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## Energy & climate: LIFEnews features 2010

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### Upgrading landfill biogas potential with LIFE Environment



*MICROPHILOX won the Energy  
Globe Award in the  
national category in 2007  
(photo: LIFE05 ENV/E/000319)*

Biogas offers beneficial opportunities as a source of renewable energy and an innovative LIFE Environment project has demonstrated how biofilters and micro-turbines can be used to produce cost effective gas supplies from landfill site emissions.

Renewable energy sources exist in many different forms and the EU is actively pursuing a wide range of options to tap the full potential of environmentally-

friendly energy supplies. Europe's landfill sites produce renewable quantities of methane (CH<sub>4</sub>) gas during the decomposition of organic waste products. This biogas contributes to climate change impacts but the methane can be harnessed as a valuable fuel for producing power and heat.

Conventional combined heat and power (CHP) plants tend to require relatively high concentrations of methane (at least 40%) to make them economically viable, but few landfill sites are able to produce sufficient quantities of methane-rich biogas to make CHP investments cost effective. In addition, landfill gases often contain corrosive substances which damage CHP equipment and so high maintenance costs were perceived as another obstacle to wider use of this naturally occurring latent energy source. Carbon filters can be used to clean biogas of harmful compounds but these pre-treatment approaches are also costly and consequently, much of the EU's landfill biogas potential has previously been wasted through burning in flaring treatments.

### Spanish solutions

Spanish environmental engineers set out to resolve this renewable energy challenge through the **MICROPHILOX** LIFE project, which ran for

For yet more examples projects funded by the programme, visit the LIFE project database.



*The project's micro-turbine  
(photo: LIFE05 ENV/E/000319)*

3.5 years from October 2005.

MICROPHILOX's private sector

**beneficiary** was allocated just over €580 000 of EU co-finance to identify commercially feasible CHP systems fuelled by landfill gas. Core project elements involved improving biogas quality by removing siloxanes, and other harmful substances, in order to allow the application of new micro-turbine technology for generating power from the cleaned methane.

An initial priority for the LIFE project team concerned developing suitable

systems for upgrading the landfill biogas, which first required an accurate method for detecting siloxane quantities within the gas. A programme of LIFE trials helped the project staff design reliable techniques for capturing and analysing sulphuric acid and siloxanes content in biogas from both pilot sites. This early work's findings were built on and subsequent project stages led to the development of a new type of biofilter for extracting corrosive elements from landfill biogas.

MICROPHILOX's innovative biofilter uses microorganisms to degrade biogas contaminants and is able to process around 15 cubic meters of gas each hour, accounting for around half of the biogas produced on the test sites. Cleaning efficiencies of up to 95% in the H<sub>2</sub>S removal process were achieved and such encouraging results allowed the LIFE team to predict that MICROPHILOX technology will now offer a cost-effective method for landfill gas treatment. The new biofilters can either completely replace activated carbon filters, or be used as a pre-treatment which will help prolong the commercial lifespan of carbon filter processes.

Conclusions from the microturbine tests were also positive and demonstrated the capacity of micro-turbines to work with a biogas methane concentration level of only 31%, an important improvement on the standard CHP systems requirements for 40% methane content. Average generated power was 52 kWe and the maintenance costs were assessed as 0.029 €/kWh.

Combined analysis of the results from MICROPHILOX's biofilter trials and micro turbine pilots have been extremely encouraging, with the LIFE micro-turbines clearly demonstrating their capacity for biogas recovery, and the innovative biological biogas upgrading system providing an effective methodology for tackling siloxane content. The MICROPHILOX team believe their technology is now appropriate for small landfills, or those at initial or final life stage, and this claim is reinforced by the project's recognition in two high profile environmental prizes – the 2007 Energy Globe Award for Spain and a Garrigues Medio Ambiente-Expansión Award for Innovation, Development and Application of Best Technologies.

See the MICROPHILOX **Layman's report** and **website** for more information about this market-led solution for realising renewable energy potential from Europe's landfill biogas.

**Energy recovery from landfill's biogas by the use of microturbines and biological removal of hydrogen sulphide and siloxanes**

