

Low quality Abandoned Mine Methane is also a resource

Low quality AMM is also a resource



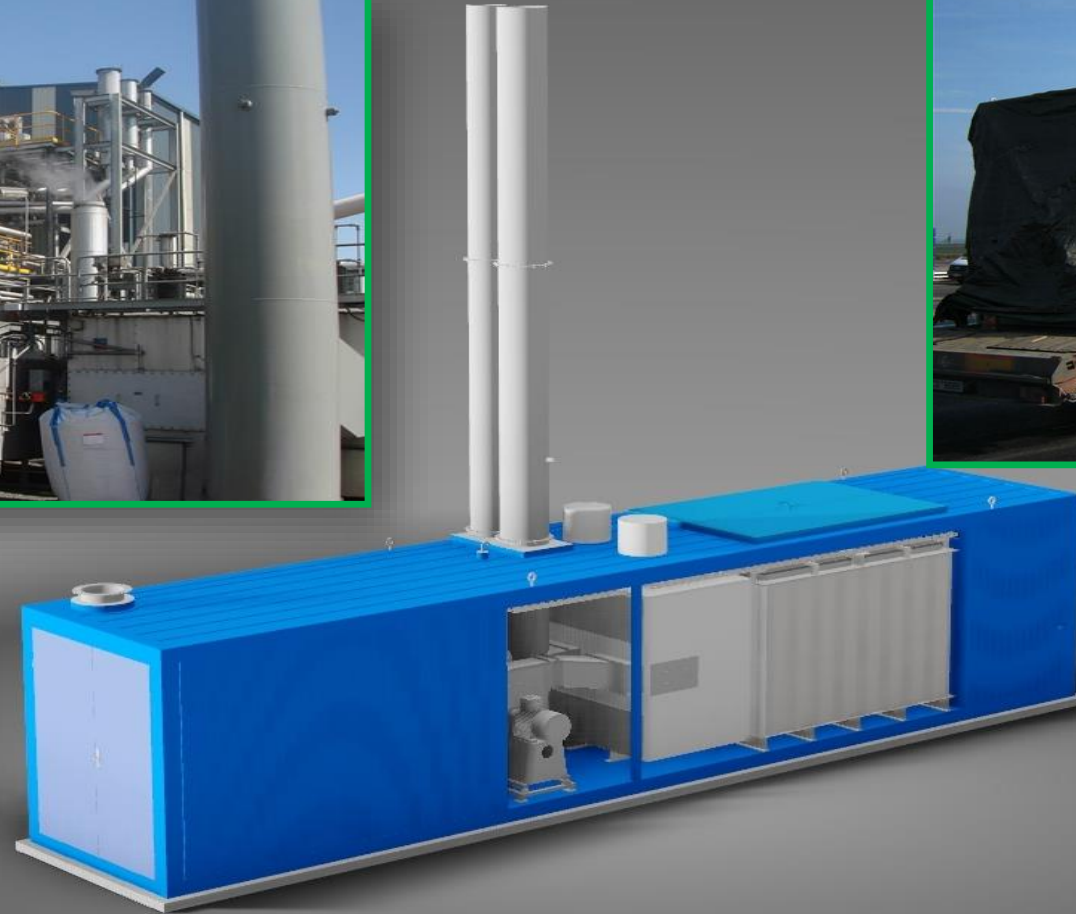
Gas from a Abandoned Mine with:

A flow of 70m³/min with 12%_{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**

AMM Abatement pilot plant



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 than 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%_{vol} methane

representing only 1/5 of the full ventilation air
flow from the mine

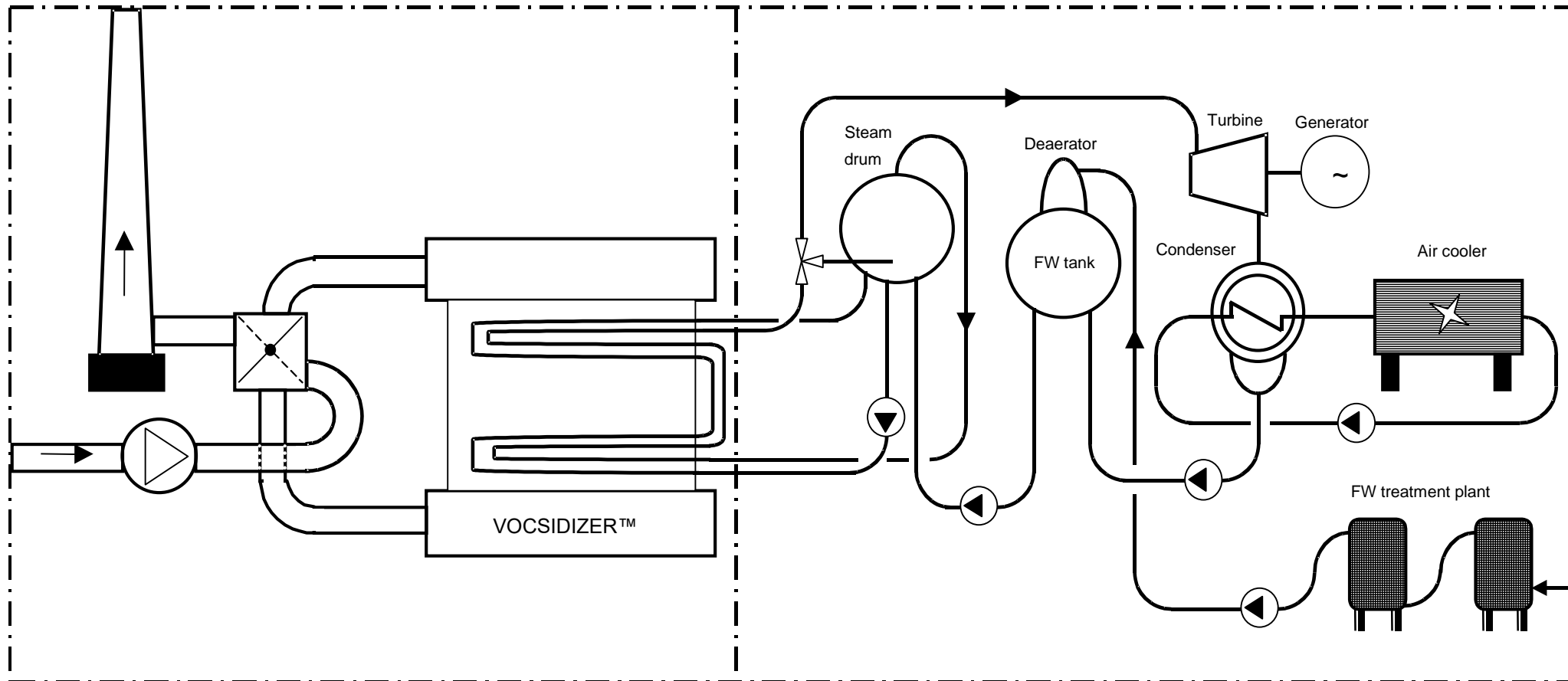
Generated >5MW_{el} net

Stopped 2017 due to changes underground
(moving longwall).

The system had then generated:

- over 270 GWh of electricity
- almost 2 million ton CO_{2e}

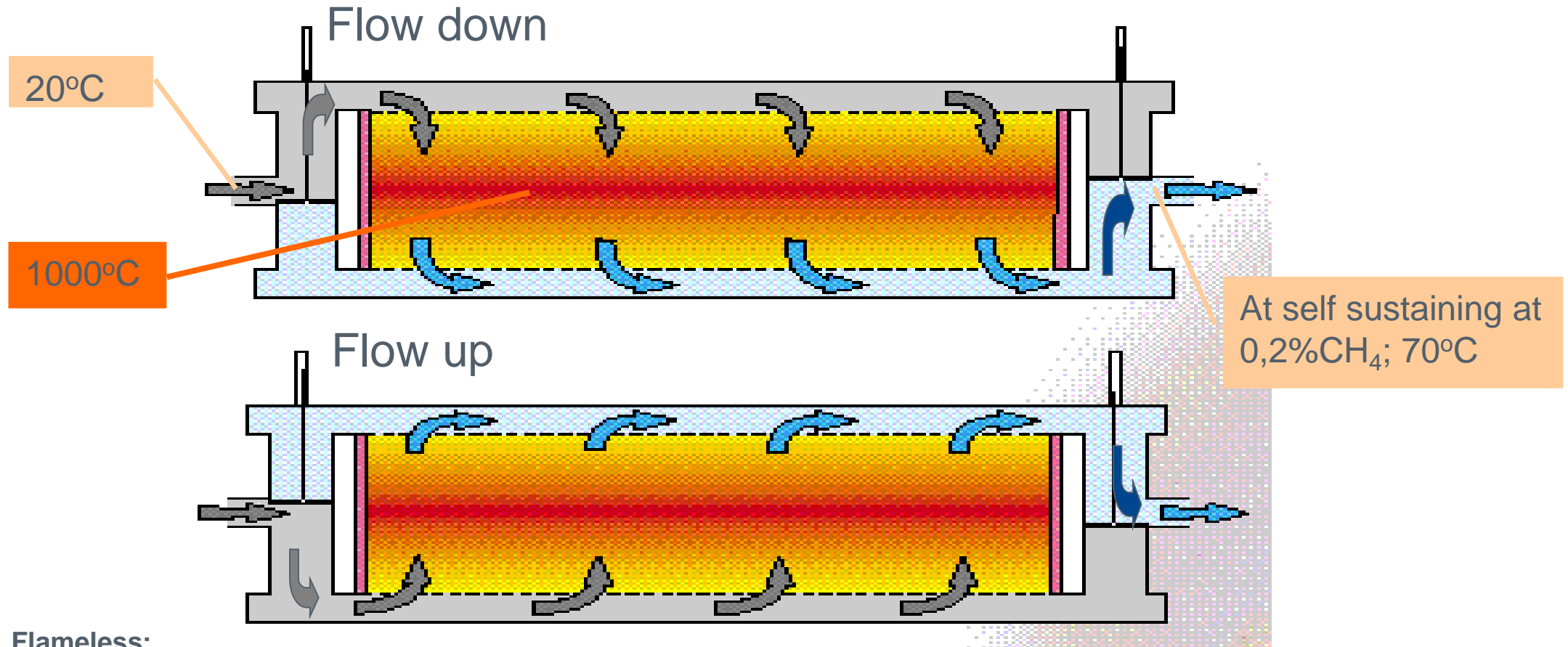
VOCSIDIZER: Steam generation for power



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



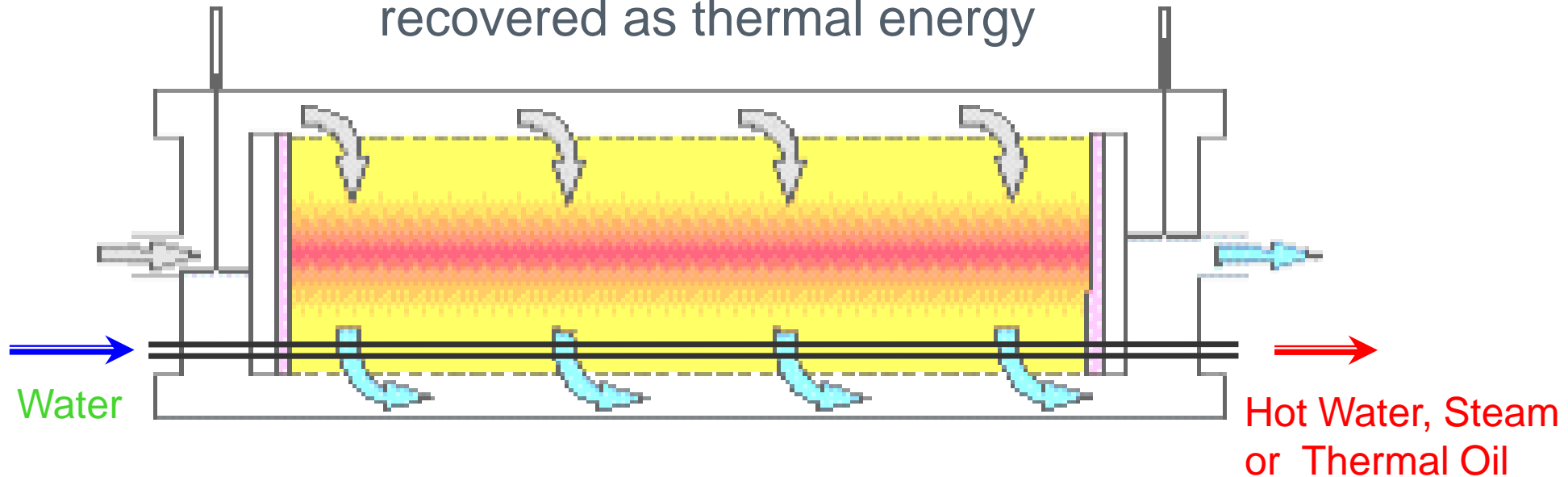
Flameless:

No NO_x 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

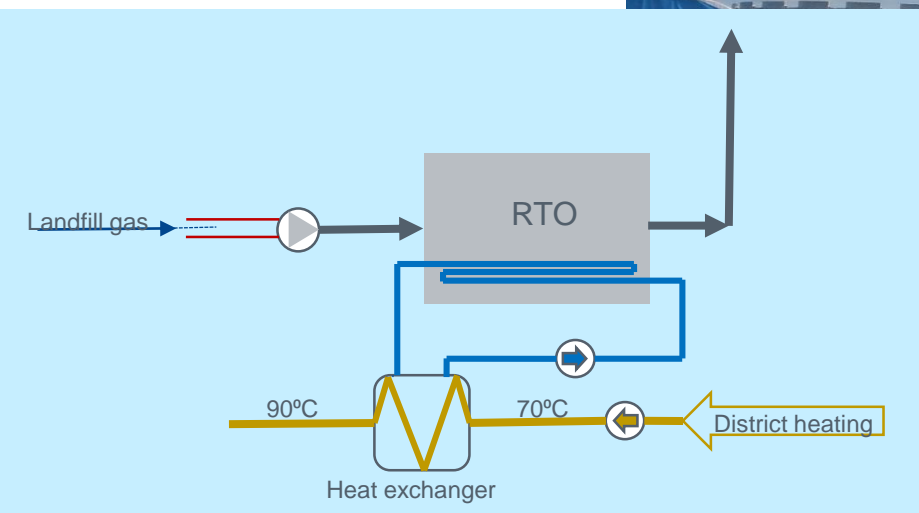
For Low Quality Landfill gas



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



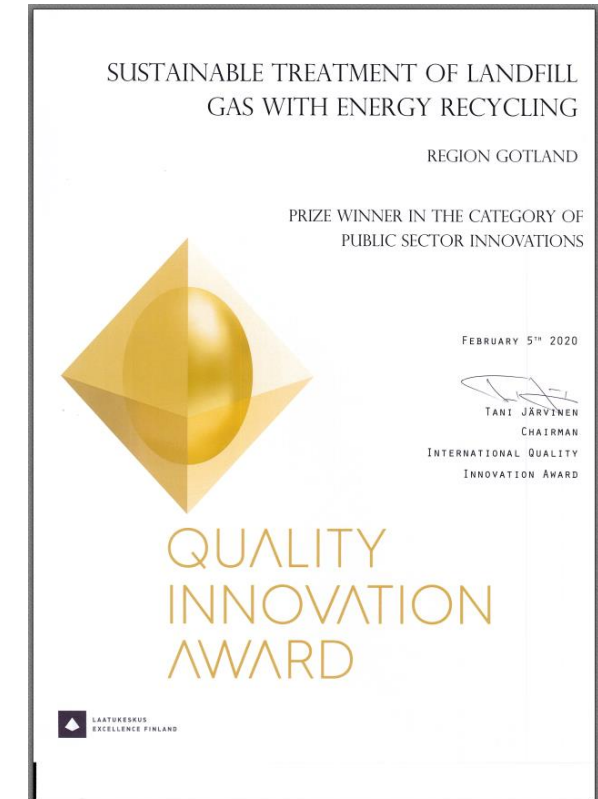
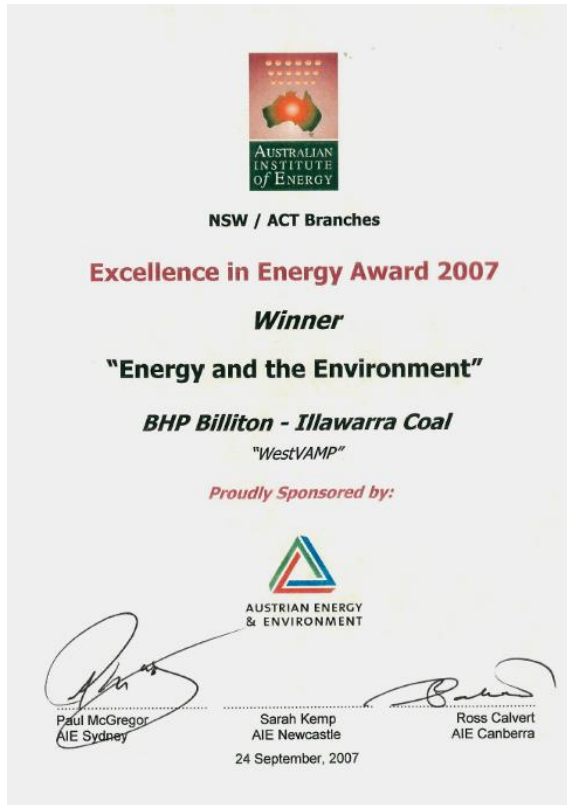
Landfill gas:
80 Nm³/h with 26%CH₄
Recovered heat:
165 kW as 90°C Water
Reduced Carbon footprint:
5'000 ton CO_{2e}/year



Awarded technology



The VOCSIDIZER technology has several times been recognized for its climate friendly way to convert waste methane to energy.



Overall conclusion:

Low quality AMM is also a resource

LOW CONCENTRATION

Even very low concentration (down to 0.2_{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!