Morphic Technologies
Gammelbackavägen 6
SE-691 51 Karlskoga, Sweden
www.morphic.se

Methane from Sewage Works Turned into Electricity and Heat

In December 2007 Helbio S.A., a Morphic Technologies subsidiary, received an order for an energy system for converting biogas from sewage into electricity and heat. Following a four-month trial period, all tests show that the system has lived up to its promise and Morphic has therefore decided to launch this combination of energy systems in a range of output categories on a wider front in Europe.

In the system, heat or electricity is extracted from biogas, which in turn is extracted directly from sewage. The first part of the system is a purification filter for the biogas that filters out sulfur, malodorous substances and other impurities. The biogas is then converted into hydrogen using Helbio's unique reformer before being fed to a fuel cell manufactured by Morphic's Italian subsidiary, Exergy Fuel Cells, in Bologna.

The buyer is Patras Municipal Corporation for Water Supply and Waste Water Management and the system produces 20 kW of electrical energy and 25 kW of heat energy. It was delivered in June 2008 and has since been installed, calibrated and tested.

The unique feature of the concept, which has now been verified in this pilot system, is that the generated hydrogen is sufficiently pure to run a fuel cell without contaminating the membranes and catalyst. The carbon monoxide content of the hydrogen must be less than 50 ppm (parts per million). Helbio's biogas reformer has been shown to achieve a purity of 1.5 ppm CO, which is exceptionally good.

"*We are pleased with the system's performance. As far as we know, this is the first time a biogas system with a reformer and fuel cell has been demonstrated in practice. The next step will be to offer products with higher outputs – 125 kW and 250 kW fuel cells – in partnership with Exergy Fuel Cells*," Professor Xenophon Verykios, CEO of Helbio, says.

Since 2005 the Morphic Group has been engaged in intensive development of environmentally friendly energy systems that enable local production of electricity, heat and hydrogen. By using wind power, solar energy and biogas in energy systems based on a combination of reformers and fuel cells, the Group has created a new type of energy system. The systems represent a completely new way of converting, storing and using renewable energy.

All Key Components Now Available for Sale
All crucial components have now been developed and are available for sale through Morphic's subsidiaries.

"*I am very pleased that we are already seeing the fruits of the partnerships among our specialized subsidiaries. Sewage treatment is just one area where the reformer-*

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fuel cell system combination can be put to direct use. Incineration plants, refuse stations, industries and agriculture are other prioritized areas. These impressive test results open up the possibility of offering these types of energy systems to the global market," Martin Valfridsson, CEO of Morphic Technologies, says.

About Helbio
Since it was established in 2001 Helbio has attained a leading position in the development of technology for cost-effective production of hydrogen. Helbio's key strength is its leading expertise in catalyst technology, combined with innovative, patented technical solutions for "reformers", which can be used in building systems designed to convert liquid and gaseous fuels such as alcohols and hydrocarbons into hydrogen.

The strength of this technology lie in its high level of efficiency, low production costs and, perhaps most importantly, the opportunities it provides to produce hydrogen locally. Two of the factors that have long been obstacles to a wider distribution of hydrogen technology are thereby eliminated – high production costs and difficulties linked to distribution.

For more information, please contact:
Johannes Falk, Vice President, Executive vice President, Investor Relations,
Morphic Technologies AB (publ)
Phone: +46 (0)70-676 73 93
E-mail: johannes.falk@morphic.se