PHOTO: @GREGORY BRANDEL

Farm biomethane plant

FRANCE

An ambitious change

Large waste utilisation centres in densely populated areas converting waste or sewage gas – such as those in Lille, Morsbach and Strasbourg – are set up mainly in the municipal sector. Besides these, plants on farms are making up leeway such as that of Bioénergie de la Brie and pools of several micro-plants emerging under numerous local farmer initiatives.

By Marie-Luise Schaller

With the Law on Energy Change and Green Growth, the French Ministry of Environmental Protection, Sustainable Development and Energy, referred to, in short, as MEDDE by the French, is bent on advancing the development of renewable energy sources not only with respect to the fact that Paris will be hosting the World Climate Conference in autumn. The targets are to increase the share of energy from renewable sources to 23 per cent of the energy demand by 2020 and to 32 per cent by 2030.

These sources should provide 40 per cent of the electricity generation and 38 per cent of the heat end energy, 15 per cent of the motor fuels and 10 per cent of the gas end energy. The fundamental change in French energy policy is not yet consolidated legally because there will be a second reading of the Bill which will not be adopted earlier than at the end of May/beginning of June. Parallel with the legislation process, however, working groups and commissions are working out the implementation regulations and provisions, and different actors in the energy market are making their contributions to the development of the growing market.

Experts of the French government and the energy sector believe that biomethane will have a great future, as was stated during the biomethane conference organised by the German-French Bureau of Renewable Energy on 26 February. Some details from the papers delivered at the conference and the latest publications will be discussed below.

From 6 plants now to 44 by the end of next year

At present, six plants produce biomethane. They feed over 70 million kilowatt-hours into the French natural gas grid every year. The use of energy crops only is a great taboo in France. Two legacy plants, a biogenic waste and composting plant in Lille and a biogenic waste plant in Morsbach, digest biogenic substrate. The other four plants operate on farming substrates and residues. Maize can be grown as an intercrop here. Another 38 plants are hoped to start production this and next year, so that the total number may go up to 44 by the end of 2016, as was reported by the GrDF in the paper by Suzanne Renard.

The plant in Lille-Séquedin was the first to feed biomethane into the French natural gas distribution system. It is owned by the companies of the Communauté Urbaine Lille Métropole. The biogas, which is produced from preselected biogenic waste, is treated by pressure scrubbing. The annual output of 16 million kilowatt-hours fuels 150 municipal buses and 80 trucks. Between 15 and 50 per cent biomethane is added to the natural gas.

Another 320 buses can also run on biomethane. As Dr. Marc Jean Mestrel as involved adviser reported in his paper, many directives and technical solutions were developed in this pilot plant in a long series of tests and examinations until the gas-fueled vehicles were financially as profitable as diesel engine-powered trucks. Feeding the biomethane into the natural gas network and fueling the vehicles during the night have a positive effect on the cost return situation.

The Méthavalor plant in Morsbach (see photo on this page) also digests biogenic waste. The waste is collected from local communities with 385,000 inhabitants altogether. The biogas is treated in a membrane unit from AirLiquide. A total of 9 million kilowatt-hours are fed into the natural gas grid every year. The farm plant of Bioénergie de la Brie in Chaumes-en-Brie consumes 12,500 tons of farm residue, among that slurry from 500 head of Limousine cattle and from 250 suckler cows with calves. If there were no seasonal limitations for the feeding of biomethane in the natural gas grid for capacity reasons, a total of 16,000 tons of input materials could be digested.

The biomethane from this plant is also treated in a membrane system from Air Liquide; it produces 125 standard cubic metres of biomethane an hour. The other farm-based plants have the same output capacity. A PSA plant is located in Mortagne-sur-Sèvres; membrane systems are installed in the plants in Sourdun and Ussy-sur-Marne. One of the interesting projects not yet completed is the Biovalsan plant in Strasbourg, where biomethane with an energy potential of 16 million kilowatt-hours a year will be produced from the gases of France's fourth-largest sewage treatment plant.

Strategy and potentials

The environment and energy targets are related closely to the growth of the economy and the consolidation of the home budgets. Heating cost will drop, means of transport become cleaner and jobs be created. Biomethane is an important player in these plans as part of the natural gas supply and also as a fuel. The production targets will be fixed by mid- or end-August, after the promulgation of the Energy Transition Act. Questions of policies and regulations are discussed intensively between Germany and France.

Under the European Green Gas Grids project, the ADEME Energy Agency developed two potential scenarios for France, engineer Olivier Théobald explains. According to these, the available materials – no change in the development trend given – are sufficient for supplying 500 plants with 12 billion kilowatt-hours, and – when the development is forced – for 1,400 plants with 30 billion kilowatt-hours. At present, over 600 biomethane projects are in the pipeline in France, of which - according to GrdF - 400 plants will feed biomethane into the general distribution system and 200 into the transport grid.

Figure 1: Present stock and expected development of biomethane plants in France (data by GRdF)

PHOTO: @SYDEME

Méthavalor in Morsbach (F) – biomethane production from biogenic waste.

Clean air with biomethane

Yet another restriction was imposed on motorcar drivers in the conurbation of Paris on Monday, March 23rd: To reduce the fine dust pollution, only vehicles with uneven registration numbers, electrically powered and hybrid vehicles as well as carpools of more than three persons are permitted to use their vehicles; public transport is free.

At the same time, the Paris Municipal Transport Services, RATP, and the gas supply company GDF SUEZ made it known that they had agreed to a three-year partnership. Together they will advance the gas-fueling for bus depots so that the RATP vehicles run on natural gas and ▶

Biogas production from sheep manure – a Franco-German success story

The product of successful cooperation is being broken in in Rullac-Saint-Cirq: the sheep manure plant of the French Arkolia Energies and the German novis GmbH from Tübingen. At present, the plant still feeds on 100 per cent sheep manure. Farm waste (for example, rapeseed dust) is a potential addition in future. The principal units, in which 6,000 tons of substrate are digested every year, are the hydrolysis container, a digester (1,000 m³), a post-digester and a 250-kW_{el} cogeneration unit.

Sheep manure has a high content of straw, which is a particular challenge: At the first stage, hydrolysis, the substrate soaks for 24 hours, is converted into a pasty mass and preheated to between 39 and 40 °C. The hydraulic dwell time of the substrate in the plant is about 95 days. All the biogas is converted to electricity. A separator separates the substrate from the post-digester. The liquid phase is concentrated in a vacuum evaporator and returned and mixed with the solid manure by a specially developed mixing screw. This produces valuable fertiliser which contains nutrients of short-term and long-term availability and is particularly suitable for organic farming. Regrettably, plant owners in France cannot make commercial use of the digested fertiliser except in their own fields.

The advantages of the partnership are obvious: Whereas Arkolia takes care of the local customers, the approval procedure and the financial aspects of the project, novis invests the experience of the German biogas sector into the success of the project. Construction management and start-up are shared activities. The distance to Tübingen is no problem as all units of the plant have remote control facilities. At the end of the start-up phase, Arkolia will be responsible for the maintenance and the biological management of the plant.

PHOTO: NOVIS GMBH

Biogas plant Rullac-Saint-Cirq/F (Département Aveyron).

biomethane. The target is to use only environmentally compatible vehicles within a period of ten years: 80 per cent electrical and 20 per cent on biogas.

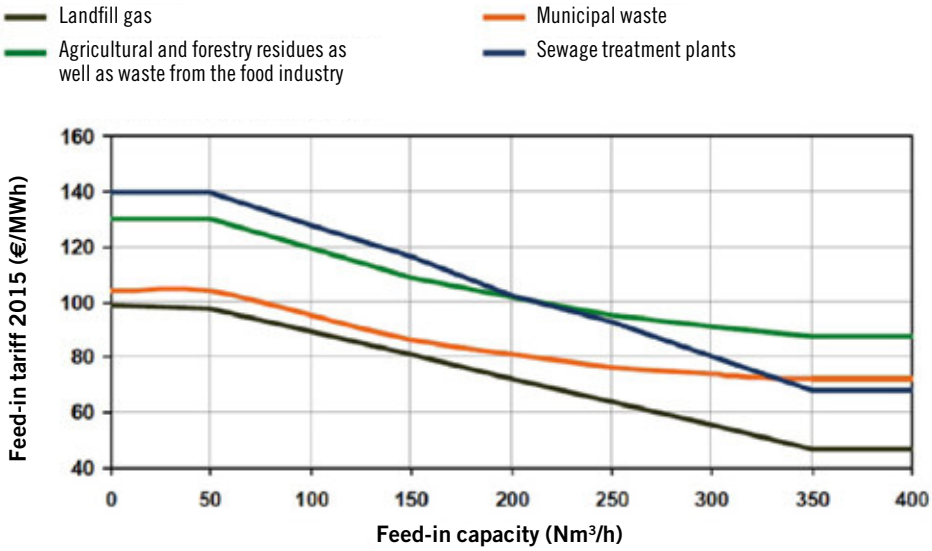
This decision enables the GDF Suez, via its subsidiary GNVert, to participate in the development of natural gas-powered vehicles, a market considered to be promising because CO_2 is saved and particulate emissions are reduced. At the same time, this development makes better use of waste materials to produce biomethane-CNG. As many as 90 natural gas-powered buses are already stationed at the Créteil base; the capacity will be expanded to 220 vehicles by mid-2015.

Conditions and prices

Every biomethane producer can enter into a 15-year contract with any gas supplier. The gas supplier pays the statutory feeding tariff for biomethane and receives the difference to the price of natural gas from a compensation fund. The MEDDE defines the relevant reference price of biomethane. The amounts paid from the compensation fund are charged to all gas users. Biomethane is supplied with certificates of origin in France.

Plants with a small treatment capacity receive higher support. For example, plants on farms and forestry plants with up to 50 standard cubic metres per hour (Nm³/h) can claim compensation of 130 euros for each megawatt-hour (MWh), which drops to about 87 euros per MWh for plants with 350 Nm³/h capacity (see Figure 2). The fairly high feeding rates are the result of the fact that 100 per cent of the cost of the feeding plant must be borne by the plant owner. In France, different types of waste can be processed. Special tariffs are in place for biogas plants which use the biogas for biomethane production and also for electricity generation.

Figure 2: Biomethane feed-in tariffs in 2015



Source: paper by Stanislas Reizine, MEDDE

Hurdles and challenges

The approval process for biogas production is made simpler by bundling the relevant procedures. The national approval of digestion residue as fertiliser is a desirable target, as is the speedy approval by the ministry of the expansion targets to be implemented in the regions. The implementation of the large number of biomethane projects is supported by measures taken by the gas grid provider GRdF: Public relations activities to raise the awareness among the population, selection of feeding points near available grids with sufficient capacity to accept the volume of biomethane fed, and provision of advisory services to project developers.

The ministry analyses the initial cost reports for the plants, and it can be expected that the feeding tariffs will also be reviewed. Most projects will probably be realised in the farming sector. Many small feeding plants may not be able to operate on a profit. So there are initiatives to bring several biogas producers together in one feeding plant. Such a project is currently in the pipeline in Brittany by the farming cooperative Triskalia in cooperation with semaeb, a regional project developer, and direct energie, a local enery supply company. The question of how the available subsidies should be adapted to the new structure must still be worked out, Mr Chapelat of semaeb explains.

The production of biomethane as fuel also requires changes to the current general framework such as the development in the vehicles segment or the net of natural gas filling stations. This has been set out in a white book published by ATEE Club Biogaz, the largest biogas association in France.

Promising prospects for sustainability

The French energy and environment policy relies on energy from renewable sources, closed-loop economy and clean transport. Biomethane offers ideal preconditions for the implementation of this policy by the municipal wastewater treatment and waste-processing firms and by transport companies. Looking at the invitation to tender for 1,500 biogas plants within the next three years, the potentials available in farming can also bring their weight to bear. It remains to be seen what general conditions for the biomethane sector the ministry will announce after the summer break.

Promising concepts have been developed in the meantime. The next biogas exhibition in Paris, ExpoBiogaz, will certainly highlight more interesting developments. And the events organised by the German-French Office for Renewables will certainly also take a look across the border and focus on direct comparisons with the conditions in Germany. ◄

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