HORUS ENERGIA

energy, any power, any place, any time

GAS & BIOGAS

CHP, POLYGENERATION

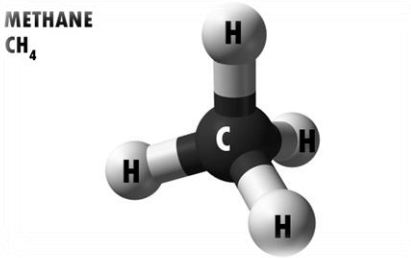
SPECIAL FUELS

MODULAR SOLUTIONS

DIESEL BI-FUEL

HORUS ENERGIA

Effective cogeneration solutions for mines and other special gas sources



GAS & BIOGAS

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SPECIAL FUELS

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CMM & VAM in Polish mines

- CMM (Coal Mine Methane)
  VAM (Ventilation Air Methane)
  they are a very large source of methane in Poland.
  Total mine methane emissions of more than
  2 billion m^3 per year.

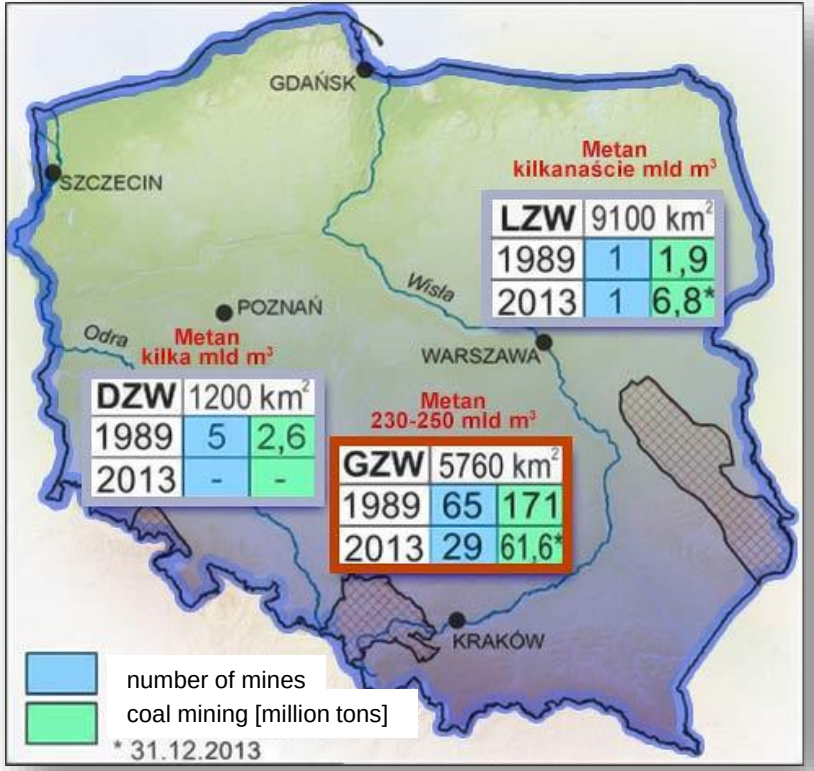
- This corresponds to approximately **8 000 GWh** of fuel energy.

- The mine methane utilisation is only about **12%** (i.e. approx. 250 mln m^3)

Source: report of USEPA 2015

The environmental effect of mine methane

- The unutilized mine methane amount corresponds to approximately 11% of natural gas consumption in Poland (16 billion m3).
- The release of unutilized mine methane into the atmosphere will have an impact on the greenhouse effect equivalent to the emission of almost **37 million tons of CO_2**. It is the same as the **annual** CO_2 emission from the Bełchatów power plant in 2015.
- Burning of unutilized mine methane in flares will reduce the impact on the greenhouse effect to only 4 million tons of CO_2. However, it still involves the loss of energy contained in the fuel.



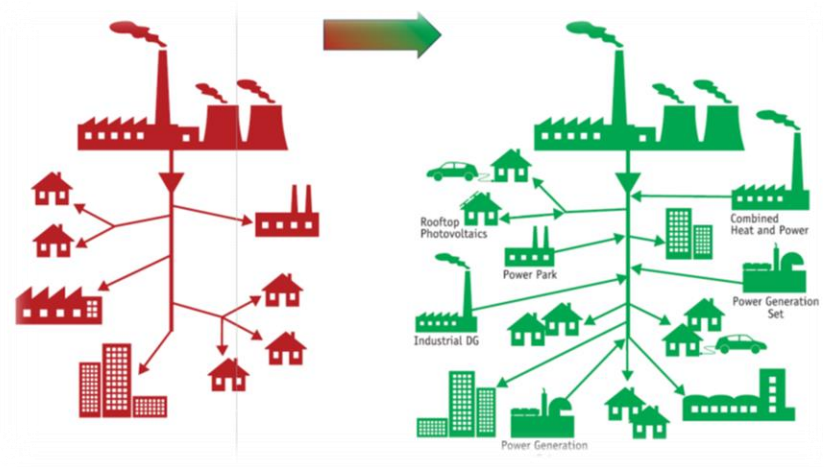
GZW deposits are among the most methane in the World

Source: report of USEPA 2015 and EEA 2017

CHP sollutions for mine metane utilization

- CHP gensets equipped with piston engines, fuelled with currently unutilized methane can produce about **2800 GWh of electricity** and additionally heat or cold at the same time

- The limitation in the common use of this type of solutions is **the minimum methane content** in the fuel required by the engine manufacturers (usually **50% -40%**) and the minimum calorific value of the fuel (most often about **18 MJ/m^3**)



CHP – Combined Heat and Power

CHP sollutions for mine metane utilization

Distributed energy is a solution based on smaller generating units located in the direct vicinity of the energy consumer

- **availability** - independent from the condition of the power grid
- short **time needed to implement the investment** as opposed to traditional large power plants
- **high reliability and high efficiency**
- **high quality of energy** without deliveries disruptions
- **energy sources diversification**
- positive impact on the environment **- lower pollutants emission**

Our sollutions for mine metane as the fuel

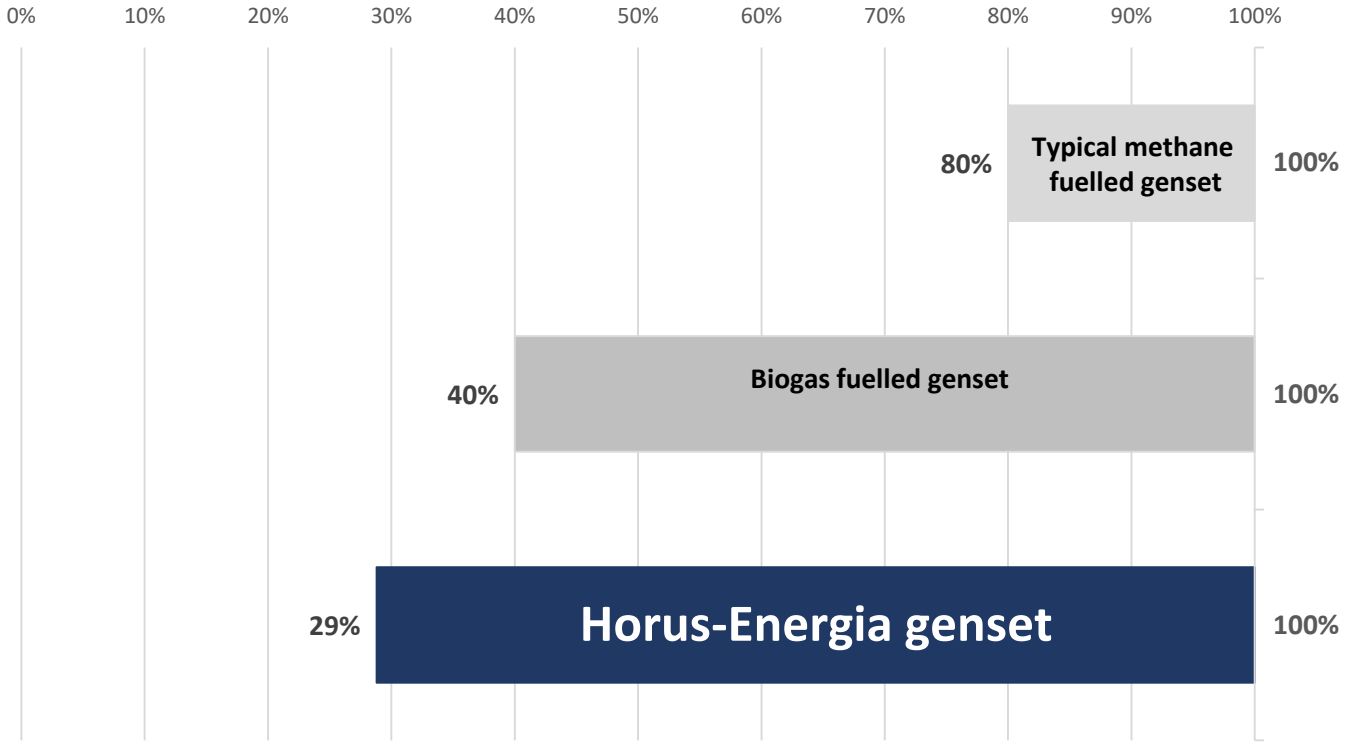
- the dedicated **engine control system** that continuously monitors the combustion process and corrects the settings from **cycle to cycle**
- **simple configuration** that allows to adopt the solution to a given fuel and its parameters variation range
- **an innovative, specially designed gas-air mixing system** that continuously adjusts the fuel dosage to maintain proper air-fuel mixture
- the solution can also be successfully used for gensets that are already in operation, as the retrofit by consumer request

HE-MUZG - principle of operation

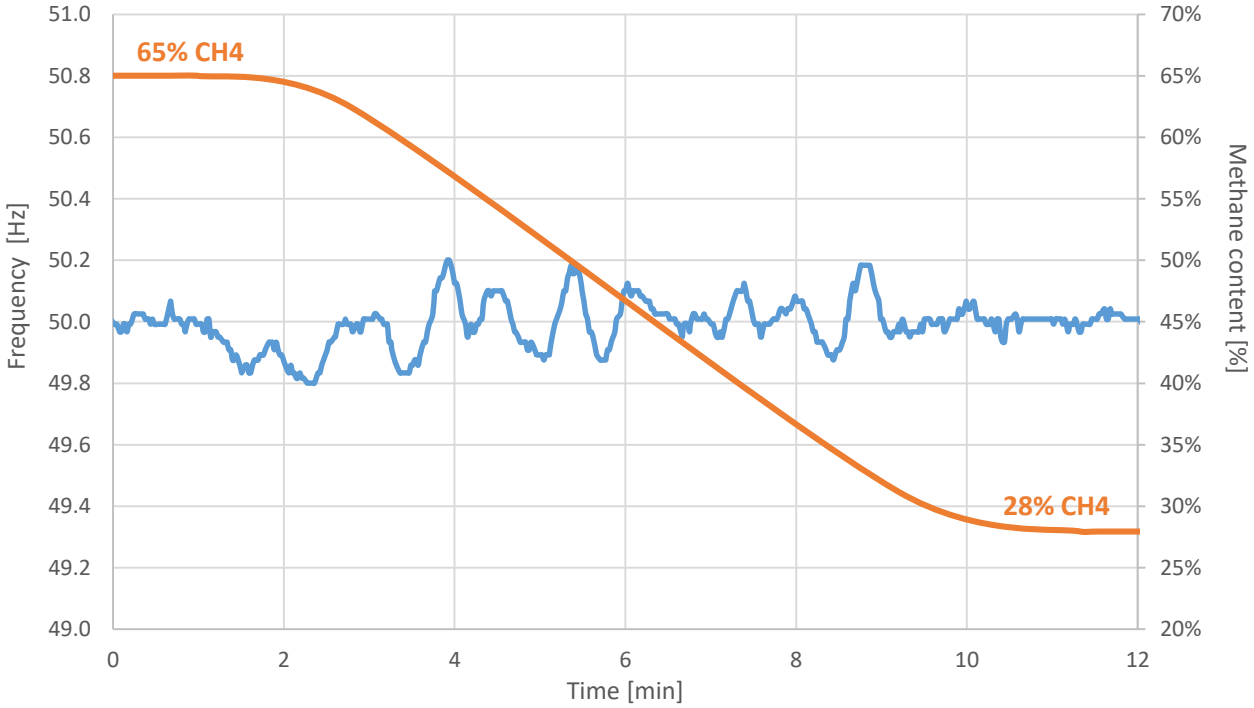
Air-fuel mixture composition
Missfire
Koncking
Power

Air-fuel mixture composition correction
Ignition advance angle
etc.

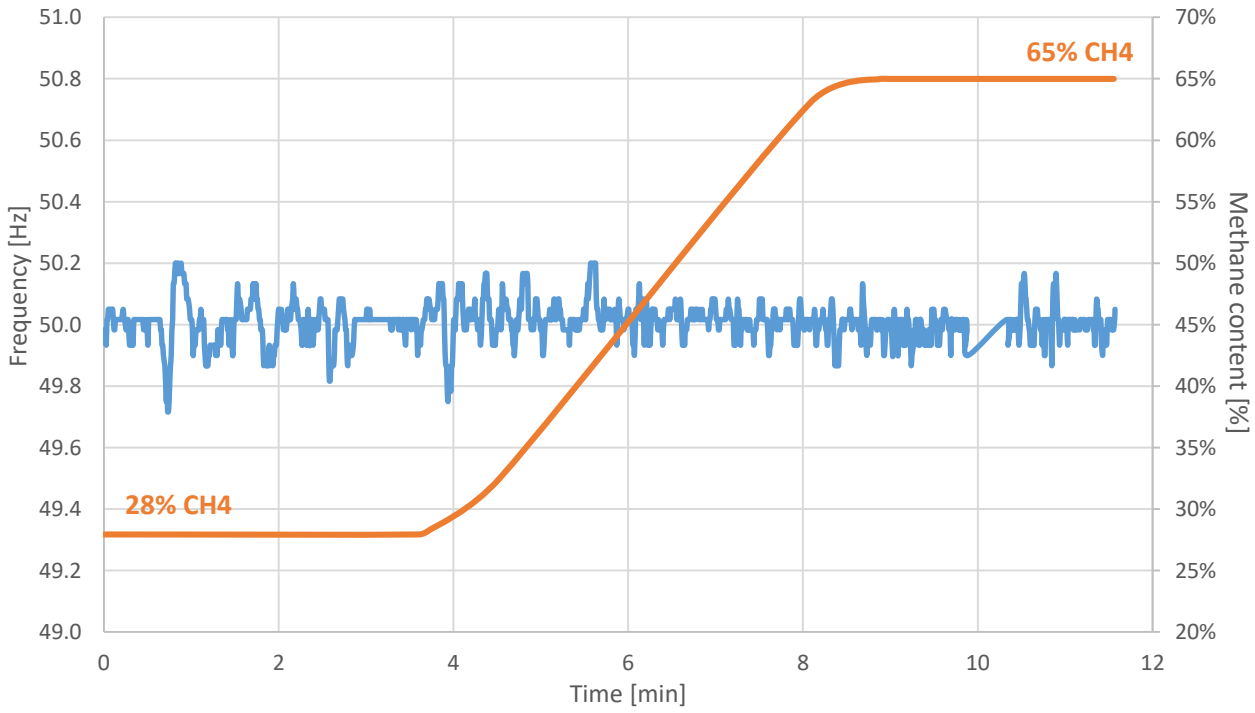
Methane content enabling start-up and operation with nominal power



Rapid decrease of methane content



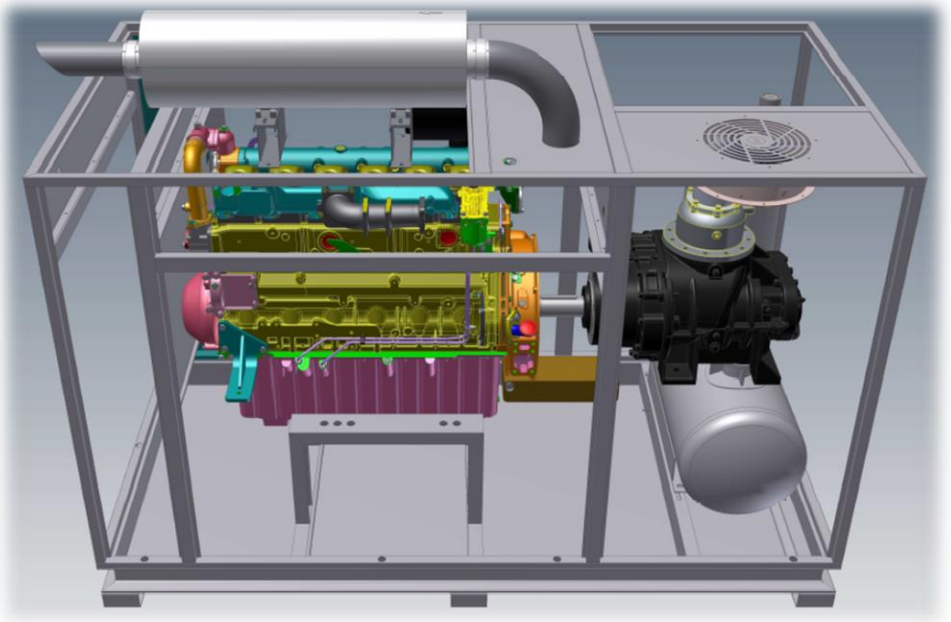
Rapid increase of methane content



Coal methane use as a fuel for air compressor driving

Mine ventilation is a significant operating cost.

Thanks to the use of a **gas engine fuelled with mine gas,** that directly drives **the air compressor,** this cost can be reduced.



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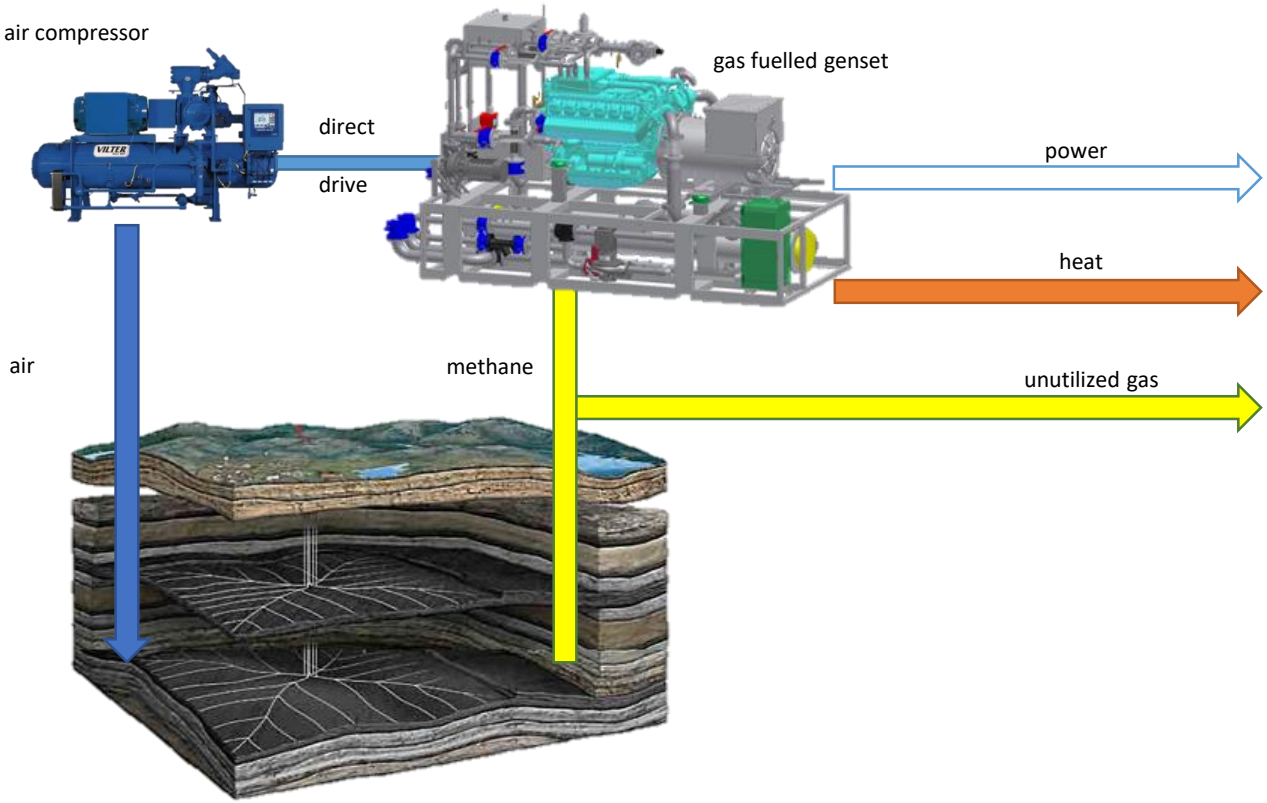
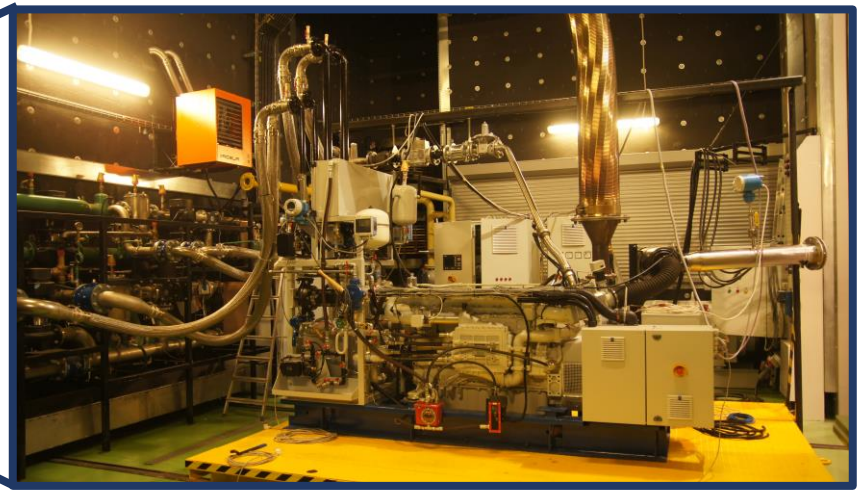


KWK Bielszowice

HORUS-ENERGIA

Horus – Energia company has been operating on the genset market **since 1984** and is now one of the largest, most technically advanced and most reputable genset companies in Poland.

Test bed



Fuel gas mixing station – allows to test gensets fueled with gas fuel of required composition

Wide range of fuels

Our gensets can be powered with typical **liquid and gas fuels**.

Our development projects allows us to introduce **new fuels** into our portfolio.

Currently, we can use the majority of fuels available on the market, including various **special fuels**.

Examples of references – Nigeria (30MW)

Klient:
GENTEC J.V. NIGERIA

Genset type:
17 x HE-CG1750-GZ

Engine:
CUMMINS QSV91G

Fuel:
Natural gas

Total power:
17 x 1750 kW

In service since:
2013

Examples of references – Kazakhstan (18,5MW)

Customer:
MACHINERY SERWIS

Genset type:
16 x HE-CG1160-GZ

Engine:
CUMMINS QSK60G

Fuel:
Gaz ziemny

Total power:
16 x 1160 kW

In service since:
2015

Przykładowe referencje – Anglia (44MW)

Customer:
CUMMINS
UKPR

Genset type:
22 x HE-CG2000-GZ

Engine:
CUMMINS QSK91G

Fuel:
Gaz ziemny

Total power:
22 x 2000 kW

In service in:
2016

Summary

- The **mine methane** is a significant **source of energy**, which is currently utilized only **in small amount**
- The **mine methane** can be used for power generation **distributed energy systems**
- **Horus-Energia generating sets**, equipped with the HE-MUZG engine control system are capable to be fuelled with **mine methane of methane content below 30%**
- The HE-MUZG engine control system allows the use of fuel with **significant and rapid gas composition fluctuations (over 5% CH_4 per minute)**
- **Horus-Energia generating sets fuelled with mine methane** can also be used to ensure ventilation of the mine
- The HE-MUZG system can also be used in **other branches of industry**, where fuel gas with a **low methane number** or **low calorific value** is difficult to be efficiently used
- The Horus-Energia company has many years of experience in the use of special fuels.

Dziękuję za uwagę

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