School of underground mining

Low quality Abandoned Mine Methane is also a resource
Low quality AMM is also a resource

Gas from a Abandoned Mine with:

A flow of 70m3/min with $12\%_{\text{vol}}$ methane

has fuel energy value of 5 MW.

Whereof 4 MW is recoverable as heat.
100+ installations for methane abatement

- VAM / AMM
- Landfill gas
- Slip gas from BIOGAS upgrade
Waste Mine Methane Abatement
- experience since 26 years

1994:
First coal mine site demonstration
Thoresby Coal Mine, British Coal, UK
Demonstrated efficient VAM Abatement

2001 - 2002:
Demonstration with heat recovery
Appin Colliery, BHP, Australia
Demonstrated, Steam generation
Injecting Abandoned mine methane of 40-60% concentration into a flow of fresh air

Up to 6 kg/min CH₄
Diluted to 850m³/min with air down to 0.3 – 1.0 % methane or less then 20% LEL

Oxidized in a VOCSIDIZER, a regenerative oxidizer for methane abatement.

5 MW heat release

Potential for 4 MW energy recovery as heat; Hot water, Steam or Thermal Oil
MEGTEC VAM Power Plant, WestVAMP at BHP Billiton in Australia operated 2007-2017

VAM Capacity 250,000 Nm3/h, (4170Nm3/min) with 1%\textsubscript{vol} methane representing only 1/5 of the full ventilation air flow from the mine

Generated >5MW\textsubscript{el} net

Stopped 2017 due to changes underground (moving longwall).

The system had then generated:
- over 270 GWh of electricity
- almost 2 million ton CO\textsubscript{2e}
The most of the released heat can be captured in an imbedded heat exchanger and utilized in a conventional steam cycle for electrical power production.
The flameless regenerative VOCSIDIZER

Flameless:
No NOx  Homogeneous temp distribution without peaks
Oxidation completely in-bed.
Electrical Start up heating in centre of ceramic bed.
Efficient Energy Recovery from the VOCSIDIZER bed

All concentration above 0.2% CH4 can be recovered as thermal energy.

From e.g. 70m³/min with 12% vol diluted to 840m³/min at 1% vol methane, 4 MW can be recovered as heat.
MEGTEC - VOCSIDIZER
For Low Quality Landfill gas

Replacing a Landfill gas boiler for district heating due to low methane concentration

Landfill gas: 80 Nm³/h with 26%CH₄
Recovered heat: 165 kW as 90°C Water
Reduced Carbon footprint: 5'000 ton CO₂ₑ/year
The VOCSIDIZER technology has several times been recognized for its climate friendly way to convert waist methane to energy.
Overall conclusion:
Low quality AMM is also a resource

LOW CONCENTRATION
Even very low concentration (down to $0.2_{\text{vol}}\%$), methane can be oxidized without any additional fuel. This has been successfully proven in more than 100 installations.

LONG OPERATING TIME
By adjusting the degree of dilution, the amount of fresh air vs. AMM, an AMM installation can be utilized over a very long period of time.

HEAT RECOVERY
Up to 80% of the energy released when oxidizing the low grade methane can be recovered as thermal energy.

Thank You for your attention!