

Biogas is produced by the anaerobic decomposition of organic matter (wood or agricultural waste, etc.) It can be captured in engineered landfill sites or be obtained by recovering the methane contained in sewage sludge or in fermentable agricultural, industrial or household waste. The municipality of Thessalonica decided to exploit the potential of biogas as an energy source at one of its landfill sites to demonstrate the capacity of local authorities to develop environmentally-friendly solutions and raise public awareness of its waste sorting programme.

THE CITY

Thessalonica is a city at the meeting point of influences between Western Europe and the north of the Balkans. It was also one of the first stronghold of Christianity. Its links with the major trading centres of the Eastern Mediterranean contributed to its economic growth and ensured the city a relatively high degree of autonomy as soon as the Roman and Byzantine periods. By the mid-19th century, vast industrial complexes were built and the port areas were deeply transformed while new built up areas bore the mark of a western influence. The launch of the International Exhibition and the opening of Aristotle University in 1926 brought fame to the city, which was awarded the title of “cultural capital of Europe” in 1997.



CONTEXT

Intended as a planning tool, the Association of Local Authorities of Greater Thessalonica was established in 1970 and is currently composed of 23 members. It is responsible for framing both short and medium term solutions to problems related to household waste management and for promoting the use of renewable energy on the territory it serves.

The strategy of the association is based on an overall approach to waste management characterised by the implementation of an ambitious waste sorting programme. The objective of this programme is to prolong service life of landfill sites while reducing the amount of energy and water used for waste processing, thus contributing to saving on raw materials. The association also supports research and development in this sector and signed in 1997 a partnership with the Association of Belgian Municipalities and Local Authorities (IDELUX) to promote exchanges of know-how and experience in waste recycling.

The strategy implemented by the association aims at:

- > **Improving the quality of life of the inhabitants**, and
- > **Protecting the environment**: sanitary upgrading to the European Union's environmental standards of landfill sites on the territory of the prefecture of Thessalonica, promotion and development aid to various forms of alternative sources of energy (including biogas, wind energy, biomass and solar energy).

This strategy is supported by a number of public relation actions geared to inform the inhabitants and increase public acceptance of these initiatives (preparation of brochures, presentation of the recycling programme and its benefits at primary schools in the prefecture with the support of the Ministry for the Environment and the municipalities concerned).

EXPERIENCE OF THESSALONICA

The decision by the Association of Local Authorities of Greater Thessalonica to invest in the construction of a power station was based on the following reasons:

- > It was the first biogas recovery scheme for energy purposes to be implemented in Greece and experience in this field was needed prior to developing larger scale projects,
- > Opportunity to develop a cost-benefit analysis of biogas utilisation as part of a waste management strategy, no prior analysis being available,
- > Opportunity to improve the environmental image of the landfill site of Tagarades.



At the landfill site, biogas is captured in sixteen collection wells. Once scrubbed of the hydrogen sulphide (H₂S) it contains and passed through a cyclone to lower its moisture content, biogas is compressed and directed towards the combustion chamber of a **power generating equipment (240 kW)**.

Fuel and combustion air inflows are electronically controlled.

The generating set consumes about 164 m³/hr of a mix composed of 60% air and 40% methane and excess biogas is flared. The equipment is connected to a 400 kVA Stamford generator. Voltage is increased by means of a 380/20 kV transformer and the electricity is then carried away on the distribution grid of the national electricity company DEH via a sub-station.

The electricity company having the monopoly of electricity distribution, they are under the obligation to buy all the electricity generated from renewable sources. Biogas is purchased at a price of 0.052 €/kWh that contributes to making the project cost-efficient.

The new production unit cost 480,000 euros, VAT included. It was commissioned on/in ?

The benefits of such investment are not to be limited only to the income generated by the sale of electricity to the National Company DEH. By contributing to reducing CO₂ emissions into the atmosphere, the electricity generated from biogas has also a positive effect on the environment. From a social point of view, the construction of new landfill sites always tend to arouse strong reactions among the population. However, the exploitation of renewable energy sources has the sympathy of the general public and facilitates public acceptance of such projects.

EVALUATION AND OUTLOOK

The activities developed by the Association of Local Authorities of Greater Thessalonica (OTA) are evidence of the role and importance of local authorities in finding solutions to environmental problems affecting modern societies. The increase in the amount of waste to be treated being by definition a social problem, it must be handled as such and the solutions to alleviate it should be everyone's affair!



The exploitation of biogas as a source of renewable energy not only provides a steady flow of income to the association but also demonstrates its willingness to reduce the impact of our modern way of live on the environment. This policy is supported by an information campaign directed towards the different age groups and contributes to improving public acceptance of the solutions provided. Support from the Greek Government as well as the purchase price applied to electricity generated from renewable energy

sources are a guarantee of long-term viability and profitability for such projects.

Planning waste management in close relation with renewable energy potentials

In view of the success of this first demonstration project, the Association of Local Authorities OTA has plans to commission by 2005 two additional units capable of processing 30% of the 582,000 tonnes of domestic waste generated annually on the territory of the Prefecture of Thessalonica:

- > One unit to produce *refuse derived fuel* to be used by the cement industry, the cost of which is estimated at nearly 12 million euros,
- > a biomethanisation unit with a digestion capacity of 107,760 tonnes of organic waste per year for an investment cost of 3.4 million euros.

FURTHER INFORMATION

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