



Technical And Economic Potential For Use Of Coal Mine And Abandoned Mine Methane

G.A.S. Energietechnologie GmbH

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Coal Mine Gas Classification & Potential



Utilisation of CMM /AMM



Boilers, secondary fuels, gas-to-pipeline



CHP Technology Solution & Operational Experience



Conclusion



Introduction of speaker

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Title: Managing Director

Qualification: graduate engineer



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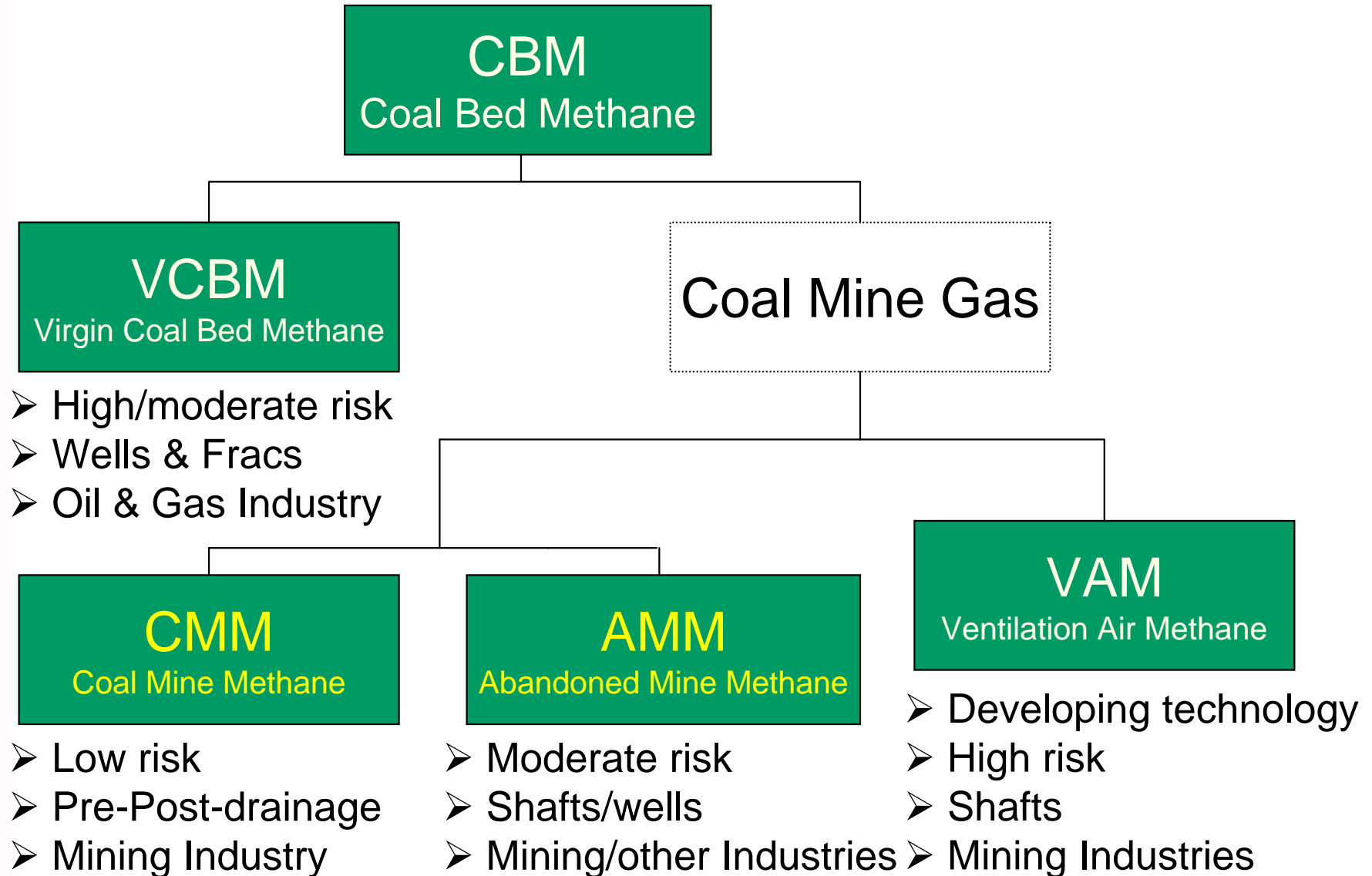
Boilers, secondary fuels, gas-to-pipeline

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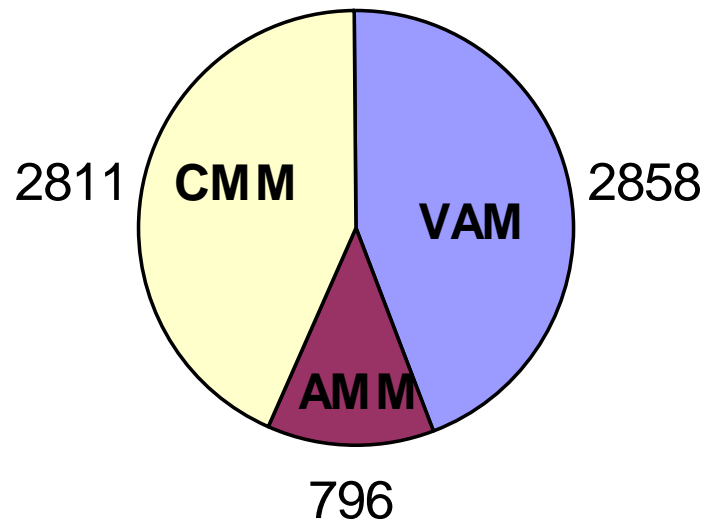
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Coal Mine Gas Classification



Worldwide potential of - Coal Mine Gas

Total 2010 MW_{eI} Power Potential



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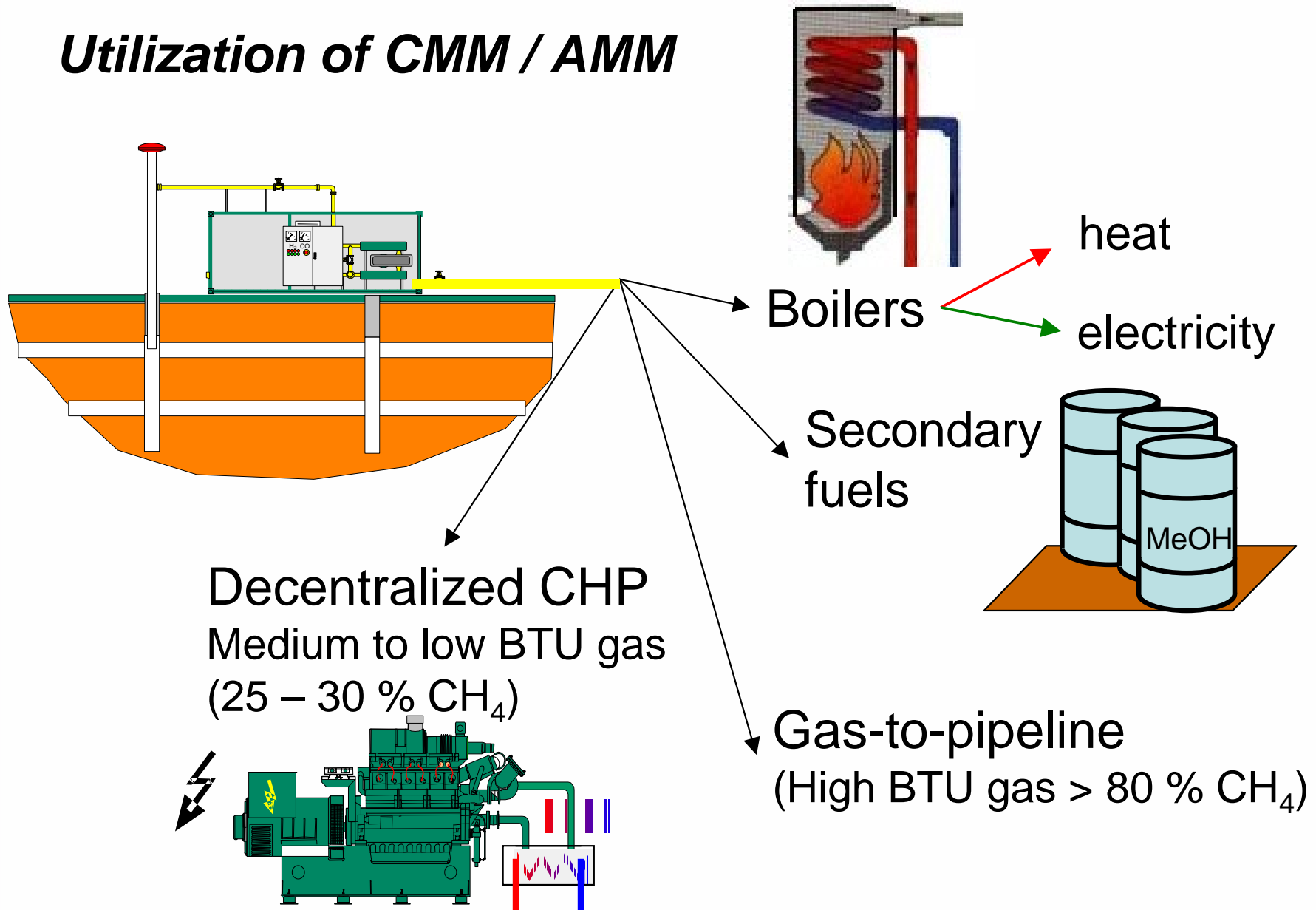
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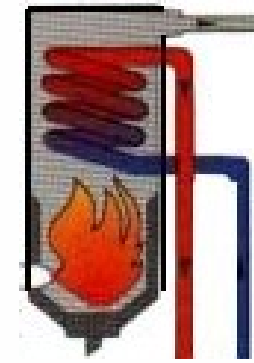
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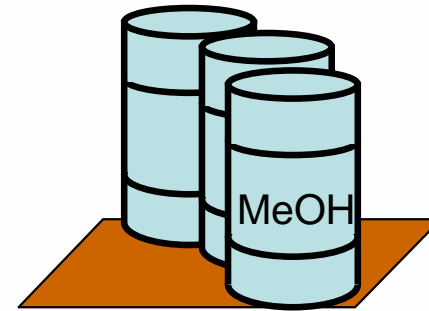
Boilers



Use of coal mine gas for heating

- District heating (Poland, Eastern Europe)
- Internal use within the mining operations (heating/cooling of ventilation air, showers, etc)
- Electricity production via steam process

Secondary fuels



Use of coal mine gas to produce

- methanol
- urea (fertilizer)
- synthesis gas

→ high scales necessary

→ currently not adopted as an common utilization option

Gas to pipeline

- High-grade CBM/CMM (> 96 % CH₄)
direct connected to pipelines
- Sub-quality gas (80 – 96 % CH₄)
has to be prepared by
 - drying
 - nitrogen and carbon dioxide rejection
 - desulphurization
 - filtrationbefore it will be used in pipelines
- feasible economics in relation to the actual
natural gas price

Example



Nitrogen Rejection Plant (NRU) Colorado, West Texas
built through DDC D'Amico Development in early 90s.

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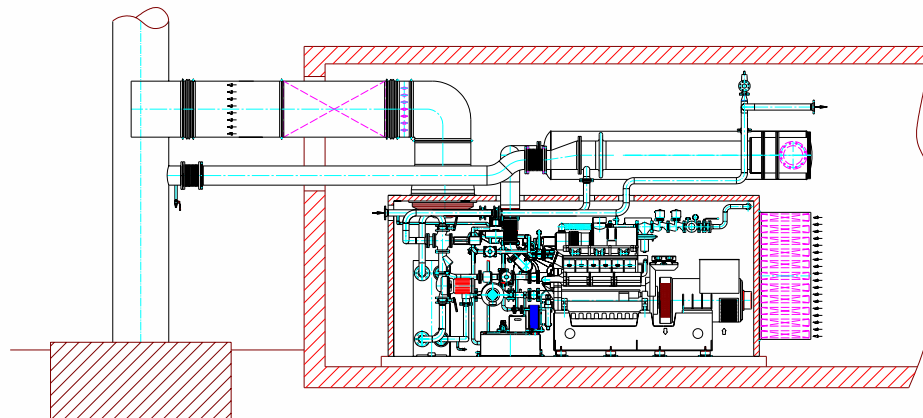
Centralized approach:

Advantages:

- large engine modules → lower specific invest
- centralized O & M

Disadvantages:

- no flexibility → difficult capacity adjustments
- high investment in fixed assets
(buildings, pipeline system)



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Decentralized approach:



Advantage:

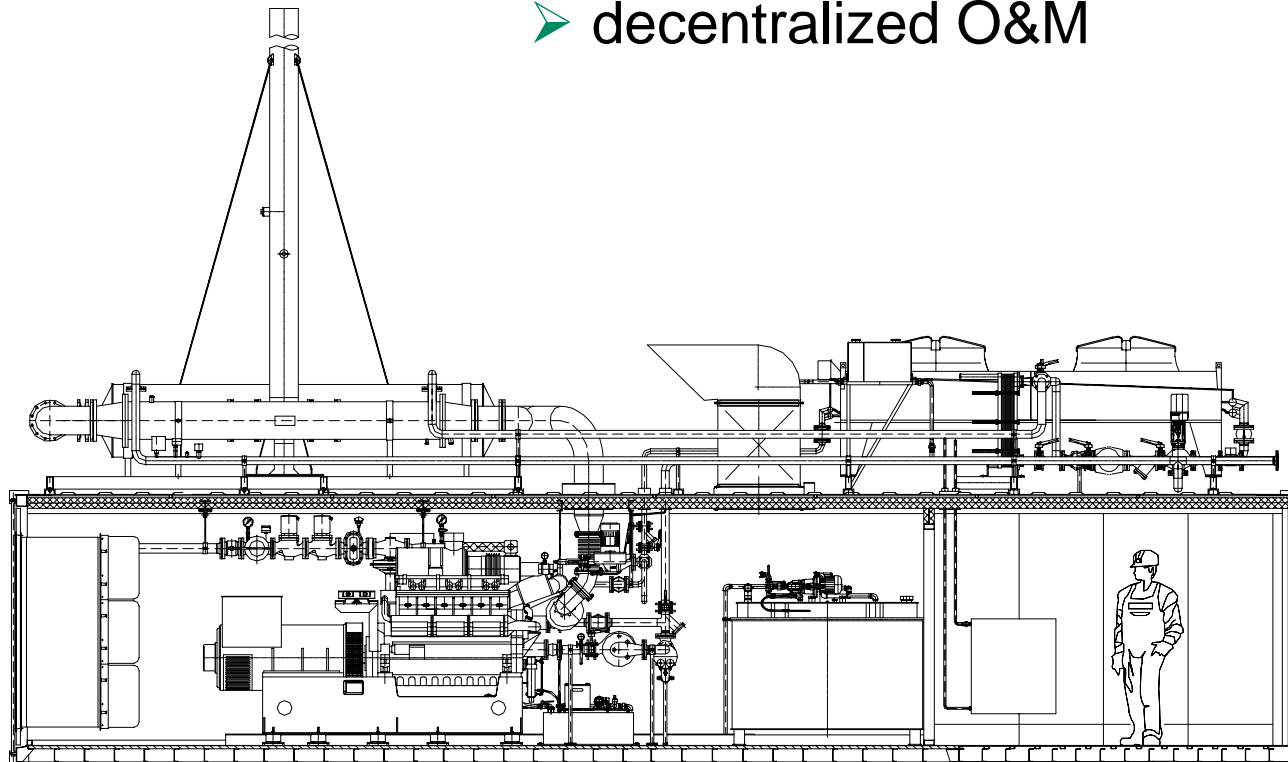
- easy adjustment of the plant capacity due to availability of coal mine gas.
- easy change of locations
- possibility of lease financing
- minimization of
 - investment risks,
 - space requirements,
 - duration of project execution (< 6 Months)

CHP Technology Solution

Decentralized approach:

Disadvantage:

- higher specific costs
- decentralized O&M



Operational experiences

Out of 25 MW installed for CMM

- CMM with a methane content down to 25 % CH₄ can be used
- Oversaturated gas due to utilization of watering pumps
- dust (coal, rock, calcium anhydrite) → higher wear of the equipment

- shorter equipment life

- high costly maintenance efforts

→ gas treatment necessary

- availabilities up to 95 % are achieved

Operational experiences

Out of 85 MW installed for AMM

- availabilities of up to 98 % are achieved.
 - decline of CH₄ concentrations and increase of sucking pressures over the time
 - air ingress and climbing water levels might occur
 - higher risk of gas availability
- portfolio of mobile equipment
- dust; sulfur and water might be a problem on certain locations → higher wear of the equipment
- gas treatment necessary

Examples of Mobil Coal Mine Gas CHP for AMM

project	Kurl 3
location	Lünen, Germany
fuel	coal mine gas
commissioning	2002
el. performance	4.074 kW_{el}
th. performance	- kW_{th}
energy for	appr. 10.000 households/a
emission reductions of	approx. 130.000 t/a CO₂-equivalents



Examples of Mobile Coal Mine Gas CHP Plants for CMM

project	Haus Aden
location	Bochum, Germany
fuel	coal mine gas
commissioning	2003/2004
el. performance	16.296 kW_{el}
energy for	approx. 40.000 households/a
emission reductions of	approx. 520.000 t/a CO₂-equivalents



Economical Aspects

- ownership of the CMM/AMM resource has to be clear
- electricity prices below 4 \$ct. /kWh do not support feasible projects.
- CO₂ credits are a possibility to enhance the economic of projects

Economical Aspects

Governmental support is important

- supported designated nation authority (DNA approval, CO₂ credit)
- preferred access to the grid
- higher electricity prices for electricity to CMM/AMM resources
- easy and fast approvals of projects
- no royalties on CMM / AMM
- dedication to save work environment

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Conclusion

- electricity from CMM/AMM is the most efficient utilization option for low BTU gas
- CMM/AMM is different from natural gas
→ sophisticated gas treatment
- governmental support is needed
- CO₂ credit might be the tool to avoid and utilize methane emissions from coal mining activities and even enhance the safety of coalmines

Thank you for your interest!

***If you have any further question,
please do not hesitate to contact me:***

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