

Biogas work placement, Obernzenn, Bavaria, Germany

12th to 27th April 2013

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I have a strong interest in Waste Management and my focus is on organics waste/resources treatments; firstly the composting industry and subsequently the anaerobic digestion (AD) and biogas sectors. The participation in Leonardo Programme was a great opportunity to enhance my knowledge of the Biogas Industry in Germany, especially its technical but also legal aspects.

The placement

My placement was at Sturm GbR, which is a family run pig farm and biogas plant based in Franconia region, near Obernzenn. It lasted two weeks, from 12th to 27th April 2013, which means a lot of sun and up to 30C in this part of the world. I was on this placement at the same time as another Leonardo participant, Billy Hamilton, which was quite helpful and I would recommend taking part in a kind of 'joint placement'.

Sturm's family

At Sturm's farm the day starts early and finishes late. Everyone is extremely busy and even the Christa, Thorsten's mother, is running her own small baking business, on top of taking care of the whole house and the family's older generation. It's a very ambitious, well organised and thought through family run farm & biogas plant. They are focused not only on the daily management of the site but always think ahead and remember to have 'as many arms as possible', which brings better stability to the business. This plant is for a person, who likes a fast pace environment in a countryside surroundings. One would need to be prepared for some labour work and lots of DIY thinking, as well as biochemistry/lab task and lots of discussions & thinking about the AD system and its improvements.

We stayed at the family house, sharing all the meals with its members and being kept up to date with all the issues occurring at the site. The Sturm family is outgoing, friendly and there are loads of smiles everywhere. Although some family members speak just a little bit of English, we didn't have any problem to communicate with each other and Thorsten has a really good command of English, which helped to sort out any confusions.

Another aspect of this placement was a huge dietary adjustment into Bavarian cuisine. Leaving on

the intensive pig farm the family thrives on sausages and other pork products, like row meat (pork), which are served three time a day. It seems that all Bavarian meals include sausage/pork but I think they are even more common in Nurnberg region (Franconia), which is famous of its Fränkische Bratwurst and Nürnberger Rostbratwurst. It could be a good idea to check with the family if one has stricter dietary requirements.

Description of the process

The biogas plant has a 500kW production capacity and is run on a mixture of 40% pig slurry and up to 50% maize & 10% rye-grass silage. Most of the feedstock comes from the Sturm’s farming activities. The slurry is supplied from the Sturm’s intensive pig farm located at the same farm, which have 2000 finishing pigs and they farm 250ha with energy crops, mainly maize. The plant was built in 2005 and was one of the first in the local area. In 2010 the company expanded through converting some of the existing tanks and building a new large end storage tank. The changes are presented in the table 1 below. The digesters are covered by a single membrane covers and concrete covers in the case of the converted slurry tanks.

The system in 2005		The system in 2010
Digester	CONVERSION	Digester
post digester		Post digester
end-storage tank		Digester
Slurry storage tank x 2		Post – digesters x 2
-		end-storage tank (new)
50 days retention time		100 days retention time
250kW generator		2 x 250kW generators

Sturm family is planning to move to flexible electricity production which is being driven by the German government and the significant electricity production from other, weather dependant renewable energy technologies. It is important to be able to supply electricity to the grid when there is a (higher) demand and reduce the energy production when necessary. In order to facilitate this functionality of the system the third generator will be installed at the plant, giving an optional maximum electrical production capacity of 750kW. The heat produced from CHP at the site is used:

- To heat the main digesters;
- For district heating network (villages of Esbach)
- For drying timber.

Regarding the digestate use, it is spread on Sturm's farm and the land rented to grow energy crops, as well as used by other local farmers. This provides necessary nutrition (including: nitrogen, potassium and phosphate) for the crops and reduce the need of using brought-in fertilisers.

Diary, 12th – 20th April 2013

The placement started with an introductory walk around the biogas plant and day trip around the neighbouring villages. In that region, there are biogas plants in almost every village and we went for a cycling trip to the nearby town to visit one of them.

On this farm the day starts at 5.30am when Thorsten carries out a routine site walk, checks level of digestate in all the tanks and fills up the feeders. Breakfast was at 7am, which we ate with the whole family, who was planning the day/activities over local newspapers.

After breakfast we did our 'daily tasks'. This included site walk and checking digestate level in each of the tanks, as well as some maintenance work. During usual busy mornings we helped Thorsten with the site management or did some readings and exchange knowledge, eg. I found a bit more about the application of digestate and engineering site of the plant & engines. We were introduced to all the control point of the system, which are thoroughly followed, checked and managed on a daily basis.

After lunch, it was sampling time and we carried out so-called 'research project'. We organised all other activities in the way that the samples are taken at the roughly the same time, 3pm. The sample was taken from each of the tanks, so 3 plus from the end-storage tank from time to time and was tested for dry matter content and FOS/TAC. The samples were also taken from the maize on a daily basis and grass silage once a week. The data were recorded on a database created by us and although it would be hard to draw any conclusion after two weeks of sampling, it gave us a better understanding of AD biochemistry and its relationship with the feeding system and gas production.

Conclusion

Two weeks, on-site experience at German biogas plant gave me a comprehensive insight into all areas of anaerobic digestion process, including: technology, biochemistry of the process and understanding of day to day challenges, as well as the possible future developments.

In addition, during the programme I had a chance to meet people from across the industry, exchange knowledge & experience and built relationships. Another important part of this exchange

was a cultural aspect. Although my German language skills are basic I found it easy & enjoyable to communicate with the family and experience a completely different food, history background & lifestyle, which can be found in small Bavarian villages. Also, we were lucky to take part in a local 350 year old brewery bear fest, which gave us a good idea of the Bavarian customs & traditions (lederhosen & mass).