Bio-methanol production at BioMCN

Paul Compagne, COO BioMCN
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Agenda

- Current situation and overview
- ‘bio’ possibilities
- ‘bio’ applications
BioMCN: ‘highlights’

- Founded in October 2006
- BioMCN’s 100% shareholder since mid 2015: OCI
- 2 methanol plants: nameplate capacity, 850kton
- 1 plant (1974) running, 1 plant (1976) idled
- First bio-methanol produced in 2009
- 65 FTE’s
Overview BioMCN site
Existing process

Steam($H_2O$) → Reforming → Synthesis gas

CO + $H_2$ → Methanol/Water ($CH_3OH/H_2O$)

Methanol convertor

$H_2$ Purge → To $H_2$ consumers

Distillation tower

Distillation

Methanol

Water

To Burners

Natural Gas

Flue gases
Demand for biofuels is growing rapidly

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<td>• 10% of the energy value of transportation fuels must consist of biofuel by 2020. Only 7% of the</td>
<td>• Reduce the greenhouse gas emissions caused by the production, transport and use of their</td>
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<td>energy may be crop based biofuels (1st gen). The other 3% must be waste based</td>
<td>fuels by 10% between 2011 and 2020</td>
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<td>• Sustainability of feedstock used to make biofuels</td>
<td>• Cut emissions by a cumulative total of 500 million tonnes of carbon dioxide by 2020</td>
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Promising perspective for bio-based alternatives

**Fossil**
- Natural Gas
- Coal

**Renewable**
- Glycerin and other liquids
- Bio-methane/green gas
- CO2
- Wood/municipal waste gasification

**Synthesis Gas**
\[(H_2 + CO)\]

**Products**
- Fuels
- Polymers
- Resins
- Glues
- Cosmetics
- Pharmaceuticals
Possible green opportunities

- Steam ($H_2O$)
- Green/Natural Gas
- Glycerin
- Green/Natural Gas (fuel)
- Synthesis gas: $CO + H_2$ and green $CO_2$
- 'External' green Synthesis gas and green $CO_2$
- Methanol converter
- Methanol
- Distillation
- Water
- To Burners
- To $H_2$ consumers
- $H_2$ Purge
From glycerol to bio-syngas

Crude glycerol
Landing facilities

Crude glycerol Storage

Glycerol Purification

Salt / waste material
Reformer line 1

MP Steam
HP Steam

MP Super heater
HP Super heater

Pre-heaters Glycerol

Glycerol evaporator

Turbine

Design data:
- Cap. 200kton/year glycerol
Bio-methanol from bio-gas certified process

- Waste digestion plants supply green gas to the national gas grid
- Gas from the grid is used for the production of methanol
- Green gas certificates are sold to BioMCN
- On a mass balance base methanol is certified as bio-methanol

Suppliers of green gas
Waste companies, industrial companies, farmers, ...
From *green* CO2 to bio-methanol

- Planned in June 2017
- Liquid *green* CO2 injection in converter loop
- 20 kton *green* CO2 converted to 15 kton bio-methanol using the access of hydrogen
- Investment: 1.2 million Euro
Market leader in bio-methanol

- Bio-methanol from green gas is a certified process
- BioMCN is the world's largest bio-methanol producer
- Demand for biofuels is growing rapidly due to regulatory requirements
- BioMCN sales developing quickly (2017: 60kton)
- Strong pipeline of green gas as feedstock
- Knowledgeable team
- Certified by Dekra according to ISCC
Bio-methanol sales

- Short and mid term
- Direct Low blending with fossil fuels (gasoline)
- Bio MTBE
- Competition from: bio-ethanol
- Long term: chemicals