

The First Biogas International AG global biogas business

First Biogas International AG (FBI) offers a unique approach to explore new biogas markets: it provides an integral approach for the development of biogas systems, adapted to local conditions. Its engineers and system experts support the customers worldwide in building up their own biogas business.

The FBI biogas academy

With regard to transfer all biogas know-how to its customers and partners in an effective and comprehensive manner, FBI runs its own biogas academy. Basically, the academy is supported by an extended network of leading biogas experts. It collects and provides most recent knowledge and experience about biogas from R&D and out of biogas practice and makes it available in a most digestible form to its customers worldwide. The academy offers three main and three additional blocks of courses that lead the trainees to master the biogas technology and business. Senior instructors with at least ten years of international biogas experience lead these courses. The courses take place in the country of the customer, in Switzerland and Germany and online. A midterm and a final examination make sure the trainees reached the necessary level of knowledge. The know-how transfer includes the transfer of all biogas knowledge, handing out all required calculation tools, knowledge databases, presentation materials etc.

Organization of the studies

Preliminary studies PS

Course #	Course description	Units
101	Introduction to biogas	1) Biogas basics; 2) Characteristics of biogas systems; 3) The markets and their demands

Basic studies BS

Course #	Course description	Units
201	Conceptual design I	1) Substrates; 2) Plant types; 3) Plant mass flow and balance; 4) Biogas system layout; 5) Feeding systems; 6) Calculation tools; 7) Feedstock logistics
202	Biotechnology and process design	1) The anaerobic digestion; 2) Gas production; 3) The lab; 4) Hydrolysis; 5) Plant start-up; 6) Inhibitors
203	Project development	1) What makes a biogas project sustainable 2) General success factors and examples
204	Hydraulics	1) Manure flow; 2) Gas flow; 3) Heating systems; 4) Pumping; 5) Steering; 6) Contraries
205	Components	1) CHP units; 2) Digesters; 3) Pumps; 4) Agitators; 5) Feeding systems; 6) Miscellaneous
206	Legal requirements and constraints	1) The actors; 2) Critical points in approval processes
207	Engineering	1) Planning and designing tools; 2) Integration in practice along 201 point 4)

Advanced studies AS

Course #	Course description	Units
401	Gas utilization	1) CHP unit; 2) Biomethane upgrade units; 3) Micro gas grid; 4) Burner; 5) Turbine
402	Electrics	1) Sensors; 2) Control unit; 3) Wiring diagrams; 4) Metering; 5) Grid connection; 6) Cabinets; 7) Remote control; 8) Visualization; 9) Automation
403	Plant efficiency	1) Own consumption; 2) Monitoring; 3) CHP efficiency systems; 4) Avoiding errors and failures; 5) Failure management
404	Plant safety and risk management	1) Ex-zones; 2) Critical equipments; 3) Gases
405	Plant economics	1) Investment; 2) Costs; 3) ROI

Project oriented studies POS

Course #	Course description	Units
601	PM	1) FB PM methodology; 2) Online collaboration tools; 3) Project controlling
602	Plant erection	1) Site management; 2) Project management and handling in practice
603	Plant commissioning	1) Mechanical acceptance; 2) Start-up; 3) CHP unit; 4) Performance test; 5) Final acceptance
604	Plant operation and monitoring	1) Technical requirements and tools; 2) Process management and control; 3) How to avoid crashes; 4) Plant maintenance
605	Plant optimization	1) Optimization methodology

Business oriented studies BOS

Course #	Course description	Units
801	Business economics	1) What makes a biogas business sustainable; 2) Core business numbers; 3) General success factors and examples
802	Contracting models	1) The models; 2) General success factors and examples
803	Sales contracts	1) Models and issues
804	Marketing	1) PR; 2) Strategies; 3) Acquisition
805	Studies	1) How to conduct studies; 2) Templates
806	Investment models	1) The models; 2) General success factors and examples

Further studies FS

Course #	Course description	Units
901	Conceptual design II	1) Slaughterhouse waste; 3) Industrial organic residues; 4) Municipal organic waste
902	Conceptual design III	1) Sewage plants
903	Conceptual design IV	1) Rural small biogas systems/decentralized electrification and heat/cold utilization;
904	Conceptual design V	1) Community energy and recycling parks
905	Biodiesel/bioethanol + biogas	1) Case studies
906	Peripheral systems	1) Denitrification; 2) Drying systems; 3) Osmose systems; 4) Composting; 5) The use of the heat

Study methodology

All course materials are written in English and available to the customer as pdf files and PowerPoint presentations. FBI will provide an online teaching platform for free (eLearning). Thus, FBI can teach and meet its customers online and in a very effective way.

Exams

If the customer wants to omit preliminary studies, he has to pass a small exam.

Midterm exam after the basic studies: if custom engineers fail to pass this exam, there will be an extra training for € 10'000.-.

Final exam after the advanced studies: if custom engineers fail to pass this exam, there will be an extra training for € 10'000,-.

After the PS, POS, BOS and FS there will be no exams.

Every exam has to be passed before moving on to the next studies.

Course of events

During the acquisition period, FBI checks already the biogas and project management knowledge level of the customer's engineers. With a small exam FB checks the engineers whether they need to take course #101 or can start immediately with 201. Then, an instructor of FBI visits the customer. He stays with the designed engineers for 4 days. At day one he informs about the courses and the academy and how to teach and learn online. The next three days he begins with the courses 20x. The customer and the instructor agree on a period when to finish the basic studies. This can take from 4 weeks up to 8 weeks.

As a next step, the engineers are coming to Switzerland and Germany. At first and for two days, they are taken to biogas plants to get a hands-on experience of various biogas technology solutions. Then, they have to take the midterm exam. In case they pass, the instructor is going on with the advanced studies for two days. Before flying home, the engineers and the instructor agree on how long they shall take for the 40x courses. This can take from 4 weeks up to 8 weeks. When the customer signals readiness for the final exam, the instructor visits him again. At first the engineers take the final exam. In case they pass this test and have real projects to start, the instructor starts with the POS. Parallel, he might start with the planning of the projects as well. If there are no actual projects, the customer may wait with the POS or start them anyway.

Efficiency

The most efficient way to pass the academy is to have already some engineers ready with some basic biogas knowledge and to have a real biogas project that has to be managed and erected. Thus, between the AS and the POS there will be no gap and just one visit at the customer's site. This visit will take two weeks and will include the final exam, the start of the POS and the start of the project and plant design. And, the POS can be tailored to the needs of the upcoming real projects.

Business oriented studies

Business oriented studies comprise courses with specialized business know-how in order to help the customer not only to have working systems and plants but also to build up successfully his own business. These courses can be started together with the regular advanced studies or at any time later on.

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Custom tailored studying modules

Depending on the needs of the customer and his biogas projects in mind, FBI puts together custom tailored studying modules. For instance, if a customer just wants to be able to erect and run simple manure plants, he doesn't need to take all courses and units and thus, can save time and money. FBI put up a system to define a "Biogas Knowledge Level (BKL)" for each customer and according to his projects and needs.

For instance, a small cow manure biogas plant with a BKL of 00 is easy to erect and run and a BKL of S9 would mean highest art in anaerobic digestion with complex multifunctional plants and systems.

See Annex I for detailed information about the BKL system.

But the BKL is not the only parameter to measure the complexity of biogas plants. The sheer size of the plant is important, too. In order to design and erect a plant of 100 kW_{el} there's less know-how needed than to erect a 1 MW_{el} plant with the same kind of substrates. Thus, FBI has a "Power Index (PI)". The PI indicates the equivalent electric power of a biogas plant.

PI	00100	00500	01000	02000	05000	10000	S10
MW _{el}	<0.1	<0.5	<1	<2	<5	<10	≤10

Thus, for instance, a S9-S10 (with a BKL of S9 and a PI of S10) project would demand the highest know-how in biogas technology, conceptual design and project management. Whereas 00-00100 projects were already erected in Switzerland back in the 1970's.

The FBI design and project management center

Once the know-how has been transferred to the customer, he can start to design his own projects and to erect biogas plants. Experienced engineers from FBI support him for at least the two first projects which should be conducted in series later-on. There will be one senior engineer from FBI heading the whole realization process. FBI is 100% responsible and the engineering leader during the whole realization period for these first two projects. This means that FBI clearly gives the rules which project management methodology and tools and which hardware components have to be applied.

Later on, the customer has his own biogas system and components layout, but can still have the engineering support of FBI, paid as a service. In case projects layout changes heavily, the customer can have support as well for as many further projects and alternative plant layouts, respectively as he wishes to have, by an extra fee.

Project Design PD

First at all, biogas projects have to be designed. Important parameters are the kind and volume of substrates, the location of the plant and the utilization of the gas. Experienced FBI engineers and project managers support the formerly trained local staff with their project according to the means learned at the POS until construction permission is gained and the project is ready to be erected.

The project design includes one visit at the customer's site to start the project design. By the means of remote support, online collaboration tools and meetings FBI steers and monitors the forthcoming project-development. FBI coaches the local staff to get to the optimized final design. All works like architect's drawings and plans, calculations (for civil works, etc.), legal approval process, getting quota from local suppliers etc. have to be conducted by the local customer's company.

Project Management PM

Once the project is designed and construction permission is gained, the erection of the plant might start. FBI takes the lead of the project management and works closely together with the local project management team (the one that has been trained from BS to POS). The project will be managed according to the methodology and tools provided by FBI and trained during the POS. The customer is responsible for the onsite construction management and has therefore to assign an experienced professional.

FBI will be four times on site (for 4 days each) and support the project during erection and after the commissioning. These visits will be scheduled at:

1. Project start
2. Mechanical completion
3. Commissioning CHP/biomethane unit
4. Final performance tests of the whole plant and biogas system

Additional on-site support of required FBI-experts (engineers, architects, process specialists...) can be booked by extra fee and availability.

Annexe I

The BKL system.