



Biogas Plants



STRABAG
Umwelttechnik GmbH

STRABAG
TEAMS WORK.

More than 30 Years of Experience in the Biogas Plant Business

STRABAG Umwelttechnik GmbH is one of the world's leading players in the field of biogas production. We offer an exceptional range of processes and technologies for biogas production that have been developed in-house and proven in various reference plants. Perfect qualifications for finding the best project-specific solution to your problem.

We have been developing and constructing plants for the biological treatment of wastewater and sewage sludge since as far back as 1971. In 1980, we expanded this area of our work by adding another important specialty: the anaerobic digestion of organic material. The first industrial-scale plant for the production of biogas from semi-liquid manure with a 500 m³ digester went into operation in 1983. To date, we have successfully completed a large number of anaerobic digestion plants for the widest variety of input materials to the satisfaction of our customers.

As a process engineering-orientated plant construction company, we are constantly developing, enhancing and extending our range of process products and technologies. Longstanding experience in the planning, construction, commissioning and long-term operational support of numerous reference plants ensure the economic efficiency and, more importantly, the operational reliability of the plants we build.



Cover: Biogas plant, Langenhagen (Germany) / **Cover top:** Biowaste digestion, Mondercange (Luxembourg) / **1** Biowaste digestion, Berlin (Germany) / **2** Biowaste digestion, Lisbon (Portugal) / **3** Biowaste digestion, Freudenstadt (Germany) / **4** LARAN® dry digestion, Ljubljana (Slovenia) / **5** Biowaste / **6** Mixed household waste / **7** Mixed manure / **8** Energy crops

Turnkey Solutions for Any Waste Management Problem

We Design and Install Biogas Plants for the Following Input Materials

- Source-separated biological waste and garden waste
- Organic fraction of domestic waste
- Restaurant waste/market waste
- Manure/dry manure
- Renewable primary products (energy crops)
- Organic suspensions from potato processing plants and distilleries
- Other organic degradation products such as brewers' grains and marc
- Organic sludge
- Heavily-loaded organic sewage

Our Scope of Services

- Engineering, supply and commissioning of components, plant sections or complete plants
- General contracting for turnkey plants
- Financing concepts
- Long-term operational support by means of service contracts
- Operational management of plants
- Laboratory and small-scale technical tests
- Consultation, planning
- Execution of planning and approval procedures



STRABAG-Processes for Biogas Generation

STRABAG Umwelttechnik GmbH offers two fundamentally different processes for generating biogas from different sources. They have been developed in-house and patented. These are the wet anaerobic digestion process in the LARAN® loop digester, conventional biogas plants using the LARAN® mixed digester and the dry anaerobic digestion process in the LARAN® plug-flow digester.

Wet Digestion in the LARAN® Loop Digester

- Patented and approved in large-scale plants
- Especially suitable in combination with specific auxiliary units (mashing/incorporation and maceration of substrates) for digesters up to 12,000 m³
- Preferred process for co-digestion with manure or for digestion of food residues, sewage sludge or mash
- With specific control and removal of scum and sediment layers

The outstanding feature of our wet digestion process is the anaerobic digester with internal loop for hydraulic agitation induced by injecting gas into the centrally arranged draft tube (gas lift → mammoth pump effect) and thus without rotating parts inside the digester.

The desulphurization process integrated in the digester comes into use depending on the input by air dosage causing suppression of H₂S-formation.

Conventional Biogas Plants Using LARAN® Mixed Digester

- Preferred process for digestion of semi-liquid manure and renewable primary products or for use as post-digester
- Conventional agitation technology in flatter, circular tanks that are less expensive to build with special feed system
- Double membrane roof mounted on biogas holder
- Standardized series production solution

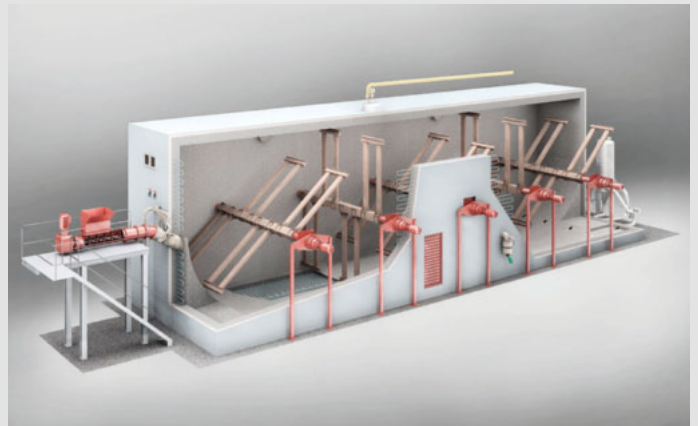


Dry Digestion in the LARAN® Plug-Flow Digester

- Patented and approved in large-scale plants
- Especially suitable for mono-digestion of critical/structure-rich substrates or for the digestion of waste with a high solid content or manure/dry manure
- Digester dimensions up to 3,500 m³, designed as standardised series production solution
- Very sturdy agitators for mixing the digester thoroughly when using very critical waste with an extremely high solid content
- With specific control and removal of scum and sediment layers

Dry digestion is a thermophilic or mesophilic process which takes place in the horizontal plug-flow digester with a rectangular cross-section. The digester is suitable for feedstock with high dry matter content up to 45 %.

→ ANIMATION LARAN® PLUG-FLOW DIGESTER



Schematic diagram of LARAN® plug-flow digester for dry digestion



1 Co-digestion of manure, energy crops and rye, Kleinbautzen (Germany) / 2 Sewage sludge digestion, Brest (Belarus) / 3 Wet mechanical feedstock preparation with pulper, Madrid (Spain) / 4 Automatic crane system of feedstock bunker of anaerobic digestion plant, Helsinki (Finland) / 5 STRABAG vacuum discharge system of LARAN® dry digester, Helsinki (Finland) / 6 Feeding system of digester for bio waste, Alphen a. d. Rijn (Netherlands)

Biogas Utilisation

Energy Production

Beside the utilisation of biogas for heat and power generation in combined heat and power units (CHP), we also realise alternative concepts for power generation such as:

- Turbines as alternative to CHPs
- Exclusive use of biogas for heat and steam generation
- ORC (Organic Rankine Cycle) plants for waste heat recovery

Upgrading of Biogas to Natural Gas Quality or Vehicle Fuel

Another interesting and frequently requested alternative use of biogas is the upgrading to natural gas quality or vehicle fuel. Based on own technologies and products for upgrading, this solution is an important element of our activities in this business field.

Depending on the project and surrounding conditions, various processes for the CO₂ separation and methane enrichment are applied by us, such as:

- Unpressurised Amine Scrubbing
- Pressure Swing Adsorption (PSA)
- Membrane Technology

The plants for the biogas upgrading can be combined with process steps for compression to feed into the public gas grid, liquefaction or direct use at gas filling stations.



Successfully Implemented Know-How

STRABAG Umwelttechnik has executed worldwide numerous plants for anaerobic digestion (biogas), solid waste treatment, waste water treatment and exhaust air treatment. You can benefit from this extensive environmental experience. Beside our core competencies in biogas generation and utilisation, we also offer you customised solutions for the treatment of the liquid effluent and exhaust air as well as processing, conditioning and upgrading of digestate.

With our expertise, we are embedding your biogas plant into an overall concept covering all necessary process steps, such as:

- Wastewater treatment of effluent or recirculation (nitrification/denitrification, stripping of NH_3 , membrane technology, reverse osmosis)
- Preparation of feedstock for anaerobic digestion based on STRABAG own technologies and components (waste pulper alone and in combination with drum screen, hammer mill, impact crusher)
- Processing of residues after digestion with technologies for dewatering, thermal or biological drying
- Upgrading of digestate to fertilizer, compost or soil
- Site specific exhaust air treatment

1 Biogas upgrading, Berlin (Germany) / 2 Waste collection vehicle at biogas filling station (CNG), Marquette (France) / 3 Composting of digestate, Mondercange (Luxembourg) / 4 Dewatering of digestate, Ljubljana (Slovenia) / 5 Feedstock preparation of mixed municipal solid waste (MSW) for digestion, Tychy (Poland) / 6 Biowaste digestion, Helsinki (Finland)





Biowaste digestion, Middenmeer (Netherlands)



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STRABAG Umwelttechnik GmbH
Plant engineering and construction
P.O. Box 50 01 24, 01031 Dresden/Germany
Tel. +49 351 26359-0
Fax +49 351 26359-4826
umwelttechnik@strabag.com
www.strabag-umwelttechnik.com