION is a top priority – BDI's benchmark process technologies are developed in the company's own technical center.

develop

- » expertise in pioneering new technologies
- » in-house lab and testing facilities

build

- » active worldwide for over 25 years
- » more than 70 industrial references
- » greenfield and retrofit projects

design

» comprehensive planning of plant construction projects across the globe

» projects of all scales



Vision

Taking pleasure in...

- » developing ideas and solving complex tasks
- » working creatively in international, multicultural surroundings
- » cooperating with research institutes and universities
- » taking on responsibility
- » growing together with customers
- » honoring our agreements

creating technological solutions...

- » with benchmark innovation and technology
- » from idea to implementation of turnkey plants
- » with in-house R&D and pilot plants
- » for fully automatic plant system operation
- » for digitalization of plants

for a sustainable industry.





- » contribution to circular economy
- » from waste to value
- » maximum technological performance
- » long-term partnerships
- » energy efficiency
- » relevant contributions to carbon-neutral solutions

Biodiesel

Technology from the market leader

MF100 technology

BDI's customized biodiesel plants operate with a multi-feedstock process developed in-house. The BDI Multi-Feedstock process can turn a wide vegetable oils into high-grade biodiesel that exceeds the highest quality standards. The company's long-term experience in the design and construction of biodiesel plants and the detailed knowledge of market conditions are of great

benefit in further exploiting the enormous potential of untapped feedstock. The flexibility in the use of raw materials, along with high yield, cost-effectirange of feedstock such as animal fats, veness in operations and maintenance, used cooking oils, grease trap fats, and and the proven reliability of the plants, ensure optimal economic efficiency. In all cases, the biodiesel product quality exceeds the most stringent international quality standards such as EN14214 and ASTM D6751.

RepCAT technology

With the RepCAT process, BDI has developed a technology for processing raw materials with up to 99 percent free fatty acids (FFA). The use of a heterogeneous catalyst, which is synthesized on- rin in distilled quality as a by-product.

site and reused within the process, is the key to the maximized efficiency of this technology. A further advantage of this process is the recovery of salt-free glyce-

Customer benefits

- » Maximum raw material flexibility no restriction on free fatty acid (FFA) content in the raw material
- » Maximum technical yield of biodiesel
- » Process generates no waste for disposal; instead, produces reusable by-products
- » Obtaining an absolutely salt-free glycerin quality (min. 95%)
- » Exceeding all globally applicable biodiesel quality standards
- » Approval of the use of risk fats by the European authority EFSA
- » Many years of global experience with large-scale industrial implementation



RetroFit

Plant optimization by the technology leader

Every biodiesel plant is unique. Standard solutions for improving individual parameters such as yield, product quality, or feedstock flexibility are therefore not effective. To achieve optimum results, it is necessary to develop an individual overall concept for each plant, in order to implement the most suitable technical solutions. For this purpose, there is no company more qualified than BDI; thanks to the experience gained

1. Status evaluation...

to determine requirements, estimate costs and evaluate existing technologies

2. Pre-engineering...

to prepare concepts, determine lavout and plan process integration

3. Offer preparation...

to plan implementation, detail costs and define scope of supply

4. Authorization procedure...

to analyze risks, prepare data and assist throughout the authorization process

Customer benefits

- » On-site evaluation by BDI process experts
- » Developing customized improvement concepts
- » Efficient project sequence with short downtimes
- » Everything from one source



from more than 70 biodiesel plants realized with its own technologies, BDI has the ability to identify and optimize individual elements. The result is sustainable improvement in plant performance.

The range of services offered by the BDI RetroFit program includes all necessary steps for the successful optimization of an existing plant.

5. Engineering and delivery...

including basic and detailed engineering, supplier management, and efficient project management

6. Equipment implementation...

to provide on-site installation support and ensure shortest possible downtimes

7. Hot and cold commissioning...

to ensure full plant functionality, optimize parameters and carry out a successful plant handover

8. Customer service...

to keep the plant running smoothly by offering further trainings, maintenance, and support



Advanced PreTreatment



The unique feedstock pretreatment process

Renewable diesel and sustainable aviation fuel in the form of hydrogenated oils and fats (HVO and HEFA) are becoming increasingly important as biofuels. Strict requirements regarding the contained impurities are imposed on the oils and fats used, to avoid negative impact on the subsequent process steps. Therefore, pretreatment is a crucial step for an efficient and economical production of hydrogenated biofuels, especially when processing waste materials.

The advanced pretreatment process is modular, allowing it to be adapted to the requirements of raw materials, based on the core modules of pre-purification, drying and adsorption. This includes additional modules such as polyethylene reduction with a special process patented by BDI, or the separation or conversion of free fatty acids from raw material.

Drawing upon extensive experience in managing diverse oils and fats, BDI provides comprehensive support throughout the entire project, from initial raw material analyses to operational support.

Customer benefits

» No filtration is required in this unique patented system to reduce polyethylene from raw materials

» Robust and efficient three phase decanter-based PrePurification unit to reduce oil losses and to increase availability compared to conventional degumming units

» Modular system offers a choice of process units - tailor-made for the particular impurities in a raw material

Biogas

The waste-to-energy service package

As a specialized plant manufacturer, BDI sets technological standards in the refining of residual and waste materials, in- for agriculture, which can be directly cluding with the unique BDI Biogas technology. For the process of anaerobic in a digestate treatment plant. Through digestion, a variety of organic waste can an energy-as-a-service contract option, be used as substrate, from spent grain BDI invests in the building and operation and yeast from breweries, to organic of biogas plants, including retrofitting waste from the food or biofuel industries. existing plants with biomethane upgra-Maximum biogas yield and quality are ding technology. BDI then provides enerachieved through a multi-stage fermen- gy services to the customer.

Input biological waste from the food industry, agriculture or biofuel industry



Customer benefits

- » No-risk energy-as-a-service contract
- » Process design tailored to the organic residues available as substrate
- » Major contribution to achieving net zero CO, targets
- » Energy autonomy

tation process. Additionally, the resulting digestate serves as an excellent fertilizer scattered on fields or further processed

Output

BD

biogas and digestate (fertilizer)

Smart **Operations**

Process optimization using an advanced process control system

Biofuel production performance highly depends on process control, which is in turn dependent on the experience and advanced process control system technical qualifications of the plant ope- (APCS) from BDI's Smart Operations rator. Deviating even one process step product range. Data analysis is used to beyond the optimal range can significantly diminish production capacity, map and iteratively optimize the indivicompromise product quality, and con- dual process steps. sequently jeopardize profitability.

From the very beginning, BDI has focu- provides the optimum setpoints for the sed on optimizing automated process individual process steps in real time, control. By integrating state-of-the-art compensates for raw material deviatisoftware tools based on artificial intelli- ons, avoids process disturbances and gence, BDI is pioneering advancements also enables precise planning of maintein process automation with Smart Ope- nance intervals. Like cruise control, rations - envisioning a fully automated, APCS ensures optimal biodiesel proself-learning production plant.

The most powerful tool for process optimization in biodiesel production is the create mathematical algorithms that

As a higher-level control system, APCS duction at all times.

Customer benefits

- » Automated process control, supported by AI
- » Optimization of operation mode by self-learning process control system
- » Increase of profitability through higher plant efficiency and better product quality
- » Enhanced industrial safety through automatization

Customer **Service**

Care. In every way.

Even the most cutting-edge technology requires maintenance and repair. Without a variety of ways. Maintenance and rea dedicated team providing prompt solu- pair, training of plant personnel, organizations to every challenge that may arise, tion of spare parts, and plant safety processes could come to a standstill. checks are just a few of the services offe-BDI Customer Service offers exactly that: red to ensure that biofuel plants continua team of highly competent service pro- ously operate in optimal condition.

- » for peak performance: a 24/7 hotline, troubleshooting with detailed root-cause analysis, preventive maintenance, and spare parts services
- » for plant safety: HAZOP analyses, electrical audits, SIL inspections, and overall plant safety checks
- » for optimum competence: on-site operation support and training, online process coaching, and technical information exchange
- » for continuous improvement: plant fitness checks, process de-bottlenecking analyses, and updates to optimize the process control system

Customer benefits

- » Globally available one-stop-shop
- » Support for all BDI plants, as well as those built by competitors
- » Tailor-made solutions for unique plant issues

fessionals who support plant operation in



GreenTech **Solutions**

Sparring partner for technology development

The department of GreenTech Solutions (GTS) functions as a knowledge center for chemical process development and scale up. This division offers customized services in all phases of technology development - from concept to market of experts with high-end engineering camaturity.

With decades of international engineering experience in optimizing sustainable material usage, minimizing waste streams as well as in chemical and bio-

chemical synthesis, GreenTech Solutions by BDI offers the full engineering capability needed to design complete industrial-scale plants for liquid chemical processes. An interdisciplinary team pabilities supported by state-of-the-art testing and laboratory facilities, GTS serves as the missing industrial link between a customer's idea and its successful implementation.



SynCycle

Chemical recycling of waste plastic

SynCycle is a joint project from ered in a multistage condensation pro-GreenTech Solutions by BDI (GTS) and cess. The resulting circular oils can be Next Generation Elements (NGE), re- fed back into a refinery process or used sulting in a new chemical recycling as secondary feedstock for new plastic technology for mixed plastic waste production. Thus, the recycling loop is fractions. During the process, plastic closed for post-consumer and post-inwaste is melted and fed into a pyroly- dustrial plastic, making SynCycle a piosis reactor, where it decomposes into neering example of circular economy. pyrolysis oil vapors which are recov-

Customer benefits

- » Tailor-made highly-automated plant
- » Self-contained processing unit
- » Optional add-ons for pretreatment and posttreatment
- » Modular design for variable plant capacity



Selected References



Plant Type: Biodiesel plant Location: Wexford, Ireland Client: Green Biofuels Ireland Feedstock: Used cooking oil, animal fat, rapeseed oil Technology: Multi-Feedstock, PreTreatment, RetroFit, Smart Operations BDI-Involvement: Engineering, equipment, installation, commissioning

RetroFit + Smart Operations



Plant Type: Biodiesel plant Location: Bakersfield, CA, USA Client: Crimson Renewable Energy Feedstock: High-FFA feedstock, waste oils and fats / external FME Technology: PreTreatment, RepCAT BDI-Involvement: Engineering, equipment, commissioning

RepCAT



Plant type: Feedstock pretreatment plant Location: Ghent, Belgium Client: Ghent Renewables Technology: PreTreatment BDI-Involvement: Engineering, equipment, commissioning

PreTreatment



Plant Type: Biogas plant Location: Göss, Austria Client: Brauunion Feedstock: Brewer's spent grain (BSG) and surplus yeast Technology: Biogas technology for BSG BDI-Involvement: Engineering, construction, commissioning, operation

Biogas





đ

BDI-BioEnergy International GmbH

Parkring 18, 8074 Raaba-Grambach, Austria T +43 316 4009 100 F +43 316 4009 110 bdi@bdi-bioenergy.com www.bdi-bioenergy.com