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BIOGAS TO FUEL – MERITS AND LIMITS

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ABSTRACT: Biogas has been used as vehicle fuel in larger scale since 1996 when the first biogas bus project started in Trollhättan in the west of Sweden. The development of biogas as vehicle fuel started in countries with low electricity prices and a growing market for natural gas vehicles. A typical prerequisite for development of biogas as vehicle fuel is an abundant supply of biogas from e.g. sewage treatment plants where often gas was flared in the 80's and 90's.
Many countries and cities were in the 90's focussed on reducing the pollution in civic centres and a predominant source of pollution was the urban transport system (e.g. city and regional buses). An easy measure to reduce both local and global emissions was to change from diesel buses to natural gas buses and this happened in many countries in Europe and in Asia. India is one of the leading countries in the market development and the implementation of natural gas buses and taxis in India has led to dramatic improvements of air quality in large cities such as Mumbai and New Dehli. Both India and China have shown an increasing interest in using biogas as vehicle fuel.
Biogas has many merits as vehicle fuel (apart from low emissions from biogas vehicles);

- Locally produced from local sources e.g. organic waste and moist waste material that cannot be used for heat recovery via combustion
- Produced in a natural and efficient process. Biogas production has the highest output per acre of land of all biofuels when produced from energy crops like maize
- Biogas production reduces greenhouse gas emissions in many ways:
    - Methane emissions from uncontrolled waste fermentation in landfills can be avoided when treating waste in an anaerobic process
    - Burning of fossil fuels can be replaced by biogas thus reducing the GHG emissions
    - Fossil CO_2 can be replaced e.g. in the food industry, by renewable CO_2 from biogas production. This require special CO_2-removal systems that currently are under development.
    - Fossil fuel based fertilizers can be replaced by bio-fertilizer, that is produced as a by-product in the anaerobic treatment process.

As in all new technologies there are also limiting factors in the utilisation of biogas as vehicle fuel. Some of the limiting factors are

- Limited market due to a hesitant vehicle industry. Car manufacturers are more used to liquid fuels and thus reluctant to invest heavily in development of gas vehicles.
- Limited distribution possibilities. Vehicle fuel is normally distributed via the large oil companies and those have to be convinced that there is a market also for gaseous fuels. Also the gas distribution companies have hesitated in being involved in the biogas business.
- Limited production. Biogas is produced mainly from organic waste material and the availability of such material is limited. A promising possibility is to utilise energy crops (as e.g. in Germany and Austria) and also to produce methane from gasified forest residues and wood waste.

The new targets concerning reduction of CO2-emissions by 20% in 2020 requires not only an increased used of bio-energy but also more efficient utilisation of bio-energy, especially in the transport sector. The biogas process can be one important tool in order to reduce GHG-emissions from the society in general and from the transport sector in particular.