

## Frauscher fights climate killer methane

- Technological milestone for methane disposal
- alphagamma® engine ignites even weak gases
- Bio-methane from slurry is converted into electricity and domestic heat energy



Cattle farming produces a lot of climate-damaging methane. The new alphagamma® engine from Frauscher can utilize agricultural biogas and thus dispose methane in a climate-friendly manner. (Use free of charge, image: Rudmer Zwerver)

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St.Marienkirchen bei Schärding. The "Global Methane Pledge" is one of the most important results of the recently concluded UN climate conference in Glasgow. With their signature, 100 participating states declare their willingness to strive for a reduction in global methane emissions by at least 30% by 2030.

The greenhouse gas methane is a climate killer: According to the 6th assessment report of the Intergovernmental Panel on Climate Change (IPCC), the climate-damaging potential of methane is 81.2 times higher than that of CO<sub>2</sub> over a period of 20 years.<sup>1</sup>

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<sup>1</sup> [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Full\\_Report.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf), S. 1842

Reducing methane emissions is currently considered the fastest and most effective lever to slow down the rate of global warming.<sup>2</sup> According to the United Nations Environment Program (UNEP), substantial measures against methane emissions could reduce the expected mean global temperature increase by almost 0.3°C until 2045.<sup>3</sup>

With the alphagamma® technology, Frauscher Thermal Motors GmbH in St. Marienkirchen bei Schärding has developed a new engine technology including a gas burner to use methane-containing waste gases to generate electricity and thermal energy and at the same time make them harmless to the atmosphere. "Our main objective during the development was to put the technical requirements for the disposal of methane-containing gases in terms of climate protection into reality", explains Managing Director Ing. Josef Frauscher.

In the case of methane emissions, a distinction is made between natural and anthropogenic – i.e. man-made – methane sources. Anthropogenic sources of methane can be found primarily in animal husbandry (slurry), in sewage treatment and in older landfills.

This is where Frauscher comes in: Suitable fuels for the alphagamma® engine are sewage gas, agricultural biogas and landfill gas, with a methane content of 20 to 70%. While Otto gas engines can hardly be operated with a methane content of under 50%, the Frauscher engine ignites at a methane content of down to 14%. So far, such gases could only be disposed harmlessly by flaring them off.

Frauscher identifies a big future market in the area of manure fermentation in animal husbandry. So far, corn and rapeseed have been used primarily in biogas plants - but the cultivation of energy crops has been heavily criticized due to the high demand of farmland. Instead, Frauscher Thermal Motors relies on the fermentation of liquid manure, which is converted into electricity and domestic heat in the alphagamma® engine.

Josef Frauscher hopes that investing in such climate-friendly systems will be promoted accordingly in the near future: "The key to reducing methane emissions lies in climate-friendly animal husbandry. However, the farmers must be financially supported during the conversion."

### **Low-maintenance endurance runner**

A Stirling engine forms the basis for the patented alphagamma® technology. The basic principle of this heat engine was invented in 1816 by the Scottish pastor Robert Stirling. However, unfavorable approaches in the thermodynamic concept, resulting in high piston forces and high production costs, prevented a sustainable market success.

Frauscher has completely rethought the Stirling engine: With its alphagamma® technology, the company uses innovative differential pistons which lead to a substantial reduction of the piston forces. As a result, the frictional forces are reduced in favor of a high level of efficiency and low wear and tear.

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<sup>2</sup> <https://www.wired.com/story/the-ipcc-reports-silver-lining-we-can-tackle-methane-now/>

<sup>3</sup> <https://www.unep.org/news-and-stories/press-release/global-assessment-urgent-steps-must-be-taken-reduce-methane>



Successful engine manufacturer and entrepreneur: Josef Frauscher heralds a new era of Stirling engines with his alphasigma® technology

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The new configuration has many advantages: the Frauscher Stirling has a simple design with manageable production costs, a long service life and low-maintenance operation. "Our engine

consists of only five moving parts – there are at least 16 in a comparable four-stroke engine”, says Josef Frauscher.

The alphagamma® engines do not require any lubricating oil. Exhaust gas after-treatment is not necessary, as the pollutant emissions are well below the legal maximum values. In addition, the noise emissions are significantly lower than those of petrol or diesel engines.

"We can now rely on more than 40.000 hours of operating experience on our test benches", says Frauscher. "With this experience, we are aiming for a maintenance interval of 8.000 hours - an unequaled value in the field of small combustion engines. The efficiency is also impressive: The test engine, which is operated with sewage gas, achieves an overall electrical efficiency of 31%.

### **180.000 hours of development**

Josef Frauscher has been doing research on Stirling engines for 20 years now. The breakthrough was achieved in 2017 with the invention of the alphagamma® technology. The engine manufacturer and successful entrepreneur, who sold the railway safety division company Frauscher Sensortechnik GmbH in the course of a management buy-out in 2016, operates its own R&D center in St. Marienkirchen. 14 employees are currently working on the development of the new engines.

In total, more than 180.000 hours went into research and development of the engines. The perseverance has paid off - the enormous progress is confirmed in scientific reports by professors from Auckland University of Technology and Reutlingen University. The development was also awarded with several innovation awards, including the VERENA powered by VERBUND special award as part of the Austrian National Award for Innovation 2020, the German Innovation Award 2021 and the Upper Austrian Award for Innovation 2019.

### **Enquiry**

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