



PLANET – PPlan for Agriculture reNewable Energy Training

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1 BIOGAS Module description

The biogas training course consists of the microbiology of digestion, technical plant lay-out, (operational) management of the biogas plant, business models, safety, environment and logistics. Site visits are combined with (group) assignments to apply the learned skills and knowledge. The training content provides the student with hands-on knowledge of the basic plant design, the operational management, safety and hazard information and compliance with the legal regulations.

This module focuses on small scale digesters, which you typically find among the agricultural premises around Europe. Small-scale digestion has many advantages. Basically it produces bio-energy out of manure and feed leftovers. The revenues of this give the farmers more income.

Besides to this manure digestion also reduces the emission of methane and nitrogen from the manure pits. Because the harmfulness of methane as a greenhouse gas this is a very huge, but still not valued, side-effect.

With the knowledge of the course the student get the ability to influence the design of a new biogas plant and is able to ensure technical, biological, sustainable and economical operation of the plant.

2 Outline

Module 5	PLANET Biogas training course	Bloom Taxonomy level	Test type
Day1	Introduction of biogas		
LO1	Understand the purpose of the module	understanding	
LO2	Understand the basic biology of the anaerobic digestion process	understanding	
LO3	Understand the basic characteristics of biogas	understanding	
LO4	Understand what the possibilities and advantages of biogas are	understanding	



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Module 5	PLANET Biogas training course	Bloom Taxonomy level	Test type
LO5	Understand what digestate is and what the value of digestate is compared to undigested manure.	understanding	
LO6	Know milestones in the history of biogas and the current situation of biogas in your country	remembering	Multiple questions
Day2	Layout of a biogas plant		
LO1	Understand the different types of digesters on farm-scale and the construction of a CSTR digester	understanding	
LO2	Understand the different components of a biogas installation	understanding	
LO3	Understand the various gas treatments and monitoring of the gas composition	understanding	
LO4	Understand basic logistics of a biogas plant	understanding	
LO5	Understand the characteristics of the different biogas utilization techniques	understanding	Multiple questions
Day 3	Process		
LO1	Understand the basics of the biology of biogas generation	understanding	
LO2	Understand the influence of process parameters on the process	understanding	
LO3	Understand the influence of substrates on biogas formation	understanding	
LO4	Understand the laws of conservation of energy	understanding	Multiple questions
Day 4	Site visit		



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Module 5	PLANET Biogas training course	Bloom Taxonomy level	Test type
LO1	Be able to recognize the type of digester and components, the type of substrate feeding the digester, and calculate the biogas yield and process conditions of the visited biogas plant, according to theoretical values	applying	Report
Day 5	Business models for biogas plants		
LO1	Know how to sizing the components of a biogas plant	remembering	
LO2	Understand the Operational costs of a biogas plant	understanding	
LO3	Understand the Income & Subsidies of a biogas plant	understanding	
LO4	Be able to compile a business model of a biogas plant	applying	Exercise + open end question
Day 6	Safety and Environment		
LO1	Be able to recognize the hazards in a biogas plant	applying	
LO2	Be able to ensure compliance with environmental legislation	applying	
LO3	Be able to assess what to do in a dangerous situation	analysing	Multiple questions
Day 7	Logistics and Management		
LO1	To manage plants for the utilisation and storage of digestate	applying	
LO2	Know the requirements and rules that must be compliant for a permits and licences	remembering	
LO3	Be able to maintain professional records in a biogas plant	applying	open end question
Day 8	Operation of biogas plant		



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LO1	Know how to operate a biogas plant	understanding	
LO2	Understand how to collect and preserve samples for analysis	understanding	
LO3	be able to resolve equipment malfunctions	applying	Practical assessment
Day 9	Maintenance		
LO1	Know how to maintain biogas plant	understanding	
LO2	Ensure rotation equipment maintenance	applying	
LO3	Monitor heaters and CHPs	applying	
LO4	Ensure static equipment maintenance	applying	
LO5	Maintain records of maintenance interventions	applying	multiple questions + Practical assessment
Day 10	Site visit		
LO1	be able to apply all the learning objects in the field	evaluating	Practical assessment